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APPENDIX A

Table of Revisions (Filed May 5, 2020)

Evidence Reference	Section Reference	Difference	Description
Exhibit 1-1-5: Application Summary	• **Table 5 - Planned Smart Grid Investments** • **Section 7.2 - Compensation**	*Table 5:* *~~Great-DR Phase 2 (~~MiGen~~)~~* *Section 7.2:* *For more information on Hydro Ottawa's compensation costs, including a comparison of 2021 Test Year compensation costs with Historical and Bridge Year costs for the 2016-2020 period, please see UPDATED ~~Exhibit~~ Attachment 4-1-5(A): Employee Compensation Strategy.*	Revised to reflect changes to MiGen program name. Revised to correct reference to Attachment.
Exhibit 2-1-1: Rate Base Overview	**Section 5.8 - 2024 Test Year vs. 2023 Test Year**	*In ~~2014~~ 2024, the WCA is estimated to increase $7.4M over 2023 due mainly to increases in Power Supply Expenses.*	Revised to correct typo in the original evidence.
Attachment 2-1-1(A): New Administrative Office and Operations Facilities	**Section 3 - Description of Facilities**	*The location of the New Administration and Operations Facilities are indicated on the ~~the~~ map of Hydro Ottawa's service territory in Figure 5 below.*	Revised to correct typo in the original evidence.
Exhibit 2-3-1: Working Capital Requirement	**Section 4 - Calculation of Power**	*There are ~~slight~~ no variances in the annual commodity expense in UPDATED Attachments (A) through (E) and UPDATED Attachment (F)~~ due to rounding differences~~.*	After accounting for 2019 actuals, variances in the annual commodity expenses no longer exist.
Attachments 2-3-1(A)-(E): OEB Appendix 2-Z - 2021-2025 Commodity Expense	**UPDATED Chapter 2 Appendices - 2021-2025 Appendix 2-Z tabs**	The numerical differences cannot be summarized in this table. Please refer to UPDATED Attachments 2-3-1(A)-(E) for details.	Rounding error in Attachments 2-3-1(A)-(E) has been rectified. As a result, there are no longer slight variances in the annual commodity expenses.

Evidence Reference	Section Reference	Difference	Description
Attachment 2-3-1(F): 2021-2025 Cost of Power 2021-2025	**UPDATED Attachment 2-3-1(F): 2021 Cost of Power for 2021 and 2022**	The numerical differences cannot be summarized in this table. Please refer to UPDATED Attachment 2-3-1(F) for details.	Revised the error in the Transmission Network, Transformation, and Line Charge (Hydro One) Rates cells.
Exhibit 2-4-1: Capital Expenditure Summary	**Table 3 - 2021-2025 Summary of Capital Additions**	*TOTAL CAPITAL ADDITIONS ($'000s):* *2021: ~~103,156~~ 99,916* *2022: ~~123,080~~ 120,564* *2023: ~~74,905~~ 78,554* *2024: ~~81,049~~ 81,218* *2025: ~~115,369~~ 115,259* Please refer to the revised Table 3 for further breakdown of revisions to Capital Additions attributed to System Access and System Renewal and Service.	Capital Additions have been revised to correspond with the original Appendix 2-BA submission. Construction in Progress numbers were mistakenly left out of Table 3 in the original submission (but were included in Appendix 2-BA).

Evidence Reference	Section Reference	Difference	Description
Exhibit 3-2-1: Other Revenue Summary	• **Table 1 - Other Revenue Summary** • **Table 6 - Other Income and Deductions**	*Table 1 - Other Revenue Summary ($'000s):* *Other Income and Deductions:* *2016: ~~$3,796~~ $3,796 (immaterial when rounded to thousands)* *2017: ~~$5,230~~ $5,239* *2018: ~~$4,923~~ $5,168* *2019: ~~$1,270~~ $1,508* *2020: ~~$2,186~~ $2,685* *Table 6 - Other Income and Deductions ($'000s):* *Services to Third Parties:* *2017: ~~$1,021~~ $1,030* *2018: ~~$254~~ $500* *2019: ~~$489~~ $728* *Gains and (Losses) on Disposal of Utility Property:* *2020: ~~($301)~~ $198*	The revisions to 2016-2019 and 2021 were made to remove some costs from Rate Base to non-distribution, resulting in an increase in Other Revenue. The revision to 2020 was made to include the offsetting entry to the regulatory asset for the Gains and Losses on Disposal of Fixed Assets Variance Account as described in UPDATED Exhibit 9-1-3: Group 2 Accounts.
Appendix 2-H: Other Operating Revenue	• **Revised Other Income and Deductions for 2016 - 2021 for Accounts 4325 and 4330** • **2019 Actuals column**	The numerical differences cannot be summarized in this table. Please refer to UPDATED Appendix 2-H for details.	The 2016-2019 and 2021 revisions reflect the removal of some costs from Rate Base to non-distribution revenue, increasing Other Revenue. The 2020 revision includes the offsetting entry to the regulatory asset for the Gains and Losses on Disposal of Fixed Assets Variance Accounts, as described in UPDATED Exhibit 9-1-3: Group 2 Accounts.

Evidence Reference	Section Reference	Difference	Description
Exhibit 4-1-4: Operations, Maintenance and Administration Cost Drivers and Program Variance Analysis	**Table 6 - Summary of OEB Fees and CDM Allocation Costs**	*Total OEB Fees and CDM Allocation Costs ($000,000s):* *2019 Bridge Year: ~~$0.7~~ $0.6*	Revised to correct typo in the original evidence.
Exhibit 4-1-5: Workforce Staffing and Compensation	**Section 4 - Compensation and Headcount**	*As a result of prudently managing FTEs and compensation costs, Hydro Ottawa's actual and forecasted annual average increase to total compensation is ~~2.8 %~~ 2.5% from 2016-2021. Total compensation costs are expected to increase on average by ~~2.8%~~ 2.5% per annum, from approximately ~~$67.4M~~ $68.4M in 2016 to $77.6M in 2021.*	Revised due to a systemic error in spreadsheet templates which affected 2016-2018 actual FTE, Temporary Equivalent and Compensation amounts.
Attachment 4-1-5(A): Employee Compensation Strategy	• **Table 4 - Number of Full Time Permanent Equivalents** • **Table 5 - Number of Temporary Equivalents (Full-Time or Part-Time)** • **Table 6 - Number of Full-Time Equivalents (Permanent and Temporary)** • **Table 7 - Total Compensation**	The numerical difference cannot be summarized in this table. Please refer to UPDATED Attachment 4-1-5(A) for details.	Revised due to a systemic error in spreadsheet templates which affected 2016-2018 actual FTE, Temporary Equivalent and Compensation amounts.

Evidence Reference	Section Reference	Difference	Description
Attachment 4-1-5(C): OEB Appendix 2-K - Employee Costs and Attachment 4-1-3(C): OEB Appendix 2-L - Recoverable OM&A Cost per Customer and per Full Time Equivalent	**Appendix 2-K:** **2016 Actuals column** **2017 Actuals column** **2018 Actuals column** **Appendix 2-L:** **2016, 2017 and 2018 Actual Number of FTEs**	*Appendix 2-K:* The numerical difference cannot be summarized in this table. Please refer to the UPDATED Attachment 4-1-5(C) for details. *Appendix 2-L:* *Number of FTEs:* *2016 Actual: ~~606~~ 611* *2017 Actual: ~~603~~ 612* *2018 Actual: ~~599~~ 605*	Revised due to a systemic error in spreadsheet templates which affected 2016-2018 actual FTE, Temporary Equivalent and Compensation amounts.
Exhibit 4-2-4: Regulatory Costs	**Page 1**	*The variance account was to be utilized until a ~~utiilty's~~ utility's rates were next rebased/reset.*	Revised to correct typo in original sentence.
Exhibit 4-4-1: Payments in Lieu of Taxes	**Footnote 1**	*As a guide for interpreting the information presented in this table, please see the explanation of the applicability of the Federal Apprenticeship Job Creation Tax Credit provided in section 7 on page ~~4~~ 5 of this Schedule.*	Revised to reflect new page number.
Exhibit 4-5-2 LRAM Variance Account	● **Table 2 - > 50 kW Commercial Allocation**	The numerical differences cannot be summarized in this table. Please refer to UPDATED Exhibit 4-5-2: LRAM Variance Account for details.	Table 2 changes are a result of changing the allocation to the relevant commercial KW. It was noticed that the original submission had used the estimated Non-RPP KW.
Exhibit 6-1-1: Calculation of Revenue Deficiency or Sufficiency	**Table 5 - 2021 - 2025 Revenue Deficiency Amounts & Drivers**	*2020 Bridge - Revenue Offsets* *~~$10,268~~ $10,767*	Revised to correct items detailed in revision above for Exhibit 3-2-1: Other Revenue Table 1
Exhibit 6-1-1: Calculation of Revenue Deficiency or Sufficiency	**Section 2 - Calculation of Deficiency or Sufficiency**	*The revenue deficiency/sufficiency for 2021-2025 was calculated using the following inputs:* ● *2020 ~~proposed~~ approved rates;*	Revised to correct typo in original evidence.

Evidence Reference	Section Reference	Difference	Description
Exhibit 8-11-1	**Table 4 - Revenue per Rate Class and Reconciliation to 2024 Revenue Requirement**	*Average # Customers/Connection - Standby Power: ~~2~~ 3*	Revised to correct typo in original evidence.
Exhibit 9-1-4: Account 1592 PILS and Tax Variance	**Table 2 - Impact of Prior CCA Rules vs. Accelerated CCA Rules on New Facilities**	*New Facilities Deferral Account Above $66M:* *2019 Difference in CCA:* *~~$(459,593)~~ $(1,459,593)*	Revised to correct typo in original evidence.
Exhibit 9-3-1: Disposition of Deferral and Variance Accounts	**● Table 1 - Proposed DVA Dispositions** **● Table 2 - Rate Riders for Group 2 Accounts (2021)** **● Table 3 - Rate Riders for Group 2 Accounts (2022)**	*Table 1:* *USofA number:* *~~1548~~ 1518 (Retail Cost Variance - Retail)* *Tables 2 and 3:* *Residential Billing Determinant: ~~$/kWh~~ $*	Revised to correct typos in original evidence.

GLOSSARY

“4GIR” - 4th Generation Incentive Regulation

“AC” - Audit Committee

“ACA” - Asset Condition Assessment

“**AFUDC”** - Allowance for Funds Used During Construction

“ACGF” - Average Customer Growth Factor

“ADMS” - Advanced Distribution Management System

“AESP” - Association of Energy Services Professionals

“AFT” - Affordability Fund Trust

“AGM” - Annual General Meeting

“AI” - Artificial Intelligence

“ALAs” - Alternate Locate Agreements

“Alectra” - Alectra Utilities Inc.

“AMC” - Asset Management Council

“AMI” - Advanced Metering Infrastructure

“AMP” - Asset Management Plans

“AMRP” - Asset Management Risk Procedure

“APB” - Activity and Program Based Benchmarking

“APH” - Accounting Procedures Handbook

“API” - Application Programming Interface

“Approved Settlement Agreement” - Hydro Ottawa 2016-2020 Custom Incentive Rate-Setting Approved Settlement Proposal, EB-2015-0004 (December 7, 2015)

“APS” - Agreement of Purchase and Sale

“APS” - Achievable Potential Study

“ARC” - Affiliate Relationships Code for Electricity Transmitters and Distributors

“ASTM” - American Society for Testing and Materials

“AWE” - Average Weekly Earnings

“BAS” - Building Automation System

“BCUC” - British Columbia Utilities Commission

“BES” - Battery Energy Storage

“BLS” - Bureau of Labor Statistics

“BOMA” - Building Owners and Managers Association

“BPA” - Business Process Automation

“bps” - Basis Points

“BMO” - Bank of Montreal

“B&V” - Black & Veatch Management Consulting, LCC

“C&I Rate Design” - Commercial and Industrial Rate Design

“CA Study” - Cost Allocation Study

“CAGR” - Compound Annual Growth Rate

“CAIDI” - Customer Average Interruption Duration Index

“CAPEX” - Capital Expenditures

“CBR” - Capacity Based Recovery

“CC&B” - Customer Care & Billing

“CCA” - Capital Cost Allowance

“CCAP” - Climate Change Action Plan

“CCAP-WG” - Climate Change Action Plan Working Group

“CCEI” - Customer Centric Engagement Index

“CCO” - Chief Customer Officer

“CCRA” - Connection and Cost Recovery Agreement

“CDM” - Conservation and Demand Management

“CDM Code” - Conservation and Demand Management Code for Electricity Distributors

“CDP” - Community Design Plans

“CEA” - Canadian Electricity Association

“CEATI” - Centre for Energy Advancement through Technological Innovation

“CEDO” - Chief Electricity Distribution Officer

“CEO” - Chief Executive Officer

“CEPr” - Customer Experience Performance rating

“CFF” - Conservation First Framework

“CFO” - Chief Financial Officer

“CGAPP” - Canadian Generally Accepted Accounting Principles

“CHEO” - Children’s Hospital of Eastern Ontario

“CGU” - Cash Generating Unit

“CHLP” - Chaudiere Hydro L.P.

“CHLP North” - Chaudiere Hydro L.P. North

“CHP” - Combined Heat and Power

“CHPP” - Chaudiere Hydro Pension Plan

"CHRO" - Chief Human Resource Officer

"CIA" - Connection Impact Assessment

"CIAC" - Contributions in Aid of Construction

"CIR" - Custom Incentive Rate-Setting

"CIS" - Customer Information System

"CITO" - Chief Information and Technology Officer

"City" - City of Ottawa

"Clearspring" - Clearspring Energy Advisors

"CLD" - Coalition of Large Distributors

"CMS" - Content Management System

"CO_2e" - Carbon Dioxide Equivalent

"Corporation" - Hydro Ottawa Holding Inc.

"COS" - Conditions of Service

"COS" - Cost of Service

"COSWG" - Conditions of Service Working Group

"COTS" - Commercial off the Shelf

"CP&G" - Corporate Planning & Governance

"CPEF" - Custom Price Escalation Factor

"CPP" - Canadian Pension Plan

"CPS" - Current Power Service

"CRM" - Customer Relationship Management

"CRVA" - Climate Risk and Vulnerability Assessment

“CSA” - Canadian Standards Association

“CSI” - Customer Service and Information

“CSR” - Customer Service Representative

“CSRM” - Customer-Specific Reliability Measures

“Custom IR” - Custom Incentive Rate-Setting

“CVPM” - Customer Value Performance Metrics

“CVR” - Conservation Voltage Reduction

“CVOR” - Commercial Vehicle Operator’s Registration

“CWIP” - Construction-Work-in-Progress

“CWPI” - Chaudiere Water Power Inc.

“DA” - Distribution Automation

“Dashboard” - Electricity Utility Performance Dashboard

“DB” - Dun & Bradstreet Database

“DBRS” - Dominion Bond Rating Service Inc.

“DBRT” - Design, Build, Run, Transfer

“DC” - Direct Current

“DCFC” - Direct Current Fast Charging

“DCSR” - Debt-Coverage Service Ratio

“DDI” - Due Diligence Inspections

“DER” - Distributed Energy Resource

“DERM” - Distributed Energy Resource Management

“DGA” - Dissolved Gas Analysis

“DMS” - Distribution Management System

“DS” - Distribution Station

“DSC” - Distribution System Code

“DSP” - Distribution System Plan

“DSO” - Distribution System Operator

“DVA” - Deferral and Variance Account

“EA_MS” - EnergyAxis Management System

“EAM” - Efficiency Adjustment Mechanism

“East Campus” - Eastern Operations and Administrative Office Building

“EC” - Eastern Campus

“EC-1” - Eastern Campus Administrative Office Building

“EC-2” - Eastern Campus Operations Centre

“EC-3” - Eastern Campus Paper Insulated Lead Covered Cable Storage Facility

“ECA” - Electrical Contractors Association

“ECCC” - Environment and Climate Change Canada

“ECL” - Expected Credit Losses

“ECP” - Enterprise Communications Platform

“EDA” - Electricity Distributors Association

“EDC” - Electric Distribution Company

“EDR” - Electricity Distribution Rate

“**EDDVAR”** - Electricity Distributors’ Deferral and Variance Account Review

“EEI” - Edison Electric Institute

“EF” - Enhanced Fujita

“EFA” - Emergency Financial Assistance

“EFT” - Electronic Funds Transfer

“Elenchus” - Elenchus Research Associates

“EMT” - Executive Management Team

“ENDM” - Ministry of Energy, Northern Development and Mines

“Energy Ottawa” - Energy Ottawa Inc.

“Envari” - Envari Holding Inc.

“EOI” - Energy Ottawa Inc.

“ERF” - Energy Resource Facility

“ERM” - Enterprise Risk Management

“ERMS” - Enterprise Risk Management System

“ERP” - Enterprise Resource Planning

“ESA” - Electrical Safety Authority

“ESB” - Enterprise Service Bus

“ESM” - Earnings Sharing Mechanism

“ETR” - Estimated Time of Restoration

“EUF” - End-Use Forecasting

“EUI” - Energy Use Intensity

“EV” - Electric Vehicle

“EWRB” - Energy and Water Reporting and Benchmarking

“FAN” - Field Area Network

"FAWG" - Financial Assistance Working Group

"FCI" - Fault Circuit Indicator

"FCR" - First Contact Resolution

"FDD" - Final Domestic Demand

"FEMI" - Feeders Experiencing Multiple Interruptions

"FERC" - Federal Energy Regulatory Commision

"FHP" - Fair Hydro Plan

"FIT" - Feed in Tariff

"FLISR" - Fault Location, Isolation and Service Restoration

"FortisBC" - FortisBC Inc.

"FR/AR" - Flame Resistant/Arc Rated

"FRP" - Facilities Renewal Program

"FSA" - Forward Sortation Area GA

"FTE" - Full-Time Equivalent

"FTTH" - Fiber-To-The-Home

"FVLCD" - Fair Value Less Costs of Disposal

"FVTPL" - Fair Value Through Profit and Loss

"GA" - Global Adjustment

"GAAP" - Generally Accepted Accounting Principles

"GEA" - Green Energy Act

"GDP-IPI" - Implicit Price Index for Gross Domestic Product

"GHG" - Greenhouse Gas

“GIS” - Geographic Information System

“GMRC” - Governance and Management Resources Committee

“GOHBA” - Greater Ottawa Home Builder Association

“GPS” - Global Positioning System

“GREAT DR” - Grid Edge Active Transactional Demand Response

“GTAP” - Grid Transformation Action Plan

“GWh” - Gigawatt-Hour

“HACS” - Hot Aisle Containment System

“Handbook” - Handbook for Utility Rate Applications

“HAP” - Home Assistance Program

“HCI” - Hydroelectric Contract Initiative

“HCM” - Human Capital Management

“HERs” - Home Energy Reports

“HES” - Head End Software

“HESOP” - Hydroelectric Standard Offer Program

“**HLR”** - Hourly labour rate

“HOEP” - Hourly Ontario Energy Price

“Holding Company” - Hydro Ottawa Holding Inc.

“HONI” - Hydro One Networks Inc.

“HR” - High Rise

“HR” - Human Resources

“HST” - Harmonized Sales Tax

“HVDS” - High Voltage Distribution Station

“Hydro Ottawa” - Hydro Ottawa Limited

“IAS” - International Accounting Standard

“IaaS” - Infrastructure-as-a-Service

“IASB” - International Accounting Standards Board

“IBEW” - International Brotherhood of Electrical Workers

“ICC” - Incident Command Centre

“ICD” - Institute of Corporate Directors

“ICI” - Industrial Conservation Initiative

“ICSRS” - Information Classification & Scheme and Retention Schedule

“IDAMS” - International Distribution Asset Management Study

“IDBC” - International Distribution Benchmark Consortium

“IDF” - Intensity-Duration-Frequency

“IEEE” - Institute of Electrical and Electronics Engineers

“IESNA” - Illuminating Engineering Society of North America

“IESO” - Independent Electricity System Operator

“IFMA” - International Facility Management Association

“IFRIC” - International Financial Reporting Interpretations Committee

“IFRS” - International Financial Reporting Standards

“IPCC” - Intergovernmental Panel on Climate Change

“IM” - Information Management

“Innovative” - Innovative Research Group

“IoT” - Internet of Things

“IR” - Infra-Red

“IRC” - Investment Review Committee

“IRM” - Incentive Regulation Mechanism

“IRRP” - Integrated Regional Resource Plan

“ISO” - International Organization for Standardization

“IT” - Information Technology

“ITA” - Income Tax Act

“ITIC” - Information Technology Industry Council

“ITOMS” - International Transmission Operations and Maintenance Study

“IVR” - Interactive Voice Response

“JDE” - J.D. Edwards

“JHSC” - Joint Health and Safety Committee

“KAM” - Key Account Management

“KPI” - Key Performance Indicators

“kV” - Kilovolt

“kW” - Kilowatt

“kWh” - Kilowatt-hours

“LAC” - Locate Alliance Consortium

“LAN” - Local Area Network

“LAP” - Local Achievable Study

“LC” - Large Commercial

“LDC” - Local Distribution Company

“LEAP” - Low-Income Energy Assistance Program

“LEED” - Leadership in Energy and Environmental Design

“LLR” - Landlord Reversion

“LMI” - Labour Market Intelligence

“LoS” - Loss of Supply

“LPSS” - Lodestar Profiling and Settlement Software

“LR” - Low Rise

“LRAM” - Lost Revenue Adjustment Mechanism

“LRAMVA” - Lost Revenue Adjustment Mechanism Variance Account

“LRT” - Light Rail Transit

“LTC” - Leave to Construct

“LTEP” - Long-Term Energy Plan

“LTLT” - Long Term Load Transfer

“LTR” - Limited Time Rating

“LV” - Low Voltage

“MAL” - IESO Prescriptive Measures and Assumptions List

“MED” - Major Event Day

“MD&A” - Management Discussion and Analysis

“MDM/R” - Meter Data Management/Repository

“MDS” - Meter Data Services

“MECP” - Ministry of the Environment, Conservation and Parks

"Mercer" - Mercer Canada

"MHL" - MyHydroLink

"MicroFIT" - Micro Feed in Tariff

"MIFRS" - Modified International Financial Reporting Standards

"MILP" - Mixed Integer Linear Programming

"MIMO" - Move-in/Move-out

"MOE" - Ministry of Energy

"MOL" - Ministry of Labour

"MOM" - Message Oriented Middleware

"MPAC" - Municipal Property Assessment Corporation

"MPSA" - Master Purchasing Service Agreement

"MTS" - Municipal Transformer Station

"MURB" - Multi-Unit Residential Building

"MUSH" - Municipalities, Universities, Schools and Hospitals

"MW" - Megawatt

"MWM" - Mobile Workforce Management

"MWh" - Megawatt-hour

"MyAccount" - Hydro Ottawa's web-based customer service portal

"NAICS" - North American Industry Classification System

"NAMAG" - North Atlantic Mutual Assistance Group

"NC" - Nominating Committee

"NEER" - New Experimental Experience Rating

"New Facilities" - Hydro Ottawa's new South Operations and Warehouse facility, Eastern Operations and Administrative Campus facility, and related land

"NIST" - National Institute of Standards and Technology

"NOC" - National Occupational Classification

"NPS" - Net Promoter Score

"NRC" - National Research Council

"NRCan" - Natural Resources Canada

"NYISO" - New York Independent System Operator

"OCI" - Other Comprehensive Income

"OCM" - Operational Migration Committee

"O&M" - Operations and Maintenance

"ODGA" - Online Dissolved Gas Analysis

"ODS" - Operational Data Store

"OEA" - Ontario Energy Association

"OEB" - Ontario Energy Board

"OESP" - Ontario Electricity Support Program

"OH" - Overhead

"OH&S" - Occupational Health, Safety and Environment

"OHSAS" - Occupational Health and Safety Assessment Series

"OHSE" - Occupational Health, Safety and Environment

"OM&A" - Operations, Maintenance and Administration

"OMERS" - Ontario Municipal Employees Retirement System

“OMS” - Outage Management System

“OOTB” - Out-of-the-Box

“OPA” - Ontario Power Authority

“OPEB” - Other Post-Employment Benefits

“OPS” - Operations

“ORCGA” - Ontario Regional Common Ground Alliance

“ORTAC” - Ontario Resource and Transmission Assessment Criteria

“OT” - Operational Technology

“PBR” - Performance Based Regulation

“PCBs” - Polychlorinated Biphenyls

“PCI” - Price Cap Index

“PCT” - Power Cable Technician

“PEG” - Pacific Economics Group

“PHEV” - Plug-in Hybrid Electric Vehicle

“PIEVC” - Public Infrastructure Engineering Vulnerability Committee

“PILC” - Paper Insulated Lead Cable

“PILS” - Payments in Lieu of Taxes

“PLM” - Power Line Maintainer

“PLS” - Pole Line Systems

“PLT” - Power Line Technician

“PMBOK” - Project Management Body of Knowledge

“PMI” - Project Management Institute

“PMO” - Program Management Office

“PPA” - Power Purchase Agreement

“PP&E” - Property, Plant and Equipment

“PPP” - Purchasing Power Parity

“PSE” - Power System Engineering, Inc.

“PSPC” - Public Services and Procurement Canada

“PSUI-CDM” - Process and Systems Upgrade Initiative

“RASCI” - Responsible, Accountable, Supporting, Consulted, and Informed

“RAP” - Redesign Action Plan

“RARA” - Regulatory Asset Refund Account

“RBD” - Radial Boom Derrick

“RCP” - Representative Concentration Pathway

“RCVA” - Retail Cost Variance Account

“REG” - Renewable Energy Generation

“Régie” - Régie de l’énergie

“RESOP” - Renewable Energy Standard Offer Program

“RFI” - Request for Information

“RFP” - Request for Proposal

“RFPQ” - Request for Pre-Qualification

“RFQ” - Request for Qualifications / Request for Quotations

“RFSA” - Request for Supply Arrangements

“RFSO” - Request for Standing Offers

“RIP” - Regional Infrastructure Plan

“RLRA” - Regulatory Liability Refund Account

“ROE” - Return on Equity

“ROW” - Right-of-Way

“RPA” - Robotic Process Automation

“RPP” - Regulated Price Plan

“RRF” - Renewed Regulatory Framework for Electricity Distributors

“RRR” - Reporting and Record Keeping Requirements

“RRRP” - Rural or Remote Electricity Rate Protection

“RRWF” - Revenue Requirement Work Form

“RSCs” - Retail Service Charges

“RSI” - Risk Sciences International

“RMS” - Root Mean Square

“RSVA” - Retail Settlement Variance Account

“RTU” - Remote Terminal Unit

“RTSR” - Retail Transmission Service Rate

“SaaS” - Software-as-a-Service

“SAIDI” - System Average Interruption Duration Index

“SAIFI” - System Average Interruption Frequency Index

“SAMP” - Strategic Asset Management Plan

“SARFI” - System Average Root Mean Square Variation Frequency Index

“SAN” - Storage Area Network

“SC” - South Campus

“SC” - Service Charge

“SC-1” - Southern Campus Administration & Operations Building

“SCADA” - Supervisory Control and Data Acquisition

“SHEU” - Survey of Household Energy

“SCIEU” - Survey of Commercial and Institutional Energy Use

“SD” - Standard Deviation

“SDHI” - Short Duration-High Intensity

“SE” - Standard Error

“SESC” - Smart Energy Steering Committee

“SF6” - Sulfur Hexafluoride

“Scorecard” - Electricity Distributor Scorecard

“SIA” - System Impact Assessment

“SIOC” - Strategic Initiatives Oversight Committee

“SIP” - Session Initiation Protocol

“S/L” - Street Lights

“SLA” - Service Level Agreement

“SMC” - Smart Metering Charge

“SME” - Smart Metering Entity

“SOA” - System of Accounts

“South Campus” - Southern Operations & Warehouse

“S&P” - Standard & Poor’s

“SPIA” - Sperry-Piltz Ice Accumulation

“SQR” - Service Quality Requirement

“SR&ED” - Scientific Research and Experimental Development

“SSC” - Specific Service Charge

“SSO” - Single Sign-On

“SSS Charge” - Standard Supply Service Administrative Charge

“Stantec” - Stantec Consulting Ltd.

“SUB” - Substations

“TDA” - Training Delivery Agent

“TFP” - Total Factor Productivity

“**THESL”** - Toronto Hydro Electric System Limited

“TIM” - Testing, Inspection & Maintenance

“TOC” - Transformer Ownership Credit

“TOD” - Transit Oriented Developments

“TOU” - Time of Use

“TS” - Transmission Station

“TWA” - Triangulated Weighted Average

“UCC” - Undepreciated Capital Cost

“UG” - Underground

“UI/UX” - User Interface/User Experience

“ULS” - Underground Line System

“UMS” - UMS Group

"UP" - UtilityPULSE

"USL" - Unmetered Scattered Load

"USofA" - Uniform System of Accounts

"UTRs" - Uniform Transmission Rates

"UWO" - University of Western Ontario

"verTerra" - verTerra Corp.

"VIU" - Value in Use

"VOC" - Voice of the Customer

"Vol. R" - Volumetric Rate

"WACC" - Weighted Average Cost of Capital

"WCA" - Working Capital Allowance

"WAHSP" - Weighted Average Hourly Spot Price

"WMS" - Wholesale Market Service

"WSIB" - Workplace Safety and Insurance Board

"XFMR" - Transformer

"XLPE" - Cross Linked Polyethylene

"Yearbook" - Electricity Distributor Yearbook

"YMPE" - Yearly Maximum Pensionable Earnings

2019 Cost of Service Checklist

Hydro Ottawa Limited

EB-2019-0261

Filing Requirement Page # Reference

Date: ORIGINAL

Filing Requirement Page # Reference		Yes/No/N/A	Evidence Reference, Notes
GENERAL REQUIREMENTS			
Ch 1, Pg. 2	Certification by a senior officer that the evidence filed is accurate, consistent and complete	Yes	Attachment 1-1-4(B)
Ch 1, Pg. 3	Confidential Information - Practice Direction has been followed	N/A	
Ch 2, Pg. 1	Statement identifying all deviations from Filing Requirements	N/A	
2	Chapter 2 appendices in live Microsoft Excel format; PDF and Excel copy of current tariff sheet	Yes	Hydro Ottawa confirms that the Chapter 2 appendices are provided in live Microsoft Excel format, and that PDF and Excel copies of the tariff sheets are included
3	If applicable, late applications filed after the commencement of the rate year for which the application is intended to set rates is converted to the following rate year.	N/A	
3	Aligning rate year with fiscal year - request for proposed alignment	N/A	
5	Text searchable and bookmarked PDF documents	Yes	Confirmed
5	Links within Excel models not broken and models names so that they can be identified (e.g. RRWF instead of Attachment A)	Yes	Confirmed
5	Materiality threshold; additional details beyond the threshold if necessary	Yes	Exhibit 1-1-5
16	Proposal for disposition of any balances in existing DVAs for renewable generation and smart grid development, if applicable	N/A	
6	State accounting standard(s) used in historical, bridge and test years. Provide a summary of changes to its accounting policies made since the applicant's last cost of service filing. Identify all material changes or confirm no material changes in the adoption of IFRS. Appendix 2-Y	Yes	Exhibit 1-1-4; Exhibit 1-1-5
RESS Guideline	Two hardcopies of application sent to OEB the same day as electronic filing (p10 of RESS Guideline)	Yes	
EXHIBIT 1 - ADMINISTRATIVE DOCUMENTS			
Table of Contents			
6	Table of Contents listing major sections and subsections of the application. Electronic version of application appropriately bookmarked to provide direct access to each section	Yes	Exhibit 1-1-1
Executive Summary			
6	Summary identifying key elements of the proposals and the Business Plan underpinning application, as guided by the Rate Handbook including plain language information about its goals	Yes	Exxhibit 1-1-8; Exhibit 1-1-9
Administration			
6	Brief but complete summary of the application that will be posted as a stand-alone document on the OEB's website for review by the general public and be made available to customers of the applicant	Yes	Exhibit 1-1-7
6 & 7	Primary contact information (name, address, phone, fax, email)	Yes	Exhibit 1-1-4
7	Identification of legal (or other) representation	Yes	Exhibit 1-1-4
7	Applicant's internet address for viewing of application and any social media accounts used by the applicant to communicate with customers	Yes	Exhibit 1-1-4
7	Statement identifying customers materially affected by the application including any change to any rate or charge and specific statement of what individual customer or customer groups would be affected by the proposed change	Yes	Exhibit 1-1-4; Exhibit 1-1-5
7	Statement identifying where notice should be published and why	Yes	Exhibit 1-1-4
7	Bill impacts - distribution only impacts for 750 kWh residential and 2000 kWh GS<50 (sub-total A of Tariff Schedule and Bill Impact Spreadsheet Model) to be used for notice; proposed bill impacts based on alternative consumption profiles and customer groups as appropriate given consumption patterns of a distributors customers	Yes	Exhibit 1-1-4
7	Form of hearing requested and why	Yes	Exhibit 1-1-4
7	Requested effective date	Yes	Exhibit 1-1-4
7	Statement identifying and describing any changes to methodologies used vs previous applications	Yes	Exhibit 1-1-4
8	Identification of OEB directions from any previous OEB Decisions and/or Orders. The applicant must clearly indicate how these are being addressed in the current application (e.g., filing of a study as directed in a previous decision)	Yes	Exhibit 1-1-4
8	Reference to Conditions of Service - LDC does not need to file Conditions of Service, but must provide reference to website and confirm version is current; identify if there are changes to Conditions of Service (a) since last CoS application or (b) as a result of the current application. Confirmation that there are no rates and charges linked in the Conditions of Service that are not in the distributor's Tariff of Rates and Charges must be provided	Yes	Exhibit 1-1-4
8	Description of the corporate and utility organizational structure, showing the main units and executive and senior management positions within the utility. Include a corporate entities relationship chart, showing the extent to which the parent company is represented on the utility company's Board of Directors and a description of the reporting relationships between utility and parent company management. Also include any planned changes in corporate or operational structure, including any changes in legal organization and control	Yes	Exhibit 1-1-4; Exhibit 1-4-1
8	List of approvals requested (and relevant section of legislation), including accounting orders - a PDF copy of Appendix 2-A should be provided in this section	Yes	Exhibit 1-1-4
Addendum, Pages 2-4	Status update on implementation of new accounting guidance (related to Accounts 1588 and 1589 - Feb 21, 2019), a review of historical balances, results of the review, and any adjustments made to account balances; for any adjustments made - include the reason, how it was quantified and the journal entried to adjust the balances	Yes	Exhibit 1-1-4; Exhibit 9-1-1
Distribution System Overview			
8	Description of Service Area (including map, communities served)	Yes	Exhibit 1-1-6; Attachment 1-1-6(A)
8 & 9	Description of whether the distributor is a host distributor and/or embedded distributor. Identification of embedded and/or host distributors; if partially embedded provide %load from host distributor. If the distributor is a host, the applicant should identify whether there is a separate Embedded Distributor customer class or if any embedded distributors are included in other customer classes such as GS > 50 kW	Yes	Exhibit 1-1-6
9	Statement as to whether or not the distributor has had any transmission or high voltage assets deemed by the OEB as distribution assets and whether or not there are any such assets the distributor is seeking approval for in this application	Yes	Exhibit 1-1-6
Application Summary			
At a minimum, the items below must be provided. Applicants must also identify all proposed changes that will have a material impact on customers.			
9	Revenue Requirement - service RR, increase/decrease ($ and %) from change from previously approved and main drivers	Yes	Exhibit 1-1-5
9	Budgeting and Accounting Assumptions - economic overview and identification of accounting standard used for test year and brief explanation of impacts arising from any change in standards	Yes	Exhibit 1-1-5
9	Load Forecast Summary - load and customer growth, % change in kWh/kW and customer numbers, description of forecasting method(s) used for customer/connection and consumption/demand	Yes	Exhibit 1-1-5
9 & 10	Rate Base and DSP - major drivers of DSP, rate base for test year, change in rate base from last approved ($ and %), capital expenditures requested for the test year, change in capital expenditures from last approved ($ and %), summary of costs requested for renewable energy connections/expansions, smart grid, and regional planning initiatives, any O.Reg 339/09 planned recovery	Yes	Exhibit 1-1-5

10	OM&A Expense - OM&A for test year and change from last approved ($ and %), summary of drivers, inflation assumed, total compensation for test year and change from last approved ($ and %).	Yes	Exhibit 1-1-5
10	Cost of Capital - summary table showing proposed capital structure and cost of capital parameters used in WACC. Statement regarding use of OEB's cost of capital parameters; summary of any deviations	Yes	Exhibit 1-1-5
10	Cost Allocation & Rate Design - summary of any deviations from OEB methodologies, significant changes proposed to revenue-to-cost ratios and fixed/variable splits and summary of proposed mitigation plans	Yes	Exhibit 1-1-5
10	Deferral and Variance Accounts - total disposition (RPP and non-RPP), disposition period, new accounts requested	Yes	Exhibit 1-1-5
10	Bill Impacts - total impacts ($ and %) for all classes for typical customers	Yes	Exhibit 1-1-5
Customer Engagement			
10	Discussion on how customers were informed of the proposals being considered for inclusion in the application and the value of those proposals to customers i.e. costs, benefits, and the impact on rates	Yes	Exhibit 1-2-2
10	Discussion of any feedback provided by customers and how the feedback shaped the final application	Yes	Exhibit 1-1-7; Exhibit 1-1-8; Exhibit 1-1-9; Exhibit 1-2-2; Exhibit 2-4-3
11	Reference to any other communication sent to customers about the application i.e. bill inserts, town hall meetings or other forms of out reach and the feedback received from customers through these engagement activities	Yes	Exhibit 1-2-2
11	Complete Appendix 2-AC Customer Engagement Activities Summary - explicit identification of the outcomes of customer engagement in terms of the impacts on the distributor's plans, and how that information has shaped the application	Yes	Attachment 1-2-1(A)
11	All responses to matters raised in letters of comment filed with the OEB	N/A	
11	Impact of customer engagement activities on the development of the capital plan are to be filed as part of the capital plan requirements in Chapter 5	Yes	Exhibit 2-4-3
Performance Measurement			
12	Discussion of performance for each of the distributor's scorecard measures over the last five years; drivers for its performance, plans for continuous improvement, identify performance improvement targets, forecast of efficiency assessment using the PEG forecasting model for the test year, discussion on how the results obtained from the PEG model has informed the business plan and application	Yes	Exhibit 1-1-11; Exhibit 1-1-12; Attachment 1-1-12 (C), (D), (E)
Financial Information			
12	Non-consolidated Audited Financial Statements for 2 most recent years (i.e. 3 years of historical actuals)	Yes	Exhibit 1-3-1; Attachment 1-3-1(A), (B)
12	Detailed reconciliation of AFS with regulatory financial results filed in the application, with identification of any deviations that are being proposed	Yes	Exhibit 1-3-2
13	Annual Report and MD&A for most recent year of distributor and parent company, if applicable	Yes	Exhibit 1-3-3; Attachment 1-3-3(A), (B), (C)
13	Rating Agency Reports, if available; Prospectuses, etc. for recent and planned public issuances	Yes	Exhibit 1-3-4; Exhibit 1-3-5
13	Any change in tax status	N/A	No change in tax status
13	Existing accounting orders and departures from the accounting orders and USoA	Yes	Exhibit 1-3-6
13	Accounting Standards used for financial statements and when adopted	Yes	Exhibit 1-3-7; Exhibit 1-3-10
13	Confirmation that accounting treatment of any non-utility business has segregated activities from rate regulated activities	Yes	Exhibit 1-3-8; Exhibit 1-3-9
Distributor Consolidation			
13	If a distributor has acquired or amalgamated with another distributor, identify any incentives that formed part of the acquisition or amalgamation transaction if the incentive represents costs that are being proposed to remain or enter rate base and/or revenue requirement. A distributor must specify whether any commitments made to shareholders are to be funded through rates	N/A	
13	Description of actual savings as a result of consolidation compared to what was in the approved consolidation application and explanation of how savings are sustainable and the efficacy of any rate plan approved as part of the MAADs application	N/A	
13	Identify approved ACM or ICM from a previous Price Cap IR application it proposes be incorporated into rate base.	N/A	
EXHIBIT 2 - RATE BASE			
Overview			
14	Completed Fixed Asset Continuity Schedule (Appendix 2-BA) - in Application and Excel format	Yes	Exhibit 2-2-1; Attachment 2-2-1(A), (B), (C), (D), (E), (F), (G), (H), (I), (J)
14	Opening and closing balances, average of opening and closing balances for gross assets and accumulated depreciation (discussion of methodology if applicant uses an alternative method); working capital allowance (historical actuals, bridge and test year forecast)	Yes	Exhibit 2-1-1
14 & 15	Continuity statements (year end balance, including interest during construction and overheads). Explanation for any restatement (e.g. due to change in accounting standards) Year over year variance analysis; explanation where variance greater than materiality threshold Hist. OEB-Approved vs Hist. Actual Hist. Act. vs. preceding Hist. Act. Hist. Act. vs. Bridge Bridge vs. Test	Yes	Exhibit 2-1-1
15	Opening and closing balances of gross assets and accumulated depreciation must correspond to fixed asset continuity statements. If not, an explanation must be provided (e.g. CWIP, ARO). Reconciliation must be between net book value balances reported on Appendix 2-BA and balances included in rate base calculation	Yes	Exhibit 2-1-1
Gross Assets - PP&E and Accumulated Depreciation			
15	Breakdown by function and by major plant account; description of major plant items for test year	Yes	Exhibit 2-2-1
15 & 16	Summary of approved and actual costs for any ICM(s) and/ or ACM approved in previous IRM applications	N/A	
16	Continuity statements must reconcile to calculated depreciation expenses and presented by asset account	Yes	Attachment 2-2-1(A), (B), (C), (D), (E), (F), (G), (H), (I), (J); Attachment 4-3-1(B), (C), (D), (E), (F), (G), (H), (I), (J), (K)
16	All asset disposals clearly identified in the Chapter 2 Appendices for all historical, bridge and test years and if any amounts related to gains or losses on disposals have been included in Account 1575 IFRS - CGAAP Transitional PP&E Amount	Yes	Attachment 2-2-1(A), (B), (C), (D), (E), (F), (G), (H), (I), (J)
Allowance for Working Capital			
16	Working Capital - 7.5% allowance or Lead/Lag Study or Previous OEB Direction	Yes	Exhibit 2-3-1
16	Lead/Lag Study - leads and lags measured in days, dollar-weighted	N/A	
16 & 17	Cost of Power must be determined by split between RPP and non-RPP Class A and Class B customers based on actual data, use most current RPP (TOU) price, use current UTR. Calculation must fully consider all other impacts resulting from the Ontario Fair Hydro Plan Act, 2017. Distributors must complete Appendix 2-Z - Commodity Expense.	Yes	Exhibit 2-3-1
17	In consideration of the impact of the Fair Hydro Plan, actual data must be split between Class A and Class B customers (RPP and non-RPP).	N/A	Applicable components of Fair Hydro Plan have been repealed
17	Non-RPP Class B consumption data must be further split between customers eligible for the Global Adjustment (GA) modifier vs. non-eligible. The GA modifier must be applied to eligible customers and a weighted average commodity price must be determined by the split between RPP, eligible non-RPP and non-eligible Non-RPP customers.	Yes	Exhibit 2-3-1
17	For customer classes that include Class A customers, distributor must incorporate Class A GA cost by completing the relevant section in Appendix 2-Z	Yes	Exhibit 2-3-1
17	If a distributor expects test year consumption data to vary significantly, a distributor may provide a forecast of the expected split between Class A and Class B and the expected split between RPP, non-RPP eligible for modifier and non-RPP non eligible for modifier consumption data and provide brief explanation of the forecast	N/A	
Capital Expenditures			
17	DSP filed as a stand-alone document; a discrete element within Exhibit 2	Yes	Exhibit 2-4-3
18	Complete Appendix 2-AB - four historical years must be actuals, forecasts for the bridge and test years; at a minimum, for historical years, applicants must provide actual totals for each DSP category. If no previous plan has been filed, applicants are only required to enter their planned total capital budget in the "plan" column for each historical year and for the bridge year including the OEB-approved amount for the last rebasing year	Yes	Attachment 2-4-3(B)

19	Distributor that has an approved ACM or ICM from a previous Price Cap IR application must file a schedule of the ACM/ICM capital asset amounts (ie PP&E and associated accumulated depreciation) it proposes be incorporated into rate base. Distributor must provide a comparison of actual capital spending with the OEB-approved amount and provide explanation for variances.	**N/A**	Hydro Ottawa does not have an approved ACM or ICM from a previous Price Cap IR application
Policy Options for the Funding of Capital			
18	Distributor may propose ACM capital project coming into service during Price Cap IR (a discrete project documented in DSP). Provide cost and materiality calculations to demonstrate ACM qualification	**N/A**	Hydro Ottawa is not applying for an ACM in this application
18	Distributor must establish need for and prudence of these projects based on DSP information; identification that distributor is proposing ACM treatment for these future projects, preliminary cost information	**N/A**	Hydro Ottawa is not applying for an ACM in this application
18	Complete Capital Module Applicable to ACM and ICM	**N/A**	Hydro Ottawa is not applying for an ACM or ICM in this application
Addition of Previously Approved ACM and ICM Project Assets to Rate Base			
19	Distributor with previously approved ACM(s) and/or ICM(s) - schedule of ACM/ICM amounts proposed to be incorporated into rate base. The distributors must compare actual capital spending with OEB-approved amount and provide an explanation for variances	**N/A**	Hydro Ottawa does not have an approved ACM or ICM from a previous Price Cap IR application
19 & 20	Balances in Account 1508 sub-accounts, reconciliation with proposed rate base amounts; recalculated revenue requirement should be compared with rate rider revenue	**N/A**	Hydro Ottawa does not have an approved ACM or ICM from a previous Price Cap IR application
Capitalization Policy and Capitalization			
20	Changes to capitalization policy since its last rebasing application as a result of the OEB's letter dated July 17, 2012 or for any other reasons, the applicant must identify the changes and the causes of the changes.	**Yes**	Exhibit 2-4-4
20	Appendix 2-D complete; identification of burden rates and burden rates prior to changes, if any	**Yes**	Attachment 2-4-5(A)
Costs of Eligible Investments for the Connection of Qualifying Generation Facilities			
21 & 22	Generation Facilities - If applicable, proposal to divide the costs of eligible investments between the distributor's ratepayers and all Ontario ratepayers per O.Reg. 330/09. Request for rate protection exceeds the materiality threshold in section 2.0.8 of the Filing Requirements - Appendices 2-FA through 2-FC identifying all eligible investments for recovery	**N/A**	
Service Quality and Reliability Performance			
22	5 historical years of ESQRs, explanation for any under-performance vs standard and actions taken	**Yes**	Exhibit 2-4-6
22	5 historical years of SAIDI and SAIFI - for all interruptions, all interruptions excluding loss of supply, and all interruptions excluding major events. The applicant should also provide a summary of major events that occurred since last rebasing. For each interruption set out in section 2.1.4.2.5 of the RRR, for the last 5 years, a distributor must report on the following data: name of the Cause of Interruption, number of interruptions that occurred as a result of the Cause of Interruption, Number of Customer Interruptions that occurred as a result of the Cause of Interruption, and the Number of customer-hours of Interruptions that occurred as a result of the Cause of Interruption	**Yes**	Exhibit 2-4-6
22	Explanation for any under-performance vs 5 year average and actions taken	**Yes**	Exhibit 2-4-6
22	Distributors may propose SAIDI and SAIFI benchmarks different than 5 year average; provide rationale	**N/A**	No new benchmarks proposed
22	Completed Appendix 2-G	**Yes**	Attachment 2-4-6(A)
Ch 5 p6	Where applicable, explanation for section headings other than Chapter 5 headings; cross reference table	**Yes**	Exhibit 2-4-3 (Appendix A)
Ch 5 p7-8	Distribution System Plan Overview - key elements, sources of cost savings, period covered, vintage of information on investment drivers, changes to asset management process since last DSP filing, dependencies	**Yes**	Exhibit 2-4-3 (s. 1.1; s. 1.2)
Ch 5 p8-9	Coordinated Planning with 3rd parties - description of consultations - deliverables of the Regional Planning Process, or status of deliverables - IESO letter in relation to REG investments (Ch 5 p9) and Dx response letter	**Yes**	Exhibit 2-4-3 (s. 1.9; s. 1.10)
Ch 5 p9-11	Performance Measurement - identify and define methods and measures used to monitor DSP performance - summary of performance and trends over historical period. Must include SAIFI and SAIDI for all interruptions and all interruptions excluding loss of supply - explain how information has affected DSP	**Yes**	Exhibit 2-4-3 (s. 4.1)
Ch 5 p11	Realized efficiencies due to smart meters -documented capital and operating efficiencies realized as a result of the deployment and operationalization of smart meters and related technologies. Both qualitative and quantitative descriptions should be provided	**Yes**	Exhibit 2-4-3 (s. 4.5)
Ch5 p12	Asset Management Process Overview - description of AM objectives/corporate goals and how Dx ranks objectives for prioritizing investments	**Yes**	Exhibit 2-4-3 (s. 5.1)
Ch5 p12	Inputs/Outputs of the AM process and information flow for investments; flowchart recommended	**Yes**	Exhibit 2-4-3 (s. 5)
Ch 5 p13	Overview of Assets Managed - description of service area (including evolution of features in forecast period affecting DSP), - description of system configuration - service profile and condition by asset type (tables and/or figures) - date data compiled - assessment of degree the capacity of system assets is utilized	**Yes**	Exhibit 2-4-3 (s. 2.1; s. 6.1)
Ch 5 p13-14	Asset Lifecycle Optimization - description of asset lifecycle optimization policies and practices, including asset replacement and refurbishment, maintenance planning criteria and assumptions - description of asset life cycle risk management policies and practices, assessment methods and approaches to mitigation	**Yes**	Exhibit 2-4-3 (s. 6.2)
Ch 5 p14-15	System Capability Assessment for REG - REG applications > 10 kW, number and MW of REG connections for forecast period, capacity of Dx to connect REG, connection constraints	**Yes**	Exhibit 2-4-3 (s. 7.3)
Ch 5 p15	Capital Expenditure Plan Summary for significant projects and activities to be undertaken - capability to connect new load or Gx customers, total annual capex over forecast period by investment category, description of how AMP and Capex planning have affected capital expenditures for each category - list, description and total capital cost of material capital expenditures sorted by category (table recommended) - information related to Regional Planning Process (Needs Assessment Report, Regional Planning Status Letter, Regional Infrastructure Plan - as appropriate) - description of customer engagement - Dx expectations of system development over next 5 years - list, description and total capital cost of projects planned in response to customer preferences, to take advantage of technology based opportunities, to study innovative processes (table recommended)	**Yes**	Exhibit 2-4-3 (s. 8.1; s. 5.4; s. 4.1; s. 1.10.2; s. 8.1.6)
Ch 5 p16-17	Capital Expenditure Planning Process Overview - description of capex planning objectives/criteria/ assumptions, relationship with AM objectives, policy on consideration of non-distribution alternatives, processes used to identify projects in each investment category, customer feedback and impact on plan, method and criteria used to priorities REG investments	**Yes**	Exhibit 2-4-3 (s. 5.2)
Ch 5 p17	Rate-Funded Activities to Defer Distribution Infrastructure -CDM programs that target distributor-specific peak demand reductions to address a local constraint of the distribution system -demand response programs to reduce peak demand in order to defer capital investment -programs to improve the efficiency of the distribution system and reduce distribution losses -energy storage programs whose primary purpose is to defer specific capital spending for the distribution system	**Yes**	Exhibit 2-4-3 (s. 8.1.4)
Ch 5 p18-19	Capital Expenditure Summary by Investment Category - completed Table 2 of Ch 5 for historical and forecast period, explanation of markedly different variances plan vs actual, explanation of markedly different variances year over year Table 2 of Ch 5 is provided in Excel format in Appendix 2-AB (must provide actual totals for historical years, as a minimum) - Must also complete Chapter 2 Appendix 2-AA, along with explanations of variances by project or category, the proposed accounting treatments, a statement should be provided that there are no expenditures for non-distribution activities in the applicant's budget	**Yes**	Exhibit 2-4-3 (s. 8.2; s. 8.3; s. 8.4; s. 8.5)
Ch 5 p19	Justifying Capital Expenditures -filings must enable OEB to assess whether and how a distributor's DSP delivers value to customers, including by controlling costs in relation to its proposed investments through appropriate optimization, prioritization, and pacing of capital-related expenditures -distributors should also keep pace with technological changes and integrate cost-effective innovative projects and traditional planning needs such as load growth, asset condition and reliability	**Yes**	Exhibit 2-4-3 (s. 8.1)
Ch5 p19-20	Overall Plan - comparative expenditures by category over historical period, forecast impact of system investment on O&M, drivers of investments by category, information related to Dx system capability assessment	**Yes**	Exhibit 2-4-3 (s. 8.2; s. 8.3; s. 8.4; s. 8.5)

Ch 5 p20-27	Material Investments - For each project that meets materiality threshold set in Ch 2 p5 - general information - total capital, customer attachments, dates, risks, variances, REG investments - evaluation criteria - may include: efficiency, customer value, reliability, etc. - category specific requirements for each project - system access, system renewal, system service, general plant (as applicable)	**Yes**	Exhibit 2-4-3 (s. 8.2; s. 8.3; s. 8.4; s. 8.5)
EXHIBIT 3 - OPERATING REVENUE			
Load and Revenue Forecasts			
22	Explanation of causes, assumptions and adjustments for volume forecast. Economic assumptions and data sources for customer and load forecasts	**Yes**	Attachment 3-1-1(C)
22	Explanation of weather normalization methodology	**Yes**	Attachment 3-1-1(C)
22	Quantification of any impacts arising from the persistence of historical CDM programs as well as the forecasted impacts arising from new programs in the bridge and test years through the current 6-year CDM framework by customer class	**Yes**	Attachment 3-1-1(C)
23	Completed Appendix 2-IB; the customer and load forecast for the test year must be entered on RRWF, Tab 10	**Yes**	Attachment 3-1-1(A)
23 & 24	Multivariate Regression Model - rationale for choice, regression statistics, explanation of weather normalization methodology, sources of data for endogenous and exogenous variables, any binary variables used to either account for individual data points or to account for seasonal or cyclical trends or for discontinuities in the historical data, explanation of any specific adjustments made; data used in load forecast must be provided in Excel format, including derivation of constructed variables	**Yes**	Attachment 3-1-1(D)
24	NAC Model - rationale for choice, data supporting NAC variables, description of accounting for CDM including licence conditions, discussion of weather normalization considerations	**Yes**	Attachment 3-1-1(A)
24 & 25	CDM Adjustment - account for CDM in load forecast. Consider impact of persistence of historical CDM and impact of new programs. Adjustments may be required for IESO reported results which are full year impacts	**Yes**	Exhibit 3-1-1; Attachment 3-1-1(A)
25	CDM savings for LRAMVA balance and adjustment to load forecast; data by customer class and for both kWh and, as applicable, kW. Provide rationale for level of CDM reductions in 2019 load forecast	**Yes**	Exhibit 3-1-1
Addendum, Page 5	Completed Appendix 2-I Requirements - for 2019 and 2020 activity, only CDM projects subject to a contractual agreement entered between the distributor and a customer by April 30, 2019 under a former CFF program should be included in the proposed CDM manual adjustment to the load forecast for 2019 and 2020; relevant documentation provided to support manual adjustment, including corresponding CFF program, project timelines and project savings	**Yes**	Attachment 3-1-1(B)
Accuracy of Load Forecast and Variance Analyses			
25	Completed Appendix 2-IB	**Yes**	Attachment 3-1-1(A)
25	For customer/connection counts - identification as to whether customer/connection count is shown in year end or average format, year-over-year variances in changes of customer/connection counts with explanation of major changes, explanations of bridge and test year forecasts by rate class, for last rebasing variance analysis between last OEB-approved and actuals with explanations for material differences	**Yes**	Exhibit 3-1-2; Attachment 3-1-1(A)
25 & 26	For consumption and demand - explanation to support how kWh are converted to kW for applicable demand-billed classes, year-over-year variances in kWh and kW by rate class and for system consumption overall (kWh) with explanations for material changes in the definition of or major changes over time (should be done for both historical actuals against each other and historical weather-normalized actuals over time), explanations of the bridge and test year forecasts by rate class, variance analysis between the last OEB-approved and the actual and weather-normalized actual results	**Yes**	Attachment 3-1-1(C)
26	With respect to average consumption, for each rate class, distributors are to provide weather-actual and weather-normalized average annual consumption or demand per customer as applicable for the rate class for last OEB approved and historical, weather normalized average annual consumption or demand per customer for the bridge and test years, explanation of the net change in average consumption from last OEB-approved and actuals from historical, bridge and test years based on year-over-year variances and any apparent trends in data	**Yes**	Attachment 3-1-1(A)
Other Revenue			
26 & 27	Completed Appendix 2-H	**Yes**	Attachment 3-2-1(A)
27	Variance analysis - year over year, historical, bridge and test	**Yes**	Exhibit 3-2-1
27	Any new proposed specific service charges, or proposed changes to rates or application of existing specific service charges	**Yes**	Exhibit 8-7-1
27	Revenue from affiliate transactions, shared services, corporate cost allocation. For each affiliate transaction, identification of the service, the nature of the service provided to affiliate entities, accounts used to record the revenue and associated costs (Appendix 2-N)	**Yes**	Exhibit 3-2-1; Exhibit 4-2-1; Attachment 3-2-1(B)
28	Distributors must identify any discrete customer groups that may be materially impacted by changes to other rates and charges	**N/A**	
EXHIBIT 4 - OPERATING COSTS			
Overview			
28 & 29	Brief explanation of test year OM&A levels, cost drivers, significant changes, trends, inflation rate assumed, business environment changes	**Yes**	Exhibit 4-1-1; Exhibit 4-1-4
Summary and Cost Driver Tables			
29	Summary of recoverable OM&A expenses; Appendix 2-JA	**Yes**	Attachment 4-1-3(A)
29	Recoverable OM&A cost drivers; Appendix 2-JB	**Yes**	Attachment 4-1-4(A)
29	OM&A programs table; Appendix 2_JC	**Yes**	Attachment 4-1-3(B)
29	Recoverable OM&A Cost per customer and per FTE; Appendix 2-L	**Yes**	Attachment 4-1-3(C)
29	Identification of change in OM&A in test year in relation to change in capitalized overhead.	**Yes**	Exhibit 4-1-3
29	OM&A variance analysis for test year with respect to bridge and historical years; Appendix 2-D	**Yes**	Attachment 4-1-3(D)
Program Delivery Costs with Variance Analysis			
29 & 30	Completed Appendix 2-JC OM&A Programs Table - completed by program or major functions; include variance analysis limited to variances that are outliers, between test year and last OEB approved and most recent actuals, including an explanation for each significant change whether the change was within or outside the applicant's control and explanation of why	**Yes**	Attachment 4-1-3(B)
30	For each significant change within the applicant's control describe business decision that was made to manage the cost increase/decrease and the alternatives	**Yes**	Exhibit 4-1-4
Workforce Planning and Employee Compensation			
30	Employee Compensation - completed Appendix 2-K	**Yes**	Attachment 4-1-5(C)
30	Description of previous and proposed workforce plans, including compensation strategy	**Yes**	Exhibit 4-1-5; Attachment 4-1-5(A), (B), (D)
30	Discussion of the outcomes of previous plans and how those outcomes have impacted their proposed plans including an explanation of the reasons for all material changes to headcount and compensation. Explanation for all years includes: - year over year variances - basis for performance pay, eligible employee groups, goals, measures, and review process for pay-for-performance plans, - relevant studies (e.g. compensation benchmarking)	**Yes**	Exhibit 4-1-5; Attachment 4-1-5(A), (B), (C), (D), (G). Note: there were no material variances
30 & 31	Details of employee benefit programs including pensions for last OEB approved, historical, bridge and test; must agree with tax section	**Yes**	Attachment 4-1-5(A)
31	Most recent actuarial report on employee benefits, pension and OPEBs	**Yes**	Attachment 4-1-5(E)
31	Accounting method for pension and OPEBs; if cash method, sufficient supporting rationale. If proposing to change the basis in which pension and OPEB costs included in OM&A, quantification of impact of transition	**Yes**	Exhibit 4-1-5(A); Exhibit 9-1-3
Shared Services and Corporate Cost Allocation			
31	Identification of all shared services among affiliates and parent company; identification of the extent to which the applicant is a "virtual utility"	**Yes**	Exhibit 4-2-1
31 & 32	Allocation methodology for corporate and shared services, list of costs and allocators, including any third party review	**Yes**	Exhibit 4-2-1
32	Completed Appendix 2-N for service provided or received for historical, bridge and test; including reconciliation with revenue included in Other Revenue	**Yes**	Attachent 3-2-1(B); Exhibit 3-2-1
32	Shared Service and Corporate Cost Variance analysis - test year vs last OEB approved and most recent actual	**Yes**	Exhibit 4-2-1
32	Identification of any Board of Director costs for affiliates included in LDC costs	**N/A**	
Non-Affiliate Services, One-Time Costs, Regulatory Costs			
32	Purchased Non-Affiliated Services - file a copy of procurement policy (signing authority, tendering process, non-affiliate service purchase compliance)	**Yes**	Exhibit 4-2-2; Attachment 4-2-2(A), (B), (C)

32	For material transactions that are not in compliance with procurement policy, or that were undertaken pursuant to exceptions contemplated within the policy, an explanation as to why as well as a summary of the nature and cost of the product, and a description of the specific methodology used for selecting the vendor	**Yes**	Exhibit 4-2-2; Attachment 4-2-2(A)
32 & 33	Identification of one-time costs in historical, bridge, test; explanation of cost recovery in test (or future years). If no recovery of one-time costs is being proposed in the test year and subsequent IRM term, an explanation must be provided	**Yes**	Exhibit 4-2-3
33	Regulatory costs - breakdown of actual and forecast, supporting information related to CoS application (e.g. legal fees, consultant fees), proposed recovery (i.e. amortized?) Completed Appendix 2-M	**Yes**	Attachment 4-2-4(A)
LEAP, Charitable and Political Donations			
33	LEAP - the greater of 0.12% of forecasted service revenue requirement or $2,000 should be included in OM&A and recovered from all rate classes	**Yes**	Exhibit 4-1-4; Exhibit 4-2-5; Exhibit 4-2-6
33	Detailed information for all contributions that are claimed for recovery	**N/A**	
33	Charitable Donations - the applicant must confirm that no political contributions have been included for recovery	**Yes**	Exhibit 4-2-6; Exhibit 4-2-7
Depreciation, Amortization and Depletion			
34	Explanations for any useful lives of an asset that are proposed that are not within the ranges contained in the Kinectrics Report	**N/A**	No new asset lives propsed outside Kinetrics' ranges
34	Depreciation, Amortization and Depletion details by asset group for historical, bridge and test years. Include asset amount and rate of depreciation/amortization. Must complete Appendix 2-C which must agree to accumulated depreciation in Appendix 2-BA under rate base	**Yes**	Exhibit 4-3-1; Attachment 4-3-1(B), (C), (D), (E), (F), (G), (H), (I), (J), (K); Differences are described in Exhibit 4-3-1
34	Identification of any Asset Retirement Obligations and associated depreciation, accretion expense	**Yes**	Exhibit 4-3-1
34	Identification of historical depreciation practice and proposal for test year. Variances from half year rule must be documented and supporting rationale provided	**Yes**	Exhibit 4-3-1
34 & 35	Copy of depreciation/amortization policy, or equivalent written description; summary of changes to depreciation/amortization policy since last CoS	**Yes**	Exhibit 2-4-4; Exhibit 4-3-1
35	Explanation of any deviations from the practice of depreciating significant parts or components of PP&E separately	**N/A**	No deviations
35	For any depreciation expense policy or asset service lives changes since its last rebasing application: - identification of the changes and detailed explanation for the causes of the changes, including any changes subsequent to those made by January 1, 2013 -use of Kinectrics study or another study to justify changes in useful life - list detailing all asset service lives tied to USoA, detail differences in TUL from Kinectrics and explain differences outside of minimum and maximum TUL range from Kinectrics; Appendix 2-BB	**Yes**	Exhibit 4-3-1
PILs and Property Taxes			
36	Completed version of the PILs model (PDF and Excel); derivation of adjustments for historical, bridge, test years	**Yes**	Exhibit 4-4-1; Atttachment 4-4-1(D), (E), (F), (G), (H)
36	Supporting schedules and calculations identifying reconciling items	**Yes**	Exhibit 4-4-1; Attachment 4-4-1(I), (J)
36	Most recent federal and provincial tax returns	**Yes**	Attachment 4-4-1(A), (B), (C)
36	Financial Statements included with tax returns if different from those filed with application	**N/A**	Not different from Financial Statements
36	Calculation of Tax Credits; redact where required (filing of unredacted versions is not required)	**Yes**	Exhibit 4-4-1
36	Supporting schedules, calculations and explanations for other additions and deductions	**Yes**	Exhibit 4-4-1; Attachment 4-4-1(I), (J)
36	Completion of the integrity checks in the PILs Model	**Yes**	Exhibit 4-4-1
36	Explanation of how taxes other than income taxes or PILS (e.g. property taxes) are derived	**Yes**	Exhibit 4-4-1
Non-recoverable and Disallowed Expenses			
36	Exclude from regulatory tax calculation any non-recoverable or disallowed expenses	**Yes**	Exhibht 4-1-4; Exhibit 4-2-6
Conservation and Demand Management			
Addendum, Pages 6-9	LRAMVA - disposition of balance. Distributors must provide version 4 of LRAMVA Work Form in a working Excel file when making LRAMVA requests for remaining amounts related to CFF activity. An application for lost revenues should include: Participation and Cost reports in Excel format, made available by the IESO. An application for lost revenues should also provide the following: - statement identifying the year(s) of new lost revenues and prior year savings persistence claimed in the LRAMVA disposition - statement confirming LRAMVA based on verified savings results supported by the distributors final CDM Report and Persistence Savings Report (both filed in Excel format) and a statement indicating use of most recent input assumptions when calculating lost revenue - summary table with principal and carrying charges by rate class and resulting rate riders - statement providing the disposition period; rationale provided for disposing the balance in the LRAMVA if one or more classes do not generate significant rate riders - statement confirming LRAMVA reference amounts, rationale for the distributors circumstances if LRAMVA threshold not used - rationale confirming how rate class allocations for actual CDM savings were determined by class and program (Tab 3-A of LRAMVA Work Form) - statement confirming whether additional documentation was provided in support of projects that were not included in distributors final CDM Annual Report (Tab 8 of LRAMVA Work Form as applicable) - for a distributor's streetlighting project(s) which may have been completed in collaboration with local municipalities, the following must be provided: Explanation of the methodology to calculate streetlighting savings; Confirmation whether the streetlighting savings were calculated in accordance with OEB-approved load profiles for streetlighting projects; Confirmation whether the streetlighting project(s) received funding from the IESO and the appropriate net-to-gross assumption used to calculate streetlighting savings For the recovery of lost revenues related to demand savings from street light upgrades, distributors should provide the following information: o Explanation of the forecast demand savings from street lights, including assumptions built into the load forecast from the last CoS application o Confirmation that the street light upgrades represent incremental savings attributable to participation in the IESO program, and that any savings not attributable to the IESO program have been removed (for example, other upgrades under normal asset management plans) o Confirmation that the associated energy savings from the applicable IESO program have been removed from the LRAMVA workform so as not to double count savings (for example, if requesting lost revenue recovery for the demand savings from a street light upgrade program, the associated energy savings from the Retrofit program have been subtracted from the Retrofit total) o Confirmation that the distributor has received reports from the participating municipality that validate the number and type of bulbs replaced or retrofitted through the IESO program o A table, in live excel format, that shows the monthly breakdown of billed demand over the period of the street light upgrade project, and the detailed calculations of the change in billed demand due to the street light upgrade project (including data on number of bulbs, type of bulb replaced or retrofitted, average demand per bulb). For the recovery of lost revenues related to demand savings from other programs that are not included in the monthly Participation and Cost Reports of the IESO (for example Combined Heat and Power projects), distributors should provide the following information: o The third party evaluation report that describes the methodology to calculate the demand savings achieved for the program year. In particular, if the proposed methodology is different than the evaluation approaches used by the IESO, an explanation must be provided explaining why the proposed approach is more appropriate o Rationale for net-to-gross assumptions used o Breakdown of billed demand and detailed level calculations in live excel format	**Yes**	Exhibit 4-5-1; Exhibit 4-5-2
EXHIBIT 5 - COST OF CAPITAL AND CAPITAL STRUCTURE			
Capital Structure			
40	Statement that LDC adopts OEB's guidelines for cost of capital and confirms that updates will be done. Alternatively - utility specific cost of capital with supporting evidence	**Yes**	Exhibit 5-1-1
40	Completed Appendix 2-OA for last OEB approved and test year	**Yes**	Attachment 5-1-1(A)
40	Completed Appendix 2-OB for historical, bridge and test years	**Yes**	Attachment 5-1-1(B)
40	Explanation for any changes in capital structure	**N/A**	No changes
Cost of Capital (Return on Equity and Cost of Debt)			
40	Calculation of cost for each capital component	**Yes**	Exhibit 5-1-1
40	Profit or loss on redemption of debt	**N/A**	
40	Copies of promissory notes or other debt arrangements with affiliates	**Yes**	Attachments 5-1-1(B), (C), (D), (E), (F), (G), (H), (I), (J), (K), (L)
40	Explanation of debt rate for each existing debt instrument	**Yes**	Exhibit 5-1-1

40	Forecast of new debt in bridge and test year - details including estimate of rate	**Yes**	Attachment 5-1-1(B)
40	If proposing any rate that is different from the OEB guidelines, a justification of the proposed rate(s), including key assumptions	**Yes**	Exhibit 5-1-1
41	Notional Debt - difference between actual debt thickness and deemed debt thickness attracts the weighted average cost of actual long-term debt rate (unless 100% equity financed)	**N/A**	
Not-for-Profit Corporations			
41	Not for Profit Corporations - evidence that excess revenue is used to build up operating and capital reserves	**N/A**	
41	Detailed calculation for test year revenue requirement based on its Reserve Requirement	**N/A**	
41	The proposed reserves and rationale for the need to establish each reserve, the time period of building up the reserves, and the procedure and policy of each reserve	**N/A**	
42	Description of the governance of the not-for-profit corporation	**N/A**	
42	If there are approved reserves from previous OEB decisions provide the following: -the limits of any capital and/or operating reserves as approved by the OEB, and identifying the decisions establishing these reserve accounts and their limits -the current balances of any established capital and/or operating reserves	**N/A**	
EXHIBIT 6 - REVENUE DEFICIENCY/SUFFICIENCY			
42	Calculation of delivery-related Revenue Deficiency/Sufficiency (excluding cost of power and associated costs): net utility income, rate base, actual return on rate base, indicated rate of return, requested rate of return, deficiency/sufficiency, gross deficiency/sufficiency. Deficiency/sufficiency must also be net of other costs (e.g. LV costs, RSVAs, smart meter or MIST meter expenditures/revenues and other DVA balances).	**Yes**	Exhibit 6-1-1
42 & 43	Summary of drivers for test year deficiency/sufficiency, how much each driver contributes; references in application evidence mapped to drivers	**Yes**	Exhibit 6-1-1
43	Impacts of any changes in methodologies to deficiency/sufficiency	**N/A**	No change in methodology
Revenue Requirement Work Form			
43	RRWF - in PDF and Excel. Revenue requirement, def/sufficiency, data entered in RRWF must correspond with other exhibits	**Yes**	Exhibit 6-1-1
43	If the enhanced RRWF cannot reflect a distributor's proposed rates accurately, the distributor must file its rate generator model	**N/A**	
43	Completed Appendices 2-JA, 2-JB, and 2-JC	**Yes**	Attachment 4-1-3(A), (B); Attachment 4-1-4(A)
EXHIBIT 7 - COST ALLOCATION			
Cost Allocation Study Requirements			
44	Completed cost allocation study using the OEB-approved methodology or a comparable model must be filed reflecting future loads and costs and be supported by appropriate explanations and live Excel spreadsheets. Sheets 11 and 12 of the RRWF must also be completed. Live Excel version of 2017 cost allocation model will be filed (updated load profiles or scaled version of HONI CAIF). Model must be consistent with test year load forecast, changes to customer classes and load profiles.	**Yes**	Exhibit 6-1-1(A), (B), (C), (D), (E); Exhibit 7-1-1; Attachment 7-1-1(A), (B)
44	Explanation provided if a distributor is unable to update its load profiles and confirm that it intends to put plans in place to update its load profiles the next time a cost allocation model is filed	**Yes**	Exhibit 7-1-1
45	Description of weighting factors, and rationale for use of default values (if applicable)	**Yes**	Exhibit 7-1-1; Attachment 7-1-1(B)
45	Hard copy of sheets I-6, I-8, O-1 and O-2 (first page)	**Yes**	Attachment 7-1-1(A)
45 & 46	Host Distributor only - evidence of consultation with embedded Dx - statement regarding embedded Dx support for approach to allocation of costs - if embedded Dx is separate class - class in cost allocation study and RRWF, Sheet 11 - if new embedded Dx class - rationale and supporting evidence (cost of serving, load served, asset ownership information, distribution charges); include in cost allocation study and RRWF, Sheet 11 - if embedded Dx billed as GS customer - , include with the GS class in cost allocation model and Appendix 2-P. Provide cost of serving, load served, asset ownership information, distribution charges, appropriateness of rate class. File Appendix 2-Q.	**N/A**	
46	Unmetered Loads (including Street Lighting) - Confirmation of communication with unmetered load customers when proposing changes to the level of the rates and charges or the introduction of new rates and charges	**N/A**	
46 & 47	microFIT - if the applicant believes that it has unique circumstances which would justify a certain rate, appropriate documentation must be provided	**Yes**	Exhibit 8-7-1
47	Standby Rates - if seeking approval on final basis, provide evidence that affected customers have been advised. If seeking changes to standby charges, provide rationale and evidence that affected customer have been advised.	**N/A**	
47	New customer class or eliminated customer class - rationale and restatement of revenue requirement from previous CoS	**N/A**	
Class Revenue Requirements			
48	To support a proposal to rebalance rates, the distributor must provide information on the revenue by class that would apply if all rates were changed by a uniform percentage. Ratios must be compared with the ratios that will result from the rates being proposed by the distributor.	**Yes**	Exhibit 6-1-1; Attachments 6-1-1(A), (B), (C), (D), (E); Exhibit 7-1-1; Attachment 7-1-1(A); Exhibit 8-1-1
Revenue to Cost Ratios			
48	If R:C ratios outside deadband based on model - distributors must include cost allocation proposal to bring them within the OEB-approved ranges. In making any such adjustments, distributors should address potential mitigation measures if the impact of the adjustments on the rates of any particular class or classes is significant.	**Yes**	Exhibit 7-1-1; Attachment 7-1-1(A)
49	If Cost Allocation Model other than OEB model used - exclude LV, exclude DVA such as smart meters	**N/A**	
EXHIBIT 8 - RATE DESIGN			
50	Monthly fixed charges - 2 decimal places; variable charges - 4 decimal places	**Yes**	Exhibit 8-1-1
Fixed Variable Proportion			
50	The following is to be provided in relation to the fixed/variable proportion of proposed rates: -Current F/V with supporting info -Proposed F/V proportion with explanation for any changes (billing determinants from proposed load forecast) -Comparison between current and proposed monthly fixed charges with the floor and ceiling as in cost allocation study Analysis must be net of rate adders, funding adders, and rate riders	**Yes**	Exhibit 8-1-1
Rate Design Policy			
50 & 51	LDCs must propose changes to residential rates consistent with policy to transition to fully fixed monthly distribution service charge.	**Yes**	Exhibit 8-2-1
51	Proposal follows approach set out in Tab 12 of RRWF	**Yes**	Exhibit 8-2-1
51	If applicable, distributor with seasonal residential class must propose identical rate design treatment for such a class	**N/A**	
RTSRs			
51	Retail Transmission Service Rate Work Form - PDF and Excel	**Yes**	Attachment 8-3-1(A)
51	RTSR information must be consistent with working capital allowance calculation	**Yes**	Exhibit 2-3-1; Exhibit 8-3-1
Retail Service Charges			
51 & 52	If proposing changes to Retail Service Charges or introduction of new rates and charges - evidence of consultation and notice	**N/A**	
Regulatory Charges			
52	Wholesale Market Service Rate - reflect current approved rate in application or justify otherwise	**Yes**	Exhibit 8-5-1
Specific Service Charges			
52 & 53	Specific Service Charge description/purpose/reason for new and revised SSC; calculations to support charges	**Yes**	Exhibit 8-7-1; Attachment 8-7-1(A)
53	Identification in the Application Summary all proposed changes that will have a material impact on customers, including charges that may affect a discrete group.	**Yes**	Exhibit 8-7-1; Attachment 8-7-1(A)
53	Identification of any rates and charges in Conditions of Service that do not appear on tariff sheet. Explain nature of costs, provide schedule outlining revenues or capital contributions 2012-2015, bridge and test years. Whether these charges should be included on tariff sheet	**Yes**	Exhibit 3-2-1; Exhibit 8-7-1
53	Ensure revenue from SSCs corresponds with Operating Revenue evidence	**Yes**	Exhibit 3-2-1; Exhibit 8-7-1
Wireline Pole Attachment Charge			
53	LDC without a distributor-specific charge will charge the province-wide pole attachment charge of $28.09 from September 1, 2018 to December 31, 2018. This charge will increase to $43.63 effective January 1, 2019.	**Yes**	Exhibit 3-2-1; Exhibit 8-7-1

54	Record the excess incremental revenue as of September 1, 2018 until the effective date of its rebased rates in a new variance account related to pole attachment charge	N/A	
Addendum, Page 9	If an LDC chooses to apply for a custom charge, it must file a completed version of the OEB's Wireline Pole Attachment Work Form, and include the following information as part of their application: statement confirming the proposed distributor-specific wireline pole attachment charge; statement discussing the main cost drivers, including rationale; a table summarizing key inputs in the rate calculation, and a statement confirming the RRR data and pre-tax weighted cost of capital are consistent; confirmation of the total number of poles and joint use poles in the rate calculation, and a table outlining the rate of pole replacements and percentage of poles depreciated over the past 5 years; confirmation of the number of attaches that are specific to the distributor's service territory, a description of the types of poles and discussion of contractual arrangements with other entities that affect the number of attachments, including overlashing attachments; description of activities performed by the distributor to directly accommodate third party attaches, should include discussion of methodology, costs and data sources to calculate each component of direct costs, detailed calculations of total administration and LOP costs, including staff time and labour rates, as applicable; Distributors must use utility-specific costs to determine the LDC-specific Power Deduction Factor and LDC-specific Maintenance Allocation Factor applicable to third parties. If distributors choose to adopt the default factors in their application of a custom charge, distributors are still required to complete Table 8 and Table 10-a of the Pole Attachment Workform to substantiate the applicability of the default factors that were used in calculating the provincially approved charge.	N/A	
Low Voltage Service Rates			
55	Forecast of LV cost, sum of host distributors charges	Yes	Exhibit 8-8-1
55	Low Voltage Cost (historical, bridge, test), variances and explanations for substantive changes	Yes	Exhibit 8-8-1
55	Support for forecast LV, e.g. Hydro One Sub-Transmission charges	Yes	Exhibit 2-3-1; Exhibit 8-8-1
55	Allocation of LV cost to customer classes (typically proportional to Tx connection revenue)	Yes	Exhibit 8-8-1
55	Proposed LV rates by customer class	Yes	Exhibit 8-8-1
Smart Meter Entity Charge			
55	Distributor must follow accounting guidance provided on March 23, 2018	Yes	Exhibit 8-6-1
Loss Factors			
55	Proposed SFLF and Total Loss Factor for test year	Yes	Exhibit 8-9-1
56	Statement as to whether LDC is embedded including whether fully or partially	Yes	Exhibit 8-9-1
56	Study of losses if required by previous decision	N/A	No Study Requested
56	3-5 years of historical loss factor data - Completed Appendix 2-R	Yes	Exhibit 8-9-1
56	If proposed loss factor >5%, explanation and action plan to reduce losses going forward	N/A	Loss Factor is not >5%
56	Explanation of SFLF if not standard	N/A	
Tariff of Rates and Charges			
Addendum, Page 10	Current and proposed Tariff of Rates and Charges filed in the Tariff Schedule/Bill Impacts Model - **must be filed in Excel format** Explanation and support of each change in the appropriate section of the application	Yes	Attachment 8-10-1(A)
56	Explanation of changes to terms and conditions of service if changes affect application of rates	N/A	
Revenue Reconciliation			
56	Calculations of revenue per class under current and proposed rates; reconciliation of rate class revenue and other revenue to total revenue requirement (i.e. breakout volumes, rates and revenues by rate component etc.)	Yes	Attachment 6-1-1(A), (B), (C), (D), (E); Exhibit 8-11-1
56 & 57	Completed RRWF - Sheet 13 - rates and charges entered on this sheet should be rounded to the same decimal places as tariff	Yes	Attachment 6-1-1(A), (B), (C), (D), (E)
Bill Impact Information			
57	Completed Tariff Schedule and Bill Impacts Model. Bill impacts must identify existing rates, proposed changes to rates, and detailed bill impacts (including % change in distribution excluding pass through costs - Sub-Total A, % change in distribution - Sub-Total B, % change in delivery - Sub-Total C, and $ change in total bill)	Yes	Exhibit 8-10-1; Attachment 8-10-1(A), (B); Exhibit 8-12-1; Attachment 8-12-1(A)
57	Impact of changes resulting from the as-filed application on representative samples of end-users (i.e. volume, % rate change and revenue). Commodity and regulatory charges held constant	Yes	Attachment 8-10-1(A), (B); Exhibit 8-12-1; Attachment 8-12-1(A)
57	Rates and charges input in the tariff schedule and Bill Impacts Model rounded to the decimal places as shown on the existing tariff	Yes	Attachment 8-10-1(A), (B); Attachment 8-12-1(A)
57	Bill impacts provided for typical customers and consumption levels. Must provide residential 750 kWh, residential at the lowest 10th percentile and GS<50 2,000 kWh. Bill impacts must be provided for a range of consumption levels relevant to the service territory.	Yes	Attachment 8-10-1(A), (B); Exhibit 8-12-1; Attachment 8-12-1(A)
57	If applicable, for certain classes where one or more customers have unique consumption and demand patterns, the distributor must show a typical impact and provide an explanation	Yes	Attachment 8-10-1(A), (B); Exhibit 8-12-1; Attachment 8-12-1(A)
Rate Mitigation			
58	Evidence showing that the monthly service charge would not rise by more than $4 per year due only to the rate design change, and that the total bill impact, reflecting all proposed changes in the application, will not exceed 10%. If either of these criteria is not met, some form of mitigation may be required (i.e. extending transition period).	Yes	Hydro Ottawa transitioned to a fully fixed charge effective January 1, 2020; Attachment 8-10-1(A), (B); Exhibit 8-12-1; Attachment 8-12-1(A)
58	Evaluation of bill impact for residential customer at 10th consumption percentile. Describe methodology for determination of 10th consumption percentile. File mitigation plan for whole residential class if impact >10% for these customers.	N/A	Hydro Ottawa transitioned to a fully fixed charge effective January 1, 2020; rate impacts are below 10%
59	Mitigation plan if total bill increase for any customer class is >10% including: specification of class and magnitude of increase, description of mitigation measures, justification, revised impact calculation. The Tariff Schedule and Bill Impacts Model must reflect any mitigation plan proposed.	Yes	Exhibit 7-1-1
59	Rate Harmonization Plans, if applicable - including impact analysis	N/A	Rate Harmonization Plans not required
EXHIBIT 9 - DEFERRAL AND VARIANCE ACCOUNTS			
60	List of all outstanding DVA and sub-accounts; provide description of DVAs that were used differently than as described in the APH	Yes	Exhibit 9-1-1
60	Completed DVA continuity schedule for period following last disposition to present - live Excel format	Yes	Attachment 9-1-1(A)
60	Confirm use of interest rates established by the OEB by month or by quarter for each year	Yes	Exhibit 9-1-1
60	Explanation if account balances in continuity schedule differs from trial balance in RRR and AFS	Yes	Exhibit 9-1-1; Attachment 9-1-1(A); Exhibit 9-1-3; Exhibit 9-1-4
60	Identification of Group 2 accounts that will continue/discontinue going forward, with explanation	Yes	Exhibit 9-1-1; Exhibit 9-1-3; Exhibit 9-2-1
60	Statement as to any new accounts, and justification.	Yes	Exhibit 9-2-1
60 & 61	Statement whether any adjustments made to DVA balances previously approved by OEB on final basis; explanation, amount of adjustment and supporting documents	Yes	Exhibit 9-1-1
61	Breakdown of energy sales and cost of power by USoA - as reported in AFS mapped and reconciled to USoA. Provide explanation if making a profit or loss on commodity.	Yes	Exhibit 9-1-2
61	Statement confirming that IESO GA charge is pro-rated into RPP and non-RPP; provide explanation if not pro-rated.	Yes	Exhibit 9-1-2
Account 1575, IFRS-CGAAP Transitional PP&E Amounts			
Addendum, Page 10	For applicants that have already rebased under revised CGAAP, but have made further material transitional changes, these impacts should be recorded in Account 1575, and an explanation provided	N/A	Not requesting addition transitioning adjustments
Retail Service Charges			
61 & 62	Retail Service Charges - material balance in 1518 or 1548 - confirm variances are incremental costs of providing retail services; identify drivers for balances - provide schedule identifying all revenues and expenses listed by USoA for 2013, actual/forecast for bridge and test year - state whether Article 490 of APH has been followed; explanation if not followed	Yes	Attachment 9-1-1(A); Exhibit 9-1-5
62	Retail Service Charges - zero balance in 1518 or 1548 - state whether Article 490 of APH has been followed; explanation if not followed	Yes	Exhibit 9-1-5
Disposition of Deferral and Variance Accounts			
62	Identify all accounts for which LDC is seeking disposition; identify DVA for which LDC is not proposing disposition and the reasons why	Yes	Attachment 9-1-1(A); Exhibit 9-1-3; Exhibit 9-1-4; Exhibit 9-3-1
62	Statement whether DVA balances before forecasted interest match the last AFS; explain any variances	Yes	Exhibit 9-1-1; Attachment 9-1-1(A); Exhibit 9-1-3; Exhibit 9-1-4; Exhibit 9-3-1

62	Provide an explanation of variance > 5% between amounts proposed for disposition and amounts reported in RRR for each account.	**Yes**	Exhibit 4-5-2; Exhibit 9-1-1; Attachment 9-1-1(A); Exhibit 9-1-3; Exhibit 9-1-4; Exhibit 9-3-1
62	Provide explanations if variances are < 5% threshold if the variances in question relate to: (1) matters of principle (i.e. conformance with the APH or prior OEB decisions, and prior period adjustments); and/or, (2) the cumulative effect of immaterial differences over several accounts total to a material difference between what is proposed for disposition in total before forecasted interest and what is recorded in the RRR filings	**N/A**	
62	For any utility specific accounts requested for disposition, supporting evidence showing how balance is derived and relevant accounting order	**Yes**	Exhibit 9-1-3
62	Disposition of residual balances for vintage Account 1595 are only done once - distributors expected to seek disposition of the balance a year after a rate rider's sunset date has expired. No further dispositions of these accounts are generally expected unless justified by the distributor	**N/A**	No Account 1595 disposal is being requested
62	Proposed mechanisms for disposition with all relevant calculations: allocation of each account (including rationale), billing determinants for recovery purposes in accordance with Rate Design Policy	**Yes**	Exhibit 4-5-2; Attachment 9-1-1(A); Exhibit 9-1-3; Exhibit 9-3-1
62	Rate riders where volumetric rider is $0.0000 for one or more classes not included in the tariff for those classes	**Yes**	Exhibit 8-10-1; Attachment 8-10-1(A), (B)
63	Propose rate riders for recovery or refund of balances that are proposed for disposition. The default disposition period is one year; if the applicant is proposing an alternative recovery period must provide explanation.	**Yes**	Exhibit 9-3-1
63	Establish separate rate riders to recover balances in the RSVA's from Market Participants who must not be allocated the RSVA balances related to charges for which the MP's settle directly with the IESO.	**N/A**	No Group 1 Accounts are being proposed for disposition; 2018 audited balances were disposed as part of 2020 rate application
63 & 64	Proposed disposition of Account 1580 sub-account CBR Class B in accordance with the CBR Accounting Guidance. - embedded distributors who are not charged CBR (therefore no balance in sub-account CBR Class B) must indicate this is the case for them - In the DVA continuity schedule, applicants must indicate whether they serve any Class A customers during the period where Account 1580 CBR Class B sub-account balance accumulated. - Account 1580 sub-account CBR Class A is not to be disposed through rates proceedings but rather follow the OEB's accounting guidance. - The DVA continuity schedule will allocation the portion of Account 1580 sub-account CBR Class B allocated to customers who transitioned between Class A and Class B based on consumption levels	**N/A**	No Group 1 accounts are being propsed for disposition at this time, as 2018 audited balances were disposed are part of 2020 rate application
Global Adjustment			
64	Establishment of a separate rate rider included in the delivery component of the bill that would apply prospectively to Non-RPP Class B customers when clearing balances from the GA Variance Account	**N/A**	
Addendum, Pages 10-11	GA Analysis Workform in live Excel format and responses to questions in Appendix A of the GA Analysis Workform Instructions; explain discrepancies between actual and expected balance; unexplained discrepancies for each year greater than +/- 1% of total annual IESO GA charges considered material	**Yes**	Attachment 9-3-1(A), (B)
65 & 66	Description of settlement process with IESO or host distributor, specify GA rate used for each rate class, itemize process for providing estimates and describe true-up process, details of method for estimating RPP and non-RPP consumption, treatment of embedded generation/distribution. If distributor uses the actual GA rate to bill non-RPP Class B customers, a proposal must be made to exclude these customer classes from the allocations of the balance of Account 1589 and the calculation of the resulting rate riders	**Yes**	Exhibit 9-1-2
66	RPP Settlement True-Up - distributors to follow guidance in May 23, 2017 letter pertaining to the period that is being requested for disposition for Accounts 1588 and 1589	**Yes**	Exhibit 9-1-3
66 & 67	Certification by the CEO, CFO or equivalent that distributor has robust processes and internal controls in place for the preparation, review, verification and oversight of account balances being proposed for disposition	**Yes**	Exhibit 1-1-8; Exhibit 9-1-2
Establishment of New Deferral and Variance Accounts			
67	New DVA - information provided which addresses that the requested DVA meets the following criteria: causation, materiality, prudence; include draft accounting order.	**Yes**	Exhibit 9-2-1
	TOTAL "NO"	**0**	

UPDATED ADMINISTRATION

1. INTRODUCTION

In accordance with the Ontario Energy Board's ("OEB") *Chapter 2 Filing Requirements for Electricity Distribution Rate Applications*, as updated on July 12, 2018 and addended on July 15, 2019 ("Filing Requirements"), this Schedule provides information relating to the administration of this Application.

2. PRIMARY CONTACT INFORMATION

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4. INTERNET ADDRESS & MEDIA ACCOUNTS

Hydro Ottawa Limited's ("Hydro Ottawa" or "the utility") main webpage is the following: www.hydroottawa.com.

Regulatory documents will be available in the Active Applications tab of the Regulatory Affairs section of the website: https://hydroottawa.com/about-us/regulatory-affairs/active-applications.

The social media accounts maintained by Hydro Ottawa are as follows:

- Twitter – twitter.com/hydroottawa
- Facebook – facebook.com/hydroottawa
- Instagram – Instagram.com/hydroottawa
- YouTube – youtube.com/hydroottawa
- LinkedIn – linkedin.com/company/hydro-ottawa

5. MATERIAL IMPACTS ON CUSTOMERS

While the proposals set forth in this Application will change the rates for all customer classes, there are no proposed changes that will result in bill impacts which exceed the 10% bill impact threshold and which would thus have a material impact on customers.

6. MATERIALITY THRESHOLD

As per the Filing Requirements, default materiality threshold is defined as $1.0M for distributors with a revenue requirement greater than $200.0M. As originally submitted, Hydro Ottawa's service revenue requirement for 2021 is $214.9M. After accounting for 2019 actuals, the 2021 service revenue requirement is $216.6M. Consequently, the default materiality threshold is $1.0M. However, consistent with the approach taken in its prior rebasing application,[1] Hydro Ottawa has generally explained variances based on a materiality threshold of $750K for purposes of this Application.

Hydro Ottawa notes that the $1.0M materiality threshold will apply to the utility for any future Z factor application.

[1] Hydro Ottawa Limited, *2016-2020 Custom Incentive Rate-setting Distribution Rate Application*, EB-2015-0004 (April 29, 2015).

7. PUBLICATION AND NOTICE

Hydro Ottawa recommends that the Notice of Hearing for this Application be published in the *Ottawa Citizen* and *Le Droit* newspapers, both of which are paid daily publications. The *Ottawa Citizen* is the English language newspaper serving Ottawa and the surrounding region, including the Village of Casselman. It has a total daily circulation of approximately 80,200. *Le Droit* is the French language newspaper serving Ottawa and the surrounding region, including the Village of Casselman. Its total daily circulation is approximately 30,000.

8. BILL IMPACTS

Table 1 and Table 2 provide a summary of distribution bill impacts and total bill percentage impact for a typical residential customer using 750 kWh per month and for a General Service < 50 kW customer using 2,000 kWh per month. Both tables have been updated to incorporate 2019 actuals.

Table 1 – AS ORIGINALLY SUBMITTED – Residential Bill Impact

Residential (750 kWh)	2021	2022	2023	2024	2025
Change in Distribution Charge ($)	$1.31	$2.18	$1.84	$0.98	$0.61
Change in Distribution Charge (%)	4.57%	7.28%	5.73%	2.88%	1.75%
Total Bill % change	1.32%	1.54%	1.28%	0.68%	0.43%

Table 1 – UPDATED FOR 2019 ACTUALS – Residential Bill Impact

Residential (750 kWh)	2021	2022	2023	2024	2025
Change in Distribution Charge ($)	$1.98	$1.88	$1.54	$0.99	$0.62
Change in Distribution Charge (%)	6.91%	6.15%	4.74%	2.91%	1.77%
Total Bill % change	1.53%	1.33%	1.38%	0.69%	0.43%

Table 2 – AS ORIGINALLY SUBMITTED – General Service < 50 kW Bill Impact

General Service < 50 kW (2000 kWh)	2021	2022	2023	2024	2025
Change in Distribution Charge ($)	$1.74	$5.07	$5.15	$3.05	$2.25
Change in Distribution Charge (%)	2.44%	6.94%	6.59%	3.66%	2.61%
Total Bill % change	0.65%	1.37%	1.37%	0.81%	0.59%

Table 2 – UPDATED FOR 2019 ACTUALS – General Service < 50 kW Bill Impact

General Service < 50 kW (2000 kWh)	2021	2022	2023	2024	2025
Change in Distribution Charge ($)	$2.89	$5.02	$4.48	$3.05	$2.26
Change in Distribution Charge (%)	4.05%	6.76%	5.65%	3.64%	2.60%
Total Bill % change	0.69%	1.36%	1.52%	0.80%	0.59%

9. FORM OF HEARING REQUESTED

Hydro Ottawa requests that this Application be disposed of by way of an oral hearing.

10. REQUESTED EFFECTIVE DATE

Hydro Ottawa is requesting approval of the proposed distribution rates and other charges set forth in this Application effective January 1, 2021.

11. CHANGES TO METHODOLOGIES USED IN PREVIOUS APPLICATIONS

For certain business processes and for certain components in this Application, the methodology employed by Hydro Ottawa has changed since the filing of the utility's previous rebasing application. These changes are as follows:

- Hydro Ottawa has adopted three new accounting standards, all of which are in the International Financial Reporting Standard ("IFRS") family of standards: IFRS 15 – *Revenue from Contracts with Customers*, IFRS 9 – *Financial Instruments,* and IFRS 16 – *Leases*. Please see Exhibit 1-3-10: Changes to Accounting Policies Used in Previous Applications for more information.
- With the goal of achieving greater alignment with the definitions utilized in the *Chapter 5 Filing Requirements for Electricity Transmission and Distribution Applications*, Hydro Ottawa has restructured certain classifications within its capital program. For example, the utility has shifted both the Metering Program and Station Enhancements Program to the System Service category, as the projects within these programs are more aligned

with the drivers under this category. For additional examples and details, please see Exhibit 2-4-3: Distribution System Plan.

- As noted in section 16 below, Hydro Ottawa is requesting changes to the years of useful life for certain assets within the General Plant category. Please see Exhibit 2-4-4: Capitalization Policy and UPDATED Exhibit 4-3-1: Depreciation, Amortization, Disposal for more information.
- In light of the modifications to the Conservation First Framework, this Application is proposing to rate-base certain conservation and demand management activities for all classes of customers, with a focus on commercial customers. For details, please refer to Exhibit 4-1-6: Conservation and Demand Management.
- Various modifications have been made to the pricing methodology and the scope of Service Level Agreements governing the provision of shared services and allocation of costs between Hydro Ottawa and its affiliates. Please see Exhibit 4-2-1: Shared Services and Corporate Cost Allocation.
- In accordance with Bill C-97, which received Royal Assent in June 2019, Hydro Ottawa has implemented new rules permitting accelerated capital cost allowance for eligible capital assets. Please see UPDATED Exhibit 4-4-1: Payments in Lieu of Taxes for more information.
- In this Application, Hydro Ottawa has completed a cost allocation study based upon the OEB-approved model. The utility has made minor adjustments to the load profile data for purposes of cost allocation, as further explained in UPDATED Exhibit 7-1-1: Cost Allocation.
- Hydro Ottawa is proposing to use updated Loss Adjustment Factors for the 2021-2025 period. Please see UPDATED Exhibit 8-9-1: Loss Adjustment Factors for more information.

12. OEB DIRECTIONS FROM PREVIOUS DECISIONS AND/OR ORDERS

Below is a summary of previous OEB directives and a description of how such directives are addressed by Hydro Ottawa in this Application.

12.1. DIRECTIVE #1

In EB-2012-0383, the OEB indicated that unmetered load (kW) and consumption (kWh) data should ultimately be used to update load profile data for the purpose of the distributor's next cost allocation filing with the OEB, which occurs during the distributor's next cost of service application to the OEB. Subsequently, in a letter dated June 12, 2015, the OEB stated that "[t]here may be merit in updating load profiles to be more reflective of an individual distributor's circumstances. The OEB expects individual distributors to be mindful of material changes to load profiles and to propose updates in their respective cost of service or Custom IR applications when warranted."[2]

In this Application, details on updated load profiles can be found in UPDATED Exhibit 7-1-1: Cost Allocation.

12.2. DIRECTIVE #2

On August 21, 2014, amendments to the *Distribution System Code* ("DSC") came into force which require a distributor to install a MIST meter on any installation that is forecast by the distributor to have a monthly average peak demand during a calendar year of over 50 kW.[3] The deadline for distributors to comply with this DSC provision is August 21, 2020. Hydro Ottawa confirms that it is on track to achieve compliance with this requirement within the prescribed timeline.

12.3. DIRECTIVE #3

In its Decision rendered in EB-2015-0004 on February 25, 2016 (in the matter of a pole attachment charge for Hydro Ottawa for the utility's 2016-2020 Custom Incentive Rate-Setting ["Custom IR"] term), the OEB stated that Hydro Ottawa should use the pole attachment rate

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[2] Ontario Energy Board, Letter re: *Issuance of New Cost Allocation Policy for Street Lighting Rate Class* (June 12, 2015), page 4.
[3] Ontario Energy Board, *Notice of Amendment to a Code: Amendments to the Distribution System Code*, EB-2013-0311 (May 21, 2014).

approved in the Decision, "subject to any direction from the OEB regarding the implementation of any changes resulting from the Policy Review."[4]

The OEB's policy review culminated with the issuance of the *Report of the Board on Wireline Pole Attachment Charges* on March 22, 2018.[5] In this report, the OEB established a policy that "at the time of rebasing, LDCs may choose to select the provincially approved charge or to use utility-specific costs and pursue an LDC-specific pole attachment charge that better reflects their cost structures."[6]

As directed, during its 2016-2020 rate term, Hydro Ottawa has maintained use of the pole attachment charge that was approved as part of the adjudication of its 2016-2020 Custom IR application. By way of this Application, Hydro Ottawa is proposing to use the OEB's generic pole attachment rate for the 2021-2025 rate period. For additional information, please see UPDATED Exhibit 8-7-1: Specific Service Charges.

12.4. DIRECTIVE #4

In the aforementioned decision rendered in EB-2015-0004 with respect to a pole attachment charge for Hydro Ottawa (hereafter referred to as the "Pole Attachment Decision"), the OEB directed Hydro Ottawa to issue invoices for the difference between the interim rate of $22.35 and the approved pole attachment rate of $53.00, should the utility have already issued invoices. Hydro Ottawa issued invoices for the pole attachment difference where invoices had already been issued. Please see UPDATED Exhibit 6-1-1: Calculation of Revenue Deficiency or Sufficiency for the adjustment to base revenue requirement related to the Pole Attachment Decision.

[4] Ontario Energy Board, *Decision and Rate Order on Pole Attachment Charge*, EB-2015-0004 (February 25, 2016) page 15.
[5] Ontario Energy Board, *Report of the Ontario Energy Board - Wireline Pole Attachment Charges*, EB-2015-0304 (March 22, 2018).
[6] *Ibid*, page 52.

12.5. DIRECTIVE #5

In the Decision rendered in EB-2015-0004 on December 22, 2015 (in the matter of Hydro Ottawa's 2016-2020 Custom IR application), the OEB established a variance account for "the difference between revenue based on the final pole attachment charge yet to be approved by the OEB for Hydro Ottawa for 2016, and revenue based on the pole attachment charge underpinning the distribution rates approved by this order (i.e. $57)."[7] As instructed by the Pole Attachment Decision and approved as part of Hydro Ottawa's 2017 rate adjustment application, the amount was collected as part of Hydro Ottawa's 2017 rates.[8] For additional information, please see UPDATED Exhibit 9-1-3: Group 2 Accounts.

12.6. DIRECTIVE #6

In the Decision rendered in EB-2018-0044 on December 13, 2018 (in the matter of Hydro Ottawa's 2019 rate adjustment application), the OEB stated that it expected Hydro Ottawa to continue reporting on both the Efficiency Adjustment Mechanism and the Earnings Sharing Mechanism in the utility's 2021 application.[9] Hydro Ottawa is therefore reporting on the 2019 Efficiency Adjustment Mechanism and 2018 Earnings Sharing Mechanism deferral accounts as part of this Application. For additional details, please see UPDATED Exhibit 9-1-3: Group 2 Accounts.

12.7. DIRECTIVE #7

In the aforementioned Decision rendered in EB-2018-0044, the OEB instructed Hydro Ottawa to provide an update on the resolution to an Industrial Conservation Initiative ("ICI") enrollment matter and report on any necessary adjustments.[10] Hydro Ottawa has engaged the OEB on this matter and, at this time, is not requesting any adjustments. As part of its Decision and Order on Hydro Ottawa's 2020 rate adjustment application, the OEB stated, in reference to this directive, that "the OEB will proceed to finalize the balances for 2017 and 2018, and in light of the OEB's October 31, 2019 letter regarding Adjustments to Correct for Errors in Electricity Distributor

[7] Ontario Energy Board, *Decision and Order*, EB-2015-0004 (December 22, 2015), page 7.
[8] Hydro Ottawa Limited, *2017 Electricity Distribution Rate Application*, EB-2019-0046 (August 12, 2019).
[9] Ontario Energy Board, *Decision and Rate Order*, EB-2019-0046 (December 17, 2019), page 6.
[10] Ontario Energy Board, *Decision and Rate Order*, EB-2018-0044 (December 13, 2018), page 15.

'Pass-Through' Variance Accounts After Disposition, the OEB expects that any revisions to previous balances relating to this matter will be accommodated through the disposition of future variance account balances."[11]

12.8. DIRECTIVE #8

On February 14, 2019, the OEB issued a Decision and Order directing electricity distributors – including distributors with utility-specific charges – to implement new Retail Service Charges.[12] Hydro Ottawa implemented the new charges as directed and has used the updated rates as a placeholder as part of this Application. For additional details, please see Exhibit 8-4-1: Retail Service Charges.

In addition, any electricity distributor which had discontinued the use of Account 1518 and Account 1548 was to establish a new 1508 Sub-Account to record the difference in the incremental revenue as a result of the Decision and Order.[13] As Hydro Ottawa had discontinued the use of Account 1518 and Account 1548, a new Sub-Account to 1508 has been established. In accordance with OEB direction, Hydro Ottawa started tracking the incremental revenue in this new Sub-Account effective May 1, 2019. For additional details, please see UPDATED Exhibit 9-1-3: Group 2 Accounts.

12.9. DIRECTIVE #9

In its Decision rendered in EB-2019-0077 on October 17, 2019, the OEB approved an application submitted by Hydro One Networks Inc. ("HONI") and Hydro Ottawa, pursuant to section 92 of the *Ontario Energy Board Act*, *1998*, seeking leave to construct the Power South Nepean Project.[14] The project consists of two key components: (1) a new municipal transformer station to be constructed by Hydro Ottawa; and (2) upgrades to existing transmission facilities, as well as construction of a segment of new transmission line by HONI. The leave granted was

[11] Ontario Energy Board, *Decision and Rate Order*, EB-2019-0046 (December 17, 2019), page 13.
[12] Ontario Energy Board, *Decision and Order in the matter of energy retailer service charges effective May 1, 2019*, EB-2015-0304 (February 14, 2019).
[13] *Ibid*, Schedule B, page 1.
[14] Ontario Energy Board, *Decision and Order*, EB-2019-0077 (October 17, 2019).

subject to the OEB's standard conditions of approval, one of which was that "[t]he applicants shall advise the OEB of any proposed material change in the project, including but not limited to changes in: the proposed route, construction schedule, the necessary environmental assessment approvals, and all other approvals, permits, licences, certificates and rights required to construct the proposed facilities."[15]

By way of this Application, Hydro Ottawa is informing the OEB of minor modifications to the project's construction schedule. Whereas the original schedule had contemplated an in-service date of November 2021, this date has subsequently been revised to Q2 2022. In addition, the name of the station has been changed from South Nepean Municipal Transformer Station ("MTS") to Cambrian MTS. For additional information, please see Attachment 2-4-3(E): Material Investments.

13. CONDITIONS OF SERVICE

The current version of Hydro Ottawa's Conditions of Service is available for viewing on the following page of the utility's website:
https://hydroottawa.com/about-us/policies/conditions-service.

Since the filing of Hydro Ottawa's last rebasing application, there have been two sets of revisions to the utility's Conditions of Service. Version 6 came into effect on April 1, 2017, while Version 7 came into effect on April 1, 2019. A summary of the major changes to both versions can be found below in Table 3 below.

[15] *Ibid*, Schedule B.

Table 3 – Summary of Changes to Hydro Ottawa's Conditions of Service (2016-2019)

Section	Subject	Details	Implementation Date
1.6	Customer Rights and Responsibilities	Updated to identify customer rights	April 1, 2019
1.7	Distributor Rights and Responsibilities	Added distributor responsibilities to line up with the OEB's Consumer Charter	April 1, 2019
2.1	Connection	Added provisions for a Design Deposit for preparing and Offer to Connect, as well as a potential material and construction deposit for project-specific equipment.	April 1, 2017.
2.1.1	Point of Supply	Updated to reflect that Hydro Ottawa may choose to permit multiple services per property to accommodate electric vehicle charging (at its discretion)	April 1, 2019
2.1.2.1 / 3.1.3.7	Basic Credit	Policy clarified - one basic connection credit including one clearance or in-line pole. Expansion beyond that is subject to economic evaluation	April 1, 2019
2.2.1	Refusal to Connect for Previous Arrears	Updated to reflect Hydro Ottawa's policy on a refusal to connect unless previous amounts owing (related to previous accounts) are paid in full	April 1, 2019
2.4.5.5	Transformer Ownership Credit	Clarified that unmetered and temporary services do not receive a Transformer Ownership Credit ("TOC") and grandfathering conditions for TOCs that existed prior to November 1, 2000.	April 1, 2017
2.4.6.1	Methods of Payment and Payment Plans	Expanded options for bill payment.	April 1, 2017.
2.6.1 / 2.6.2	Customer Rate Classification	Clarified and updated criteria in determining customer rate classification.	April 1, 2017
3.0.8	Property Reinstatement	Added section outlining developer and property owner responsibilities with respect to new subdivision driveways and sidewalks.	April 1, 2017
3.0.17	Other Points of Ownership Demarcation	New section detailing demarcation of control signal lines and secondary distribution vault supplies	April 1, 2017
3.2.2 / 3.9.1	Service Requirements	Added 120/280 V, 2-phase, 3-wire, and 347.600V, 3-phase, 4-wire overhead supply up to 400A as offerings.	April 1, 2017
3.9	Temporary Services	Added conditions with respect to separate Temporary Services in addition to existing electrical Services	April 1, 2017

At the time of filing, Hydro Ottawa is not expecting that any of the approvals requested in this Application would result in changes to its Conditions of Service.

Hydro Ottawa confirms that no rates and charges are listed in its Conditions of Service that are not in its Tariff of Rates and Charges.

14. CORPORATE AND UTILITY ORGANIZATIONAL STRUCTURE

A description of Hydro Ottawa's corporate and utility organizational structure, along with a corporate entities relationship chart, is included in Exhibit 1-4-1: Corporate Structure and Governance.

There are currently no plans for modifying Hydro Ottawa's corporate or operational structure, nor for amending the utility's legal organization or control.

15. ACCOUNTING GUIDANCE FOR ACCOUNTS 1588 & 1589

In 2019, the OEB issued updated accounting guidance with respect to Account 1588 RSVA – Power and Account 1589 RSVA – Global Adjustment.[16] Hydro Ottawa confirms that its journal entries are recorded, as per the instructions set forth in this guidance. For additional details, please see UPDATED Exhibit 9-1-2: Group 1 Accounts.

16. SPECIFIC RELIEF REQUESTED

This Application is submitted pursuant to section 78 of the *Ontario Energy Board Act, 1998*. Herein, Hydro Ottawa is seeking the following approvals, which are also separately identified in UPDATED Appendix 2-A and clearly documented throughout applicable sections of this Application:

a) Approval of 2021-2025 revenue requirement, as proposed in UPDATED Exhibit 6-1-1: Calculation of Revenue Deficiency or Sufficiency;
b) Approval of 2021 distribution rates and charges, effective January 1, 2021, as proposed in UPDATED Exhibit 8-10-1: Current and Proposed Tariff of Rates and Charges;

[16] Ontario Energy Board, *Accounting Procedures Handbook Update - Accounting Guidance Related to Commodity Pass-Through Accounts 1588 & 1589* (February 21, 2019).

c) Approval of the Custom IR rate-setting formula and related elements for 2022-2025 distribution rates and charges, as proposed in UPDATED Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework;

d) Approvals related to deferral and variance accounts, as thus proposed throughout various Schedules in Exhibit 9:

   i) approval of the continuation of certain existing deferral and variance accounts, as set out in UPDATED Exhibit 9-1-1: Summary of Current Deferral and Variance Accounts;

   ii) approval of the discontinuance of certain existing deferral and variance accounts, as proposed in UPDATED Exhibit 9-1-1: Summary of Current Deferral and Variance Accounts and UPDATED Exhibit 9-1-3: Group 2 Accounts;

   iii) approval of new deferral and variance accounts, as proposed in Exhibit 9-2-1: New Deferral and Variance Accounts; and

   iv) disposition of balances in existing deferral and variance accounts, as set out in UPDATED Exhibit 9-3-1: Disposition of Deferral and Variance Accounts.

e) Approval of annual reporting for the 2021-2025 rate term, as proposed in Exhibit 1-1-11: Proposed Annual Reporting - 2021-2025;

f) Approval for a transformer substation called Cambrian MTS, with assets that operate above 50 kV, to form part of the Hydro Ottawa distribution system, as proposed in Exhibit 2-4-3: Distribution System Plan;

g) Approval of the inclusion into the 2021 opening rate base of Hydro Ottawa's New Facilities and Connection Cost Recovery Agreement Payments, whose revenue requirement has been held in deferral and variance accounts;

h) Approval to include the cost of any future right-of-use assets related to leases as part of rate base, as proposed in Exhibit 1-3-10: Changes to Accounting Policies Used in Previous Applications;

i) Approval to cease providing the transformer ownership credit effective November 1, 2025, as proposed in UPDATED Exhibit 8-1-1: Fixed/Variable Proportion;

j) Approval to increase the Standard Supply Service Administrative Charge, as proposed in UPDATED Exhibit 8-7-1: Specific Service Charges;

k) Approval of revised loss factor per UPDATED Exhibit: 8-9-1 Loss Adjustment Factors;

l) Approval to change the years of useful life for certain assets within the General Plant category, as requested in Exhibit 2-4-4: Capitalization Policy and Attachment 2-4-3(F): Fleet Replacement Program; and

m) Approval of other items or amounts that may be requested by Hydro Ottawa in the course of the proceeding, and such other relief or entitlements that the OEB may grant.

UPDATED - Appendix 2-A
List of Requested Approvals

The distributor must fill out the following sheet with the complete list of specific approvals requested and relevant section(s) of the legislation must be provided. All approvals, including accounting orders (deferral and variance accounts) new rate classes, revised specific service charges or retail service charges which the applicant is seeking, must be separately identified, as well being clearly documented in the appropriate sections of the application.

Additional requests may be added by copying and pasting blank input rows, as needed.

If additional requests arise, or requested approvals are removed, during the processing of the application, the distributor should update this list.

Hydro Ottawa Limited is seeking the following approvals in this application:

1		Approval of 2021-2025 revenue requirement, as proposed in **UPDATED** Exhibit 6-1-1: Calculation of Revenue Deficiency or Sufficiency;
2		Approval of 2021 distribution rates and charges, effective January 1, 2021, as proposed in **UPDATED** Exhibit 8-10-1: Current and Proposed Tariff of Rates and Charges;
3		Approval of the Custom Incentive Rate-Setting formula and related elements for 2022-2025 distribution rates and charges, as proposed in **UPDATED** Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework;
4		Approvals related to deferral and variance accounts, as thus proposed throughout various Schedules in Exhibit 9, as oulined in 4i- iv below:
4	i	approval of the continuation of certain existing deferral and variance accounts, as set out in **UPDATED** Exhibit 9-1-1: Summary of Current Deferral and Variance Accounts;

4	ii	approval of the discontinuance of certain existing deferral and variance accounts, as proposed in **UPDATED** Exhibit 9-1-2: Group 1 Accounts and **UPDATED** Exhibit 9-1-3: Group 2 Accounts;
4	iii	approval of new deferral and variance accounts, as proposed in Exhibit 9-2-1: New Deferral and Variance Accounts; and
4	iv	disposition of balances in existing deferral and variance accounts, as set out in **UPDATED** Exhibit 9-3-1: Disposition of Deferral and Variance Accounts
5		Approval of annual reporting for the 2021-2025 rate term, as proposed in Exhibit 1-1-11: Proposed Annual Reporting - 2021-2025;
6		Approval for a transformer substation called Cambrian MTS, with assets that operate above 50kV, to form part of the Hydro Ottawa distribution system, as proposed in Exhibit 2-4-3: Distribution System Plan;
7		Approval of the inclusion into the 2021 opening rate base of Hydro Ottawa's New Facilities and Connection Cost Recovery Agreement Payments, whose revenue requirement has been held in deferral and variance accounts;
8		Approval to include the cost of any future right-of-use assets related to leases as part of rate base, as proposed in Exhibit 1-3-10: Changes to Accounting Policies Used in Previous Applications;
9		Approval to cease providing the transformer ownership credit effective November 1, 2025, as proposed in **UPDATED** Exhibit 8-1-1: Fixed/Variable Proportion;
10		Approval to increase the Standard Supply Service Administrative Charge, **as proposed in UPDATED Exhibit 8-7-1: Specific Service Charges**;

11		Approval of revised loss factor per **UPDATED** Exhibit: 8-9-1 Loss Adjustment Factors;
12		Approval to change the years of useful life for certain assets within the General Plant category, as requested in Exhibit 2-4-4: Capitalization Policy and Attachment 2-4-3(F): Fleet Replacement Program; and
13		Approval of other items or amounts that may be requested by Hydro Ottawa in the course of the proceeding, and such other relief or entitlements that the OEB may grant.

CERTIFICATION OF EVIDENCE

I, Geoff Simpson, Chief Financial Officer of Hydro Ottawa Limited ("Hydro Ottawa"), hereby certify that, to the best of my knowledge, the UPDATED evidence filed in support of Hydro Ottawa's 2021-2025 Custom Incentive Rate-setting Application is accurate, consistent, and complete.

This certification is provided pursuant to the Ontario Energy Board's *Chapter 2, Chapter 3*, and *Chapter 5 Filing Requirements for Electricity Distribution Rate Applications*, as issued on July 12, 2018 and addended on July 15, 2019.

DATED this **4th** day of **May, 2020**.

DocuSigned by:
Geoff Simpson
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Geoff Simpson
Chief Financial Officer
Hydro Ottawa Limited

UPDATED APPLICATION SUMMARY

1. INTRODUCTION

This Schedule provides all of the information that is requested pursuant to section 2.1.6 of the Ontario Energy Board's ("OEB") *Chapter 2 Filing Requirements for Electricity Distribution Rate Applications*, as updated on July 12, 2018 and addended on July 15, 2019 ("Filing Requirements"). In addition, this Schedule summarizes the changes proposed in this Application that will have a material impact on customers of Hydro Ottawa Limited ("Hydro Ottawa"), including any changes to rates and charges that may affect discrete customer groups. As appropriate, specific customers or customer groups that will be impacted by such proposals are also identified.

2. REVENUE REQUIREMENT

As presented in Table 1 below, Hydro Ottawa's Service Revenue Requirement (as originally submitted) is $214.9M for the 2021 Test Year.

After accounting for 2019 actuals, Hydro Ottawa's Service Revenue Requirement is $216.6M for the 2021 Test Year, as shown in the updated version of Table 1 below.

Table 1 – AS ORIGINALLY SUBMITTED – Service Revenue Requirement - Change and Drivers ($'000s)

	OEB-Approved	Test Year	Change		Drivers
	2020	2021	$	%	
Return on Rate Base	$56,211	$67,489	$11,278	20%	- $173.8M increase in net fixed assets - Previously excluded items added back to rate base
Distribution Expenses (not including amortization)	$89,007[1]	$93,923	$4,916	6%	- Increases in compensation - Inflationary increases - Increase in distribution operations expenses
Amortization	$49,384	$52,450	$3,066	6%	- Increase in sustainment additions
Payment in Lieu of Taxes	$5,943	$1,024	($4,919)	(83%)	- Higher CCA deduction caused by large amount of fixed asset additions
Service Revenue Requirement[2]	**$200,544**	**$214,886**	**$14,342**	**7%**	

[1] This figure includes the mid-term adjustment to operations, maintenance and administration ("OM&A") expenses.
[2] Totals may not sum due to rounding.

Table 1 – UPDATED FOR 2019 ACTUALS – Service Revenue Requirement - Change and Drivers ($'000s)

	OEB-Approved	Test Year	Change		Drivers
	2020	2021	$	%	
Return on Rate Base	$56,211	$68,158	$11,947	21%	- $173.8M increase in net fixed assets (as originally submitted) - $171.9M increase in net fixed assets (accounting for 2019 actuals) - Previously excluded items added back to rate base
Distribution Expenses (not including amortization)	$89,007[3]	$93,923	$4,916	6%	- Increases in compensation - Inflationary increases - Increase in distribution operations expenses
Amortization	$49,384	$52,333	$2,949	6%	- Increase in sustainment additions
Payment in Lieu of Taxes	$5,943	$2,224	$(3,719)	(63%)	- Higher CCA deduction caused by large amount of fixed asset additions (as originally submitted) - Higher accounting depreciation add back caused by large amount of fixed asset additions (accounting for 2019 actuals)
Service Revenue Requirement[4]	**$200,544**	**$216,638**	**$16,094**	**8%**	

For further details on Hydro Ottawa's revenue requirement, please see UPDATED Exhibit 6-1-1: Calculation of Revenue Deficiency or Sufficiency.

3. BUDGETING AND ACCOUNTING ASSUMPTIONS

3.1. ECONOMIC OVERVIEW (GROWTH AND INFLATION)

In keeping with the rate adjustment formula used in its 2016-2020 Custom Incentive Rate-setting ("Custom IR") plan, Hydro Ottawa has assumed the Conference Board of Canada's updated inflation rate of 2.01% for all non-compensation-related costs in this Application.

[3] This figure includes the mid-term adjustment to operations, maintenance and administration ("OM&A") expenses.
[4] Totals may not sum due to rounding.

With respect to operations, maintenance and administration ("OM&A") expenses, year one of the Application term (2021) is a traditional rebasing year, with rates set on the basis of a forecast Test Year of $93.9M. Thereafter, OM&A expenditures in each year of the rate term will be adjusted using a Custom Price Escalation Factor ("CPEF") of 2.51%. The CPEF is comprised of three components, including a forecasted inflation factor of 2.26%. This factor is derived from applying Hydro Ottawa's specific labour/non-labour weighting factors to two indices (the Gross Domestic Product Implicit Price Index and Average Weekly Earnings for workers in Ontario, both reported by Statistics Canada) and averaging them over the 2017-2025 period.

For more information on the CPEF, please see UPDATED Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework.

3.2. ACCOUNTING STANDARDS

Hydro Ottawa adopted International Financial Reporting Standards ("IFRS") for financial reporting purposes on January 1, 2015.

Subsequent to that action, and to the filing of Hydro Ottawa's last rebasing application,[5] the utility has adopted three new accounting standards as required by the International Accounting Standards Board, as follows:

- IFRS 9 – *Financial Instruments*: this standard introduces revised guidance on the classification and measurement of financial assets, including basing the classification of financial assets on their contractual cash flow characteristics and the entity's business model for managing financial assets. Hydro Ottawa's adoption of IFRS 9 was effective as of January 1, 2018. There is no impact to revenue requirement associated with adoption of this standard.
- IFRS 15 – *Revenue from Contracts with Customers*: IFRS 15 provides a standardized, five-step model to recognize revenue (i.e. identify contract, identify performance obligations, determine transaction price, allocate transaction price, and recognize

[5] Hydro Ottawa Limited, *2016-2020 Custom Incentive Rate-Setting Distribution Rate Application*, EB-2015-0004 (April 29, 2015).

revenue). The adoption of IFRS 15 was effective as of January 1, 2018. There is no impact to revenue requirement associated with its adoption.

- IFRS 16 – *Leases*: this standard eliminates the current dual model (i.e. on and off balance sheet) and aims to provide greater comparability between companies who lease assets (i.e. right-of-use assets) and those who purchase assets with a single on-balance sheet approach. Hydro Ottawa adopted IFRS 16 as of January 1, 2019. As of that date, the adoption of IFRS 16 did not result in any right-of-use assets being recognized by the utility. However, by way of this Application, Hydro Ottawa is proposing to include the cost of any future right-of-use assets related to leases as part of rate base, since it is akin to purchasing property, plant, and/or equipment and financing it.

For additional information on the aforementioned IFRS standards, please see Exhibit 1-3-10: Changes to Accounting Policies Used in Previous Applications.

4. LOAD FORECAST SUMMARY

Hydro Ottawa's forecasted energy sales for the 2021 Test Year are 7,065,745 MWh, as originally submitted. This is 374,879 MWh (5.0%) lower than the 2016 OEB-approved MWh forecast. Accounting for 2019 actuals, Hydro Ottawa's forecasted energy sales for the 2021 Test Year are 7,063,482 MWh. This is 377,142 MWh (5.1%) lower than the 2016 OEB-approved MWh forecast.

Hydro Ottawa's demand sales forecast for the 2021 Test Year is 9,465,512 kW, as originally submitted.[6] This is 659,441 kW (6.5%) lower than the 2016 OEB-approved kW forecast. Accounting for 2019 actuals, Hydro Ottawa's forecasted demand sales for the 2021 Test Year are 9,454,357 kW.[6] This is 708,793 kW (7.0%) lower than the 2016 OEB-approved kW forecast.

The utility's forecasted average number of customers for the 2021 Test Year is 344,936, representing an increase of 6.1% over the 2016 OEB-approved number.

[6] This represents kW sales for commercial classes above 50kW, Sentinel Lighting, Street Lighting, and Standby Power.

The updated version of Table 2 provides a high-level summary of Hydro Ottawa's load forecast for the 2021-2025 Custom IR term.

Table 2 – AS ORIGINALLY SUBMITTED – Load Forecast Summary

Year	Total Sales (MWh)	Total Sales Demand (kW)[7]	Average Customers[8]
2021	7,065,745	9,465,512	344,936
2022	7,088,184	9,452,590	348,104
2023	7,116,619	9,452,792	351,138
2024	7,165,092	9,472,485	354,088
2025	7,179,631	9,457,798	357,017

Table 2 – UPDATED FOR 2019 ACTUALS – Load Forecast Summary

Year	Total Sales (MWh)	Total Sales Demand (kW)[9]	Average Customers[10]
2021	7,063,482	9,454,357	344,936
2022	7,085,688	9,450,676	348,104
2023	7,113,883	9,451,114	351,138
2024	7,162,048	9,470,932	354,088
2025	7,176,418	9,456,613	357,017

Hydro Ottawa has provided a detailed five-year, class-specific, and weather-normalized load forecast and customer connection forecast for each rate class in UPDATED Exhibit 3-1-1: Load Forecast. This forecast incorporates modifications to the provincial electricity conservation framework that were enacted in 2019 as well as the impacts of embedded generation.

5. DISTRIBUTION SYSTEM PLAN

Hydro Ottawa has formulated a consolidated Distribution System Plan ("DSP"), which provides a detailed and comprehensive view of the utility's investment plans and supporting information for the 2021-2025 period.[11] The DSP identifies the capital investments in Hydro Ottawa's

[7] *Ibid*.
[8] Customer numbers do not include Street Lighting, Sentinel Lights, Unmetered Scattered Load, and Standby Power.
[9] *Ibid*.
[10] Customer numbers do not include Street Lighting, Sentinel Lights, Unmetered Scattered Load, and Standby Power.
[11] Please see Exhibit 2-4-3.

distribution system and general plant assets which are required to maintain safe and reliable service to customers in the City of Ottawa and Village of Casselman, with operations that remain responsive to their primary needs and preferences: (i) keeping distribution rates low; (ii) maintaining reliability; and (iii) investing in new technology. In addition, the DSP outlines how capital investments will be prioritized, paced, and optimized, while minimizing rate impacts for customers and facilitating continuous improvement and productivity.

The expenditures outlined in the DSP are driven by distinct, specific needs. Table 3 below summarizes the major drivers underlying Hydro Ottawa's capital investment program for the 2021-2025 rate period.

Table 3 – 2021-2025 Capital Expenditure Drivers by Investment Category

Investment Category	Driver	Description
System Access	Customer Service Request	Customer request for new connection (load or generation)
	Third Party Requirements	Request by a third party for plant relocation or upgrade to an existing service
	Mandated Service Obligation	Regulatory requirement to maintain distribution licence under the *Distribution System Code* or requirement as per Hydro Ottawa's Conditions of Service
System Renewal	Assets at End of Service Life i. Failure ii. Failure Risk iii. Substandard Performance iv. High Performance Risk v. Functional Obsolescence	i. Asset no longer meets functional requirements ii. Asset is at risk of no longer meeting functional requirements iii. Asset still meets functional requirements; however, it falls below standards for operability or efficiency iv. Asset is at risk of failure in a way that can cause harm or damage to other equipment or assets or would put the distribution system in a detrimental state v. Asset is functionally obsolete with no spare parts, tools, and/or software to continue operation
System Service	Capacity Constraint	Requirement for additional capacity (station transformation or circuit) due to planned or realized load increases
	Reliability	Requirements driven by poor distribution system performance such as abnormally high duration or frequency of interruptions
	System Operability	Requirements for improved system operability and visibility
General Plant	System Capital Investment Support	• Capital contributions to Hydro One Networks Inc. for connection projects • Requirement for fleet/vehicle acquisition
	System Maintenance Support	Requirement for tools and associated equipment
	Business Operations Efficiency	Requirements for information technology software and systems
	Non-System Physical Plant	Building infrastructure requirements

Table 4, as updated below, provides a summary of the total capital expenditures that are planned for the 2021-2025 Custom IR rate term. The changes in 2021 and 2022 are the result of updates to the MiGen program, as described in updated section 2.3.3 of Attachment 2-4-3(E): Material Investments.

Table 4 – AS ORIGINALLY SUBMITTED – Summary of 2021-2025 Capital Expenditures ($'000,000s)

Investment Category	2021	2022	2023	2024	2025	Average 2021-2025
System Access	$56.7	$41.0	$37.4	$34.5	$34.0	$40.7
System Renewal	$43.3	$44.0	$40.2	$39.4	$40.5	$41.5
System Service	$31.0	$27.4	$24.3	$25.2	$23.9	$26.4
General Plant	$32.0	$11.7	$7.6	$17.4	$16.9	$17.1
Capital Contributions	$(41.3)	$(25.2)	$(19.9)	$(19.2)	$(19.3)	$(25.0)
TOTAL	**$121.8**	**$98.9**	**$89.6**	**$97.2**	**$96.0**	**$100.7**

Table 4 – UPDATED FOR 2019 ACTUALS – Summary of 2021-2025 Capital Expenditures ($'000,000s)

Investment Category	2021	2022	2023	2024	2025	Average 2021-2025
System Access	$56.7	$41.0	$37.4	$34.5	$34.0	$40.7
System Renewal	$43.3	$44.0	$40.2	$39.4	$40.5	$41.5
System Service	$26.7	$28.3	$24.3	$25.2	$23.9	$25.7
General Plant	$32.0	$11.7	$7.6	$17.4	$16.9	$17.1
Capital Contributions	$(39.2)	$(23.5)	$(19.9)	$(19.2)	$(19.3)	$(24.2)
TOTAL	**$119.5**	**$101.5**	**$89.6**	**$97.2**	**$96.0**	**$100.8**

These figures illustrate the sustained level of need for significant capital investment in Hydro Ottawa's distribution system, in order to maintain reliability and service quality for customers. This need is the result of several factors, including aging infrastructure, an expanding customer base, continued growth across the City of Ottawa, and the effects of severe weather events.

5.1.1. Renewable Energy Connection Costs

There are no renewable energy connection projects included in Hydro Ottawa's DSP which seek cost recovery from all ratepayers.

Similarly, Hydro Ottawa is not planning to specifically address stations that have restrictions for the connection of Energy Resource Facilities ("ERFs") within its capital expenditure plan. Nevertheless, the utility intends to replace station transformers that are identified for replacement through its Asset Management Process with units that have reverse-flow capabilities and can thus accommodate injection of renewable energy onto the grid.

The DSP does acknowledge that the number of ERF connections is expected to continue growing over the 2021-2025 rate period. Hydro Ottawa will respond to customer/generator requests for ERF connection and will seek appropriate recovery of costs from ERF proponents, as per its established Connection Impact Assessment process.

5.1.2. Smart Grid Costs

Table 5 below identifies planned investments related to Smart Grid for the 2021-2025 period.

Table 5 – AS ORIGINALLY SUBMITTED – Planned Smart Grid Investments ($'000s)

Budget Program & Project[12]	Forecast					
	2021	2022	2023	2024	2025	Total
Stations Enhancements • Station Temperature Sensors • Station Cybersecurity (OT Visibility & Safeguards)	$905	$459	$459	$459	$459	$2,741
Distribution Enhancements • Smart Grid Fund Initiatives • Great-DR Phase 2 (MiGen) • Other Distribution Enhancement Projects	$5,955	$4,016	$2,262	$1,860	$1,788	$15,881
SCADA Upgrades • SCADA System Renewal • Outage Management System Replacement • Distribution Management System • AMI Outage Management Integrations	$803	$2,708	$1,521	$501	$1,891	$7,424
RTU Upgrades • Self-Healing Grid	$253	$253	$253	$253	$253	$1,265
Communications Infrastructure • Optical Telecommunications Network Replacement • Field Area Network	$1,790	$1,044	$1,044	$1,044	$2,035	$6,957
Remote Disconnected Smart Meter	$501	$501	$501	$501	$501	$2,505
Cybersecurity Enhancement	$302.3	$201.5	$201.5	$201.5	$201.5	$1,108

[12] Additional information on these projects are available in Attachment 2-4-3(E): Material Investments. With the exception of Cybersecurity Enhancement, all of the projects listed fall under the System Service category. Cybersecurity Enhancement is within the General Plant category.

Table 5 – UPDATED FOR 2019 ACTUALS – Planned Smart Grid Investments ($'000s)

Budget Program & Project[13]	Forecast					
	2021	2022	2023	2024	2025	Total
Stations Enhancements ● Station Temperature Sensors ● Station Cybersecurity (OT Visibility & Safeguards)	$905	$459	$459	$459	$459	$2,741
Distribution Enhancements ● Smart Grid Fund Initiatives ● ~~Great-DR Phase 2 (~~MiGen~~)~~ ● Other Distribution Enhancement Projects	$1,612	$4,919	$2,262	$1,860	$1,788	$12,440
SCADA Upgrades ● SCADA System Renewal ● Outage Management System Replacement ● Distribution Management System ● AMI Outage Management Integrations	$803	$2,708	$1,521	$501	$1,891	$7,424
RTU Upgrades ● Self-Healing Grid	$253	$253	$253	$253	$253	$1,265
Communications Infrastructure ● Optical Telecommunications Network Replacement ● Field Area Network	$1,790	$1,044	$1,044	$1,044	$2,035	$6,957
Remote Disconnected Smart Meter	$501	$501	$501	$501	$501	$2,505
Cybersecurity Enhancement	$302.3	$201.5	$201.5	$201.5	$201.5	$1,108

5.1.3. Regional Planning Initiatives

Hydro Ottawa is currently engaged in the latest Integrated Regional Resource Plan ("IRRP") cycle for the Greater Ottawa area, which is expected to be completed in Q1 2020.[14] A number of regional and bulk system needs are currently being studied to determine optimal solutions. Table 6 below summarizes the preliminary short-term needs that have thus far been identified through the IRRP process. Of note, along with Hydro Ottawa, Hydro One Networks Inc.

[13] Additional information on these projects are available in Attachment 2-4-3(E): Material Investments. With the exception of Cybersecurity Enhancement, all of the projects listed fall under the System Service category. Cybersecurity Enhancement is within the General Plant category.

[14] The new IRRP for Greater Ottawa was published by the Independent Electricity System Operator ("IESO") on March 4, 2020. The planning solutions identified in the final IRRP match those that are identified in Table 6 below. In addition, the IESO is set to undertake an addendum study to investigate a handful of planning matters in more detail. Accordingly, Hydro Ottawa has not made any updates to this section of the Schedule or to its 2021-2025 DSP, as the existing content regarding regional planning initiatives remains relevant.

("HONI") is set to be assigned responsibility for executing certain solutions that are under consideration for addressing identified needs.

Table 6 – Preliminary Results from Active IRRP Cycle for Greater Ottawa Region

Need	Description	Preliminary Solution
Supply to Kanata	Several stations in the area are operating at or near their planning capacity. Large commercial and residential developments are driving significant growth in electricity demand in the near-term and medium-term.	Limitations on the existing transmission system in the area cannot accommodate expansion of the existing stations. A new station is likely required to provide reliable long-term supply in the area. The IESO is currently developing a bulk transmission plan in parallel to the Greater Ottawa IRRP that might impact requirements for connecting the new station. Bulk transmission plan will be finalized in 2020. Hydro Ottawa is planning to implement distribution system upgrades to distribute forecast growth between stations in the area.
Supply to South East Ottawa	Several stations in the area are operating at or near their planning capacity. Demand is expected to increase driven by large residential, mixed and industrial developments.	Hydro Ottawa will proceed with a plan to build a new 230 kV connected supply station in the south east part of the City. The new station is planned for energization in 2025. HONI will evaluate the options for this upgrade in the Regional Infrastructure Plan.
Supply to East Ottawa	Bilberry Creek TS came into service in 1976 and is approaching end of life. Options to decommission or refurbish the station were evaluated including the impact to the bulk system. Large industrial and residential mixed-use developments are forecasted to increase demand over the near-term and medium-term.	HONI will refurbish Bilberry Creek TS, including like for like transformer replacement. HONI will expand the station to provide two additional breaker positions to supply Hydro Ottawa customers.
Supply to the Regional 115 kV System	Several of the 230/115 kV transformers at Merivale and Hawthorne are operating at or near their capability	HONI will replace the more limiting of the 230/115 kV transformers at Merivale TS in the near-term so that the two Merivale transformers have similar capability. Subsequent to the release of the IRRP, the Working Group will undertake an IRRP Addendum Study. This will include an evaluation of the potential benefit of non-wires options to manage future demand growth on the 115 kV system.

Hydro Ottawa's five-year investment plan incorporates required projects to address the near-term regional needs, as identified in Table 7 below. Of note, these investments will remain subject to change through the finalization of the IRRP and subsequent Regional Infrastructure Plan ("RIP") processes.

Table 7 – Planned Investments Related to Regional Planning ($'000,000s)

Project	Forecast					
	2021	2022	2023	2024	2025	Total
Cambrian Municipal Transformer Station[15]	$27.9	$2.2	$0	$0	$0	$30.1
New East Station[16]	$0.51	$2.61	$7.32	$10.46	$9.79	$30.69
Distribution Capacity Upgrades (Kanata North, South Nepean, Bilberry)	$1.49	$2.10	$3.80	$3.04	$1.50	$11.93

6. RATE BASE

Table 8, as updated below, summarizes proposed changes in rate base for 2021. As originally submitted, Hydro Ottawa's 2021 Test Year rate base is budgeted to be $244.8M or 25% higher than the 2020 OEB-approved amount. Accounting for 2019 actuals, Hydro Ottawa's 2021 Test Year rate base is budgeted to be $256.9M or 26% higher than the 2020 OEB-approved amount. The increase is attributable to planned increases in capital additions as well as to previously-excluded items being placed back into rate base at their net book value.

Full details on Hydro Ottawa's proposed rate base for 2021-2025 can be found in UPDATED Exhibit 2-1-1: Rate Base Overview.

[15] Project costs include Connection Cost Recovery Agreement ("CCRA") payments to HONI.
[16] Project costs include CCRA payments to HONI.

Table 8 – AS ORIGINALLY SUBMITTED – 2020 OEB-Approved Rate Base vs. 2021 Test Year Rate Base ($'000s)

	OEB-Approved	Test Year	Change	
	2020	2021	$	%
Rate Base	$973,801	$1,218,659	$244,858	25%

Table 8 – UPDATED FOR 2019 ACTUALS – 2020 OEB-Approved Rate Base vs. 2021 Test Year Rate Base ($'000s)

	OEB-Approved	Test Year	Change	
	2020	2021	$	%
Rate Base	$973,801	$1,230,736	$256,935	26%

Table 9 below provides a summary of the change in capital expenditures between the 2021-2025 Test Year proposals and OEB-approved expenditures for the 2016-2020 period. The $34.0M reduction in capital expenditures can be largely explained by the completion of the Facilities Renewal Program.[17] For further details, please see UPDATED Exhibit 2-4-1: Capital Expenditure Summary and Exhibit 2-4-3: Distribution System Plan.

[17] For more information on the Facilities Renewal Program, please see UPDATED Attachment 2-1-1(A): New Administrative Office and Operations Facilities.

Table 9 – AS ORIGINALLY SUBMITTED – 2016-2020 OEB-Approved Capital Expenditures vs. 2021-2025 Proposed Capital Expenditures ($'000s)

	OEB-Approved	Test Years	Change	
	2016-2020	2021-2025	$	%
Capital Expenditures	$537,450[18]	$503,494	$(33,956)	(6%)

Table 9 – UPDATED FOR 2019 ACTUALS – 2016-2020 OEB-Approved Capital Expenditures vs. 2021-2025 Proposed Capital Expenditures ($'000s)

	OEB-Approved	Test Years	Change	
	2016-2020	2021-2025	$	%
Capital Expenditures	$537,450[19]	$503,799	$(33,651)	(6%)

7. OPERATIONS, MAINTENANCE, AND ADMINISTRATION EXPENSE

Hydro Ottawa's 2021 OM&A budget was developed as a Test Year rebasing budget and is based on the utility's forecast of expenditures needed to maintain service reliability and safety, and to remain in compliance with regulatory and legislative requirements.

As discussed in section 3.1 above, for the 2022-2025 Test Years Hydro Ottawa will adjust OM&A using a CPEF to align with the principles of incentive regulation, as enshrined in the Renewed Regulatory Framework ("RRF"). This formula consists of a two-component Price Cap Index ("PCI"): inflation and productivity. The formula includes an inflation factor and two factors for productivity. One productivity factor is a fixed amount for industry-wide productivity, and the other is a stretch factor which is set each year based on the level of productivity the distributor has achieved. In addition to the PCI components, the CPEF includes a growth factor as well.

[18] Approved capital expenditures for 2016-2020 are equivalent to those which were included in Hydro Ottawa's original 2016-2020 rate application. In the Approved Settlement Agreement governing the utility's 2016-2020 rate plan, the $10.0M reduction was applied to capital additions only.
[19] Approved capital expenditures for 2016-2020 are equivalent to those which were included in Hydro Ottawa's original 2016-2020 rate application. In the Approved Settlement Agreement governing the utility's 2016-2020 rate plan, the $10.0M reduction was applied to capital additions only.

The CPEF that Hydro Ottawa is proposing to apply to OM&A costs for the 2022-2025 Test Years is 2.51%. For more information on the CPEF and how it was developed, please see UPDATED Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework.

Table 10 below outlines Hydro Ottawa's Historical, Bridge, and Test Year OM&A expenditures.

Table 10 – AS ORIGINALLY SUBMITTED – OM&A Expenditures & Variances ($'000s)

	Year	OM&A	Previous Year	Variance	Variance
Historical	2016	$82,621			
	2017	$82,245	$82,621	$(376)	(0.46)%
	2018	$86,863	$82,245	$4,619	5.62%
Bridge	2019	$87,545	$86,863	$682	0.79%
	2020	$91,990	$87,545	$4,445	5.08%
Test	2021	$93,923	$91,990	$1,932	2.10%
	2022	$96,280	$93,923	$2,357	2.51%
	2023	$98,697	$96,280	$2,417	2.51%
	2024	$101,174	$98,697	$2,477	2.51%
	2025	$103,714	$101,174	$2,539	2.51%

Table 10 – UPDATED FOR 2019 ACTUALS – OM&A Expenditures & Variances ($'000s)

	Year	OM&A	Previous Year	Variance	Variance
Historical	2016	$82,621			
	2017	$82,245	$82,621	$(376)	(0.46)%
	2018	$86,863	$82,245	$4,619	5.62%
	2019	$83,113	$86,863	($3,750)	(4.32%)
Bridge	2020	$91,990	$83,113	$8,878	10.68%
Test	2021	$93,923	$91,990	$1,932	2.10%
	2022	$96,280	$93,923	$2,357	2.51%
	2023	$98,697	$96,280	$2,417	2.51%
	2024	$101,174	$98,697	$2,477	2.51%
	2025	$103,714	$101,174	$2,539	2.51%

For 2021 Test Year OM&A, Table 11 below shows both the dollar and percentage change from the last year of OM&A expenditures approved by the OEB (i.e. 2020 Bridge Year).

Table 11 – 2020 OEB-Approved OM&A vs. 2021 Test Year OM&A ($'000s)

	OEB-Approved	Test	Change	
	2020	2021	$	%
OM&A	$89,007	$93,923	$4,916	5.5%

For more information on OM&A, please see UPDATED Exhibit 4-1-1: Operations, Maintenance and Administration Summary and UPDATED Exhibit 4-1-3: Operations, Maintenance and Administration Program Costs.

7.1. COST DRIVERS & TRENDS

Table 12 below shows the overall cost drivers for OM&A. More detailed explanations for each item are provided in UPDATED Exhibit 4-1-4: Operations, Maintenance and Administration Cost Drivers and Program Variance Analysis.

Table 12 – AS ORIGINALLY SUBMITTED – Summary of Overall OM&A Cost Drivers and Trends ($'000,000s)

Major Driver	2016 Historical Year	2017 Historical Year	2018 Historical Year	2019 Bridge Year	2020 Bridge Year	2021 Test Year
OPENING BALANCE	**$83.1**[20]	**$ 82.6**	**$ 82.2**	**$ 86.8**	**$ 87.5**	**$ 91.9**
Labour Compensation and Benefits		$(0.2)	$3.3	$0.6	$1.6	$2.0
Proactive and Reactive Distribution System Maintenance		$0.1	$0.5	$0.5	$(0.1)	$0.3
Facilities, Insurance and Fuel		$0.1	$0.3	$2.9	$(1.5)	$0.2
OEB Fees and CDM Allocation		$(0.1)	$0.0	$0.2	$0.2	$0.7
Call Centre, Postage and Bad Debt		$0.3	$(1.0)	$ (0.7)	$0.8	$0.0
Dark Fiber Fees		$(0.1)	$0.0	$0.3	$0.9	$(1.7)
Technology		$0.8	$0.4	$0.5	$1.3	$0.9
SLA Cost Reclassification		$0.0	$0.0	$(3.7)	$(0.2)	$(0.1)
Other	$(0.5)	$(1.3)	$1.1	$0.1	$1.4	$(0.3)
Total Change	**$(0.5)**	**$(0.4)**	**$4.6**	**$0.7**	**$4.4**	**$2.0**
CLOSING BALANCE[21]	**$ 82.6**	**$ 82.2**	**$ 86.8**	**$ 87.5**	**$ 91.9**	**$ 93.9**

[20] The 2016 Opening Balance represents that which was approved by the OEB in the adjudication of Hydro Ottawa's 2016-2020 Custom IR application (EB-2015-0004).
[21] Totals may not sum due to rounding.

Table 12 – UPDATED FOR 2019 ACTUALS – Summary of Overall OM&A Cost Drivers and Trends[22] ($'000,000s)

Major Driver	2016 Historical Year	2017 Historical Year	2018 Historical Year	2019 Historical Year	2020 Bridge Year	2021 Test Year
OPENING BALANCE	**$83.1[23]**	**$ 82.6**	**$ 82.2**	**$ 86.8**	**$ 83.1**	**$ 91.9**
Labour Compensation and Benefits		$(0.2)	$3.3	($1.9)	$4.1	$2.0
Proactive and Reactive Distribution System Maintenance		$0.1	$0.5	$0.0	$0.4	$0.3
Facilities, Insurance, and Fuel		$0.1	$0.3	$3.4	$(2.0)	$0.2
OEB Fees and CDM Allocation		$(0.1)	$0.0	$0.2	$0.2	$0.7
Call Centre, Postage, and Bad Debt		$0.3	$(1.0)	$(0.7)	$0.8	$0.0
Dark Fiber Fees		$(0.1)	$0.0	$0.1	$1.0	$(1.7)
Technology		$0.8	$0.4	$0.5	$1.3	$0.9
SLA Cost Reclassification		$0.0	$0.0	$(3.2)	$(0.7)	$(0.1)
Other	$(0.5)	$(1.3)	$1.1	$(2.1)	$3.7	$(0.3)
Total Change	**$(0.5)**	**$(0.4)**	**$4.6**	**$(3.7)**	**$8.8**	**$2.0**
CLOSING BALANCE[24]	**$ 82.6**	**$ 82.2**	**$ 86.8**	**$ 83.1**	**$ 91.9**	**$ 93.9**

7.2. COMPENSATION

Table 13 below shows the total compensation included in OM&A for each of the Historical, Bridge, and Test Years. For more information, please see UPDATED Exhibit 4-1-4: Operations, Maintenance and Administration Cost Drivers and Program Variance Analysis as well as UPDATED Exhibit 4-1-5: Workforce Staffing and Compensation.

[22] Information has been updated and presented consistent with UPDATED Attachment 4-1-4(A): OEB Appendix 2-JB: Recoverable OM&A Cost Driver Table.
[23] The 2016 Opening Balance represents that which was approved by the OEB in the adjudication of Hydro Ottawa's *2016-2020 Custom Incentive Rate-Setting Distribution Rate Application* (EB-2015-0004).
[24] Totals may not sum due to rounding.

Table 13 – AS ORIGINALLY SUBMITTED – Total Compensation Costs, Including Benefits ($'000s)

	Year	Compensation	Previous Year	Variance ($)	Variance (%)
Historical	2016	$72,127			
	2017	$71,939	$72,127	$(188)	(0.26)%
	2018	$75,205	$71,939	$3,266	4.54%
Bridge	2019	$75,810	$75,205	$605	0.80%
	2020	$77,447	$75,810	$1,637	2.16%
Test	2021	$79,486	$77,447	$2,039	2.63%

Table 13 – UPDATED FOR 2019 ACTUALS – Total Compensation Costs, Including Benefits ($'000s)

	Year	Compensation	Previous Year	Variance ($)	Variance (%)
Historical	2016	$72,127			
	2017	$71,939	$72,127	$(188)	(0.26)%
	2018	$75,205	$71,939	$3,266	4.54%
	2019	$73,329	$75,205	$(1,876)	(2.49)%
Bridge	2020	$77,447	$73,329	$4,118	5.62%
Test	2021	$79,486	$77,447	$2,039	2.63%

The Filing Requirements stipulate that applicants must specify total compensation costs for the Test Year as well as the change in compensation costs between the Test Year and the last OEB-approved year (expressed in both monetary and percentage terms). In this regard, Hydro Ottawa notes that the previous approval granted by the OEB with respect to compensation costs was embedded in the OEB's general approval of the utility's total OM&A costs for the 2016-2020 period. More specifically, in the adjudication of Hydro Ottawa's 2016-2020 Custom IR application, the utility was granted approval for an overall envelope of OM&A costs (inclusive of compensation) for the 2016 base year, with 2017-2020 OM&A costs adjusted on an annual basis using an escalator factor.

For more information on Hydro Ottawa's compensation costs, including a comparison of 2021 Test Year compensation costs with Historical and Bridge Year costs for the 2016-2020 period, please see UPDATED ~~Exhibit~~ Attachment 4-1-5(A): Employee Compensation Strategy.

8. COST OF CAPITAL

Table 14 below summarizes the capital structure, cost of capital parameters, and Weighted Average Cost of Capital ("WACC") that Hydro Ottawa is proposing to utilize for purposes of this Application.

Table 14 – 2021-2025 Weighted Average Cost of Capital

Year	Short-Term Debt Weight	Short-Term Debt Rate	Long-Term Debt Weight	Long-Term Debt Rate	Equity Weight	Return on Equity	WACC
2021	4%	2.75%	56%	3.35%	40%	8.88%	5.54%
2022	4%	2.75%	56%	3.36%	40%	9.13%	5.64%
2023	4%	2.75%	56%	3.40%	40%	9.31%	5.74%
2024	4%	2.75%	56%	3.44%	40%	9.41%	5.80%
2025	4%	2.75%	56%	3.69%	40%	9.46%	5.96%

Hydro Ottawa is using the OEB's cost of capital methodology for its capital components. The short-term debt component uses the 2.75% rate as outlined in the OEB's 2020 Cost of Capital Parameters letter dated October 31, 2019.[25] Hydro Ottawa is proposing that this rate be locked in for the five-year term covered by this Application. The long-term debt and return on equity ("ROE") are calculated as per UPDATED Exhibit 5-1-1: Cost of Capital and Capital Structure, and use the OEB's formulaic methodology to determine the forecast rates. The only deviation from this is the use of Hydro Ottawa's own historical spreads in determining long-term interest rates.

[25] Ontario Energy Board, Letter re: *2020 Cost of Capital Parameters* (October 31, 2019).

9. COST ALLOCATION AND RATE DESIGN

9.1. COST ALLOCATION

Hydro Ottawa engaged Elenchus Research Associates ("Elenchus") to assist in preparing a Cost Allocation Model for the 2021 Test Year. Using the OEB's approved cost allocation methodologies and the V3.7 Cost Allocation Model, Hydro Ottawa's 2021 base revenue requirement has been allocated to the utility's nine rate classes. The primary purpose of the Cost Allocation Report is to determine the proportions of total revenue requirement that are the responsibility of each rate class.[26] The resulting revenue-to-cost ratios for each rate class were determined using the total revenues over costs for the Test Year, pursuant to the OEB's policies for cost allocation by electricity distributors.[27]

9.2. RATE DESIGN

The results of the Cost Allocation Report were the main input into Hydro Ottawa's rate design process. Elenchus undertook the study to determine whether refinements were necessary to better reflect the OEB's principle of cost causality in the utility's cost allocation to customers. The result of Elenchus' study indicated that some classes of customers fell outside the acceptable revenue-to-cost ranges as established by the OEB. The utility adjusted GS <50 kW, Large Use, and Street Lighting customer classes to bring them within the specified ranges. The Sentinel customer class will be adjusted over a five-year period to mitigate the bill impact associated with a large increase in revenue requirement that is necessary to bring that class within its range.

As of January 1, 2020, Residential distribution rates are fully fixed in compliance with the policy adopted by the OEB in 2015.[28] Rates for all other customer classes will continue to have both a fixed component and a variable component based on consumption (kWh) or demand (kW).

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[26] Please see Attachment 7-1-1(B): Cost Allocation Report.
[27] Ontario Energy Board, *Report of the Board - Review of Electricity Distribution Cost Allocation Policy*, EB-2010-0219 (March 31, 2011).
[28] Ontario Energy Board, *Board Policy - A New Distribution Rate Design for Residential Electricity Customers*, EB-2012-0410 (April 2, 2015).

10. DEFERRAL AND VARIANCE ACCOUNTS

Hydro Ottawa proposes to clear Group 2 deferral accounts, including the Lost Revenue Adjustment Mechanism ("LRAM") Account. The total net deferral and variance ("DVA") balance proposed for disposition is $(5,751,923), as originally submitted. Hydro Ottawa is proposing that the Rate Riders for Group 2 Accounts (excluding LRAM) be disposed of over two years. For the LRAM Variance Account, a one-year disposition period is proposed. As no Group 1 Accounts are being requested for disposition at this time, the rate riders are the same for Regulated Price Plan ("RPP") and non-RPP customers.

After accounting for 2019 actuals, Hydro Ottawa is proposing to clear Group 1 and Group 2 Accounts, including the LRAM Account. The total net DVA updated balance proposed for disposition is $(6,695,545). Hydro Ottawa is proposing that the Deferral/Variance Accounts Rate Riders for Group 1 and Group 2 Accounts be disposed of over two years. Disposition of all other rate riders is requested over a one-year period.

Hydro Ottawa is proposing modifications to the following DVAs (for details, please refer to Exhibit 9-2-1: New Deferral and Variance Accounts):

- Uniform System of Account ("USofA") Sub-Account 1508 Connections Cost Recovery Agreement Payments Deferral Account
- USofA Sub-Account 1508 Capital Additions Revenue (excluding System Access) Differential Variance Account
- USofA Sub-Account 1508 System Access Capital Additions Revenue Requirement Differential Variance Account
- USofA Sub-Account 1508 Earnings Sharing Mechanism Variance Account

In addition, Hydro Ottawa is requesting that the following DVAs be discontinued:

- 1508 Sub-Account - Energy East Consultation Costs

- 1508 Sub-Account - Pole Attachment Charge Revenues Variance Account
- 1508 Sub-Account - Wireless Attachment Revenues Deferral Account
- 1508 Sub-Account - Y-Factor Variance Account
- 1508 Sub-Account - Gains/Losses from Sale of Existing Facilities Deferral
- 1508 Sub-Account - New Facilities Deferral Account

The following Accounts were approved for discontinuance as part of Hydro Ottawa's 2016-2020 rate plan. However, clearance of final balances are being requested as part of this Application.

- Account 1518 - Retail Cost Variance Account – Retail
- Account 1548 - Retail Cost Variance Account – STR

Further information regarding DVAs, the amounts proposed for clearance, and proposals for new DVAs, please refer to UPDATED Exhibit 9-1-1: Summary of Current Deferral and Variance Accounts, Exhibit 9-2-1: New Deferral and Variance Accounts, and UPDATED Exhibit 9-3-1: Disposition of Deferral and Variance Accounts.

11. BILL IMPACTS

In developing its capital and OM&A budgets for the 2021-2025 period, Hydro Ottawa was careful to have due regard for the impacts that bill increases may have on customers. The utility's objective was to keep the total bill impacts for each of its customer classes as minimal as possible.

The updated version of Table 15 below provides a summary of the total bill impacts for typical customers in all classes and has been updated to account for 2019 actuals. Further details regarding Hydro Ottawa's proposed bill impacts are available in UPDATED Exhibit 8-12-1.

Table 15 – AS ORIGINALLY SUBMITTED – Summary of Bill Impacts

Rate Class		Approved	Proposed				
		2020	2021	2022	2023	2024	2025
Residential (750 kWh)	Distribution Charge	$28.64	$29.95	$32.13	$33.97	$34.95	$35.56
	Change in Distribution Charge		$1.31	$2.18	$1.84	$0.98	$0.61
	% Distribution Increase		4.57%	7.28%	5.73%	2.88%	1.75%
	% Increase of Total Bill		1.32%	1.54%	1.28%	0.68%	0.43%
General Service <50 kW (2,000 kWh)	Distribution Charge	$71.32	$73.06	$78.13	$83.28	$86.33	$88.58
	Change in Distribution Charge		$1.74	$5.07	$5.15	$3.05	$2.25
	% Distribution Increase		2.44%	6.94%	6.59%	3.66%	2.61%
	% Increase of Total Bill		0.65%	1.37%	1.37%	0.81%	0.59%
General Service 50 kW - 1,499 kW (250 kW)	Distribution Charge	$1,461.93	$1,537.98	$1,669.42	$1,785.17	$1,853.01	$1,905.37
	Change in Distribution Charge		$76.05	$131.44	$115.76	$67.84	$52.36
	% Distribution Increase		5.20%	8.55%	6.93%	3.80%	2.83%
	% Increase of Total Bill		1.59%	0.74%	0.65%	0.38%	0.29%
General Service 1,500 kW - 4,999 kW (2,500 kW)	Distribution Charge	$15,941.18	$16,614.68	$18,015.99	$19,263.84	$19,992.90	$20,452.40
	Change in Distribution Charge		$673.50	$1,401.31	$1,247.85	$729.06	$459.50
	% Distribution Increase		4.22%	8.43%	6.93%	3.78%	2.30%
	% Increase of Total Bill		1.53%	0.78%	0.69%	0.40%	0.25%
Large Use (7,500 kW)	Distribution Charge	$48,420.32	$53,922.32	$58,287.22	$62,092.67	$64,292.42	$65,709.17
	Change in Distribution Charge		$5,502.00	$4,364.90	$3,805.45	$2,199.75	$1,416.75
	% Distribution Increase		11.36%	8.09%	6.53%	3.54%	2.20%
	% Increase of Total Bill		2.16%	0.79%	0.68%	0.39%	0.25%
Sentinel Lighting (0.4 kW)	Distribution Charge	$9.53	$10.91	$13.14	$15.31	$17.20	$18.99
	Change in Distribution Charge		$1.38	$2.23	$2.17	$1.89	$1.79
	% Distribution Increase		14.46%	20.46%	16.54%	12.33%	10.44%
	% Increase of Total Bill		7.36%	8.74%	7.83%	6.32%	5.65%
Street Lighting (1 kW)	Distribution Charge	$7.76	$6.99	$7.97	$8.68	$8.98	$9.24
	Change in Distribution Charge		$(0.77)	$0.98	$0.71	$0.30	$0.26
	% Distribution Increase		(9.98)%	14.07%	8.92%	3.46%	2.91%
	% Increase of Total Bill		(1.10)%	3.16%	2.24%	0.96%	0.83%
Unmetered Scattered Load (470 kWh)	Distribution Charge	$17.08	$17.49	$19.55	$21.37	$22.67	$23.82
	Change in Distribution Charge		$0.41	$2.06	$1.82	$1.30	$1.15
	% Distribution Increase		2.42%	11.76%	9.33%	6.10%	5.07%
	% Increase of Total Bill		0.98%	2.36%	2.05%	1.44%	1.26%

Table 15 – UPDATED FOR 2019 ACTUALS – Summary of Bill Impacts

Rate Class		Approved	Proposed				
		2020	2021	2022	2023	2024	2025
Residential (750 kWh)	Distribution Charge	$28.64	$30.62	$32.50	$34.04	$35.03	$35.65
	Change in Distribution Charge		$1.98	$1.88	$1.54	$0.99	$0.62
	% Distribution Increase		6.91%	6.15%	4.74%	2.91%	1.77%
	% Increase of Total Bill		1.53%	1.33%	1.38%	0.69%	0.43%
General Service <50 kW (2,000 kWh)	Distribution Charge	$71.32	$74.21	$79.23	$83.71	$86.76	$89.02
	Change in Distribution Charge		$2.89	$5.02	$4.48	$3.05	$2.26
	% Distribution Increase		4.05%	6.76%	5.65%	3.64%	2.60%
	% Increase of Total Bill		0.69%	1.36%	1.52%	0.80%	0.59%
General Service 50 kW - 1,499 kW (250 kW)	Distribution Charge	$1,461.93	$1,508.85	$1,620.11	$1,788.85	$1,857.00	$1,909.66
	Change in Distribution Charge		$46.93	$111.26	$168.74	$68.15	$52.66
	% Distribution Increase		3.21%	7.37%	10.42%	3.81%	2.84%
	% Increase of Total Bill		2.96%	(1.08)%	1.20%	0.38%	0.29%
General Service 1,500 kW - 4,999 kW (2,500 kW)	Distribution Charge	$15,941.18	$16,483.93	$17,672.63	$19,315.57	$20,048.54	$20,512.79
	Change in Distribution Charge		$542.75	$1,188.70	$1,642.94	$732.97	$464.25
	% Distribution Increase		3.40%	7.21%	9.30%	3.79%	2.32%
	% Increase of Total Bill		2.94%	(1.01)%	1.18%	0.40%	0.25%
Large Use (7,500 kW)	Distribution Charge	$48,420.32	$53,055.32	$56,727.95	$62,069.06	$64,275.56	$65,702.06
	Change in Distribution Charge		$4,635.00	$3,672.63	$5,341.11	$2,206.50	$1,426.50
	% Distribution Increase		9.57%	6.92%	9.42%	3.55%	2.22%
	% Increase of Total Bill		3.46%	(1.19)%	1.38%	0.39%	0.25%
Sentinel Lighting (0.4 kW)	Distribution Charge	$9.53	$11.25	$13.34	$15.38	$17.30	$19.12
	Change in Distribution Charge		$1.72	$2.10	$2.04	$1.91	$1.82
	% Distribution Increase		18.02%	18.64%	15.32%	12.43%	10.53%
	% Increase of Total Bill		8.47%	8.13%	7.62%	6.38%	5.71%
Street Lighting (1 kW)	Distribution Charge	$7.76	$7.46	$8.08	$8.80	$9.11	$9.38
	Change in Distribution Charge		$(0.30)	$0.62	$0.72	$0.31	$0.27
	% Distribution Increase		(3.89)%	8.26%	8.94%	3.55%	3.00%
	% Increase of Total Bill		(0.22)%	1.96%	2.93%	0.99%	0.87%
Unmetered Scattered Load (470 kWh)	Distribution Charge	$17.08	$17.68	$19.38	$21.25	$22.55	$23.70
	Change in Distribution Charge		$0.60	$1.71	$1.86	$1.30	$1.15
	% Distribution Increase		3.54%	9.64%	9.61%	6.13%	5.10%
	% Increase of Total Bill		0.92%	1.96%	2.42%	1.44%	1.26%

DISTRIBUTION SYSTEM OVERVIEW

1. OVERVIEW

Hydro Ottawa operates in the City of Ottawa and the Village of Casselman. Hydro Ottawa is a corporation incorporated pursuant to the *Business Corporations Act* RSO 1990 c. B.16 in Ontario and is licensed under Ontario Energy Board ("OEB") Electricity Distributor License No. ED-2002-0556. With approximately 340,000 customers within its service territory as of the end of 2019, the utility is one of the largest Local Distribution Companies ("LDCs") in the province in terms of customer count.

Hydro Ottawa was created in November 2000, following the amalgamation of several municipalities in the region and the formation of the City of Ottawa. Hydro Ottawa acquired the assets of Casselman Hydro Inc. in April 2002. The Ottawa and Casselman segments of the service territory are non-contiguous and separated by the territory of Hydro One Networks Inc. ("Hydro One"). A map of Hydro Ottawa's service territory is provided in Attachment 1-1-6(A): Distribution System Map.

Like other LDCs in Ontario, Hydro Ottawa carries out its business activities under the same direction and oversight from the OEB, but operates within its own unique environment. Hydro Ottawa's foremost distinctiveness is the profile and physical size of its service territory. With a service area comprised of 662 km^2 of rural area and 454 km^2 of urban area, its total footprint of 1,116 km^2 makes it the fifth physically largest in the province.

The breakdown of Hydro Ottawa's total customer base of 339,771 customers is as follows: 311,464 residential; 25,080 small commercial; 3,216 commercial; and 11 Large Users. Hydro Ottawa is one of the largest LDCs in the province in terms of customer count, ranking behind only Hydro One, Alectra Utilities Corporation, and Toronto Hydro Electric-System Limited in this category. As an LDC serving the National Capital Region, Hydro Ottawa has a customer demographic with a number of institutional customers, including many Federal Government facilities and campuses, four hospitals, and three post-secondary educational institutions.

Hydro Ottawa's service territory is a geographically diverse area, with significant population dispersion. The utility's service territory sits at the convergence of three major rivers: the Ottawa River, the Gatineau River, and the Rideau River. The Ottawa River functions as the northern border of the service territory, with the province of Québec located beyond it. Hydro Ottawa's service area includes the majority of the City of Ottawa and is otherwise completely surrounded by the service territory of Hydro One. The Rideau Canal, which bypasses unnavigable sections of the Rideau River, winds itself through the service area. Constructed barriers such as Highways (417, 416, and 174) and rail lines further subdivide the territory.

Around the main urban area of the City of Ottawa is an extensive greenbelt comprised of mostly forest, farmland, and marshland. Outside of the greenbelt, there are a number of rapidly expanding suburban communities. These distinct geographical features present Hydro Ottawa with unique circumstances in terms of response time and, ultimately, operating costs.

2. HOST VS. EMBEDDED DISTRIBUTOR

As noted above, Hydro Ottawa's service area is surrounded by the service territory of Hydro One. There are no licensed distributors embedded within Hydro Ottawa's service area. Hydro Ottawa's load is primarily delivered through transmission connection points; however, there are a number of delivery points embedded in the Hydro One distribution system.

3. HIGH VOLTAGE DISTRIBUTION ASSETS

The following list of substations includes all of Hydro Ottawa's assets that operate at or above 50kV and form part of the distribution system:[1]

- Bridlewood MS (8kV)
- Bridlewood MS (27.6kV)
- Centrepointe DS
- Cyrville MS

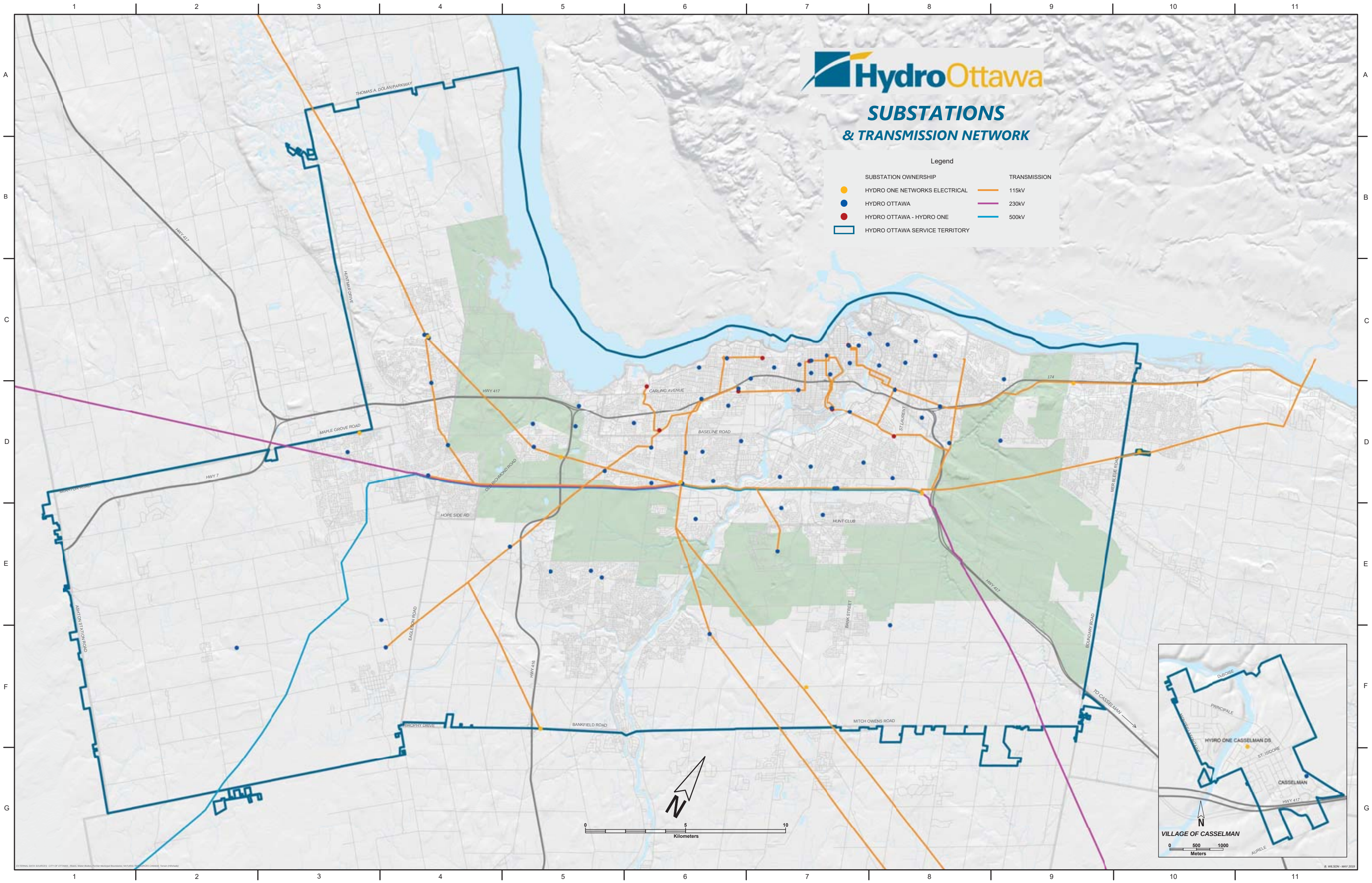
[1] "DS" means "distribution station," "MS" means "municipal station," and "MTS" means "municipal transformer station." This terminology is historical, often based on past ownership arrangements.

- Ellwood MS
- Epworth DS
- Fallowfield DS
- Kanata MTS
- Limebank MS
- Manordale DS
- Marchwood MS
- Merivale DS
- Moulton MS
- Richmond South DS
- Terry Fox DS
- Uplands MS (27.6kV)

Hydro Ottawa plans to add one transformer station above 50kV to its distribution system over the period of 2021-2025. Cambrian MTS, which will serve customers in South Nepean, has a planned in-service date of 2022.

In 2019, the OEB granted Hydro Ottawa leave to construct approval for Cambrian MTS.[2] By way of this Application, the utility is therefore seeking approval from the OEB that this substation form part of Hydro Ottawa's distribution system and that the asset be included in rate base.[3] Hydro Ottawa records these stations per the Uniform System of Accounts in Account 1815 Transformer Station Equipment - Normally Primary above 50 kV.

[2] Ontario Energy Board, *Decision and Order on the Power South Nepean Project*, EB-2019-0077 (October 17, 2019).
[3] Exhibit 1-1-4: Administration includes a separate request for approval pertaining to Cambrian MTS.


SUBSTATIONS
& TRANSMISSION NETWORK
Legend
SUBSTATION OWNERSHIP
HYDRO ONE NETWORKS ELECTRICAL
HYDRO OTTAWA
HYDRO OTTAWA - HYDRO ONE
HYDRO OTTAWA SERVICE TERRITORY
TRANSMISSION
115kV
230kV
500kV
THOMAS A. DOLAN PARKWAY
HWY 417
MAPLE GROVE ROAD
HWY 7
CARLING AVENUE
BASELINE ROAD
HUNT CLUB
BANKFIELD ROAD
MITCH OWENS ROAD
TO CASSELMAN
Kilometers
VILLAGE OF CASSELMAN
Meters

UPDATED CUSTOMER SUMMARY

A copy of Hydro Ottawa's Customer Summary is attached below, in accordance with section 2.1.3 of the *Chapter 2 Filing Requirements for Electricity Distribution Rate Applications*, as updated on July 12, 2018 and addended on July 15, 2019.

In this Schedule, Hydro Ottawa has presented bill impacts with respect to the distribution portion of bills for the residential and GS < 50 kW customer classes. As of January 1, 2020, Hydro Ottawa completed its transition to fully fixed rates for residential customers. Seeing as there is no longer a variable component in the distribution rates charged to residential customers, Hydro Ottawa has not utilized a consumption threshold in its presentation of distribution bill impacts for these customers.

The information related to bill impacts has been updated to account for 2019 actuals. In addition, total capital expenditures for 2021-2025 have been adjusted to reflect updates to the MiGen program, as described in updated section 2.3.3 of Attachment 2-4-3(E): Material Investments.

Understanding Hydro Ottawa's 2021-2025 Rate Application

ABOUT HYDRO OTTAWA

Hydro Ottawa is the third largest municipally-owned electricity distributor in Ontario. We distribute electricity to approximately 340,000 customers, serving a population of more than one million people in the City of Ottawa and the Village of Casselman. We are a private business corporation that is 100% owned by our shareholder, the City of Ottawa.

It's our responsibility to transport power from the provincial transmission grid and deliver it safely and reliably to homes and businesses across our service territory. We own and operate a large, complex distribution network consisting of 50,000 poles, 2,700 km of overhead lines, 3,000 km of underground cable, and 45,000 transformers.

OUR FIVE-YEAR BUSINESS PLAN

Hydro Ottawa is seeking approval from the Ontario Energy Board (OEB) for the distribution rates that will be charged to customers for the 2021-2025 period.

The electricity industry in Ontario is regulated by the OEB. One of the OEB's roles is to review the business and distribution plans of all electricity distributors and approve the rates that they charge customers.

Between 2016 and 2020, Hydro Ottawa invested in distribution system capacity as well as the replacement of aging infrastructure to maintain operational effectiveness and efficiency. Upgrades to our fibre optic network and Customer Care and Billing System were also a focus, in addition to consolidating employees in two new buildings from end-of-life facilities.

HOW DOES HYDRO OTTAWA PLAN?

Hydro Ottawa is proposing a plan that is responsive to:

- **Legal and regulatory requirements** by continuing to meet our obligations.
- **Internal business planning** based on expert analysis and professional judgment to develop construction and operations programs that address safety, business, technical, and operational needs.
- **Customer feedback** collected throughout our consultation on the application and ongoing customer engagements.

Over the course of 2021 to 2025, Hydro Ottawa will need to continue to invest in our infrastructure, equipment, and workforce.

These needs are being driven by a diverse set of factors, such as aging infrastructure, sustained population and economic growth in the Ottawa area, an increasing number of severe weather events, technological evolution, cyber security threats, and workforce retirements. The plan forward includes major asset replacement and upgrades, vehicle replacements, systems and software for resource planning programs, data analytics, and productivity improvements.

> *To learn more about Hydro Ottawa's plan, please see Exhibit 1-1-9 Business Plan in the application.*

As a result, key initiatives that we have planned include:

- Building new distribution stations in growing areas of the city
- Connecting thousands of new customers every year
- Supporting local infrastructure projects like Light Rail Transit
- Upgrading and modifying infrastructure to enhance reliability and capacity on the grid
- Replacing equipment that has reached end-of-life
- Strengthening the grid's ability to withstand the effects of severe weather
- Investing in digital solutions to enhance customer service
- Renewing our vehicle fleet
- Recruiting and retaining a new generation of highly-skilled employees

HOW CUSTOMERS HELPED INFORM OUR PLAN

Our goal is to put the customer at the centre of everything we do. Hydro Ottawa is committed to engaging with our customers, understanding their needs and preferences, and operating in an efficient and cost effective manner. In preparing our business plan, we reached out directly to customers, to better understand their priorities and expectations for the electricity services they receive. Price, reliability, and investing in new technology ranked as the top three priorities.

Together with the customer feedback that we receive on an ongoing basis, we took this input and developed a plan emphasizing four principles:

01 Minimize rate increases

02 Maintain reliability and service quality

03 Address key pressures to the distribution system

04 Make prudent investments in emerging technologies to enhance service offerings and/or reduce operating costs

Nearly 21,000 customers shared their thoughts on our preliminary plan through the completion of an online survey. The majority of residential customers (83%), small business customers (76%), and mid-market and key account customers (69%) shared that they supported Hydro Ottawa's planned increase or even spending a bit more to improve service based on the priorities above.

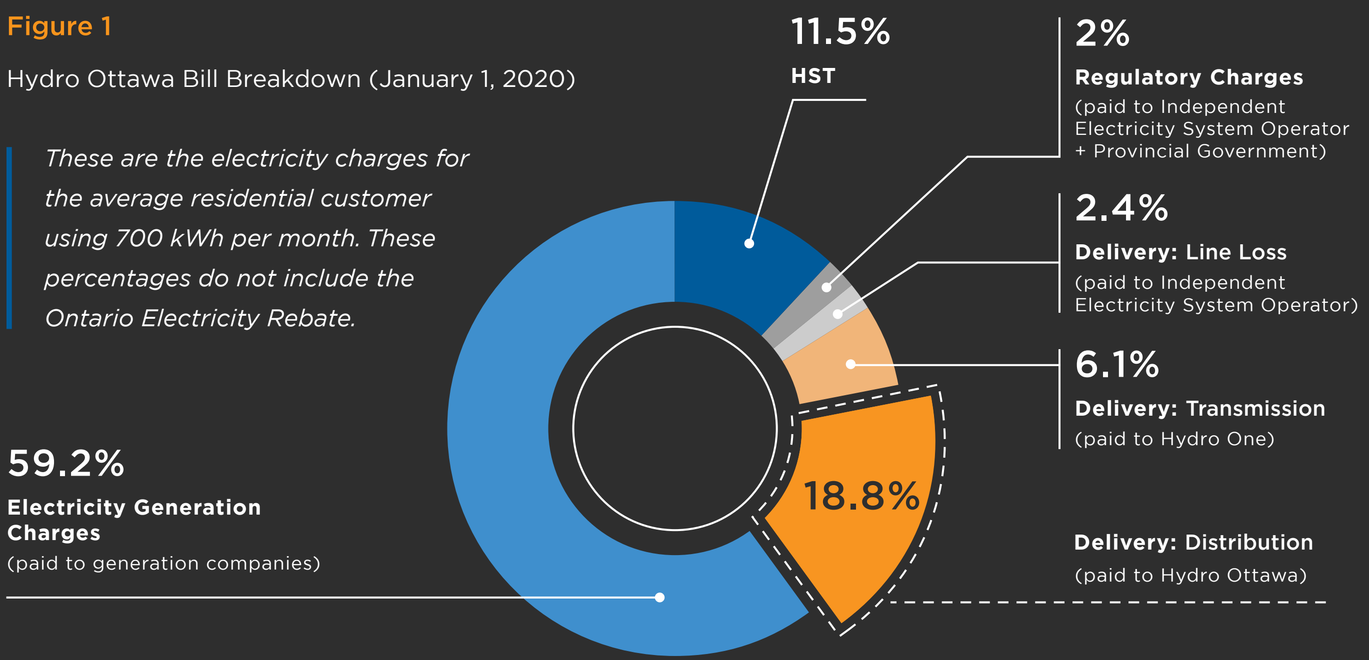
> *To learn more on how Hydro Ottawa engages customers and responds to their needs, please see Exhibit 1-2-1 Customer Engagement in the application.*

Electricity distributors like Hydro Ottawa are funded through the distribution rates paid by customers. We do not receive taxpayer money to fund our operations or investments in the distribution system. While Hydro Ottawa is responsible for collecting payment for the entire electricity bill, we retain only a portion of the delivery charge representing less than 20% of the bill.

Figure 1

Hydro Ottawa Bill Breakdown (January 1, 2020)

These are the electricity charges for the average residential customer using 700 kWh per month. These percentages do not include the Ontario Electricity Rebate.



DOLLARS AND CENTS – EXPECTED COSTS OF THE PLAN

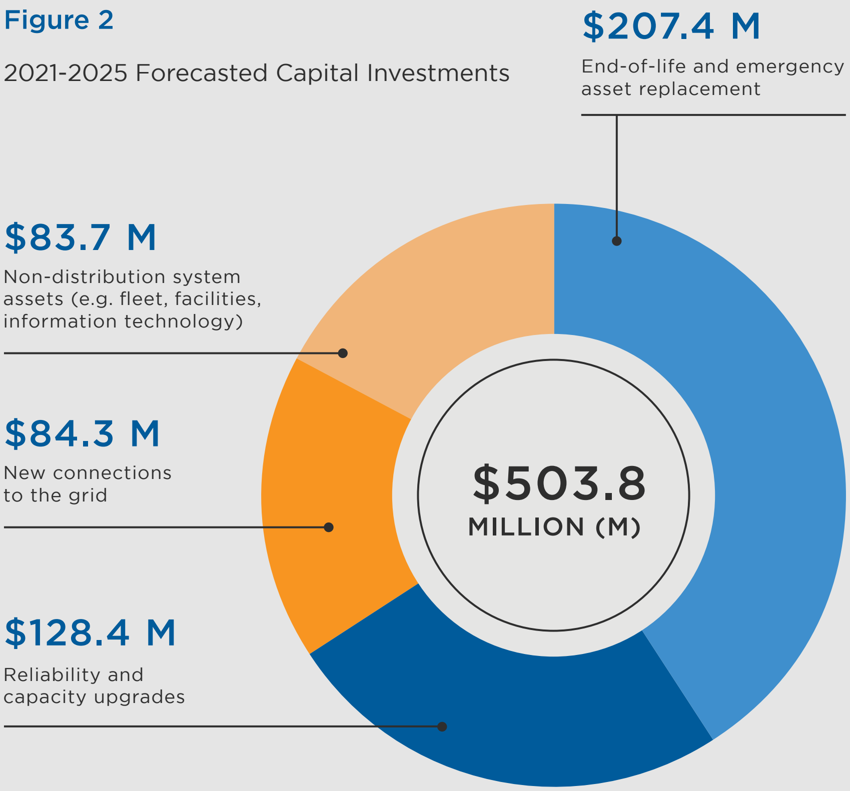
Like most businesses, Hydro Ottawa manages both a capital and an operating budget.

Capital expenditures are assets that have lasting benefits over many years (e.g. poles and wires), while operating expenditures are recurring expenses in day-to-day management of the company (e.g. tree trimming and billing).

For the 2021-2025 period, the capital required to maintain system reliability and safety, and invest in infrastructure and equipment priorities is $503.8 million. For operations, a budget of $493.8 million is needed.

Figure 2

2021-2025 Forecasted Capital Investments



In order to move forward with our proposals, we're seeking approval from the OEB to change our rates.

The expected impacts on the distribution portion of customer bills over the five-year rate period are shown in the table below.

Impacts on Customers' Distribution Rates

	Change in Distribution Charge	2021 Proposed	2022 Proposed	2023 Proposed	2024 Proposed	2025 Proposed	Average
Residential	$/month	$1.98	$1.88	$1.54	$0.99	$0.62	$1.40
	Annual % Change	6.91%	6.15%	4.74%	2.91%	1.77%	4.49%
General Service (<50 kW)	$/month	$2.89	$5.02	$4.48	$3.05	$2.26	$3.54
	Annual % Change	4.05%	6.76%	5.65%	3.64%	2.60%	4.54%

DELIVERING VALUE FOR MONEY – EXPECTED BENEFITS FOR CUSTOMERS

Moving forward on our five-year plan will enable us to maintain a high level of reliability for customers, while ensuring that we keep costs low and continuously improve the way we do business.

Some of the ways in which customers and communities are expected to benefit from the proposals in our plan include the following:

- Improved system reliability (fewer and shorter outages, quicker restoration times, enhanced resilience to severe weather)
- Greater electricity supply capacity for growing areas of the city
- Greater personalization, choice, convenience, and self-serve capability in the services provided to customers
- More options and solutions to help customers manage and monitor energy use with ongoing development of the Hydro Ottawa app and MyAccount
- Stronger protections for grid assets and customer data against cyber threats
- Increased ability to connect more renewable energy resources to the grid
- Lower costs, relative to alternative investment scenarios

HAVE YOUR SAY

The OEB will review Hydro Ottawa's plan and proposed rates in an open and transparent public process.

For more information on how you can participate in that process, please visit hydroottawa.com/active-applications.

UPDATED EXECUTIVE SUMMARY

1. INTRODUCTION

This Schedule provides a summary of Hydro Ottawa Limited's ("Hydro Ottawa" or "the utility") application to the Ontario Energy Board ("OEB") seeking approval of its proposed distribution rates and other charges for the five-year period of January 1, 2021 to December 31, 2025. This application ("Application") is submitted pursuant to section 78 of the *Ontario Energy Board Act, 1998*. In preparing this Application, Hydro Ottawa has been guided by the provisions set forth in the *Chapter 2, Chapter 3*, and *Chapter 5 Filing Requirements for Electricity Distribution Rate Applications*, as updated on July 12, 2018 and addended on July 15, 2019 ("Filing Requirements"), as well as the *Handbook for Utility Rate Applications* issued in 2016.

Herein, Hydro Ottawa highlights the key elements of this Application. These include the business, capital, and operational plans that underpin the Application, and the corresponding funding that is required to enable the utility to continue providing efficient and reliable services, along with a first-class customer experience, to Hydro Ottawa customers. This Schedule likewise explains how these plans align with customer needs and expectations, as well as what types of impacts are expected on customers' bills. For details on the specific approvals that Hydro Ottawa is requesting from the OEB by way of this Application, please see UPDATED Exhibit 1-1-4: Administration and UPDATED Attachment 1-1-4(A): OEB Appendix 2-A - List of Requested Approvals.

This Application employs the Custom Incentive Rate-setting ("Custom IR") method and marks the second successive rate filing in which Hydro Ottawa has opted to avail itself of this particular rate-setting approach.

Looking ahead to the 2021-2025 term, Hydro Ottawa anticipates a sustained need to undertake significant levels of capital investment in its distribution system, in order to maintain reliability and service quality for its customers. This need is the result of several factors, including aging infrastructure, an expanding customer base, continued growth across the City of Ottawa, and the effects of severe weather events. With respect to operational requirements, the utility likewise continues to face numerous pressures, such as ongoing shifts in consumer expectations for innovative services, the evolution of mission critical technologies, increased penetration of distributed energy resources ("DERs"), and workforce retirements. Together, these and other challenges are driving the need for investments and solutions which will ensure that overall system performance is maintained and customer preferences are met – all while safeguarding rates at a reasonable level. Accordingly, as described further below and elsewhere in this Application, the Custom IR method remains the most suitable rate-setting option to govern the approaching rate period for the utility.

The rate plan set forth in this Application builds upon the scope and success of the Custom IR plan that Hydro Ottawa has been implementing over the course of the 2016-2020 period. Numerous milestones have been achieved in the execution of this plan. Foremost was the roll-out of a multi-year Customer Experience Roadmap, which was anchored in the twin imperatives of putting the customer at the centre of everything that Hydro Ottawa does and facilitating a customer experience that is driven by customer choice. Among the flagship deliverables in this initiative were enhancements to the Customer Contact Centre (including becoming one of the first distributors in Ontario to expand its hours of operation into Saturdays), deployment of omni-channel capabilities and self-serve features to support customer communication through preferred channels, introduction of a mobile application, achievement of the highest level of customer participation in online billing of any distributor in Ontario, and the launch of voice-activated digital assistance through such devices as Amazon Alexa and Google Home (the first of its kind by any electric utility in Canada). Concurrent with the implementation of this roadmap, Hydro Ottawa consistently received high marks from its customers in the annual surveys that were commissioned to measure customer satisfaction with the utility.

Under its 2016-2020 rate plan, Hydro Ottawa has also crossed a new frontier in terms of operational effectiveness. As of the end of 2019, the utility was on track to successfully execute the largest multi-year capital expenditure plan in its history, with significant progress made in replacing a large portion of assets at the end of their useful lives, connecting new customers to the grid, and enhancing system capacity to keep pace with shifts in loads within the service territory. These expenditures have translated into improved system reliability and performance, with the utility having consistently met or exceeded its reliability targets over the 2016-2018 timeframe. In fact, over the course of 2016-2018, Hydro Ottawa met or exceeded each of the measures in the annual Electricity Utility Scorecard for which a target had been assigned, with 100% of those measures showing performance improvement or consistent trending. Moreover, the outage management and emergency restoration capabilities of the utility were put to the test during several significant extreme weather events – the most damaging of which was the unprecedented series of tornadoes that touched down in Hydro Ottawa's service territory in September 2018. While challenging, these events nevertheless presented the opportunity for the utility to demonstrate its organizational and operational strength, depth, and maturity. The positive response from customers and the community attested to the success of these efforts.

Hydro Ottawa also successfully completed a once-in-a-generation project to consolidate the majority of its employees into new administrative and operations facilities. This project was executed pursuant to approval granted by the OEB in its Decision and Rate Order on Hydro Ottawa's 2016-2020 Custom IR application.[1] For more background information, including a detailed justification of the prudency of the costs incurred by the utility in the completion of this project, please see UPDATED Attachment 2-1-1(A): New Administrative Office and Operations Facilities.

Other noteworthy performance outcomes from 2016-2020 included the following:

- Productivity gains through cost containment and increased automation of business processes;[2]

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[1] Ontario Energy Board, *Decision and Order*, EB-2015-0004 (December 22, 2015).
[2] Several productivity initiatives have enabled Hydro Ottawa to seek a reduction in specific customer charges for the 2021-2025 rate term. Please see UPDATED Exhibit 8-7-1: Specific Service Charges for details.

- Successful delivery of conservation programs to customers;
- Greater efficiencies in maintenance and construction work;
- Upgrades to core business systems (including migration to cloud-based platforms);
- Implementation of a formal cyber security program;
- Replenishment of the workforce through execution of a Talent Management Strategy;
- Expansion of the fibre telecommunications network to connect field area devices with select substations; and
- Financial returns consistent with approved Return on Equity ("ROE") levels.

It merits observation that Hydro Ottawa achieved the aforementioned outcomes and their attendant benefits against the backdrop of approximately 6.0% growth in total customer count during the 2016-2020 period, and of successful efforts to ensure no net increase in overall permanent full-time employee headcount.

In light of its best-in-class performance in many areas, Hydro Ottawa received numerous industry and professional awards during the 2016-2020 period, with recognition extended in the contexts of customer programs, human resources and safety innovation, corporate social responsibility, and best employer (among others).

Hydro Ottawa is confident that the accomplishments of the 2016-2020 rate term will position the utility for continued success in delivering value to customers and meeting their needs for reliable, responsive, and cost-effective services over the upcoming five-year period. As they did in the preceding rate plan, customer engagement, continuous improvement, and performance measurement will remain hallmarks of Hydro Ottawa's planned activity for 2021-2025. Productivity expectations and initiatives are embedded throughout the plans underpinning this Application, alongside a robust framework for tracking and measuring outcomes, much of which is informed by the benchmarking of Hydro Ottawa's performance in several key program areas.

2. ABOUT HYDRO OTTAWA

Hydro Ottawa is licensed by the OEB to distribute electricity to approximately 340,000 customers, as of the end of 2019, within the City of Ottawa and the Village of Casselman. By number of customers, Hydro Ottawa is the third largest municipally-owned electricity distributor in Ontario. Its service territory covers 1,116 square kilometres and is comprised of a dense urban core, large areas of suburban development, and a vast rural area that represents 60% of the overall footprint.

Hydro Ottawa and its predecessor utilities have proudly served communities in the National Capital Region for over 100 years. The utility's unique customer base includes residential customers, commercial businesses, farms, and large institutional and industrial customers. As the national seat of government, Ottawa is home to the federal parliament and key institutions within the Government of Canada. Moreover, in terms of population, the city serves as the second largest in the Province of Ontario and the sixth largest in the country.

In its current corporate structure, Hydro Ottawa serves as the successor to five utilities which consolidated in the year 2000 (Ottawa Hydro, Kanata Hydro, Gloucester Hydro, Nepean Hydro, and Goulbourn Hydro), following the amalgamation of several municipalities in the region and the formation of the City of Ottawa. In 2002, the service territory of Casselman Hydro was acquired.

Hydro Ottawa is a wholly-owned subsidiary of Hydro Ottawa Holding Inc., which is 100% owned by the City of Ottawa and governed by an independent Board of Directors.

3. HYDRO OTTAWA'S BUSINESS PLAN

In accordance with the OEB's *Handbook for Utility Rate Applications*, Hydro Ottawa has prepared a formal Business Plan that serves as the basis for the utility's overall strategy and goals, elucidates the intersection between these goals and the proposals set forth in this Application, and speaks to the benefits that will accrue to customers as a result of the plan's execution. This Business Plan was approved by Hydro Ottawa's Board of Directors on November 28, 2019 and is included in this Application as UPDATED Exhibit 1-1-9.

3.1 CORPORATE VISION & STRATEGIC OBJECTIVES

Hydro Ottawa's vision is to serve as a leading partner in a smart energy future and as the trusted energy advisor for customers. In order to achieve this vision, the utility has organized its business strategy for several years around four critical areas of focus and their accompanying strategic objectives. Hydro Ottawa will maintain continuity in these core objectives heading into the 2021-2025 period. The key rationale for this approach is the level of success achieved during the preceding five-year rate term, as well as the trajectory of the business and policy landscape in which Hydro Ottawa operates.

Accordingly, as denoted in Figure 1 below, the business objectives that will guide Hydro Ottawa's activities and investments throughout the 2021-2025 rate period will be the following:

- **Customer Value:** we will deliver value across the entire customer experience by providing reliable, responsive, and innovative services at competitive rates.

- **Financial Strength:** we will create sustainable growth in our business and our earnings by improving productivity and pursuing business growth opportunities that leverage our strengths – our core capabilities, our assets, and our people.

- **Organizational Effectiveness:** we will achieve performance excellence by cultivating a culture of innovation and continuous improvement.

- **Corporate Citizenship:** we will contribute to the well-being of the community by acting at all times as a responsible and engaged corporate citizen.

Figure 1 – Corporate Strategic Objectives

Of these objectives, the most important driver for Hydro Ottawa's business strategy will remain Customer Value, with the utility striving to put the customer at the centre of everything it does.

3.2 ALIGNMENT WITH THE RENEWED REGULATORY FRAMEWORK

The primary objectives animating Hydro Ottawa's corporate vision are wholly consistent with the main performance outcomes promoted under the OEB's Renewed Regulatory Framework ("RRF"). Hydro Ottawa views this broad alignment as a competitive advantage and remains committed to firmly entrenching RRF principles and objectives throughout its operations and business.

Table 1 below illustrates the alignment between the utility's overarching objectives and the key categories of performance outcomes under the RRF. For additional context, the table also shows the congruence of Hydro Ottawa's high-level performance goals and strategic outcomes – which are utilized to measure progress in achieving the strategic objectives – with the RRF's areas of focus.

Table 1 – Alignment of Hydro Ottawa's Corporate Areas of Focus and Strategic Objectives with the OEB's RRF Performance Outcomes

OEB	Hydro Ottawa		
RRF Performance Outcomes	**Key Area of Focus**	**Corporate Performance Goal**	**Strategic Outcome**
Customer Focus	Customer Value	• Assist customers in managing their energy consumption and electricity costs • Deliver on customer expectations for service quality and responsiveness • Maintain overall distribution system reliability	• Customer loyalty and satisfaction
Operational Effectiveness	Organizational Effectiveness	• Continue to enhance operational performance and productivity • Maintain leading health and safety record • Enhance organizational and employee capability	• Efficient and effective operations • Safe and healthy work environment • Engaged, aligned and prepared workforce
Public Policy Responsiveness	Corporate Citizenship	• Enhance our brand image in the community and the industry • Continue to improve our environmental performance and reduce our impact on the environment	• Leading governance and business practices • Engaged stakeholders • Safe, secure and environmentally responsible services • Positive community impact
Financial Performance	Financial Strength	• Grow revenues from new sources • Enhance / protect revenues from existing business lines	• Growth in shareholder value

Further detail with respect to Hydro Ottawa's alignment with the RRF can be found in UPDATED Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework.

3.3 CUSTOMER ENGAGEMENT

The integration of customer feedback and providing customers with value for money serve as cornerstones of Hydro Ottawa's business planning. In step with its overall business strategy to put the customer at the centre of everything it does, the utility endeavours to ensure that its capital and operational investment plans are guided and informed by customer needs, preferences, and priorities.

Hydro Ottawa avails itself of numerous tools, activities, and interactions to engage customers and to reflect their input in the utility's planning and plans. Foremost among these are the engagement initiatives that are administered on an ongoing basis. These represent an evergreen posture on Hydro Ottawa's part to develop a genuine understanding of customers' interests through a fluid and continuous feedback loop, which helps inform and sharpen the utility's service delivery as a matter of established routine. Several of these activities are in line with industry best practice, such as an annual customer satisfaction survey, formal Key Accounts program, and engagement in numerous social media platforms. Other activities are homegrown, having been formulated and customized to suit the particular needs of the utility and its unique customer base. These include project-specific consultations that are hosted by Hydro Ottawa when major distribution system projects have the potential to impact customers and their community. Based on customer feedback, these consultations have resulted in the evaluation of additional design options, the use of less impactful equipment, and/or the collaborative scheduling of mutually agreeable timelines for project completion. Other examples include surveys that are conducted each month of customers who contact Hydro Ottawa's contact centre. Each customer is contacted and invited to rate their customer service experience. Through analysis and monitoring of these results, Hydro Ottawa is able to identify areas for improvement and adapt its processes to respond to customer preferences.

As a complement to the foregoing activities, Hydro Ottawa undertook targeted customer outreach to inform the development of the specific plans and proposals set forth in this Application. Consisting of a mix of qualitative and quantitative methodologies, this engagement was launched in January 2019 and extended through September 2019.

The initial phase yielded consistent findings across low-volume customer classes – namely, that reliability, prices, and investment in new technology constituted the top three priorities for customers. Moreover, these customers generally held favourable views on making proactive investments in aging infrastructure and grid modernization at the present time, with the understanding that this may lead to near-term costs but will result in future savings.

Based upon the feedback received during Phase I, Hydro Ottawa undertook a second, more expansive phase of engagement, in which the utility surveyed customers for their detailed feedback on proposed plans for capital and operational investments over the 2021-2025 period. A series of expenditure options were presented – namely, a reference case outlining the utility's proposed course of action, along with scenarios which either accelerated and expanded the proposal, or which scaled back the scope and timing of the proposal. Customers were thus able to express their views on a range of alternative proposals, as well as the respective trade-offs, outcomes, and rate impacts.

Ultimately, the response from customers in all classes was heavily weighted in support of Hydro Ottawa's proposed plans or spending more than proposed for certain services. Nearly one-half of respondents in the residential, small business, and mid-market and Key Account classes (48%, 47%, and 46%, respectively) identified that Hydro Ottawa should maintain the forecasted annual increase to deliver a program which focuses on the stated priorities. An additional 35%, 29%, and 23% of customers in these segments, respectively, expressed support for further improvements in service, even if this entailed additional rate increases.

Of note, the number of customers who participated in this engagement exercise – nearly 21,000 in total – was the largest in the history of any Hydro Ottawa rate application. In itself, this result was encouraging and instilled confidence in the quality of the information gleaned and the representativeness of the sample pool of customers. Beyond this, however, Hydro Ottawa was buoyed by the fact that the rate of response (i.e. number of respondents as a percentage of the total customer base) exceeded that which was observed in the most recent rate filings from the three largest distribution utilities in Ontario.[3] In fact, according to the external vendor retained by Hydro Ottawa to help execute the customer consultation process, the utility's engagement

[3] Hydro One Networks Inc., *2018-2022 Custom Incentive Rate-setting Distribution Rate Application*, EB-2017-0049 (March 31, 2017); Toronto Hydro-Electric System Limited, *2020-2024 Custom Incentive Rate-setting Distribution Rate Application*, EB-2018-0165 (August 15, 2018); and Alectra Utilities Inc., *2020 Electricity Distribution Rate Application*, EB-2019-0018 (May 28, 2019).

represented the single largest proportion of customers ever engaged by an electricity distributor in Ontario for the purpose of informing the development of a rate application.[4]

Based upon customer feedback, Hydro Ottawa has crafted capital and operational plans that emphasize the following four core principles:

1. Minimize rate increases
2. Maintain reliability and service quality
3. Address key pressures to the system, including:
    - Aging infrastructure
    - An expanding customer base and continued population growth
    - The effects of severe weather events
4. Make prudent investments in emerging technologies to enhance service offerings and/or reduce operation costs

Additional information on the portfolio of Hydro Ottawa's customer engagement activities, as well as the targeted activities undertaken to consult customers on the development of this Application, is available in Exhibit 1-2-1: Customer Engagement Overview and Exhibit 1-2-2: Customer Engagement on the 2021-2025 Rate Application.

3.4 DISTRIBUTION SYSTEM PLAN

Hydro Ottawa's Distribution System Plan ("DSP") represents the culmination of multiple internal and external planning processes related to business strategy, customer engagement, capital investment, asset management, and regional planning. The DSP details how distribution system expenditures will be prioritized, paced, and optimized, while minimizing rate impacts for customers and facilitating continuous improvement and productivity.

The DSP in its entirety can be viewed in Exhibit 2-4-3.

[4] Attachment 1-2-2(A): Customer Engagement Report, page 2.

3.5 PERFORMANCE MANAGEMENT AND MEASUREMENT

Hydro Ottawa is committing to a robust performance measurement and reporting framework for the upcoming five-year rate period. This framework expands and builds upon the success of the one that was in place for 2016-2020, and will maintain the approach of combining standard OEB performance measures with others that are customized for Hydro Ottawa’s unique use.

An integral component of this framework is the set of measures that will form the basis of Hydro Ottawa’s 2021-2025 Custom Performance Scorecard (see Table 2 below). These measures have been selected based upon a variety of factors and drivers, including responsiveness to customer preferences, alignment with core RRF and corporate strategic objectives, and correlation to key findings from the benchmarking analyses performed in support of this Application.

Table 2 – Custom Performance Scorecard Measures for 2021-2025

Outcome	OEB Reporting Category	Hydro Ottawa Custom Measures	New/Existing	Target
Customer Focus	Customer Satisfaction	Contact Centre Satisfaction – Transactional Feedback	New	Maintain
		Number of MyAccount Customers	New	Increase
		Number of Online Billing Accounts	New	Increase
Operational Effectiveness	Safety	All Injury/Illness Frequency Rate	New	Reduce
		Lost Workday Severity Rate	New	Reduce
	System Reliability	Customer Average Interruption Duration Index	Existing	Monitor
		Feeders Experiencing Multiple Sustained Interruptions	Existing	Maintain
		Worst Feeder Analysis – Number of Feeders with Very Poor Performance	Existing	Reduce
		Stations Exceeding Planning Capacity	Existing	≤5%
		Feeders Exceeding Planning Capacity	Existing	≤10%
		Stations Approaching Rated Capacity	Existing	0%
		Feeders Approaching Rated Capacity	Existing	0%
	Cost Control	Productive Time	Existing	Maintain
		Labour Allocation	Modified	Maintain
		3-Year Average Cost per Pole – Wood Pole Replacement	New	Monitor
		3-Year Average Cost per Meter – Underground Cable	New	Monitor
		Average Cost per Kilometer – Vegetation Management	New	Monitor
		Average Cost per Pole – Pole Test and Inspection	New	Monitor
	Asset Efficiency	Technology Infrastructure Cost per Employee	New	Monitor
Public Policy Responsiveness	Environment	Annual Oil Spills & Costs of Remediation	Existing	Reduce
		Non-Hazardous Waste Diversion Rate	New	Maintain
		Percentage of Green Suppliers	New	Maintain
Financial Performance	Financial Metrics	OM&A per Customer	New	Monitor
		Bad Debt as a Percentage of Total Electricity Revenue	New	Monitor
		Cumulative Capital Additions per Investment Category	New	Monitor
		Annual Capital Spending per Investment Category	New	Monitor

This proposed reporting regime is intended to equip the OEB, customers, and other stakeholders with the ability to better monitor and understand diverse aspects of Hydro Ottawa's performance, and to demonstrate the utility's accountability in transparently communicating the outcomes achieved under its performance management framework.

3.6 BENCHMARKING

The preparation of Hydro Ottawa's business plan was supported by year-over-year comparisons of Hydro Ottawa's costs and outcomes, along with evaluations of the utility's performance against its peers. The scope and substance of particular capital and operational programs were shaped, in part, by the analysis of trends in the achievement of system reliability, customer value, and financial strength outcomes. Similarly, the benchmarking of Hydro Ottawa's expenditures and performance relative to samples of utilities across Ontario, Canada, and the United States has yielded valuable insights into areas in which the utility performs well and those in which there is room for improvement.

To help inform the development of its business plan, the utility commissioned the following benchmarking studies from third-party experts:

Table 3 – Benchmarking Studies Filed in this Application

Benchmarking Review	External Consultant	Application Attachment
Econometric Benchmarking Study of Hydro Ottawa's Total Cost and Reliability	Clearspring Energy Advisors	Attachment 1-1-12(A)
Unit Costs Benchmarking Study	UMS Group	Attachment 1-1-12(B)
IT Budget Assessment Benchmark	Gartner	Attachment 1-1-12(F)
2019 Market Benchmarking	Mercer Canada	Attachment 1-1-12(G)

The results from these studies consistently revealed that Hydro Ottawa is a strong performer relative to its peers in numerous categories, and that the utility is well-positioned to sustain ongoing improvements in key areas of performance.

These findings have been internalized and incorporated into specific work programs, and will serve as important baselines and points of reference against which to measure the utility's progress.

3.7 PRODUCTIVITY & CONTINUOUS IMPROVEMENT

Responsibly controlling costs and focusing on cost-effective delivery of outcomes that matter to customers remain core priorities for Hydro Ottawa. Amidst the unique and challenging confluence of compounding demands, pressures, and constraints on operations, the utility is placing increased emphasis on incorporating productivity and continuous improvement gains, so as to offset increasing expenditures and boost organizational capacity. Hydro Ottawa has adopted numerous controls to provide the OEB, customers, and other stakeholders with robust assurance that productivity, cost control, and continuous improvement objectives have been firmly integrated into the utility's business planning process, and the resultant capital and operational plans, for the 2021-2025 rate period.

For information on the range of productivity and continuous improvement activities that are planned over the course of the upcoming rate term, please see Exhibit 1-1-13: Productivity and Continuous Improvement Initiatives.

4. HYDRO OTTAWA'S CUSTOM IR APPLICATION

As noted in the OEB's 2012 report entitled *Renewed Regulatory Framework for Electricity Distributors: A Performance-Based Approach* ("RRFE Report"), the Custom IR method is "intended to be customized to fit the specific applicant's circumstances"[5] and "may be appropriate for distributors with significantly large multi-year or highly variable investment commitments with relatively certain timing and level of associated expenditures."[6]

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[5] Ontario Energy Board, *Report of the Board - Renewed Regulatory Framework for Electricity Distributors: A Performance-Based Approach* (October 18, 2012), page 19.
[6] *Ibid*, page 14.

4.1. PRINCIPAL DRIVERS JUSTIFYING THE USE OF CUSTOM IR

The foregoing description of the suitable context for employing the Custom IR option is one which remains applicable to Hydro Ottawa, as it prepares to enter into a new five-year rate period. The results of the utility's asset management and network investment planning processes have confirmed that significant capital investments are required over the course of 2021-2025, in order to ensure Hydro Ottawa is able to deliver safe and reliable electricity service and to meet the needs and expectations of customers.

The drivers underlying this need are numerous. For starters, while the overall profile of Hydro Ottawa's asset demographic is positive, a major segment of the asset population (19%) has reached its expected service life and thus poses a higher risk of failure. This includes approximately 51% of stations and 23% of overhead system assets (i.e. poles, transformers, and switches). Alongside these asset demographic figures, the utility's asset demographic ratings show that 17% of assets are in Poor or Very Poor condition.[7]

What's more, the City of Ottawa continues to experience steady year-over-year growth, with municipal policy promoting the development of new residential subdivisions and business parks, as well as intensification in urban areas.

In addition, an increase in storms and severe weather events is placing greater stress on the system, with an upward trend over the last five years in the number of outages caused by adverse weather. During a six-month span in 2018 alone, there were three major weather events that affected the Ottawa area (tornadoes, flooding, and freezing rain), which in turn caused considerable damage to the system and heavily impacted spending in emergency replacement of assets.

[7] Please see Exhibit 2-4-3: Distribution System Plan for more information on the demographics and condition of the utility's assets.

4.2. CAPITAL EXPENDITURES

Hydro Ottawa developed its forecasted capital expenditures for the years 2021-2025 based upon an identification and analysis of system needs, customer expectations, and requirements for general plant capital. The total capital expenditure forecast underwent a number of iterations and refinements, in order to address issues of priority, customer preference, rate and bill impacts, resource capacity, and financing capability.

In response to feedback expressed by customers, appropriate parameters and constraints have been incorporated to limit the costs and impacts on bills associated with planned capital investments. In its customer engagement activities, Hydro Ottawa heard a recurring preference for reliability to be maintained or improved at minimal or no increased cost. As a result, the utility has created a capital plan that paces investments in order to minimize rate impacts, with a focus on continuous improvement with respect to the efficiency and productivity of distribution planning and plan implementation.

One practical effect of this approach is that the proposals set forth in this Application do not encompass all of the investments that Hydro Ottawa would deem to be worthwhile for purposes of optimally fulfilling system needs during the 2021-2025 period.[8] Nevertheless, Hydro Ottawa is confident that the portfolio of capital investments that ultimately emerged from its prioritization and calibration process will enable strong performance of the system and will serve customers' interests effectively.

As originally submitted, Hydro Ottawa's capital expenditure plan for the 2021-2025 period proposes an average annual expenditure of $100.7M per year, with this figure having been slightly adjusted to $100.8M per year based on 2019 actuals, as follows:

[8] As explained further in UPDATED Exhibit 2-4-1: Capital Expenditure Summary, the process undertaken by the utility to rationalize its initial asset needs forecast resulted in a reduction in the 2021-2025 capital expenditure forecast of approximately $50.0M per year.

Table 4 – AS ORIGINALLY SUBMITTED – Summary of 2021-2025 Capital Expenditures ($'000,000s)

Investment Category	2021	2022	2023	2024	2025	Average 2021-2025
System Access	$56.7	$41.0	$37.4	$34.5	$34.0	$40.7
System Renewal	$43.3	$44.0	$40.2	$39.4	$40.5	$41.5
System Service	$31.0	$27.4	$24.3	$25.2	$23.9	$26.4
General Plant	$32.0	$11.7	$7.6	$17.4	$16.9	$17.1
Capital Contributions	$(41.3)	$(25.2)	$(19.9)	$(19.2)	$(19.3)	$(25.0)
TOTAL	**$121.8**	**$98.9**	**$89.6**	**$97.2**	**$96.0**	**$100.7**

Table 4 – UPDATED FOR 2019 ACTUALS – Summary of 2021-2025 Capital Expenditures ($'000,000s)[9]

Investment Category	2021	2022	2023	2024	2025	Average 2021-2025
System Access	$56.7	$41.0	$37.4	$34.5	$34.0	$40.7
System Renewal	$43.3	$44.0	$40.2	$39.4	$40.5	$41.5
System Service	$26.7	$28.3	$24.3	$25.2	$23.9	$25.7
General Plant	$32.0	$11.7	$7.6	$17.4	$16.9	$17.1
Capital Contributions	$(39.2)	$(23.5)	$(19.9)	$(19.2)	$(19.3)	$(24.2)
TOTAL	**$119.5**	**$101.5**	**$89.6**	**$97.2**	**$96.0**	**$100.8**

For more detail on 2021-2025 capital funding requirements, please refer to Hydro Ottawa's DSP and associated attachments in Exhibit 2-4-3.

4.3. OPERATIONS, MAINTENANCE & ADMINISTRATION EXPENDITURES

Hydro Ottawa's duties to manage a safe and reliable distribution system, serve customers in a manner that is responsive to their needs and preferences, and maintain compliance with a broad range of legislative and regulatory requirements compel the utility to incur a level of costs that is proportionate to the magnitude of its operational obligations. Responsibly controlling

[9] The changes reflected in the updated version of Table 4 for 2021 and 2022 are the result of updates to the MiGen project, as described in updated section 2.3.3 of Attachment 2-4-3(E): Material Investments.

these costs and focusing on cost-effective delivery of outcomes therefore remain core priorities for the utility. What's more, the critical importance of cost control is magnified against the backdrop of the evolution underway across the broader North American electricity sector, which is forcing utilities to modernize aspects of their service delivery models in order to adapt to the increased complexity of system operations, the changing expectations of customers, and the shifting economics of the marketplace.

It is important to understand Hydro Ottawa's proposed operations, maintenance, and administration ("OM&A") expenditures for the years 2021-2025 in the context of OM&A costs for the 2016-2020 Custom IR rate period, as presented in Table 5 below.

Table 5 – AS ORIGINALLY SUBMITTED – Historical, Bridge, and Test Year OM&A Costs by Major OM&A Category ($'000s)

OM&A Category	Historical			Bridge		Test	CAGR[10]
	2016	2017	2018	2019	2020	2021	
Operations	$18,399	$18,860	$20,877	$22,398	$23,824	$22,924	4.5%
Maintenance	$9,739	$10,299	$9,125	$8,653	$9,767	$9,855	0.2%
Subtotal	$28,138	$29,158	$30,003	$31,050	$33,591	$32,779	3.1%
Billing and Collecting	$12,594	$12,745	$11,941	$10,220	$12,052	$12,711	0.2%
Community Relations	$5,290	$5,120	$4,759	$5,131	$5,895	$6,365	3.8%
Subtotal	**$17,884**	**$17,865**	**$16,700**	**$15.352**	**$17,946**	**$19,076**	**1.3%**
Administrative and General	$36,599	$35,222	$40,161	$41,143	$40,453	$42,068	2.8%
TOTAL OM&A EXPENSES[11]	**$82,621**	**$82,245**	**$86,863**	**$87,545**	**$91,990**	**$93,923**	**2.6%**

[10] CAGR represents the compound annual growth rate between 2017 and 2021.
[11] Totals may not sum due to rounding.

Table 5 – UPDATED FOR 2019 ACTUALS – Historical, Bridge, and Test Year OM&A Costs by Major OM&A Category ($'000s)

OM&A Category	Historical				Bridge	Test	CAGR[12]
	2016	2017	2018	2019	2020	2021	
Operations	$18,399	$18,860	$20,877	$20,863	$23,824	$22,924	4.5%
Maintenance	$9,739	$10,299	$9,125	$7,693	$9,767	$9,855	0.2%
Subtotal	$28,138	$29,158	$30,003	$28,556	$33,591	$32,779	3.1%
Billing and Collecting	$12,594	$12,745	$11,941	$10,873	$12,052	$12,711	0.2%
Community Relations	$5,290	$5,120	$4,759	$4,796	$5,895	$6,365	3.8%
Subtotal	**$17,884**	**$17,865**	**$16,700**	**$15,670**	**$17,946**	**$19,076**	**1.3%**
Administrative and General	$36,599	$35,222	$40,161	$38,887	$40,453	$42,068	2.8%
TOTAL OM&A EXPENSES[13]	**$82,621**	**$82,245**	**$86,863**	**$83,113**	**$91,990**	**$93,923**	**2.6%**

Based on the proposed costs for the 2021 Test Year, OM&A expenditures for the remaining years of the 2021-2025 Custom IR period have been calculated through the application of an escalation factor, which is discussed in further detail in section 4.4 below. The result is the breakdown of OM&A costs shown in Table 6.

Table 6 – Annual OM&A Program Expenditures for 2021-2025 ($'000s)

2021	2022	2023	2024	2025
$93,923	$96,280	$98,697	$101,174	$103,714

Hydro Ottawa's proposed OM&A costs over the 2021-2025 term translate into an average annual expenditure of $98.8M.

Of note, during the internal budgeting process, the initial levels of OM&A submitted by the various Divisions within the utility resulted in a compound annual growth rate ("CAGR") of 3.5% over the 2021-2025 period. In step with its commitment to continuous improvement and with

[12] CAGR represents the compound annual growth rate between 2017 and 2021.
[13] Totals may not sum due to rounding.

customer preferences for minimizing rate increases, Hydro Ottawa then applied a custom OM&A escalation factor to contain upward pressure on operational expenses and to embed productivity expectations throughout the 2021-2025 period. This lowered the overall OM&A CAGR to 2.51% and achieved a reduction of $13.1M in OM&A spending over the course of the rate term.

For additional information on Hydro Ottawa's OM&A programs, cost drivers, and year-over-year variances, please see UPDATED Exhibit 4-1-1: Operations, Maintenance and Administration Summary and UPDATED Exhibit 4-1-4: Operations, Maintenance and Administration Cost Drivers and Program Variance Analysis.

4.4. CUSTOM PRICE ESCALATION FACTOR

As established by the RRF, under a price cap form of incentive rate-setting, rates are adjusted using a formulaic approach in the years following the first year base rates. This formula consists of a two-component Price Cap Index ("PCI"): inflation and productivity. For electricity distributors, the formula includes an industry-specific inflation factor and two factors for productivity. One productivity factor is a fixed amount for industry-wide productivity, and the other is a stretch factor which is set each year based on the level of productivity the distributor has achieved as evaluated by the Pacific Economics Group ("PEG") econometric model.

Under a Custom IR approach, the annual rate adjustment must be based on a custom index supported by empirical evidence that can be tested. The annual adjustment must include explicit financial incentives for continuous improvement and cost control targets. As noted in the OEB's *Handbook for Utility Rate Applications*, "these incentive elements, including a productivity factor, must be incorporated through a custom index or an explicit revenue reduction over the term of the plan (not built into the cost forecast)."[14]

[14] Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 25.

As a result, for years two through five of its upcoming rate term (i.e. 2022-2025), Hydro Ottawa is proposing to adopt a Custom Price Escalation Factor ("CPEF") framework, which is based on the approach approved by the OEB in Hydro Ottawa's 2016-2020 Custom IR application.[15] This framework is aligned with OEB policy and based on sound ratemaking principles, and incorporates the OEB's key principles and expectations of a Custom IR application.

Hydro Ottawa is proposing that OM&A costs in years two through five of its rate term be adjusted by the CPEF, on an annual basis, as follows:

CPEF = I - X + G

where

"I" is the inflation factor
"X" is the two-component productivity factor
"G" is the growth factor

Using this formula, Hydro Ottawa has determined that the CPEF will be 2.51%.

A more detailed explanation of the CPEF and the evidence supporting the use and assigned value of each factor is included in UPDATED Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework.

4.5. RATE BASE

As originally submitted, Hydro Ottawa's requested rate base for the 2021 test year is $1,219M, which represents an increase of approximately $244.8M or 25% over the OEB-approved rate base for the 2020 Bridge Year. After accounting for 2019 actuals, Hydro Ottawa is revising its requested rate base for the 2021 test year to $1,231M. This represents an increase of

[15] Ontario Energy Board, *Decision and Order*, EB-2015-0004 (December 22, 2015), page 1.

approximately $256.9M or 26% over the OEB-approved rate base for 2020. Table 7, as updated below, identifies the rate base requested for each year during the 2021-2025 period. Please refer to UPDATED Exhibit 2-1-1: Rate Base Overview for further details.

Table 7 – AS ORIGINALLY SUBMITTED – Summary of Rate Base ($'000s)

	2021	2022	2023	2024	2025
Rate Base	$1,218,659	$1,303,922	$1,349,619	$1,376,805	$1,419,763

Table 7 – UPDATED FOR 2019 ACTUALS – Summary of Rate Base ($'000s)

	2021	2022	2023	2024	2025
Rate Base	$1,230,736	$1,315,708	$1,363,582	$1,390,890	$1,433,972

4.6. REVENUE REQUIREMENT

Hydro Ottawa is requesting approval for both service and base revenue requirement for each year in its planned 2021-2025 rate term, along with the resulting rates and riders based on forecast capital expenditures, OM&A, depreciation expense, cost of capital, payments in lieu of taxes ("PILS"), and revenue from other sources. For the 2021 Test Year, Hydro Ottawa requests a service revenue requirement of $214.9M, which represents an increase of $14.3M or 7% from the service revenue requirement previously approved by the OEB for 2020. After accounting for 2019 actuals, Hydro Ottawa is revising its request to a service revenue requirement of $216.6M for the 2021 Test Year, which represents an increase of $16.1M or 8% from the service revenue requirement previously approved by the OEB for 2020.

The principal cost drivers underlying Hydro Ottawa's Test Year revenue requirement are the increases to rate base, which are attributable to capital investments that the utility must undertake in order to continue providing safe and reliable electricity service to the residents and businesses in Ottawa and Casselman. Other cost drivers include increases to amortization expense, OM&A expenses, interest, and return on rate base.

Table 8, as updated below, provides a summary of the proposed revenue requirement for 2021-2025.

For additional details regarding Hydro Ottawa's revenue requirement and related cost drivers, please refer to UPDATED Exhibit 6-1-1: Calculation of Revenue Deficiency or Sufficiency.

Table 8 – AS ORIGINALLY SUBMITTED – Summary of Revenue Requirement for 2021-2025 ($'000s)

	2021	2022	2023	2024	2025
Return on Rate Base	$67,489	$73,588	$77,441	$79,860	$84,624
Distribution Expenses (not including amortization)	$93,923	$96,280	$98,697	$101,174	$103,714
Amortization	$52,450	$56,860	$59,142	$60,711	$64,027
Payment in Lieu of Taxes	$1,024	$5,211	$8,766	$11,660	$7,689
Service Revenue Requirement	**$214,886**	**$231,939**	**$244,045**	**$253,405**	**$260,053**
Less Revenue Offsets	$10,977	$11,013	$11,667	$12,151	$12,457
Base Revenue Requirement	**$203,909**	**$220,926**	**$232,378**	**$241,254**	**$247,596**
Transformer Ownership Credit	$1,056	$1,056	$1,056	$1,059	$886
Revenue Requirement from Rates	**$204,965**	**$221,982**	**$233,434**	**$242,312**	**$248,483**
Forecasted Load at 2020 Rates	$187,905	$188,833	$189,716	$190,703	$191,468
Cumulative Revenue Deficiency (over 2020)	**$(17,060)**	**$(33,149)**	**$(43,719)**	**$(51,609)**	**$(57,014)**
Yearly Revenue Deficiency over 2020	**$(17,060)**	**$(16,089)**	**$(10,570)**	**$(7,891)**	**$(5,405)**

Table 8 – UPDATED FOR 2019 ACTUALS – Revenue Deficiency/Sufficiency for 2021-2025 ($'000s)

	2021	2022	2023	2024	2025
Return on Rate Base	$68,158	$74,253	$78,242	$80,677	$85,470
Distribution Expenses (not including amortization)	$93,923	$96,280	$98,697	$101,174	$103,714
Amortization	$52,333	$56,699	$59,015	$60,585	$63,900
Payment in Lieu of Taxes	$2,224	$3,881	$8,604	$11,533	$7,590
Service Revenue Requirement	**$216,638**	**$231,113**	**$244,558**	**$253,969**	**$260,674**
Less Revenue Offsets	$11,013	$10,971	$11,667	$12,151	$12,457
Base Revenue Requirement	**$205,624**	**$220,142**	**$232,891**	**$241,817**	**$248,217**
Transformer Ownership Credit	$1,056	$1,056	$1,056	$1,059	$886
Revenue Requirement from Rates	**$206,680**	**$221,197**	**$233,947**	**$242,876**	**$249,104**
Forecasted Load at 2020 Rates	$187,888	$188,816	$189,699	$190,686	$191,453
Cumulative Revenue Deficiency (over 2020)	**$(18,792)**	**$(32,381)**	**$(44,248)**	**$(52,190)**	**$(57,651)**
Yearly Revenue Deficiency over 2020[16]	**$(18,792)**	**$(13,589)**	**$(11,867)**	**$(7,942)**	**$(5,461)**

4.7. LOAD FORECAST

Hydro Ottawa's forecasted energy consumption for the 2021 Test Year is 7,065,745 MWh, as originally submitted. After accounting for 2019 actuals, Hydro Ottawa's forecasted energy consumption for the 2021 Test Year is 7,063,482. This is 377,142 MWh (5.1%) lower than the 2016 OEB-approved MWh forecast. The utility's forecasted number of customers for the 2021 Test Year is 344,936, representing an increase of 6.1% over the 2016 OEB-approved number.

Table 9, as updated below, provides a high-level summary of Hydro Ottawa's forecasted load for 2021-2025.

[16] Totals may not sum due to rounding.

Table 9 – AS ORIGINALLY SUBMITTED – Load Forecast Summary

Year	Total Sales (MWh)	Total Customers[17]
2021	7,065,745	344,936
2022	7,088,184	348,104
2023	7,116,619	351,138
2024	7,165,092	354,088
2025	7,179,631	357,017

Table 9 – UPDATED FOR 2019 ACTUALS – Load Forecast Summary

Year	Total Sales (MWh)	Total Customers[18]
2021	7,063,482	344,936
2022	7,085,688	348,104
2023	7,113,883	351,138
2024	7,162,048	354,088
2025	7,176,418	357,017

Hydro Ottawa has provided a five-year detailed class-specific weather normalized load forecast and customer connection forecast for each rate class in UPDATED Exhibit 3-1-1: Load Forecast. This forecast incorporates modifications to the provincial electricity conservation framework that were enacted by the Government of Ontario in 2019, as well as the impacts of embedded generation.

4.8. COST OF CAPITAL

Cost of capital components have been determined for each year during the 2021-2025 planned rate term. Hydro Ottawa has used the following debt/equity ratio for all years: 4% short-term debt, 56% long-term debt, and 40% equity.

Hydro Ottawa has utilized the short-term debt rate of 2.75%, as provided in the 2020 Cost of Capital Parameters letter dated October 31, 2019, for the full five-year term covered by this Application. The utility has forecasted the weighted average cost of long-term debt based on the

[17] Figures in this column do not include Standby Power customers.
[18] Figures in this column do not include Standby Power customers.

cost of existing embedded debt, anticipated long-term borrowing requirements, and the forecast yield for 2021-2025 long-term debt issuances. Using the OEB's formulaic calculation, Hydro Ottawa has also forecast an ROE for the full five-year period covered by this Application.

It is Hydro Ottawa's intention to provide regulatory efficiency and rate stability over the five-year term of this Application by not making any further updates to the cost of capital components.

For additional details on the cost of capital determinations and calculations employed by Hydro Ottawa, please see UPDATED Exhibit 5-1-1: Cost of Capital and Capital Structure.

4.9. COST ALLOCATION AND RATE DESIGN

Hydro Ottawa has prepared a cost allocation model for each of the five years in the proposed 2021-2025 rate plan using the OEB's cost allocation methodologies and model. Hydro Ottawa's 2021 base revenue requirement has been allocated across the utility's nine rate classes. The resulting revenues-to-cost ratios for each rate class were determined using the total revenues over costs for each year, pursuant to OEB guidelines.

Hydro Ottawa engaged Elenchus Research Associates to undertake a Cost Allocation Model study to determine whether refinements were necessary to better reflect the OEB's principle of cost causality in its cost allocation to customers. The results of the study indicated that four rate classes require adjustments to bring them within OEB-approved ranges. In this Application, the utility is proposing the necessary adjustments to achieve this result. For more information, please see UPDATED Exhibit 7-1-1: Cost Allocation.

With respect to rate design, one noteworthy feature of Hydro Ottawa's 2021-2025 rate plan is that it marks the first five-year rate term for the utility in which distribution rates for residential customers will be set at a fully fixed charge. Effective January 1, 2020, Hydro Ottawa completed the transition to fully fixed rates for these customers, in accordance with the policy adopted by the OEB in 2015.[19] As noted elsewhere, the execution of this transition has implications for the presentation of information pertaining to the impacts on residential customer rates associated with the proposals and plans set forth in this Application.[20]

4.10. DEFERRAL AND VARIANCE ACCOUNTS

Hydro Ottawa is proposing to clear Group 2 Accounts, including the Lost Revenue Adjustment Mechanism ("LRAM") Account. The total net deferral and variance ("DVA") balance proposed for disposition is $(5,751,923), as originally submitted. Hydro Ottawa is proposing that the Rate Riders for Group 2 Accounts (excluding LRAM) be disposed of over two years. For the LRAM Variance Account, a one-year disposition period is proposed. As no Group 1 Accounts are being requested for disposition at this time, the rate riders are the same for Regulated Price Plan ("RPP") and non-RPP customers.

After accounting for 2019 actuals, Hydro Ottawa is proposing to clear Group 1 and Group 2 Accounts, including the LRAM Account. The total net DVA updated balance proposed for disposition is $(6,695,545). Hydro Ottawa is proposing that the Deferral/Variance Accounts Rate Riders for Group 1 and Group 2 Accounts be disposed of over two years. Disposition of all other rate riders is requested over a one-year period.

In this Application, Hydro Ottawa is also proposing modifications to and the discontinuance of certain DVAs. For further such information, as well as for details on amounts proposed for DVA clearances, please see UPDATED Exhibit 9-1-1: Summary of Current Deferral and Variance Accounts and Exhibit 9-2-1: New Deferral and Variance Accounts.

4.10.1. Capital Variance Account

In this Application, Hydro Ottawa proposes to sustain the use of a variance account wherein it will record, on an annual basis, the impacts on revenue requirement arising from variances

[19] Ontario Energy Board, *Board Policy - A New Distribution Rate Design for Residential Electricity Customers*, EB-2012-0410 (April 2, 2015). Please see Exhibit 8-2-1: Rate Design Policy Consultation for details.
[20] For example, please see the explanation provided in UPDATED Exhibit 1-1-7: Customer Summary.

between actual and forecasted cumulative capital additions. Capital additions would be tracked using three categories: System Access, System Service and System Renewal, and General Plant.[21] The creation and use of such a variance account was sanctioned as part of the Approved Settlement Agreement governing Hydro Ottawa's 2016-2020 rates. The utility believes that the administration of this capital variance account on an ongoing basis is an effective means of ensuring transparency and accountability in the planning, execution, and reporting of annual capital expenditures. By proposing the calculation of the annual variance on a cumulative basis, Hydro Ottawa's intent is to ensure that if projects are delayed, but are completed as planned at a later time, then the reduction to revenue requirement will only reflect the period of delay and will cease when the projects have been added to rate base.

The one modification to the capital variance account that Hydro Ottawa is proposing to introduce for the 2021-2025 period is the use of a separate sub-account for System Access capital additions. The rationale for this proposal is that capital spending in this category is driven by customer requests and is therefore difficult to predict, as the level of required expenditure is outside of the utility's control.

For additional information on the Capital Variance Account, please see Exhibit 9-2-1: New Deferral and Variance Accounts.

4.10.2. Earnings Sharing Mechanism

In order to insulate customers from the risk of Hydro Ottawa generating excess earnings, the utility is proposing the inclusion of an earnings sharing mechanism ("ESM"). ESMs permit the sharing of utility earnings with customers when earnings rise above or fall below a certain threshold. Under an ESM, earnings may be passed along to customers in the form of rate reductions or rate offsets. Hydro Ottawa is proposing an asymmetrical ESM such that it is only

[21] The System Renewal and System Service categories have been merged into one category to reflect Hydro Ottawa's standard operating practice to shift funds between the two categories, as warranted by customer and operational requirements.

proposing to share earnings that exceed a basis point threshold above the utility's ROE, with no corresponding adjustment if its earnings fall below the basis point threshold.

The proposed ESM formula is as follows:

Table 10 – Proposed ESM Formula

#	Threshold	Treatment
1	Under earning	Borne entirely by shareholder
2	0-150 basis points	Fully retained by shareholder
3	Above 150 basis points	50/50 sharing of ratepayer/shareholder

Additional detail on the ESM is included in Exhibit 9-2-1: New Deferral and Variance Accounts.

4.10.3. Z Factor(s)

In its *Handbook for Utility Rate Applications*, the OEB affirmed its policy that "[a]n acceptable adjustment during a Custom IR term is a Z factor mechanism for cost recovery of unforeseen events."[22] In step with this guideline, Hydro Ottawa intends to reserve its right over the course of the 2021-2025 rate term to file a Z factor application in order to recover costs resulting from unforeseen events, decisions, or activities, the results of which cannot be reasonably anticipated or quantified at this juncture and where the costs exceed the utility's materiality threshold. Examples include unforeseen weather events or changes to laws or regulations requiring significant implementation investment.

4.10.4. Certification of Evidence - Commodity Accounts 1588 and 1589

As per the Filing Requirements, Hydro Ottawa's Chief Financial Officer hereby certifies that the utility maintains robust processes and internal controls for the preparation, review, verification, and oversight of Account 1588 RSVA – Power and Account 1589 RSVA – Global Adjustment.

[22] Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 27.

4.11. BILL IMPACTS

Table 11, as updated below, provides a summary of the total bill impacts for typical customers in all rate classes. Further details regarding Hydro Ottawa's proposed bill impacts are available in UPDATED Exhibit 8-12-1: Bill Impact Information.

1 **Table 11 – AS ORIGINALLY SUBMITTED – Summary of Bill Impacts**

Rate Class		Approved	Proposed				
		2020	2021	2022	2023	2024	2025
Residential (750 kWh)	Distribution Charge	$28.64	$29.95	$32.13	$33.97	$34.95	$35.56
	Change in Distribution Charge		$1.31	$2.18	$1.84	$0.98	$0.61
	% Distribution Increase		4.57%	7.28%	5.73%	2.88%	1.75%
	% Increase of Total Bill		1.32%	1.54%	1.28%	0.68%	0.43%
General Service <50 kW (2,000 kWh)	Distribution Charge	$71.32	$73.06	$78.13	$83.28	$86.33	$88.58
	Change in Distribution Charge		$1.74	$5.07	$5.15	$3.05	$2.25
	% Distribution Increase		2.44%	6.94%	6.59%	3.66%	2.61%
	% Increase of Total Bill		0.65%	1.37%	1.37%	0.81%	0.59%
General Service 50 kW - 1,499 kW (250 kW)	Distribution Charge	$1,461.93	$1,537.98	$1,669.42	$1,785.17	$1,853.01	$1,905.37
	Change in Distribution Charge		$76.05	$131.44	$115.76	$67.84	$52.36
	% Distribution Increase		5.20%	8.55%	6.93%	3.80%	2.83%
	% Increase of Total Bill		1.59%	0.74%	0.65%	0.38%	0.29%
General Service 1,500 kW - 4,999 kW (2,500 kW)	Distribution Charge	$15,941.18	$16,614.68	$18,015.99	$19,263.84	$19,992.90	$20,452.40
	Change in Distribution Charge		$673.50	$1,401.31	$1,247.85	$729.06	$459.50
	% Distribution Increase		4.22%	8.43%	6.93%	3.78%	2.30%
	% Increase of Total Bill		1.53%	0.78%	0.69%	0.40%	0.25%
Large Use (7,500 kW)	Distribution Charge	$48,420.32	$53,922.32	$58,287.22	$62,092.67	$64,292.42	$65,709.17
	Change in Distribution Charge		$5,502.00	$4,364.90	$3,805.45	$2,199.75	$1,416.75
	% Distribution Increase		11.36%	8.09%	6.53%	3.54%	2.20%
	% Increase of Total Bill		2.16%	0.79%	0.68%	0.39%	0.25%
Sentinel Lighting (0.4 kW)	Distribution Charge	$9.53	$10.91	$13.14	$15.31	$17.20	$18.99
	Change in Distribution Charge		$1.38	$2.23	$2.17	$1.89	$1.79
	% Distribution Increase		14.46%	20.46%	16.54%	12.33%	10.44%
	% Increase of Total Bill		7.36%	8.74%	7.83%	6.32%	5.65%
Street Lighting (1 kW)	Distribution Charge	$7.76	$6.99	$7.97	$8.68	$8.98	$9.24
	Change in Distribution Charge		$(0.77)	$0.98	$0.71	$0.30	$0.26
	% Distribution Increase		(9.98)%	14.07%	8.92%	3.46%	2.91%
	% Increase of Total Bill		(1.10)%	3.16%	2.24%	0.96%	0.83%
Unmetered Scattered Load (470 kWh)	Distribution Charge	$17.08	$17.49	$19.55	$21.37	$22.67	$23.82
	Change in Distribution Charge		$0.41	$2.06	$1.82	$1.30	$1.15
	% Distribution Increase		2.42%	11.76%	9.33%	6.10%	5.07%
	% Increase of Total Bill		0.98%	2.36%	2.05%	1.44%	1.26%

Table 11 – UPDATED FOR 2019 ACTUALS – Summary of Bill Impacts

Rate Class		Approved	Proposed				
		2020	2021	2022	2023	2024	2025
Residential (750 kWh)	Distribution Charge	$28.64	$30.62	$32.50	$34.04	$35.03	$35.65
	Change in Distribution Charge		$1.98	$1.88	$1.54	$0.99	$0.62
	% Distribution Increase		6.91%	6.15%	4.74%	2.91%	1.77%
	% Increase of Total Bill		1.53%	1.33%	1.38%	0.69%	0.43%
General Service <50 kW (2,000 kWh)	Distribution Charge	$71.32	$74.21	$79.23	$83.71	$86.76	$89.02
	Change in Distribution Charge		$2.89	$5.02	$4.48	$3.05	$2.26
	% Distribution Increase		4.05%	6.76%	5.65%	3.64%	2.60%
	% Increase of Total Bill		0.69%	1.36%	1.52%	0.80%	0.59%
General Service 50 kW - 1,499 kW (250 kW)	Distribution Charge	$1,461.93	$1,508.85	$1,620.11	$1,788.85	$1,857.00	$1,909.66
	Change in Distribution Charge		$46.93	$111.26	$168.74	$68.15	$52.66
	% Distribution Increase		3.21%	7.37%	10.42%	3.81%	2.84%
	% Increase of Total Bill		2.96%	(1.08)%	1.20%	0.38%	0.29%
General Service 1,500 kW - 4,999 kW (2,500 kW)	Distribution Charge	$15,941.18	$16,483.93	$17,672.63	$19,315.57	$20,048.54	$20,512.79
	Change in Distribution Charge		$542.75	$1,188.70	$1,642.94	$732.97	$464.25
	% Distribution Increase		3.40%	7.21%	9.30%	3.79%	2.32%
	% Increase of Total Bill		2.94%	(1.01)%	1.18%	0.40%	0.25%
Large Use (7,500 kW)	Distribution Charge	$48,420.32	$53,055.32	$56,727.95	$62,069.06	$64,275.56	$65,702.06
	Change in Distribution Charge		$4,635.00	$3,672.63	$5,341.11	$2,206.50	$1,426.50
	% Distribution Increase		9.57%	6.92%	9.42%	3.55%	2.22%
	% Increase of Total Bill		3.46%	(1.19)%	1.38%	0.39%	0.25%
Sentinel Lighting (0.4 kW)	Distribution Charge	$9.53	$11.25	$13.34	$15.38	$17.30	$19.12
	Change in Distribution Charge		$1.72	$2.10	$2.04	$1.91	$1.82
	% Distribution Increase		18.02%	18.64%	15.32%	12.43%	10.53%
	% Increase of Total Bill		8.47%	8.13%	7.62%	6.38%	5.71%
Street Lighting (1 kW)	Distribution Charge	$7.76	$7.46	$8.08	$8.80	$9.11	$9.38
	Change in Distribution Charge		$(0.30)	$0.62	$0.72	$0.31	$0.27
	% Distribution Increase		(3.89)%	8.26%	8.94%	3.55%	3.00%
	% Increase of Total Bill		(0.22)%	1.96%	2.93%	0.99%	0.87%
Unmetered Scattered Load (470 kWh)	Distribution Charge	$17.08	$17.68	$19.38	$21.25	$22.55	$23.70
	Change in Distribution Charge		$0.60	$1.71	$1.86	$1.30	$1.15
	% Distribution Increase		3.54%	9.64%	9.61%	6.13%	5.10%
	% Increase of Total Bill		0.92%	1.96%	2.42%	1.44%	1.26%

UPDATED Hydro Ottawa Limited

Business Plan

2021-2025

May 2020

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1. INTRODUCTION

Hydro Ottawa Limited ("Hydro Ottawa" or "the utility") has prepared a formal Business Plan that serves as the basis for the utility's overall strategy and goals, highlights the intersection between these goals and the proposals set forth in its 2021-2025 Custom Incentive Rate-setting ("Custom IR") application, and speaks to the benefits that will accrue to customers as a result of the plan's execution.

This Business Plan has been prepared in conformance with the requirements set forth in the Ontario Energy Board's ("OEB") *Handbook for Utility Rate Applications*.

2. COMPANY OVERVIEW

Mission

To create long-term value for our shareholder, benefitting our customers and the communities we serve

Organizational Values

Teamwork, Integrity, Excellence, Service

Vision

Hydro Ottawa – a leading partner in a smart energy future

Hydro Ottawa is a regulated electricity distribution company serving approximately 340,000 customers within the City of Ottawa and the Village of Casselman, as of the end of 2019. As the third-largest municipally owned electrical utility in Ontario, the company maintains one of the safest, most reliable, and cost-effective electricity distribution systems in the province. Its service territory stretches 1,116 square kilometres and is comprised of a dense urban core, large areas of suburban development, and a vast rural area that represents 60% of the overall footprint.

Hydro Ottawa and its predecessor utilities have proudly served communities in the National Capital Region for over 100 years. The utility's unique customer base includes residential customers, commercial businesses, farms, and large institutional and industrial customers. As the national seat of government, Ottawa is home to the federal parliament and key institutions within the Government of Canada. Moreover, the city is the second largest in the Province of Ontario and the sixth largest in the country.

The utility is a wholly-owned subsidiary of Hydro Ottawa Holding Inc., which is 100% owned by the City of Ottawa and governed by an independent Board of Directors.

3. INTEGRATED BUSINESS PLANNING & PERFORMANCE MANAGEMENT FRAMEWORK

For more than a decade, the larger corporate enterprise of which Hydro Ottawa is a member has successfully administered an integrated business planning and corporate performance management framework. This framework links the strategic and business planning, budgeting, performance measurement, management reporting, and employee alignment activities into one continuous business and improvement cycle. Applying this framework in whole, Hydro Ottawa is able to chart its course for a five-year period, implement and operate in accordance with annual plans and budgets, and monitor and report performance and progress against these plans and budgets.

In accordance with its charter, Hydro Ottawa's Board of Directors ("the Board") is responsible for developing and approving a business plan which indicates the overarching strategy that the utility intends to pursue. The Board must regularly review the integrity of the business plan. At any time, if the Board is of the opinion that the then-existing business plan is no longer appropriate, the Board – in conjunction with the Chief Executive Officer ("CEO") – must develop a revised business plan. What's more, on an ongoing basis, the Board is likewise responsible for monitoring the utility's implementation of the plan and the progress toward achieving it.

Similarly, the Board is tasked with approving the annual budget, and monitoring its progress and achievement at each regular meeting.

The key components of the integrated planning and performance management framework are as follows:

a. An enterprise strategic plan approved by the holding company Board that sets the course for the enterprise for a five-year period.
b. Annual business plans that are approved at both the holding company and regulated distribution utility levels, which are comprised of a corporate performance scorecard and budget. These elements operationalize the strategic plan in a given year and cascade to employees through individual contribution and performance appraisal systems. The annual business plans are informed by, and draw upon, updated plans for each administrative division within the utility which are prepared by the applicable member of the Executive Management Team.
c. Regular monitoring and reporting of performance and progress against annual plans and budget, including:
    i. Monthly reviews by the Executive Management Team of financials, status of priorities and critical projects, and performance measures and targets as established for each key area of focus in the annual Corporate Performance Scorecard;
    ii. Monthly updates to the Shareholder;
    iii. A quarterly President and CEO Report to the holding company and regulated distribution utility Boards of progress against the Corporate Performance Scorecard, including enterprise risk management reporting;
    iv. Quarterly financial reports to the Shareholder;
    v. Review by the holding company and regulated distribution utility Boards of annual results against the Corporate Performance Scorecard and financial results in April; and

vi. An annual report to the Shareholder in June.

d. As part of the development of the annual plan for the next year, an annual review of the critical issues and opportunities facing the utility by the Executive Management Team, and subsequently by the Board of Directors, to determine whether an adjustment to the five-year plan is required.

In addition, a key input into the process is a set of formal guidelines from the Chief Financial Officer for the preparation of five-year budgets for Hydro Ottawa's subsequent distribution rate period. This guidance is circulated approximately one year in advance of the expected filing date of the rate application. The document lays out a timeline for budget development; identifies constraints and expectations relevant to such matters as compensation, headcount, and capital and operational expenditure levels; and stipulates requirements related to productivity, continuous improvement, cost control, and alignment of spending to the utility's priorities.

A copy of the memorandum setting forth guidelines for 2020-2025 budgets and priorities is included as an attachment below.

4. CUSTOMER NEEDS & PREFERENCES

Providing customers with value for money and facilitating a customer experience that is driven by choice are cornerstones of Hydro Ottawa's business planning. In step with its overall business strategy to put the customer at the centre of everything it does, the utility endeavours to ensure that its capital and operational investment plans are guided and informed by customer needs, preferences, and priorities.

4.1. ONGOING CUSTOMER ENGAGEMENT

Hydro Ottawa avails itself of numerous tools, activities, and interactions to engage customers and to reflect their input in the utility's planning and plans on an ongoing basis. These reflect an evergreen posture on Hydro Ottawa's part to develop a genuine understanding of customers' interests through a fluid and continuous feedback loop. This helps inform and sharpen the utility's service delivery as a matter of established routine, and embed a customer-centric culture across the organization.

Hydro Ottawa's approach to customer engagement represents a blend of activities that are either aligned with industry best practice or are homegrown, having been formulated and customized internally in order to suit the particular needs of the utility and its customer base. Key channels for interaction include telephone, email, web chat, social media, website, in person, and community events. Focus groups, surveys, and analytics are also important research tools for gleaning broader insights and trends.

The following serve as illustrative – but by no means comprehensive – examples of specific instruments used by Hydro Ottawa to identify customer needs and preferences, and to incorporate them into the utility's plans for providing electricity distribution services:

- **Social media platforms** – Hydro Ottawa uses social media channels to engage in two-way conversations with customers on a daily basis. Channels are monitored during business hours and, in particular, during prolonged power outages in order to answer customer questions or concerns. Recent trends indicate that many customers have a strong preference to use social media to share information or ask questions related to outages, and that they value real-time responses to their inquiries.

- **Transactional surveys** – every week, customers who phoned Hydro Ottawa's call centre during the previous week are automatically invited to rate their experience with the service received. Based upon the survey results, Hydro Ottawa is able to enhance the customer experience and adapt processes in a timely and responsive manner. More recently, Hydro Ottawa added email and web chat features to this survey, in keeping with the utility's commitment to engage customers through the channel of their choice.

- **Annual customer satisfaction survey** – survey questions cover a wide variety of topics, including overall satisfaction with Hydro Ottawa, reliability, customer service, power outages, billing, cost of electricity, and corporate image. Feedback from these surveys is incorporated into Hydro Ottawa's planning process, and ultimately forms the basis of plans which address customer needs as well as service improvements and offerings.

- **Key Accounts program** – customers are categorized as a Key Account based on their size of service, financial impact, and impact on the community and the grid. Hydro Ottawa works proactively with these large business and institutional customers on a range of priorities, including billing, load profile, rates analysis, power quality, energy management, and education and awareness of provincial regulations.

- **Project-specific open houses** – these are hosted by Hydro Ottawa when major distribution system projects have the potential to impact customers and their community. Based on customer feedback, these consultations have resulted in the evaluation of additional design options, the use of less impactful equipment, and/or the scheduling of mutually agreeable timelines for project completion. Between 2016 and 2019, Hydro Ottawa held 35 such open houses.

- **Collaboration with contractors and developers** – this takes the form of routine information sharing and participation in dedicated associations and forums with members of this unique stakeholder group. These engagements offer valuable insights into customer expectations around Hydro Ottawa's communications, processes, standards, specifications, costing, and Conditions of Service.

- **Conditions of Service revisions** – Hydro Ottawa compiles suggested edits to its Conditions of Service ("COS") on an ongoing basis, in response to customer feedback. Prior to the filing of any revised COS, Hydro Ottawa solicits customer comments through its website and social media accounts. All customers likewise receive notification of the review period through an on-bill message. In addition, contractors, City of Ottawa contacts, and Key Accounts are directly notified of the review period by letter.

- **Engagement with the City of Ottawa** – given the impact of municipal planning, services, and regulations on customer needs, the relationship with the City is a vital one. Accordingly, Hydro Ottawa frequently interacts with numerous divisions across the municipal government. These interactions serve as platforms for discussing critical matters, such as long-term planning, capital programs, permitting, standards, and servicing. In turn, they play a valuable role in enhancing communications and coordination, sharing of lessons learned, identifying opportunities for improvement, and building mutual understanding.

4.2. CUSTOMER CONSULTATION ON THE 2021-2025 RATE APPLICATION

As a complement to, and extension of, the foregoing activities, Hydro Ottawa undertook targeted customer outreach activities to inform the development of the specific plans and proposals set forth in its 2021-2025 rate application. Consisting of a mix of qualitative and quantitative methodologies, this engagement was launched in January 2019 and extended through September 2019.

Phase I of this consultation focused on low-volume customers (residential and small business), seeing as these segments represent approximately 99% of the total customer base. This initial phase focused on gathering general insights on customer priorities, preferences, and needs.

Consistent findings were yielded across low-volume customer classes. To begin, the clear majority of these customers expressed satisfaction with the current service they receive from Hydro Ottawa. In addition, ensuring reliability, maintaining reasonable rates, and investing in technology in order to help reduce future costs constituted the top three priorities for customers. Moreover, these customers generally held favourable views on making proactive investments in aging infrastructure and grid modernization at the present time, with the understanding that this may lead to near-term costs but will result in future savings. With respect to reliability outcomes, above all customers placed a premium on accelerating restoration times following extreme weather events. Minimizing the number and duration of outages in general was flagged as the next most pressing priority.

Based upon the feedback received during Phase I, Hydro Ottawa undertook a second, more expansive phase of engagement, in which the utility surveyed customers for their detailed feedback on proposed plans for capital and operational investments over the 2021-2025 period. A series of expenditure options was presented – namely, a reference case outlining the utility's proposed course of action, along with scenarios which either accelerated and expanded the proposal, or which scaled back the scope and timing of the proposal. Customers were thus able to express their views on a range of alternative proposals, as well as the respective trade-offs, outcomes, and rate impacts.

For residential and small business customer classes, the response was heavily weighted in support of Hydro Ottawa's proposed plans or spending more than proposed for certain services. Nearly one-half of respondents in both segments (48% and 47%, respectively) identified that Hydro Ottawa should maintain the forecasted annual increase to deliver a program which focuses on the stated priorities. A further 35% of residential and 29% of small business customers expressed support for further improvements in service, even if this entailed additional rate increases. What's more, a majority of respondents called for investments above and beyond the reference case for purposes of renewing the overhead and underground portions of the grid, while more than 75% of customers signalled a willingness to pay more on their monthly bill in order to enable Hydro Ottawa to undertake measures to prepare for the effects of severe weather.

With respect to participants from large customer segments, these voices expressed concern over the rate increases being proposed and were open to potential decreases in service reliability if this equated to reductions in forecasted bill increases. This feedback was highly valuable, insofar as it emphasized the critical importance of a balanced plan – one which maximizes the impact of investments to match residential customer expectations without exacerbating rate pressures on business customers (and all while relentlessly pursuing efficiency and productivity improvements).

Of note, the number of customers who participated in this engagement exercise – nearly 21,000 in total – was the largest in the history of any Hydro Ottawa rate application. In itself, this result was encouraging and instilled confidence in the quality of the information gleaned and the representativeness of the sample pool of customers. Beyond this, however, Hydro Ottawa was buoyed by the fact that the rate of response (i.e. number of respondents as a percentage of the total customer base) exceeded that which has been observed in any rate filing from an OEB-regulated distributor in recent memory.

5. STRATEGIC CONTEXT

Hydro Ottawa has formulated its corporate vision and objectives against the backdrop of numerous trends and shifts that are unfolding in the operational, business, and policy environments in which the utility carries out its activity.

5.1. OPERATIONAL CHALLENGES

5.1.1. Aging Infrastructure

Foremost among the operational pressures facing the utility is the advanced age of a significant subset of its asset base. Large segments of the system were constructed in the 1960s through the 1980s. With most assets having a lifespan of approximately 50 years, a considerable proportion of the system is approaching or has exceeded the anticipated end of life.

For example, nearly 19% of all assets have reached their expected service life and now pose a higher risk of failure. This includes approximately 51% of stations and 23% of overhead system assets (i.e. poles, transformers, and switches). Another 12% of the asset population is within 10 years of reaching its end of life.

In the absence of critical system renewal investments, the increased potential of failures posed by these aging assets will impact Hydro Ottawa's ability to maintain grid reliability.

5.1.2. An Expanding Customer Base

Compounding the challenge of replacing aging infrastructure is the sustained growth which the City of Ottawa continues to experience. This trend has translated into a steady expansion in the number of customers served by the utility and the number of new customers requiring connection to Hydro Ottawa's network on an annual basis.

Similar to the patterns observed throughout 2016 to 2020, Hydro Ottawa anticipates a comparable level of growth over the course of the planned 2021-2025 rate term. In fact, the City of Ottawa is projecting an increase of over 16% in the city's population by 2031, relative to 2016 levels. This growth is expected to take several distinct forms: the development of new mixed commercial/residential communities; intensification of development within the urban core of the service territory; continued suburban growth in the east, west, and southern regions; and former rural areas fed by long distribution lines becoming suburban centres. Alongside this development, major infrastructure projects such as the Stage 2 expansion of Ottawa's Light Rail Transit system are also set to overlap with the utility's upcoming rate period.

5.1.3. Extreme Weather Effects

In a 2019 report examining Canada's top climate change risks, the Council of Canadian Academies found that "climate change is very likely to cause significant negative impacts across many natural and human systems in Canada over the next 20 years." The report concluded that adaptation action will need to be pursued through effective partnerships among government, the private sector, communities, and individuals, in order to avoid the worst damages stemming from climate change.

Over the last five years, Hydro Ottawa and its customers experienced firsthand the growing frequency of severe weather events and their adverse impacts on the distribution grid. During a six-month span in 2018 alone, there were three major weather events that affected the Ottawa area (including a multiple-tornado event during the month of September) which caused considerable damage and heavily impacted spending on emergency replacement of assets. This series of events was bookended on either side by historic flooding along the Ottawa River in 2017 and 2019, which resulted in tens of millions of dollars in economic losses and prolonged disruptions to customers in affected areas.

In light of these findings and events, and in view of the rising trend of extreme weather, Hydro Ottawa will be compelled to enhance adaptation and risk mitigation measures within the design, operation, and maintenance of its system, in order to help protect infrastructure, service delivery, and occupational health and safety. To that end, the utility has already commissioned and received a formal distribution system climate risk and vulnerability assessment, and is undertaking a multi-year action plan to implement the recommendations.

5.1.4. Technological Complexity

The operational and informational technology systems that underpin utilities' performance are rapidly evolving and becoming increasingly complex. The business systems and processes supporting frontline operations and back-office functions are steadily migrating towards digital, mobile-friendly, and cloud-based solutions. Core operational systems continue their convergence with enterprise information systems. Automation is on the rise, with the frontier into artificial intelligence likewise being crossed. And while utilities are navigating this shifting terrain, they are simultaneously compelled to mitigate the risk of technologies becoming obsolete – whether as a result of third-party providers discontinuing maintenance services for legacy solutions or existing tools having reached the end of their useful lives (as in the case of first-generation smart meters).

Meanwhile, the implementation of smart grid equipment and devices, alongside the proliferation of distributed energy resources ("DERs"), has fostered a more dynamic ecosystem of transactions, participants, and flows of energy, information, and communications. What's more, a central tenet of the "Smart City" movement is that utilities will enable the connectivity which harnesses the power of data and technology to enhance the quality of life for communities.

Taken together, the aforementioned technological trends and pressures introduce a wide spectrum of both risk and opportunity for Hydro Ottawa.

5.1.5. Cyber Security

The critical nature of the services provided by utilities makes for a double-edged sword. On the one hand, there is widespread recognition of the indispensable role played by electricity distributors in the quality of life that is enjoyed by consumers. Conversely, the essential role played by electricity means that utilities rank among the most high-value targets for malicious actors in cyberspace. This risk is magnified for a distributor like Hydro Ottawa, which serves the capital city of a G7 country and a multitude of customers with unique service quality and data confidentiality needs.

The risks faced by utilities in Ontario in relation to cyber security are set to amplify exponentially over the coming five-year horizon and beyond, in light of the rising complexity of operational and informational technology systems noted in the foregoing section. Further reflection of the shifting risk landscape is the OEB's recent implementation of a cyber security framework for utilities under its jurisdiction, as well as the expansion of the Independent Electricity System Operator's ("IESO") mandate to provide cyber security information services to licensed transmitters and distributors.

5.1.6. Workforce Retirements

Hydro Ottawa has long maintained that its strength and success as a company is derived from the quality of its employees. Like many companies in the electricity sector, though, Hydro

Ottawa faces challenging workforce demographics. For example, over the next 10 years, 34% of the workforce will be eligible for retirement, of which 60% are skilled workers in trades or technical professions. Taken together with the fact that almost one-third of employees have five years or less of service, the picture of the workforce population at Hydro Ottawa is one in which there is less experience in a highly complex and safety-focused operating environment. The ability of the utility to proactively prepare for the impacts of workforce demographics, as well as the impacts of technological and digital transformation on requisite employee skill sets, will be a critical determinant of whether core business objectives and customer needs can be met.

5.2. BUSINESS ENVIRONMENT

5.2.1. State of the Economy

The state of the local, provincial, national, and international economies can have a significant impact on Hydro Ottawa's business through factors such as inflation, customer credit risk, weakening demand for electricity and/or value-added services, and availability of market capital to fund growth. The economic climate can also have an effect on the stability and performance of some of the utility's key business partners. While near- and mid-term indicators in Ottawa, Ontario, and Canada are generally positive, the prospect of economic headwinds and uncertainty lingers, especially in relation to competitiveness and regulatory and tax burdens.

5.2.2. Evolution of the Utility Business Model

It is widely acknowledged across industry, academic, and government circles that the sector is in the midst of a historic transition. In some corners, this transformation is attributed to the confluence of key factors known as the "three Ds" – decentralization, decarbonisation, and digitization. Innovative tools, technologies, and data sets are introducing new options to enhance customers' control, understanding, and supply of energy. In turn, this is cultivating higher customer expectations for leading-edge services and solutions. Moreover, the economics of supply options have evolved significantly. Maturing forms of non-emitting resources are approaching cost parity with conventional generation resources, while the appeal of DERs has also grown.

Against this backdrop of change, the prevailing consensus favours the view that the utility has no choice but to abandon its conventional business model. What ought to replace it, however, remains a subject of contentious debate. It is a question that every utility will be compelled to address and resolve in short order. If an effective and viable response is not forthcoming, the risk emerges of actors and forces beyond the utility's control making the decision instead.

5.2.3. Customer Interest in Choice & Sustainability

As signalled in the foregoing section, the engine that is fueling the transformation unfolding in the sector is the changing role of the customer. Whereas this role has historically been passive in nature, it has become much more influential in the new landscape. The opportunities and expectations for customized service, control, and convenience continue to expand. A prominent example in this regard is the rising level of customer interest in sourcing power from clean sources of energy and the manifestation of this appetite in the steady proliferation of DERs across Ontario.

The shifting sands of customers' needs and choices present an exciting opportunity for offering new products and services to enhance customer value and service. To realize these opportunities, utilities will need to continuously improve the way they do business, with a particular focus on creating a more effortless and engaging customer experience. As the preferences and priorities of customers continue to evolve, Hydro Ottawa must be ready, willing, and able to fulfill them. Maintaining a business strategy that puts the customer at the centre of everything the utility does will be a fundamental prerequisite for success.

5.2.4. Consolidation & Shared Services in the Distribution Sector

The business environment of Ontario's electricity distribution sector is unique, in terms of the number of participating members. Over 60 local distributors provide electricity to the province's 5.2 million customers. For many years, public policy has sought to encourage and incentivize consolidation within the distribution community. What's more, numerous aspects of the sector's evolution and the changing utility business model seem to favour economies of scale in a distributor's operations and activities. It is therefore not altogether surprising that, since the filing of Hydro Ottawa's last rebasing application in 2015, the sector has witnessed a steady succession of consolidations, along with an uptick in the entry into shared services agreements.

The footprint and dispersion of distribution utilities throughout Eastern Ontario means that Hydro Ottawa remains well-positioned to pursue consolidation opportunities. Similarly, the utility's range of experience with shared services has underscored the value of targeted collaboration and partnership with utility peers, where appropriate. As such, going forward, these options will remain important parts of the utility's toolkit to provide the most cost-effective solutions to customers.

5.2.5. Market Renewal

Hydro Ottawa is a registered participant in the provincial electricity market administered by the IESO. In its capacity as a market participant, the company purchases electricity from the IESO on behalf of the vast majority of its customers. Accordingly, Hydro Ottawa has a direct stake in an efficient and reliable market, which is able to supply customers with power at the lowest possible cost. Since 2016, the IESO has been exploring a series of enhancements to the design and administration of Ontario's markets. Several of these proposals contemplate fundamental changes to the structures and methodologies for determining the wholesale price of electricity. Under the IESO's project management timeline for Market Renewal, the initial group of these proposals is slated to take effect in March 2023, near the mid-point of Hydro Ottawa's next five-year rate term.

For electricity distributors, the reforms emanating from Market Renewal may represent a double-edged sword. On the one hand, they may pose certain administrative challenges, especially from a settlements and billing perspective. Concurrently, however, to the extent that Market Renewal serves as a platform for developing new product and service offerings, the initiative could also open the door to new business and revenue opportunities.

5.3. POLICY & REGULATORY ENVIRONMENT

5.3.1. Shifts in Public Policy & Regulation

Over the course of Hydro Ottawa's 2016-2020 rate period, there were numerous policy and regulatory developments which had profound effects on the utility and the sector at large: establishment and subsequent cancellation of a provincial cap-and-trade program; implementation of numerous electricity rate mitigation and assistance programs; changes to the OEB's customer service rules, including the institution of a moratorium on residential disconnections during winter; adoption of the Ontario Cyber Security Framework; issuance of OEB guidance on corporate governance; cancellation of Ontario's conservation framework; and reforms to the OEB's governance structure.

And with respect to the primary vehicle driving provincial energy policy of late – the Long-Term Energy Plan ("LTEP") – it warrants observation that a total of three LTEPs have been issued over the past seven years. Each iteration of the LTEP left a lasting imprint on the public policy landscape. Assuming the current legislative framework for LTEP development remains in place, two new LTEPs are set to be released over the course of Hydro Ottawa's 2021-2025 rate term.

A practical effect of these recent trends has been a heightened need for electricity distributors to respond quickly to policy and regulatory actions which significantly impact the operations, activities, investments, and structure of the distribution sector. Hydro Ottawa anticipates that this need for readiness and nimbleness in adapting to shifts in public policy direction will endure throughout the utility's forthcoming rate period.

5.3.2. Affordability & Cost Reduction

While in recent years the broader policy landscape has been fluid, one aspect has remained firm – an enduring interest on the part of policymakers and regulators in placing downward pressure on customers' rates and bills. This objective has been pursued in varying forms, whether through rate rebates and mitigation, assistance for customers struggling to pay their bills, dedicated programs for commercial and industrial ratepayers, subsidies for the purchase of energy efficient equipment, or pilot programs to test alternative pricing structures. Depending upon the future direction and constraints of public policy in this regard, rate-regulated utilities may face challenges, such as barriers or resistance to approval for cost recovery of operational and capital expenditures.

5.3.3. GHG Emissions Reduction & Electrification

Across all levels of government, there is a crystallizing consensus that greenhouse gas ("GHG") emissions ought to be lowered. Where sharp differences in policy prescriptions do exist is in regards to the means for achieving this end. And yet, even in this respect, there are common threads woven by policy actors that are of significant relevance to the electricity distribution sector in Ontario. Foremost among these is growing policy interest in the electrification of various economic sectors, especially transportation. This enthusiasm can be observed in a range of federal government climate change initiatives as well as in the province's projections for a steady uptick in the deployment of electric vehicles. Hydro Ottawa is also in the unique vantage point of having a shareholder, the City of Ottawa, which views electrification as a critical means of supporting its "Energy Evolution" strategy for reducing GHGs and boosting renewable energy use.

With the arc of GHG reduction policy bending in a direction that is increasingly favourable to enhanced electrification, both the implications and opportunities for distributors are numerous. In the former context, localized impacts on distribution infrastructure could be significant, depending upon the scale and pace of electrification. As for the latter, the embrace of electrification is advantageous to distributors, insofar as it bolsters their position to serve as a trusted energy advisor for customers and as an enabler of smart energy solutions.

5.3.4. Policy Action on Utility Revenue & Ratemaking

Looking ahead to the next five-year rate term for Hydro Ottawa, the outlook is decidedly mixed with respect to the revenue and ratemaking models for Ontario distributors. Grounds for optimism, in relation to the prospect of expanded business interests and opportunities, include provisions of the *Ontario Energy Board Act, 1998* which have relaxed restrictions on permissible business activity for distributors, as well as signals from the regulator that it is open to reducing barriers to new utility business models and examining approaches to remuneration that incent cost-effective innovation. At the same time, however, any conversation around utility remuneration will feature some degree of risk that other actors may seek outcomes that are at odds with the goal of enlarging the playing field in which distributors can compete. What's more, the prospect lingers of policy action on electricity pricing and bill reduction that may have adverse consequences for distributors from a financial viability perspective.

6. STRATEGIC OBJECTIVES & CORPORATE PERFORMANCE GOALS

6.1. STRATEGIC OBJECTIVES

Hydro Ottawa's vision is to be a leading partner in a smart energy future and to serve as the trusted energy advisor for customers. To achieve this vision, the utility has organized its business strategy around four critical areas of performance and supporting strategic objectives for several years – as represented in the figure below.

Hydro Ottawa will maintain continuity in its core objectives heading into the 2021-2025 period. Consistent with past years, the renewed strategic objectives are being formally adopted at the holding company level and will cascade across the enterprise. They will therefore serve to guide the business and operations of the regulated distribution utility.

The rationale underlying this approach includes such key factors as the level of success achieved during the preceding five-year rate term, the trajectory of the business and policy landscape in which Hydro Ottawa operates (as described in the preceding section on Strategic Context), and the input received from customers regarding the utility's performance and direction.

Figure 1 – Corporate Strategic Objectives

- **Customer Value:** we will deliver value across the entire customer experience by providing reliable, responsive and innovative services at competitive rates.

- **Organizational Effectiveness:** we will achieve performance excellence by cultivating a culture of innovation and continuous improvement.

- **Financial Strength:** we will create sustainable growth in our business and our earnings by improving productivity and pursuing business growth opportunities that leverage our strengths – our core capabilities, our assets and our people.

- **Corporate Citizenship:** we will contribute to the well-being of the community by acting at all times as a responsible and engaged corporate citizen.

Of these objectives, the most important driver of Hydro Ottawa's business strategy will remain Customer Value, with the utility striving to put the customer at the centre of everything it does.

6.2. CORPORATE PERFORMANCE GOALS

Customer Value, Financial Strength, Organizational Effectiveness, and Corporate Citizenship serve as the overarching four key areas of focus around which Hydro Ottawa anchors and organizes its business activity. With respect to the design and execution of plans to achieve strategic objectives in each of these areas of performance, a critical step is the establishment of a corporate performance scorecard. This scorecard establishes qualitative performance goals and priorities, along with quantitative measures and targets, in each of the four strategic areas of focus. Similar to the adoption of the strategic objectives, the corporate performance goals are established by the holding company, and in turn, are cascaded across the enterprise.

The table below depicts the planned alignment between the strategic objectives and corporate performance goals for Hydro Ottawa's regulated electricity distribution business for the 2021-2025 rate term.

Table 1 – Alignment of Corporate Strategic Objectives & Corporate Performance Goals

5-Year Enterprise Strategic Objectives and Outcomes (2021-2025)		Corporate Performance Goals
Customer Value	**<u>Enterprise Strategic Objective:</u>** **We will deliver value across the entire customer experience** *By providing reliable, responsive and innovative services at competitive rates* **<u>Enterprise Strategic Outcome:</u>** *Customer loyalty*	• *Assist customers in managing their energy consumption and electricity costs* • *Deliver on customer expectations for service quality and responsiveness* • *Maintain overall distribution system reliability*
Organizational Effectiveness	**<u>Enterprise Strategic Objective:</u>** **We will achieve performance excellence** *By cultivating a culture of innovation and continuous improvement* **<u>Enterprise Strategic Outcomes:</u>** *Efficient and effective operations* *Safe and healthy work environment* *Engaged, aligned and prepared workforce*	• *Continue to enhance operational performance and productivity* • *Maintain leading health and safety record* • *Enhance organizational and employee capability*
Financial Strength	**<u>Enterprise Strategic Objective:</u>** **We will create sustainable growth in our business and our earnings** *By improving productivity and pursuing business growth opportunities that leverage our strengths – our core capabilities, our assets and our people* **<u>Enterprise Strategic Outcome:</u>** *Growth in shareholder value*	• *Grow revenues from new sources* • *Enhance / protect revenues from existing business lines*
Corporate Citizenship	**<u>Enterprise Strategic Objective:</u>** **We will contribute to the well-being of the community** *By acting at all times as a responsible and engaged corporate citizen* **<u>Enterprise Strategic Outcomes:</u>** *Leading governance and business practices* *Engaged stakeholders* *Safe, secure and environmentally responsible services* *Positive community impact*	• *Enhance our brand image in the community and the industry* • *Continue to improve our environmental performance and reduce our impact on the environment*

7. CAPITAL & OPERATIONAL PLANS

This business strategy's centre of gravity is the set of plans which will organize and govern Hydro Ottawa's proposed investments in capital and operational programs over the 2021-2025 period.

Capital expenditures relate to items that, once purchased, have lasting benefits over many years. These include the overhead and underground infrastructure (stations, poles, wires) that serve as the backbone of the distribution system, as well as supporting assets and equipment, such as facilities, vehicles, and computer systems. Operating expenditures pertain to recurring expenses that are incurred in the day-to-day management of Hydro Ottawa's activities, like maintenance of assets and equipment, tree trimming, customer billing, workforce training, and employee payroll.

Based upon customer feedback, Hydro Ottawa has crafted capital and operational plans that emphasize the following four core principles:

1. Minimize rate increases
2. Maintain reliability and service quality
3. Address key pressures to the system, including:
    - Aging infrastructure
    - An expanding customer base and continued population growth
    - The effects of severe weather events
4. Make prudent investments in emerging technologies to enhance service offerings and/or reduce operation costs.

7.1. CAPITAL PLAN

Hydro Ottawa's assessments of its capital needs, and its proposed expenditures for meeting them, are captured in the utility's Distribution System Plan ("DSP"). The DSP details how capital investments will be prioritized, paced, and optimized, while minimizing rate impacts for customers and facilitating continuous improvement and productivity. The DSP is a core deliverable emerging from multiple internal and external planning processes related to capital investment, asset management, regional planning, customer engagement, and business strategy.

The investment proposals set forth in the DSP are organized into four categories – System Access, System Renewal, System Service, and General Plant. Projected expenditures, as well as the breakdown of programs, within each of these categories are outlined in the table below.

Table 2 – AS ORIGINALLY SUBMITTED – Annual Capital Investments ($'000,000s)

Investment Category	2021	2022	2023	2024	2025
System Access	$56.7	$41.0	$37.4	$34.5	$34.0
System Renewal	$43.3	$44.0	$40.2	$39.4	$40.5
System Service	$31.0	$27.4	$24.3	$25.2	$23.9
General Plant	$32.0	$11.7	$7.6	$17.4	$16.9
Capital Contributions	$(41.3)	$(25.2)	$(19.9)	$(19.2)	$(19.3)
TOTAL	**$121.8**	**$98.9**	**$89.6**	**$97.2**	**$96.0**

Table 2 – UPDATED FOR 2019 ACTUALS – Annual Capital Investments ($'000,000s)

Investment Category	2021	2022	2023	2024	2025
System Access	$56.7	$41.0	$37.4	$34.5	$34.0
System Renewal	$43.3	$44.0	$40.2	$39.4	$40.5
System Service	$26.7	$28.3	$24.3	$25.2	$23.9
General Plant	$32.0	$11.7	$7.6	$17.4	$16.9
Capital Contributions	$(39.2)	$(23.5)	$(19.9)	$(19.2)	$(19.3)
TOTAL	**$119.5**	**$101.5**	**$89.6**	**$97.2**	**$96.0**

7.1.1. System Access

This category encompasses those investments that allow Hydro Ottawa to meet its obligation to connect customers to the grid. These expenditures are subdivided into specific programs focused on connecting customers (e.g. new residential and commercial developments, and customer-driven electric generation projects), relocating equipment to accommodate municipal infrastructure needs like road widening, and installing meters.

System Access – Capital Programs
- Plant Relocation & Upgrade
- Residential Subdivision
- Commercial Development
- System Expansion
- Embedded Generation
- Infill Service (Residential & Small Commercial)
- Metering

Major projects expected in this investment category during 2021-2025 include residential and commercial connections consistent with recent historical expenditures, system expansion, plant relocation (especially in relation to Stage 2 of Light Rail Transit in the City of Ottawa), and retrofits of bulk metered buildings to unit metering.

With the City of Ottawa continuing to experience a steady level of growth, and with the utility having recently averaged upwards of 4,000-5,000 new connections every year, System Access expenditures remain crucial to achieving positive outcomes in relation to customer expectations for service quality and responsiveness. Likewise, they will be critical to the success of flagship local infrastructure projects over the 2021-2025 period. There is also a nexus between this category of investment and the environmental benefits that accrue to customers and the community from increased deployment of distributed renewable generation, including net metered projects.

7.1.2. System Renewal

Included under the scope of this category is the replacement and refurbishment of system assets, in order to extend their original service life or replace them on an emergency basis. Of note, this activity touches the parts of Hydro Ottawa's grid that are either most visible (poles, wires, transformers, and stations) or least visible (underground cable and vaults) to the public. Together, these programs are aimed at alleviating one of the most significant pressures on the system – namely, mitigating the risk of the potential failure of end-of-life assets and equipment. The primacy of System Renewal is underscored by the fact that this grouping represents the largest share of the broader capital funding envelope.

System Renewal – Capital Programs
- Station Assets Renewal
- Overhead Distribution Assets Renewal
- Underground Distribution Assets Renewal
- Corrective Renewal
- Damage to Plant

Planned projects of note under this investment category include renewal of distribution poles, transformers, and stations, emergency replacement of overhead assets following severe weather events, rehabilitation of underground chamber assets, replacement of underground cable, and upgrades of various types of metering equipment that have reached end of life.

Key outcomes associated with System Renewal expenditures are improvements to overall system reliability, as well as reductions in the average duration and frequency of outages.

7.1.3. System Service

The purpose of these infrastructure upgrades and modifications is to enhance reliability and capacity on the grid, and ensure that the system continues to meet operational objectives while addressing future customer needs. Similar to the foregoing categories, System Service is comprised of its own unique set of programs. Expenditures revolve around capacity upgrades that are intended to relieve constraints caused by load growth; system and station enhancements that improve operating characteristics, add redundancy, and strengthen the resilience against severe weather

System Service – Capital Programs
- Capacity Upgrades
- Distribution Enhancements
- Station Enhancements
- Grid Technologies
- Metering

events; and deployment of grid technologies that augment the technological and communication capabilities of the system.

Major station projects in this category will be the development of new stations in the south Nepean and east Leitrim regions of the City of Ottawa, which are needed to accommodate customer load growth and to increase supply capacity in growing suburbs that have already reached the limits of local transformation capacity. Other major projects include upgrades to the functionality of Hydro Ottawa's Supervisory Control and Data Acquisition ("SCADA") system, enhancements to the Outage Management System, the installation of field area network infrastructure to enable greater automation in communications, roll-out of the next phase of the utility's MiGen smart energy project, deployment of cyber security and monitoring equipment at stations, and upgrades to customer meters to enable remote disconnections.

Maintaining current levels of reliability, while targeting those pockets of the system in which reliability performance is below average, are principal objectives driving this basket of investments.

7.1.4. General Plant

Whereas the three system-related categories discussed above relate to investments in the core components of Hydro Ottawa's distribution grid, General Plant covers expenditures on assets that are not part of the system. These include facilities, land, fleet, tools, equipment, information technology hardware and software, and other rolling stock that is used to support essential business activities.

General Plant – Capital Programs

- Buildings - Facilities
- Customer Service
- Enterprise Resource Planning System
- Fleet Replacement
- IT New Initiatives
- IT Life Cycle & Enhancements
- Operation Initiatives
- Tools Replacement
- Facilities Implementation

Successful completion of General Plant projects is a key determinant of the efficiency and effectiveness of the utility's overall business performance. In many instances, the ability to follow through on commitments to customers and to safeguard employee health and safety hinges upon program expenditures in this category.

Key projects planned in this investment category for 2021-2025 include deployment of a digital Customer Relationship Management system enabling a 360-degree view of customer activity, migration of the enterprise resource planning system to a cloud-based platform, adoption of enhanced equipment and software to support crews in the field, replacement of critical IT infrastructure, implementation of cyber security safeguards, and upgrades to the numerous business systems responsible for collecting, processing, and validating incoming meter data.

Similarly, several of these investments will have multi-faceted value streams, insofar as they will enable Hydro Ottawa to achieve multiple performance outcomes at the same time. For example, enhancements to the Customer Care & Billing ("CC&B") system will better position Hydro Ottawa to assist customers in managing their energy needs, offer a more personalized experience, and ensure satisfaction with the utility's services. Beyond this, however, upgraded CC&B functionality will also introduce new options to customers for obtaining value-added products or services (e.g. direct deposit of credits into customers' bank accounts, and a wider range of options for payment methods and bill due dates), while simultaneously opening doors to opportunities for shared services with other utilities and services to third parties. The availability of this solution will expand customer choice and convenience as well as carve out space for growing revenue from new sources.

Finally, certain projects in this portfolio are set to serve as unique illustrations of the best-in-class innovation culture which Hydro Ottawa continuously seeks to foster. Examples include the deployment of artificial intelligence solutions in order to automate a number of business processes and enhance their efficiency and accuracy.

7.2. OPERATIONAL PLAN

Hydro Ottawa's responsibility to manage a safe and reliable distribution system, serve customers in a manner that is responsive to their needs and preferences, and maintain compliance with a broad range of legislative and regulatory requirements compel the utility to incur a level of costs that is proportionate to the magnitude of its operational obligations. These costs are spread across 14 different operations, maintenance and administration ("OM&A") program categories that serve to structure the myriad of activities which are part and parcel of keeping the lights on. Annual OM&A expenditures for the 2021-2025 rate term are outlined in the table below.

Table 3 – Annual OM&A Program Expenditures ($'000,000s)

2021	2022	2023	2024	2025
$93.9	$96.3	$98.7	$101.2	$103.7

The principal cost drivers underlying Hydro Ottawa's forecasted OM&A expenses include costs associated with legislative and regulatory compliance; operational investments needed for safety and reliability; employee compensation and training; ongoing support, maintenance, licensing, and protection of the company's IT systems; fuel; market priced contracts; and inflation.

Of note, during the internal budgeting process, the initial levels of OM&A submitted by the various divisions within the utility resulted in an overall OM&A Compound Annual Growth Rate ("CAGR") of 3.5% over the 2021-2025 period. In step with its commitment to continuous improvement and customer preferences for minimizing rate increases, Hydro Ottawa then applied a custom OM&A escalation factor to contain upward pressure on operational expenses and to embed productivity expectations throughout the 2021-2025 period. This lowered the overall OM&A CAGR to 2.51% and achieved a reduction of $13.1 million in OM&A spending over the course of the rate term.

Moreover, Hydro Ottawa staff levels will not increase between 2021 and 2025, relative to staffing levels from 2019. Similarly, heading into this next Custom IR period, Hydro Ottawa is set to serve a larger number of customers than at the outset of its previous five-year rate plan (~323,000 as of the end of 2015 vs. ~340,000 as of the end of 2019 – an increase of over 5%). Both of these data points attest to the effectiveness of the utility's ongoing productivity and efficiency initiatives.

Hydro Ottawa's total operating costs are reported every year to the OEB and benchmarked against other distribution companies in Ontario. In the last year of publicly available data collected by the OEB, Hydro Ottawa's total operating cost per customer was $260. Consistent with the pattern of recent years, this result compared favourably to the average cost per customer across all electricity distributors in the province ($316).

7.3. INCORPORATING CUSTOMER FEEDBACK & PREFERENCES

Hydro Ottawa has designed its capital and operational plans to reflect the needs and priorities of customers, in both general and specific ways. Examples of how the utility has sought to incorporate the insights gleaned from extensive engagement with customers include the following:

- Certain proposals for capital spending have been deferred, as part of an asset needs rationalization process which was undertaken in order to prioritize the most critical projects for system reliability and maintenance and to identify opportunities for minimizing rate impacts.
- To further support efforts to defer capital spending and lower costs for customers, the use of non-wire alternatives is planned. In the Kanata North area, for example, a mix of conservation, load transfers, and voltage reductions solutions will be deployed to enable the deferral of a transmission-connected substation that had originally been identified as a need through the latest regional planning cycle.

- Critical investments in reliability-related projects are being paced in accordance with customer expectations for an appropriate level of service. One illustration in this regard is the prioritization of the construction of the new Cambrian Municipal Transformer Station in the early years of the rate period. This reflects the imperative to ensure sufficient capacity is available in an area which is forecasted to continue experiencing significant load growth over the next decade.
- A selective portfolio of prudent investments is planned in new technologies and solutions that will enhance the menu of service offerings available to customers and, in many cases, lead to reduced operational costs. These will open up new channels for customers to engage and transact with Hydro Ottawa, and continue the utility's movement to digital and cloud-based platforms which help eliminate the need for costly, on-premise IT infrastructure.
- Several steps are being taken to more formally incorporate climate change risk management into system planning processes and decision-making practices. The range of actions will include augmenting vegetation management practices, developing new anti-cascade standards for utility poles, and investing in greater automation capability for remote isolation and restoration of faulted system components.

Alongside the aforementioned examples, the ongoing implementation of productivity and efficiency initiatives will play a crucial role in minimizing operating costs. Specific examples of productivity are discussed in the ensuing section.

8. PRODUCTIVITY AND CONTINUOUS IMPROVEMENT

Responsibly controlling costs and focusing on cost-effective delivery of outcomes that matter to customers remain core priorities for Hydro Ottawa. Amidst the unique confluence of demands, pressures, and constraints on operations, the utility is placing increased emphasis on incorporating productivity and continuous improvement gains, so as to offset increasing expenditures and boost organizational capacity. Hydro Ottawa is therefore committed to ensuring that productivity and continuous improvement serve as hallmarks of its 2021-2025 rate plan.

8.1. 2016-2020 INITIATIVES

A retrospective glance at the outcomes and efficiencies derived from productivity initiatives during the preceding five-year rate period demonstrates that there is a firm foundation upon which to build. During the 2016-2020 period, Hydro Ottawa successfully executed a wide spectrum of initiatives which resulted in tangible savings to customers – and at no expense to service quality or system reliability. Headlining this deep pool of initiatives were the following:

- Enhancements to the customer contact centre, giving customers an improved experience through access to more efficient service and a broad range of options for communicating with Hydro Ottawa through the channel of their choice;
- Introduction of new digital tools, such as a mobile application and Smart Speaker skills (a first in the Canadian electric utility sector), to take customer service to the next level of convenience and sophistication;
- Movement away from manual, paper-based processes and adoption of electronic solutions to support core business systems and practices, including the enterprise resource planning platform, field crew scheduling, fleet management, and planned outage communications;
- Consolidation and modernization of administrative and operational facilities; and
- Workforce stabilization and optimization, through such measures as reallocation of vacant positions to trades hiring and reduction of both on-call and overtime costs.

8.2. 2021-2025 INITIATIVES

Whether through harnessing the potential of new technologies and solutions to better serve customers, elevating standards of business performance and excellence, or rationalizing and re-purposing resources, Hydro Ottawa is set to continue strengthening its culture of continuous improvement over the course of its next five-year rate term.

In accordance with internal guidelines for the preparation of plans and budgets for the 2021-2025 period, each administrative division within the utility was mandated to demonstrate productivity savings in a quantitative and/or qualitative fashion, and to identify initiatives dedicated to continuous improvement. This provides assurance that productivity and cost control objectives are firmly integrated into the business planning process.

A survey of the productivity initiatives planned over the next rate plan horizon reveals the following highlights:

- Movement of enterprise resource planning system to a cloud-based solution, thereby enabling greater administrative efficiency, reduced system maintenance costs, and timely access to new functionality;
- Integration of the recent SCADA system upgrade with the existing Outage Management System and a new Distribution Management System, enabling superior functionality and automation, and providing control room operators with line of sight and situational awareness through a single interface;
- Deployment of a digital platform for Customer Relationship Management, enabling a 360-degree view of customer activity across the utility;
- Increased deployment and further innovation in voice-activated digital assistance technology, for use in customer service and experience applications;
- Implementation of robotic process automation capabilities across multiple business units and programs, in order to more efficiently and expeditiously execute highly transactional activities;
- Renegotiation of contracts with external service providers for underground cable locates and vegetation management;
- Replacement of outdated phone lines for advanced metering infrastructure systems with modernized data collection nodes, which offer more extensive communications reach and enhanced resiliency against power interruptions;

- Deployment of a cloud-based platform to optimize the use and value of advanced metering infrastructure data analytics, as a means of driving operational efficiencies across a wide range of core business functions;
- Increase in the number of Alternate Locate Agreements;
- Enhanced productivity and reduced overtime costs for crews, on account of the implementation of seasonal construction schedules which aim to shift work away from the winter season, during which construction is more costly and inefficient due to environmental and operational constraints;
- Rationalizing and right-sizing of the utility's vehicle fleet through analytics of vehicle utilization;
- Achievement of 4% increase in daily available wrench time for crews; and
- Administration of internal programs dedicated to optimizing the lifecycle management and enhancement of IT assets.

8.3. BENCHMARKING

The preparation of this Business Plan was supported by year-over-year comparisons of Hydro Ottawa's costs and outcomes, along with evaluations of the utility's performance against its peers. Tracking and analysis of trends in the achievement of system reliability, customer value, and financial strength outcomes have informed the scope and substance of particular capital and OM&A programs. Similarly, the benchmarking of Hydro Ottawa's expenditures and performance relative to samples of utilities across Ontario, Canada, and the United States has yielded valuable insights into areas in which the utility performs well and those in which there is room for improvement. These findings have been internalized and incorporated into specific work programs, and will serve as important baselines and points of reference against which to measure the utility's progress.

As the implementation of Hydro Ottawa's capital and operational plans unfolds over the 2021-2025 period, the use of internal and external benchmarking will remain a vital tool for monitoring and measuring performance. The utility fully anticipates undertaking additional benchmarking analysis during the rate term, as a means of supporting its broader performance management and business planning framework, as well as its system and asset management planning processes.

9. ALIGNMENT WITH THE RENEWED REGULATORY FRAMEWORK

The primary objectives animating Hydro Ottawa's corporate vision are wholly consistent with the main performance outcomes promoted under the OEB's Renewed Regulatory Framework ("RRF"). Hydro Ottawa views this broad alignment as a competitive advantage and remains committed to firmly entrenching RRF principles and objectives throughout its operations and business.

Table 4 below illustrates the alignment between the utility's overarching objectives and the key categories of performance outcomes under the RRF. For additional context, the table also shows the congruence of Hydro Ottawa's high-level performance goals and strategic outcomes – which are utilized to measure progress in achieving the strategic objectives – with the RRF's areas of focus.

Table 4 – Alignment of Corporate Strategic Objectives with RRF Performance Outcomes

OEB RRF Performance Outcomes	Key Area of Focus	Corporate Performance Goal	Strategic Outcome
Customer Focus	Customer Value	• Assist customers in managing their energy consumption and electricity costs • Deliver on customer expectations for service quality and responsiveness • Maintain overall distribution system reliability	• Customer loyalty and satisfaction
Operational Effectiveness	Organizational Effectiveness	• Continue to enhance operational performance and productivity • Maintain leading health and safety record • Enhance organizational and employee capability	• Efficient and effective operations • Safe and healthy work environment • Engaged, aligned and prepared workforce
Public Policy Responsiveness	Corporate Citizenship	• Enhance our brand image in the community and the industry • Continue to improve our environmental performance and reduce our impact on the environment	• Leading governance and business practices • Engaged stakeholders • Safe, secure and environmentally responsible services • Positive community impact
Financial Performance	Financial Strength	• Grow revenues from new sources • Enhance / protect revenues from existing business lines	• Growth in shareholder value

9.1. PERFORMANCE MEASUREMENTS

In accordance with the RRF's emphasis on achieving outcomes that provide value to customers, Hydro Ottawa is committing to a robust performance measurement and reporting framework for the upcoming five-year rate period. This framework expands and builds upon the success of the one that was in place for 2016-2020, and will maintain the approach of combining standard OEB performance measures with others that are customized for Hydro Ottawa's unique use.

As displayed in the table below, an integral component of this framework is the set of measures that will form the basis of Hydro Ottawa's 2021-2025 Custom Performance Scorecard. These measures have been selected based upon a variety of factors and drivers, including responsiveness to customer preferences, alignment with core RRF and corporate strategic objectives, and correlation to key findings from the benchmarking analyses performed in support of this Business Plan.

Table 5 – Custom Performance Scorecard Measures

Outcome	OEB Reporting Category	Hydro Ottawa Custom Measures	New/Existing	Target
Customer Focus	Customer Satisfaction	Contact Centre Satisfaction – Transactional Feedback	New	Maintain
		Number of MyAccount Customers	New	Increase
		Number of Online Billing Accounts	New	Increase
Operational Effectiveness	Safety	All Injury/Illness Frequency Rate	New	Reduce
		Lost Workday Severity Rate	New	Reduce
	System Reliability	Customer Average Interruption Duration Index	Existing	Monitor
		Feeders Experiencing Multiple Sustained Interruptions	Existing	Maintain
		Worst Feeder Analysis – Number of Feeders with Very Poor Performance	Existing	Reduce
		Stations Exceeding Planning Capacity	Existing	≤5%
		Feeders Exceeding Planning Capacity	Existing	≤10%
		Stations Approaching Rated Capacity	Existing	0%
		Feeders Approaching Rated Capacity	Existing	0%
	Cost Control	Productive Time	Existing	Maintain
		Labour Allocation	Modified	Maintain
		3-Year Average Cost per Pole – Wood Pole Replacement	New	Monitor
		3-Year Average Cost per Meter – Underground Cable	New	Monitor
		Average Cost per Kilometer – Vegetation Management	New	Monitor
		Average Cost per Pole – Pole Test and Inspection	New	Monitor
	Asset Efficiency	Technology Infrastructure Cost per Employee	New	Monitor
Public Policy Responsiveness	Environment	Annual Oil Spills & Costs of Remediation	Existing	Reduce
		Non-Hazardous Waste Diversion Rate	New	Maintain
		Percentage of Green Suppliers	New	Maintain
Financial Performance	Financial Metrics	OM&A per Customer	New	Monitor
		Bad Debt as a Percentage of Total Electricity Revenue	New	Monitor
		Cumulative Capital Additions per Investment Category	New	Monitor
		Annual Capital Spending per Investment Category	New	Monitor

Consistent with the prescriptions of the RRF, this proposed reporting regime is intended to equip the OEB, customers, and other stakeholders with the ability to better monitor and understand diverse aspects of Hydro Ottawa's performance, and to demonstrate the utility's accountability in transparently communicating the outcomes achieved under its performance management framework.

10. REVENUE REQUIREMENT & BILL IMPACTS

The Revenue Requirement and Bill Impacts associated with Hydro Ottawa's proposed 2021-2025 capital and operational plans are summarized in the tables below.

Table 6 – AS ORIGINALLY SUBMITTED – Revenue Sufficiency/Deficiency ($'000s)

	2021	2022	2023	2024	2025
Return on Rate Base	$67,489	$73,588	$77,441	$79,860	$84,624
Distribution Expenses (not including amortization)	$93,923	$96,280	$98,697	$101,174	$103,714
Amortization	$52,450	$56,860	$59,142	$60,711	$64,027
Payment in Lieu of Taxes	$1,024	$5,211	$8,766	$11,660	$7,689
Service Revenue Requirement	**$214,886**	**$231,939**	**$244,045**	**$253,405**	**$260,053**
Less Revenue Offsets: Per Approved Settlement Agreement[1] Adjustment per Pole Attachment Decision[2]	$10,977	$11,013	$11,667	$12,151	$12,457
Base Revenue Requirement	**$203,909**	**$220,926**	**$232,378**	**$241,254**	**$247,596**
Transformer Ownership Allowance	$1,056	$1,056	$1,056	$1,059	$886
Revenue Requirement from Rates	**$204,965**	**$221,982**	**$233,434**	**$242,312**	**$248,483**
Forecasted Load at 2020 Rates	$187,905	$188,833	$189,716	$190,703	$191,468
Cumulative Revenue Deficiency (over 2020)	**$(17,060)**	**$(33,149)**	**$(43,719)**	**$(51,609)**	**$(57,014)**
Yearly Revenue Deficiency over 2020	**$(17,060)**	**$(16,089)**	**$(10,570)**	**$(7,891)**	**$(5,405)**

[1] This refers to the Approved Settlement Agreement governing Hydro Ottawa's 2016-2020 rate term, which was approved by the OEB in 2015.
[2] This refers to an OEB decision from 2016 which authorized Hydro Ottawa to use a utility-specific rate for pole attachments.

Table 6 – UPDATED FOR 2019 ACTUALS – Revenue Sufficiency/Deficiency ($'000s)

	2021	2022	2023	2024	2025
Return on Rate Base	$68,158	$74,253	$78,242	$80,677	$85,470
Distribution Expenses (not including amortization)	$93,923	$96,280	$98,697	$101,174	$103,714
Amortization	$52,333	$56,699	$59,015	$60,585	$63,900
Payment in Lieu of Taxes	$2,224	$3,881	$8,604	$11,533	$7,590
Service Revenue Requirement	**$216,638**	**$231,113**	**$244,558**	**$253,969**	**$260,674**
Less Revenue Offsets: Per Approved Settlement Agreement[3] Adjustment per Pole Attachment Decision[4]	$11,013	$10,971	$11,667	$12,151	$12,457
Base Revenue Requirement	**$205,624**	**$220,142**	**$232,891**	**$241,817**	**$248,217**
Transformer Ownership Allowance	$1,056	$1,056	$1,056	$1,059	$886
Revenue Requirement from Rates	**$206,680**	**$221,197**	**$233,947**	**$242,876**	**$249,104**
Forecasted Load at 2020 Rates	$187,888	$188,816	$189,699	$190,686	$191,453
Cumulative Revenue Deficiency (over 2020)	**$(18,792)**	**$(32,381)**	**$(44,248)**	**$(52,190)**	**$(57,651)**
Yearly Revenue Deficiency over 2020	**$(18,792)**	**$(13,589)**	**$(11,867)**	**$(7,942)**	**$(5,461)**

[3] This refers to the Approved Settlement Agreement governing Hydro Ottawa's 2016-2020 rate term, which was approved by the OEB in 2015.
[4] This refers to an OEB decision from 2016 which authorized Hydro Ottawa to use a utility-specific rate for pole attachments.

Table 7 – AS ORIGINALLY SUBMITTED – Distribution Bill Impacts by Customer Class

Rate Class	Year-over-Year Distribution % Change					
	2021	2022	2023	2024	2025	Average
Residential	4.57%	7.28%	5.73%	2.88%	1.75%	*4.44%*
GS < 50 kW	2.44%	6.94%	6.59%	3.66%	2.61%	*4.45%*
GS > 50 to 1,499 kW	5.20%	8.55%	6.93%	3.80%	2.83%	*5.46%*
GS > 1,500 to 4,999 kW	4.22%	8.43%	6.93%	3.80%	2.30%	*5.13%*
Large Use	11.36%	8.09%	6.53%	3.54%	2.20%	*6.35%*
Street Lighting	(9.98)%	14.07%	8.92%	3.46%	2.91%	*3.87%*
Sentinel Lighting	14.46%	20.46%	16.54%	12.33%	10.44%	*14.84%*
Unmetered Scattered Load	2.42%	11.76%	9.33%	6.10%	5.07%	*6.93%*

Table 7 – UPDATED FOR 2019 ACTUALS – Distribution Bill Impacts by Customer Class

Rate Class	Year-over-Year Distribution % Change					
	2021	2022	2023	2024	2025	Average
Residential	6.91%	6.15%	4.74%	2.91%	1.77%	*4.49%*
GS < 50 kW	4.05%	6.76%	5.65%	3.64%	2.60%	*4.54%*
GS > 50 to 1,499 kW	3.21%	7.37%	10.42%	3.81%	2.84%	*5.53%*
GS > 1,500 to 4,999 kW	3.40%	7.21%	9.30%	3.79%	2.32%	*5.20%*
Large Use	9.57%	6.92%	9.42%	3.55%	2.22%	*6.34%*
Street Lighting	(3.89)%	8.26%	8.94%	3.55%	3.00%	*3.97%*
Sentinel Lighting	18.02%	18.64%	15.32%	12.43%	10.53%	*14.99%*
Unmetered Scattered Load	3.54%	9.64%	9.61%	6.13%	5.10%	*6.80%*

11. CONCLUSION

The 2021-2025 period represents a unique moment in time for Hydro Ottawa. It follows on the heels of what was, by numerous measures, a highly successful five-year window in which the utility executed its first-ever Custom IR rate plan. With the benefit of the outcomes and knowledge gained over the course of 2016-2020, the utility is poised to enter the next chapter of its journey towards a smart energy future in a position of strength and with a positive track record.

However, the landscape has shifted appreciably since the OEB last approved a rebasing application from Hydro Ottawa. Despite the robust progress made in replacing aging infrastructure, continued investment to mitigate the risk of asset failure remains a critical priority, with over 19% of assets having reached the end of their useful lives. At the same time, the steady level of growth which the City of Ottawa is experiencing means that expanding the distribution grid and ensuring access for new customers are urgent imperatives as well. Together with the demands posed by more frequent and more acute severe weather events, heightened customer expectations for greater convenience and choice, and the rapid evolution of operational technologies and threats, these pressures present an immensely challenging landscape for Hydro Ottawa to navigate. Against the backdrop of an increasingly complex and fluid policy environment, these pressures are magnified even further.

Accordingly, the utility requires a comprehensive, data-driven, customer-sanctioned roadmap through which it can chart its course for the next five years. Hydro Ottawa is confident that this Business Plan will effectively fulfill this need. The utility welcomes the opportunity to move this strategy forward and to deliver the attendant benefits to its customers and community.

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To: Executive Management Team (EMT)

Date: January 31, 2019

Subject: 2020-2025 Priorities and Budget Guidelines

Background:

The purpose of this memorandum is to set guidelines to be used in preparation of the Hydro Ottawa Limited (HOL) 2020 to 2025 Priorities and Budgets. These guidelines and high-level timelines were presented to the Executive Management Team on June 28, 2018 and to your divisional senior management team in a series of meetings last July along with wider audience rate application updates since then.

Overview:

As you are aware, HOL will file its 2021 - 2025 rate application in December 2019 in order to have new distribution rates in place on January 1, 2021. Following are the specifics.

- This will be a Custom Incentive Regulation application covering rates for 2021-2025.
- The filing will include the 2020 Budget (referred to as the Bridge year) and budgeted data for the 2021 to 2025 period (referred to as the Test years).
- The filing will also include Actuals for 2015, 2016, 2017 and 2018 as compared to the OEB Approved Rate Application levels.
- The 2019 Budget will also be filed in December 2019 with an update to 2019 Actuals filed with the OEB at the end of April 2020 subsequent to the HOL Board approval of the audited 2019 Actuals.
- The information submitted by each business unit for the 2021 to 2025 period will need to be at a detailed level (i.e. consistent with the level of detail required for a normal budget year).
- Each of the business unit plans will need to outline the major projects and programs being undertaken and their tie to the company's strategic direction with particular focus on the alignment with our customers' interests. There will also need to be a discussion of all of the major projects and programs and the outcomes that are expected from them.
- The Budget for 2020 to 2025 will be entered into our financial system at the detailed Business Unit (BU) level.
- Please keep in mind that there will need to be detailed variance explanations for year over year changes from 2015 through to 2025 for major projects and programs.

Key Milestones:

- Compensation Assumptions are due February 22, 2019.
- High-level position approach by division is due by March 29, 2019 – subject to outcome of discussions at EMT meeting of February 20, 2019.
- The first draft of the 2020 and the 2021 to 2025 budgets is due March 29, 2019 (both OPEX and CAPEX).
- The first draft of the Distribution System Plan (DSP) write-up is also due March 29, 2019.
- The Rate Application Working Group and Steering Committee will review the draft budgets on April 2019.
- The second draft of the budgets (up to EBITDA) is due May 31, 2019 (CAPEX and OPEX numbers will be locked as of this date).
- The final budgets - Full P&L and Capex – are due June 28, 2019 (All numbers will be locked as of this date).
- The Regulatory Affairs Group will release the detailed schedule of due dates on evidence writing under separate cover.
- Revenue requirement and rate impacts are due July 31, 2019.
- Final HOL Board approval will occur in November 2019.
- Filing of the 2021 to 2025 Rate Application will occur in December 2019.

Alignment of Spending to Company Priorities

All spending must align to our enterprise strategic objectives, outcomes and performance goals for each of our four key areas of focus as summarized in Appendix A. It should be noted that the company's current four key areas of focus and associated strategic objectives, outcomes and performance goals will carry forward to 2025. It should also be noted that Hydro Ottawa's four key areas of focus align closely to the Ontario Energy Board's (OEB) policy and direction established under the Handbook and the Renewed Regulatory Framework (RRF) as described in Appendix B.

Productivity, Continuous Improvement and Cost Control

Productivity, continuous improvement and cost control remain a key corporate priority. Each program area should consider a focus on cost effective delivery of outcomes that matter to customers, with appropriate pacing and prioritization to control costs and manage risks. All divisions must show productivity savings in a quantitative and / or qualitative manner and identify continuous improvement initiatives.

Compensation & Positions

Compensation and benefit estimates will be provided by the Chief Human Resources Officer Division and will be based on the renewed collective agreement and anticipated increases beyond the existing term.

All requests for permanent/regular trades hiring are subject to workforce modelling. All other permanent/regular position requests must be supported by a business case (Appendix C).

Technology

Divisions are responsible for liaising with the CITO Division (IT) through their IT Prime Contacts to communicate and coordinate technology requirements to ensure alignment with company priorities. All new technology requirements must first be supported by an IT Project Request (Appendix D) and for any project greater than $750K, the Material Investment Plan documentation (Appendix E) must also be completed – this is a joint responsibility between the Division requesting the IT Project and the IT Prime Contact. The first draft of the Material Investment Plan is due by March 29, 2019. IT will consolidate all requests from each Division and will prioritize which projects are to move forward for EMT approval prior to inclusion in the budgets.

Inflation Rate

The inflation rate will be applied corporately. No automatic inflationary factors are to be applied until the review is completed by April 2019, therefore please budget in constant dollars.

Non-Compensation OM&A

Non-compensation OM&A spending should be split into two groups: one group that remains relatively flat and generally would only increase with the rate of inflation (to be applied corporately as noted above); and the second group that is based on anticipated changes in programs, volume or contract pricing negotiated / anticipated to be higher than inflation with supporting evidence.

All new or expansion of existing funding must be supported and approved by EMT.

Capital

Capital investment should provide for customer growth and the replacement of aging infrastructure to maintain plant reliability as per the needs analysis documented in the Distribution System Plan.

Capital investment key considerations include but are not restricted to the following:

- Affordability;
- Maintaining reliability;
- Efficient, reliable and cost effective and more prepared for technological changes;
- Planned investments related to accommodating the connection of renewable energy generation;
- Planned investments for the development and implementation of the smart grid to support grid modernization and expenditures as required by legislation;
- Provide more customer choice and address customers' preferences and expectations;
- Coordination of infrastructure planning with customers, the transmitter, other distributors, and the Independent Electric System Operator (IESO) or other third parties where appropriate.

In Q3 /Q4 2018, high-level capital expenditure levels for the period 2021 to 2025 were developed by each division. Subsequently an exercise was followed using the following criteria for rationalization of the submitted forecasts:

- Requirements for typical asset operation;
- Spending levels taking into account financing structure (D/E ratio);
- Rate impacts;

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- Safety;
- Reliability; and
- Customer Growth.

An average forecast of CAPEX of $95M per year for years 2021 to 2025 resulted from this process, as such the CAPEX that is to be uploaded in the financial system by March 29, 2019 should be at this rationalized level per each of the categories noted below:

	Average
System Renewal and Service excl CCRAs	68.1
System Access Net	14.8
IT General Plant	8.0
Other General Plant excl CCRAs	4.1
TOTAL	**95.0**

For any capital projects exceeding $750K, the first draft of the Material Investment Plan documentation must also be completed by March 29, 2019 (Appendix E).

Thank you.

Geoff Simpson
Chief Financial Officer

cc: Tina Tardioli – Director, Corporate Planning & Governance
Angela Collier – Director, Finance
Louisa Yeung – Manager, Corporate Financial Planning and Analysis
Greg Van Dusen – Director, Regulatory Affairs
April Barrie – Manager, Rates and Revenue
Laurie Elliott - Manager, Regulatory Compliance and Reporting
Patrick Brown – Manager, Regulatory Policy and Research
Jeannine Ladouceur – Director, Human Resources Services
Audrey Lizotte – Director, Labour Relations and Compensation
Sarah Green – Director, Planning and Program Management for IM & IT
Management Accountants [1]
HR Partners [1]
IT Prime Contacts [1]

[1] Refer to Appendix F for divisional partner list

Appendix A

Enterprise Strategic Objectives, Outcomes and Performance Goals

	Enterprise Strategic Objectives and Outcomes	Corporate Performance Goals
Financial Strength	**Enterprise Strategic Objective:** **We will create sustainable growth in our business and our earnings** *By improving productivity and pursuing business growth opportunities that leverage our strengths – our core capabilities, our assets and our people* **Enterprise Strategic Outcome:** *Growth in shareholder value*	*1. Grow revenues from new sources* *2. Enhance / protect revenues from existing business lines*
Customer Value	**Enterprise Strategic Objective:** **We will deliver value across the entire customer experience** *By providing reliable, responsive and innovative services at competitive rates* **Enterprise Strategic Outcome:** *Customer loyalty*	*3. Assist customers in managing their energy consumption and electricity costs* *4. Deliver on customer expectations for service quality and responsiveness* *5. Maintain overall distribution system reliability*
Organizational Effectiveness	**Enterprise Strategic Objective:** **We will achieve performance excellence** *By cultivating a culture of innovation and continuous improvement* **Enterprise Strategic Outcomes:** *Efficient and effective operations* *Safe and healthy work environment* *Engaged, aligned and prepared workforce*	*6. Continue to enhance operational performance and productivity* *7. Maintain leading health and safety record* *8. Enhance organizational and employee capability*
Corporate Citizenship	**Enterprise Strategic Objective:** **We will contribute to the well being of the community** *By acting at all times as a responsible and engaged corporate citizen* **Enterprise Strategic Outcomes:** *Leading governance and business practices* *Engaged stakeholders* *Safe, secure and environmentally responsible services* *Positive community impact*	*9. Enhance our brand image in the community and the industry* *10. Continue to improve our environmental performance and reduce our impact on the environment*

Appendix B

The OEB established a new framework for electricity distribution rate regulation in 2012. The Renewed Regulatory Framework for Electricity is a foundational policy: it articulates the OEB's goal for an outcomes-based approach to regulation which aligns the interests of customers and utilities. Key principles of the RRFE include the expectation for continuous improvement, robust integrated planning and asset management that paces and prioritizes investments, strong incentives to enhance utility performance, ongoing monitoring of performance against targets, and customer engagement to ensure utility plans are informed by customer expectations.

The OEB set out its goals for the RRFE as follows:

> *The Board's renewed regulatory framework for electricity is designed to support the cost-effective planning and operation of the electricity distribution network – a network that is efficient, reliable, sustainable, and provides value for customers. Through taking a longer term view, the new framework will provide an appropriate alignment between a sustainable, financially viable electricity sector and the expectations of customers for reliable service at a reasonable price. The performance-based approach described in this Report is an important step in the continued evolution of electricity regulation in Ontario.*

An important aspect of the RRFE is the evolution to an outcomes-based approach. The OEB "believes that emphasizing results rather than activities, will better respond to customer preferences, enhance distributor productivity and promote innovation. **There are four categories of outcomes under the RRFE: customer focus, operational effectiveness, financial performance and public policy responsiveness:**

• **Customer Focus:** Customer engagement is now an explicit and important component of the regulatory framework. Utilities are expected to develop a genuine understanding of their customers' interests and preferences and reflect those interests and preferences in their business plans. Utilities are expected to demonstrate value for money by delivering genuine benefits to customers and by providing services in a manner which is responsive to customer preferences.

• **Operational Effectiveness:** Utilities are expected to demonstrate ongoing continuous improvement in their productivity and cost performance while delivering on system reliability and quality objectives. The OEB will assess performance trends and look for evidence of strong system planning and good corporate governance. The OEB will use benchmarking to assess a utility's performance over time and to compare its performance against other utilities. Utilities are expected to demonstrate value for money by presenting plans for delivering services that meet the needs of their customers while controlling their costs.

• **Public Policy Responsiveness:** Utilities are expected to consider public policy objectives in their business planning and to deliver on the obligations required of regulated utilities. These obligations may evolve over time and therefore this Handbook does not provide a comprehensive list of all requirements. Utilities are expected to demonstrate that they have considered Conservation First in their investment decisions. The OEB will expect to see proposals for how distributors are supporting low income customers through programs such as LEAP and/or OESP, or through other distributor-specific programs. Electricity distributors and transmitters are expected to expand or reinforce their systems to accommodate the connection to their system for renewable energy generation facilities and the OEB expects their system plans to include details on how they will meet this requirement.

• **Financial Performance:** Utilities are expected to demonstrate sustainable improvements in their efficiency and in doing so will have the opportunity to earn a fair return. The OEB will monitor the financial performance of each utility to assess continuing financial viability and to determine whether returns are excessive. Utilities have a choice of rate-setting methods to meet their particular needs. Additional tools are available to support infrastructure investment. Utilities must report comprehensive and consistent information, allowing for comparisons over time and across utilities. The OEB will act on its obligations to ensure a financially viable sector where performance indicates that a regulatory response is needed.[i]

[i] Handbook to Utility Rate Applications, October 13, 2016, Section 2

Appendix C

Business Case for Additional Headcount/Position*

*Full-time regular non-trades only

TITLE OF POSITION REQUESTED:

1. **ISSUE STATEMENT**
   Describe the business issue that this staffing action(s) will address. The issue may be process, technology, or product/service oriented. This section should not include any discussion related to the recommendation.

2. **RECOMMENDATION**
   Summarize the approach for how the staffing action(s) will address the business issue. This section should also describe how desirable results will be achieved by moving forward with the staffing action(s).

3. **ORGANIZATIONAL IMPACT**
   Describe how the proposed recommendation and associated staffing action(s) will support business goals and objectives and explain how existing roles may change as a result of the staffing action(s), if applicable.

   Also describe how the staffing action(s) will modify or affect the organizational processes, tools, hardware, and/or software.

4. **ANTICIPATED OUTCOMES**
   Describe the anticipated outcome(s) if the proposed staffing action(s) is/are approved. It should include how the staffing action(s) will benefit the business and describe the expected end state.

5. **STRATEGIC ALIGNMENT**
   All proposals should support Hydro Ottawa's 2016-2020 Strategic Direction in order to add value and maintain executive and organizational support. Provide an overview of the related roadmap(s) and how the staffing action(s) supports delivery against the roadmap and the 2016-2020 Strategic Direction.

6. **COST BENEFIT ANALYSIS**
   Quantify the financial benefits of the staffing action(s) as much as possible by completing a cost benefit analysis to illustrate the costs of the staffing action(s) and compare it with the benefits and savings to determine if it is worth pursuing.

7. **ALTERNATIVES ANALYSIS**
   Business issues may be addressed by any number of alternatives. Provide a brief summary of the alternatives that were considered, one of which should be the status quo or doing nothing. The reasons for not selecting the alternatives should also be included.

8. JUSTIFICATION

Justify why the recommended staffing action(s) should be approved and why the recommendation was selected over other alternatives. Where applicable, quantitative support should be provided and the impact of not approving the staffing action(s) should also be included.

Signature of Executive

Name	Title	Signature	Date

Appendix D

IT Project Request Template

Please input the data using the electronic template (see link below)

https://eod2.ecl.eclipseppm.com/api/projectrequest/form?environmentid=1109&formuniqueid=008b4e41-7f8d-480d-b53b-00177970de3b

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Project Request Form (2019 - Technology Initiative Request Form Template)

Requested By: required

Please enter an email address that belongs to a user or a resource in your Eclipse environment. Only active users and resources can request projects.

Project Values Tell us about your project.

Project Name: required

Provide very brief and concise project name. The details are to be included in the "Description" field.

Description: required

Provide brief description of the requested project aka IDEA For the initial IDEA request form the following fields need to be completed and are identified as "required" on the request form: 1. Project Name 2. Description 3. Pain Points 4. Expected Business Benefits

Description on projects

Pain Points: required

What are some of the main issues/problems that this project is addressing/resolving?

Expected - DIRECT Business Benefits: required

Requests are being assessed in terms of which of the 8 HOHI "Strategic Plan Actions" the projects will have "Direct" impact on, and the impact should be quantifiable. Avoid selecting items for which the impact is weak or convoluted. - Grow revenues from new sources: - Enhance / protect revenues from existing business lines: - Assist customers in managing their energy consumption and electricity costs: - Deliver on customer expectations for service quality and responsiveness: - Maintain overall distribution system reliability: - Continue to enhance operational performance and productivity: - Maintain leading health and safety record: - Enhance organizational and employee capability: - Enhance our brand image in the community and the industry: - Continue to improve our environmental performance and reduce our impact on the environment:

Grow revenues from new sources
Enhance / protect revenues from existing business lines
Assist cust. in mg'g their energy consump. and electricity costs
Deliver on cust. expect'n for service quality and responsiveness

Justification for identified Expected (Direct) Business Benefit: required

Provide the justification for each of the identified Expected (Direct) Business Benefits for this project

Benefit: Grow revenues from new sources:

Benefit: Enhance / protect revenues from existing business lines:

Submit Request

Appendix E

Enter Project/Program Name

Contents

1 Project/Program Summary

Summary is a snapshot of the information that will be explained in further details throughout the business case.

2 Project/Program Description

2.1 Current Issues

Describe the current situation and the existing issues in current system that will be addressed by this program. (For example, capacity limitations, load growth, etc.)

2.2 Program/Project Scope

Describe the scope of the project/program.

Where applicable, describe HOL's participation in the regional planning process and any regional electricity infrastructure requirements identified in this process that affected the initiation or final configuration of this program/project.; also provide information on the corresponding distribution of the benefits and responsibility for project costs.

If applicable, describe how advanced technology has been incorporated into the project.

2.3 Main and Secondary Drivers

Please identify the main and secondary (if applicable) drivers for this project. Make sure to align these definitions with examples provided by the OEB (see Table1 in Ch5 Filing Requirements).

2.4 Performance Targets and Objectives

Please define the objectives to be achieved by implementing the project. This should also include a discussion on any additional planning objectives that are met by the project have intentionally been combined into the project, and if so, what objectives and why. For instance, a system upgrades project meeting system renewal objectives.

3 Project/Program Justification

3.1 Alternatives Evaluation

3.1.1 Alternatives Considered

Please provide description of alternatives considered to address the drivers and achieve the objectives, including the "Do-Nothing" option, the preferred option, and other technically feasible alternatives that will meet the same objectives as the proposed project.

3.1.2 Evaluation Criteria

Provide a description of evaluation criteria that were used to compare alternatives.

3.1.3 Preferred Alternative

- *Restate what the preferred alternative is*
- *What was the ranking of the preferred alternative relative to other alternatives?*
- *Explain why the proposed project was given this ranking?*
- *Using the tools and methods described in 5.4.2© of the DSP, analyze project benefits and costs comparing the preferred alternative to other feasible alternatives*
- *Where the ranking of the proposed project relative to alternatives has been adjusted to account for significant benefits and costs the value of which cannot readily be quantified, information should be provided that describes these 'qualitative' factors in relation to the proposed project and all alternatives, and that explains whether and how these factors affected the selection of the proposed project*

3.2 Project/Program Timing & Expenditure

Please provide a description that addresses the following:

- *What were the expenditures for projects in the historical period that were equivalent to this project? Briefly describe the scope of these projects.*
- *What are the future expenditures for the project?*
- *How has HOL minimized the controllable costs in this project?*

	Historical ($M)					Future ($M)				
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total Expenditure										
Units										

3.3 Benefits

Please describe the benefits of the project using, where applicable, quantitative and/or qualitative analyses of the project.

Benefits	Description
System Operation Efficiency and Cost Effectiveness	Please describe the effect of the investment on system operation efficiency and cost-effectiveness, as well as identify and set targets for key performance indicators that will be affected by the investment. Describe how the investment potentially enables future technological functionality and/or addresses future operational requirements.
Customer	Please describe here the net benefits accruing to customers as a result of the investment, and the impact of the investment on reliability performance including on the frequency and duration of outages. This can be done by identifying and setting targets for key performance indicators that will be affected by the investment. Where measurable, include an assessment of the benefits of the project for customers in relation to the achievement of the objectives of the investment; express the result (including where value is in the form of an avoided cost) in terms of cost impact to customers where practicable.
Safety	Please describe the effect of the investment on health and safety protections and performance.
Cyber-Security, Privacy	Please provide, where applicable, information showing that the investment conforms to all applicable laws, standards and best utility practices pertaining to customer privacy, cyber-security and grid protection.
Co-ordination,	If applicable, please explain how the investment applies recognized standards,

Interoperability	referencing co-ordination with utilities, regional planning, and/or links with 3rd party providers and/or industry
Economic Development	If applicable, please describe the effect of the investment on Ontario economic growth and job creation.
Environment	If applicable, please describe the effect of the investment on the use of clean technology, conservation and more efficient use of existing technologies.

4 Prioritization

4.1 Consequences of Deferral

If applicable, please identify and describe the consequences / risks of deferring the project, including implication on O&M costs and system operations, customer impact, safety, cyber-security, coordination / interoperability, economic development and environment.

4.2 Priority

Please provide a description of the priority level of the project that addresses the following:

- *What is the priority level of the project compared to other projects in this and other categories? (i.e. High, Medium, Low)*
- *What are the reasons for its priority? (Make sure this discussion is tie to section 5.4.2c of the DSP on HOL's approach for identifying, selecting, prioritizing, and pacing projects in each investment category)*

5 Execution Path

5.1 Implementation Plan

Please describe the implementation strategy for the project/program, for instance, the order in which stations/feeders/geographic areas will be addressed, and the rationale for this decision.

5.2 Risks to Completion and Risk Mitigation Strategies

Please identify any risks that might prevent HOL from completing the project as planned and describe HOL's risk mitigation strategy for each.

5.3 Timing Factors

Please identify and describe factors that might affect the timing/priority of the project.

5.4 Cost Factors

Please identify and describe factors that might affect the final cost of the project.

Include any capital contributions made or forecast to be made to a transmitter with respect to a Connection and Cost Recovery Agreement. Details to be provided include: initial forecast used to calculate contribution, amount of contribution (if any), true-up dates and potential true-up payments.

5.5 Other Factors

Please identify and describe any other factors that might have an impact on the project, such as factors relating to customer preferences or input from customers and other third parties.

6 Renewable Energy Generation (if applicable)

If applicable, please provide in this section information on the following where applicable:

- *Total capital and O&M costs associated with REG investment*
- *How is the REG investment expected to improve the system's ability to accommodate the connection of REG facilities?*
- *The nature and magnitude of the system impacts of the project, the costs of any system modifications required to accommodate these impacts and the means by which these costs are to be recovered.*

7 Leave-To-Construct (if applicable)

Where a proposed project requires Leave to Construct approval under Section 92 of the OEB Act, with construction commencing in the test year, the applicant must provide a summary of the evidence for that project consistent with the requirements set out in Chapter4 of the filing requirements (sections 4.3 and 4.4 in particular).

If not applicable, enter "N/A".

8 Project Details and Justification

(For each project in the program, please fill out information in the following table)

Project Name:	*Enter Project Name*
Capital Cost:	*Enter Project Capital*
O&M:	*Enter Project O&M*
Start Date:	*Enter Project Start Date*
In-Service Date:	*Enter Project In-Service Date*
Investment Category:	*Enter Investment Category*
Main Driver:	*Enter Main Driver*
Secondary Driver(s):	*Enter Secondary Driver(s)*
Customer/Load Attachment	*Enter Number of Customers/Load Attached*
Project Scope	
Enter Description of Project Scope	
Work Plan	
Enter Description of Work Plan	
Customer Impact	
Enter Description of Customer Impact, including where measurable, an assessment of the benefits of the project for customers in relation to the achievement of the objectives of the investment; express the result (including where value is in the form of an avoided cost) in terms of cost impact to customers where applicable.	

Appendix F

Divisional Partners

Portfolio	HR Partner	Safety Partner	Management Accountant	Information Technology Prime Contact
Distribution Engineering and Asset Management Group	Judy Muldoon	Shawn Diceman	Kirk Thomson	Sally Barakat for Metering Charles Berndt for all other inquiries
Chief Customer Officer Division	Judy Muldoon	Sylvain Pinard	Tressa Valdivia	Sally Barakat for Billing, Collections and Meter Data Services David Ricottone for all other inquiries
Distribution Operations Group	Maureen Daly	Dave Stephens	Kirk Thomson	Sally Barakat for Business Performance & Scheduling Charles Berndt for all other inquiries
Chief Financial Officer Division	Shannon Nicholson	Jean Belanger	Lauren Blake	Andrew Willis for Internal Audit Sally Barakat for Regulatory Michelle Pharand for all other inquiries

Portfolio	HR Partner	Safety Partner	Management Accountant	Information Technology Prime Contact
Chief Information and Technology Officer Division	Shannon Nicholson	Jean Belanger	Lauren Blake	N/A
Chief Human Resources Officer Division	Shannon Nicholson	Jean Belanger	Tressa Valdivia	Michelle Pharand
Chief Electricity Generation Officer Division	Cathy DeMelo	Sylvain Pinard	Liza Kheirallah	Jojo Maalouf
Chief Energy and Infrastructure Services Officer Division	Cathy DeMelo	Sylvain Pinard	Andrea Brennan	Andrew Willis
Chief Executive Officer, Legal Counsel and Governance and Planning Groups	Cathy DeMelo	Sylvain Pinard	Lauren Blake	Sarah Green

UPDATED ALIGNMENT WITH THE RENEWED REGULATORY FRAMEWORK

1. INTRODUCTION

In 2012, the OEB adopted its current performance-based approach to regulation, through the release of its report entitled *Renewed Regulatory Framework for Electricity Distributors: A Performance Based Approach* (hereafter referred to as the "RRFE Report").[1] This paradigm, which the OEB has since applied to all rate-regulated utilities under its jurisdiction and has captioned as the "Renewed Regulatory Framework" ("RRF"), is intended to serve several key purposes: act as a more consumer-centric approach to utility regulation; better align the interests of customers and utilities; facilitate the achievement of distinct performance outcomes by utilities; and place a greater focus on delivering value for money.[2]

A cornerstone of the RRF is a set of outcomes, against which utilities are measured as a means of gauging the strength of their overall performance in delivering results that are valued by customers. The categories of RRF performance outcomes are as follows: Customer Focus, Operational Effectiveness, Public Policy Responsiveness, and Financial Performance. Complementing these outcome categories are core principles that underpin the RRF, including "the expectation for continuous improvement, robust integrated planning and asset management that paces and prioritizes investments, strong incentives to enhance utility performance, ongoing monitoring of performance against targets, and customer engagement to ensure utility plans are informed by customer expectations."[3] Rounding out the key components of the RRF is a three-pronged policy platform aimed at facilitating the achievement of performance outcomes: availability of three rate-setting methods, the individual selection of which is at the discretion of the utility, based upon its unique needs and circumstances; formalized requirements for distribution system planning and regional planning; and standards to measure utility performance.

[1] Ontario Energy Board, *Report of the Board - Renewed Regulatory Framework for Electricity Distributors: A Performance-Based Approach* (October 18, 2012).
[2] *Ibid,* page 1.
[3] Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 2.

Since the inception of the RRF, Hydro Ottawa has endeavoured to incorporate RRF principles across its business operations, execute its corporate plans and capital investment programs in accordance with RRF objectives, and continually align its interests with those of its customers. In particular, Hydro Ottawa believes that this commitment has been on full display throughout its 2016-2020 rate term.

The establishment of the utility's 2016-2020 rate term was enabled by a finding from the OEB that Hydro Ottawa's 2016-2020 Custom Incentive Rate-setting ("Custom IR") application, and the subsequent settlement proposal prepared by parties to the proceeding, met the expectations of the RRF for a Custom IR.[4]

Moreover, in step with the RRF's emphasis on the achievement of performance outcomes, the utility has closely tracked the achievement of RRF performance outcomes over the course of its rate term. This monitoring has taken the form not only of the Electricity Utility Scorecard that is issued annually for all local distribution companies ("LDCs"), but of additional measures and methods as well. Chief among these has been the preparation and filing of an annual report ("CIR Annual Report") to the OEB and parties to the Approved Settlement Agreement governing Hydro Ottawa's 2016-2020 Custom IR rate plan. These CIR Annual Reports have provided updates on actual capital expenditures by program type (i.e. System Access, System Service and System Renewal, and General Plant) vs. budgeted capital expenditures by program type and appropriate variance analysis. In addition, the CIR Annual Reports have tracked the utility's continuous improvement using a series of Key Performance Indicators ("KPIs") that were incorporated into Hydro Ottawa's 2016-2020 Distribution System Plan ("DSP"). For additional information on these CIR Annual Reports, please see Exhibit 1-1-11: Proposed Annual Reporting - 2021-2025.[5]

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[4] Ontario Energy Board, *Decision and Order*, EB-2015-0004 (December 22, 2015), page 1.
[5] These reports are available on Hydro Ottawa's website: https://hydroottawa.com/about-us/regulatory-affairs/custom-incentive-reports.

In addition, Hydro Ottawa has annually prepared a summary of initiatives and outcomes emanating from the 2016-2020 rate plan which align with the outcome categories enshrined in the RRF. These summaries – which have been pro-actively developed on a voluntary basis – have helped support the fostering of a culture of continuous improvement across the utility. Copies of these summaries for the years 2016, 2017, and 2018 have been appended to this Schedule as Attachments 1-1-10(A), (B), and (C), respectively.

This Schedule outlines how the Application aligns with the hallmark precepts, objectives, and expectations of the RRF. Specific matters that will be addressed are as follows: broader alignment between Hydro Ottawa's corporate strategic objectives and RRF performance outcomes; customer engagement; rate-setting elements, including selection of the Custom IR option; performance measurement, continuous improvement, and benchmarking; and distribution system planning.

2. ALIGNMENT BETWEEN CORPORATE STRATEGY & RRF OUTCOMES

Before highlighting the specific ways in which this Application aligns with essential features of the RRF, Hydro Ottawa wishes to establish some broader context. Namely, it seems appropriate to first draw attention to the more fundamental alignment between the categories of performance outcomes under the RRF and the principal areas of focus in the utility's business strategy.

Hydro Ottawa's vision is to serve as the trusted energy advisor for its customers and as a leading partner in a smart energy future. To achieve this vision, the utility has organized its business strategy around four strategic objectives and areas of performance for several years – as represented in Figure 1 below. Hydro Ottawa will maintain continuity in its core objectives heading into the 2021-2025 period. Consistent with past years, the renewed strategic objectives are being formally adopted at the holding company level and will cascade across the enterprise, thereby guiding the business and operations of the regulated distribution utility.

Figure 1 – Corporate Strategic Objectives

- **Customer Value:** we will deliver value across the entire customer experience by providing reliable, responsive, and innovative services at competitive rates.

- **Organizational Effectiveness:** we will achieve performance excellence by cultivating a culture of innovation and continuous improvement.

- **Financial Strength:** we will create sustainable growth in our business and our earnings by improving productivity and pursuing business growth opportunities that leverage our strengths – our core capabilities, our assets, and our people.

- **Corporate Citizenship:** we will contribute to the well-being of the community by acting at all times as a responsible and engaged corporate citizen.

Of these objectives, the most important driver of Hydro Ottawa's business strategy will remain Customer Value, with the utility striving to put the customer at the centre of everything it does.

The primary objectives animating Hydro Ottawa's corporate vision are wholly consistent with the main performance outcomes promoted under the RRF, as illustrated in Table 1 below. For additional context, the table also shows the congruence of Hydro Ottawa's high-level performance goals and strategic outcomes – which are utilized to measure progress in achieving the strategic objectives – with the RRF's areas of focus.

Table 1 – Alignment of Hydro Ottawa's Corporate Strategic Objectives with RRF Performance Outcomes

RRF Performance Outcomes	Hydro Ottawa Strategic Objective	Hydro Ottawa Corporate Performance Goal	Hydro Ottawa Strategic Outcome
Customer Focus	Customer Value	• Assist customers in managing their energy consumption and electricity costs • Deliver on customer expectations for service quality and responsiveness • Maintain overall distribution system reliability	• Customer loyalty and satisfaction
Operational Effectiveness	Organizational Effectiveness	• Continue to enhance operational performance and productivity • Maintain leading health and safety record • Enhance organizational and employee capability	• Efficient and effective operations • Safe and healthy work environment • Engaged, aligned, and prepared workforce
Public Policy Responsiveness	Corporate Citizenship	• Enhance our brand image in the community and the industry • Continue to improve our environmental performance and reduce our impact on the environment	• Leading governance and business practices • Engaged stakeholders • Safe, secure and environmentally responsible services • Positive community impact
Financial Performance	Financial Strength	• Grow revenues from new sources • Enhance / protect revenues from existing business lines	• Growth in shareholder value

Hydro Ottawa views this broad alignment as a competitive advantage and as further reinforcement of the imperative – as well as the value – of remaining firmly committed to entrenching RRF principles and objectives throughout its business and operations.

Against the backdrop of this high-level alignment between its corporate objectives and RRF performance outcomes, Hydro Ottawa will focus the subsequent sections of this Schedule on the alignment of this Application with more specific elements of the RRF.

3. CUSTOMER ENGAGEMENT

The OEB's *Handbook for Utility Rate Applications* states the following:

> *"Customer engagement is foundational to the RRF. Enhanced engagement between utilities and their customers provides better alignment between utility plans and customers' needs and expectations...Utilities are expected to demonstrate value for money by delivering genuine benefits to customers and providing services in a manner which is responsive to customer preferences. Customer engagement is expected to inform the development of utility plans, and utilities are expected to demonstrate in their proposals how customer expectations have been integrated into their plans, including the trade-offs between outcomes and costs."*[6]

Providing customers with value for money and facilitating a customer experience that is driven by choice are cornerstones of Hydro Ottawa's business planning. In step with its overall business strategy to put the customer at the centre of everything it does, the utility endeavours to ensure that its capital and operational investment plans are guided and informed by customer needs, preferences, and priorities. In order to identify and learn about customers' expectations, Hydro Ottawa avails itself of numerous tools and interactions to engage customers on an ongoing basis. Moreover, for the purposes of informing the development of the specific plans and proposals set forth in this Application, Hydro Ottawa undertook targeted outreach to customers as well.

[6] Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 11.

For more details on the utility's customer engagement activities, and their consistency with RRF expectations for responsiveness to customer priorities and needs, please see Exhibit 1-2-1: Customer Engagement Overview and Exhibit 1-2-2: Customer Engagement on the 2021-2025 Application.

4. RATE-SETTING FRAMEWORK

The OEB has developed and continues to administer a trio of related policies that are intended to facilitate the achievement of the core performance outcomes embedded in the RRF.[7] These policies are rate-setting, planning, and measuring performance. The remainder of this Schedule describes how this Application fulfills the expectations of each of these policies.

4.1. SELECTION OF CUSTOM INCENTIVE RATE-SETTING OPTION

The RRF makes three distinct rate-setting methods available to electricity distributors. The RRFE Report describes them, and their corresponding fitness for the differing circumstances and needs of distributors, as follows: 4th Generation Incentive Rate-setting (suitable for most distributors); Custom Incentive Rate-Setting (suitable for those distributors with large or highly variable capital requirements); and the Annual Incentive Rate-Setting Index (suitable for distributors with limited incremental capital requirements).[8]

In this Application, Hydro Ottawa has opted to avail itself of the Custom IR method. A principal justification for this decision is the sustained need on the horizon for significant levels of capital investment in the utility's distribution system, in order to maintain overall system performance and meet customer preferences – all while safeguarding rates at a reasonable level. This need is the result of several factors, including aging infrastructure, an expanding customer base, continued growth across the City of Ottawa, and the effects of severe weather events. Major capital initiatives that are required over the course of the upcoming rate term include the construction of new distribution stations in growing areas of the city, the connection of

[7] RRFE Report, page 3.
[8] *Ibid.*

thousands of new customers every year, infrastructure upgrades and modifications to enhance reliability and capacity on the grid, replacement of equipment that has reached the end of its useful life, strengthening the grid's ability to withstand severe weather events, support for local infrastructure projects like Ottawa's Light Rail Transit, and renewal of the utility's vehicle fleet. Table 2 below summarizes the projected breakdown of total capital investments during each year of the 2021-2025 period.

Table 2 – AS ORIGINALLY SUBMITTED – 2021-2025 Annual Capital Expenditures ($'000,000s)

Investment Category	2021	2022	2023	2024	2025	Average 2021-2025
System Access	$56.7	$41.0	$37.4	$34.5	$34.0	$40.7
System Renewal	$43.3	$44.0	$40.2	$39.4	$40.5	$41.5
System Service	$31.0	$27.4	$24.3	$25.2	$23.9	$26.4
General Plant	$32.0	$11.7	$7.6	$17.4	$16.9	$17.1
Capital Contributions	$(41.3)	$(25.2)	$(19.9)	$(19.2)	$(19.3)	$(25.0)
TOTAL	**$121.8**	**$98.9**	**$89.6**	**$97.2**	**$96.0**	**$100.7**

Table 2 – UPDATED FOR 2019 ACTUALS – 2021-2025 Annual Capital Expenditures ($'000,000s)

Investment Category	2021	2022	2023	2024	2025	Average 2021-2025
System Access	$56.7	$41.0	$37.4	$34.5	$34.0	$40.7
System Renewal	$43.3	$44.0	$40.2	$39.4	$40.5	$41.5
System Service	$26.7	$28.3	$24.3	$25.2	$23.9	$25.7
General Plant	$32.0	$11.7	$7.6	$17.4	$16.9	$17.1
Capital Contributions	$(39.2)	$(23.5)	$(19.9)	$(19.2)	$(19.3)	$(24.2)
TOTAL	**$119.5**	**$101.5**	**$89.6**	**$97.2**	**$96.0**	**$100.8**

This five-year envelope for capital investment translates into an annual average expenditure requirement of $100.7M. After accounting for 2019 actuals, this figure increases slightly to $100.8M. This figure mirrors (but falls short of) the annual average of capital expenditures budgeted for in Hydro Ottawa's 2016-2020 Custom IR application, which was $107.5M. Of note, this latter figure represents the highest annual average from any multi-year rate term in the utility's history.[9]

The close alignment of the annual averages for capital expenditures from the 2016-2020 and 2021-2025 rate terms is wholly consistent with the direction signalled in Hydro Ottawa's 2016-2020 Custom IR application, which articulated the expectation that a historically high level of annual capital expenditures "will be sustained, if not increased, through the decade from 2020-2030."[10]

While Hydro Ottawa's large, multi-year capital investment needs are one of the main drivers behind the decision to select the Custom IR option, considerations with respect to operational funding were likewise germane. In particular, the requirement to embed productivity gains into the annual rate adjustment mechanism helps to ensure greater convergence between Hydro Ottawa's interests and those of its customers, who wish to see continuous improvement on the utility's part in delivering outcomes in an efficient and cost-effective manner.

Accordingly, Hydro Ottawa maintains that the Custom IR method remains the most suitable rate-setting option for governing the 2021-2025 rate term. The ensuing sub-sections explain in greater detail the specifics of the rate-setting framework that the utility has customized for the purposes of its five-year rate plan.

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[9] For additional information on Hydro Ottawa's 2016-2020 capital expenditures, please see UPDATED Exhibit 2-4-1: Capital Expenditure Summary.
[10] Hydro Ottawa Limited, *2016-2020 Custom Incentive Rate-setting Distribution Rate Application*, EB-2015-0004 (April 29, 2015), Exhibit A-2-1, page 10.

4.2. YEAR ONE – STANDARD REBASING

This Application is based on a Custom IR approach for a five-year period, consistent with the OEB's RRF as set out in the *Handbook for Utility Rate Applications*. The first Test Year of the five-year period (2021) is a standard rebasing approach, consistent with the OEB's 4th Generation Incentive Regulation approach.

Hydro Ottawa has developed and submitted a forecast of its base revenue requirement for 2021 in this Application, as well as detailed forecasts of its costs based on its capital and operational plans for 2021.[11] In keeping with the rate adjustment formula used in its 2016-2020 Custom IR rate plan, Hydro Ottawa has assumed the Conference Board of Canada's updated inflation rate of 2.01% for all non-compensation-related costs. The calculated revenue requirement resulting from these projections is detailed in UPDATED Exhibit 6-1-1: Calculation of Revenue Deficiency or Sufficiency.

The forecasted costs in this Application were developed with the benefit of information obtained from several external and internal benchmarking studies (see Exhibit 1-1-12: Benchmarking). These studies helped inform Hydro Ottawa's plans and expenditures. In addition, these plans were developed with the benefit of significant customer engagement including surveys, focus groups, town hall meetings, special studies, and ongoing day-to-day customer interactions. The full extent of Hydro Ottawa's customer engagement is detailed in Exhibit 1-2-1: Customer Engagement Overview and Exhibit 1-2-2: Customer Engagement on the 2021-2025 Application.

4.3. YEARS TWO THROUGH FIVE – RATE FRAMEWORK: CUSTOM PRICE ESCALATION FACTOR

As established by the RRF, under Price Cap Incentive Rate-Setting, rates are adjusted using a formulaic approach in the years following the first year base rates. This formula consists of a two-component Price Cap Index ("PCI"): inflation and productivity. For electricity distributors, the

[11] See UPDATED Exhibit 1-1-9: Business Plan, UPDATED Exhibit 2-4-1: Capital Expenditure Summary, Exhibit 2-4-3: Distribution System Plan, and UPDATED Exhibit 4-1-1: Operations, Maintenance and Administration Summary.

formula includes an industry-specific inflation factor and two factors for productivity. One productivity factor is a fixed value for industry-wide productivity. The other is a stretch factor which is set each year based on the level of efficiency the distributor has achieved, as evaluated by the Pacific Economics Group's ("PEG") econometric model.

Under a Custom IR approach, the annual rate adjustment must be based on a custom index supported by empirical evidence that can be tested. The annual adjustment must include explicit financial incentives for continuous improvement and cost control targets. As noted in the OEB's *Handbook for Utility Rate Applications*, "these incentive elements, including a productivity factor, must be incorporated through a custom index or an explicit revenue reduction over the term of the plan (not built into the cost forecast)."[12]

As a result, Hydro Ottawa is proposing to adopt a **C**ustom **P**rice **E**scalation **F**actor ("CPEF") rate framework for years two through five, which is based on the approach approved by the OEB in the utility's 2016-2020 Custom IR application.[13] This framework is aligned with OEB policy and based on sound ratemaking principles. The CPEF incorporates the OEB's key principles and expectations of a Custom IR application, and thus has been structured in a way that:

- Includes productivity gains as part of the rate adjustment mechanism;
- Constrains operational funding increases going forward at approximately the rate of inflation; and
- Acknowledges the funding requirements to address Hydro Ottawa's significant, multi-year investment needs over the 2021-2025 period.

The OEB has provided specific guidance with respect to Custom IR applications and expectations for the annual rate adjustment index. The *Handbook for Utility Rate Applications* states the following:

[12] Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 25.
[13] Ontario Energy Board, *Decision and Order*, EB-2015-0004 (December 22, 2015), page 1.

> *"**Custom IR:** Under this methodology, rates are set for five years considering a five-year forecast of the utility's costs and sales volumes. This method is intended to be customized to fit the specific utility's circumstances, but expected productivity gains will be explicitly included in the rate adjustment mechanism. Utilities adopting this approach will need to demonstrate a high level of competence related to planning and operations.*
>
> ***Index for the Annual Rate Adjustment:** The annual rate adjustment must be based on a custom index supported by empirical evidence (using third party and/or internal resources) that can be tested. Custom IR is not a multi-year cost of service; explicit financial incentives for continuous improvement and cost control targets must be included in the application. These incentive elements, including a productivity factor, must be incorporated through a custom index or an explicit revenue reduction over the term of the plan (not built into the cost forecast).*
>
> *The index must be informed by an analysis of the trade-offs between capital and operating costs, which may be presented through a five-year forecast of operating and capital costs and volumes. If a five-year forecast is provided, it is to be used to inform the derivation of the custom index, not solely to set rates on the basis of multi-year cost of service. An application containing a proposed custom index which lacks the required supporting empirical information may be considered to be incomplete and not processed until that information is provided.*
>
> *It is insufficient to simply adopt the stretch factor that the OEB has established for electricity distribution IRM applications. Given a utility's ability to customize the approach to rate-setting to meet its specific circumstances, the OEB would generally expect the custom index to be higher, and certainly no lower than the OEB-approved X factor for Price Cap IR (productivity and stretch factors) that is used for electricity distributors."*[14]

The CPEF adheres to this guidance and consists of three main components: a custom inflation factor, a two-component productivity factor and a growth factor. Supplementary evidence is supplied in support of each factor below. As previously noted, year one is a traditional rebasing year, with costs allocated and rates set on the basis of a forecast Test Year. Distribution rates in years two through five are adjusted annually by the CPEF, as follows:

[14] Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13,2016), pages 25-26.

CPEF = I - X + G

where

"I" is the inflation factor (see section 4.3.1 below)

"X" is the two-component productivity factor (see section 4.3.2 below)

"G" is the growth factor (see section 4.3.3 below)

As referenced above, this approach is consistent with the OEB's RRF guidance on Custom IR applications. This formulaic approach with customization reflects Hydro Ottawa's significantly large, multi-year investments within the 2021-2025 period, while embedding productivity savings for the customer.

4.3.1. "I" Factor: Inflation Factor

In its 2013 report, *Rate Setting Parameters and Benchmarking under the Renewed Regulatory Framework for Ontario's Electricity Distributors*, the OEB established a methodology for determining its annual inflation factor for use in incentive-based rate adjustment mechanisms.[15] The OEB's two-factor inflation factor is based on the weighted sum of the following sub-indices:

- Non-Labour: 70% of the annual percentage change in Canada's Gross Domestic Product Implicit Price Index ("GDP-IPI") Final Domestic Demand ("FDD"), as reported by Statistics Canada; and
- Labour: 30% of the annual percentage in the Average Weekly Earnings ("AWE") for workers in Ontario, as reported by Statistics Canada.

The OEB's inflation factor can be calculated as follows:

[15] Ontario Energy Board, *Report of the Board - Rate Setting Parameters and Benchmarking under the Renewed Regulatory Framework for Ontario's Electricity Distributors*, EB-2010-0379 (November 21, 2013), pages 5-11.

$$\textbf{\textit{Inflation Factor}} = 0.70 \times \Delta\text{GDP-IPI (FDD)} + 0.30 \times \Delta\text{AWE (Ontario)}$$

where

GDP-IPI (FDD) is the annual Implicit Price Index for (national) Gross Domestic Product.

AWE (Ontario) is the annual Average Weekly Earnings for Ontario, all businesses except unclassified, including overtime.

The OEB's inflation factor calculation uses component weights of 30% labour and 70% non-labour. Hydro Ottawa proposes to use an inflation factor consistent with the OEB's approach. However, the utility proposes to use a weighting of the two sub-indices that is more suitable for Hydro Ottawa's historical labour/non-labour split. Hydro Ottawa maintains that a weighting that is more closely aligned with its own labour/non-labour split is more appropriate than the OEB's 70/30 split, as it represents the utility's actual conditions.

After an analysis of both historical and forecast operations, maintenance and administration ("OM&A") expenditure data over the 2016-2020 period, Hydro Ottawa has determined that a unique labour/non-labour weighting of 55.5% labour and 44.5% non-labour is appropriate. Table 3 below provides an overview of Hydro Ottawa's labour and non-labour OM&A components, as a percentage of total OM&A.

Table 3 – Hydro Ottawa's Labour/Non-Labour Split (2016-2020)

	2016	2017	2018	2019	2020	5-Year Total
Labour (55.5% weight)	$72,126,923	$71,938,869	$75,204,872	$75,788,503	$77,366,800	$372,425,968
Non-Labour (44.5% weight)	$54,929,916	$57,241,300	$59,383,744	$61,471,941	$65,067,573	$298,094,474
Labour as a % of Gross OM&A	56.77%	55.69%	55.88%	55.22%	54.32%	55.5% (average)

Hydro Ottawa thus proposes to calculate its inflation factor as follows:

Inflation Factor = 0.445 × △GDP-IPI (FDD) + 0.555 × △AWE (Ontario)

where

GDP-IPI (FDD) *is the annual Implicit Price Index for (national) Gross Domestic Product.*

AWE (Ontario) *is the annual Average Weekly Earnings for Ontario, all businesses except unclassified, including overtime.*

Hydro Ottawa proposes to use a static inflation factor for the duration of this Application's term, and therefore proposes to derive its inflation factor using an average based on historical and forecast data over the 2017-2025 period. Annual GDP-IPI data and AWE historical and projection data for the 2017-2025 period from the Conference Board of Canada is presented in Tables 4 and 5 below, alongside Hydro Ottawa's adjusted labour/non-labour weighting.[16]

Table 4 – 2017-2025 GDP-IPI (FDD) Index

Year	GDP-IPI	Hydro Ottawa Non-Labour Weighting	Adjusted GDP-IPI
2017	2.50%	44.46%	2.78%
2018	1.67%	44.46%	1.86%
2019	1.19%	44.46%	1.32%
2020	2.33%	44.46%	2.59%
2021	2.11%	44.46%	2.34%
2022	2.10%	44.46%	2.33%
2023	2.07%	44.46%	2.30%
2024	2.07%	44.46%	2.30%
2025	2.07%	44.46%	2.30%

Source: Conference Board of Canada

[16] Note that projection data for GDP-IPI and AWE is available up to 2023 only. Consistent with the inflation indices used in Clearspring Energy Advisors' *Econometric Benchmarking Study of Hydro Ottawa's Total Cost and Reliability* (Attachment 1-1-12(A)), the 2023 inflation rate was applied to 2024 and 2025.

Table 5 – 2017-2025 AWE (Ontario) Index

Year	AWE	Hydro Ottawa Labour Weighting	Adjusted AWE
2017	0.82%	55.54%	0.73%
2018	3.40%	55.54%	3.02%
2019	2.61%	55.54%	2.32%
2020	2.77%	55.54%	2.46%
2021	2.75%	55.54%	2.45%
2022	2.72%	55.54%	2.42%
2023	2.71%	55.54%	2.41%
2024	2.71%	55.54%	2.41%
2025	2.71%	55.54%	2.41%

Source: Conference Board of Canada

Table 6 below presents an annual breakdown of Hydro Ottawa's adjusted weightings for both GDP-IPI and AWE over the 2017-2025 period.

Table 6 – Hydro Ottawa's Labour/Non-Labour Split (2017-2025)

Year	GDP-IPI (Non-Labour)	AWE (Labour)	Average
2017	2.78%	0.73%	1.75%
2018	1.86%	3.02%	2.44%
2019	1.32%	2.32%	1.82%
2020	2.59%	2.46%	2.53%
2021	2.34%	2.45%	2.39%
2022	2.33%	2.42%	2.38%
2023	2.30%	2.41%	2.35%
2024	2.30%	2.41%	2.35%
2025	2.30%	2.41%	2.35%
2017-2025 Average	**2.23%**	**2.29%**	**2.26%**

As shown in Table 6 above, applying Hydro Ottawa's specific labour/non-labour weighting factors to the AWE and GDP-IPI indices, and averaging over the 2017-2025 period, yields an inflation factor of 2.26%. Hydro Ottawa does not intend to update the inflation factor over the course of its 2021-2025 rate term.

4.3.2. "X" Factor: Productivity and Stretch Factors

4.3.2.1. Productivity Factor

There are two components to the X factor: an industry Total Factor Productivity ("TFP") component and a stretch factor component. The productivity component is intended to be an estimate of industry TFP growth in Ontario's electricity distribution sector. In its 2013 report, *Productivity and Benchmarking Research in Support of Incentive Rate Setting in Ontario*, PEG defines TFP growth "as the change in total output quantity minus the change in total input quantity."[17] PEG's analysis yielded a TFP growth factor of -0.33%, and ultimately, PEG recommended a zero TFP factor.[18] In turn, the OEB adopted PEG's recommendation.[19]

More recently, the OEB re-affirmed a zero TFP factor in the context of a Custom IR rate filing from Hydro One Networks Inc. ("HONI"). During this proceeding, separate reports submitted by PEG and another independent third-party expert (Power System Engineering ["PSE"]) both recommended a TFP factor of 0.0%. Of note, PSE had updated Ontario industry TFP research to 2015 and concluded that TFP continues to decline. The OEB ultimately accepted a TFP of 0% in its Decision and Order.[20]

Consistent with the RRFE Report[21] and the foregoing OEB rulings, Hydro Ottawa proposes to adopt the OEB's TFP factor of zero in its CPEF.

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[17] Pacific Economics Group, *Productivity and Benchmarking Research in Support of Incentive Rate Setting in Ontario* (November 2013), page 25.
[18] *Ibid*, pages 51-53.
[19] Ontario Energy Board, *Report of the Board - Rate Setting Parameters and Benchmarking under the Renewed Regulatory Framework for Ontario's Electricity Distributors* (November 21, 2013, corrected December 4, 2013), page 17.
[20] Ontario Energy Board, *Decision and Order*, EB-2017-0049 (March 7, 2019).
[21] RRFE Report, page 17.

4.3.2.2. Stretch Factor

The second component to the X factor is the stretch factor, which is intended to reflect the incremental productivity gains that distributors are expected to achieve under Incentive Regulation. The OEB has concluded that stretch factors play an important role in Incentive Regulation and "promote, recognize and reward distributors for efficiency improvements relative to the expected sector productivity trend."[22]

Under the current methodology, stretch factors are determined based on a distributor's assignment in one of five efficiency assessment rankings. Efficiency assessments are determined using a total cost econometric model developed by PEG, which is updated annually. The PEG model renders a comparison of each distributor's "actual" total costs relative to their predicted costs. Distributors are then placed into one of five cohorts and assigned a corresponding stretch factor based on the percentage difference between actual and predicted costs. Stretch factors range from 0.0% to 0.60%, with lower stretch factors indicating higher efficiency. Since 2015, Hydro Ottawa has been placed in Cohort 4 and assigned a stretch factor of 0.45% in accordance with the PEG model's finding that actual costs have been between 10%-25% above predicted costs.

While Hydro Ottawa acknowledges and accepts the value of total cost benchmarking as a measure of productivity and efficiency, as well as the merit of incorporating a productivity factor into its CPEF, the utility is concerned by some of the inherent limitations in the PEG model. These limitations have induced Hydro Ottawa to submit alternative total cost benchmarking analysis as part of this Application. More detailed rationale in support of the utility's approach is outlined in Attachment 1-1-12(E): PEG Benchmarking Forecast.

The total cost benchmarking study included in this Application as Attachment 1-1-12(A) is econometric in nature, similar to the PEG model. The study has been prepared by Clearspring

[22] Ontario Energy Board, *Rate Setting Parameters and Benchmarking under the Renewed Regulatory Framework for Ontario's Electricity Distributors* (November 21, 2013, corrected December 4, 2013), page 19.

Energy Advisors ("Clearspring"). Clearspring's analysis provides an appropriate and empirical basis for setting Hydro Ottawa's stretch factor. As noted in the report, Clearspring's total cost findings for Hydro Ottawa during the Custom IR period demonstrate a total cost benchmarking score of -7.1% below predicted costs, which corresponds to a stretch factor of 0.30%. However, when normalized for two once-in-a-generation expenditures, the value of this factor decreases to 0.15%, with a total cost benchmarking score of -12.5%. This normalization entails the removal of the expenditures and in-service additions for the Facilities Renewal Program ("FRP") and the Cambrian Municipal Transformer Station ("MTS"). These projects are described in Clearspring's report, as follows:

- **Facilities Renewal Program**: The purpose of this program is to (a) consolidate operations and administrative staff; (b) move Hydro Ottawa's operational centers out of high-traffic residential areas to sites with easy access to major highways within the Ottawa area; (c) replace aging buildings; and (d) upgrade operational centers in order to provide better response to customers. Under the program, two parcels of land were purchased, upon which Hydro Ottawa has constructed two regional campuses – namely, the Eastern Operations and Administrative Campus, and the Southern Operations & Warehouse.

  This program is a "once in a generation" modernization and operational efficiency initiative. Most of the capital additions for the FRP occur in 2019. This large investment worsens the total cost benchmarking scores throughout the entire Custom IR period.

- **Cambrian MTS**[23]: This project consists of two key components: (1) a new municipal transformer station to be constructed by Hydro Ottawa; and (2) upgrades to existing transmission facilities, as well as construction of a segment of new transmission line by Hydro One. These facilities are required to accommodate customer load growth and increase supply capacity in the South Nepean area of Ottawa, which has already reached the limits of local transformation capacity.

  The capital additions for the Cambrian MTS project occur in 2021 and 2022. Therefore, this large investment will worsen the total cost benchmarking scores beginning in 2021 and then throughout the Custom IR period.

[23] The previous name for Cambrian MTS was South Nepean MTS. Clearspring's report retains the original nomenclature of South Nepean MTS.

Projects of this nature do not occur on a regular basis. In the last decade, Hydro Ottawa built only two new transformer stations, neither of which required a transmission investment level of the magnitude of Cambrian MTS.[24]

As noted above, when Clearspring analyzed Hydro Ottawa's total costs in the absence of these two projects, the stretch factor dropped to 0.15%:

> "The 2021 to 2025 average forecasted results show that if the FRP investment was excluded the score becomes -9.9%. This is just above the threshold to move the stretch factor recommendation from 0.3% to 0.15%. If both the FRP and the South Nepean MTS investments are excluded the total cost benchmarking score for 2021 to 2025 averages -12.5%. If these two investments were not forecasted, this would have pushed the stretch factor recommendation to 0.15%."[25]

These two projects represent approximately $180M worth of expenditures incurred in a very short time period (2018-2022). Seeing as the FRP is not of a recurring nature, and a new MTS requiring a major transmission upgrade is a rare investment, it is Hydro Ottawa's position that these projects should be excluded for purposes of determining the utility's stretch factor.

4.3.3. "G" Factor: Growth Factor

Hydro Ottawa's CPEF will include a growth factor to account for the increased costs associated with its substantial and steady customer growth. The inclusion of a growth variable in the CPEF is warranted in order to capture the change in distribution revenue that would naturally occur (in the absence of any rate changes) as a result of an increase in the number of customers over the forecast period. The value of the growth factor is determined based upon Hydro Ottawa's historical and forecast growth in customers for the period 2012-2020. As shown in Tables 7 and

[24] The last two MTS projects to go into service were Ellwood MTS in 2012 and Terry Fox MTS in 2014. For more information on these projects, please see Exhibit B, Tab 7, Schedule 1 in the joint application filed by Hydro Ottawa and HONI in EB-2019-0077. This joint application sought Leave to Construct approval for the South Nepean/Cambrian MTS and the corresponding transmission system upgrades and expansion.
[25] Attachment 1-1-12(A): Econometric Benchmarking Study of Hydro Ottawa's Total Cost and Reliability, page 35.

8 below, customer growth in Ottawa has been substantial and consistent over that period, averaging approximately 1.34% on an annual basis.

Table 7 – Hydro Ottawa Customer Count (2012-2020)

Rate Class	2012	2013	2014	2015	2016	2017	2018	2019	2020[26]
Residential	282,187	287,191	291,759	296,036	299,909	303,571	307,053	311,464	315,887
Small Commercial	23,921	23,972	24,149	24,563	24,689	24,888	24,996	25,080	25,250
Commercial	3,415	3,548	3,617	3,310	3,271	3,305	3,260	3,216	3,189
Large User	11	11	11	10	11	13	11	11	11
TOTAL	**309,534**	**314,722**	**319,536**	**323,919**	**327,880**	**331,777**	**335,320**	**339,771**	**344,325**

Table 8 – Hydro Ottawa Customer Count (2012-2020): Total Change, Total Percentage Change, and Compound Annual Growth Rate ("CAGR")

Hydro Ottawa Customer Growth	
Total Change	34,791
% Change	11.24%
CAGR	**1.34%**

According to data from Statistics Canada's 2011 census, the population in the City of Ottawa increased by 8.8% since 2006, which is a faster growth rate than Ontario (5.7%) and Canada as a whole (5.9%).[27] Moreover, the City's *Official Plan* predicts a population growth rate of 16% between 2016 and 2031.[28] With additional customers comes the requirement for associated expenditures to serve those customers.

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[26] In this instance, the customer count for 2020 represents a forecast based on historical trends. This forecast was developed internally at Hydro Ottawa and was utilized as an input in the preparation of the supporting evidence for this Schedule prior to the completion of the load forecast which is appended to this Application as UPDATED Attachment 3-1-1(C).

[27] Statistics Canada, *Focus on Geography Series, 2011 Census* (2012). Statistics Canada Catalogue no. 98-310-XWE2011004. Ottawa, Ontario. Analytical products, 2011 Census.

[28] City of Ottawa, *Official Plan: Volume 1* (May 2003), page 2-3.

Hydro Ottawa's load forecast anticipates modest growth in total energy sales and steady growth in customer count over the 2021-2025 period.[29] While a load forecast generally reflects the expected growth in a utility's customer base and energy sales, a growth factor is intended to capture the relationship between the increasing number of customers and the costs to serve them.

Hydro Ottawa's proposed approach with its CPEF is not without precedent in the context of utility regulation in Canada. The use of a growth factor has been previously employed and approved by regulators in Ontario,[30] Québec,[31] Alberta,[32] and British Columbia.[33]

As an expert witness hired by the OEB in HONI's most recent Custom IR proceeding, PEG noted the correlation between customer growth and operating costs as an important factor and recommended that HONI include a customer growth factor in its custom index.[34]

Similarly, in a report prepared for the Régie de l'énergie ("Régie") in Québec, PEG has affirmed that "the number of customers served drives the costs of customer services (e.g. billing and collection) and some distribution costs (e.g. those of metering and connections)...In econometric research on distribution cost, the customers variable typically has the highest estimated cost elasticity amongst the scale variables modelled."[35] For its part, the Régie has previously established that it will apply a scaling factor of 0.75 to Hydro Québec Distribution's ("Hydro Québec") growth factor as part of Hydro Québec's mécanisme de réglementation incitative

[29] See UPDATED Exhibit 3-1-1: Load Forecast.
[30] Ontario Energy Board, *Decision* (in the matter of a rate application filed by Enbridge Gas Distribution), EB-2007-0615.
[31] Régie de l'énergie, *Décision*, D-2017-043 (April 7, 2017). This decision was in the matter of the establishment of a regulatory incentive mechanism to ensure efficiency gains by Hydro-Québec Distribution and Hydro-Québec TransÉnergie.
[32] Alberta Utilities Commission, *Decision*, 20414-D01-2016 (Errata), (2018-2022 Performance-Based Regulation Plans for Alberta Electric and Gas Distribution Utilities).
[33] British Columbia Utilities Commission, *Decision and Orders*, G-138-14 and G-139-14 (Performance Based Ratemaking Plans for 2014 through 2019 for FortisBC Energy Inc. and FortisBC Inc.).
[34] EB-2017-0049: Pacific Economics Group, *IRM Design for Hydro One Networks, Inc.*, (April 13, 2018), page 48.
[35] Pacific Economics Group, *X Factor Calibration Guidelines for Hydro-Québec Distribution* (May 12, 2019), page 7.

("MRI").[36]

In addition, since the mid-1990s, electric utility FortisBC Inc. ("FortisBC") has generally used an Average Customer Growth Factor ("ACGF") in its approach to operations and maintenance ("O&M") escalation.[37] As approved by the British Columbia Utilities Commission ("BCUC") in Order G-139-14 dated September 15, 2014,[38] FortisBC's current rate plan includes a growth factor of 50% of the ratio of the average number of customers ("AC") one year previous to the average number of customers two years previous, expressed as:

$$\boldsymbol{ACGF = [1 + ((ACt\text{-}1 - ACt\text{-}2\,) / ACt\text{-}2) \times P\%)]}$$

where

ACT-1 = customer count at time minus 1

ACT-2 = customer count at time minus 2

P = percentage/scaling factor

Hydro Ottawa proposes to employ a scaling factor of 0.35 to determine its growth factor, consistent with the approved approaches for FortisBC and Hydro Québec. The selection of this scaling factor was made by considering the scaling factors used in other jurisdictions and taking into account the substantial growth in population and customers in the Ottawa area.

Using a scaling factor of 0.35 would render a growth factor in the range of 0.39% and 0.43%, depending on the specific historical years chosen for analysis. For example, using the percentage change in customer count between 2017-2018 and plugging it into the ACGF formula described above would result in a growth rate of 0.39%, as follows:

[36] "Mécanisme de réglementation incitative" roughly translates into English as "incentive regulation mechanism."
[37] FortisBC Inc.'s 1996-2004, 2005-2006, 2007-2011 and 2014-2019 rate plans were approved performance-based rate plans that employed formula based O&M escalation factors based on an I-X index multiplied by the average percentage growth of average number of customers.
[38] G-139-14: British Columbia Utilities Commission, *Decision and Order*, *In the Matter of FortisBC Inc. Multi-Year Performance Based Ratemaking Plan for 2014 through 2018 Decision*, (September 15, 2014), page 116.

$$ACGF = [1 + ((333,621 - 329,926) / 329,926) *0.35]$$

$$ACGF = 0.392\%$$

Similarly, use of the percentage change in customer count between 2016-2017 would yield a growth rate of 0.43%:

$$ACGF = [1 + ((329,926 - 325,913) / 325,913) * 0.35]$$

$$ACGF = 0.431\%$$

Unlike FortisBC, which updates its growth factor annually, Hydro Ottawa does not intend to update the growth factor throughout the term of this Application.

Based on the foregoing discussion, and in particular, Hydro Ottawa's consistent customer growth rate since 2012, Hydro Ottawa proposes to employ a conservative growth rate near the lower end of the calculated range of 0.40% in its CPEF. This growth rate would remain unchanged over the course of the 2021-2025 period.

4.3.4. Summary – Custom Price Escalation Factor

Hydro Ottawa proposes to apply a CPEF to its OM&A over the term of this Application. Similar to the escalation formula approved by the OEB in the utility's last Custom IR application,[39] Hydro Ottawa's CPEF consists of three variables:

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[39] Hydro Ottawa Limited, *2016-2020 Custom Incentive Rate-Setting Distribution Rate Application*, EB-2015-0004 (April 29, 2015).

$$\mathbf{CPEF = I - X + G}$$

where

"I" is Hydro Ottawa's custom Inflation Factor (2.26%)

"X" is a two-component productivity factor consisting of the OEB's Total Factor Productivity + Hydro Ottawa's custom Stretch Factor (0.0% +0.15%)

"G" is Hydro Ottawa's customer Growth Factor (0.40%)

$$\mathbf{= 2.26\% - 0.15\% + 0.40\%}$$
$$\mathbf{= 2.51\%}$$

The result of Hydro Ottawa's CPEF is an escalation of 2.51% per year for years two through five of the 2021-2025 Custom IR term. Year one of the Application term is a traditional rebasing year, with rates set on the basis of a forecast Test Year of $93.9M. Thereafter, each year will be adjusted by the CPEF (2.51%), as shown in Table 9.

Table 9 – 2021 to 2025 Annual OM&A Expenditures ($'000s)

Year	OM&A	Previous Year	Variance	Variance/ CPEF
2021	$93,923	N/A	N/A	N/A
2022	$96,280	$93,923	$2,357	2.51%
2023	$98,697	$96,280	$2,417	2.51%
2024	$101,174	$98,697	$2,477	2.51%
2025	$103,714	$101,174	$2,539	2.51%

This formulaic adjustment is consistent with the OEB's policy framework under the RRF, where rates charged to customers are de-linked from the costs of operating the utility. The CPEF conforms to OEB guidance for the Index for Annual Rate Adjustment under the Custom IR method (as laid out in the *Handbook for Utility Rate Applications*), as it accomplishes all of the following:

- It is based on a custom index supported by empirical evidence that can be tested;
- Explicit financial incentives for continuous improvement and cost control targets are included in this Application and incorporated through the CPEF;
- The CPEF does not adopt the stretch factor that the OEB has established for electricity incentive regulation mechanism applications;
- The CPEF is higher than the OEB approved index (I-X) used for electricity distributors under Price Cap IR; and
- The application of the CPEF resulted in a reduction of OM&A spending over the 2021-2025 period of $13.1M. These savings will be achieved, in part, through productivity gains as described in Exhibit 1-1-13: Productivity and Continuous Improvement Initiatives.

4.4. EARNINGS SHARING MECHANISM

The OEB has clarified that electricity distributors which are filing Custom IR applications are expected to propose one or more mechanisms to protect customers from excessive utility earnings.[40] In this Application, Hydro Ottawa proposes to include two such mechanisms.

The first is an earnings sharing mechanism ("ESM"). ESMs permit the sharing of utility earnings with customers when earnings rise above or fall below a certain threshold. Under an ESM, earnings may be passed along to customers in the form of rate reductions or rate offsets.

Hydro Ottawa is proposing an asymmetrical ESM such that the utility would only share earnings that exceed a basis point threshold above the utility's return on equity ("ROE"), with no corresponding adjustment if its earnings fall below the basis point threshold.

The proposed ESM formula is as follows:

[40] Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 27.

Table 10 – Proposed ESM Formula

#	Threshold	Treatment
1	Under earning	Borne entirely by shareholder
2	0-150 basis points	Fully retained by shareholder
3	Above 150 basis points	50:50 sharing of ratepayer/shareholder

Additional detail on the proposed ESM is set forth in Exhibit 9-2-1: New Deferral and Variance Accounts.

4.5. OFF-RAMP(S)

The second mechanism which Hydro Ottawa proposes to include as a means of protecting customers against excessive utility earnings is an off-ramp. Similar to its 2016-2020 Custom IR application, this Application proposes to apply the OEB's existing policy with respect to off-ramps, wherein a regulatory review may be initiated in the event that an electricity distributor performs outside of an annual ROE dead band of plus or minus 300 basis points.

4.6. Z FACTOR(S)

In its *Handbook for Utility Rate Applications*, the OEB affirmed its policy that "[a]n acceptable adjustment during a Custom IR term is a Z factor mechanism for cost recovery of unforeseen events."[41] In step with this guideline, Hydro Ottawa intends to reserve its right over the course of the 2021-2025 rate term to file a Z factor application in order to recover costs resulting from unforeseen events, decisions, or activities, the results of which cannot be reasonably anticipated or quantified at this juncture and where the costs exceed Hydro Ottawa's materiality threshold. Examples include unforeseen weather events or changes to laws or regulations which would require significant investment to implement.

Please see Exhibit 9-2-1: New Deferral and Variance Accounts for additional information on Z factors.

[41] Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 27.

4.7. CAPITAL VARIANCE ACCOUNT

In this Application, Hydro Ottawa proposes to sustain the use of a variance account wherein it will track, on an annual basis, variances in the cumulative revenue requirement arising from variances in the forecasts for the four key categories of capital spending: System Access, System Service and System Renewal, and General Plant.[42] The creation and use of such a variance account was sanctioned as part of the Approved Settlement Agreement governing Hydro Ottawa's 2016-2020 rates. The utility believes that the administration of this capital variance account on an ongoing basis is an effective means of ensuring transparency and accountability in the planning, execution, and reporting of annual capital expenditures. Accordingly, it is proposed to remain in effect for the 2021-2025 period, and to retain the general design of the account that has been utilized during the 2016-2020 rate term, namely:

- Variances will be calculated by reference to the current forecast for each of the four categories in each year;
- Variances and associated revenue requirement impacts will be calculated and tracked on an annual basis;
- In each year of the 2021-2025 Custom IR plan, if Hydro Ottawa adds to rate base less than its forecast cumulative amount in any of the four categories, the corresponding reduction in revenue requirement will be credited to the variance account and any cumulative reduction in revenue requirement in any of the four categories will be disposed of at the end of the term of the Custom IR plan;
- Each year, Hydro Ottawa will estimate the impact of the revenue requirement resulting from the variance in its cumulative capital additions for each of the four capital additions budgets;
- Disposition of any underspending in the four categories, on a cumulative basis, will be at the conclusion of the five-year Custom IR term; and

[42] For its 2016-2020 Custom IR rate plan, Hydro Ottawa was granted approval to merge System Renewal and System Service into one category for purposes of this variance account and annual reporting. This approach reflected Hydro Ottawa's standard operating practice to shift funds between the two categories, as warranted by customer and operational requirements. Hydro Ottawa is planning to maintain this approach during the 2021-2025 rate term, with some modifications, as explained in further detail below.

- If, at the end of the five-year Custom IR plan, there has been overspending in any category, there will be no charge to the customer.

One important modification to the capital variance account that Hydro Ottawa is proposing to introduce for 2021-2025 is the use of a separate sub-account for System Access capital expenditures. The rationale for this proposal is that capital spending in this category is driven by customer requests and is therefore difficult to predict, as the level of required expenditure is outside of Hydro Ottawa's control.

By proposing the calculation of the annual variance on a cumulative basis, Hydro Ottawa's intent is to ensure that if projects are delayed, but are completed as planned at a later time, then the reduction to revenue requirement will only reflect the period of delay and will cease when the projects have been added to rate base.

For additional information on the capital variance account, please see Exhibit 9-2-1: New Deferral and Variance Accounts.

4.8. CCRA PAYMENTS DEFERRAL ACCOUNT

Similar to the Capital Variance Account discussed above, Hydro Ottawa proposes to continue the use of a variance account to record the revenue requirement impact of Connection Cost Recovery Agreement ("CCRA") payments made to HONI commencing in the year in which the facilities to which each CCRA payment relates provides services to Hydro Ottawa customers. In step with the administration of this account over the 2016-2020 rate term, for the 2021-2025 Custom IR plan Hydro Ottawa intends to record depreciation, interest, return, and payment in lieu of taxes components of revenue requirement impact as CCRA-related assets are put into service. The balance will be disposed as part of the Group 2 Accounts and according to the OEB's direction regarding the disposition of Group 2 Accounts.

It is Hydro Ottawa's intent to utilize this account for purposes of new CCRA payments and for true-ups.

For additional information, please see Exhibit 9-2-1: New Deferral and Variance Accounts.

5. PERFORMANCE MEASUREMENT

As described by the OEB, the RRF is fundamentally a "comprehensive performance-based approach to regulation that promotes the achievement of performance outcomes that will benefit existing and future customers."[43] The RRF's four categories of performance outcomes – Customer Focus, Operational Effectiveness, Public Policy Responsiveness, and Financial Performance – serve as the lodestar for the framework and the focal point towards which the other core components gravitate and culminate. Accordingly, another key component in the OEB's basket of RRF implementation policies is measuring utilities' performance and setting expectations for continuous improvement in the delivery of services and benefits to customers.

This Application includes several features that comport with the RRF's emphasis on performance measurement, monitoring, and reporting.

5.1. CUSTOM PERFORMANCE SCORECARD

As detailed above, Hydro Ottawa embedded a robust framework for performance measurement into its 2016-2020 rate plan. This framework represented a blend of OEB performance measures that were – and continue to be – standardized in their application to all rate-regulated distributors (i.e. through the Electricity Utility Scorecard), along with a series of unique KPIs and reporting measures that were customized in their application to Hydro Ottawa. Pursuant to the RRFE Report and the Approved Settlement Agreement governing the utility's 2016-2020 rate term, Hydro Ottawa committed to an annual cycle of reporting on these KPIs, as well as on capital expenditures in each of the four principal categories of spending (System Access, System Renewal and System Service, and General Plant).

[43] RRFE Report, page 55.

In 2016, the OEB formally clarified its expectation that the annual Electricity Utility Scorecard cannot constitute, on its own, an electricity distributor's performance measurement framework. The *Handbook for Utility Rate Applications* confirmed that, while the OEB had already established a standardized scorecard for all distributors, "additional performance metrics should also be proposed so that expected outcomes can be monitored."[44]

For the 2021-2025 rate period, Hydro Ottawa is therefore proposing an extension and expansion of its previous framework for performance measurement and reporting. This subsequent iteration of the framework will build upon the success of the preceding one and maintain the approach of combining standard OEB performance measures with ones that are customized for Hydro Ottawa's unique use. What's more, the framework will incorporate customized enhancements that seek to implement lessons learned and findings from the prior rate plan, to strengthen the linkages between customer priorities and Hydro Ottawa's programs, and to incorporate key results from the benchmarking performed by the utility to compare its performance against that of its peers. Through this framework and Hydro Ottawa's use of a Custom Performance Scorecard, the OEB, customers, and other stakeholders will be equipped with quantitative tools with which to effectively measure the utility's performance in achieving customer-focused outcomes.

For a more detailed description of the proposed performance measurement framework, and the accompanying reporting plan, please see Exhibit 1-1-11: Proposed Annual Reporting - 2021-2025.

5.2. BENCHMARKING

A key tool in the RRF performance measurement toolkit is benchmarking. In its original RRFE Report, the OEB found that "[e]xpanded use of benchmarking will be necessary to support the Board's renewed regulatory framework policies."[45] This finding is affirmed in the *Handbook for*

[44] Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 26.
[45] RRFE Report, page 59.

Utility Rate Applications, which conveys the OEB's expectation for utilities "to provide benchmarking analysis which supports their proposed plans and programs and demonstrates continuous improvement."[46]

This Application includes several pieces of benchmarking evidence, which are intended to serve multiple purposes. First and foremost, the inclusion of benchmarking information will assist the OEB in evaluating Hydro Ottawa's patterns of performance and in assessing the proposals set forth in the utility's capital and operational plans. Second, the benchmarking that has either been conducted or commissioned by Hydro Ottawa has helped inform the establishment and incorporation of specific outcomes into the performance measurement framework for the 2021-2025 rate period. It has also influenced the development of the Custom Price Escalation Factor, which is a defining feature of the Custom IR rate-setting framework underpinning this Application (see section 4.3 in this Schedule). Third, the use of such studies and analyses is directed at supporting the achievement of the utility's own corporate strategic objective of Organizational Effectiveness, which is interpreted as the pursuit of performance excellence through the cultivation of a culture of innovation and continuous improvement. Together, these functions will help ensure that Hydro Ottawa remains accountable to the OEB, its customers, and other stakeholders with respect to providing value for money and cost-effective delivery of outcomes.

Consistent with OEB requirements, the benchmarking evidence appended to this Application takes two forms – internal and external. The internal benchmarking primarily relies upon metrics utilized in the annual Electricity Utility Scorecard, the OEB's annual *Yearbook of Electricity Distributors*, and annual PEG Benchmarking Updates to assess Hydro Ottawa's performance and continuous improvement over time. The external benchmarking consists of analysis conducted by Hydro Ottawa, in which the utility's performance is juxtaposed against that of a select subset of the electricity distributor community in Ontario. It also consists of a series of reports commissioned from third-parties, for the purpose of analyzing the utility's performance in

[46] Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 18.

a range of categories and measures relative to a comparator group of utilities located either in Ontario, Canada, and/or the United States. These reports are as follows:

- "Econometric Benchmarking Study of Hydro Ottawa's Total Cost and Reliability" – Clearspring Energy Advisors
- "Unit Costs Benchmarking Study" – UMS Group
- "IT Budget Assessment Benchmark" – Gartner Consulting
- "2019 Market Benchmarking" – Mercer Canada

These benchmarking analyses have yielded important insights into Hydro Ottawa's performance and efficiency over the last several years, and into the costs of key programs relative to the utility's peers. In varying measures, the results from these studies have been reflected in different aspects of this Application, whether serving to validate certain proposals and plans or prompting modifications to others, such that the ongoing achievement of efficiencies can be ensured over the course of the 2021-2025 rate period.

For further details, please see Exhibit 1-1-12: Benchmarking.

5.3. PRODUCTIVITY & CONTINUOUS IMPROVEMENT

Productivity and continuous improvement feature prominently in the architecture of the OEB's performance-based approach to utility regulation. The *Handbook for Utility Rate Applications*, for example, states that "a key objective of incentive regulation is to drive productivity improvements within the utilities."[47] Moreover, these themes are embedded in the OEB's description of the second performance outcome category underpinning the RRF, Operational Effectiveness: "continuous improvement in productivity and cost performance is achieved; and utilities deliver on system reliability and quality objectives."[48] What's more, the various rate-setting methods that are made available under the RRF apply a productivity factor to

[47] Ontario Energy Board, *Handbook for Utility Rate Applications*, page 27.
[48] RRFE Report, page 2.

electricity distributors which is derived from industry productivity trends determined by the OEB. These productivity factors are entrenched in the rate adjustment mechanisms governing utility proposals and reflect the OEB's expectation that standard business practice for distributors will involve the achievement of incremental productivity gains.

Responsibly controlling costs and focusing on cost-effective delivery of outcomes that matter to customers remain core priorities for Hydro Ottawa. Amidst the unique confluence of demands, pressures, and constraints on operations, the utility is placing increased emphasis on incorporating productivity and continuous improvement gains, so as to offset increasing expenditures and boost organizational capacity. Hydro Ottawa is therefore committed to ensuring that productivity and continuous improvement serve as hallmarks of its 2021-2025 rate plan.

A retrospective glance at the outcomes and efficiencies derived from productivity initiatives during the preceding five-year rate period demonstrates that there is a firm foundation upon which to build. During the 2016-2020 period, Hydro Ottawa successfully executed a wide spectrum of initiatives which resulted in tangible savings to customers – and at no expense to service quality or system reliability.

Hydro Ottawa is set to continue strengthening its culture of continuous improvement over the course of its next five-year rate term – whether through harnessing the potential of new technologies and solutions to better serve customers, elevating standards of business performance and excellence, or rationalizing and re-purposing resources.

Of note, there are particular controls that Hydro Ottawa has adopted to provide the OEB, customers, and other stakeholders with robust assurance that productivity, cost control, and continuous improvement objectives have been firmly integrated into the utility's business planning process, and the resultant capital and operational plans, for the 2021-2025 rate period. Foremost among these is the design of the Custom IR rate-setting framework that serves as the basis of this Application. As discussed above, the Custom Price Escalation Factor will embed productivity savings for customers by capping any increases to operational funding at approximately the rate of inflation. Similarly, in preparing their plans and budgets for the five-year rate term, each administrative division within the utility was mandated to demonstrate productivity savings in a quantitative and/or qualitative fashion and to identify initiatives dedicated to continuous improvement.[49] Moreover, Hydro Ottawa will continue to administer a performance management framework that ensures accountability in the monitoring and reporting of corporate productivity against a defined set of targets and metrics.

Along with other measures, the aforementioned internal controls can provide confidence that Hydro Ottawa is well-positioned to continue strengthening its culture of continuous improvement and producing significant savings for customers over the course of its next rate period.

A more detailed examination of Hydro Ottawa's productivity record and culture is included in Exhibit 1-1-13: Productivity and Continuous Improvement Initiatives. This examination is both retrospective and prospective in nature – i.e. surveying the productivity accomplishments of the 2016-2020 rate period as well as identifying the productivity efforts that are planned for 2021-2025.

6. DISTRIBUTION SYSTEM PLANNING

Alongside the availability of various rate-setting options and expectations for performance measurement, the third and final policy that the OEB has adopted to help facilitate achievement of RRF performance outcomes is the requirement for utilities to engage in long-term planning. The RRFE Report affirms that "[a]n integrated approach to planning will provide a foundation for the setting of distribution rates and lead to optimized investments that support the achievement

[49] Please see Attachment 1-1-9(A): Corporate Memorandum - 2020-2025 Priorities and Budget Guidelines. This memorandum was issued by Hydro Ottawa's Chief Financial Officer to members of the executive team in January 2019, regarding the preparation of 2020-2025 priorities and budgets.

of the outcomes identified by the Board."[50] Through the RRF, the OEB has established a firm expectation for distributors to file five-year capital plans to support their rate applications.

In step with RRF requirements, Hydro Ottawa has formulated a consolidated Distribution System Plan ("DSP"), which provides a detailed and comprehensive view of the utility's investment plans and supporting information for the 2021-2025 period. The DSP is a core deliverable emerging from multiple internal and external planning processes related to capital investment, asset management, regional planning, customer engagement, and business strategy. Hydro Ottawa's DSP details the planning process used to identify the risks and opportunities in the systems of assets and translate them into an expenditure plan. In addition, the DSP outlines how capital investments will be prioritized, paced, and optimized, while minimizing rate impacts for customers and facilitating continuous improvement and productivity. The DSP serves as a continuation of Hydro Ottawa's 2016-2020 plan, which focused on the enhancement of system capacity to keep pace with growth and shifts in loads within the service territory, and on the renewal of aged and aging infrastructure at risk of failure.

In preparing the DSP, Hydro Ottawa was guided by the needs and preferences expressed by its customers: (i) keeping distribution rates low; (ii) maintaining reliability; and (iii) investing in new technology. Consultations with customers revealed strong support for making proactive investments in aging infrastructure and grid modernization, with the understanding that this may lead to near-term costs but will result in future savings. What's more, customers confirmed that they place considerable value on accelerated restoration times following extreme weather events and on a reduction in the number and frequency of outages.

The DSP represents the minimum level of investment needed to achieve a balance between pressures on the distribution system and the top priorities of customers – all while avoiding the accumulation of risk and declines in performance over the long-term.

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[50] RRFE Report, page 31.

To view the DSP in full, please see Exhibit 2-4-3.

2016 Annual Summary

Achieving Ontario Energy Board Renewed Regulatory Framework Performance Outcomes

Prepared by: Hydro Ottawa Limited

Date: September 2017

(Revised: December 2019)

Table of Contents

I. Overview

This document is intended to serve as an annual summary of initiatives at Hydro Ottawa Limited ("Hydro Ottawa") that align with the core performance outcomes enshrined in the Ontario Energy Board's ("OEB") Renewed Regulatory Framework ("RRF").

1. Background – Renewed Regulatory Framework

In its 2012 report – *Renewed Regulatory Framework for Electricity Distributors: A Performance-Based Approach* ("RRF Report") – the OEB outlined a "comprehensive performance-based approach to regulation that is based on the achievement of outcomes that ensure that Ontario's electricity system provides value for money for customers."[1] In the RRF Report, the OEB concluded that four categories of outcomes were appropriate for purposes of better aligning the interests of customers and electricity distributors, and driving continuous improvement within the sector: (1) Customer Focus; (2) Operational Effectiveness; (3) Public Policy Responsiveness; and (4) Financial Performance.

In October 2016, the OEB issued an updated *Handbook for Utility Rate Applications* ("Handbook"). The Handbook provided additional guidance on how the OEB would apply the key principles underpinning the RRF when reviewing rate applications. Development of the Handbook was based on the experience gained by the OEB in reviewing rate applications since the release of the RRF Report.

The Handbook elaborated further upon the OEB's expectations for how utilities would achieve the four performance outcomes under the RRF:

- Customer Focus: "Customer engagement is now an explicit and important component of the regulatory framework. Utilities are expected to develop a genuine understanding of their customers' interests and preferences and reflect those interests and preferences in their business plans. Utilities are expected to demonstrate value for money by delivering genuine benefits to customers and by providing services in a manner which is responsive to customer preferences."

- Operational Effectiveness: "Utilities are expected to demonstrate ongoing continuous improvement in their productivity and cost performance while delivering on system reliability and quality objectives. The OEB will assess performance trends and look for evidence of strong system planning and good corporate governance. The OEB will use benchmarking to assess a utility's performance over time and to compare its performance against other utilities. Utilities are expected to demonstrate value for money by presenting plans for delivering services that meet the needs of their customers while controlling their costs."

- Public Policy Responsiveness: "Utilities are expected to consider public policy objectives in their business planning and to deliver on the obligations required of regulated utilities. These obligations may evolve over time and therefore this Handbook does not provide a comprehensive list of all requirements. Utilities are expected to demonstrate that they

[1] RRF Report, p. 2.

have considered Conservation First in their investment decisions. The OEB will expect to see proposals for how distributors are supporting low income customers through programs such as LEAP and/or OESP, or through other distributor-specific programs. Electricity distributors and transmitters are expected to expand or reinforce their systems to accommodate the connection to their system for renewable energy generation facilities and the OEB expects their system plans to include details on how they will meet this requirement. Natural gas utilities are expected to identify investments or programs that have been planned to meet obligations under Ontario's cap and trade program."

- Financial Performance: "Utilities are expected to demonstrate sustainable improvements in their efficiency and in doing so will have the opportunity to earn a fair return. The OEB will monitor the financial performance of each utility to assess continuing financial viability and to determine whether returns are excessive. Utilities have a choice of rate-setting methods to meet their particular needs. Additional tools are available to support infrastructure investment. Utilities must report comprehensive and consistent information, allowing for comparisons over time and across utilities. The OEB will act on its obligations to ensure a financially viable sector where performance indicates that a regulatory response is needed."

The Handbook also confirmed that, although the RRF was originally developed specifically for electricity distributors, the OEB had since indicated that RRF principles would be applicable to all rate-regulated entities under the OEB's jurisdiction (natural gas utilities, electricity distributors, electricity transmitters, and Ontario Power Generation).

2. Background – Hydro Ottawa's Five-Year Custom IR Rate Plan

To help facilitate the achievement of the RRF's core performance outcomes, the OEB also adopted a set of related policies, one of which involved modifying the methods available to electricity distributors for rate-setting purposes. In the RRF Report, a new method was introduced – Custom Incentive Rate-setting ("Custom IR"), under which "rates are set based on a five year forecast of a distributor's revenue requirement and sales volumes."[2]

In April 2015, Hydro Ottawa filed a Custom IR Application with the OEB, in which Hydro Ottawa sought approval for changes to the rates that it charges for electricity distribution for a period of five years (January 1, 2016 through December 31, 2020).[3] In December 2015 – following an extensive oral hearing proceeding, which included a Technical Conference, interrogatories, and settlement negotiations with intervenor groups – the OEB issued a decision approving Hydro Ottawa's application.[4] In its decision, the OEB found that Hydro Ottawa's application and the settlement proposal prepared by the parties met the expectations under the RRF for the Custom IR method.

Under the settlement agreement reached for its 2016-2020 rate plan, Hydro Ottawa must file an annual application to adjust its distribution rates and charges. In addition, pursuant to OEB

[2] RRF Report, p. 18.
[3] OEB File No. EB-2015-0004.
[4] More specifically, the OEB approved a settlement agreement reached by Hydro Ottawa and intervenor groups that governed the terms under which Hydro Ottawa would establish and apply rates charged to customers from 2016-2020. In addition, in February 2016, the OEB issued a decision that addressed the one outstanding issue that was not covered under the settlement agreement – Hydro Ottawa's pole attachment charge, which is the annual charge levied on telecommunications carrier companies for attachments to utility poles.

requirements for the Custom IR method, Hydro Ottawa must submit annual reports on the actual amounts of capital spending that the company undertakes.

3. Annual Summary – Description & Purpose

As stated above, this document – hereinafter referred to as "Annual Summary" – is intended to catalogue initiatives at Hydro Ottawa that align with the four major performance outcomes set forth in the OEB's RRF.

This Annual Summary will capture those initiatives that were launched, were ongoing, or were completed during 2016. Hydro Ottawa intends to prepare an Annual Summary of this nature for each of the five years in its 2016-2020 Custom IR term.

The value of this Annual Summary is four-fold. The document will:

1. Support the preparation of the annual rate adjustment application and annual report on capital spending, which Hydro Ottawa is obligated to submit to the OEB under the terms of the settlement agreement governing its Custom IR rate plan;

2. Support the preparation of the next Custom IR application that Hydro Ottawa plans to file, for the 2021-2025 period;

3. Help foster a culture of continuous improvement within Hydro Ottawa; and

4. Help ensure that the execution of the company's business plans and capital investment programs over the course of its Custom IR term are guided by the expectations and goals embedded in the RRF.

The Annual Summary is written in a manner that renders the document suitable for submission to the OEB, as appropriate (e.g. as part of the annual report on capital spending or as evidence for Hydro Ottawa's planned 2021-2025 Custom IR application).

II. Hydro Ottawa Initiatives by OEB Performance Outcome Category

Alignment between Hydro Ottawa's Strategic Direction and OEB Performance Outcomes

Hydro Ottawa believes that an important point of departure for discussing the alignment between its corporate initiatives and the OEB's core performance outcomes is the company's *2016-2020 Strategic Direction*.

Refreshed in June 2016, Hydro Ottawa's Strategic Direction provides an overview of the company's business strategy and financial projections for the next five years. It is designed to inform Hydro Ottawa's shareholder and all other stakeholders about the most important trends shaping the company's business environment, and how the company intends to respond to them.

As represented in the figure below, the Strategic Direction is grounded in four key areas of focus: (i) Customer Value; (ii) Financial Strength; (iii) Organizational Effectiveness; and (iv) Corporate Citizenship. These objectives were first enshrined in the company's *2012-2016 Strategic Direction*. In step with its predecessor version, Hydro Ottawa's renewed strategy rests on the central imperative of delivering value across the full customer experience.

Source: Hydro Ottawa 2016-2020 Strategic Direction

The primary objectives animating Hydro Ottawa's corporate vision are wholly consistent with the main performance outcomes promoted under the OEB's RRF. Hydro Ottawa views this high-level alignment as a competitive advantage and remains committed to firmly entrenching RRF principles and objectives throughout its operations and business.

The above discussion serves as a useful springboard for examining specific Hydro Ottawa initiatives that align with RRF outcomes and that were in various stages of implementation in 2016. More details are provided on this wide range of initiatives in the sections below.

1. Customer Focus

"Customer engagement is now an explicit and important component of the regulatory framework. Utilities are expected to develop a genuine understanding of their customers' interests and preferences and reflect those interests and preferences in their business plans. Utilities are expected to demonstrate value for money by delivering genuine benefits to customers and by providing services in a manner which is responsive to customer preferences."

A recurring theme that underpins Hydro Ottawa's *2016-2020 Strategic Direction* is that the company seeks to put the customer at the centre of everything it does.

As described in Hydro Ottawa's 2016-2020 Custom IR application, the company's vision is that by 2020, the customer experience will be driven by choice – the customer's choice. Customers will be given options to allow them to be in control and to interact with Hydro Ottawa how and when they want. Customers will see Hydro Ottawa as an organization that is customer centric in nature, easy to do business with, caring, efficient, and knowledgeable.

A key to delivering this experience is transitioning from treating all customers in the same way to serving customers when, where, and how they wish to interact with Hydro Ottawa.

To guide and effectuate this transition, Hydro Ottawa crafted a five-year Customer Experience Roadmap, the timeframe of which is aligned with that of the company's Strategic Direction and Custom IR term. It serves as an integrated, "whole of company" roadmap for Hydro Ottawa's customer experience journey. The Roadmap is comprised of approximately 30 projects that were scored and prioritized using an evaluation framework based on expected customer benefits, number of customers impacted, project size, and alignment with internally-developed strategic categories.[5] The Roadmap charts a course towards ensuring increased customer choice, convenience, control, and communication.

The initiatives highlighted in this section of the Annual Summary demonstrate how Hydro Ottawa is (a) delivering on the commitments in its Custom IR application and Customer Experience Roadmap, in terms of enhanced customer engagement across a range of touchpoints; and (b) achieving outcomes that are aligned with the RRF's Customer Focus category.

(i) <u>Touchpoint Inventory and Journey Mapping</u>

An essential first step in the implementation of Hydro Ottawa's Customer Experience Roadmap was listing and prioritizing all of the touchpoints for customer engagement. Completion of the inventory resulted in the identification of over 50 touchpoints. In turn, these enabled Hydro Ottawa to map out in detail the experiences and journeys for different types of customers, with over 100 improvement opportunities catalogued – both in terms of reduced pain points for customers and greater efficiencies and productivity for the company. This inventory served as a critical platform for the launch of subsequent customer experience enhancements, many of which are highlighted later in this section. Implementation of the many improvement opportunities identified as part of this exercise remains ongoing.

[5] The seven strategic categories are as follows: (1) Customer Centric Culture; (2) Understanding our Customers; (3) Touchpoint Improvement; (4) Leading Services and Products; (5) Enhanced Technologies and Processes; (6) Leadership and Governance; and (7) Value Monitoring.

(ii) Enterprise Communications Platform

Hydro Ottawa is continuing the digital transformation of its business, using the power of mobile and digital technology to serve customers anytime and anywhere, in a more engaging and effortless manner.

A cornerstone of this transformation is the modernization of the company's Enterprise Communications Platform ("ECP"). This will involve significant replacement and enhancement of Hydro Ottawa's voice, data, and customer communications infrastructure, which has reached the end of its useful life and no longer possesses the functionality required to optimize customer service and business operations. In addition, the company's multi-web environment will be streamlined to better integrate its website, mobile site, online customer portal (MyHydroLink), and additional software.

This investment in a modernized, omni-channel, and feature-rich ECP will yield benefits to customers and Hydro Ottawa alike, in the form of improved services, lower costs, and operational efficiencies.

Core components of this initiative include the following:

a. Customer Contact Centre Enhancements

In step with its commitment to improving the customer experience and achieving operational efficiencies, Hydro Ottawa initiated significant enhancements to its Customer Contact Centre in 2016.

Foremost was the transitioning of the Contact Centre to a new service provider. Following a rigorous procurement process, Optima Communications was selected as the successful proponent.[6] Optima is a seasoned service provider in many sectors, including the utility sector.

Under the new arrangement, service levels to customers will be elevated considerably. Customer inquiries will be answered more efficiently, additional agents will be made available during emergency events, and system adjustments will enable greater adaptability during periods of high call volume. In addition, translation services will be offered in up to 120 languages (alongside service in both official languages).

This project also includes numerous upgrades to the underlying telecommunications infrastructure and technology. Upon full implementation, a range of advanced self-serve features will be available to customers: omni-channel capabilities (including phone, email, text, and chat) allowing customers to communicate with Hydro Ottawa through the channel of their choice; "Virtual Hold," enabling customer call back without the need to remain on the line; "My Voice is My Password" capability; refreshed Interactive Voice Response functions granting access to billing and payment self-serve options, and allowing callers to "press or say" options, rather than relying solely on key pads; and availability of account balance information via telephone, bypassing the need to speak with a service agent. In addition, long distance charges to the Contact Centre have been eliminated.

[6] Hydro Ottawa is also transitioning service support for its outage communications call centre to Optima, with an expected "go-live" timeframe of Fall 2017. See below for further details.

In terms of savings, Hydro Ottawa has projected that the contract with the new vendor will yield approximately $400,000 per year in reduced OM&A expenditures.

As of the end of 2016, the migration of Contact Centre services to a new provider was scheduled to be fully executed by March 6, 2017, with the implementation of service enhancements set to continue thereafter.

b. Outage Communications

Building on its award-winning outage communications system, Hydro Ottawa continued to validate this tool in 2016 and identified areas for further improvement. By implementing new technologies and creating a cross-enterprise team to manage outage communications seamlessly in an integrated fashion, this initiative will make personal, proactive outage information available to customers in the communications channel of their choice (email, text, phone, etc.). In addition, it will allow customers to report outages to Hydro Ottawa through their preferred channel. Final implementation of this latest round of enhancements is expected in 2017/2018.

A new feature incorporated into the company's outage communications toolbox has been the use of real-time footage of utility crews restoring power following a weather event. Utilizing a live-streaming video platform, Periscope, Hydro Ottawa communications personnel are able to diffuse this footage directly from the crews' location to the company's 13,000 followers on Twitter. This service is proving to be increasingly effective in communicating Hydro Ottawa's responsiveness during outage events and, in turn, is becoming increasingly popular with customers.

c. Voice and Data Infrastructure Upgrade

In conjunction with enhancements to components of the company's ECP that are customer-facing, Hydro Ottawa successfully upgraded communications infrastructure that is essential to internal business operations. This includes, for example, the telephone and computer infrastructure that employees rely upon to perform their daily activities.

Much of this infrastructure and technology was more than 25 years old, and therefore had limited functionality. Together with initiatives under the company's Telecommunications Master Plan (see page 20 for more details), the company's new voice and data infrastructure will improve connectivity and redundancy with, and between, Hydro Ottawa's office buildings and substations.

Moreover, the ECP improvements will help ensure a smooth transition to the company's new facilities, which is scheduled to occur in 2019. (See page 19 for further details). The adoption of the Session Initiation Protocol ("SIP") for Hydro Ottawa's public switched telephone network will facilitate the transfer of this network to the new offices. Likewise, utilization of enhanced Voice over Internet Protocol and Power over Ethernet technology for the upgraded voice and data infrastructure will ensure that employees transition to their new workstations with minimal interruption and are able to work anytime – and anywhere – at the new locations.

(iii) Bidgely Mobile Application

Over the course of 2016, Hydro Ottawa continued its development of a free mobile application that will serve as a personal energy advisor to residential customers. The app will provide customers with timely and relevant billing and outage information, as well as personalized recommendations on how they can conserve electricity – all within the palm of their hands.

The app will disaggregate whole-home meter data to provide the customer with specific energy use information, patterns, and insights. Such disaggregated data presents an enormous opportunity for customers to better understand their consumption practices, determine easy and cost-effective measures or actions to increase their energy efficiency, and ultimately reduce their overall consumption.

Key features of the app will include the following:

- Access to data – breakdown of customer electricity usage and costs, as well as trends in usage from bill-to-bill;
- Useful alerts – customer receipt of notifications about usage along with insights to help reduce consumption;
- Neighbourhood comparison – ability for customers to view consumption relative to similar homes in their neighbourhood;
- Cost projections – avoiding bill surprises with a daily cost projection for electricity charges;
- Account information – access to billing history; and
- Outage map – access to latest information on power outages.

Energy reports generated through the app will include information on customer electricity use compared to their historical usage (self-benchmarking), customer electricity use compared to neighbours (social benchmarking), and personalized electricity savings advice with actionable solutions and tips.

The app will utilize three different communication delivery methods, designed to match the preferred communication channel for different customer segments: web and mobile-based tools; monthly email reports; and quarterly paper reports. By incorporating multiple communication channels, the app will help maximize customer participation and motivation – and, in turn, increase savings – by ensuring that each customer will be able to select the communication channel which is most comfortable for them.

In developing the mobile application, Hydro Ottawa worked with Bidgely, a California-based energy services and analytics company with extensive expertise in behind-the-meter, appliance-level consumption information.[7] Bidgely enables utility customers to monitor and manage their household energy use with the help from a machine-learning algorithm that recognizes appliances.

Hydro Ottawa's Bidgely app was sourced, designed, and created in 2016. As of the end of 2016, the scheduled launch date was Q2 2017. Customers will be able to download the app onto Apple and Android mobile devices. In addition, this program is expected to provide an

[7] https://www.bidgely.com/.

estimated contribution of 35.4 GWh of electricity savings towards Hydro Ottawa's Conservation First target of 394.5 GWh.

(iv) Bill Re-Design

In response to customer feedback, Hydro Ottawa initiated a project in November 2015 to improve the format and design of customer bills, with the goal of developing a bill that would better fulfill customers' expectations for clarity and personalized communications.

The project is moving forward in four distinct phases:

- Phase 1 – Hydro Ottawa performed qualitative internal research, with input from a broad cross-section of employees and internal stakeholders. Prior research from other companies seeking to improve billing communications was also examined, along with research commissioned by the OEB to inform its Regulated Price Plan Roadmap.[8] Based on this research, Hydro Ottawa then surveyed customers using a customized, online tool through which respondents were able to "design" their ideal bill.[9] This approach enabled Hydro Ottawa to identify (i) what information customers deemed to be most important, and (ii) how customers prefer to view this content on their bill. The original goal targeted for number of completed surveys was 400. Ultimately, almost 3,000 surveys were submitted, with approximately 850 including substantive feedback for consideration. (Completed – November 2016)

- Phase 2 – Following evaluation of the research results, Hydro Ottawa prepared design concepts for both bill print and E-Bill proposals. A short list consisting of three specific designs was established. (Completed – November 2016)

- Phase 3 – The three design proposals will be assessed, based on the following criteria: technical feasibility, capital implementation costs, OM&A implementation costs, ongoing OM&A costs, and estimated implementation time. (Estimated completion date, as of the end of 2016 – March 2017)

- Phase 4 – The final phase will feature roll-out and communications to customers on the new bill print and E-Bill designs. (Estimated completion date, as of the end of 2016 – November 2017)

Among the many benefits that this initiative is expected to yield are the following: a more personalized experience for engagement and transactions with customers (e.g. unilingual correspondence); enhanced energy literacy and comprehension through a simpler, more understandable bill that provides better information; behavioural change in the form of reduced consumption; integration of new technologies; cost savings (e.g. lower OM&A through reduced paper use); and improved attitudes towards the utility and the sector.

(v) Key Accounts Program

In 2016, Hydro Ottawa continued its transition towards a more proactive approach in managing relationships with Key Account customers. This initiative is focused on the continued evolution

[8] OEB File Nos. EB-2014-0319 and EB-2016-0201 (Regulated Price Plan Roadmap). http://www.ontarioenergyboard.ca/oeb/Industry/Regulatory+Proceedings/Policy+Initiatives+and+Consultations/Regulated+Price+Plan/RPP+Roadmap+(EB-2016-0201)

[9] As an incentive, Hydro Ottawa held a draw for three iPad tablets for customers who completed the survey.

of the company's collaboration with Key Accounts, aimed at assessing and addressing their unique priorities and needs.

Hydro Ottawa's structured approach to relationship-building with Key Account customers is anchored in a five-phase cycle – strategy development, research, action planning, plan execution, and review – with a continuous feedback loop. Specific services offered under this approach include C-Level customer engagement, formal annual account plan reviews, single points of contact for customers at the utility, simplified bill reporting service for large customers with hundreds of individual accounts, landlord reversion agreements, and conservation and demand management ("CDM") assistance. In addition, in 2016 Hydro Ottawa sought to assist customers in understanding and preparing for potential obligations and opportunities associated with the establishment of a cap and trade program in Ontario, as well as with modifications to the Industrial Conservation Initiative.

Another recurring service that Hydro Ottawa continues to refine is the organization of an annual Key Account Symposium. Held in November 2016, the latest installment of this symposium featured networking, valuable business development opportunities for customers, and presentations from Hydro Ottawa on issues of critical importance to customers' businesses (e.g. new and emerging grid technologies, opportunities related to the adoption of "Smart City" solutions in the Ottawa area, and service offerings related to electrical vault maintenance and ownership). An on-site anonymous survey of customers' satisfaction with Hydro Ottawa was conducted, with results made available in real-time. Sixty-five representatives from three dozen of the company's largest customers attended the event.

By using the above approach, and by providing regular opportunities for consultation with the company's Key Account Coordinators, Hydro Ottawa is fostering continuous improvement in its engagement with this particular subset of customers.

(vi) Community Engagement

In 2016, Hydro Ottawa celebrated the 100th anniversary of the company's (and its predecessor utilities') service to the community.[10] The company has built on this heritage as a responsible, community-focused organization by ensuring that it remains visible and accessible to customers and stakeholders, and by stepping up its community presence.

Over the course of the year, Hydro Ottawa participated in more than 350 community events – a 34% increase over 2015. This included an inaugural Community Forum, in which the company hosted community associations, city councillors, and community housing representatives to provide an overview of Hydro Ottawa's latest initiatives and programs. Company officials in attendance included the President & CEO, as well as select members of the executive team and senior management. The company's community activities included energy-related educational programs in schools, a Conservation Team that attends diverse community, corporate and retail events, and a wide range of other tours and presentations. Customized newsletters were likewise launched to keep Community Associations and Business Improvement Areas up to date on key issues of interest.

Hydro Ottawa also increased its online presence and social media engagement. Total visits to the company's webpage (https://hydroottawa.com) increased by approximately 150% from 2015 to 2016, with significant year-over-year growth in subscribers across all social media platforms

[10] The Ottawa Hydro Electric Commission was formed in 1916.

as well (Facebook, 174%; LinkedIn, 30%; and Twitter, 18%). Video news releases and drone footage also became more standard features of the company's communications and customer education programs.

In addition, Hydro Ottawa regularly consulted customers with regards to major projects that were designed to improve infrastructure and service to customers and their community. These consultations included project-specific open houses, which are typically conducted for large complex cable replacement, pole replacement, voltage conversion, and substation build/rebuild projects. Hydro Ottawa conducted five such public open houses in 2016 for projects scheduled to go in service in 2017. Company attendance at these events typically included the project manager, planning engineers, a design supervisor, additional technical support as required, staff from the company's media and public affairs department, and a CDM representative.

Specific examples from 2016 of positive customer interaction, and subsequent incorporation of customer feedback, included the following:

- Glen Cairn Cable Replacement Project – During the open house session, several customers expressed concern with the proposed location of equipment.

  The design team took these comments under advisement and evaluated additional design options. By analyzing the various options and re-thinking ways to accommodate affected customers in the area, a modified design was created using less impactful equipment locations.

- Woodroffe Substation Pre-Cast Walls Replacement – As part of a larger project to replace switchgear equipment and construct new protection and control structures at a major substation, it was determined that pre-cast walls forming the perimeter of the substation required demolition and replacement.

  Hydro Ottawa worked collaboratively with senior personnel at the elementary school located directly adjacent to the substation, with respect to establishing a mutually agreeable timeline for project completion. In order to avoid disruptions to normal school operations and concerns associated with student drop-off/pick-up in close proximity to a worksite with an exposed substation, Hydro Ottawa undertook an accelerated work schedule during Summer 2016 and successfully completed construction prior to the beginning of the school year. In addition, Hydro Ottawa partnered with school staff and students on painting a mural on the school-facing side of the newly completed wall.

These initiatives reinforce how Hydro Ottawa views effective community engagement as essential to earning and retaining customers' confidence and trust, and in turn, to enabling the company's success.

(vii) Customer Connectivity

Over the course of 2016, Hydro Ottawa undertook numerous steps to continue enhancing its web-based customer content and self-serve offerings.

Chief among these was sustained promotion of E-Billing adoption by customers. Hydro Ottawa's 2016 "Go Paperless" Campaign – in which the company makes a $5 donation to charity for every customer that signs up for E-Billing or automated payments – was the most successful on record. The registration of over 20,000 customers resulted in a $102,000 donation to the Children's Hospital of Eastern Ontario Foundation to support the upgrade of patient monitors. With over 120,000 customers enrolled in E-Billing (representing approximately 38% of the company's total customer base), Hydro Ottawa enjoys the highest participation rate of any utility in Ontario, with annual cost savings equalling $1.3 million annually.

Also ongoing were efforts to optimize customer access to consumption data. By the end of 2016, 135,567 customer accounts (representing approximately 42% of total customers) were registered with MyHydroLink ("MHL"), Hydro Ottawa's online customer account portal. MHL is a web-based customer preference electronic dashboard, which offers a wide range of convenient, flexible self-service options. These include options to view electricity consumption data and usage patterns (hourly, daily, weekly, monthly, etc.); to export data to multiple formats for further analysis; to compare bills based on consumption, rates, bill dates, and weather; to receive bill predictions, based on forecasted usage estimates; to establish and manage customer profile/account information, including bill payment options; to receive, view, and store bills electronically; and to receive alerts when customer-set thresholds regarding consumption and cost have been exceeded. MHL has enabled Hydro Ottawa to make considerable gains in engaging customers and improving energy literacy.

(viii) Customer Satisfaction Survey

Since 2004, Hydro Ottawa has engaged a third party to conduct annual customer satisfaction surveys. The survey questions cover a wide variety of relevant topics, including overall satisfaction with Hydro Ottawa, reliability, customer service, power outages, billing, cost of electricity, and corporate image.

Feedback from these surveys is incorporated into Hydro Ottawa's planning process, and ultimately forms the basis of plans which address customer needs and service offerings. A final report is produced which confirms customer satisfaction levels and identifies areas for improvement. Customer satisfaction surveys also help to identify the most effective means of communication with customers.

For the 2016 installment of this survey, Hydro Ottawa engaged over 600 customers (85% residential and 15% small commercial). Based on the size of the customer sample, results can be considered accurate plus or minus 4%, 19 times out of 20.

In 2016, Hydro Ottawa's overall customer satisfaction was 81%, equal to the Ontario benchmark. In terms of a letter grade, the company scored a "B+," with the provincial benchmark being "B." These numbers are down from 2015, when Hydro Ottawa scored an 87% satisfaction level with customers (compared to the Ontario benchmark of 86%). These scores, along with other results from the survey, helped to yield the key finding that a customer's ability to pay has a direct correlation to overall satisfaction.

In the survey, areas in which Hydro Ottawa scored above the provincial benchmark were the following (Hydro Ottawa's score is listed first, followed by the Ontario average):

- Provides consistent reliable power (92% vs. 86%);
- Electrical safety (89% vs. 84%);
- Outage response (89% vs. 83%);
- Reliability that meets customer expectations (88% vs. 84%);

- Contact response (83% vs. 68%);
- Helpfulness and knowledge of staff (78% and 78% vs. 69% and 68%);
- Level of courtesy (86% vs. 79%); and
- Quality of information provided (75% vs. 66%).

Areas that Hydro Ottawa has flagged for improvement, which include those in which the company's customer satisfaction scores fell below the Ontario benchmark, were the following:

- Adapts well to changes in customer expectations (63% vs. 69%);
- Operates a cost-effective electricity system (58% vs. 57%);
- Provides good value for money (57% vs. 58%); and
- Cost of electricity is reasonable when compared to other utilities (48% vs. 46%).

When asked how Hydro Ottawa could improve its service, the answer from 50% of customers was better prices/lower rates.

(ix) Public Awareness of Electrical Safety

Helping customers understand the importance of staying safe and using electricity wisely is a priority for Hydro Ottawa. The company works to continuously enhance public awareness of electrical safety through three primary vehicles:

- The company's website and related social media tools, which provide electrical safety information to the public in a variety of subject areas, including safety inside and outside the home, during tree trimming, during electrical emergencies, and safety tips for students.

- Hydro Ottawa's well-established student education program, which teaches elementary school children how to use electricity safely and wisely. Since 2001, more than 2,050 presentations have been delivered to over 232,600 students in 306 elementary schools in the community.

- Hazard-specific education campaigns, such as Hydro Ottawa's annual promotion and support of the Ontario Regional Common Ground Alliance's ("ORCGA") Dig Safe Month, the Electrical Safety Authority's ("ESA") Powerline Safety Month, and the ESA's Holiday Safety Campaign. As a member of ORCGA, Hydro Ottawa actively participates in Dig Safe Month in April of each year. This month is dedicated to raising awareness of safe digging practices across the province to improve safety and reduce damages to underground equipment. The ORCGA and its members encourage homeowners and contractors to call for locates before they dig to prevent injuries, property damage, and electrical outages. Hydro Ottawa raises public awareness of promotional campaigns such as Dig Safe Month and ESA's safety campaigns through its website, local community newspapers, and social media channels.

In order to gauge overall electrical safety awareness amongst the general public, Hydro Ottawa commissioned a research firm to conduct the company's first *Public Awareness of Electrical Safety Scorecard Survey,* during March 2016. The online survey consisted of a representative sample of 407 residents, 18 years or older, currently residing in Hydro Ottawa's service territory.

Responses to the six core survey questions resulted in a 2016 Public Safety Awareness Index of 70%. The results of the survey inform Hydro Ottawa's ongoing public safety messaging and programs.

(x) Customer Specific Reliability Pilot with OEB

In 2015, the OEB announced an initiative to implement Customer-Specific Reliability Measures ("CSRM") and reporting requirements. The OEB agreed with findings of the related working group that it would be beneficial to undertake a series of pilot projects with a number of willing electricity distributors. Hydro Ottawa volunteered to participate, with the company's project focused on implementing the tracking/measurement of CSRM for its full service territory using data logged in its outage management system. The project would then assess the level of effort and identify business processes required to assess, maintain, and improve the accuracy of the CSRM data collected.

As of the end of 2016, the pilot was still underway. The scheduled project completion date was April 2017, with a final report outlining findings and recommendations set to follow thereafter.

(xi) Creation of Chief Customer Officer Position

In 2016, Hydro Ottawa implemented leadership and organizational shifts to better align the company with the goals set forth in its *2016-2020 Strategic Direction* – and in particular, with the overriding imperative to put the customer at the centre of everything the organization does.

These changes included the establishment of a new executive position – Chief Customer Officer ("CCO"). Hydro Ottawa's CCO is responsible for consolidating and overseeing the functions of Customer Service, Communications and Public Affairs, and CDM. By organizing these groups together under a single executive, Hydro Ottawa is better able to leverage, align, and expand its customer service offerings; advance the delivery of the company's Customer Experience Roadmap; and position Hydro Ottawa as an innovative and truly customer-centric organization.

2. Operational Effectiveness

"Utilities are expected to demonstrate ongoing continuous improvement in their productivity and cost performance while delivering on system reliability and quality objectives. The OEB will assess performance trends and look for evidence of strong system planning and good corporate governance. The OEB will use benchmarking to assess a utility's performance over time and to compare its performance against other utilities. Utilities are expected to demonstrate value for money by presenting plans for delivering services that meet the needs of their customers while controlling their costs."

This section of the Annual Summary highlights how Hydro Ottawa is (a) delivering on the commitments in its Custom IR application regarding continuous improvement, productivity initiatives, and cost performance; and (b) achieving outcomes that are aligned with the RRF's Operational Effectiveness category.

It should be noted that this section does not include information on capital spending undertaken by Hydro Ottawa, in accordance with its OEB-approved Distribution System Plan ("DSP"). As explained on pages 4-5, Hydro Ottawa is obligated to submit annual reports to the OEB on its actual capital spending on a program level, based on three categories: System Access; System Renewal/System Service; and General Plant. Please consult these annual reports for information on the progress in Hydro Ottawa's capital expenditures against its DSP.

(i) <u>Enterprise Resource Planning Project</u>
Hydro Ottawa relies on a centralized enterprise resource planning ("ERP") system to manage core functions related to finance, accounting, inventory and supply chain management, work order management, and human resources.

Initially deployed in 2003, this system required supplemental customizations over the years as business needs evolved. More recently, Hydro Ottawa experienced growing operational and financial management challenges, on account of complexities associated with ongoing ERP system modifications and the relative age of the system itself.

Ultimately, it was determined that a more agile, flexible, and integrated ERP environment was required. A formal ERP replacement project was initiated ("Project Transformer"), aimed at executing upon the following key objectives:

- Establish a stable, well-supported platform for all desired ERP operations that is easy to maintain;
- Develop well-defined processes and best practices that improve the efficiency, effectiveness, and accuracy of information flows to transform the business;
- Eliminate offline systems, paper, and other manual workarounds;
- Ensure the security and integrity of critical information such that the system can be relied on as trusted source for annual audits;
- Improve user adoption and productivity improvements by providing employee and manager self-service capabilities with a focus on user experience;
- Introduce dashboards and improved real-time reporting capabilities to facilitate timely and accurate decision making; and

- Leverage mobile integration to ERP to facilitate collaboration, sharing of information, timely approvals, and ultimately make the day-to-day tasks of employees easier.

External partners engaged to support Project Transformer include IT hardware and software solutions expert Mid-Range Inc., along with PwC Canada.

Through this project, the effectiveness of core Hydro Ottawa business functions are being enhanced, while the company is being more effectively positioned for growth and responsiveness to continual evolutions in the business environment.

As of the end of 2016, Phase 1 of Project Transformer, in which ERP system upgrades will go live for finance and human resource business units, was set to be complete in Q4 2017.

(ii) Mobile Workforce Management

Hydro Ottawa has a large mobile workforce that is responsible for a wide range of work – from simple disconnections, reconnections, or meter changes, to more complex and longer-duration pole changes and cable replacements. The company historically used a combination of Microsoft Excel spreadsheets, in-house developed databases, and an Intergraph In-Service system for scheduling and dispatching work. This was executed through a decentralized model, with several different groups dispatching mainly to their own resources. While good success was achieved through this approach over the years, it was recognized that evolving business needs, combined with technological advances, required investment in a Mobile Workforce Management (“MWM”) tool to drive productivity to the next level.

MWM is an automated scheduling and dispatch tool designed to optimize the scheduling and routing of work and crews to increase productivity and enhance customer service. The system enables Hydro Ottawa to centralize the scheduling and dispatch functions for field resources, improve the overall visibility of workload, reduce unnecessary manual planning activities, highlight resource availability, and ensure consistent application of scheduling policies to all types of work. With features such as schedule optimization and route planning, MWM improves field resource productivity, reduces mileage and overtime costs, and increases the ability to meet customer commitments. It also reduces the time spent on scheduling, allowing the dispatcher to focus on handling exceptions or emergencies like trouble calls or outages.

Hydro Ottawa’s MWM system went live in December 2015, meaning 2016 represented the first full year of implementation.

MWM has been implemented for new residential service connections, collections, metering, forestry inspections, service trench inspections, and service truck work (e.g. service upgrades, disconnections and re-energizations, and service removals and demolitions). As of the end of 2016, 28 separate crews within Hydro Ottawa were operating on the system.

During the first phase of adoption, the Collections and Metering groups achieved immediate positive results. Through greater workflow automation and elimination of certain manual processes, Metering experienced a 4% increase in the total number of tasks completed, notwithstanding the use of approximately 6,200 or 21% fewer chargeable hours. With regards to Collections activity, use of MWM freed-up greater internal resources, with productivity increases enabling Hydro Ottawa to allow a contract with a third-party collections agency to lapse. This will translate into an annual OM&A savings of approximately $300,000.

Hydro Ottawa plans to continue boosting the use of MWM across its operations, including through integration into the enhanced ERP program once Phase 1 is complete in 2017 (see above). In addition, in 2017 MWM is set to be expanded to damage prevention inspectors, with potential further extension to plant inspectors and stations technicians engaged in preventative maintenance programs.

(iii) Facilities Renewal Program

With the approvals secured in its 2016-2020 Custom IR rate plan, Hydro Ottawa has embarked on a Facilities Renewal Program. This program will serve as a key modernization and operational efficiency initiative that will see the company consolidate administrative functions; modernize the work environment and provide for future growth; and relocate from obsolete, end of life facilities in 2019.

Under the program, two parcels of land have been purchased, upon which Hydro Ottawa will construct two regional campuses. The sites are ideally situated in commercial and light-industrial areas that will increase emergency responsiveness, given their proximity to major highways and interchanges. The East Campus will be home to the company's Main Offices, East Operations Centre, and cable storage facility. The South Campus will house the South Operations Centre, Metering, Transformer Shop, and Warehousing.

The Facilities Renewal Program will also involve the sale of certain existing facilities.

In 2016, Hydro Ottawa issued a Request for Proposals ("RFP") and awarded a design-build contract for the new facilities.

(iv) Smart Grid Deployment

A key component of Hydro Ottawa's 2016-2020 Custom IR application was the "Grid Transformation Action Plan." This plan catalogues a range of projects and initiatives that Hydro Ottawa will execute as part of supporting the implementation of a smart grid in Ontario, and as part of delivering on the vision enshrined in the company's *2016-2020 Strategic Direction* to become a leading partner in a smart energy future.

Key accomplishments in 2016 related to smart grid deployment and implementation included the following:

a. SCADA System Upgrade

Hydro Ottawa's existing Supervisory Control and Data Acquisition ("SCADA") system has been in place since 2006 and is due for replacement, on account of its utilization of older technology that is becoming obsolete. SCADA is the primary tool in the control room for monitoring and controlling the power system. The new system will be designed from the ground up, will include quadruple redundancy across two dedicated physical sites, and will align with corporate and industry best practices, including cyber security, virtualization, and maintainability.

The Request for Information ("RFI") process and vendor demonstrations were completed in 2015. In 2016, the major milestones were the launch and completion of a formal RFP, with a contract awarded to a specific vendor. Final migration to the new system is expected in Q1 2018.

b. Telecommunications Master Plan

In 2016, Hydro Ottawa pushed forward on its multi-year plan to upgrade its telecommunication infrastructure, with the goal of developing a high-speed, high-performance network that will expand the opportunities and impacts of devices and sensors on the distribution grid. This project will include the installation of approximately 300 kilometres of dark fibre across the company's service territory, as well as the implementation of wireless networks in locations where fibre is not feasible.

When the telecommunications transformation is complete, Hydro Ottawa will have opportunities to leverage this infrastructure to help meet the broadband needs of the community, through "Smart City" initiatives or strategic partnerships with businesses and the MUSH (municipalities, universities, schools and hospitals) sector.

Contracts for both the network equipment installation and communication medium (fibre) installation were awarded to vendors in 2016. The multi-year detailed design packages progressed well, with approximately 65% completion. Dark fibre installation in 2016 totalled 11.5 km. Equipment deployment is set to continue in stages through 2019.

c. Smart Grid Projects

- **The GREAT DR** – The goal of the "Grid Edge Active Transactional Demand Response" project ("GREAT DR") is to develop a field-proven, open source, and royalty-free reference standard. This standard would define the transactive energy and demand response negotiations that need to occur between behind-the-meter sources and the grid, in order to ensure that they can manage themselves autonomously within the limits of available grid supply and capacity. This innovative and complex system will be facilitated through the detailed collaboration of energy management systems, renewable generation, and energy storage. In 2016, Hydro Ottawa worked with other partners (Ministry of Energy, Carleton University, University of Ottawa, Energate, Panasonic, Quadra Power, and CIMA+) to finalize the project scope. As of the end of 2016, initial deployment and field testing was scheduled to occur over the course of 2017 and 2018.

- **Ellwood Energy Storage Project** – This project is a 4 MW/2.7 MWh lithium ion battery energy storage facility that will be built by Canadian Solar as part of a three-year contract with the Independent Electricity System Operator ("IESO") for grid support and voltage control. The facility consists of several lithium ion battery modules that will inject energy into or take energy from the grid, in order to support grid stabilization in response to IESO operational directives. Hydro Ottawa is hosting this project on-site at its main office location. Key milestones in 2016 included execution of the access license agreement and the offer to connect, completion of Hydro Ottawa's design package, civil preparation, and installation of the station service. As of the end of 2016, the planned energization date was Summer 2017. This project represents an excellent opportunity to observe and evaluate an energy storage facility and its effects on the grid. At the end of the contract between Canadian Solar and the IESO, Hydro Ottawa will have the option to purchase the facility, if a mutually agreeable transfer of ownership agreement can be executed.

- **Surplus Electric Baseload for Building Thermal** – In late 2016, Hydro Ottawa was awarded funding through the City of Ottawa's Energy Evolution Catalyst Funding Program for a proof of concept solution that will use clean, efficient electricity to supplement the use of natural gas boilers for space heating. This solution will be applied without increasing the building's electricity demand, and will provide operational savings and reduced greenhouse gas emissions. As of the end of 2016, Hydro Ottawa was set to launch the project in 2017, in partnership with Thorium Technologies. Assuming successful proof of concept, the solution has the potential to be replicated in approximately 30 municipal facilities, such as community centres, sports complexes, offices, and retirement homes.

d. Smart Energy Steering Committee

In 2016, Hydro Ottawa formed a cross-functional internal Smart Energy Steering Committee ("SESC"). The SESC has been tasked with providing leadership, oversight, coordination, and direction of Hydro Ottawa's Smart Energy initiatives on both sides of the meter, through a whole-of-company, multi-year roadmap.

Formation of the SESC was borne out of recognition that, while the company's Smart Grid initiatives have provided a net benefit to Hydro Ottawa, there remain significant opportunities for further collaboration and alignment in the selection and execution of future projects. The SESC is expected to yield the formal governance structure necessary to ensure maximum effectiveness and efficiency in the planning and delivery of the utility's Smart Grid initiatives.

Early SESC deliverables in 2016 included preparing a Terms of Reference, as well as performing an initial review for optimization and prioritization of Hydro Ottawa's Smart Grid project portfolio.

(v) System Reliability

In 2016, Hydro Ottawa achieved its best system reliability results in the past five years, with three-year rolling averages for both frequency and duration of outages continuing to trend downward.[11] Critical to the achievement of this high performance level was the significant amount of investment made to keep our system reliable, with $65 million targeted towards aging infrastructure, localized reliability issues, and increasing station capacity. A further $38 million was invested to expand the system to meet customer needs. Over the course of the year, a total of 1,135 new poles, 398 overhead transformers, and 270 km of overhead cables were installed, while 200 demand capital projects were initiated, including the addition of 2,738 new residential and 502 new commercial connections.

(vi) Good Corporate Governance Practices

Hydro Ottawa is committed to establishing and maintaining leading governance practices for a company of its size and mandate. Because governance standards and best practices are always evolving, the company seeks to continuously improve its governance practices.

While Hydro Ottawa is not a reporting issuer under the *Securities Act* and is therefore not subject to governance standards that apply to publicly-traded companies, the company is guided by these standards and seeks to meet or exceed them. In addition, Hydro Ottawa regularly

[11] The company's System Average Interruption Duration Index ("SAIDI") fell from 1.15 in 2015 to 1.00 in 2016, while its System Average Interruption Frequency Index ("SAIFI") dropped from 0.75 in 2015 to 0.74 in 2016.

compares its governance practices to those of private and public sector organizations, and to standards set by agencies such as the Canadian Securities Administrators and the Ontario Securities Commission.

In 2016, Hydro Ottawa undertook several activities in accordance with its standard governance practices. This included annual review of the charters of the Board of Directors and Board committees, as well as annual assessment of the Board's effectiveness. Likewise, Hydro Ottawa prepared a detailed annual report, outlining its major accomplishments, financial results, and progress against its strategic and business plans, for the previous year. Consistent with established practice, the annual report included a dedicated section summarizing the company's corporate governance structure, processes, and controls. The annual report was presented by the Board Chair and President & CEO to the company's shareholder, the City of Ottawa, at the shareholder's Annual General Meeting.

Activities that were unique to the specific context of 2016 were the execution of succession plans for Directors whose terms expired during the year, as well as the adoption of a new five-year Strategic Direction, which provides an overview of the company's business strategy and financial projections for the 2016-2020 timeframe. (For more details on the Strategic Direction, please see page 6).

(vii) Information Management Strategy

In 2016, Hydro Ottawa continued its implementation of a multi-year initiative to proactively address challenges and opportunities related to long-term information management ("IM") requirements and needs within the company. Among the key goals of this initiative is to efficiently and sustainably transition the company to a higher level of IM maturity by mid-2018, prior to the company's re-location to its new facilities.

In large part, the scope of this initiative is based on the findings of an expert consultant's assessment of the maturity level of Hydro Ottawa's current IM programs and practices. Presented to the company in early 2016, this assessment examined the company's IM landscape; analyzed the relationship between IM and the company's mission, vision, and strategic plan; reviewed IM in relation to the company's legislative and regulatory environment (including the record retention requirements introduced by the OEB in 2016); identified the IM implications of the company's organizational structure and culture; and benchmarked the company's current IM program and practices against the *Generally Accepted Recordkeeping Principles®*.

Early actions undertaken by Hydro Ottawa in 2016 in response to the external findings included the adoption of a formal IM vision statement,[12] as well as the establishment of four strategic priorities that will guide the company's IM strategy going forward: (1) IM Governance: (2) IM Processes; (3) IM Communications and Training; and (4) IM and IM-related Technology.

In addition, Hydro Ottawa has taken initial action to implement the following recommendations emerging from the consultant's report:

[12] The vision statement reads as follows: "Hydro Ottawa's recorded information will be managed in accordance with law, policy, standards, and procedures to support service delivery, foster informed decision-making, and facilitate accountability, transparency, and collaboration."

- Recognize and re-implement IM as a corporate business program through consistent governance and oversight, the reaffirmation/development of IM policies, the hiring and retention of IM subject matter experts, and the development and implementation of processes to monitor and audit IM performance;

- Develop, enhance, and implement procedures, processes, and tools to support IM renewal and sustain the corporate IM program;

- Develop and implement a communications strategy to raise and sustain IM awareness, and communicate corporate IM program information; and

- Develop and implement a training program for all employees (including new hires) to educate them on IM requirements and instruct them in using IM tools and technologies.

(viii) Migration of Business Systems to Cloud-Based Solutions

Fall 2016 marked an important milestone in the execution of Hydro Ottawa's information technology ("IT") strategy. At that time, the company reached an agreement with IBM to leverage its SoftLayer Infrastructure-as-a-Service ("IaaS") offering. SoftLayer is a leading cloud computing platform offering bare metal, virtual servers, networking, and turnkey big data and private cloud solutions.

Under terms of the agreement, IBM will provide Hydro Ottawa with cloud-based infrastructure for many of the company's key business systems. This platform will serve as a single web portal to view and manage servers, storage, and infrastructure. Movement to the cloud will eliminate the need for purchasing, deploying, and maintaining on-premise solutions; alleviate IT resource constraints; enable Hydro Ottawa to deliver an enhanced customer experience; increase the reliability, flexibility, and security of the company's business systems; and ensure the company is able to keep pace with technological innovation. Other benefits will include access to a highly secure and trusted data centre; increased infrastructure reporting; a single technology and service provider reducing resolution time; reduced local footprint; improved service level agreements; and introduction of 24/7 infrastructure support.

Initial adoption of the SoftLayer platform will focus on two of Hydro Ottawa's largest business systems that are due for refreshed hardware. As of the end of 2016, IBM was scheduled to stand up new hardware by February 2017 to host the new version of the JD Edwards ERP system, as part of Project Transformer. IBM was also set to migrate the Customer Care & Billing ("CC&B") system to a cloud-based platform before May 2017.

(ix) Asset Management

Key initiatives in 2016 related to asset management included the following:

a. Efficiencies in Major Equipment Procurement

Hydro Ottawa is employing several strategies to decrease costs of major equipment purchases while continuing to provide high levels of reliability to the distribution system. The company has formed cross-functional working groups to evaluate and create approved supplier lists for major equipment procurement. Major equipment suppliers are actively reviewed on a proactive basis for quality, responsiveness, and cost management. As approved supplier lists are updated and finalized, the information feeds into master purchasing service agreements ("MPSAs") for each type of equipment. Such an approach increases consistency and improves efficiencies during design, construction, and the remaining lifecycle of an asset. MPSAs serve as a safeguard against undertaking multiple procurements for the same piece of equipment for multiple projects. To promote and achieve continuous improvement, the MPSAs are set to be updated on an as-required basis through lessons learned discussion and documentation.

This new approach through MPSAs was implemented in 2016 for the procurement of electrical and civil engineering consulting services.

b. Utilization of Enhanced Asset Management Software

Hydro Ottawa is working to improve the way asset replacement decisions are made by utilizing enhanced software for investment planning. As a result of superior analytics capabilities offered through Copperleaf C55 software, the company will be able to better define its specific data requirements and the timeframe for collection through existing and new inspection and maintenance programs. As of the end of 2016, this initiative was on track for completion by 2019.

c. ISO 55000 Compliance

In 2016, Hydro Ottawa contracted an external party to assess the company's current asset management practices against the requirements of ISO 55001:2014, the international standard for Asset Management Systems. The review involved a team of consultants and consisted of off-site documentation review, onsite interviews, and additional information gathering. The exercise resulted in a gap analysis report and development of a roadmap which would enable Hydro Ottawa to improve its practices and move towards compliance with the standard. Findings included both Hydro Ottawa's internal view and the third-party external view of ISO 55001 compliance. In each case, compliance was scored using the Institute of Asset Management's maturity scale.

Based on the results of this analysis, Hydro Ottawa has initiated a working group with the goal of maturing the company's asset management practices to become ISO 55001 compliant. Certification with the standard may be considered and pursued at a later time.

d. Asset Condition Assessment

Over the course of 2016, Hydro Ottawa completed a detailed asset condition assessment of stations' major equipment, including transformers and switchgear. The data was collected through inspection and maintenance programs, and then translated into indicators utilized to develop a probability of failure for each asset type in the system. Next, the probability of failure was applied in a risk assessment process to produce an asset failure risk score. Going forward, Hydro Ottawa will use these risk scores to plan asset replacements.

Historically, asset condition scores were primarily based on asset age. However, through enhanced practices and tools, the adoption of a risk-based asset management framework has enabled the company to identify the optimal replacement time for aging assets, and thereby minimize total costs of asset ownership. This includes direct financial costs as well as indirect costs related to reliability, environmental impacts, collateral damage, and safety impacts.

(x) Enhancements in Program Execution Timelines for System Design

In its OEB-approved 2016-2020 DSP, Hydro Ottawa highlighted several areas in its capital programs for which it intended to apply a particular focus on achieving greater productivity, efficiencies, and cost savings. One of those areas was more detailed short-term planning.

In 2016, particular progress was achieved in this area in relation to timelines for program execution. Through more advanced coordination with third parties, the company's planning process for system design has become more adaptive and better able to accommodate adjustments in projects, with customer feedback received earlier in the process.

With more system design packages created in advance, Hydro Ottawa was able to bump-up completion dates for package-ready projects from 2017 to September 2016. This resulted in more accurate resource and budget planning, while offering options for project advancement, deferral, or swapping, in the event of unforeseen needs or third-party constraints arising.

(xi) Contractor Onboarding

In 2016, Hydro Ottawa established a new process for contractor onboarding. The process applies to all contractors that require either network or physical access to company facilities.

Using a centralized identity management system (an Oracle-based product referred to as "OIM"), Hydro Ottawa has been able to re-purpose the framework and workflow currently in place that synchronizes and automates employee information between critical business systems owned by different departments (Human Resources, IM&IT, and Facilities).

As a result, contractor onboarding, off boarding, and status changes will now be automatically synchronized to email and network accounts, as well as the building badge/access system. When a contractor joins or leaves Hydro Ottawa, a series of automated entries will now take place within numerous systems that contain contractor information.

This automated workflow will reduce a number of manual tasks, increase productivity, ensure accuracy and consistency of contractor information throughout all business lines, improve identity security and backups, and significantly reduce duplication.

Alongside the new OIM system going live in 2016, draft training material was prepared. In addition, the company initiated a working group that has been tasked with strengthening our contractor onboarding training process. As of the end of 2016, an updated training program for contractors and Hydro Ottawa staff was scheduled for delivery in 2017.

(xii) Fleet Wi-Fi & GPS Installation

Hydro Ottawa's fleet service is responsible for the maintenance and management of approximately 230 vehicles.

The existing Global Positioning System ("GPS") and telematics system utilized for fleet management was adopted in 2003. After approximately 12 years, the system had reached end of life, with vendor support no longer provided as well. Accordingly, Hydro Ottawa issued an RFP in March 2016 to upgrade to a new set of solutions. The RFP was evaluated and the contract awarded in July 2016, with the agreement executed in December 2016.

The scope of services encompassed within the agreement includes the supply and installation of new Automatic Vehicle Locator tracking devices; installation of Wi-Fi hotspot devices; integration with Hydro Ottawa's existing fleet management application and internal outage map; adoption of a web-enabled electronic process for logging hours of service and preparing Driver's Vehicle Inspection Reporting for all bucket trucks; and ongoing technical support for these solutions for a term of three years. Moreover, in step with the discussion on page 23 regarding cloud services, the fleet management software utilized (MyGeotab) is a Software-as-a Service ("SaaS") solution that will help achieve greater efficiencies and flexibility in overall fleet management.

Deployment of these solutions will enable optimization of the company's fleet with real-time data on vehicle position, speed, and fuel use; reduced fuel costs; and improved driver behaviour, which in turn will increase safety and security. As of the end of 2016, estimated cost savings associated with the use of fleet Wi-Fi, instead of individual laptops, is $70,000 per year, with these savings expected to be fully realized in Q1 2018.

(xiii) Field Crew Operational Productivity Improvements

In 2016, Hydro Ottawa conducted a thorough investigation of field crew resource allocation by location. Based on the results, the company was able to optimize the location of field crews in regions with the highest volume of scheduled work, thereby reducing travel time and increasing wrench time. To further the success of this productivity enhancement, projects were also coordinated with existing road closures, which in turn lowered both travel and set-up times.[13] In addition, Hydro Ottawa introduced innovative equipment into our fleet to enable crews to work more safely and efficiently on distribution assets located in rear lots. Finally, the company successfully installed an additional 2,500 remote disconnect meters, which will yield benefits in the form of reduced field work and reduced need for vehicle dispatch.

(xiv) Workforce Stabilization

Hydro Ottawa continued its implementation in 2016 of a multi-year, whole-of-company initiative around organizational rightsizing as a complement to productivity initiatives. Key outcomes achieved included no increase in full-time permanent positions; reallocation of vacant positions to trades hiring; reduction of 18% in on-call costs from 2014 to 2016, as a result of rationalizing and ensuring better front-line coverage; and ongoing stabilization of overtime costs, with 2016 costs 5.7% below 2014 costs. These and other measures served to illustrate Hydro Ottawa's enduring commitment to doing more with less, and to demonstrate sustained sensitivity to containing costs and safeguarding ratepayer interests.

(xv) Workforce Planning

Like many other utilities, Hydro Ottawa faces challenging workforce demographics that require a concerted response. In 2016, the company continued to implement a proactive and multifaceted Talent Management Strategy to ensure a prepared and sustainable workforce over the next five to 10 years. This included ongoing execution of a comprehensive succession planning process to identify and develop talent for all levels of leadership throughout the organization; growth in programs related to apprenticeships, powerline technicians, summer and co-op students, engineering interns, and retiree and older worker engagement; and expanded partnerships with industry and educational institutions, including renewed collaboration with Algonquin College to deliver the College's Powerline Technician programs in Eastern Ontario for 2016-2020.

[13] A specific example of a particularly successful project in this regard was the relocation of 20 utility poles during a 12-hour period, as part of a road widening project.

(xvi) Skype for Business

In step with the company's technology modernization initiatives, Hydro Ottawa implemented Skype for Business in October 2016, following a successful pilot program. The roll-out of Skype capabilities across the company allows employees to engage in virtual collaboration with co-workers, through the use of instant messaging, online meetings, and screen sharing. In addition to enhanced collaboration, benefits include reduced travel and employee reimbursement costs associated with travel in between the company's various offices and facilities located across its service territory.

3. Public Policy Responsiveness

"Utilities are expected to consider public policy objectives in their business planning and to deliver on the obligations required of regulated utilities. These obligations may evolve over time and therefore this Handbook does not provide a comprehensive list of all requirements. Utilities are expected to demonstrate that they have considered Conservation First in their investment decisions. The OEB will expect to see proposals for how distributors are supporting low income customers through programs such as LEAP and/or OESP, or through other distributor-specific programs. Electricity distributors and transmitters are expected to expand or reinforce their systems to accommodate the connection to their system for renewable energy generation facilities and the OEB expects their system plans to include details on how they will meet this requirement. Natural gas utilities are expected to identify investments or programs that have been planned to meet obligations under Ontario's cap and trade program."

This section of the Annual Summary highlights how Hydro Ottawa is (a) delivering on obligations mandated by government through legislation, Ministerial directives, and regulatory requirements; and (b) achieving outcomes that are aligned with the RRF's Public Policy Responsiveness category.

Consistent with the discussion on page 6 regarding general alignment between Hydro Ottawa's Strategic Direction and RRF performance outcomes, Hydro Ottawa wishes to emphasize that its responsiveness to public policy at all levels of government is rooted in its commitment to the well-being of the community by acting as a responsible and engaged corporate citizen.

(i) Regulatory Compliance Project
In step with the company's commitment to excellence in fulfilling its OEB- and IESO-related compliance obligations, Hydro Ottawa undertook a formal review of its regulatory compliance program in 2016.

The goals of the review were to assess the effectiveness of the company's existing compliance program and associated business practices; identify both gaps and best practices; and develop and implement solutions for program re-design, including formal documentation to facilitate enhanced compliance. Key outcomes identified as part of the targeted end-state for the company's regulatory compliance framework included automated compliance monitoring; a compliance inventory and outcomes repository; operational compliance management, policies, and accountability; internal stakeholder engagement and education; efficient compliance management practices; compliance sustainability; best practices; and a culture of compliance.

As part of the project roll-out, Hydro Ottawa conducted a competitive RFP process in Summer 2016 to obtain expert third-party services and support for the project. Following selection of a proponent, Hydro Ottawa collaborated with the external consultant throughout Fall 2016 to map out the processes utilized under the existing program and to conduct interviews with relevant internal stakeholders engaged in compliance activities. As of the end of 2016, the development and finalization of an enhanced regulatory compliance program was scheduled to occur in early 2017, followed by implementation of a pilot project as a test case for the new program.

(ii) 8% Provincial Rebate

In its September 2016 Speech from the Throne, the government announced plans to rebate an amount equal to the provincial portion of the Harmonized Sales Tax ("HST") for residential, farm, and small business electricity consumers, beginning January 1, 2017. Enabling legislation – *Ontario Rebate for Electricity Consumers Act, 2016* – was then passed in October 2016.

Notwithstanding provisions in the legislation that authorized electricity vendors to adapt their invoices no later than July 1, 2017, Hydro Ottawa worked diligently to prioritize implementation of the 8% Provincial Rebate in advance of the January 1, 2017 effective date. Hydro Ottawa ensured that the first invoices issued to applicable customers for electricity consumed in 2017 included the rebate. The company also sought to raise customer awareness of the rebate through the addition of a dedicated page on its public website; distribution of a bill insert; communications shared through on-envelope, on-bill, and on-hold messaging; and social media outreach.[14]

In addition, Hydro Ottawa supported the effective implementation of the 8% Provincial Rebate through direct participation in the Electricity Rate Mitigation Working Group formed by the Ministry of Energy to solicit input on operational and technical matters related to the program.

(iii) Climate Change Action Plan Working Group

In October 2016, Hydro Ottawa established an inter-departmental Climate Change Action Plan Working Group ("CCAP-WG"). The formation of this group was driven by recognition of (i) the priority status of the Climate Change Action Plan ("CCAP") within the Government of Ontario's public policy agenda, and (ii) the significant impact that the CCAP could have on electricity distributors and their customers.

The CCAP-WG serves as a forum for the exchange of information and proposal of Hydro Ottawa's engagement strategies regarding the implementation of the CCAP and cap and trade program. The CCAP-WG is comprised of representatives from divisions across the company which will be impacted by the CCAP's various programs, and/or which will play a leadership role in preparing and steering the company's engagement therein. The group's membership features a balanced mix of competencies, skill sets, and seniority.

Through the CCAP-WG, Hydro Ottawa believes that it will be well-positioned to support the implementation of, and be responsive to, an over-arching policy priority of the Government of Ontario.

In addition, as noted on pages 11-12, in 2016 Hydro Ottawa sought to assist Key Account customers in understanding and preparing for potential obligations and opportunities associated with the establishment of a cap and trade program in Ontario.

(iv) Conservation Results & Planning

In 2016, Hydro Ottawa achieved over 59 GWh in energy savings through its CDM programs. In addition, as part of the 2016 year-end results, the IESO adjusted the company's 2015 results upwards by 15.5 GWh. Hydro Ottawa's combined results for 2015-2016 represent achievement of 33% of the company's allocated target under the province's Conservation First Framework ("CFF"). In terms of overall energy savings on a kWh basis, Hydro Ottawa ranked 5th amongst Ontario distributors based on 2015-2016 results.

[14] https://hydroottawa.com/8percent (Accessed September 11, 2017).

Several large CDM projects were initiated and went in-service in 2016, but will not be eligible for attribution until 2018 and 2019. Many of these projects involve the installation of Combined Heat and Power ("CHP") facilities on the premises of large institutional customers. These projects serve as excellent examples of how Hydro Ottawa continued to incorporate CFF obligations into its planning and investment decisions. The company actively supported these customers in exploring and ultimately deploying on-site CHP units. The $2 million incentive provided by Hydro Ottawa to one customer covered 17% of their project cost. This customer's annual consumption is set to be reduced by 10.1 GWh, which represents approximately 40% of their total electricity usage.

These projects were executed under the auspices of Hydro Ottawa's largest conservation program – the Save on Energy Retrofit Program. Established in 2007, the program includes lighting upgrades, motor and heating retrofits, and updated control and automation systems in order to increase energy efficiency. This program benefits approximately 1,000 commercial customers each year and was responsible for 27.6 GWh of the energy savings achieved by Hydro Ottawa in 2016 (representing 47% of overall savings). On the residential side, the company's most successful program in 2016 was the Save on Energy Coupon Program, which delivered 15 GWh in savings.

In addition to the energy savings achieved, 2016 featured a series of enhancements to Hydro Ottawa's CDM marketing campaigns and sales tools.

With respect to marketing, changes were driven by findings that the company had covered the "low hanging fruit" across its customer base and that a recalibration of messaging was required. In turn, Hydro Ottawa crafted a lifestyle-inspired theme – "Save Your Energy for What Matters" – that transitioned away from a transactional engagement with customers to a more personal focus. Among the positive results achieved through this campaign has been tremendous growth in customer redemption of LED coupons.

Regarding improved sales tools, Hydro Ottawa modified the previous version of the Retrofit Program lighting worksheet and replaced it with a more customer- and contractor-friendly tool. With the updated tool, information is inputted once, with subsequent self-population of other applicable fields which also rely on that information. The ultimate output of the tool is a single page that enables customers to make an informed decision on a potential project, with financial impacts, incentive opportunities, and multi-year cash flows all clearly presented. What's more, the output page can serve as the customer's application to the program. Among the metrics of the success of this improved tool are increased sales by lighting contractors and adoption of the tool by electricity distributors across Ontario, with whom Hydro Ottawa has shared the tool.

(v) <u>Low-Income Customer Support</u>

Hydro Ottawa is committed to assisting low-income customers through various programs and actions. In 2016, 10,081 Hydro Ottawa customers collectively received over $2 million in financial assistance through the Ontario Electricity Support Program ("OESP"), 482 customers accessed emergency relief through the Low-Income Energy Assistance Program ("LEAP"), and 588 households participated in the Home Assistance Program ("HAP").

Through engagement with government and other stakeholders, Hydro Ottawa continued to highlight the need for targeted enhancements to these programs, especially in relation to improving the processes for identifying and enrolling eligible customers. In addition, the company sought to raise customer awareness of these programs through such actions as the inclusion of information for low-income customers on the home page of its public website, creation of a page specific to low-income programs, on-bill and on-hold messaging, and outreach via social media.

(vi) Integration of Renewable Energy Generation

Hydro Ottawa has remained active in facilitating the connection of renewable energy facilities since the passage of the *Green Energy and Green Economy Act* in 2009 and the predecessor Renewable Energy Standard Offer Program 2006. In 2016, Hydro Ottawa connected 1270.33 kW of embedded generation, with embedded generation in the company's service territory now totaling 71.8973 MW. Connections in 2016 were comprised of 32 embedded generation facilities totaling 1216.03 kW, along with 54.3 kW of net metered solar generation.

(vii) Long-Term Load Transfers

Hydro Ottawa was pleased to be party (along with Hydro One Networks) to the first joint application by distributors to eliminate long-term load transfer ("LTLT") arrangements, in accordance with amendments to the Distribution System Code from 2015 which established a June 21, 2017 deadline for elimination of all LTLTs. In April 2016, Hydro Ottawa and Hydro One filed an application to transfer 309 Hydro One customers to Hydro Ottawa, and to transfer 44 Hydro Ottawa customers to Hydro One. The company worked collaboratively with Hydro One to coordinate proactive communications to customers and to make the transition as seamless as possible. With only one exception, all LTLT customers were successfully transitioned by the end of 2016.

(viii) Carbon 613

In step with its commitment to environmental sustainability, in 2016 Hydro Ottawa became a charter member of Carbon 613. The Carbon 613 network is a made-in-Ottawa, target-based sustainability program that supports local businesses in setting and achieving sustainability goals, while enhancing their competitive advantage and stimulating the low-carbon economy. The program is one of eight such programs across Ontario.

Members of Carbon 613 reduce their greenhouse gas ("GHG") emissions by setting a baseline and GHG-reduction target, taking action to achieve that target, tracking and reporting annual emissions, and publicly disclosing emissions data.

(ix) Federal PCB Regulations

In 2008, Environment and Climate Change Canada ("ECCC") finalized regulations that established specific deadlines for ending the use of polychlorinated biphenyls ("PCBs") above a prescribed concentration and mandated the removal of all equipment containing PCBs.

Understanding the severity of environmental and health impacts of PCBs, Hydro Ottawa initiated a vigorous and aggressive testing and replacement program of all suspect equipment following issuance of the regulations. Hydro Ottawa has been able to meet all timelines set out by ECCC. As of the end of 2016, the company had achieved 95% progress in its PCB and equipment removal plans, with the expectation of completing all activity well in advance of the December 31, 2025 deadline.

(x) Collaboration with Natural Resources Canada on Electric Vehicles Study

In March 2016, Hydro Ottawa became a partner in a research project initiated by Natural Resources Canada ("NRCan"). The project was launched to increase learning around the impact of direct current fast charging (“DCFC”) electric vehicle (“EV”) chargers on local distribution networks. Hydro Ottawa committed in-kind support to the project. As of the end of 2016, a project charter had been established, with the project set for completion in 2017.

(xi) Regional Infrastructure Planning

Hydro Ottawa has actively participated in and supported the IESO-led Regional Infrastructure Planning (“RIP”) process to develop short- and long-term investment plans based on system needs in the Greater Ottawa region. Hydro Ottawa has also engaged community membership through the Local Advisory Committee (“LAC”) and has identified opportunities for enhancing community engagement through the LAC.

(xii) Participation in OEB, Government & IESO Working Groups

Hydro Ottawa strives to support the development and implementation of robust public policy that will enable movement towards a smart, sustainable energy future for Ontario. As evidence of this commitment, Table 1 below identifies representatives from the company who constructively contributed to the formulation of effective regulations and policies through formal participation on OEB, government, and IESO working groups in 2016.

Table 1 – Hydro Ottawa Participants in OEB, Government & IESO Working Groups

Name	Title	Working Group	Government/Sector Organization
Raed Abdullah	Distribution Engineer	Smart Grid	Ministry of Energy
Sally Barakat	Manager, Meter to Cash Support	Electricity Rate Mitigation	Ministry of Energy
		Smart Metering Entity (SME) Licence Order	Independent Electricity System Operator
Bruce Bibby	Manager, Conservation Programs	Conservation First Implementation Committee	Independent Electricity System Operator
Linda Bruce	Supervisor, Conservation	Residential Working Group	Independent Electricity System Operator
Mark Fernandes	Chief Information & Technology Officer	Cyber Security Steering Committee – Protecting Privacy of Personal Information and the Reliable Operation of the Smart Grid in Ontario (EB-2016-0032)	Ontario Energy Board

Name	Title	Working Group	Government/Sector Organization
Shane Labrash	Program Officer, CDM	Business Working Group – Lighting Sub-group	Independent Electricity System Operator
Jojo Maalouf	Manager, IT Security	Cyber Security Working Group – Protecting Privacy of Personal Information and the Reliable Operation of the Smart Grid in Ontario (EB-2016-0032)	Ontario Energy Board
Casey Malone	Manager, Distribution Policies & Standards	Pole Attachment Working Group	Ontario Energy Board
Matthew McGrath	Supervisor, Asset Management	Regional Planning and Cost Allocation Review (EB-2016-0003)	Ontario Energy Board
Joel McGuire	Supervisor, Data Systems Metering	Free Overnight Charging for Electric Vehicles	Ministry of Energy
Chantal Nault	Manager, Systems Projects	Financial Assistance Working Group	Ontario Energy Board
Michel Provost	Manager, Billing, Collections & MDS	Electricity Rate Mitigation	Ministry of Energy
		Smart Metering Entity Steering Committee	Independent Electricity System Operator
		Smart Metering Entity (SME) Licence Order	Independent Electricity System Operator
		Financial Assistance Working Group	Ontario Energy Board
Charles Zaloum	Supervisor, Conservation	Business Working Group	Independent Electricity System Operator

4. Financial Performance

"Utilities are expected to demonstrate sustainable improvements in their efficiency and in doing so will have the opportunity to earn a fair return. The OEB will monitor the financial performance of each utility to assess continuing financial viability and to determine whether returns are excessive. Utilities have a choice of rate-setting methods to meet their particular needs. Additional tools are available to support infrastructure investment. Utilities must report comprehensive and consistent information, allowing for comparisons over time and across utilities. The OEB will act on its obligations to ensure a financially viable sector where performance indicates that a regulatory response is needed."

This section of the Annual Summary highlights how Hydro Ottawa is (a) creating sustainable growth in its business and earnings; and (b) achieving outcomes that are aligned with the RRF's Financial Performance category.

As noted on pages 4-5, this section does not include information on capital spending undertaken by Hydro Ottawa. Hydro Ottawa is obligated to submit annual reports to the OEB on its actual capital spending on a program level. Please consult these annual reports for information on the progress in Hydro Ottawa's capital expenditures against its DSP.

(i) <u>Financial Results</u>

By several metrics, Hydro Ottawa achieved strong financial results in the first year of its approved Custom IR rate plan. For example, distribution revenue increased $7.2 million (or 4%) from 2015. The company also increased its net income by $0.6 million over the previous year, for a total of $34.3 million. In addition, the company's liquidity ratio increased to 1.19 – the highest level in the last five years. Finally, the actual return on equity ("ROE") realized was 9.8%.[15]

With respect to Hydro Ottawa's debt to equity ratio, for the past three years the company has carried a higher ratio as a result of the significant capital expenditure program required to replace aging distribution system infrastructure. Although Hydro Ottawa is more highly leveraged than the deemed capital structure, the company has been able to keep its cost of borrowing very low due to favourable interest rates on its long-term debt.

(ii) <u>Dividend & Updated Dividend Policy</u>

Hydro Ottawa's strong financial performance in 2016 generated a dividend for the enterprise's sole shareholder – the City of Ottawa – of $20.6 million.[16]

This dividend was significant for several reasons. First, it marked the largest dividend payment in the company's history. Second, it was the first dividend executed pursuant to a new dividend policy approved by the Shareholder in June 2016. The scope of the amended dividend policy applies to regulated net income only. Annual dividends will be the larger of (i) 60% of the net income of Hydro Ottawa (i.e. the local distribution utility within the company's corporate structure), or (ii) $20 million.

[15] The 9.8% ROE calculation reflects the impacts of Lost Revenue Adjustment Mechanism from the previous fiscal year, consistent with OEB and IESO reporting requirements.

[16] The annual dividend paid by Hydro Ottawa is based on the previous year's results. Accordingly, the dividend based on 2016 results was paid in 2017.

Both the dividend payment and amended policy reflect the robust positioning of the company for sustainable long-term growth and performance.

III. Conclusion

As catalogued above, 2016 marked the first year in which Hydro Ottawa embarked on the parallel five-year journeys of an OEB-approved rate plan and a refreshed corporate strategic plan. Both are anchored in consistent and mutually reinforcing objectives.

Hydro Ottawa trusts that the preparation of this Annual Summary, along with the content included herein, will serve to underscore the company's robust commitment to incorporating RRF principles across its business operations. It is hoped that the range of initiatives captured in this Annual Summary will be viewed as evidence that Hydro Ottawa has undertaken a strong start in seeking to deliver upon the RRF's objectives and that the company will remain firmly guided by the expectations of the RRF over the course of the next few years – and beyond.

Hydro Ottawa is pleased to present this Annual Summary and looks forward to preparing successive versions for each of the years in its 2016-2020 Custom IR term.

Version History Tracking

Version	Author	Date Revised	Description of Changes
Version 1	Regulatory Affairs	September 2017	N/A – initial release
Version 2	Regulatory Affairs	October 2019	Revisions to section II., 4. Financial Performance, (ii) Dividend Payment (addition of clarifying language).
Version 3	Regulatory Affairs	December 2019	Revisions to section II., 2. Operational Effectiveness, (iv) Smart Grid Deployment (refinement of project descriptions) and (xii) Fleet Wi-Fi & GPS Installation (addition of clarifying language).

2017 Annual Summary

Achieving Ontario Energy Board Renewed Regulatory Framework Performance Outcomes

Prepared by: Hydro Ottawa Limited

Date: December 2018

(Revised: December 2019)

Table of Contents

I. Overview

1. Background – Hydro Ottawa's 2016 Summary of Initiatives Aligned with the RRF

In September 2017, Hydro Ottawa Limited ("Hydro Ottawa") finalized a document entitled *2016 Annual Summary: Achieving Ontario Energy Board Renewed Regulatory Framework Performance Outcomes.* The document summarized initiatives at Hydro Ottawa that were launched, were ongoing, or were completed during 2016, and that aligned with the core performance outcomes enshrined in the Ontario Energy Board's ("OEB") Renewed Regulatory Framework ("RRF").

As stated therein, the value and purpose of that document was the following:

1. Support the preparation of the annual rate adjustment application and annual report on capital spending, which Hydro Ottawa is obligated to submit to the OEB under the terms of the settlement agreement governing its Custom IR rate plan;

2. Support the preparation of the next Custom IR application that Hydro Ottawa plans to file, for the 2021-2025 period;

3. Help foster a culture of continuous improvement within Hydro Ottawa; and

4. Help ensure that the execution of the company's business plans and capital investment programs over the course of its Custom IR term are guided by the expectations and goals embedded in the RRF.

The aforementioned document (hereinafter referred to as the "2016 RRF Summary") also signaled Hydro Ottawa's intention to prepare an annual summary of a similar nature for each of the five years in its 2016-2020 Custom IR term.

2. Hydro Ottawa's Second Annual RRF Summary (For 2017 Initiatives)

Hydro Ottawa is hereby pleased to present the second version of this annual summary (hereinafter referred to as the "2017 RRF Summary"). The pages below serve as a catalogue of Hydro Ottawa's initiatives from the year 2017 that were in direct alignment with the OEB's RRF performance categories.

In order to avoid duplication and optimize the efficiency of review, this 2017 RRF Summary does not duplicate any of the background sections included in the 2016 RRF Summary – namely, the detailed information provided on the OEB's RRF and four performance categories, as well as on Hydro Ottawa's five-year Custom IR rate plan and corporate strategic direction.

In addition, for those initiatives which were either launched or were underway in 2016, and which witnessed a milestone, deliverable, or culmination in 2017, this 2017 RRF Summary likewise does not offer a detailed description of that initiative. Instead, only the incremental information of relevance for 2017 is highlighted.

Similar to the 2016 RRF Summary, the 2017 RRF Summary is organized around the four principal performance outcomes enshrined under the RRF: (i) Customer Focus; (ii) Operational Effectiveness; (iii) Public Policy Responsiveness; and (iv) Financial Performance.

Moreover, it was equally Hydro Ottawa's intent in preparing the 2017 RRF Summary that the document be suitable for submittal to the OEB at a later date, as appropriate.

In sum, Hydro Ottawa trusts that the 2017 RRF Summary reflects the company's commitment to further entrench RRF principles throughout its operations and business, to execute its corporate plans and capital investment programs in accordance with RRF objectives, and to continually align its interests with those of its customers.

II. Hydro Ottawa Initiatives by RFF Performance Outcome Category

1. Customer Focus

"Customer engagement is now an explicit and important component of the regulatory framework. Utilities are expected to develop a genuine understanding of their customers' interests and preferences and reflect those interests and preferences in their business plans. Utilities are expected to demonstrate value for money by delivering genuine benefits to customers and by providing services in a manner which is responsive to customer preferences."

As noted in Hydro Ottawa's 2016 RRF Summary:

- Hydro Ottawa's *2016-2020 Strategic Direction* is anchored in the imperative that the company will seek to put the customer at the centre of everything it does.
- Hydro Ottawa's vision is that by 2020, the customer experience will be driven by choice – the customer's choice. Customers will be given options to allow them to be in control and to interact with Hydro Ottawa how and when they want.
- Hydro Ottawa has crafted a five-year Customer Experience Roadmap, the timeframe of which is aligned with that of the company's Strategic Direction and Custom IR term. It serves as an integrated, "whole of company" roadmap for Hydro Ottawa's customer experience journey.

The initiatives highlighted in this section of the 2017 RRF Summary illustrate the progress being achieved by Hydro Ottawa in (a) delivering on the commitments in its Custom IR application and Customer Experience Roadmap, as they relate to enhanced customer engagement across a range of touchpoints; and (b) achieving outcomes that are aligned with the RRF's Customer Focus category.

As a preface to the information presented below, Hydro Ottawa would note that its progress and leadership in service excellence received external recognition in 2017. CS Week is the largest utility customer service conference in the world, with over 2,000 delegates from more than 300 utilities. In May 2017, CS Week recognized Hydro Ottawa with an Innovation in Digital Customer Engagement Award. Examples of the types of activities which formed the basis for receipt of this award are outlined in the sections below.

(i) Enterprise Communications Platform

Major milestones achieved over the course of 2017 in the implementation of the core components of this initiative were the following:

a. Customer Contact Centre Enhancements

Arguably one of the most significant accomplishments achieved by Hydro Ottawa in 2017 in any of the RRF performance categories was the migration of the company's Customer Contact Centre to a new service provider – Optima Communications, which was selected following a rigorous procurement process.[1]

[1] Optima is a seasoned service provider in many sectors, including the utility sector.

Following more than 12 months of meticulous planning and preparation, the transition was executed on March 6, 2017.

Under this new arrangement, Hydro Ottawa and its customers are benefitting through improved customer service, lower costs, and operational efficiencies. For example:

- Customer inquiries are answered more efficiently;
- Additional agents are made available during emergency events;
- System adjustments are enabling greater adaptability during periods of high call volume;
- Translation services are offered in up to 120 languages (alongside service in both official languages);
- Long distance charges to the Contact Centre have been eliminated; and
- A range of advanced self-serve features are available to customers:
    - omni-channel capabilities (including phone and email) allowing customers to communicate with Hydro Ottawa through the channel of their choice;
    - “Virtual Hold” Call Back Assist, enabling customer call back without the need to remain on the line;
    - “Voice ID” capability, which uses voice biometrics authentication to enable customer access to personal account information;
    - refreshed Interactive Voice Response (“IVR”) functions granting access to billing and payment self-serve options, and allowing callers to “press or say” options, rather than relying solely on key pads; and
    - 24/7 availability of such information as account balance, bill due date, amount of last payment, and date of last payment received via IVR, bypassing the need to speak with a service agent.

In addition, the transition enabled Hydro Ottawa to expand the Contact Centre’s hours of operation. On July 29, 2017, Hydro Ottawa began offering service on Saturdays, from 9:00 am to 3:00 pm, becoming one of the first local distribution companies (“LDCs”) in Ontario to open to customers on Saturdays.

Finally, this initiative contributed significantly to the substantial reduction in Operating, Maintenance and Administration (“OM&A”) costs achieved by Hydro Ottawa in 2017. The company estimates that migration of the Customer Contact Centre yielded approximately $400,000 in OM&A savings in 2017, and will produce a similar level of annual savings going forward.

b. Outage Communications[2]

In addition to the new customer self-serve IVR enhancements, Hydro Ottawa made a number of customer experience improvements to its outage communications system in 2017.

When calling to report an outage, customers will receive a more streamlined experience. They will hear a consistent “voice” across Hydro Ottawa’s system and will be able to speak to the system in a natural language format.

[2] This initiative is one of seven “material investments” under the General Plant category that are included in Hydro Ottawa’s 2016-2020 Distribution System Plan (“DSP”).

From a Hydro Ottawa perspective, the upgraded outage communications IVR solution will offer a number of efficiency gains. The number of phone calls that the system can handle simultaneously has been almost doubled, with near real-time logging of outages through the IVR rather than the previous batch file transfer process. Over time, this will translate into faster processing of outage reports and more expedited power restoration times. Further, the new system will allow faster daily customer telephone number updates rather than the weekly updates of the past.

Concurrently with these changes and with the migration to a new Customer Contact Centre, Hydro Ottawa transitioned its live outage call answering to its new Contact Centre provider – Optima Communications. This streamlines the previous dual contact centre vendor solution to one vendor. The new vendor will provide a greater number of agents for customer outage call answering, thereby increasing customer service while reducing customer reporting timelines.

(ii) Hydro Ottawa Mobile Application

In May 2017, Hydro Ottawa introduced a mobile app that allows residential customers to track their electricity usage and costs, to access their billing information, and to find out about current power outages. The app acts as a personal energy advisor to customers, delivering timely and relevant insights to the palm of their hands. Customers receive alerts and notifications with personalized saving tips, neighbourhood comparisons, and cost projections. Unique and industry-leading, this bilingual app (English & French) is the first in North America to offer all of these features in one, easy-to-use, and customizable tool.

Key features of the app include the following:

- Access to data – breakdown of customer electricity usage and costs (overall and disaggregated for individual appliances), as well as trends in usage from bill-to-bill;
- Useful alerts – customer receipt of notifications about usage along with insights to help reduce consumption;
- Neighbourhood comparison – ability for customers to view consumption relative to similar homes in their neighbourhood;
- Cost projections – avoiding bill surprises with a daily cost projection for electricity charges;
- Account information – access to billing history; and
- Outage map – access to latest information on power outages.

Hydro Ottawa spent approximately two years customizing the mobile application in partnership with Bidgely, a California-based energy services and analytics company with extensive expertise in behind-the-meter, appliance-level consumption information.[3] Bidgely enables utility customers to monitor and manage their household energy use with the help from a machine-learning algorithm that recognizes appliances.

Customers are able to download the app free-of-charge onto Apple and Android mobile devices through iTunes and the Google Play Store.

By the end of 2017, more than 8,500 residential customers had downloaded the app. An early, recurring trend observed by Hydro Ottawa was that downloads of the app spiked during

[3] https://www.bidgely.com/.

outages, suggesting that the outage map and outage-related information provided by the app are popular features amongst customers.

Hydro Ottawa is planning a focused marketing and education campaign in 2018 to raise awareness of the app and promote its usage and benefits.

(iii) Bill Re-Design

In response to customer feedback, Hydro Ottawa initiated a project in November 2015 to improve the format and design of customer bills, with the goal of developing a bill that would better fulfill customers' expectations for clarity and personalized communications.

The first two of the four phases of this project were completed in 2016 (i.e. performance of external and internal research, followed by a customer survey based on the research results, as well as preparation of specific design concepts for both bill print and online bills).

The subsequent phases (assessment of design proposals, followed by adoption and roll-out) were planned for completion by the end of 2017. However, this initiative was put on hold in early 2017 in order to prioritize the implementation of requirements associated with the Government of Ontario's Fair Hydro Plan ("FHP"). Thereafter, this project was again delayed, following the receipt of notification from the Ministry of Energy in June 2017 that the Ministry would be launching a Redesign Action Plan ("RAP") to simplify the regulatory framework governing bill presentment for electricity invoices.

In order to ensure successful implementation of the modified bill presentment framework (including requirements for a "dynamic message" on customer invoices to indicate savings achieved as a result of the FHP), Hydro Ottawa ultimately decided to defer execution of its bill re-design project until a new bill print provider had been selected through a competitive procurement process. The contract with Hydro Ottawa's provider was scheduled to expire on May 24, 2018. Accordingly, the remainder of 2017 was spent undertaking the necessary steps to prepare for issuance of a Request for Proposal in advance of the contract expiration.

(iv) Community Engagement

Over the course of 2017, Hydro Ottawa participated in more than 465 community events – a 32% increase over 2016.[4] The company's community activities included energy-related educational programs in schools (with over 24,000 students educated on electricity safety, conservation, and renewable energy), a Conservation Team that attends diverse community, corporate and retail events, and a wide range of other tours and presentations. Following a successful inaugural event in 2016, Hydro Ottawa hosted its second annual Community Forum, in which the company provided updates on Hydro Ottawa's latest initiatives and programs to community associations, city councillors, and community housing representatives.

In addition, Hydro Ottawa significantly expanded its program and practices for consulting customers who were set to be affected by major projects that were designed to improve infrastructure and service in their community. A main feature of these consultations was project-specific open houses, which are typically conducted for large complex cable replacement, pole replacement, voltage conversion, and substation build/rebuild projects. Whereas Hydro Ottawa held five such public open houses in 2016, the company increased this number to 14 in 2017. Company attendance at these events typically included the project manager, planning

[4] Of note, the number of community events held in 2016 (351) represented a 34% increase over 2015.

engineers, a design supervisor, additional technical support as required, staff from the company's media and public affairs department, and a Conservation and Demand Management program representative.

Hydro Ottawa likewise worked closely with the City of Ottawa to coordinate project work around the "Canada 150" sesquicentennial celebrations and to minimize traffic impacts on arterial roads. This collaboration resulted in the avoidance of any disruption to the organization of public events, while ensuring smooth delivery of Hydro Ottawa's capital program projects.

The company's online presence and social media engagement also experienced an uptick in 2017. Total visits to the company's webpage (https://hydroottawa.com) increased by 57% over 2016, with significant year-over-year growth in subscribers across all social media platforms as well (Facebook, 51%; LinkedIn, 40%; and Twitter, 21%).

(v) Customer Connectivity

Continuous improvement in the quality and quantity of web-based customer content and self-serve offerings to customers remained a priority for Hydro Ottawa in 2017.

A significant new feature introduced in January 2017 was a social login capability for the company's website. This update allows increased customer choice and convenience as customers can now sign-in to their online MyAccount using email, Facebook, or Google. As part of this revamped logon process, and in light of heightened cyber security concerns worldwide, Hydro Ottawa asked customers to strengthen their passwords in order to help protect their data. The new login process will serve as the gateway enabling Hydro Ottawa to offer a number of new and improved service offerings online.

Other action included the implementation of a new customer self-serve Automated Payment Plan management tool. Built within MyAccount, this new tool is fully mobile-friendly and addresses previous technical challenges experienced when customers were looking to register or make changes to their Autopay and/or Equal Monthly Payment Plans. Available 24/7, the new solution is interactive and provides a smoother, integrated customer experience. In addition to the customer benefits, Hydro Ottawa will benefit from 50% less manual effort and estimated operational cost savings of up to $40,000 per year.

In addition, Hydro Ottawa continued to promote online billing among its customer base. The company's annual "Go Paperless" Campaign – in which the company makes a $5 donation to charity for every customer that signs up for online billing or automated payments – resulted in the registration of over 17,000 customers and a donation of $88,465 to the CHEO Foundation to enable the purchase of new equipment for patients in neonatal intensive care. Hydro Ottawa continued to enjoy the highest online billing participation rate of any utility in Ontario, with 134,761 customers enrolled – representing more than 40% of the total customer base. With the growth in online billing participation from 2017, annual cost savings are expected to increase slightly from 2016 levels (from $1.3 million to $1.4 million).

There was also an uptick in 2017 in the total number of customers registered for MyAccount. By the end of the year, 167,114 accounts were registered, representing approximately 50% of all customers and an increase of 23% from 2016's total of 135,567 accounts.

(vi) Customer Satisfaction Survey

Since 2004, Hydro Ottawa has engaged a third party to conduct annual customer satisfaction surveys. The survey questions cover a wide variety of relevant topics, including overall satisfaction with Hydro Ottawa, reliability, customer service, power outages, billing, cost of electricity, and corporate image. Feedback from these surveys is incorporated into Hydro Ottawa's planning process, and ultimately forms the basis of plans which address customer needs and service offerings.

In 2016, customers stated that an inability to pay their bill was a real concern. In 2017, a number of government initiatives were implemented to address affordability, such as the Fair Hydro Plan and increased low-income assistance. Nevertheless, 52% of customers surveyed indicated that lower rates would be viewed as a service improvement.

In 2017, Hydro Ottawa's overall customer satisfaction level – 90% – experienced a marked increase over 2016 (81%). Hydro Ottawa believes that much of this shift can be attributed to implementation of the new programs discussed above (e.g. website enhancements, online self-service offerings, and the new mobile app).

In the survey, areas in which Hydro Ottawa scored above the provincial benchmark were the following (Hydro Ottawa's score is listed first, followed by the Ontario average):

- Provides consistent reliable power (93% vs. 89%);
- Electrical safety (89% vs. 87%);
- Outage response (88% vs. 85%);
- Reliability that meets customer expectations (91% vs. 86%);
- Delivers on service commitments (87% vs. 84%);

Areas that Hydro Ottawa has flagged for improvement, which include those in which the company's customer satisfaction scores fell below the Ontario benchmark, were the following (similar to the list above, Hydro Ottawa's score is listed first, followed by the Ontario average):

- Adapts well to changes in customer expectations (71% vs. 69%);
- Operates a cost-effective electricity system (65% vs. 60%);
- Provides good value for money (66% vs. 57%);
- Cost of electricity is reasonable when compared to other utilities (58% vs. 52%); and
- Provides information to help customers reduce their costs (79% vs. 74%).

(vii) Public Awareness of Electrical Safety

In 2017, Hydro Ottawa continued its strong promotion of electrical safety awareness through established channels such as the company's website, social media, education programs for elementary schools, on-bill messages, participation in "Dig Safe Week" events, and the organization of a specific forum on safety with contractors. In addition, the company augmented its traditional toolkit through the launch of a focused public safety video campaign (https://hydroottawa.com/community/educational-resources/electrical-safety). Entitled "Smart as a Fox," the campaign featured a series of videos reinforcing simple, but critical, steps to stay safe near electrical equipment.

In addition, Hydro Ottawa safety specialists performed 330 visits to work sites in 2017. Of these, 204 visits were to the work sites of Hydro Ottawa crews, while 126 visits were to the work sites of contractors. What's more, 34 unplanned visits were made to non-Hydro Ottawa work sites, which were typically the result of a Hydro Ottawa employee observing a potential hazard and reporting it for follow-up attention. These visits focused on making construction supervisors and workers aware of the safe limits of approach to overhead powerlines, in situations where construction activity might place workers or members of the public at risk of electrical contact.

In 2017, the company's Public Safety Awareness Index remained constant at 2015 and 2016 levels (70%). Hydro Ottawa will assess these results and contemplate additional program enhancements for 2018.

(viii) Customer Specific Reliability Pilot with OEB

In 2015, the OEB announced an initiative to implement Customer-Specific Reliability Measures ("CSRM") and reporting requirements. The OEB agreed with findings of the related working group that it would be beneficial to undertake a series of pilot projects with a number of willing electricity distributors. Hydro Ottawa volunteered to participate, with the company's project focused on implementing the tracking/measurement of CSRM for its full service territory using data logged in its Outage Management System ("OMS"). The focus of the pilot was on assessing the level of effort and identifying business processes required to assess, maintain, and improve the accuracy of the CSRM data being collected and the tools required to do so.

The pilot took place over the course of June 2016 to April 2017. A key outcome yielded through the pilot was improvement in the utilization of OMS for reliability reporting. Hydro Ottawa found that, through the integration of reporting processes into OMS, the system will provide benefits by integrating data stored from several separate systems into a single repository which will enable more detailed analysis into customer specific performance.

Overall, it was determined that the tools and processes in place through OMS for reporting reliability information were adequate for Hydro Ottawa's needs. With over 99% of Hydro Ottawa's customers being tied to a premise location captured in the company's Geographic Information System ("GIS"), the OMS is set to remain Hydro Ottawa's preferred approach for providing accurate customer specific data.

However, it was also found that there remain data quality issues to enable reporting at the required confidence level. In order to continuously improve data accuracy and reliability, Hydro Ottawa intends to execute process improvements and training. Likewise, the pilot demonstrated that due to the volume of records involved in system CSRM data, offline post processing to address errors and omissions in the data was not feasible.

Hydro Ottawa will continue to enhance its processes to use the OMS in order to report accurate customer-specific outage data.

2. Operational Effectiveness

"Utilities are expected to demonstrate ongoing continuous improvement in their productivity and cost performance while delivering on system reliability and quality objectives. The OEB will assess performance trends and look for evidence of strong system planning and good corporate governance. The OEB will use benchmarking to assess a utility's performance over time and to compare its performance against other utilities. Utilities are expected to demonstrate value for money by presenting plans for delivering services that meet the needs of their customers while controlling their costs."

This section of the Annual Summary highlights how Hydro Ottawa is (a) delivering on the commitments in its Custom IR application regarding continuous improvement, productivity initiatives, and cost performance; and (b) achieving outcomes that are aligned with the RRF's Operational Effectiveness category.

Consistent with the approach taken in the 2016 RRF Summary, this section of the 2017 RRF Summary does not include information on capital spending undertaken by Hydro Ottawa, in accordance with its OEB-approved Distribution System Plan ("DSP"). Hydro Ottawa is obligated to submit annual reports to the OEB on its actual capital spending on a program level, based on three categories: System Access; System Renewal/System Service; and General Plant. Please consult these annual reports for information on the progress in Hydro Ottawa's capital expenditures against its DSP.

It should be noted that the combined savings achieved by the productivity initiatives outlined below and the activities identified in the section above on Customer Focus contributed to a decrease of almost $1 million in Operating, Maintenance and Administration ("OM&A") costs from 2016. Although Hydro Ottawa's OM&A costs typically increase year-over-year due to inflation and the rising cost of doing business, continuous efforts to increase productivity and efficiency resulted in a reduction of OM&A costs to below 2015 levels. These programs demonstrate Hydro Ottawa's commitment to continuous improvement in productivity and cost performance, while simultaneously maintaining the ability to deliver increased system reliability and service quality to its customers.

(i) Enterprise Resource Planning Project[5]

As detailed in the 2016 RRF Summary, Hydro Ottawa initiated a project to replace its centralized enterprise resource planning ("ERP") system to manage core functions related to finance, accounting, inventory and supply chain management, work order management, and human resources.

Over the course of 2017, numerous milestones were achieved in preparing for the ultimate deployment of the upgraded ERP system – especially in relation to employee training and change management.

As of the end of 2017, Phase 1 of this project (dubbed "Project Transformer"), encompassing ERP system upgrades for finance and human resource business units, was set to go live and be available to all employees by early January 2018.

[5] The finance system upgrade (JDE Application Upgrade) that is included under the scope of this initiative is one of the seven material General Plant investments included in Hydro Ottawa's 2016-2020 DSP.

(ii) Mobile Workforce Management[6]

Mobile Workforce Management ("MWM") is an automated scheduling and dispatch tool designed to optimize the scheduling and routing of work and crews to increase productivity and enhance customer service.

Following the first full year of MWM implementation in 2016, Hydro Ottawa expanded use of the tool in 2017 to its inspections group and forestry contractors, as well as to contract service trucks. In total, as of the end of 2017, 33 field crews were operating on the MWM system (representing an increase of 15% in the number of crews for whom the tool has been deployed).

One particular area in which the use of MWM matured and strengthened considerably in 2017 was the offering of a wider variety of appointment windows to customers. Hydro Ottawa was able to meet over 90% of all appointments booked with customers, with specific appointment arrival windows being as narrow as 30 minutes.

Additional groups within the company that will be targeted for MWM capability in 2018 include remaining plant and stations inspection resources.

(iii) Facilities Renewal Program[7]

With the approvals secured in its 2016-2020 Custom IR rate plan, Hydro Ottawa has embarked on a Facilities Renewal Program. This program will serve as a key modernization and operational efficiency initiative that will see the company consolidate administrative functions; relocate from obsolete, end of life facilities in 2019; improve productivity; enhance service through more strategically-located and better-equipped facilities; modernize the work environment and provide for future growth; promote sustainability, innovation, and flexibility; and enable Hydro Ottawa to be more customer-focused.

In 2017, Hydro Ottawa broke ground on the construction of its new East and South Campuses, and as of the end of the year, was proceeding on schedule with its project partners and contractors. In addition, the company launched the initial phases of an extensive internal change management program, the goal of which is to ensure a smooth and seamless migration of personnel, equipment, records, and other resources to the new facilities.

(iv) CC&B Enhancements[8]

An essential component – and determinant – of Hydro Ottawa's operational effectiveness is its Customer Care & Billing ("CC&B") system, which produces all of the customer invoices for the company. With the goal of continuing to enhance the services that are provided to customers, as well as to ensure compliance with the maintenance contract with the system vendor, Hydro Ottawa undertakes periodic upgrades to CC&B, on an as-needed basis.

In 2017, CC&B system enhancements included completion of system migration to a cloud-based platform, integration of direct deposit functionality, and implementation of an auto-dialer solution to replace hand delivery of disconnection notices (for further detail, see page 18 below).

As described in Hydro Ottawa's DSP, the most significant planned enhancement to CC&B is

[6] This initiative is among the seven material General Plant investments included in Hydro Ottawa's 2016-2020 DSP.
[7] *Ibid*.
[8] *Ibid*.

scheduled for 2019, at which time the system will be upgraded to the next full version contemplated by the vendor (version 3.0).

(v) Enterprise Architecture Program[9]

To support achieving the company's vision that information should be accessible when and where it is needed to support customer interaction and ongoing business operations, Hydro Ottawa set out to establish a standard architectural framework. The projected benefits of this initiative included improving integration, facilitating access to key data, re-engineering business processes to improve outcomes, productivity and efficiency, and implementing master data management.

Hydro Ottawa launched an Enterprise Architecture Program-Enterprise Service Bus project in 2014. As part of this project, a Service Oriented Architecture ("SOA") methodology for managing, measuring, executing, and optimizing processes was adopted within Hydro Ottawa to help better achieve business outcomes. A key component of the SOA methodology was the deployment of an Enterprise Service Bus ("ESB"), which establishes and prioritizes a standard architectural framework for all system and solution work across the company. ESB sought to leverage industry best practices and enable real-time integration of business applications.

The intended scope of the project from 2016 to 2020 was to focus on integrating applications via the ESB and automating major processes using SOA service orchestration. The integration would mainly involve integrating new applications to existing applications, seeing as Hydro Ottawa was expecting to deploy approximately 20 new applications over the course of its five-year rate plan.

However, in 2017, adjustments were made to this project for several reasons. First, work was deferred in light of the re-prioritization of various information technology ("IT") projects. Secondly, the departure of key staff personnel resulted in a reduction of the specialized expertise and skills necessary to ensure project success.

In turn, Hydro Ottawa began exploring alternative ways to pursue application integration – including through the potential use of a cloud-based solution that does not require a specialized skill set. Work is expected to continue on this effort throughout 2018 and 2019.

(vi) Smart Grid Deployment

A key component of Hydro Ottawa's 2016-2020 Custom IR application was the "Grid Transformation Action Plan." This plan catalogues a range of projects and initiatives that Hydro Ottawa will execute as part of supporting the implementation of a smart grid in Ontario, and as part of delivering on the vision enshrined in the company's *2016-2020 Strategic Direction* to become a leading partner in a smart energy future.

Much of 2017 was spent advancing the development of key projects which are expected to be fully executed during later years of the company's five-year rate plan. Major accomplishments in this regard included the following:

a. *SCADA System Upgrade* –The new hardware was received from the vendor and underwent significant testing and data conversion evaluation. In addition, training was launched and continued over the course of the year for the company's internal SCADA

[9] *Ibid*.

administrative team. As of the end of 2017, final cut-over to the new system was expected in Q1 2018.

b. *Telecommunications Master Plan* – Installation of dark fibre was ongoing throughout 2017 and transitioned into a more accelerated pace of work, following a re-organization of internal resources aimed at optimizing the design process. A third-party solutions provider was also retained to assist with provision and installation of all optical and networking equipment. Equipment deployment is set to continue in stages through 2019.

c. *Smart Grid Projects*

- **The GREAT DR** – Activity focused heavily on customer outreach and recruitment. In September 2017, approximately 2,500 letters were sent to prospective participants, with around 125 replies received. Following further narrowing down of the prospect pool, Hydro Ottawa invited over 40 prospective participants to a public information session held on November 6, 2017. At this session, attendees had the opportunity to learn more about the project trial and its benefits. Initial deployment and field testing was scheduled to occur in early 2018.

- **Ellwood Energy Storage Project** – This project is a 4 MW/2.7 MWh lithium ion battery energy storage facility that will be built by Canadian Solar as part of a three-year contract with the Independent Electricity System Operator ("IESO") for grid support and voltage control. The facility consists of several lithium ion battery modules that will inject energy into or take energy from the grid, in order to support grid stabilization in response to IESO operational directives. Hydro Ottawa is hosting this project on-site at its main office location. The original timeframe for project energization was Summer 2017. However, the proponent encountered several challenges and delays over the course of 2017 in procuring the lithium ion batteries from an overseas vendor. As a result, the targeted energization date has been pushed back into 2018.

- **Surplus Electric Baseload for Building Thermal** – In 2016, Hydro Ottawa was awarded funding through the City of Ottawa's Energy Evolution Catalyst Funding Program for a proof of concept solution using clean, efficient electricity to supplement the use of natural gas boilers for space heating.

  The solution was tested and modelled through a mock study involving the Building Automation System ("BAS") for Ottawa's City Hall. The software solution's optimization program determined the real-time marginal cost of electricity and compared it to prices for natural gas, and set-up historical tracking to record and report the input and output data to validate both dollar and greenhouse gas ("GHG") savings.

  The simulation ultimately yielded findings of an energy cost savings potential of at least $22,000 and 150 tonnes of CO_2 equivalent. Based on these results, the City of Ottawa is assessing various opportunities and scenarios, including enhancement of the software solution and installation of electric heating at municipal facilities. It is estimated that the solution has the potential to be replicated in approximately 30 City of Ottawa facilities.

d. *Smart Energy Steering Committee ("SESC")* – Hydro Ottawa's SESC was formed to provide leadership, oversight, coordination, and direction of the company's Smart Energy initiatives on both sides of the meter, through a whole-of-company, multi-year roadmap. In 2017, the committee focused on initiatives to achieve the company's goal of developing service offerings to enable provision of a 100% reliability electrical service guarantee to customers, and on formalizing an intake process for scoring and prioritizing Smart Energy projects based on a set of defined criteria (reliability and system resilience; customer benefit; innovation and technology; environmental sustainability; leveraging our infrastructure and people; and revenue growth and diversification).

(vii) <u>Planned Outage Communications</u>

On any given day, Hydro Ottawa plans multiple outages to complete its maintenance and capital projects. For customers, this can be very impactful. Hydro Ottawa's commitment is to provide customers with at least 48 hours' notice of the outage, so that they can plan accordingly. Historically, the company often used powerline maintainer ("PLM") staff to hand-deliver planned outage notices at the premises of affected customers. Over time, the use of highly-skilled staff resources for this purpose proved to be time consuming and sub-optimal from a cost-effectiveness perspective.

Accordingly, in late 2017 Hydro Ottawa launched an initiative to complete customer notifications using an alternative solution that would reduce costs, leverage existing technology and platforms, and support the company's broader adoption of digital – as opposed to paper-based – solutions.

The solution contemplated would allow Hydro Ottawa to utilize an existing platform known as Tough Logic to make outbound calls to all phone numbers associated with a customer account in order to inform them of the planned outage. The company's service desk team would use pole and transformer nomenclature lists to extract a list of impacted customers from the GIS system. Tough Logic enables the uploading of the list of customers and phone numbers – along with the date, time, and duration of the planned outages – and the transmission of phone calls at a cost of $0.12 per minute. As part of the project scope, Hydro Ottawa recorded different messages for service desk and forestry work, along with cancellation notifications in the event that a project is impacted by weather or other circumstances.

Expected benefits of this initiative include the following:

1. Timely dissemination of planned outage notifications (and cancellations, where appropriate)
2. Ability to disseminate notifications on an expedited basis, in the event of such occurrences as emergency tree removals
3. Elimination of the need to coordinate the printing of hard copy notices and to manually fill out door knocker cards
4. Re-direction of skilled PLM resources to higher-priority capital and maintenance work
5. Optimization of existing technology and platforms, as opposed to the introduction of another solution or system into the company's IT architecture
6. Support for corporate-wide migration to paperless environment

As of the end of 2017, the initiative was scheduled to be fully implemented by mid-2018.

(viii) Fleet Replacement[10]

Hydro Ottawa's fleet service is responsible for the maintenance and management of approximately 230 vehicles.

Hydro Ottawa maintains a multiple-year capital plan to effectively manage its fleet assets. This plan is an essential tool for both short- and long-term planning and budgeting. Fleet replacement is required to support the day-to-day business activities and to sustain operations by minimizing down-time and total vehicle lifecycle costs.

Major developments that occurred in 2017 as part of Hydro Ottawa's ongoing implementation of its fleet management and replacement plans were the following:

- *Acquisition of extended-reach bucket trucks:* In recent years, Hydro Ottawa has observed a considerable uptick in the number of system access, renewal, and service projects for which bucket trucks with an extended reach are required (e.g. pole replacements and new installs located higher off and further away from the road). Procurement research revealed that trucks with extended reach and larger capacity would cost significantly more than a conventional bucket truck with a 65-foot reach. The solution that was ultimately pursued involved the purchase of 65-foot units equipped with 12-foot bed elevators, offering a 77-foot reach and an 83-foot working height from the bucket. The purchase of two of these units resulted in savings of $108,000 relative to the price of conventional units.

- *Deployment of "mini" bucket trucks:* Hydro Ottawa successfully experimented with the use of "backyard" bucket trucks. Track-mounted and designed for work in narrow, difficult-to-access areas such as residential backyards, these miniature units make digging, setting utility poles, restoring power, and maintaining power lines both safer and more efficient. Hydro Ottawa tested units with reaches of 47 feet and 58 feet, and found them to yield several positive outcomes in a field environment. Use of these mini trucks has also reduced the need for the following: crane rentals to assist with backyard pole replacement projects (translating into cost savings); planned outages in situations where crews perform work in areas with constrained access; and pole climbing by crews, thereby enhancing worker safety and comfort. Based on the early, encouraging experience with these trucks, Hydro Ottawa plans to continue using them and examine opportunities for expanding their application as well.

(ix) Fleet GPS Installation

As noted in Hydro Ottawa's 2016 RRF Summary, the company launched a GPS Evaluation & Implementation Project in 2016 to install and configure a new fleet service Global Positioning Solution ("GPS") solution.

Over the course of 2017, several major milestones were achieved in project execution:

- Installation of new GPS tracking devices and Wi-Fi hotspot devices into fleet vehicles;
- Configuration of Software as a Service ("SaaS") database solution;
- Transition of Commercial Vehicle Operator's Registration ("CVOR") vehicles to a web-enabled process for Hours of Service and Driver's Vehicle Inspection Reporting; and

[10] *Ibid*.

- Training for more than 175 managers, supervisors, drivers, and administrative assistants.

As of the end of 2017, additional project integration, training, and close-out activity was scheduled for completion by Q2 2018.

(x) Cybersecurity Program

Since 2012, Hydro Ottawa has had a formal, robust cybersecurity program in place, in which an annual roadmap of deliverables is defined and executed. For the first several years, the program was anchored in the ISO 27000 series of standards governing information security. Subsequently, in 2016, Hydro Ottawa began implementing core components of the Cyber Security Framework developed by the U.S. National Institute of Standards and Technology ("NIST"). The decision to begin adhering to the NIST Framework was based, in part, upon the results of a third-party maturity assessment, which underscored a broader shift taking place across the North American electric utility industry in adopting the Framework.

In 2017, areas of focus for Hydro Ottawa revolved around the "Identify" and "Detect" functions, as outlined in the NIST Framework. Activities included enhancing the company's focus on governance and risk management through the updating of corporate policies, procedures, and guidelines, as well as the tracking of cybersecurity risks across the company. In addition, Hydro Ottawa launched a pilot project with an external cyber security firm, Stratejm. Stratejm will provide a managed security service solution to Hydro Ottawa, alongside the implementation of advanced auditing, alert, and detective capabilities through automated workflow. The pilot project is scheduled to wrap-up in 2018.

Likewise, as noted below on pages 25-26, Hydro Ottawa participated fulsomely over the course of 2017 in the work of the OEB's Cyber Security Steering Committee and Cyber Security Working Group to assist in the establishment of cyber security policy and reporting requirements for OEB-regulated utilities.

(xi) Automated Outbound Calling System for Disconnect Notices

In October 2017, Hydro Ottawa implemented an automated outbound calling system to replace its previous hand delivery of Disconnect Notices. As part of the new approach, the company will no longer roll a truck to the service address for residential and small commercial customers who are within 48 hours of service disconnection.

With this solution, all Disconnect Notices will be considered 100% delivered, so long as there is a working customer telephone number. For those customers who do not have a valid telephone number, Hydro Ottawa will maintain its previous Disconnection Notice delivery process.

For larger commercial customers, they will receive live phone calls from Hydro Ottawa customer service agents, should they be within 48 hours of disconnection. In the case of not reaching these customers via an agent phone call, the company's traditional delivery process will be followed.

At the time of receiving the automated phone call from Hydro Ottawa, customers are able to switch to a live agent to discuss payment arrangements. Customers also have the option of making a payment by credit card.

This new automated process will involve Hydro Ottawa's CC&B system generating a contact note with the corresponding time and date stamp of the call, along with the telephone number dialed and the balance outstanding. All calls will be delivered in the customer's language of choice.

Through this new approach, Hydro Ottawa became one of the first utilities in Ontario to fully integrate an automated outbound calling system into its collections processes.

These changes will yield several benefits. From a cost savings perspective, this functionality has already helped to achieve savings, as it enabled Hydro Ottawa to discontinue a contract with an external service provider that had been retained to support delivery of Disconnect Notices and service reconnections. Expected savings associated with discontinuance of this contractual arrangement are approximately $300,000 per year.

Similarly, this tool will lead to greater efficiency in the use of Hydro Ottawa's collections resources – in particular, by allowing field representatives to focus on the installation of 7,000 remote disconnect/reconnect meters per year and on the execution of actual service disconnects for non-payment.[11] In addition, the movement away from paper-based Disconnect Notices will reduce the company's environmental footprint.

Likewise, as a result of this automation, Hydro Ottawa has observed a 65% payment rate within a few days of the call being received by the customer.

As a final note, Hydro Ottawa wishes to emphasize that, during the Disconnection Ban Period in which LDCs are prohibited from disconnecting residential customers for reason of non-payment, automated calls to customers are utilized strictly for purposes of extending payment reminders.

(xii) Field Crew Operational Efficiencies

In November 2017, the OEB amended the licenses of all electricity distributors in Ontario to prohibit the disconnection of residential customers by reason of non-payment from November 15th in one year to April 30th in the following year. One practical effect of the prohibition was an impact on the workload of the collections field representatives employed by Hydro Ottawa.

During the Disconnection Ban Period, Hydro Ottawa re-deployed these personnel to assist with other areas of company operations, including the following activities: removal and replacement of approximately 1,800 transformer labels; flagging services for construction and maintenance crews; field checks on meters for which remote reads are not feasible; investigations into meter data service requests and inquiries requiring additional analysis or troubleshooting; and overhaul and clean-up of warehouse and storage inventory. Through this approach, Hydro Ottawa ensured the efficient scheduling and use of collections field personnel for the benefit of customers and the company.

(xiii) Workforce Planning

In 2017, Hydro Ottawa achieved savings of $30,000 by transferring the training costs for powerline technician apprentices to an in-house Training Delivery Agent ("TDA") program, which was developed and is administered in partnership with Algonquin College. The TDA program was also expanded in 2017 to offer training services to other utilities and utility contractors.

[11] To confirm, in 2017 Hydro Ottawa was successful in reaching its target of installing 7,000 new remote disconnect meters.

3. Public Policy Responsiveness

"Utilities are expected to consider public policy objectives in their business planning and to deliver on the obligations required of regulated utilities. These obligations may evolve over time and therefore this Handbook does not provide a comprehensive list of all requirements. Utilities are expected to demonstrate that they have considered Conservation First in their investment decisions. The OEB will expect to see proposals for how distributors are supporting low income customers through programs such as LEAP and/or OESP, or through other distributor-specific programs. Electricity distributors and transmitters are expected to expand or reinforce their systems to accommodate the connection to their system for renewable energy generation facilities and the OEB expects their system plans to include details on how they will meet this requirement. Natural gas utilities are expected to identify investments or programs that have been planned to meet obligations under Ontario's cap and trade program."

This section of the Annual Summary highlights how Hydro Ottawa is (a) delivering on obligations mandated by government through legislation, Ministerial directives, and regulatory requirements; and (b) achieving outcomes that are aligned with the RRF's Public Policy Responsiveness category.

(i) Fair Hydro Plan Implementation

Arguably, the most significant public policy obligation for Hydro Ottawa in 2017 was the implementation of the Fair Hydro Plan ("FHP"). Announced in March 2017, the FHP consists of various rate mitigation measures which, taken together, are lowering electricity bills for residential, farm, and small business customers by an average of 25%. The reduction of 25% includes the 8% Provincial Rebate introduced in January 2017.

The core components of the FHP are the following:

- Re-financing of a portion of the Global Adjustment ("GA"), with the costs of clean energy investments spread out over a longer period of time;
- Increasing the Ontario Electricity Support Program ("OESP") credit by 50%, broadening eligibility requirements for the program, and shifting program costs from provincial electricity ratepayers to the tax base; and
- Enhancement of the Rural and Remote Rate Protection ("RRRP") program, including by shifting program costs from ratepayers to the tax base.

In addition, these proposals were accompanied by other actions intended to provide rate relief to different customer classes: reduction of the eligibility threshold for the Industrial Conservation Initiative ("ICI"); elimination of the delivery charge for all on-reserve First Nations households; and establishment of an Affordability Fund to assist customers who do not qualify for low-income conservation programs and are unable to undertake energy efficiency improvements without financial assistance.

Enabling legislation – *The Fair Hydro Act, 2017* – was passed on May 31, 2017 and came into effect on June 1, 2017. The implementation date for the majority of the FHP's programs was July 1, 2017.

Hydro Ottawa undertook a wide array of actions to ensure smooth implementation of the FHP for customers. Numerous briefings and information sessions were held for internal stakeholders, so as to achieve a robust level of awareness across the company of the FHP's programs, as well as Hydro Ottawa's assorted obligations under the plan. The company also sought to ensure a high level of awareness among customers regarding the relevant components of the FHP through the establishment of a dedicated page on its public website;[12] distribution of Ministry of Energy ("MOE") bill inserts on a quarterly basis; communications shared through on-envelope, on-bill, and on-hold messaging; preparation of background information and key messages for Customer Contact Centre call agents; and social media outreach.

In addition, Hydro Ottawa supported the effective implementation of the FHP through direct participation in the Electricity Rate Mitigation Working Group formed by the MOE to solicit input on operational and technical matters related to the programs. (This was the same working group convened by MOE in Fall 2016 to seek input on matters related to the implementation of the 8% Provincial Rebate).

(ii) Conservation Results

Hydro Ottawa delivered exceptional results through its Conservation and Demand Management ("CDM") programming in 2017, with energy savings totaling 108 GWh. This result is 1.8 times greater than the results achieved in 2016 and is the equivalent of 27% of the company's allocated target of 395 GWh under the province's Conservation First Framework ("CFF"). As of the end of 2017, Hydro Ottawa had achieved 69.98% of its six-year CFF target. In terms of overall energy savings on a kWh basis, the company ranked 4th amongst Ontario distributors in 2017.

In addition, Hydro Ottawa was recognized by its peers for excellence in the promotion of Save on Energy programs. At the inaugural "Powerful Ideas" conference hosted by the IESO in June 2017, Hydro Ottawa received three awards for best-in-class projects involving sales and marketing: Best Creative, Large LDC (re-design of Home Show Display Booth), Best in Show (advertising promotions for Hydro Ottawa's "Save Your Energy for What Matters" campaign), and Best Sales Tactic (Lighting Worksheet tool to identify costs and payback associated with lighting retrofits, that has subsequently been adopted by many LDCs across the province).

Similarly, Hydro Ottawa distinguished itself as a leader in the delivery of CDM customer service and sales training to other LDCs in Ontario, as well as channel partners in its service territory. The company collaborated with IESO and Enbridge in offering training courses to local channel partners during January and February 2017, with the aim of boosting these organizations' success in sales and service to end-user customers. Thereafter, this pilot program was extended to five cities across Ontario.

(iii) Redesign Action Plan/Bill Presentment

In conjunction with the implementation of the FHP, MOE initiated a Redesign Action Plan aimed at simplifying bill presentment and optimizing key elements of electricity invoices. Hydro Ottawa participated in the working group that was struck in July 2017 to advise MOE staff on areas for improving bill presentment and to assist with the development of a new regulatory framework for invoicing. As of the end of 2017, MOE had published proposed regulatory amendments to

[12] https://hydroottawa.com/accounts-and-billing/residential/rates-and-conditions/ontarios-fair-hydro-plan (Accessed November 1, 2017).

prescribe invoicing requirements in order to implement a bill that is redesigned to meet the needs of Ontario consumers and was reviewing comments submitted by stakeholders.

(iv) Climate Change Action Plan Working Group
Throughout 2017, the inter-departmental Climate Change Action Plan Working Group ("CCAP-WG") formed by Hydro Ottawa met to discuss matters related to the roll-out of various initiatives under the government's Climate Change Action Plan ("CCAP").

The CCAP-WG focused its attention primarily on programs with a direct impact on Hydro Ottawa and its customers. Chief among these were the following:

- *Ontario Climate Change Solutions Deployment Corporation* – incorporated pursuant to O.Reg. 46/17 and publicly launched under the "Green Ontario Fund" brand in August 2017, this organization was set up to stimulate development of industry, trades and business undertakings in Ontario that would further the deployment of commercially available technology to reduce GHG emissions from buildings and from the production of goods.

  Hydro Ottawa sought to support the uptake of Green Ontario Fund programs among its customer base by taking such actions as adding information and links to the Fund on the company's Save on Energy "Incentives and Rebates" webpage and through social media outreach.

- *Amendment to Electric Vehicle Requirements in the 2012 Building Code* – in May 2017, the Building Code was amended through O. Reg. 139/17 to include new requirements for "electric vehicle ready" homes and businesses. More specifically, provisions were added to the Building Code stipulating that (i) all new homes and townhomes with garages, carports, or driveways must be equipped with a 200 amp panelboard to allow for the future installation of electric vehicle ("EV") supply equipment, and (ii) all new commercial office buildings and workplaces (where parking is provided within the building) must have at least 20% of parking spaces equipped with EV supply equipment.

  These requirements were slated to take effect on January 1, 2018. However, in the lead-up to the effective date, it became apparent that interpretations of how to apply these requirements differed between certain stakeholder groups. Hydro Ottawa played a lead role amongst Ontario LDCs in providing guidance to the Ministry of Municipal Affairs on the development of transition provisions to support the smooth implementation of these requirements. These transition provisions were formalized in December 2017 and helped carve out a clear, reasonable implementation path forward for all parties.

(v) Energy and Water Reporting and Benchmarking
O.Reg. 20/17: Reporting of Energy Consumption and Water Use was finalized and published in February 2017. The goal of the regulation is to assist Ontario in meeting its energy conservation and GHG-reduction objectives by requiring building owners to submit reports on their energy and water use, and to benchmark their consumption against comparator buildings. Under the regulation, LDCs are obligated to provide yearly electricity consumption data to building owners, upon request.

Following publication of O.Reg. 20/17, Hydro Ottawa convened internal stakeholders to raise awareness around the new requirements and to assign compliance accountabilities to relevant business units. As of the end of 2017, applicable business units had engaged in several months of preparation for customer education and outreach initiatives, which were scheduled for roll-out in early Q1 2018.

In addition, Hydro Ottawa volunteered to participate in a working group of utility representatives that was formed by MOE to offer guidance on numerous technical matters related to the provision of electricity consumption data to building owners. This working group convened on three separate occasions over the course of Fall 2017. One of the most consequential initial deliverables for this working group was the launch of pilot projects to test utilities' business processes and systems for data reporting. Hydro Ottawa successfully supported the participation of four Ottawa-area building owners in the pilot.

(vi) Regulatory Compliance Project

As noted in the 2016 RRF Summary, Hydro Ottawa undertook a formal review of its regulatory compliance program in 2016. The goals of the review were to assess the effectiveness of the company's existing compliance program and associated business practices; identify both gaps and best practices; and develop and implement solutions for program re-design, including formal documentation to facilitate enhanced compliance.

In 2017, the first major phase of this initiative was completed. It consisted of compliance review sessions which were held with key internal stakeholders and which were facilitated by the external consultant retained by Hydro Ottawa. Participating stakeholders were those who are directly involved in regulatory reporting and compliance activities on behalf of the company.

Based upon the input received at these sessions, and together with separate research and mapping exercises performed by the consultant, Hydro Ottawa was able to produce a compliance catalogue documenting all relevant processes and tools. This catalogue will serve as a repository for all OEB (and IESO) compliance requirements and process maps. Perhaps most importantly, the catalogue incorporates a RACI matrix to establish stakeholder roles and responsibilities for each compliance requirement as follows: responsible, accountable, consulted, or informed ("RACI").

The second phase of this project will focus on applying the tools developed in Phase 1 to assess the quality and reliability of reported information, associated internal business processes, and evidentiary material. A key component will be a compliance review pilot program involving internal business units across the company. The pilot is scheduled to commence in Q1 2018.

(vii) Low-Income Customer Support

In 2017, 12,074 Hydro Ottawa customers collectively received $5.9 million in financial assistance through the Ontario Electricity Support Program ("OESP"), 476 customers accessed emergency relief through the Low-Income Energy Assistance Program ("LEAP"), and 924 households participated in the Home Assistance Program ("HAP").

Hydro Ottawa continued to raise customer awareness of these programs through such actions as the inclusion of information for low-income customers on the home page of its public website, creation of a page specific to low-income programs, on-bill and on-hold messaging, and outreach via social media. During collections calls and collection field visits, the company makes every attempt to inform customers of available low-income support programs. In addition, in 2017 Hydro Ottawa began developing a financial assistance brochure for customers that would cover the entire range of programs available. As of the end of 2017, this brochure was scheduled for distribution in early 2018.

(viii) Integration of Renewable Energy Generation

Hydro Ottawa has remained active in facilitating the connection of renewable energy facilities since the passage of the *Green Energy and Green Economy Act* in 2009 and the predecessor Renewable Energy Standard Offer Program in 2006. In 2017, Hydro Ottawa connected 8,646.88 kW of embedded generation, with embedded generation in the company's service territory now totaling 80,554 kW. Connections in 2017 were comprised of 59 embedded generation facilities totaling 8,641 kW, along with 5.88 kW of net metered solar generation.

(ix) Collaboration with Natural Resources Canada on Electric Vehicles Study

In 2016, Hydro Ottawa became a partner in a research project initiated by Natural Resources Canada ("NRCan") and funded through the department's Energy Innovation Program. The project was launched to increase learning around the impact of direct current fast charging ("DCFC") EV chargers on local distribution networks. More specifically, Hydro Ottawa and NRCan investigated the need for DCFCs in Ottawa, the locations at which they will likely be installed, and their impact on the distribution grid for different scenarios of EV penetration for the period 2017-2037. Hydro Ottawa committed in-kind support to the project.

The study – entitled "Impact of Clusters of DC Fast Charging Stations on the Electricity Distribution Grid in Ottawa, Canada" – was published in October 2017, in conjunction with the international EVS30 Symposium held in Germany. Key findings in the study were as follows:

- EV growth over the next 20 years will require the installation of a large number of DCFCs to facilitate long-distance travelling and provide charging opportunities for EV owners who cannot charge at home.
- The impact of the large load of DCFC clusters on the distribution grid was found to be fairly limited. It should not be a problem for Hydro Ottawa to prepare for grid impacts, given the 20-year period over which these impacts will slowly increase.
- The dynamic impact of the large load of DCFC clusters on the distribution grid will need to be taken into account in the installation phase to ensure the proper operation of the grid. Most feeders in Ottawa will allow the installation of DCFCs without upgrades to the distribution grid.

Hydro Ottawa is confident that the results of this study will play a value-added role in helping the company plan and prepare for increased penetration of EVs across its service territory.

(x) Participation in OEB, Government & IESO Working Groups

Hydro Ottawa strives to support the development and implementation of robust public policy that will enable movement towards a smart, sustainable energy future for Ontario. As evidence of this commitment, Table 1 below identifies representatives from the company who constructively contributed to the formulation of effective regulations and policies through formal participation on OEB, government, and IESO working groups over the course of 2017.

Table 1 – Hydro Ottawa Participants in OEB, Government & IESO Working Groups

Name	Title	Working Group	Government/Sector Organization
Raed Abdullah	Distribution Engineer	Smart Grid	Ministry of Energy
Sally Barakat	Manager, Meter to Cash Support	Electricity Rate Mitigation	Ministry of Energy
		Smart Metering Entity (SME) Licence Order	Independent Electricity System Operator
April Barrie	Manager, Rates & Revenue	Energy Retailer Service Charges (EB-2015-0304)	Ontario Energy Board
Susan Barrett	Manager, Communications	Redesign Action Plan	Ministry of Energy
Bruce Bibby	Manager, Conservation Programs	Conservation First Implementation Committee	Independent Electricity System Operator
Patrick Brown	Manager, Regulatory Policy & Research	Data Strategy Advisory Council	Independent Electricity System Operator
Linda Bruce	Supervisor, Conservation	Residential Working Group	Independent Electricity System Operator
Mark Fernandes	Chief Information & Technology Officer	Cyber Security Steering Committee – Protecting Privacy of Personal Information and the Reliable Operation of the Smart Grid in Ontario (EB-2016-0032)	Ontario Energy Board
		Energy Transformation Network of Ontario	Independent Electricity System Operator
Benjamin Hazlett	Manager, Distribution Policies & Standards	Pole Attachment Working Group (EB-2015-0304)	Ontario Energy Board
Shane Labrash	Program Officer, CDM	Business Working Group – Lighting Sub-group	Independent Electricity System Operator

Name	Title	Working Group	Government/Sector Organization
Jojo Maalouf	Manager, IT Security	Cyber Security Working Group – Protecting Privacy of Personal Information and the Reliable Operation of the Smart Grid in Ontario (EB-2016-0032)	Ontario Energy Board
Casey Malone	Manager, Distribution Policies & Standards	Pole Attachment Working Group (EB-2015-0304)	Ontario Energy Board
Matthew McGrath	Supervisor, Asset Management	Regional Planning and Cost Allocation Review (EB-2016-0003)	Ontario Energy Board
Joel McGuire	Supervisor, Data Systems Metering	Free Overnight Charging for Electric Vehicles	Ministry of Energy
Chantal Nault	Manager, Systems Projects	Financial Assistance Working Group	Ontario Energy Board
Michel Provost	Manager, Billing, Collections & MDS	Electricity Rate Mitigation	Ministry of Energy
		Smart Metering Entity Steering Committee	Independent Electricity System Operator
		Smart Metering Entity (SME) Licence Order	Independent Electricity System Operator
		Financial Assistance Working Group	Ontario Energy Board
Gregory Van Dusen	Director, Regulatory Affairs	Regulatory Affairs Standing Committee	Ontario Energy Board
Charles Zaloum	Supervisor, Conservation	Business Working Group	Independent Electricity System Operator

4. Financial Performance

"Utilities are expected to demonstrate sustainable improvements in their efficiency and in doing so will have the opportunity to earn a fair return. The OEB will monitor the financial performance of each utility to assess continuing financial viability and to determine whether returns are excessive. Utilities have a choice of rate-setting methods to meet their particular needs. Additional tools are available to support infrastructure investment. Utilities must report comprehensive and consistent information, allowing for comparisons over time and across utilities. The OEB will act on its obligations to ensure a financially viable sector where performance indicates that a regulatory response is needed."

This section of the Annual Summary highlights how Hydro Ottawa is (a) creating sustainable growth in its business and earnings; and (b) achieving outcomes that are aligned with the RRF's Financial Performance category.

As noted on page 12, this section does not include information on capital spending undertaken by Hydro Ottawa. Hydro Ottawa is obligated to submit annual reports to the OEB on its actual capital spending on a program level. Please consult these annual reports for information on the progress in Hydro Ottawa's capital expenditures against its DSP.

(i) Financial Results

Hydro Ottawa continued to achieve strong financial results in the second year of its approved Custom IR rate plan. For example, distribution revenue increased $5.1 million (or 2.8%) over 2016. The company also increased its net income by $2.1 million over the previous year, for a total of $36.5 million. In addition, the company's liquidity ratio set another new record high, increasing to 1.23. Finally, Hydro Ottawa witnessed steady year-over-year growth in its actual return on equity ("ROE") as well, with an ROE of 10.1%.

With respect to Hydro Ottawa's debt to equity ratio, for the past three years the company has carried a higher ratio as a result of the significant capital expenditure program required to replace aging distribution system infrastructure. Although Hydro Ottawa is more highly leveraged than the deemed capital structure, the company has been able to keep its cost of borrowing very low due to favourable interest rates on its long-term debt.

(ii) Dividend

Hydro Ottawa's robust financial performance in 2017 also helped produce another new record. Its strong financial results generated a dividend of $11.9 million for the holding company, thereby positioning the holding company to make the largest dividend payment to the enterprise's sole shareholder – the City of Ottawa – in its history.[13] The holding company's 2017 dividend totaled $21.9 million, representing a 6.3% increase over 2016. Likewise, the payment was $1.9 million higher than the $20 million floor for the dividend payment, which was established pursuant to a revised dividend policy adopted in 2016.

[13] The annual dividend paid by Hydro Ottawa to the holding company is based on the previous year's results. Accordingly, the dividend based on 2017 results was paid in 2018. The same applies for the dividend paid by the holding company to the shareholder.

Together with the increase in the company's ROE, the year-over-year growth in the Hydro Ottawa's dividend payment bodes well for the company's ability to continue providing strong value to both its shareholder and its customers into the future.

III. Conclusion

This 2017 RRF Summary describes the numerous outcomes achieved by Hydro Ottawa over the course of 2017 that were guided by RRF objectives and expectations.

Hydro Ottawa is pleased to be able to report that 2017 featured a broad range of milestones that underscore a strong level of performance across the four areas of focus underpinning the RRF. These include, but are not limited to, the transition to a new Customer Contact Centre, roll-out of a mobile application for residential customers, continued progress in the transformation of the company's enterprise resource planning platform, exceptional results in CDM programming, highest shareholder dividend payment in the company's history, timely and smooth implementation of all Fair Hydro Plan requirements, and a $1 million reduction in OM&A expenses.

Hydro Ottawa is confident that the 2017 RRF Summary serves to illustrate the company's commitment to continuous improvement and to the incorporation of RRF principles across its business operations.

Hydro Ottawa looks forward to preparing and presenting the next version of its annual summary for the year 2018.

Version History Tracking

Version	Author	Date Revised	Description of Changes
Version 1	Regulatory Affairs	December 2018	N/A – initial release
Version 2	Regulatory Affairs	October 2019	Revisions to section II., 3. Public Policy Responsiveness, (x) Participation in OEB, Government & IESO Working Group (addition of participant in OEB Regulatory Affairs Standing Committee). Revisions to section II., 4. Financial Performance, (ii) Dividend Payment (addition of clarifying language).
Version 3	Regulatory Affairs	December 2019	Revisions to section II., 2. Operational Effectiveness, (viii) Fleet Replacement (addition of clarifying language).

2018 Annual Summary

Achieving Ontario Energy Board Renewed Regulatory Framework Performance Outcomes

Prepared by: Hydro Ottawa Limited

Date: October 2019

(Revised: December 2019)

Table of Contents

I. Overview

1. Background – Hydro Ottawa's Annual Summaries of Initiatives Aligned with the RRF

In September 2017, Hydro Ottawa Limited ("Hydro Ottawa") finalized a document entitled *2016 Annual Summary: Achieving Ontario Energy Board Renewed Regulatory Framework Performance Outcomes.* The document summarized initiatives at Hydro Ottawa that were launched, were ongoing, or were completed during 2016, and that aligned with the core performance outcomes enshrined in the Ontario Energy Board's ("OEB") Renewed Regulatory Framework ("RRF").

As stated therein, the value and purpose of that document was the following:

1. Support the preparation of the annual rate adjustment application and annual report on capital spending, which Hydro Ottawa is obligated to submit to the OEB under the terms of the settlement agreement governing its Custom IR rate plan;

2. Support the preparation of the next Custom IR application that Hydro Ottawa plans to file, for the 2021-2025 period;

3. Help foster a culture of continuous improvement within Hydro Ottawa; and

4. Help ensure that the execution of the company's business plans and capital investment programs over the course of its Custom IR term are guided by the expectations and goals embedded in the RRF.

The aforementioned document (hereinafter referred to as the "2016 RRF Summary") also signaled Hydro Ottawa's intention to prepare an annual summary of a similar nature for each of the five years in its 2016-2020 Custom IR term.

2. Hydro Ottawa's Third Annual RRF Summary (For 2018 Initiatives)

Hydro Ottawa is hereby pleased to present the third version of this annual summary (hereinafter referred to as the "2018 RRF Summary"). The pages below serve as a catalogue of Hydro Ottawa's initiatives from the year 2018 that were in direct alignment with the OEB's RRF performance categories.

In order to avoid duplication and optimize the efficiency of review, this 2018 RRF Summary does not duplicate any of the background sections included in previous versions of this document – namely, the detailed information provided on the OEB's RRF and four performance categories, as well as on Hydro Ottawa's five-year Custom IR rate plan and corporate strategic direction.

In addition, for those initiatives which were either launched or were underway in 2016 and/or 2017, and which witnessed a milestone, deliverable, or culmination in 2018, this 2018 RRF Summary likewise does not offer a detailed description of that initiative. Instead, only the incremental information of relevance for 2018 is highlighted.

Similar to previous versions of this annual summary, the 2018 RRF Summary is organized around the four principal performance outcomes enshrined under the RRF: (i) Customer Focus; (ii) Operational Effectiveness; (iii) Public Policy Responsiveness; and (iv) Financial Performance.

Moreover, in step with past years, it remains Hydro Ottawa's intent that this document be suitable for submittal to the OEB at a later date, as appropriate.

In sum, Hydro Ottawa trusts that the 2018 RRF Summary reflects the company's commitment to cement the principles of the RRF throughout its operations and business, to execute the company's corporate plans and capital investment programs in accordance with RRF objectives, and to continually align its interests with those of its customers.

II. Hydro Ottawa Initiatives by RRF Performance Outcome Category

1. Customer Focus

"Customer engagement is now an explicit and important component of the regulatory framework. Utilities are expected to develop a genuine understanding of their customers' interests and preferences and reflect those interests and preferences in their business plans. Utilities are expected to demonstrate value for money by delivering genuine benefits to customers and by providing services in a manner which is responsive to customer preferences."

As noted in Hydro Ottawa's 2016 RRF Summary:

- Hydro Ottawa's *2016-2020 Strategic Direction* is anchored in the imperative that the company will seek to put the customer at the centre of everything it does.
- Hydro Ottawa's vision is that by 2020, the customer experience will be driven by choice – the customer's choice. Customers will be given options to allow them to be in control and to interact with Hydro Ottawa how and when they want.
- Hydro Ottawa has crafted a five-year Customer Experience Roadmap, the timeframe of which is aligned with that of the company's Strategic Direction and Custom IR term. It serves as an integrated, "whole of company" roadmap for Hydro Ottawa's customer experience journey.

The initiatives highlighted in this section of the 2018 RRF Summary illustrate the progress being achieved by Hydro Ottawa in (a) delivering on the commitments in its Custom IR application and Customer Experience Roadmap, as they relate to enhanced customer engagement across a range of touchpoints; and (b) achieving outcomes that are aligned with the RRF's Customer Focus category.

(i) Enterprise Communications Platform

As noted in the 2016 and 2017 versions of this RRF Summary, Hydro Ottawa has been in the process of transforming many of its tools for communicating with customers. Key milestones achieved in 2018 in the ongoing implementation of this initiative were the following:

a. Customer Contact Centre Enhancements

The migration of Hydro Ottawa's Customer Contact Centre to a new service provider in 2017 opened the door to improved service offerings for customers. One such example is the availability of translation services in up to 120 languages (alongside service in both English and French). Communicating with customers in their preferred language is integral to the customer-centric service Hydro Ottawa provides.

To ensure the company had customers' language preferences on file, along with up-to-date contact information, Hydro Ottawa launched a "Your preference matters" campaign in early 2018. Residential customers were encouraged to login to their online account to review their language preference, telephone numbers, and email address. Customers who updated their preferences during the campaign period were entered into a contest to win one of three tablets. Residential customers with an up-to-date online account were also automatically entered into the contest. This initiative was promoted in customer communications, advertisements, and social media.

As part of its evaluation of the benefits associated with its new call centre, Hydro Ottawa implemented a metric which tracks the number of customer calls received in which translation services were requested. In 2018, 134 such calls were received from customers speaking 20 different languages, representing 0.06% of the overall number of calls received.

b. Outage Communications[1]

Piggybacking upon a suite of changes made to its outage communications system in 2017, Hydro Ottawa made additional enhancements over the course of 2018. These included equipping customers with the ability to report outages through Hydro Ottawa's website and mobile application.

Moreover, Hydro Ottawa gained valuable insights into the limitations of its online outage map, in the aftermath of the September 2018 tornadoes that touched down in the National Capital Region. (See page 12 below for more details). At the peak of the event, high volumes of customer traffic led to technical difficulties with the availability and accuracy of outage information.[2] In light of the discovery of this vulnerability, a strategic decision was made to suppress the outage maps in favour of maintaining an online presence during the event. However, the public reaction to this action was generally negative, prompting the company to troubleshoot and develop a stop-gap solution to restore the outage maps. In collaboration with the Outage Management System vendor, Hydro Ottawa was able to expedite the implementation of an outage map hosted within Microsoft Azure Cloud that was able to withstand sustained high traffic volumes over the course of consecutive days, until service was fully restored.

Based on this successful model, Hydro Ottawa now possesses the capability to develop a stop-gap outage map solution that will alleviate system resources during high traffic volumes until such time that the main website (hydroottawa.com) has been re-platformed and/or a new solution can be sourced. What's more, the experience yielded additional fruit in the form of new features for the map that were not previously supported: an address search that will zoom to the address entered and pin the location; current location identifier (based on where the user is located, the identifier will zoom in and pin the location); and distinct pin symbols that differentiate between planned outages (orange polygon) and unplanned outages (red polygon).

In April 2018, the company earned recognition for its successful efforts to enhance the online customer experience during outages. This recognition took the form of a Best Practices Award in Outage Communications from Chartwell. The award acknowledged Hydro Ottawa's multi-solution efforts, including leveraging video on social media (for example, through the use of drone footage) and utilization of the mobile app that was rolled out in 2017.

[1] This initiative is one of seven "material investments" under the General Plant category that are included in Hydro Ottawa's 2016-2020 Distribution System Plan ("DSP").
[2] To put the post-tornado online customer traffic in its proper context, Hydro Ottawa wishes to offer the following information. From the afternoon of September 21, 2018 (when the tornadoes first touched down) to September 22, 2018 at 12:00 pm, Hydro Ottawa's website processed over 1 million unique pageviews. This represents the equivalent of the average year's worth of site traffic.

(ii) Behavioural Savings Program

Over the first full year of implementing its Behavioural Savings Program for residential customers, Hydro Ottawa gained many valuable insights into customer needs and preferences. The program includes a mobile application, Home Energy Report emails, and a personalized web portal for obtaining valuable insights on energy consumption.

Through the program, Home Energy Reports are provided to customers free of charge. The Home Energy Reports are personalized emails that offer a variety of information, including the following: a monthly summary of electricity use and costs, personalized energy-saving tips, neighbourhood comparisons, bill projections, high usage alerts, and more. In each email, customers are asked to provide feedback as to whether the email was useful or not, as well as why they liked or disliked the email and its content.

Hydro Ottawa then compiled feedback and inputted the results into dashboard reporting. The reporting included the percentage of negative and positive feedback, the number of customer comments per email type (e.g. neighbourhood comparison vs. monthly summary), and trending reasons motivating the feedback rating.

In addition to the Home Energy Report feedback, Hydro Ottawa monitored the mobile app reviews and ratings in the Apple Store and Google Play. These ratings and reviews alerted the company to customer challenges and areas for improvement.

In Fall 2018, Hydro Ottawa launched a marketing campaign to encourage customers to download and use the app, and to subscribe to the Home Energy Reports. Campaign messaging was centered around tips for increasing energy efficiency in the home and the creation of savings opportunities. The campaign was promoted online through the company's website, digital ads, and social media. Other campaign channels included on-bill messaging, on-hold messaging, bill inserts, and advertisements on municipal transit and at select sports venues.

On a monthly basis, program metrics for the Home Energy Reports, the mobile app, and the online portal were shared with key internal stakeholders, including senior leadership. Acting upon the input received from customer feedback, app reviews, and program metrics is one example of how the Behavioural Savings Program has proven extremely valuable in identifying opportunities for adjusting and enhancing the customer experience and has better equipped Hydro Ottawa to listen and respond to the voice of the customer.

As of the end of 2018, the mobile application had been downloaded over 20,400 times.

(iii) Innovation in Voice-Activated Digital Assistance

In 2018, Hydro Ottawa became the first utility in Canada to develop and make information available through a Smart Speaker skill, compatible with both Amazon Echo and Google Assistant. The deployment of this tool was driven by Hydro Ottawa's enduring commitment to serve customers using a channel of their choice and to equip customers with information, when and how they need it. It was also the fruit of the company's past investments in cloud-based customer identity management software and social sign-on capability, and its focus on creating applications using Application Programming Interface ("API") protocols and tools, which enable access to commonly used operating systems and simplify the development of solutions for customers.

The company's Smart Speaker skill is designed to provide customers with information about their account. Once activated by customers, it provides information on the topics that are the subject of many of the most commonly-asked questions from customers, including conservation tips, current electricity rates, outage information, and bill information.

Moreover, Hydro Ottawa's Smart Speaker skill system collects metrics on its own performance – e.g. customer retention, poorly handled messages, customer pathways, and most importantly, queries posed by customers that the skill was unable to answer in an anonymized manner. Likewise, the system collects web-based analytics which are employed to ensure that the most requested information is also available on other Hydro Ottawa customer communications channels, such as the website and mobile app.

At the time of launch, the Hydro Ottawa Smart Speaker skill was available only in English, with the company actively exploring French language capabilities. The skill is free to download and is available on the following Smart Speaker devices: Google Home, Google Mini, Amazon Echo, Echo Plus, Echo Dot, and Echo Spot. What's more, information is accessible wherever Amazon's Alexa or Google's Home Assistant platforms are accessible, including by phone, tablet, or in-vehicle systems.

The page on Hydro Ottawa's website that is dedicated to this skill includes a demonstration of the application and frequently asked questions.[3]

As of the end of 2018, over 1,800 customers had downloaded the skill. The number of customer interactions with the skill was averaging approximately 260 on a monthly basis, 70 on a weekly basis, and 10 on a daily basis. These figures are expected to increase as customer awareness of the availability of this solution grows.

(iv) Community Engagement

Over the course of 2018, Hydro Ottawa participated in more than 400 community events. Similar to previous years, the company's community activities included the following: energy-related educational programs in schools; a Conservation Team that attended diverse community, corporate, and retail events; engagement with business improvement areas; and a wide range of other tours and presentations.

Hydro Ottawa also sustained its program and practices for consulting customers who are set to be affected by major projects that were designed to improve infrastructure and service in their community. Scheduled during the Fall, the company's open houses educate customers on planned projects for the following year, providing them with information, insight, and the opportunity to ask questions or voice concerns well in advance of the work taking place.

From September-November 2018, Hydro Ottawa hosted eight open houses in various wards across the city to address projects that were scheduled for 2019. Customers who reside in the affected areas were invited to the events. All open houses were accessible to the general public, with details available on the company's website. These events help ensure that, if any issues arise prior to work beginning, Hydro Ottawa project managers can collaborate with customers in order to best address their concerns while keeping projects on schedule.

[3] https://hydroottawa.com/save-energy/innovation/smart-audio.

- **Elgin Street Renewal:** a significant infrastructure renewal effort in which Hydro Ottawa played a key support role in 2018 was an integrated road, sewer, water, and utility project for a major north-south artery in downtown Ottawa. Initial working group meetings for the Elgin Street Renewal project were hosted by the City of Ottawa beginning in Q4 2017, enabling all key stakeholders – especially the Elgin Street business association – the opportunity to ask questions and suggest recommendations to Hydro Ottawa's proposed designs for relocation and underground burial of its distribution infrastructure.

  Continuing into 2018, Hydro Ottawa and the City held public drop-in sessions to receive input from members of the public on the proposed work. This gave Hydro Ottawa the opportunity to engage numerous business owners and residents on a face-to-face basis, which helped foster a strong working relationship with the local community. Based on the needs and preferences communicated by stakeholders, Hydro Ottawa relocated padmounted transformer equipment away from originally proposed locations and coordinated with City officials and local business improvement area associations to ensure power is available to their future deployment of public WiFi in the area. The company also worked with the Canadian Museum of Nature to identify decorative options for the padmount equipment set to be installed at this facility, located at the southern tip of the project area. The museum ultimately opted for a decorative blind, to obscure the padmount devices while maintaining the required operational clearances.

  The beginning of construction was not scheduled until Q4 2018, so as to avoid disruption of local commerce and events during seasons of peak activity. In addition, to the maximum extent possible, Hydro Ottawa and its contractors arranged work times around business hours over the course of the year, in order to avoid impeding access for patrons to local businesses. What's more, Hydro Ottawa erected temporary trench crossing bridges (all of which were compliant with the *Accessibility for Ontarians with Disabilities Act*) that allowed for uninterrupted pedestrian access to local businesses.

  Alongside the City of Ottawa, the company distributed customer notification letters to almost 10,000 customers in the area, sharing critical information related to traffic management, road closures, and pending construction. Hydro Ottawa also created a specific page on its website dedicated to the project.[4]

  Feedback from stakeholders, especially the local business association, on Hydro Ottawa's engagement efforts was quite positive overall.

Year-over-year growth was also sustained in several aspects of the company's online and social media presence. For example, web-based engagements increased by more than 300% over 2017, while the total number of Twitter followers exceeded 30,000, as of year-end. Hydro Ottawa also published over 100 videos, with many of them focused on customer education around such topics as storm response, essential capital projects like pole replacement and transformer relocation, electrical safety, conservation tips, and what to anticipate when requesting a specific service from the utility.

[4] https://hydroottawa.com/blog/elgin-street-renewal.

(v) Customer Satisfaction Survey

For over a decade, Hydro Ottawa has engaged a third party to conduct annual customer satisfaction surveys. These customer satisfaction surveys provide information that supports the analysis and planning of customer service improvements and offerings within Hydro Ottawa. The survey questions cover a wide variety of relevant topics, including overall satisfaction with Hydro Ottawa, reliability, customer service, power outages, billing, cost of electricity, and corporate image. Feedback from these surveys is incorporated into Hydro Ottawa's planning process, and ultimately forms the basis of plans which address customer needs and service offerings.

For the second consecutive year, Hydro Ottawa experienced an appreciable uptick in overall customer satisfaction – from 90% in 2017 to 93% in 2018. Multiple macro-level ratings placed Hydro Ottawa in the top quartile amongst its peers: Credibility & Trust Index of 85%, Customer Experience Performance Rating of 87%, Customer Centric Engagement Index of 84%, and an overall grade of "A" on the survey's report card (while the Ontario-wide averages were 80%, 83%, 80%, and "B+", respectively).

According to the survey results, Hydro Ottawa scored above the provincial benchmark in numerous core responsibility categories, such as the following (the company's score is listed first, followed by the Ontario average):

- Provides consistent reliable power (93% vs. 90%);
- Quickly handles outages and restores power (91% vs. 86%);
- Electricity safety is a top priority (91% vs. 86%); and
- Delivers on its service commitments (88% vs. 86%).

The survey likewise pointed out areas requiring more pro-active communication and attention from Hydro Ottawa. Nevertheless, in these categories as well, the company's scores still exceeded the Ontario benchmark (similar to the list above, Hydro Ottawa's score is listed first, followed by the provincial average):

- Adapts well to changes in customer expectations (75% vs. 72%);
- Operates a cost-effective electricity distribution system (76% vs. 71%);
- Provides good value for money (75% vs. 71%);
- Cost of electricity is reasonable when compared to other utilities (65% vs. 61%); and
- Provides information to help customers reduce their costs (82% vs. 78%).

And in specific categories related to customer service satisfaction, Hydro Ottawa once again ranked above the provincial benchmark, in all but one metric (which is marked in italics):

- Deals professionally with customers' problems (88% vs. 82%);
- Is "easy to do business with" (85% vs. 82%);
- Customer-focused and treats customers as if they're valued (83% vs. 79%);
- The time it took to contact someone (73% vs. 64%);
- The time it took someone to deal with your problem (70% vs. 65%);
- The helpfulness of the staff who dealt with you (65% vs. 64%);
- *The knowledge of the staff who dealt with you (62% vs. 64%);*
- The level of courtesy of the staff who dealt with you (74% vs. 70%);

- The quality of information provided by the staff who dealt with you (65% vs. 61%); and
- The 24/7 availability of call-centre staff Monday to Friday (82% vs. 76%).

(vi) Customer Connectivity

Over the course of 2018, Hydro Ottawa continued to witness steady growth in the number of customers opting to register in the company's online MyAccount portal. By year's end, over 184,000 customers were enrolled, representing approximately 55% of the customer base. These numbers were bolstered by concerted efforts to reduce the level of burden for customers to create an online account with Hydro Ottawa. In 2018, the company eliminated the need for a customer to have a physical bill in hand to create an online account. Moving forward, a customer will only require a valid email address, with registration only taking a matter of minutes and including the option to enroll in online billing. Other improvements for MyAccount users include the availability of electricity disaggregation data and Home Energy Reports, that are also made available through the mobile application for residential customers (see page 7 above). Data exports through the Green Button Download My Data function also remain available to users.[5]

With respect to online billing, the total number of customer accounts receiving bills online increased to almost 151,000 (or 45% of all customers). Overall OM&A annualized savings associated with Hydro Ottawa's online billing program stand at $1,668,000.[6]

Other highlights in relation to strengthening customer connectivity included the following:

- **Move-in Move-out ("MIMO") enhancements:** in 2018, Hydro Ottawa processed approximately 60,000 MIMO requests from customers. Effective December 2018, existing customers who are moving are encouraged to submit their move requests online through the MyAccount portal. The benefits of this new business process will include encouraging customer registration for MyAccount and online billing, improving customer security by requiring MyAccount authentication, simplifying customer experience with auto-populated fields after login, and minimizing the need for Hydro Ottawa call backs due to insufficient information.

- **Electronic payments:** following simplifications to its online registration and electronic payment processes, Hydro Ottawa observed a 58% increase in electronic payments by customers in 2018, relative to 2017.

[5] http://www.greenbuttondata.org/.
[6] These savings are calculated by multiplying the total number of customer accounts registered for online billing by annual savings per customer in 2018 of $11.05.

2. Operational Effectiveness

"Utilities are expected to demonstrate ongoing continuous improvement in their productivity and cost performance while delivering on system reliability and quality objectives. The OEB will assess performance trends and look for evidence of strong system planning and good corporate governance. The OEB will use benchmarking to assess a utility's performance over time and to compare its performance against other utilities. Utilities are expected to demonstrate value for money by presenting plans for delivering services that meet the needs of their customers while controlling their costs."

This section of the Annual Summary highlights how Hydro Ottawa is (a) delivering on the commitments in its Custom IR application regarding continuous improvement, productivity initiatives, and cost performance; and (b) achieving outcomes that are aligned with the RRF's Operational Effectiveness category.

Consistent with the approach taken in the 2016 RRF Summary, this section of the 2018 RRF Summary does not include information on capital spending undertaken by Hydro Ottawa, in accordance with its OEB-approved Distribution System Plan ("DSP"). Hydro Ottawa is obligated to submit annual reports to the OEB on its actual capital spending on a program level, based on three categories: System Access; System Renewal/System Service; and General Plant. Please consult these annual reports for information on the progress in Hydro Ottawa's capital expenditures against its DSP.[7]

(i) Post-Tornado Storm Response

Hydro Ottawa experienced an historic severe weather event on September 21, 2018, when tornadoes with wind speeds of up to 265 km/h produced devastating effects in the western and southern segments of the company's service territory. Damage occurred to various sections of primary circuits, hundreds of individual customer secondary lines, as well as the provincial transmission system, including extensive damage to Hydro One's Merivale Transformer Station, which serves as one of the key supply points for Ottawa from the bulk power system. This loss of supply further impacted customers in central areas due to outages at multiple Hydro Ottawa substations. At the peak of the outage, approximately 174,000 customers – almost 50% of the company's customer base – was without power. All told, the tornadoes adversely impacted Hydro Ottawa's distribution system more than any other event in the last 20 years.

After activating its Electricity Emergency Response Plan and mobilizing its Incident Command Centre ("ICC"), Hydro Ottawa undertook a significant restoration effort. By the evening of September 24, with primary lines having been rebuilt and through collaboration with Hydro One in reconfiguring transmission supply to local substations, service was restored to 95% of customers. By September 26, all remaining customers without damaged services or equipment had been restored.

Notwithstanding the exceptional scale, speed, and success of the restoration effort, there were several lessons learned for the company. Many of these were identified in one of a few forums: (i) formal debriefs within the company's Crisis Communication Team, and among the ICC and Distribution Operations teams, during which all management parties involved in restoration

[7] These reports are available on Hydro Ottawa's website: https://hydroottawa.com/about/regulatory-affairs/reports.

examined what worked well and where there were areas for improvement; and (ii) a meeting with leaders from the municipality and local community associations, which featured discussion on various aspects of storm response. Feedback from these forums was consolidated into an official After Action Report, which underwent several rounds of review before being finalized in early January 2019. Among other things, this report formally documented the lessons learned emerging from the event – which ranged from updated training for employees on emergency response planning to centralization of contractor management functions to reviews of logistics support and communications technology. The report assigned designated leads for execution, along with timelines for completion.

In recognition of the exceptional performance in responding to this severe weather event, the Edison Electric Institute presented Hydro Ottawa with its annual Emergency Recovery Award. This award is presented to utilities in honour of extraordinary efforts to restore power to customers after service disruptions caused by severe weather conditions or other natural events. Award winners are selected by a panel of judges following an international nomination process.

(ii) Enterprise Resource Planning Project[8]

As detailed in the 2016 RRF Summary, Hydro Ottawa initiated a project to replace its centralized enterprise resource planning (“ERP”) system to manage core functions related to finance, accounting, inventory and supply chain management, work order management, and human resources (“HR”).

Many functional areas within the company rely upon the ERP system to achieve their operational mandates. Accordingly, the underlying objective of this project was to shift away from time-consuming, manual, and paper-based processes which required multiple employees to execute, and adopt a digital solution with self-service capability that would simplify business practices and put more and better information into the hands of employees. In many ways, the implementation of an enhanced ERP system was not simply a technology initiative, but also an important opportunity for business transformation.

The one-week period between December 31, 2017 and January 6, 2018 (inclusive) marked the achievement of a landmark project milestone, with the successful launch of the upgraded ERP system. This system consists of two integrated software solutions – Workday for human capital management (“HCM”) and JD Edwards (“JDE”) EnterpriseOne version 9.2 for all other core ERP functions (e.g. finance, accounting, and supply chain).

The investments made in this up-to-date, out-of-the-box (“OOTB”) ERP solution have firmly established a solid technology foundation that will reliably support current and future operational needs. What’s more, both solutions have a strong customer base and robust vendor commitment to continued reliable results through sustaining and growing their solutions to meet evolving business needs. The contractual and strategic relationships between Hydro Ottawa and its vendors (Workday and Oracle) will provide opportunities for the company to influence product evolution, based on shifting business requirements.

From a broad perspective, one important benefit of this investment is that ERP support employees at Hydro Ottawa are now able to concentrate most of their efforts on enhancing

[8] The finance system upgrade (JDE Application Upgrade) that is included under the scope of this initiative is one of the seven material General Plant investments included in Hydro Ottawa’s 2016-2020 DSP.

functionality by utilizing the standard vendor support resources. With the previous ERP system, the support model involved a heavy reliance on developers, seeing as much of the core ERP functionality had been modified and this dependence deepened with every incremental change that was applied.

Prior to the launch of the new ERP system, an extensive change management and training program was delivered, in order to ensure a high level of staff acceptance and readiness for the new systems. Over 90 training sessions were delivered to employees and over 110 instructional aids were created to guide employees in completing specific transactions. The availability of this functional training material going forward will be valuable from a knowledge transfer perspective.

The early experience with the enhanced ERP systems in 2018 served as validation of the original project objectives. In addition, it advanced Hydro Ottawa's larger strategic goal of leveraging technology and enhancing productivity through an "Anything, Anytime, Anywhere" approach to making tools available to the workforce where and when they are needed.

(a) Workday

For the HCM components of the company's business, all employees – whether in the office or in the field – are able to benefit from the industry-leading, enterprise-level software Workday.[9] Through Workday, employees are much better equipped to satisfy a comprehensive suite of HR-related functional requirements and access HR services, thereby enhancing accountability.

Implementation of Workday unfolded in two phases over the course of 2018. Phase 1 focused on foundational modules such as personal information, time tracking, compensation, benefits, onboarding, safety incident tracking, and job requisitions. Towards the latter half of the year, Phase 2 concentrated on the movement to Workday of the more strategic modules of learning, talent, and performance management. The second phase also involved the deployment of a dashboard tool for managers and supervisors to generate reports which provide a broad range of high-level insights into their respective teams (e.g. overtime hours, compensation summaries, average length of service, retirement eligibility, training transcripts, and organizational charts), thereby enabling superior performance management and decision-making.

The diverse toolbox of analytics enabled by Workday provided assurance of robust employee adoption. As an illustration, by the end of June 2018 there had been 48,770 unique employee self-service log-ins, and 96% of employees used Workday from their computer, while 4% used it from their phone or tablet.

Furthermore, the implementation of Workday has generated significant efficiencies which have improved the overall employee experience and enhanced productivity. For example, under the old system, the allocation of hours applied to Work Orders and equipment required supervisors to spend upwards of one hour per day manually entering information for their employees into a spreadsheet. With the system upgrade, total time has been reduced to 10 minutes, with employees entering their own hours through a process flow which is automatically sent to supervisors for approval.

By the end of 2018, Hydro Ottawa was on track to save approximately 9,000 hours a year in supervisor time, allowing them to dedicate greater time to operational and safety-related duties,

[9] https://www.workday.com/.

rather than manual administrative ones. The level of transparency and access that employees enjoy with Workday translates into efficiencies insofar as accountability has been shifted from HR personnel to employees who are better placed to review and action an item.

What's more, Hydro Ottawa's internal Workday implementation team was successful in several instances in expanding and leveraging the functionality of Workday to suit the unique needs of the company. For example, an automated solution was crafted for targeted employee notifications and associated action items, with the ability to track progress on the completion of these items. This was formerly a time-consuming, manual task. In addition, the company continues to integrate Workday with other systems, one of which is the system for ordering flame resistant/arc rated ("FR/AR") and non-FR/AR clothing for employees into Workday. This provides greater flexibility for employees to order clothing as required and to enable direct delivery to the employee's place of residence.

Altogether, the first year of experience with Workday bodes well for ongoing productivity and business transformation. With Workday's annual cost per employee equaling $480, Hydro Ottawa is confident that this system will allow the company to continue improving its operational efficiency and flexibility, and better meet the evolving needs of employees and customers as a result.

(b) JDE

Offered and maintained by the leading multinational cloud-based solutions firm Oracle, JDE is a top-tier integrated ERP solution.[10] JDE has historically been employed by Hydro Ottawa to support operational needs related to finance, accounting, inventory and supply chain management, and work order management.

As of the timeframe of the filing of Hydro Ottawa's 2016-2020 Custom IR application (i.e. early 2015), the version of JDE that was in use at the company (EnterpriseOne version 9.0 or "JDE v9.0") was becoming outdated and lapsing into sustainment support. This represented a significant shift in the risk profile for this mission-critical business application. In contrast, the version to which Hydro Ottawa has now upgraded (JDE v9.2) enjoys the benefit of the vendor's commitment to a continuous delivery approach for incremental updates for new features and functions, and to the provision of full technical support.

Among the numerous benefits that were realized through the first year of experience with the enhanced JDE platform (and that are set to multiply going forward) were the following:

- General navigation was significantly improved through the introduction of E-1 pages to guide infrequent users to the most common transaction types. Along with the configuration of predefined access for individual users, this is reducing user confusion, as employees are only able to access those features which are necessary to fulfill their specific responsibilities and needs.
- Expense management was transitioned away from a paper-based process to a more efficient self-serve model which, in storing expense claims within JDE, enables increased transparency, provides superior support for audit review control purposes, and comports with the company's "Anything, Anytime, Anywhere" philosophy by allowing employees and supervisors to submit and approve expenses electronically.

[10] https://www.oracle.com/ca-en/products/applications/jd-edwards-enterpriseone/overview/.

- Efficiencies have been achieved in the reconciliation process and account mapping between JDE and Uniform System of Accounts ("USoA") for regulatory accounting purposes. For example, the heavily customized nature of many of the applications utilized by Hydro Ottawa under the previous version of JDE meant that manual effort was required in much of the company's regulatory accounting and reporting activity that relied upon JDE data. With the adoption of the new version of JDE, the company now has the benefit of standard category code functionality, which encompasses USoA. Moreover, the upgraded version of JDE offers the ability to analyze multiple years of USoA coding within the program in real time. Previously, multiple year comparisons involved a need to create spreadsheets and other files outside of the program, and lacked the capability for real-time analysis. Likewise, modifications to USoA coding for smaller tasks can now be executed in real time and no longer involve running multiple processes or batches in order to be able to see the updated changes.
- New integrations with Workday have significantly enhanced insight, and the timeliness of insight, into job cost information on an ongoing basis. This stands in contrast to the previous approach, which entailed waiting for bi-weekly payroll cycles.
- Generation of quotations related to standard fees for various services (in accordance with Appendix G of Hydro Ottawa's Conditions of Service) and subsequent tracking of any necessary customer engagement can now be performed within JDE, rather than through a manual process involving multiple spreadsheets. In addition, quotation forms have been simplified, thereby improving the customer and field crew experiences while continuing to satisfy related reporting requirements.
- Introduction of Service Contract Billing has provided greater flexibility, reduced manual efforts, and improved reporting. One contract can have both capital and work for others combined on one invoice. Using this billing module for pole and duct rental has provided streamlining over the previous process and also provides a system-generated revenue recognition advantage.
- Significant changes were evident in the Work Order process to eliminate the customizations of the past and to embrace recommended OOTB best practices available within the ERP. For example, the ability to create Purchase Orders directly from the Work Order eliminated both the need to create receipts for services and to manually sign paper copies. In addition, procurement orders with long lead times now come directly from Work Orders, as opposed to manual requisitions. These and other Work Order-related changes have improved efficiency, flexibility, supportability, controls, and reporting for many stakeholder areas.
- Watchlists have been established to log system advisements about progressions like Work Order status changes to impacted groups. This helps maintain awareness of the status of Work Orders and, where necessary, prompt appropriate action by staff.
- Receiving by Supply Chain resources was eliminated for everything except stock items to avoid those recurring process steps which gave little incremental business value.
- Policy updates were enabled allowing for two-way instead of three-way matching for most Accounts Payable receipts. This facilitated a more streamlined process and overall time savings.
- The OOTB recurring invoicing functionality for cyclical items such as rentals and retiree benefits recovery has streamlined the previous manual tracking outside of the system and has provided greater visibility.
- A process change was introduced to enter Requests for Quotes within the ERP rather than through various off-line methods. This change helped improve both transparency for involved parties and reporting capabilities.

- The new Service and Warranty module has facilitated data mining on service layout requests and has helped to ensure that proper costing is performed for each item – all while avoiding the need for manual inputs.

(iii) Facilities Renewal Program[11]

In 2018, progress was sustained in the execution of this once-in-a-generation project. With shovels having been put in the ground the previous year, much of 2018 was spent on facility construction, as well as the initiation of operational integration and migration processes.

For example, several critical decisions were made on the technologies that would be utilized at the new administrative campuses and operational centers. A refreshed closed loop radio system was implemented ensuring the security and responsiveness of a mission critical system used to support the safety of our operational staff and communication between our System Office and Field Crews. A separate Request for Proposals process was likewise successfully completed, through the procurement of a Hot Aisle Containment System ("HACS"), which will provide more efficient cooling and distribution of heat for rooms housing critical IT equipment. HACS sensors monitor room temperature and adjust cooling to meet requirements. Case studies have shown that containment systems offer 50% energy consumption savings, meaning use of this technology will also reduce Hydro Ottawa's own energy footprint.

Prior to migrating the company's servers and network gear to the new facilities, Hydro Ottawa analyzed any systems that were approaching end-of-life and were due for replacement. In turn, appliances were purchased to reduce physical footprint and approximately 30 servers were replaced with a virtual instance. One upshot of this option will be reducing the number of IT outages required in 2019 once migration of equipment and personnel begins. Furthermore, through outreach to multiple vendors, Hydro Ottawa was able to find one that agreed to loan the company network equipment during the three-month migration process. This resulted in a cost avoidance of approximately $250,000, without impacting uptime for the operations.

In addition, in support of the company's "Anything, Anytime, Anywhere" approach to making tools available to the workforce where and when they are needed, a majority of user-assigned desktop computers (approximately 185 in total) were replaced with notebook computers. This helped contribute to overall reductions in employees' use of printed paper.

Key efforts were also focused on physical cleanup of onsite paper records at existing administrative facilities, in preparation for the move to new facilities. This cleanup effort amounted to more than 10,625 boxes being safely disposed, representing a 78% disposal rate. Alleviating Hydro Ottawa of these unnecessary records will reduce operational costs.

Finally, Hydro Ottawa administered a robust change management program with extensive employee engagement and consultation. As of year's end, the company remained on schedule to begin occupying its new east and south campuses in May 2019.

(iv) CC&B Enhancements[12]

As noted in the 2017 RRF Summary, the most significant planned enhancement to the company's Customer Care and Billing ("CC&B") system is scheduled for 2019-2020, at which

[11] This initiative is among the seven material General Plant investments included in Hydro Ottawa's 2016-2020 DSP.
[12] *Ibid*.

time the system will be upgraded to the next full version contemplated by the vendor.

In the interim, Hydro Ottawa continues to pursue and implement other improvements to its CC&B system, in order to achieve greater efficiencies and effectiveness in its billing services. In this regard, key enhancements undertaken in 2018 were as follows:

- **Simplified authentication process:** in an effort to reduce the number of systems to support and maintain CC&B, Hydro Ottawa implemented a change to our security process for user authentication. When CC&B was implemented in 2014, end-users would authenticate themselves to access the system via an interface with multiple third-party systems. In addition, through this process, end-users who required access to the non-production billing environments (e.g. month-end reporting) would need to maintain different passwords for each environment. Accordingly, Hydro Ottawa implemented a change that only requires users to interface with one of the third-party systems, while also allowing end users to use consistent log-ins for the CC&B environments to which they require access. Eliminating the need to support different access requirements for different environments has resulted in a simplified process for users as well as reduced system maintenance costs.

- **Renegotiation of CC&B application hosting and support contract:** in 2018, a decision was made to perform a technical upgrade of CC&B to a more current version, beginning in 2019. This upgrade will allow Hydro Ottawa to benefit from a supported Oracle platform, leverage new base functionality, and provide opportunity for future enhancements that will help with potential new business ventures. It was also decided to enlist the company's current Application Managed Services support vendor as the Systems Integrator for this technical upgrade and to leverage this opportunity to renegotiate the services contract with the vendor. Subsequently, an amendment to the current contract was signed in late 2018 to extend managed services support with the vendor for another five years beyond the original contract end date (up to 2027) with an overall operational cost savings of $1 million. This will allow for consistency of support from current operations for critical billing system functions and for sustained operations at an overall reduced rate. Additionally, Hydro Ottawa was given the option by the vendor to enter into an extended payment plan financing arrangement for these services. Hydro Ottawa availed itself of this option, as it will allow for deferral of payment for services rendered by the vendor on both the upgrade project and on operational costs, while improving cash flow.

(v) Enterprise Architecture Program[13]

To support achieving the company's vision that information should be accessible when and where it is needed to support customer interaction and ongoing business operations, Hydro Ottawa set out to establish a standard architectural framework. The projected benefits of this initiative included improving integration, facilitating access to key data, re-engineering business processes to improve outcomes, productivity, and efficiency, and implementing master data management.

Hydro Ottawa launched an Enterprise Architecture Program-Enterprise Service Bus project in 2014. However, findings from the pilot indicated that the solution was too complex for the

[13] This initiative is among the seven material General Plant investments included in Hydro Ottawa's 2016-2020 DSP.

company's needs. Notwithstanding this determination, Hydro Ottawa has continued with the Service Oriented Architecture principles and has adopted Boomi, which is a middle-ware technology leveraging industry best practices and enabling real-time integration of business applications.

In addition, the Enterprise Architecture program sought to advance productivity and efficiency through adoption of standard practices such as release management. Through elevating the visibility of changes in the technology architecture and ensuring solid release plans are in place, the risks to unplanned service interruptions can be reduced.

The Enterprise Architecture program also partnered with internal Cyber Security and Information Management resources to identify sensitive data belonging to customers and employees. This will serve as an integral first step in Hydro Ottawa's efforts related to master data management.

(vi) Fleet Replacement[14]

Hydro Ottawa's fleet service is responsible for the maintenance and management of approximately 230 vehicles.

Hydro Ottawa maintains a multiple-year capital plan to effectively manage its fleet assets. This plan is an essential tool for both short- and long-term planning and budgeting. Fleet replacement is required to support the day-to-day business activities and to sustain operations by minimizing down-time and total vehicle lifecycle costs.

Major fleet management developments were few in 2018. The company's Fleet group continued to review industry standards to help inform new projects and practices, including the deployment of additional low- or zero-emission vehicles. (It should be noted, however, that the adoption of fully electrified vehicles is not always a viable option, given the local climate). In addition, the company procured a single elevator, telescopic bucket as a new specification which will allow for extended side reach in tight areas of the downtown core. This capability permits the operator to reach over obstructions on the street, such as cars and patios, in order to access power lines.

(vii) Fleet GPS Installation

As noted in the 2016 and 2017 versions of this RRF Summary, the company launched a GPS Evaluation & Implementation Project in 2016 to install and configure a new fleet service Global Positioning System ("GPS") solution.

Following final integration and training, the project was closed-out in 2018. As of the end of the year, monitoring was underway to track progress against the original targeted outcomes of fleet optimization, increased fuel savings, improved health and safety of field personnel, enhanced compliance with provincial regulations, and reduced maintenance costs. Measurable benefits had already been achieved with respect to paperwork reduction for commercial vehicle operator's registration compliance-related activities, improvements in real-time location of vehicles on Hydro Ottawa's situational awareness map, and reduction of connection costs with WiFi mobile hotspots in vehicles.

[14] This initiative is among the seven material General Plant investments included in Hydro Ottawa's 2016-2020 DSP.

(viii) Smart Grid Deployment

Consistent with the commitments set forth in the company's *2016-2020 Strategic Direction* and its "Grid Transformation Action Plan," Hydro Ottawa continued the roll-out of flagship Smart Grid projects over the course of 2018. Key highlights in this regard included the following:

a. *SCADA System Upgrade* – Supervisory Control and Data Acquisition ("SCADA") systems are critical to the reliable operation of a local distribution network, as they equip system operators with real-time access to system status and control, and play an essential role in the monitoring and controlling of distribution stations and equipment. As highlighted in the Distribution System Plan, Grid Transformation Plan, and Reliability Plan supporting Hydro Ottawa's 2016-2020 Custom IR application, the company's SCADA system required wholesale renewal. The system had not undergone any major upgrades or patching since its installation in 2006, and was thus employing outdated technology, with ongoing vendor support becoming increasingly challenging to secure.

   September 2018 marked the completion of a project launched in 2015 to upgrade this core asset. The successful achievement of this milestone was preceded by several years' worth of project planning, training, testing, configuration, and evaluation of data conversion by a dedicated internal team working in concert with the vendor.

   Hydro Ottawa's revitalized SCADA capability is set to yield numerous benefits with respect to situational awareness, system control, and system restoration. Within just a few weeks of the final cut-over, the new system had the opportunity to showcase its strengths, following the tornadoes that touched down in the Ottawa-Gatineau region on September 21, 2018. The SCADA system performed exceptionally well in providing system operators with visibility into the condition of Hydro Ottawa's grid and the outages affecting customers.

b. *Smart Grid Projects*

   - **The GREAT DR** – this remains one of Hydro Ottawa's marquee grid modernization projects, representing the future of the electricity marketplace and transactive energy solutions. In 2018, activity focused on developing The GREAT-DR interoperable platform and lab testing the prototype. In the lab, Hydro Ottawa and its partners were able to prove that decentralized demand response through to the grid edge is achievable and can serve as the optimal approach for securely and privately managing "prosumer" devices for democratizing and electrically supporting the grid. Lab tests showed promise in being able to reduce loading and thus change the load shape within seconds (which is a much higher level of performance than the standard five-minute target period). In 2019, the focus of project activity will be on proving the same objectives in a field demonstration and then closing-out the project with lessons learned that will be shared with industry partners and other stakeholders.

   - **Ellwood Energy Storage Project** – This project is a 4 MW/2.7 MWh lithium ion battery energy storage facility developed by Canadian Solar as part of a three-year contract with the Independent Electricity System Operator ("IESO") for grid support and voltage control. The facility consists of several lithium ion battery modules that will inject energy into or take energy from the grid, in order to support grid stabilization in response to IESO operational directives. Hydro Ottawa is hosting this project on-site at its main office location. The original timeframe for project energization was Summer 2017. Following delays encountered in procuring the lithium ion batteries from an overseas vendor, the project was energized in August 2018. The remainder of 2018 was spent performing testing and addressing operational matters, with final in-service commissioning expected for Q1 2019.

- **Starflower Lane Solar Project –** Alongside the main proponents (Ottawa Community Housing and Kingston, Ontario-based SPARQ Systems), Hydro Ottawa served in a collaborator role for this project. This project, which received support from Ontario's Smart Grid Fund, featured the installation of 640 solar panels on the rooftops of 32 townhomes in the Regina Lane housing community and went into service in 2018. Totalling 160 kW of capacity, with the ability to generate 200,000 kWh each year, the installation represents one of the largest solar arrays on social housing in Canada. In addition, it utilizes innovative solar micro-inverter technology, which can adapt to variations in grid conditions, including with respect to the availability of reactive power. This smart inverter complies with the State of California's Rule 21, which is a subset of requirements from the Institute of Electrical and Electronics Engineers' ("IEEE") 1547-2018 "IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces."[15]

  For its part, Hydro Ottawa upgraded the area's transformers to accommodate the embedded generation, and made in-kind contributions of materials, labour, site recruitment, and utility expertise. Key drivers behind Hydro Ottawa's participation in the project were the commitment to help customers achieve their sustainability goals and the ability to derive lessons learned from monitoring the performance of smart (micro) inverter technology. This technology holds great potential to enable higher penetration of distributed energy resources ("DERs") and to allow the use of embedded generation to play a managed role in supporting the grid's integrity – for example, by easing the power variance from embedded generation (particularly intermittent types like photovoltaic solar) and allowing generation to ride through certain disturbances, rather than switch off and cause supply-demand imbalance problems.

- **Autonomous Intelligent Nanogrid Solution** – Hydro Ottawa is playing a supporting role in this project, which is being led by Solantro Semiconductors (an Ottawa-based firm with expertise in semiconductors and digital power processors) and which has received support through Ontario's Smart Grid Fund. The goal of this project is to demonstrate the viability of an autonomous, intelligent nanogrid through the deployment of eight systems within Hydro Ottawa's service area: six in private residences and two at the National Research Council of Canada's research facility consisting of twin test houses. The project is also aimed at increasing understanding around the challenges and opportunities (primarily technical and financial) involved in customers becoming more self-sufficient in on-grid and off-grid scenarios. Hydro Ottawa's responsibilities as a project collaborator consist of facilitating interconnection and providing technical and regulatory expertise. As of the end of 2018, the project was scheduled to conclude by December 2019.

[15] https://www.cpuc.ca.gov/Rule21/.

(ix) Distribution System Climate Risk and Vulnerability Assessment

As a matter of practice, Hydro Ottawa routinely examines opportunities and threats to its distribution grid to ensure assets are able to operate effectively and deliver value throughout their lifecycle. In order to drive continuous improvement in its existing asset management system, Hydro Ottawa initiated a project in 2018 to perform a distribution system climate risk and vulnerability assessment and, based upon the results of this assessment, develop a Climate Change Adaptation Plan. In Q4 2018, the company launched a competitive procurement process to select an external service provider to prepare the following deliverables: (i) an overview of how climate change impacts are likely to affect Hydro Ottawa's distribution system; (ii) processes by which Hydro Ottawa can continue efforts to better understand its risks, take proactive steps to manage risks, and enhance the resilience of its distribution system to climate change; and (iii) an Adaptation Plan, following a recognized protocol for climate impact assessment, to improve the resilience of Hydro Ottawa's system.

As of the end of 2018, Hydro Ottawa had evaluated proposals from proponents, selected a successful proponent, and was set to initiate project work in early 2019.

(x) Planned Outage Communications

As noted in the 2017 RRF Summary, Hydro Ottawa launched an initiative that year to complete customer notifications using an alternative solution that would allow the company to utilize an existing platform (TouchLogic) to make outbound calls to all phone numbers associated with a customer account in order to inform them of the planned outage.

As of the end of August 2018, the total cost incurred for outbound calls to over 15,000 customers was less than $1,200, while the cost savings totaled approximately $80,000. This latter figure is based upon the assumption that, for every outbound call, the company saves one hour of work each for two Power Line Maintainers, along with a truck roll, to hand deliver notifications. Moreover, Hydro Ottawa is now able to redirect those skilled resources to core capital, maintenance, and other project work.

Early experience with the new solution has featured only a modest number of customer escalations (less than five). In several instances, these were related to customers not having maintained up-to-date contact information with the company.

Overall, this initiative has achieved several key outcomes, including reduced operating costs, greater efficiency through leveraging of existing technology, timely communication of information to customers, and enhanced customer convenience.

Based upon the success of this program, Hydro Ottawa expanded the program in 2018 to include auto-dialer notification for vegetation management work taking place in the neighbourhoods of affected customers. What's more, in step with the company's commitment to communicating with customers through a channel of their choice, the auto-dialer service is set for further expansion to text message/SMS and email channels in Fall 2019.

(xi) Cybersecurity Program

In recognition of the growing exposure of information systems to cybersecurity risks, Hydro Ottawa continues to take seriously its need to strengthen the protection of its critical infrastructure against the threats emanating from cyberspace. Several accomplishments from 2018 are noteworthy in this regard.

To begin, as noted below on page 33, the company published an updated corporate policy on cybersecurity which reflects the current landscape of cyber risks. The policy serves several broad purposes, including informing all users of mandatory requirements and acceptable user practices for protecting the company's cybersecurity assets, as well as ensuring that all electronic assets are protected and comply with essential security principles. In addition, the updated policy enshrines an expectation of compliance with the OEB's new certification and attestation requirements for electricity distributors.

A second major initiative was the retention of an external expert (PwC) to provide a suite of cybersecurity-related services:

- **Program Maturity & Gap Assessment:** Hydro Ottawa's information technology ("IT") and operational technology networks were assessed against the U.S. National Institute of Standards and Technology's Cyber Security Framework, which the company has been implementing for several years, and a maturity ranking was provided in comparison to other electric utilities. Among the key findings was a determination that Hydro Ottawa's performance exceeds the industry average with respect to IT protections, although targeted improvements are required around "people" and "process."

- **Privacy Impact Assessment Framework:** As part of the maturity assessment, a privacy assessment was also performed. The results highlighted that privacy controls have not yet matured into a core competency for Hydro Ottawa and that more work is therefore required to enhance the company's controls and plans in this regard.

- **Incident Response Retainer:** The establishment of a retainer will allow Hydro Ottawa to enlist the services of experts to help contain and mitigate the effects of a cybersecurity event or breach.

- **Penetration Testing:** A penetration test and social engineering attack was performed on Hydro Ottawa's employees to test the resiliency of the company's controls (both technical and non-technical) for its public-facing web applications. Overall, the results were favourable, although greater employee awareness is needed to combat phishing.

A third milestone was the completion of a pilot project with an external service provider (Stratejm) for managed security services. Based on the positive results, Hydro Ottawa has retained the firm to serve as a fully managed security service provider for the company, with the aim of ensuring 100% coverage of all server assets.

Finally, several process improvements were implemented to strengthen the company's overall cybersecurity posture. For example, Hydro Ottawa instituted new processes and guidelines for third-party contractors, the incorporation of cybersecurity practices into IT technology, and supply chain management.

(xii) Cybersecurity Program – External Email Tagging

As part of its enterprise-wide cyber security program, the company has been tagging all incoming external emails to Hydro Ottawa email accounts since 2016. This tagging has taken the form of inserting "Notice: External Email" in grey text at the top of the body of the email message. This provides Hydro Ottawa employees with a clear indication that the email received has originated from an external source and not from a Hydro Ottawa account.

The adoption of this solution served as a response to the growing number of email spam and phishing campaigns that are being launched against electric utilities. On average, 70% of the emails received by Hydro Ottawa are marked as spam. Moreover, the sector across North America has observed a significant uptick in cyber security incidents, including ransomware attacks in which personal and corporate data are held for ransom.

A common feature of many of these incidents is that the vector of penetration into the organization was a phishing email. Phishing is described by the Canadian Centre for Cyber Security as a "a general term for emails, text messages and websites fabricated and sent by criminals and designed to look like they come from well-known and trusted businesses, financial institutions and government agencies in an attempt to collect personal, financial and sensitive information."[16] Phishing remains one of the most popular and most successful methods utilized by malicious actors to compromise organizations' information systems and data.

Best practice in critical infrastructure sectors such as electricity call for the use of tagging external emails as one of the most effective defenses against phishing. Tagging enables employees and users to easily differentiate between an internal email and an external email.

In 2018, in step with the company's continuous improvement efforts, Hydro Ottawa introduced enhancements to its external tagging techniques. These modifications were intended to ensure greater visibility to employees of the tag and to provide more useful information pertaining to opening attachments or clicking on links. In lieu of the previous "Notice: External Email" text, the following banner is now employed for tagging purposes at the top of the body of the message of every external email received by a Hydro Ottawa employee:

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

(xiii) Underground Field Crew Operational Efficiencies

The underground ("U/G") portion of Hydro Ottawa's network encompasses all of the infrastructure and equipment that is used to distribute power to customers which is located beneath ground level. Approximately 52% of the company's total circuit kilometres of line are underground, with the majority of this located downtown and in suburban areas. Given the unique demands of operating and maintaining infrastructure of this nature, and the resources required to fulfill these core functions, realizing efficiencies in this area of the business remains an enduring priority for the company.

In this regard, continuous improvement and productivity measures that were undertaken in 2018 included the following:

- **Digitization of cable chamber inspection scheduling** – Hydro Ottawa utilizes a staggered schedule for routine inspections of the U/G cable chambers in its service territory. Each chamber is inspected approximately once every three years, with the inspection cycle originating in the eastern portion of the service territory and moving steadily across to the western perimeter. On an annual basis, Hydro Ottawa inspects upwards of 400 U/G cable chambers. As part of the ongoing digitization of its business

[16] https://cyber.gc.ca/en/cyber-incidents.

processes and practices, the company has adopted an electronic solution to enhance the efficiency of this work. Hydro Ottawa has now recorded the GPS coordinates for the location of each cable chamber and downloads this information to mobile tablet devices which are provided to field personnel. These devices help reduce travel time and location inaccuracies, ensure the most up to date information is available to crews, and facilitate the scheduling of any repair or upgrade work in conjunction with inspections.

- **Elimination of fossil fuel-powered equipment and tools** – in step with its commitment to environmental protection and sustainable business practices, Hydro Ottawa looks for opportunities to reduce the use of fossil fuels in as many aspects of its operations and activities as possible. In applying this objective to U/G field crew work, some key milestones were achieved in 2018. For example, hand-held tools and other equipment utilized by U/G field personnel – such as saws, drills, cutters, and lights – have been transitioned to rechargeable battery-powered units. In addition to being lighter and easier to maneuver and handle, these units eliminate the exposure of crew personnel and members of the public to fumes and noise, while maintaining a high degree of performance and reliability. Similarly, for purposes of recycling old or unusable lead cable, personnel are able to use electrically-powered reels at Hydro Ottawa's operations centres, as opposed to diesel-powered units, thereby contributing to further reductions in harmful emissions.

- **Re-purposing of fleet vehicle for snow clearance at U/G work sites** – during the lengthy winter season in Ottawa, access to U/G cable chambers can be challenging on account of high levels of snow accumulation. On occasion, access to certain chambers across the service territory can either require contracting third-party services for snow removal or be impeded altogether. In 2018, Hydro Ottawa was able to re-purpose one of its fleet pick-up trucks, install a snow plow and salter assembly, and deploy it in support of snow clearance at U/G chamber sites. This allowed for increased work time during the winter months, while avoiding the cost of purchasing a dedicated vehicle for this activity.

- **Streamlined internal communications process for cable fault responses** – the previous internal process for communicating the discovery of cable faults on Hydro Ottawa's grid and assigning resources to respond relied upon the use of a mass email notification approach. Over time, it was recognized that a more appropriate course of action would be to target a select subset of responsible supervisors and staff. This approach was implemented in 2018 and has led to improved efficiency and timeliness in the scheduling and dispatching of crews to respond to cable faults, with enhanced accountabilities for communications and execution.

(xiv) Billing & Meter Data Services Operational Efficiencies

In 2018, Hydro Ottawa successfully completed numerous productivity and continuous improvement activities in its Billing and Meter Data Services ("MDS") departments – both of which fulfill essential back-office functions in support of the provision of reliable distribution services to customers. These enhancements included the following:

a. Billing

- **Enhanced CCB exception reports** – For a small handful of customer accounts which are not billed according to standardized processes, or for accounts for which there may have been a glitch encountered in the execution of the billing process, Hydro Ottawa's CC&B system generates exception reports. In 2018, the company implemented a series of enhancements to assist billing agents in identifying the root causes of exceptions more quickly and in improving control points. For example, these enhancements included a new feature that automatically groups exceptions into defined segments. In turn, this facilitates the assignment of specific billing agents to specific segments and allows exceptions to be resolved more efficiently. In addition, there is new functionality that excludes legitimate non-billable accounts from the report, thereby eliminating false positives from the reports and ensuring agents can focus attention on those accounts which actually require review. Hydro Ottawa will have the extra benefit of being able to use this feature for purposes of the anticipated increase in the number of aggregated suite metered accounts. At certain times, these accounts may have a meter but no customer. As such, these accounts will be captured by the characteristic flag that has been put in place and will be excluded from CC&B exception reports.

- **Integration of high/low exception list** – in collaboration with its CC&B service provider, Hydro Ottawa developed new functionality that allows for flagging customer accounts which have either exceeded or fallen below expected consumption, based on historical consumption patterns. If the account falls outside the established parameters, it is automatically flagged for manual review by a billing agent. This is intended to serve as a safeguard against potential metering issues and as a means for ensuring accuracy of customers' bills.

- **Enhanced unbilled reporting** – similar to exception reports, CC&B also generates a list of all accounts that have not been billed on their regular cycle, for any number of reasons. Alongside the aforementioned enhancements, Hydro Ottawa also adopted a series of measures in 2018 to improve the quality of these reports and to assist billing agents in reviewing them more efficiently and expeditiously. For example, in order to allow for effective grouping of unbilled reports, data sets were added for billing cycle, service cycle, and Universal Service Delivery Point Identifier. What's more, functionality now permits the oldest unbilled accounts to be prioritized for initial review. With these enhancements in place, Hydro Ottawa is able to reduce unbilled revenue and better ensure that all customers are billed in a timely manner.

- **Revamped ICI reports** – the Industrial Conservation Initiative ("ICI") is a provincial demand response program allowing participants to manage and reduce their Global Adjustment ("GA") costs by reducing their demand during peak periods. The program is administered by the IESO, with electricity distributors like Hydro Ottawa tasked with various program requirements such as reporting and adjustments to customer accounts and invoices. In 2018, with the aim of supporting more efficient ICI implementation, Hydro Ottawa consolidated and standardized its various internal reports related to ICI. Going forward, there will be one master report that will assist functional areas (Billing, MDS, Meter to Cash, Conservation and Demand Management, Regulatory, and Finance) in achieving their respective operational mandates related to ICI.

b. MDS

- **Improved IESO reconciliation process** – Hydro Ottawa employs Lodestar Profiling and Settlement Software ("LPSS") to reconcile financial statements and invoices received by the IESO on a daily and monthly basis, respectively. All wholesale accounts in LPSS are reviewed rigorously for accuracy – in particular, with respect to loss calculations. The company enacted several process changes which resulted in enhanced accuracy of statement and invoice reconciliation. In turn, this strengthened the ability of Hydro Ottawa's Finance group to validate kWh received from the IESO with much higher level of accuracy, while MDS' targets were also improved through tightened dollar-level tolerances.

- **Improved validations of IESO invoices** – Hydro Ottawa undertook several modifications to the programs used for importing and converting IESO invoices into LPSS. These changes allowed for automated additions of new charge types, when necessary (typically two to three times per year). The previous process required manual configurations at the time of implementing new charges, thereby presenting risk to data accuracy. With the new program modifications, the need to manually pass-through charges that could not be calculated by LPSS has been eliminated, thus improving overall data accuracy.

- **Enhanced functionality of meter change database** – The purpose of this database is to track and send meter installation information from the Metering department to MDS. Originally developed in 2008, it required upgrades for performance, security, and usability. Enhancements were applied in 2018, allowing users to login using Windows security credentials, make changes to existing entries, sort and search more effectively, and eliminate old forms that were no longer in use. These modifications have improved the accuracy of information exchanged between the teams, resulting in reduced errors and operational efficiencies.

- **Reduced field visits for new commercial meter installations** – MDS staff collaborated with Metering to implement a process for the installation of new commercial meters, with the goal of reducing the number of field visits required for commissioning the equipment. It was observed that, on average, three (3) site visits were being performed during the commissioning of equipment and services for large retail customers. MDS and Metering examined their respective business processes and requirements with an eye towards gaining efficiencies, where possible. Emerging from this effort was a solution for reducing the average number of field visits to 1.5 for purposes of this work. In turn, this has reduced operating expenses and time for the company, while producing savings and more efficient commissioning of service for customers.

<u>(xv) Automated Net Metering Billing Solution</u>

In addition to the billing-related initiatives discussed in the foregoing subsection, Hydro Ottawa wishes to highlight a separate billing project that was undertaken in 2018. Given the nature of this project and the length of the description below, this item has been assigned its own unique subsection in this summary.

For more than 10 years, the provincial net metering program has allowed customers to reduce their monthly electricity costs by generating their own electricity from a renewable energy source. As of the end of 2018, Hydro Ottawa had 27 customers that were registered as net metered generators. While this number is small compared to the total number of customers served by the company (~335,000), it is expected to grow as the following events occur in the coming years: costs of self-generation using renewable technology (especially rooftop solar panels) continue to decline; contracts for Feed in Tariff ("FIT") and MicroFIT generators begin to expire, with many of those generators expected to transition to net metering arrangements; and the number of participants increase in Hydro Ottawa's GREAT-DR smart grid project (see page 20 above for details).

Net metering is a convenient option for customers to generate their own electricity supply and earn credits for surplus generation sold into the grid. Notwithstanding the benefits derived by customers, however, the administrative challenges posed by net metering arrangements to local distribution companies ("LDCs") from a billing perspective can be significant.

Since the inception of the net metering program in 2005, LDCs in Ontario have had to rely upon onerous manual procedures to perform the requisite billing and settlement processes. This is the result of limitations in LDCs' billing systems – such as the CC&B system employed by Hydro Ottawa and other large distributors – which are not configured to perform the complex calculation, application, and tracking of credits associated with net metering. Examples of the manual procedures that the company has to undertake include, but are not limited to, the following:

- obtaining the preliminary consumption (kWh) and net generation (kWhr) meter reads for an account;
- entering data into a standardized spreadsheet template maintained by Hydro Ottawa, which serves as a template for net metering billing for customers of different rate classes;
- verifying the accuracy of information for a customer's Net Metering Opening Balance, Net Metering Current Generation, and Net Metering Carried Forward Credit, and ensuring that any Net Metering Applied Credit is limited to and does not exceed a customer's variable charges;
- applying the Net Metering fixed service charge and related taxes;
- executing necessary transfers between the billable charge service agreement and the master service agreement; and
- recording a message in the customer's profile regarding the opening balance, billable charges, and accumulated credits (the latter of which cannot be displayed on a customer's bill, due to system limitations), so that this information is available to Hydro Ottawa employees and agents, should any inquiries be received from the customer.

All told, the manual process described above can consume anywhere from 15-30 minutes of an employee's time, depending upon the various circumstances and the complexity of the customer's net metering arrangement. Over time, this approach has resulted in the suboptimal use of staff time and resources.

Accordingly, Hydro Ottawa initiated a project in 2018 to enhance its billing system platform to enable automation of the billing process for net metered customers in all customer classes. The initial phase of the project involved multiple discovery sessions with internal stakeholders and the external provider. These sessions involved identification and validation of essential functional requirements (e.g. credit tracking, financial transactions, billing, service agreements, meter reads, bill print extract, and bill presentment), along with examination of a preliminary solution design and automation prototype. By year end, the project had successfully secured all of the requisite internal approvals and was set to transition into its next phase in early 2019, at which time implementation of the solution for residential customers was set to begin. (With respect to expanding this solution to other customer classes, this is likewise planned to occur in 2019 for small commercial customers, while late 2019 is the projected timeframe for large commercial customers, contingent upon the successful completion of an LPSS replacement project).

This project will result in positive outcomes for customers and the company alike. For net metered customers, they will enjoy much more transparency with their billing, through presentment of information on net metering-related balances and credits, and a summary of their net generation. Hydro Ottawa call centre agents will also have access to a credit tracking portal, which will better assist in responding to customer inquiries. For the company, there will be significantly greater efficiencies in the billing process for net metered customers, along with greater confidence in the accuracy of the billing data (including for IESO settlement purposes). What's more, the solution will enable re-deployment of staff resources in support of other core business activities and functions.

(xvi) Promoting Public Safety in Municipal Building Permit Applications

Hydro Ottawa's distribution design team began working more closely with the City of Ottawa's Building Permits and Inspection group to identify potential conflicts with energized overhead lines early on in the permitting application process. As part of this initiative, when an application is submitted to the City, any proposed development in the vicinity of the lines is sent to Hydro Ottawa's Service Layout group for review and for customer education on clearance requirements. Options to relocate and reconfigure lines are also presented. This has resulted in closer collaboration not with only the City, but with customers, contractors, developers, and architects. Potential challenges and concerns are identified at an early phase of the planning process, leaving ample time for developers and customers to adjust any project plans, as required, and thereby producing favourable outcomes from a public safety perspective.

(xvii) New HR Service Delivery Model

In conjunction with the implementation of Workday as a digital solution for the HCM component of Hydro Ottawa's enhanced ERP system (see pages 13-15 for more details), the company rolled out a new service delivery model for HR services in early 2018. The new, more agile HR Service Delivery and Operating Model is aligned to the business, leverages the self-service capabilities of Workday, and better enables HR and its stakeholders to execute on the company's Strategic Direction.

Tailored to address the needs of Hydro Ottawa's continually evolving business, the rapid pace of shifting employee demographics, and increasing access to technology, the new service delivery model consists of the following tiered service delivery approach:

- **HR Technology:** Workday and other employee-focussed technologies will provide employees and management with direct access to their information anytime, anywhere through self-service on any device.

- **HR Service Centre:** this centre will serve as the first point of contact for employees and managers for all HR inquiries, with a dedicated phone extension and email address.

- **HR Centres of Expertise:** these will serve as teams of functional HR experts and specialists who design and develop strategies to drive policies, programs, processes and tools, and provide solutions to customer/business needs.

- **HR Partners:** this new role of business-facing strategic partner provides advisory and consultative services to managers, bringing solutions on employee-related matters. HR Partners are assigned to specific divisions and groups across the company, with the HR Partner leveraging the HR Centres of Expertise to bring the right combination of services to their client groups. HR Partners serve alongside an HR Safety Partner, who likewise is dedicated to a certain division or group within the company.

- **HR Leadership:** senior HR leadership will help establish and implement a roadmap in alignment with the company's *2016-2020 Strategic Direction,* so as to ensure an effective and constantly learning organization, with the right skill sets and organizational capacity to deliver on existing and new businesses.

The adoption of an enhanced Human Resources Service Delivery Model will lend valuable capacity and support to fostering a culture of innovation, continuous improvement, productivity, and customer service within Hydro Ottawa.

(xviii) Legal Services Group Operational Efficiencies

This group is responsible for the coordination of legal services across the corporate enterprise. Continuous improvement and productivity measures that were undertaken in 2018 included the following:

- **Elimination of paper copies of legal report binders for jurisprudence and legal updates –** in step with the company's broader objective of going paperless, Legal Services adopted Lexis Nexis, an online database featuring a robust repository of information. Cost savings totalled approximately $7,000, as well as reduced space required for physical binders and reduced time to manually update these materials on a monthly basis.

- **Precedent agreements for procurement** – a precedent database allows for greater coordination and standardization of the company's position on legal risks in contracts. The increased standardization can reduce the uncertainty in interpreting clauses, thereby minimizing the prospects for disputes arising with service providers. In addition, by creating and using precedents, both business and legal professionals become familiar with the documents. In turn, this reduces the amount of time needed to prepare and negotiate procurement materials.

(xix) Extended Trim Program

In conjunction with established business practices to seek ongoing efficiencies in program delivery and execution, a pilot program was initiated in 2018, providing customers with the benefit of scheduling trimming or removal of trees and branches through Hydro Ottawa. This service is intended to offer a safe and reliable vegetation management option in and around the home owner's secondary service. Any revenue derived from the program is applied towards offsetting the company's annual vegetation management costs.

(xx) Cost Savings in Vegetation Management Services

Hydro Ottawa has used third-party vegetation management contractors to complete regular cycle trim, as well as project and emergency vegetation work for a number of years. In 2018, a new request for standing offer was issued to cover the five year period from 2019-2023. As a result of the strict enforcement of Hydro Ottawa's trim standards through our Forestry Inspector audits and excellent contractor relationships, the company awarded a contract to a vendor that will produce annual savings of approximately $300,000 in its regular cycle trim program. These savings can be used to offset expenses related to emergency or unplanned vegetation costs associated with major storm events, such as the September 2018 tornadoes.

(xxi) Residential Electric Vehicle Charging Program

In step with the company's commitment to innovation, sustainability, and customer value, Hydro Ottawa announced the launch of a pilot program in April 2018 aimed at helping to increase understanding around the impacts of electric vehicles ("EVs") on the grid, while responding to customer preferences for EV transportation options. This pilot program was established in partnership with FLO, Canada's largest EV charging network provider, and targeted the deployment of 100 Level 2 EV charging stations at the residential customer level.

As part of the pilot, Hydro Ottawa assumed responsibility for pilot participant recruitment, marketing the project, and managing the installation of charging stations for eligible participants. FLO assumed responsibility for the provision of 100 FLO Home X5 charging stations, along with the provision of software services for the duration of the project term, including real-time monitoring, and reporting and analysis of infrastructure impacts. In addition, FLO's role in future phases of the pilot will encompass enabling Hydro Ottawa to initiate demand response events on the charging stations and determining requirements related to the integration of EV charging technology with renewable resources.

The selection of FLO's Home X5 residential charger was a conscious choice by Hydro Ottawa, seeing as it gives customers control over their charging behaviour and preferences. Through the use of this particular piece of equipment, customers are able to track their usage data, as well as customize and manage their settings from a private FLO account.

As part of this pilot, Hydro Ottawa also has access to participating customers' charging data. This data serves as valuable information to help the company's engineers assess and plan for the changes and challenges on the electrical grid that will accompany mass EV adoption. Over the course of the pilot roll-out, Hydro Ottawa monitored and assessed the available data, and will seek to integrate it with the company's technical standards and long-term planning in 2019.

Roll-out of the pilot project occurred over the course of Q2-Q4 2018. As of the end of 2018, Hydro Ottawa had successfully recruited approximately 50 participants. Of these, approximately 20 had charging stations installed and operating by year's end, while the remainder were at an earlier stage in the pre-installation process.

(xxii) Alternate Locate Agreements

Hydro Ottawa implemented Alternate Locate Agreements ("ALAs") in 2018. An ALA is an agreement between a utility and an excavator, in which the excavator may work using specific digging methods without requiring a locate from the utility. A locate identifies the location of utility plant buried in an excavation area. However, under an ALA, an excavator agrees to use hand digging or a hydro vac in specific low-risk situations. The practical effect of such an arrangement is OM&A cost savings for the utility and administrative and time savings for excavators.

The ALAs were implemented part way through 2018 and achieved approximately $55,000 in OM&A savings for the year. Extrapolating these savings to a full 12 months of ALA implementation, it is anticipated that the annual cost savings may be higher in 2019 and beyond.

<u>(xxiii) Field Crew Operational Efficiencies</u>
In November 2017, the OEB amended the licenses of all electricity distributors in Ontario to prohibit the disconnection of residential customers by reason of non-payment from November 15th in one year to April 30th in the following year.

Consequently, Hydro Ottawa had excess capacity in its collections field representatives group during the segments of the disconnection ban periods in effect in 2018. Hydro Ottawa therefore used its Mobile Workforce Management system to allocate low-risk, non-electrical maintenance work to Field Collectors during this period. This is work that is often identified during the infra scans and other inspections and that typically takes extended periods of time to complete, inasmuch as it is regularly displaced on the priority list of tasks for Operations resources. In light of the efficiencies gained through this practice, Hydro Ottawa anticipates sustaining – and potentially expanding – it on a go forward basis.

<u>(xxiv) Information Management Program</u>
In 2018, a large communication and education campaign was undertaken to accompany the physical cleanup of records (see page 17 above) to ensure staff were aware of what constitutes a corporate record and were supported through cleanup efforts.

The Information Management program also spent significant time defining the company's Information Classification & Scheme and Retention Schedule ("ICSRS"), which involved interviewing all divisions and groups to understand their business functions and leveraging models implemented by peer organizations.

A refreshed corporate policy on Information Management was also published (see page 33 below).

<u>(xxv) Electronic Document Signature Tool</u>
In late 2018, Hydro Ottawa deployed a new tool – DocuSign – to facilitate employee review and approval of documents. With DocuSign, approvers are able to review and sign document(s), and gain instant visibility into the document status. Each electronic signature is unique, documentable, encrypted, and tamper-proof. The software is compatible with computers, smartphones, and tablets, and allows for signing of documents in common formats, including Microsoft Word and PDF. What's more, the tool enables archiving of electronic documents.

One concrete example of the efficiencies gained through the implementation of DocuSign is the paperless processing by the MDS department of all generation, wholesale (i.e. IESO and Hydro One), weather, and miscellaneous invoices. For this group, DocuSign has led to paper reduction and more expeditious processing of invoices, as responsible individuals are able to authorize their approval remotely.

This tool serves as an example of the company's commitment to achieving greater efficiencies and continuous improvement across all of its business processes and practices, and to moving towards a paperless work environment.

(xxvi) New Corporate Policies

In step with the overarching objective of Organizational Effectiveness set forth in the company's *2016-2020 Strategic Direction*, as well as with its commitment to continuous improvement, productivity, and safety, Hydro Ottawa instituted a package of new corporate policies over the course of 2018:[17]

- **Cybersecurity:** defines a formal set of cybersecurity requirements which must be met by all users who are given access to Hydro Ottawa's electronic assets, including directives for acceptable user practices. (For further details, please see page 22).

- **Information Management:** identifies the principles and directives that guide information management at the company, and establishes safeguards and parameters to the information that Hydro Ottawa holds in its custody or control in the conduct of its business transactions and activities.

- **Safe Use of Mobile Devices in the Workplace Policy:** aims at preventing incidents and injuries directly or indirectly related to inappropriate use of mobile devices in the workplace, and establishes parameters for the use of mobile devices in the workplace, with the goal of increasing employees' concentration on the task at hand, improving the quality of employees' work, and decreasing the number of incidents associated with distractions caused by using mobile devices.

- **Workplace Drug and Alcohol Policy:** sets out Hydro Ottawa's expectations regarding the use of substances that could impact an employee's ability to perform their duties safely, competently, and efficiently. The policy provides the potential consequences for non-compliance and the support available to employees who are dealing with a substance use disorder. This policy was intended, in part, to be responsive to the legalization of cannabis. (For further details on this matter, please see pages 36-37).

[17] These policies were adopted at the holding company level and have enterprise-wide applicability across the Hydro Ottawa group of companies, including Hydro Ottawa Limited.

3. Public Policy Responsiveness

"Utilities are expected to consider public policy objectives in their business planning and to deliver on the obligations required of regulated utilities. These obligations may evolve over time and therefore this Handbook does not provide a comprehensive list of all requirements. Utilities are expected to demonstrate that they have considered Conservation First in their investment decisions. The OEB will expect to see proposals for how distributors are supporting low income customers through programs such as LEAP and/or OESP, or through other distributor-specific programs. Electricity distributors and transmitters are expected to expand or reinforce their systems to accommodate the connection to their system for renewable energy generation facilities and the OEB expects their system plans to include details on how they will meet this requirement. Natural gas utilities are expected to identify investments or programs that have been planned to meet obligations under Ontario's cap and trade program."

This section of the Annual Summary highlights how Hydro Ottawa is (a) delivering on obligations mandated by government through legislation, Ministerial directives, and regulatory requirements; and (b) achieving outcomes that are aligned with the RRF's Public Policy Responsiveness category.

<u>(i) Conservation Results</u>
In 2018, Hydro Ottawa achieved 59 GWh of net energy savings. This represents 15% of the 395 GWh energy savings target assigned to the utility under the province's Conservation First Framework ("CFF"). As of the end of 2018, with two years remaining in the CFF program, Hydro Ottawa had achieved a cumulative total of 335 GWh of energy savings – equivalent to 85% of its six-year target.

Based on its overall robust performance in delivering energy efficiency savings for its customers, Hydro Ottawa earned a one-time, mid-term incentive payment from the CFF program of $4.1 million. (This payment was based on achieving 276 GWh of final verified savings for the 2015-2017 period).

<u>(ii) Affordability Fund Trust</u>
The Government of Ontario's Fair Hydro Plan established an Affordability Fund Trust ("AFT") in 2017 to assist customers who do not qualify for low-income conservation programs and are unable to undertake energy efficiency improvements without financial assistance. Through a competitive procurement process, Hydro Ottawa retained an external service provider in 2018 to administer and deliver AFT programs in its service territory. Hydro Ottawa collaborated with the external provider in validating program applications and referrals, and in tracking the delivery of Home Energy Kits to program participants. In 2018, 370 customers participated in AFT programs.

<u>(iii) Energy and Water Reporting and Benchmarking</u>
With July 1, 2018 marking the initial reporting deadline under O.Reg. 20/17: Reporting of Energy Consumption and Water Use, Hydro Ottawa undertook numerous actions – both in the lead-up to this date and beyond it – to support customers and building owners in achieving compliance:

- Throughout 2018 – ongoing engagement in the stakeholder working groups convened by Ministry of Energy ("MOE") to offer guidance on numerous technical matters related to the provision of electricity consumption data to building owners, as well as feedback on lessons learned from EWRB data delivery and reporting for Year 1.

- January 2018 – preparation of a formal communications plan that structured and sequenced Hydro Ottawa's EWRB-related outreach to target audiences and key stakeholders. Activities and deliverables that fell under the scope of this plan included the posting of a dedicated EWRB page and data request form on Hydro Ottawa's website[18]; email correspondence to affected customers; posting of information, tips, and MOE sharable materials on social media platforms; and preparation of key messages and information for Hydro Ottawa call centre agents.

  Hydro Ottawa received positive feedback on the online form that was established to allow building owners to request their data. This tool proved to be popular and user-friendly with data requesters, and was likewise acknowledged as such by MOE staff.

- January-March 2018 – participation in two events hosted by the Building Owners and Managers Association ("BOMA") that were intended to educate the building sector on the requirements of the EWRB regulation, the timetable for reporting, and the information and tools which would be necessary to fulfill reporting obligations. The first event on January 24 was a webinar hosted by BOMA Toronto, in which Hydro Ottawa joined other electricity and gas utilities in highlighting plans to assist building owners in obtaining necessary data. The second event was a detailed seminar on EWRB for Ottawa-area building owners, co-sponsored by BOMA Ottawa and Hydro Ottawa.

- January-June 2018 – extensive planning by internal stakeholders to develop, test, and refine business processes for Hydro Ottawa's intake and data collection activities related to EWRB requests.

(iv) Regulatory Compliance Project

As noted in the 2017 RRF Summary, Hydro Ottawa completed Phase 1 of its regulatory compliance program review in 2017. Hydro Ottawa was able to create a compliance catalogue to document OEB (and IESO) compliance requirements and the associated RACI matrix. ("RACI" stands for "responsible, accountable, consulted, or informed"). The RACI matrix establishes stakeholder roles and responsibilities for each compliance requirement.

As part of Phase 2 of this initiative, Hydro Ottawa developed and implemented a compliance review pilot in 2018. The cross-functional compliance review pilot applied the tools developed in Phase 1, such as the RACI matrix and compliance catalogue to assess the quality and accuracy of reported information from internal business units. Hydro Ottawa reviewed selected businesses processes and solicited stakeholder input to identify opportunities for improvement and make recommendations. The compliance review process led to an updated "RASCI" matrix, incorporating the additional role of "supporting." This effort also reinforced to stakeholders the importance of compliance monitoring within their business activities.

At the conclusion of the compliance review pilot, results and recommended next steps to

[18] https://hydroottawa.com/accounts-and-billing/business/request/ewrb. Hydro Ottawa established a dedicated email address to manage all customer inquiries and requests related to EWRB reporting (ewrb@hydroottawa.com).

enhance the Hydro Ottawa compliance program were identified and communicated to all stakeholders.

(v) Low-Income Customer Support

In 2018, 14,562 Hydro Ottawa customers collectively received $9.3 million in financial assistance through the Ontario Electricity Support Program ("OESP"), while 246 customers accessed emergency relief through the Low-Income Energy Assistance Program ("LEAP") for an average grant of $407.

With respect to the Home Assistance Program ("HAP"), administration responsibility for this program was transferred from electricity distributors to the IESO, effective January 1, 2018, pursuant to a Ministerial directive.[19] Accordingly, Hydro Ottawa is no longer able to track the number of customers participating in CFF programs targeted to the low-income customer segment.

Hydro Ottawa continued to raise customer awareness of these programs through such actions as the inclusion of information for low-income customers on the home page of its public website, maintenance of a page specific to low-income programs, on-bill and on-hold messaging, and outreach via social media. During collections calls and collections field visits, the company makes every attempt to inform customers of available low-income support programs. In addition, in 2018 Hydro Ottawa finalized a financial assistance brochure that covers the entire range of programs available to customers. The brochure is distributed at various community events and was also included in one cycle of disconnection notices in May 2018, following the expiration of the disconnection ban period. The brochure is set to be updated annually.

(vi) Integration of Renewable Energy Generation

Hydro Ottawa has remained active in facilitating the connection of renewable energy facilities since the passage of the *Green Energy and Green Economy Act* in 2009 and the predecessor Renewable Energy Standard Offer Program in 2006. In 2018, Hydro Ottawa connected over 140 embedded generation facilities to its distribution system, representing the equivalent of 32 kW of generation capacity. As of the end of 2018, embedded generation in the company's service territory totaled 112,745 kW. In addition, the number of net metered customers nearly doubled (from 14 to 27), while the total installed capacity of net metered generation increased approximately 900% (from just under 100 kW to approximately 900 kW), relative to 2017.

(vii) Preparation for the Legalization of Cannabis

On October 17, 2018, federal legislation governing the legalization and regulation of cannabis came into force. In preparation for this major shift in public policy, Hydro Ottawa enacted a Workplace Drug and Alcohol Policy and implemented an internal communications and training program to support introduction and roll-out of the policy, and to help safeguard workplace, employee, and public safety. Training sessions included an overview of the new policy and program, related changes to Hydro Ottawa's Code of Business Conduct, a presentation on the details of the legislation, and a seminar from one of Canada's leading certified addiction medicine physicians on a range of topics, including cannabis potency, short and long term

[19] Ministerial Directive re: 2015-2020 Conservation First Framework and Partnering with Green Ontario Fund; Delivery of Conservation and Demand Management Programs Targeted to the Low-Income Customer Segment (August 4, 2017).

effects, medical vs. recreational cannabis use, fitness for duty in safety sensitive positions, and duty to accommodate.

(viii) Participation in OEB, Government & IESO Working Groups

Hydro Ottawa strives to support the development and implementation of robust public policy that will enable movement towards a smart, sustainable energy future for Ontario. As evidence of this commitment, Table 1 below identifies representatives from the company who constructively contributed to the formulation of effective regulations and policies through formal participation on OEB, government, and IESO working groups over the course of 2018.

Table 1 – Hydro Ottawa Participants in OEB, Government & IESO Working Groups

Name	Title	Working Group	Government/Sector Organization
Raed Abdullah	Distribution Engineer	Smart Grid	Ministry of Energy
April Barrie	Manager, Rates & Revenue	Energy Retailer Service Charges (EB-2015-0304)	Ontario Energy Board
Susan Barrett	Manager, Communications	Redesign Action Plan	Ministry of Energy
Shawn Carr	Manager, Conservation Programs	Conservation First Implementation Committee CFF Task Committee – High Performance New Construction	Independent Electricity System Operator
		EWRB Stakeholder Working Group	Ministry of Energy
Patrick Brown	Manager, Regulatory Policy & Research	Data Strategy Advisory Council	Independent Electricity System Operator
		EWRB Stakeholder Working Group	Ministry of Energy
Mark Fernandes	Chief Information & Technology Officer	Cyber Security Steering Committee – Protecting Privacy of Personal Information and the Reliable Operation of the Smart Grid in Ontario (EB-2016-0032)	Ontario Energy Board
		Energy Transformation Network of Ontario	Independent Electricity System Operator
Benjamin Hazlett	Manager, Distribution Policies & Standards	Pole Attachment Working Group (EB-2015-0304)	Ontario Energy Board
Shane Labrash	Program Officer, CDM	CFF Task Committee – Prescriptive Measures	Independent Electricity System Operator

Name	Title	Working Group	Government/Sector Organization
Jojo Maalouf	Manager, IT Security	Cyber Security Working Group – Protecting Privacy of Personal Information and the Reliable Operation of the Smart Grid in Ontario (EB-2016-0032)	Ontario Energy Board
Matthew McGrath	Supervisor, Asset Management	Regional Planning and Cost Allocation Review (EB-2016-0003)	Ontario Energy Board
Michel Provost	Manager, Billing, Collections & MDS	Smart Metering Entity Steering Committee	Independent Electricity System Operator
		Financial Assistance Working Group	Ontario Energy Board
Gregory Van Dusen	Director, Regulatory Affairs	Regulatory Affairs Standing Committee	Ontario Energy Board
Charles Zaloum	Supervisor, Conservation	CFF Task Committee – Retrofit	Independent Electricity System Operator

4. Financial Performance

"Utilities are expected to demonstrate sustainable improvements in their efficiency and in doing so will have the opportunity to earn a fair return. The OEB will monitor the financial performance of each utility to assess continuing financial viability and to determine whether returns are excessive. Utilities have a choice of rate-setting methods to meet their particular needs. Additional tools are available to support infrastructure investment. Utilities must report comprehensive and consistent information, allowing for comparisons over time and across utilities. The OEB will act on its obligations to ensure a financially viable sector where performance indicates that a regulatory response is needed."

This section of the Annual Summary highlights how Hydro Ottawa is (a) creating sustainable growth in its business and earnings; and (b) achieving outcomes that are aligned with the RRF's Financial Performance category.

As noted on page 12, this section does not include information on capital spending undertaken by Hydro Ottawa. Hydro Ottawa is obligated to submit annual reports to the OEB on its actual capital spending on a program level. Please consult these annual reports for information on the progress in Hydro Ottawa's capital expenditures against its DSP.[20]

<u>(i) Financial Results</u>

The third year of its approved Custom IR rate plan once again marked a robust level of financial performance by the company. Distribution revenue continued its trend of steady year-over-year growth, increasing $9.2 million (or 5.4%) over 2017. The company also increased its net income by $0.7 million over the previous year, for a total of $37.2 million. In turn, Hydro Ottawa was able to achieve a strong return on equity ("ROE") result of 9.14%.

With respect to Hydro Ottawa's debt to equity ratio, the year 2018 concluded with the company continuing to carry a ratio higher than the OEB's deemed capital structure. Similar to the previous years within the Custom IR term, this was a result of the ongoing capital expenditure program required to replace aging distribution system infrastructure. Although Hydro Ottawa is more highly leveraged than the deemed capital structure, the company has been able to keep its cost of borrowing very low due to favourable interest rates on its long-term debt.

<u>(ii) Dividend</u>

For the second consecutive year, the strength of Hydro Ottawa's financial performance helped support the establishment of a new record in terms of the dividend payment made at the holding company level to the City of Ottawa, the enterprise's sole shareholder.

Hydro Ottawa's 2018 performance generated a dividend of $18.3 million for the holding company.[21] In turn, this positioned the holding company to be able to return a dividend of $22.3 million to the shareholder, representing an approximate 2% increase over the 2017 dividend. The holding company's 2018 dividend was likewise $2.3 million higher than the $20 million floor for the

[20] These reports are available on Hydro Ottawa's website: https://hydroottawa.com/about/regulatory-affairs/reports.

[21] The annual dividend paid by Hydro Ottawa to the holding company is based on the previous year's results. Accordingly, the dividend based on 2018 results was paid in 2019. The same applies for the dividend paid by the holding company to the shareholder.

dividend payment, which was established pursuant to a revised dividend policy adopted by the shareholder in 2016. This policy stipulates that annual dividends from the holding company will be the larger of either (i) 60% of the net income of Hydro Ottawa Limited (i.e. the regulated LDC), or (ii) $20 million.

The aforementioned results bode well for Hydro Ottawa's ability to continue providing strong value to the holding company, the enterprise's shareholder, and its customers into the future.

III. Conclusion

This 2018 RRF Summary describes the numerous outcomes achieved by Hydro Ottawa over the course of 2018 that were guided by RRF objectives and expectations.

Hydro Ottawa is pleased to be able to highlight a broad range of outcomes that underscore a strong level of performance across the four areas of focus underpinning the RRF. These include, but are not limited to, the effective mobilization and deployment of restoration resources following the historic September 2018 tornado event, robust customer satisfaction levels, the first deployment of a Smart Speaker skill by an electric utility in Canada, improvements to the flow of information and the availability of innovative services to customers, implementation of an enhanced ERP system, installation of a new SCADA system, and strong financial performance for the third consecutive year within the company's current five-year rate plan.

Hydro Ottawa is confident that the 2018 RRF Summary serves to illustrate the company's commitment to continuous improvement and to the incorporation of RRF principles across its business operations.

Hydro Ottawa looks forward to preparing and presenting the next version of its annual summary for the year 2019.

Version History Tracking

Version	Author	Date Revised	Description of Changes
Version 1	Regulatory Affairs	October 2019	N/A – initial release
Version 2	Regulatory Affairs	December 2019	Revisions to section II., 2. Operational Effectiveness, (vi) Fleet Replacement (addition of clarifying language).

PROPOSED ANNUAL REPORTING – 2021-2025

1. INTRODUCTION

As described by the OEB, the Renewed Regulatory Framework ("RRF") is fundamentally a "comprehensive performance-based approach to regulation that promotes the achievement of performance outcomes that will benefit existing and future customers."[1] In its roll-out of the RRF, the OEB underscored the importance of public reporting by electricity distributors of their performance under the RRF's core outcome categories. This level of importance was demonstrated in the OEB's adoption of a standardized Electricity Utility Scorecard, which is intended to provide open and transparent reporting and monitoring of individual distributors' performance, and allow for comparisons across the sector. Alongside the standards and measures set out in the Electricity Utility Scorecard, the OEB also signalled interest in distributors reporting their progress against the goals laid out in their network investment plans.[2]

While maintaining an emphasis on the standardized annual scorecard for electricity distributors, the OEB has also confirmed an expectation that distributors will incorporate supplementary reporting measures that will speak to unique aspects of distributors' strategic plans and performance. For example, the *Handbook for Utility Rate Applications* issued in 2016 includes the following language in its discussion of specific considerations for the Custom Incentive Rate-Setting ("Custom IR") method:

> *"**Performance Metrics:** The OEB has established a scorecard for electricity distributors, however, additional performance metrics should also be proposed so that expected outcomes can be monitored. All other utilities must propose a comprehensive scorecard that is informed by the scorecard for electricity distributors, but specifically includes other performance metrics aligned to the outcomes identified in the application. This is required for both Custom IR and cost of service rate applications."*[3]

[1] Ontario Energy Board, *Report of the Board - Renewed Regulatory Framework for Electricity Distributors: A Performance-Based Approach* (October 18, 2012), page 55. This report is hereafter referred to as the "RRFE Report."
[2] *Ibid,* page 58.
[3] Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 26.

In addition, the OEB has begun examining the possibility of instituting activity and program based ("APB") benchmarking for electricity distributors. The launch of the APB Initiative positioned the proposal as an evolution of the OEB's toolkit for monitoring utility performance.[4] Of note, the OEB acknowledged that the success of any APB framework would be contingent upon improvements to reporting and data quality, which the OEB had previously identified as a need in light of its experience with several years' worth of reporting from the distribution sector.[5]

A final example of the OEB's interest in ongoing refinement of performance reporting by utilities was the inclusion in the OEB's *2019-2022 Business Plan* of a specific initiative focused on updating the Electricity Utility Scorecard, in order to ensure that it was continuing to provide value to consumers.[6]

In step with the foregoing discussion, this Schedule will identify the following: (i) the various performance measures which Hydro Ottawa committed to report on an annual basis as part of its 2016-2020 Custom IR application, and (ii) those performance measures which the utility is committing to report against on an annual basis for the 2021-2025 period. Consistent with the prescriptions of the RRF, these reporting requirements are intended to provide the OEB, customers, and other stakeholders with the ability to better monitor and understand diverse aspects of Hydro Ottawa's performance, and to demonstrate the utility's accountability in transparently communicating the outcomes achieved under its performance management framework.

2. 2016-2020 ANNUAL REPORTING (CURRENT)

As part of the adjudication of Hydro Ottawa's 2016-2020 application, the utility agreed to report the following information on an annual basis:[7]

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[4] Ontario Energy Board, Letter re: *Activity and Program Based Benchmarking (ABP) Initiative*, EB-2018-0278 (October 10, 2018), page 2.
[5] Ontario Energy Board, Staff Discussion Paper, *Activity and Program Based Benchmarking for Electricity Distributors*, EB-2018-0278 (February 25, 2019), page 47.
[6] Ontario Energy Board, *2019-2022 Business Plan*, page 13.
[7] Hydro Ottawa Limited, *2016-2020 Custom Incentive Rate-Setting Approved Settlement Proposal*, EB-2015-0004 (December 7, 2015), page 24.

(i) Electricity Utility Scorecard results, as well as Reporting and Record-keeping Requirement (“RRR”) data;
(ii) Annual update on actual capital expenditures by program type (i.e. System Access, System Service and System Renewal, and General Plant) vs. budgeted capital expenditures by program type and appropriate variance analysis;[8]
(iii) Key Performance Indicators (“KPIs”) that were incorporated into the 2016-2020 Distribution System Plan (“DSP”) to measure continuous improvement in several categories of asset management planning, capital investment planning, and customer-oriented performance; and
(iv) System Average Interruption Duration Index (“SAIDI”) and System Average Interruption Frequency Index (“SAIFI”) by cause code.

Items (ii) and (iii) have been reported through the filing of an annual report (“CIR Annual Report”) to the OEB and parties to the Approved Settlement Agreement governing Hydro Ottawa’s 2016-2020 rate plan.[9] Item (iv) is reported through annual RRR filings.

3. 2021-2025 ANNUAL REPORTING (PROPOSED)

Hydro Ottawa’s proposals for annual performance reporting to the OEB are comprised of two essential elements: (i) a Custom Performance Scorecard and (ii) updates on the progress of capital spending in key categories.

In addition to these customized mechanisms for annual reporting, Hydro Ottawa will comply with mandatory reporting mechanisms that are applicable to all electricity distributors, such as the annual Electricity Utility Scorecard and RRR requirements.

[8] The System Renewal and System Service categories were merged into one category to reflect Hydro Ottawa’s standard operating practice to shift funds between the two categories, as warranted by customer and operational requirements.
[9] These reports are available on Hydro Ottawa’s website: https://hydroottawa.com/about-us/regulatory-affairs/custom-incentive-reports.

3.1. CUSTOM PERFORMANCE SCORECARD

Hydro Ottawa is proposing to include 26 measures in its Custom Performance Scorecard for the 2021-2025 rate term. Of these measures, 10 are part of the existing CIR Annual Reports. The other 16 are new, insofar as this Application represents the first instance in which Hydro Ottawa is proposing to formally report against their progress to the OEB.

When combined with the number of measures contained in the Electricity Utility Scorecard, this amounts to a total of 49 outcomes to be monitored annually as part of the utility's 2021-2025 Custom IR plan.[10]

Targets for each measure were informed by recent historical data. It is generally Hydro Ottawa's intent for the targets to be assessed as five-year targets, stretching over the duration of the 2021-2025 rate period. Where possible and appropriate, the utility has provided specific, quantitative targets for particular measures. As Hydro Ottawa progresses through each year of its rate term, it will continue to assess the feasibility of setting annual targets for other measures.

Hydro Ottawa's proposed Custom Performance Scorecard is presented in Table 1 below.

[10] The total number of outcomes includes the Net Cumulative Energy Savings measure that has been included in the Electricity Utility Scorecard in recent years. Hydro Ottawa acknowledges that the inclusion of this measure on the Electricity Utility Scorecard going forward may be subject to change, in light of the discontinuance of the Conservation First Framework in 2019.

Table 1 – Custom Performance Scorecard Measures (2021-2025)

RRF Outcome	OEB Reporting Category	Hydro Ottawa Custom Measures	New/ Existing	Target
Customer Focus	Customer Satisfaction	Contact Centre Satisfaction – Transactional Feedback	New	Maintain
		Number of MyAccount Customers	New	Increase
		Number of Online Billing Accounts	New	Increase
Operational Effectiveness	Safety	All Injury/Illness Frequency Rate	New	Reduce
		Lost Workday Severity Rate	New	Reduce
	System Reliability	Customer Average Interruption Duration Index	Existing	Monitor
		Feeders Experiencing Multiple Sustained Interruptions	Existing	Maintain
		Worst Feeder Analysis – Number of Feeders with Very Poor Performance	Existing	Reduce
		Stations Exceeding Planning Capacity	Existing	≤5%
		Feeders Exceeding Planning Capacity	Existing	≤10%
		Stations Approaching Rated Capacity	Existing	0%
		Feeders Approaching Rated Capacity	Existing	0%
	Cost Control	Productive Time	Existing	Maintain
		Labour Allocation	Modified	Maintain
		3-Year Average Cost per Pole – Wood Pole Replacement	New	Monitor
		3-Year Average Cost per Meter – Underground Cable	New	Monitor
		Average Cost per Kilometer – Vegetation Management	New	Monitor
		Average Cost per Pole – Pole Test and Inspection	New	Monitor
	Asset Efficiency	Technology Infrastructure Cost per Employee	New	Monitor
Public Policy Responsiveness	Environment	Annual Oil Spills & Costs of Remediation	Existing	Reduce
		Non-Hazardous Waste Diversion Rate	New	Maintain
		Percentage of Green Suppliers	New	Maintain
Financial Performance	Financial Metrics	OM&A per Customer	New	Monitor
		Bad Debt as a Percentage of Total Electricity Revenue	New	Monitor
		Cumulative Capital Additions per Investment Category	New	Monitor
		Annual Capital Spending per Investment Category	New	Monitor

3.1.1. Description of Custom Performance Scorecard Measures

In order to ensure that the OEB, customers, other stakeholders and Hydro Ottawa are aligned in their understanding of the nature of the reporting measures that are proposed for inclusion in the utility's Custom Performance Scorecard, a description of each measure is included below.

- **Contact Centre Satisfaction – Transactional Feedback:** the level of satisfaction expressed by customers with the service received from Hydro Ottawa's customer contact centre.[11]

- **Number of MyAccount Customers:** the total number of customers registered in the utility's online customer account portal.[12]

- **Number of Online Billing Accounts:** the total number of customers registered to receive and pay their bills electronically.

- **All Injury/Illness Frequency Rate:** the number of work-related injuries and illnesses, multiplied by 200,000 hours, and divided by total number of actual hours worked.

- **Lost Workday Severity Rate:** the number of workdays lost due to work-related injuries and illnesses, multiplied by 200,000 hours, and divided by total number of actual hours worked.

- **Customer Average Interruption Duration Index:** the annual average time required to restore power to the average customer per sustained outage.

- **Feeders Experiencing Multiple Sustained Interruptions:** the number of feeders that experienced 10 or more sustained outages greater than one minute in duration.

[11] This measure applies to customer interactions with the contact centre that occur through phone, email, or web chat channels.
[12] MyAccount is a web-based customer preference electronic dashboard. Among other things, it allows customers to view their consumption data, pay their bills, compare bills, receive alerts and notifications, and manage their customer profile.

- **Worst Feeder Analysis – Number of Feeders with Very Poor Performance:** the number of feeders whose performance is determined to be very poor, as assessed from the worst performing feeder analysis.

- **Stations Exceeding Planning Capacity:** the percentage of stations with a summer peak operating above 100% of their planned capacity rating.

- **Feeders Exceeding Planning Capacity:** the percentage of feeders with a summer peak operating above 100% of their planned capacity rating.

- **Stations Approaching Rated Capacity:** the percentage of stations at or above 90% of their rated capacity.

- **Feeders Approaching Rated Capacity:** the percentage of feeders at or above 90% of their rated capacity.

- **Productive Time:** the total regular hours charged to a work order as a ratio of total regular hours.[13]

- **Labour Allocation:** the amount of labour spent on maintenance and administrative work as a ratio of total productive time.[14]

- **3-Year Average Cost per Pole – Wood Pole Replacement:** the three-year average cost to replace a single wood pole.[15]

[13] The target of this indicator is to maximize this index by identifying and improving efficiencies.
[14] Historically, this metric represented the amount of labour spent on capital activities as a ratio of total regular hours. However, starting in 2020, Hydro Ottawa has modified this metric in order to support broader performance management objectives. Accordingly, the target under the modified metric is to stabilize the amount of labour allocated to maintenance and administrative work.
[15] Components such as risers and underground cable are excluded.

- **3-Year Average Cost per Meter – Underground Cable:** the three-year average cost to replace a meter of underground cable.[16]

- **Average Cost per Kilometer – Vegetation Management:** the average cost to clear vegetation along one kilometer of distribution line.

- **Average Cost per Pole – Pole Test and Inspection:** the average cost to test and inspect a single pole.

- **Technology Infrastructure Cost per Employee:** the sum of external IT support costs, computer hardware, and software depreciation divided by the number of employees.

- **Annual Oil Spills & Costs of Remediation:** the total amount of oil (in litres) from Hydro Ottawa infrastructure and equipment spilled into the environment, and the corresponding costs of remediation (represented in external contractor costs only).

- **Non-Hazardous Waste Diversion Rate:** the rate at which non-hazardous waste is successfully diverted from landfills, measured as a percentage.

- **Percentage of Green Suppliers:** the percentage of goods and services that are procured from local suppliers (i.e. suppliers located within a 100 km radius of the National Capital Region).

- **OM&A per Customer:** the total operations, maintenance, and administration expenses divided by the total number of customers that Hydro Ottawa serves.[17]

- **Bad Debt as a Percentage of Total Electricity Revenue:** the percentage derived by dividing total bad debt by total electricity revenue.

[16] Civil duct banks and associated secondary devices are excluded.
[17] This definition is intended to align with the definition of “Total O&M per Customer” that is utilized in Appendix 5-A, which can be found in Attachment C of Exhibit 2-4-3: Distribution System Plan.

- **Cumulative Capital Additions per Investment Category:** the cumulative actual capital additions over the 2021-2025 period for each of System Access, System Service and System Renewal, and General Plant, as compared to the amounts submitted in Hydro Ottawa's 2021-2025 Custom IR application.[18]

- **Annual Capital Spending per Investment Category:** the actual total annual capital expenditure amount for each of System Access, System Service and System Renewal, and General Plant, as compared to the amounts submitted in Hydro Ottawa's 2021-2025 Custom IR application.

3.1.2. Rationale for Inclusion of Custom Performance Scorecard Measures

The OEB's *Handbook for Utility Rate Applications* makes clear that there must be sound reasoning in support of the inclusion of specific outcomes and metrics in a utility's performance measurement framework:

> *"A utility is accountable for identifying specific outcomes valued by its customers and explaining how the utility's plans and proposed expenditures deliver those outcomes. These outcomes are linked to performance metrics, which will be used to show whether the outcomes have been achieved. Utilities are expected to consider cost trends, benchmarking of comparable utilities, and learnings from their customer engagement in setting outcomes and performance metrics."*[19]

The proposed incorporation of the aforementioned metrics into the performance measurement framework for Hydro Ottawa's 2021-2025 Custom IR term is guided by specific rationale and criteria, as follows:

[18] In step with the practice adopted for 2016-2020 reporting, the System Renewal and System Service categories are merged into one category to reflect Hydro Ottawa's standard operating practice to shift funds between the two categories, as warranted by customer and operational requirements.
[19] Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 15.

(i) Responsiveness to Customer Preferences & Priorities

Customer input serves as a key influencer and determinant of the adoption of certain performance metrics. As explored in further detail in Exhibit 1-2-1: Customer Engagement Overview, Hydro Ottawa's consultation with customers on its business plan and proposals for the 2021-2025 period yielded valuable insights into how customers view their interests. From the feedback provided, price, reliability, and investments in new technology topped the list of customer priorities. Accordingly, Hydro Ottawa has endeavoured to integrate performance metrics which reflect these areas of interest.

With respect to price, all of the measures under the reporting categories of Asset Efficiency, Cost Control, and Financial Metrics are intended to be responsive to customer input. The same applies to the broad range of measures organized around the dedicated category of System Reliability. As for investments in new technologies, the measures under Customer Satisfaction pertaining to the number of customers signed-up for Hydro Ottawa's online offerings, as well as the Technology Infrastructure Cost per Employee measure, can trace their origin, in part, to customer opinion.

(ii) Alignment with Core RRF Outcomes & Hydro Ottawa Strategic Objectives

Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework illustrates how the principal strategic objectives of the utility closely mirror the chief performance outcomes championed under the RRF. Hydro Ottawa therefore believes that it is appropriate to include performance metrics which converge with the key points of intersection between the RRF and the utility's corporate strategy.

Given the paramount focus on customer value under both frameworks (i.e. the RRF and the utility's business strategy), the addition of more explicitly customer-focused measures is a clear imperative. Hence the inclusion of three targeted measures under the reporting category of Customer Satisfaction (Contact Centre Satisfaction - Transactional Feedback, Number of MyAccount Customers, and Number of Online Billing Accounts). Moreover, the shared emphasis in the RRF and Hydro Ottawa's corporate strategy on continuous improvement and productivity translates into a proposed performance measurement framework for the utility in which the majority of measures are aimed at tracking Operational Effectiveness. Likewise, the overlap between the RRF's support for Public Policy Responsiveness and Hydro Ottawa's commitment to Corporate Citizenship has fostered an interest on the utility's part in assuring a heightened level of accountability for reporting on actions related to environmental protection. In turn, additional measures are proposed for incorporation in this regard.

(iii) Responsiveness to Benchmarking Results

Exhibit 1-1-12: Benchmarking highlights the take-aways from numerous benchmarking analyses that Hydro Ottawa either performed or commissioned, in support of the formulation of the plans and proposals set forth in this Application. Consistent with best industry practices, as well as the expectations of the RRF, Hydro Ottawa wishes to ensure the presence of robust linkages between key outcomes in the benchmarking studies and the composition of the performance measurement framework for the 2021-2025 period.

Consequently, the Custom Performance Scorecard includes several measures with correlations to Hydro Ottawa's benchmarked costs and performance. For example, the four measures under the reporting category of Cost Control which evaluate the average costs of certain asset categories and maintenance programs fall within the scope of the unit costs benchmarking study prepared by the UMS Group. Similarly, the metric pertaining to Technology Infrastructure Cost per Employee is influenced, in part, by the areas of focus in the IT Budget Assessment Benchmark authored by Gartner.

(iv) Alignment with Hydro Ottawa's Corporate Productivity Scorecard

As part of its commitment to productivity, Hydro Ottawa has previously developed a Corporate Productivity Scorecard. Intended for internal use, this scorecard is populated with certain KPIs that are monitored for the purpose of measuring continuous improvement in areas of strategic interest to the utility. A prior version of this Corporate Productivity Scorecard was included in Hydro Ottawa's 2016-2020 Custom IR application and an updated version is included in this Application (please see Attachment 1-1-13(A): Productivity Scorecard).

Certain metrics from Hydro Ottawa's Corporate Productivity Scorecard have been included in the group of KPIs against which the utility has been reporting during the 2016-2020 period – namely, Productive Time and Labour Allocation. In the spirit of demonstrating accountability and providing more insights to the OEB, customers, and other stakeholders, and of achieving greater alignment between its internal tracking and the planned external reporting for 2021-2025, Hydro Ottawa is migrating an additional set of metrics from the Corporate Productivity Scorecard to the proposed Custom Performance Scorecard. These are Technology Infrastructure Cost per Employee and Bad Debt as a Percentage of Total Electricity Revenue.

(v) Support for OEB APB Initiative

A final motivating factor for the proposed inclusion of the specific number and nature of performance measures in Hydro Ottawa's Custom Performance Scorecard is an interest in lending support to the OEB's initiative to enhance the effectiveness and efficiency of its regulation through benchmarking at the program and activity level. Consistent with the RRF's call for utilities to deliver outcomes in respect of Public Policy Responsiveness, Hydro Ottawa's selection of a diverse and meaningful set of metrics is intended to help inform the OEB's approach to monitoring and benchmarking utility performance at a greater level of granularity.

3.2. UPDATES ON PROGRESS OF CAPITAL SPENDING BY CATEGORY

Alongside the Custom Performance Scorecard, the second major component of Hydro Ottawa's tailored performance reporting regime for 2021-2025 is a continuation of the filing of annual updates on the progress of capital spending in key categories. These updates track actual capital expenditures by program type (i.e. System Access, System Service and System Renewal, and General Plant) versus budgeted capital expenditures, and include variance analysis, where appropriate.

As part of the Approved Settlement Agreement, Hydro Ottawa committed to annual reporting of this nature for the duration of the 2016-2020 Custom IR term. This commitment was in accordance with the following expectations articulated in the RRFE Report regarding rate-setting through the Custom IR method:

> *"Once rates have been approved, the Board will monitor capital spending against the approved plan by requiring distributors to report annually on actual amounts spent. If actual spending is significantly different from the level reflected in a distributor's plan, the Board will investigate the matter and could, if necessary, terminate the distributor's rate-setting method."*[20]

In Hydro Ottawa's view, the filing of these updates has helped to maximize transparency and accountability in the utility's execution of its capital programs. The CIR Annual Reports have provided the OEB, customers, stakeholders, and the general public the ability to evaluate the utility's capability to fulfill the commitments made around capital spending in its 2016-2020 Custom IR application.

Accordingly, Hydro Ottawa will maintain a robust level of compliance with this reporting requirement over the course of its 2021-2025 rate term.

4. CONCLUSION

Hydro Ottawa is confident that the annual reporting program outlined above will serve as the basis of a rigorous performance management framework for its impending five-year rate plan.

[20] RRFE Report, page 20.

BENCHMARKING

1. INTRODUCTION

A key tool in the Renewed Regulatory Framework ("RRF") performance measurement toolkit is benchmarking. In its *Report of the Board - Renewed Regulatory Framework for Electricity Distributors: A Performance-Based Approach* ("RRFE Report"), the OEB determined that "[e]xpanded use of benchmarking will be necessary to support the Board's renewed regulatory framework policies."[1] This finding is affirmed in the *Handbook for Utility Rate Applications*, which conveys the OEB's expectation for utilities "to provide benchmarking analysis which supports their proposed plans and programs and demonstrates continuous improvement."[2]

This Schedule contains several pieces of benchmarking evidence, which are intended to serve multiple purposes:

- The inclusion of benchmarking information will assist the OEB in evaluating Hydro Ottawa's patterns of performance and in assessing the proposals set forth in the utility's capital and operational plans.
- The benchmarking that has either been conducted or commissioned by Hydro Ottawa has helped inform the establishment and incorporation of specific outcomes into the performance measurement framework for the 2021-2025 rate period. It has also influenced the development of the Custom Price Escalation Factor, which is a defining feature of the Custom Incentive Rate-Setting ("Custom IR") framework underpinning this Application.
- The use of benchmarking studies and analyses is directed at supporting the achievement of the utility's own corporate strategic objective of Organizational Effectiveness, which is interpreted as the pursuit of performance excellence through the cultivation of a culture of innovation and continuous improvement.

[1] Ontario Energy Board, *Renewed Regulatory Framework for Electricity Distributors: A Performance-Based Approach* (October 18, 2012), page 59.
[2] Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 18.

Together, these functions will help ensure that Hydro Ottawa remains accountable to the OEB, its customers, and other stakeholders with respect to providing value for money and cost-effective delivery of outcomes.

Consistent with OEB requirements, the benchmarking evidence appended to this Application takes two forms – external and internal. The external benchmarking consists of a series of reports commissioned from third parties, for the purpose of analyzing the utility's performance in a range of categories and measures relative to comparator groups of utilities located either in Ontario, Canada, and/or the United States. It also consists of benchmarking analysis conducted by Hydro Ottawa itself, in which the utility's performance is juxtaposed against that of a select subset of the electricity distributor community in Ontario. The internal benchmarking primarily relies upon metrics utilized in the annual Electricity Utility Scorecard as well as the OEB's annual *Yearbook of Electricity Distributors* to assess Hydro Ottawa's performance and continuous improvement over time.

In the sections below, and in the accompanying Attachments to this Schedule, Hydro Ottawa explains in greater detail the specific rationale for conducting the respective benchmarking exercises, what insights were yielded into recent trends in the utility's performance and efficiency, how the utility is interpreting the findings, and what actions the utility is taking as a result.

2. EXTERNAL BENCHMARKING – THIRD-PARTY STUDIES

In support of the objectives identified above (i.e. assisting the OEB in evaluating Hydro Ottawa's recent performance and Application proposals; informing the development of the Custom Price Escalation Factor and specific outcomes for inclusion in the 2021-2025 performance measurement framework; and advancing the utility's own strategic objective of Organizational Effectiveness), the utility commissioned the following benchmarking studies from third-party experts:

Table 1 – Benchmarking Studies Filed in this Application

Benchmarking Review	External Consultant	Application Attachment
Econometric Benchmarking Study of Hydro Ottawa's Total Cost & Reliability	Clearspring Energy Advisors	Attachment 1-1-12(A)
Unit Costs Benchmarking Study	UMS Group	Attachment 1-1-12(B)
IT Budget Assessment Benchmark	Gartner	Attachment 1-1-12(F)
Compensation Benchmarking Study	Mercer Canada	Attachment 1-1-12(G)

The results from these studies consistently revealed that Hydro Ottawa is a strong performer relative to its peers in numerous categories, and that the utility is well-positioned to sustain ongoing improvements in key areas of performance.

2.1. TOTAL COST AND RELIABILITY BENCHMARKING STUDY

Section 2.1.8 of the *Chapter 2 Filing Requirements for Electricity Distribution Rate Applications*, as updated on July 12, 2018 and addended on July 15, 2019 ("Filing Requirements"), stipulate that a distributor must provide a forecast of its efficiency assessment for the purposes of providing the OEB with a directional indication of efficiency and discuss how the results of this assessment have informed the distributor's business plan and application. The tool that is prescribed for conducting this efficiency assessment is the total cost econometric benchmarking model developed by the Pacific Economics Group ("PEG").

Notwithstanding the aforementioned stipulation, the OEB has also signalled that an electricity distributor which is filing a Custom IR application is not compelled to adhere to standardized filing requirements.[3] Accordingly, Hydro Ottawa has undertaken a two-pronged approach in this Application.

First, the utility has completed the Benchmarking Spreadsheet Forecast Model, with the results set forth in Attachment 1-1-12(E): PEG Benchmarking Forecast. In addition, as a customized feature of this Application and based upon rationale that is more explicitly articulated in

[3] Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 25: "A Custom IR application is by its very nature custom, and therefore no specific filing requirements have been established."

Attachment 1-1-12(E) and Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework, Hydro Ottawa has opted to submit and incorporate the results of a separate econometric benchmarking study in lieu of the PEG model results.

Hydro Ottawa retained Clearspring Energy Advisors ("Clearspring"), a leading expert in econometric benchmarking, to prepare a total cost and reliability study. The purpose of this study was three-fold: first, to assess the reasonableness of Hydro Ottawa's cost forecasts; second, to analyze the utility's historical reliability performance; and third, to assign a stretch factor for inclusion in the Custom Price Escalation Factor formula that serves to reflect the expected efficiency level of the utility, and to anchor the rate-setting framework for this Application.

Of note, the study utilized a robust and populous dataset. The peer group consisted of 88 utilities – 81 located in the U.S. and seven located in Ontario. Data samples for the U.S. utilities stretched from 2002-2017, while the sample years for Ontario utilities stretched from 2006-2017 (with the exception of Hydro Ottawa itself, for which data was provided through 2025). Altogether, the study is underpinned by 1,370 data observations – a sufficiently rigorous number to ensure the statistical significance and robustness of the model.

2.1.1. Key Findings

2.1.1.1. Total Cost Benchmark

With respect to Hydro Ottawa's performance against the benchmark for total costs, Clearspring's study reached the following conclusions:

- "The total cost results provide evidence that Hydro Ottawa's historical and projected cost levels are reasonable."[4]
- The most recent three-year average of historical total costs (2016-2018) for Hydro Ottawa are below benchmark expectations. The average benchmark score for Hydro Ottawa from 2016 to 2018 is -9.0%.

[4] Attachment 1-1-12(A): Econometric Benchmarking Study of Hydro Ottawa's Total Cost and Reliability, page 31.

- The projected total cost levels during Hydro Ottawa's Custom IR period (2021-2025) remain below the benchmark predictions. Under a certain set of parameters, the average benchmark score for Hydro Ottawa during the Custom IR period is -12.5%.

With respect to the third conclusion in the foregoing list, the parameters in question are the exclusion of two major capital projects that will have an appreciable impact on rates over the 2021-2025 timeframe. The first project is the pair of new administrative and operational centres that Hydro Ottawa has constructed as part of its Facilities Renewal Program and constitute a generational investment by the utility. The second is the Cambrian Municipal Transformer Station ("MTS"), which is required to accommodate customer load growth and increase supply capacity in the South Nepean area of Ottawa.[5] Its development will necessitate upgrades to existing transmission facilities and construction of a segment of new transmission line by Hydro One Networks Inc. Seeing as the underlying need for the Cambrian MTS project is driven by Hydro Ottawa and its customers, the bulk of the project costs (both station and line) have been apportioned to Hydro Ottawa. In turn, this has the practical effect of making this project one of the most expensive capital projects in the utility's history.

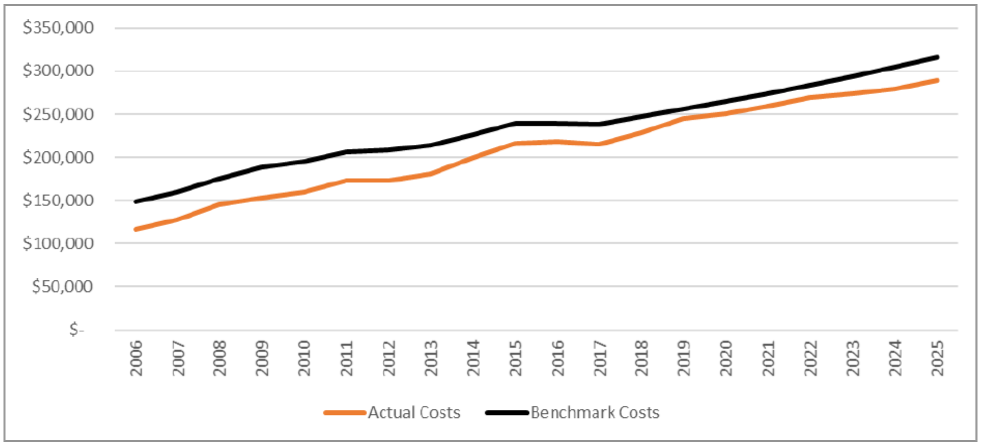
In the absence of these unique, once-in-a-generation investments, the projected average total cost benchmark score for Hydro Ottawa during its Custom IR period would be -12.5%. Conversely, the inclusion of these projects in the benchmarking analysis results in an average total cost score of -7.1%. As explained in greater detail in section 2.1.2 below, Hydro Ottawa strongly believes that the use of the former figure (-12.5%) as a benchmarking score is more appropriate, as it serves to normalize what are otherwise extremely rare circumstances impacting the utility (i.e. the confluence of two generational capital projects).

Figure 1 below, which is sourced from Clearspring's study, compares Hydro Ottawa's historical and projected total costs with the model's benchmark costs. In the graph, the costs projected for the 2021-2025 period correlate to the average benchmark score of -7.1%. At the same time, the

[5] This station was previously referred to as South Nepean MTS, but has since been re-named. The total cost and reliability study prepared by Clearspring retains the original nomenclature of South Nepean MTS.

graph is directionally consistent with the alternative score of -12.5%, which is the result that Hydro Ottawa maintains should be granted more weight.

Figure 1 – Hydro Ottawa Total Cost Benchmarking Results 2006-2025: Actual vs. Benchmark ($'000s, C$)



2.1.1.2. Reliability Benchmark (SAIFI and CAIDI)

As noted in Clearspring's report, the vast majority of jurisdictions that require reporting of reliability indicators by electric utilities include the metrics of SAIFI and CAIDI (which, respectively, stand for "System Average Interruption Frequency Index" and "Customer Average Interruption Duration Index").[6] Likewise, the report observes that in Ontario, Major Event Days ("MEDs") are excluded from reliability statistics, so as to reduce year-over-year volatility in reported data which might otherwise be attributable to extreme weather events. What is included in the dataset, however, are outages caused by loss of supply, so as to ensure consistency with U.S.-sourced data.

With respect to the measurement of Hydro Ottawa's recent reliability performance using these metrics, Clearspring's analysis indicated the following:

[6] Attachment 1-1-12(A): Econometric Benchmarking Study of Hydro Ottawa's Total Cost and Reliability, page 25.

- The most recent three-year average (2016-2018) for SAIFI is 11.3% above benchmark expectations.
- The most recent three-year average (2016-2018) for CAIDI is 13.7% below benchmark expectations.

Of note, Clearspring's report states that the reliability benchmarking results provide no evidence that Hydro Ottawa is producing better than average cost performance at the expense of reliability outcomes.[7]

2.1.2. Recommended Stretch Factor

Based on the findings and scores produced by the total cost benchmarking analysis, Clearspring is recommending a stretch factor of 0.30% for this Application.

However, as noted above, Clearspring's study also examined how Hydro Ottawa's benchmarking results would have appeared in the absence of "once-in-a-generation" investments whose costs have a lopsided effect on the total cost scoring. As detailed above, Hydro Ottawa finds itself in the rare situation of simultaneously executing two significant projects – the Facilities Renewal Program and the Cambrian MTS – which are generational in nature and which will have a much more acute impact on customer rates than if they had been implemented in isolation at separate junctures over an extended time horizon.[8] As noted in Clearspring's report, the costs associated with these investments negatively affect the benchmarking score throughout the 2021-2025 Custom IR period. Absent the cost of these projects, Clearspring's recommended stretch factor for Hydro Ottawa would have been 0.15%.

Accordingly, Hydro Ottawa submits the following: (i) these two projects should be excluded for the purposes of formulating the stretch factor; and (ii) 0.15% is the appropriate stretch factor to

[7] *Ibid*, page 32.
[8] For more details on the Facilities Renewal Program, please see Attachment 2-1-1(A): New Administrative Office and Operations Facilities; for Cambrian MTS, please see Exhibit 2-4-3: Distribution System Plan and Attachment 2-4-3(E): Material Investments.

utilize. Further context and justification for this approach is articulated in Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework.

2.1.3. Incorporating Results into the Application

Throughout this Application, there are several linkages between the plans and proposals set forth by Hydro Ottawa, and the results of Clearspring's analysis.

Foremost among these is the inclusion of the proposed stretch factor of 0.15% in the utility's Custom Price Escalation Factor.[9]

Secondly, along with the generally positive and supportive feedback received from customers on Hydro Ottawa's proposed capital and operational plans, the findings yielded from this econometric benchmarking exercise serve as critical validation of the reasonableness of the utility's projected capital and operations, maintenance and administration ("OM&A") expenditures over the course of 2021-2025. This affirmation informed Hydro Ottawa's approach to finalizing its overall envelope of capital projects and OM&A programs, with the utility drawing confidence from the report's findings around what would be viewed as prudent investments by customers, other stakeholders, and the OEB.

In addition, the results from Clearspring's analysis have helped to inform the proposed inclusion of several measures in Hydro Ottawa's Custom Performance Scorecard. These measures will track different aspects of the reliability performance achieved by the utility and will continue to serve as a key means for ensuring accountability to customers in monitoring, improving, and reporting on system reliability. Please see Exhibit 1-1-11: Proposed Annual Reporting 2021-2025 for more details.

[9] As per the discussion in section 2.1.2 above, please see Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework for further details.

2.2. UNIT COSTS BENCHMARKING STUDY

As part of its efforts to measure and monitor the achievement of productivity gains across the utility, Hydro Ottawa has previously employed unit cost metrics to track its performance and cost trends. For example, its 2016-2020 Custom Incentive Rate-Setting application included a copy of the Corporate Productivity Scorecard that has been utilized for several years by the utility to measure continuous improvement in specific areas of focus.[10] Over the years, this internal scorecard has included several measures that are based on the unit cost of a specific asset class or maintenance program, such as Technology Infrastructure Cost per Employee and Cost per Underground Locate.

Hydro Ottawa has opted to include formal unit cost benchmarking in support of the proposals and evidence set forth in this Application. The reasons for this decision were manifold. To begin, the commissioning of a dedicated study comparing the utility's unit costs in select asset categories and OM&A programs to a sample group of peer utilities represented a logical extension of existing continuous improvement practices. Secondly, Hydro Ottawa viewed the inclusion of unit cost analysis as a valuable complement to the benchmarking of the utility's total cost envelope and as an opportunity to obtain insights into the efficiency of its system investment and OM&A programs at a more granular level. Lastly, Hydro Ottawa regarded the procurement and presentation of such analysis as being consistent with, and supportive of, the Activity and Program Based ("APB") Benchmarking for Electricity Distributors initiative that the OEB launched in 2018.[11] In fact, the utility consciously ensured that a majority of the asset categories and OM&A programs selected for inclusion in the unit cost benchmarking study were likewise contained in the OEB's preliminary list of candidates for benchmarking through the APB initiative.

The unit cost benchmarking study included in this Application was prepared by UMS Group ("UMS"), an international utility management consulting firm. Hydro Ottawa provided UMS with

[10] Hydro Ottawa Limited, *2016-2020 Custom Incentive Rate-Setting Distribution Rate Application*, EB-2016-0004 (April 29, 2015), Exhibit D-1-4, Attachment D-1(C).
[11] Ontario Energy Board, Letter, *Activity and Program Based Benchmarking (ABP) Initiative*, EB-2018-0278 (October 10, 2018).

detailed unit cost data in System Renewal capital categories as well as preventative and predictive maintenance categories for the 2016-2018 period (along with a host of other data inputs). In the professional judgment of UMS, the scope of the study served as a relevant proxy for assessing the efficiency and effectiveness of Hydro Ottawa's work. This determination was reached on account of the fact that the six asset categories examined in the report represented more than 70% of the System Renewal budget during the study period, while the six OM&A programs comprised a 48% share of the preventative and predictive maintenance budget during the same timeframe.[12]

Utilizing multiple normalization factors, UMS compared Hydro Ottawa's costs and performance to those of a peer group consisting of 15 utilities spread across Ontario, Canada, and the United States. Members of the peer group were chosen based upon criteria that would ensure relevant comparisons to an electric utility of Hydro Ottawa's size, complexity, and demographics.

Importantly, the study includes an affirmation from the authors that the methodology employed is consistent with best industry practices.

2.2.1. Key Findings

On the whole, UMS concluded that Hydro Ottawa compares favourably to the peer group. The key take-aways from their analysis are captured in the table below.

[12] The seventh OM&A program included in the study, Meter Maintenance, is a reactive program.

Table 2 – Results of UMS' Fully Normalized Unit Cost Benchmark Comparisons

Category / Program	Quartile			
	Top	2nd	3rd	Bottom
Asset Category (Capital)				
Wood Pole Replacement				
UG Cable (XLPE) Replacement				
OH Switches Replacement				
OH Transformer Replacement				
UG Transformer Replacement				
Station Breaker Replacement				
OM&A Program / Practice				
Vegetation Management				
Pole Test and Inspection				
Overhead Line Patrol				
Station Breaker and Relay Test and Inspection				
Billing-Paper				
Billing-Online				
Meter Maintenance				

As shown in Table 2, within the six asset categories that were selected for inclusion in the study, three of Hydro Ottawa's unit cost trends fell within the top quartile of the peer group while the other three ranked within the second quartile.

With respect to the seven OM&A program areas, only one of the utility's unit cost trends placed worse than those of the peer group. However, this finding is accompanied with the caveat that future unit cost analyses of the program in question (Pole Test and Inspection) are expected to yield lower results, on account of modifications to program execution which Hydro Ottawa put in place in 2018 (i.e. use of more junior employees with lower hourly rates to complete the work). For two other programs (Billing-Online and Meter Maintenance), Hydro Ottawa's average unit costs were identical to the values of the peer group median, and are therefore characterized as straddling the second and third quartiles for these categories.

Alongside its presentation of the principal results of the study, UMS specifically highlighted two areas of strength at Hydro Ottawa, contending that they will serve as a strong platform for continuous improvement at the utility: a performance management framework that espouses line-of-sight between corporate strategy and individual performers, and strong competence with financial management tools.

2.2.2. Incorporating Results into the Application

Together with the generally complimentary feedback received from customers on its proposed capital and operational plans, as well as the findings from the total cost benchmarking report discussed above, Hydro Ottawa has interpreted the results of UMS' unit cost analysis as an attestation of the overall efficiency and cost-effectiveness of the utility's capital and maintenance activities. Through this study, the rigour, discipline, and transparency that Hydro Ottawa strives to apply to its cost calculations and reporting has been affirmed, along with its focused efforts to ensure alignment between corporate strategic objectives, divisional plans, and individual performance goals.

At the same time, Hydro Ottawa acknowledges that the results identify opportunities for continuous improvement. Accordingly, as a direct upshot of the study's findings, the utility is adding specific measures and outcomes to its performance management framework for the 2021-2025 period. More specifically, unit cost metrics that were subject to analysis in UMS' benchmarking study have been integrated into the Custom Performance Scorecard which will serve as a cornerstone of Hydro Ottawa's performance management framework for its upcoming five-year Custom IR term. The applicable unit cost metrics are as follows (with the corresponding asset category or maintenance program identified in parentheses):

- Cost per wood pole (Wood Poles Replacement)
- Cost per meter of underground cable (UG Cable [XLPE] Replacement)
- Cost per kilometer (Vegetation Management)
- Cost per pole (Pole Test and Inspection)

For additional details on Hydro Ottawa's proposed performance measurement framework for its Custom IR rate plan, please see Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework and Exhibit 1-1-11: Proposed Annual Reporting 2021-2025.

2.3. INFORMATION TECHNOLOGY BENCHMARKING STUDY

Hydro Ottawa's business performance is dependent upon complex Information Technology ("IT") systems, covering both frontline operations (e.g. geographic information system, outage management system, supervisory control and data acquisition system) as well as back office processes (e.g. customer information and billing systems, and an enterprise resource planning system). Moreover, the growing complexity of these systems remains on an upward trajectory, given the broader trend across the electricity distribution sector of the convergence between core operational systems and enterprise information systems.

In light of these realities, and in view of Hydro Ottawa's proactive approach to leveraging innovative technologies to enhance the customer experience and improve productivity, the utility saw fit to commission a benchmarking study with a dedicated focus on IT spending. This was deemed to be a valuable means of assessing the reasonableness of Hydro Ottawa's IT expenditures, with the study thereby serving as a valuable addition to the body of evidence in this Application.

Accordingly, Hydro Ottawa contracted the services of Gartner to perform an IT Budget Assessment Benchmark. The scope of the study involved assessing the utility's distribution of IT spending as well as overall IT spending in terms of specific metrics. The study also benchmarked IT spending at Hydro Ottawa with a peer group of utilities. This group was comprised of five U.S. utilities, two Canadian utilities, and two Australian utilities whose data was made available from Gartner's benchmarking database. In Gartner's professional judgment, the sample group that was defined for this analysis was a representative set of electricity utility peers and was suitable for purposes of conducting an effective, credible benchmarking study.

Gartner's report consisted of two types of analysis: (i) benchmarking total IT budget envelope; and (ii) benchmarking IT budget based on allocations. This analysis relied upon 2018 fiscal year data supplied by Hydro Ottawa and peer group members.

2.3.1. Key Findings

The results from the study revealed that Hydro Ottawa compared favourably to the peer group under several important metrics, as summarized in Table 3 below.

Table 3 – Results of Gartner's IT Budget Assessment

Metric	Hydro Ottawa	Peer Average	Peer 25th	Observation
IT Budget as a percentage of Revenue	2.4%	3.7%	2.7%	Below 25th percentile
IT Budget as a percentage of Operating Expense	2.7%	4.5%	3.4%	Below 25th percentile
IT Budget per Company Employee	$39,947	$39,151	$34,757	Similar to peer average

The study showed that Hydro Ottawa had more streamlined IT operations than the peer group, evidenced by both the IT budget as a percentage of revenue and operating expense metrics falling below the 25th percentile relative to the peer group average.

What's more, this observation was accompanied by the finding that Hydro Ottawa's IT budget allocation differed from the peer group average in some important ways. Gartner examines IT budget allocations using the Run, Grow, Transform paradigm, in which "run" is a category that captures essential business processes and investments, "grow" relates to improvements in operations and performance within existing business models, and "transform" pertains to new markets, new products, and new business models.[13] Gartner found that, while Hydro Ottawa allocates 47% of its IT budget to "run", the peer group average was 69%. Similarly, the utility allocates 8% of its IT budget to "grow" and 45% to "transformation," whereas the peer group benchmark was 22% and 9% in the respective categories.

[13] Attachment 1-1-12(F): Hydro Ottawa IT Budget Assessment Benchmark, page 21.

One additional take-away from the report merits attention. Compared to the peer group average, Gartner found that Hydro Ottawa has a lower ratio of IT full-time equivalent employees ("FTEs") to total company employees, and that the peer group uses less outsourcing and more contract staff augmentation for IT than Hydro Ottawa. All of these factors can be interpreted as having helped to contribute to an above-average level of streamlined IT operations within the utility.

2.3.2. Incorporating Results into the Application

In this Application, Hydro Ottawa has applied the insights yielded from Gartner's study in several instances and for several purposes.

First, Hydro Ottawa believes that Gartner's study has confirmed that the utility's IT strategy and investments are generally consistent with the top quartile performers of a representative sample of the industry. On a comparative basis to the peer group, Hydro Ottawa runs a streamlined IT business across the utility, with substantially fewer employees. Although having fewer employees can inversely impact a metric like IT budget per employee, Hydro Ottawa's metric is consistent with the peer group average.

Secondly, Hydro Ottawa interprets the findings from Gartner's study as validation of a successful execution of a five-year technology plan which focused on building a digital workplace to improve productivity and operational excellence, and to yield value for the customer. Hydro Ottawa is encouraged by the study's conclusion that the utility's IT strategy and budget allocation are in line with the emerging best practice in the industry of shifting IT budgets away from maintaining infrastructure and instead concentrating on "digital initiatives that support optimization of the core business processes and digitally enabled innovation and transformation."[14]

This is arguably the greatest differentiator between Hydro Ottawa and the peer group. With over half of its IT budget allocated to growth and transformation, Hydro Ottawa has fostered an IT culture focused on innovation and customer service, as evidenced by initiatives aimed at

[14] *Ibid*, page 13.

facilitating process automation and upgrading or replacing key business applications, so as to maximize the level of resources available for developing new solutions for customers. The utility's focus has been to simplify infrastructure, invest in foundational technologies, and leverage cloud services. Hydro Ottawa's strategy of outsourcing commodity work with a cloud-first approach, using external hosting services, leveraging an ecosystem of partners, primarily using contractors for project work (not for staff augmentation), and focusing employees' time on higher-value, customer-oriented work has enabled the utility to maintain streamlined IT operations and has resulted in an expense model with significant scalability and flexibility.

Hydro Ottawa therefore intends to sustain this approach to IT budget allocation over the course of its 2021-2025 rate plan. This course has been charted through the utility's formal *Digital Strategy*.[15] (It merits observation that the Digital Strategy's goal of working within the existing IT headcount envelope is bolstered by Gartner's findings of Hydro Ottawa running streamlined operations with a lower IT employee ratio than the industry average). In addition, the blueprints for numerous IT and technology initiatives have been designed accordingly, as reflected in the project summaries for several of the IT-related General Plant Material Investments in the Distribution System Plan.[16]

Lastly, consistent with the discussion above in section 2.2 regarding benchmarking of unit costs, the findings from Gartner's study reveal opportunities for ensuring continuous improvement in the utility's performance and in the delivery of cost-effective, meaningful outcomes for customers. To that end, Hydro Ottawa believes that it is appropriate to include a metric in its Custom Performance Scorecard that is related to IT spending and that will help demonstrate accountability in the tracking and reporting of IT-related costs incurred by the utility. Technology Infrastructure Cost per Employee is therefore proposed for inclusion among the mix of custom performance measures against which Hydro Ottawa will report on an annual basis over the

[15] Please see Attachment 1-1-13(B): Digital Strategy.
[16] Examples in this regard include items 1.3 (Service Automation) and 2.2 (ERP Program) under the General Plant category of the Material Investments included in Attachment 2-4-3(E).

2021-2025 Custom IR period. Please see Exhibit 1-1-11: Proposed Annual Reporting 2021-2025 for further details.

2.4. COMPENSATION BENCHMARKING STUDY

The fourth and final benchmarking study commissioned by Hydro Ottawa pertained to the utility's compensation and benefits program for employees.

Several factors prompted the preparation of this study. To begin, consistent with historical and industry trends, compensation costs continue to represent a significant share of Hydro Ottawa's overall OM&A expenses. In addition, the OEB has signalled interest in utility benchmarking of compensation costs. In the *Handbook for Utility Rate Applications*, the OEB establishes an expectation that utilities will address several matters in their descriptions of compensation strategies and policies, including "how target salaries are compared to external benchmarks…"[17]

Accordingly, Hydro Ottawa retained Mercer Canada ("Mercer") to evaluate the competitiveness of the utility's cash compensation and benefits for unionized and management group employees against relevant market comparators. Comparators were drawn from both the utility industry and from the general market (i.e. other economic sectors). The study reviewed a total of 15 positions, consisting of a blend of jobs that are core to the business, as well as technical, professional, and para-professional roles that support the business. Of these 15 positions, five were drawn from the pool of management employees while 10 were from the unionized segments of the utility's workforce.[18] The positions selected for inclusion are representative of the two categories of employees (i.e. unionized and management). Likewise, they stretch across the different classification levels for positions in each category.

[17] Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 19.
[18] All of the positions from the management group of employees that were within the scope of the study were non-executive positions.

2.4.1. Key Findings

In keeping with best practices for statistical integrity and standard reporting requirements, Mercer's study defined the "competitiveness" of salaries and total cash compensation as falling within +/- 10% of the median job rate for each market and industry comparator.[19]

The study found that Hydro Ottawa jobs which are core to the operational business (e.g. Manager, Distribution Operations; Supervisor, Distribution Operations; Distribution Engineer; Power Line Technician; and System Operator) were all well-aligned with the utility market comparators. Similarly, key professional roles such as Network Administrators and Management Accountants were also found to be in alignment with comparators in the utility and general industry markets.

The average base salary for several jobs – generally unionized support roles – were found to be higher than the general industry market comparators. However, in almost all cases, these job rates fell within +/-10% of P50 of the utility market comparators. What's more, the job rates for a handful of positions were more than 10% below P50.

With respect to employer-paid benefits (i.e. insurance, wellness benefits, and pension), Mercer found that Hydro Ottawa's contributions were generally aligned with what is typically observed in the market for non-executive employees. In particular, when compared to the Ontario Public Sector, where such benefits account for 20%-22% of base salary, Hydro Ottawa's benefits were found to be within 19%-21% of base salary.

Taken together, these results reflect a general posture of alignment on the part of Hydro Ottawa with market and utility industry comparators, with respect to cash compensation and employer-paid benefits for employees.

[19] The market median job rate is also referred to as P50.

2.4.2. Incorporating Results into the Application

Hydro Ottawa has interpreted the results of Mercer's benchmarking analysis as general validation of the utility's approach to the management of compensation costs. The bulk of the findings from the study underscore broader alignment between the average base salary for a range of Hydro Ottawa positions and comparable jobs in utility industry and market comparators. The results of the study serve as an impetus for the utility to continue exercising prudence in controlling total compensation costs, while balancing its formulation of compensation packages with the need to attract and retain a highly-skilled workforce and to foster a performance-driven workplace culture.

For those positions whose job rates were more than 10% above P50 in a given comparator category, Hydro Ottawa will continue to monitor any increases in compensation and will periodically seek affirmation from external sources that average base salaries remain in general alignment with the median rate in the companion comparator category.

As acknowledged in the OEB's *Handbook for Utility Rate Applications*, the comparison of target salaries to external benchmarks serves as only one component in a utility's strategy for managing employee compensation. Other components may include formal policies governing the establishment and periodic review of salary scales, as well as performance pay structures. Alongside external benchmarking, these elements likewise comprise different pieces of Hydro Ottawa's larger approach to employee compensation. For a more detailed description of the utility's compensation philosophy and associated components, including the framework in place for evaluating employees' performance and contributions to the utility's achievement of its strategic objectives, please see Exhibit 4-1-5: Workforce Staffing and Compensation and the accompanying information in Attachment 4-1-5(A): Employee Compensation Strategy, Attachment 4-1-5(B): Workforce Planning Strategy, and Attachment 4-1-5(C): OEB Appendix 2-K - Employee Costs.

2.5. CONCLUSION

The foregoing third-party external benchmarking analyses have yielded important insights into Hydro Ottawa's performance and efficiency over the last several years, and into the costs of key programs relative to the utility's peers. In varying measures, the results from these studies have been reflected in different aspects of this Application, whether serving to validate certain proposals and plans or prompting modifications to others, such that the ongoing achievement of efficiencies and productivity improvements can be ensured over the course of the 2021-2025 rate period.

3. EXTERNAL BENCHMARKING & INTERNAL BENCHMARKING – HYDRO OTTAWA ANALYSIS

In addition to commissioning studies from third-party experts, Hydro Ottawa has performed its own benchmarking analysis related to various performance outcomes over the last five-year period. These analyses are intended to support the various proposals and plans set forth in this Application, and to provide evidence attesting to the utility's strong patterns of performance and continuous improvement over time.

The analysis, and the results thereof, encompass both external and internal benchmarking – namely, comparing the utility's performance to a peer group as well as evaluating the utility's year-over-year performance in isolation. This blended approach underpins the analysis contained in Attachment 1-1-12(C): Electricity Utility Scorecard and Attachment 1-1-12(D): Ontario Energy Board Electricity Distributor Yearbook and Performance Dashboard. Attachment 1-1-12(C) explores Hydro Ottawa's performance in each of the Electricity Utility Scorecard's measures over the 2014-2018 period, while Attachment 1-1-12(D) examines various distributor data identified by the OEB as key metrics in the Electricity Distributor Yearbook and on its online Performance Dashboard.

Taken together, these two Attachments assess Hydro Ottawa's effectiveness in achieving the four performance outcomes under the RRF: Customer Focus, Operational Effectiveness, Public Policy Responsiveness, and Financial Performance. Through juxtaposition against a defined group of comparable Ontario distributor peers, as well as to all distributors in the province where possible, it can be seen that Hydro Ottawa compares favourably to its peers and exceeds the average utility score in the majority of industry performance measures. In particular, Hydro Ottawa has shown marked continuous performance improvement in Service Quality, Safety, and System Reliability. At the same time, Hydro Ottawa's OM&A per customer and distribution revenue per customer remains below the industry average in Ontario.

Econometric Benchmarking Study of Hydro Ottawa's Total Cost and Reliability

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SEPTEMBER 30, 2019

(WITH MINOR REVISIONS MADE IN NOVEMBER 2019)

Clearspring Energy Advisors LLC

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1 Executive Summary

Hydro Ottawa Limited ("Hydro Ottawa" or "Company") engaged Clearspring Energy Advisors, LLC ("Clearspring Energy") to conduct an econometric benchmarking study of Hydro Ottawa's past and projected total costs and its historical reliability metrics. The lead researcher of the study is Mr. Steven A. Fenrick.

Mr. Fenrick has led numerous benchmarking studies in Ontario and throughout North America, including Hydro Ottawa's prior total cost and reliability benchmarking study, found in Ontario Energy Board ("OEB" or the "Board") docket EB-2015-0004.[1] Other studies conducted by Mr. Fenrick in Ontario include:

- Benchmarking and productivity studies for Hydro One Network's distribution and transmission utilities,[2]
- Research for the Coalition of Large Distributors during the 4th Generation Incentive Regulation ("4GIR") proceeding,[3] and
- Benchmarking studies for the last two Toronto Hydro custom incentive regulation ("Custom IR") applications.[4]

Clearspring Energy uses the results of this study to determine the appropriate stretch factor for Hydro Ottawa in its 2021-2025 Custom IR application. The study results can also provide useful information to the OEB and stakeholders. The benchmarking research uses the econometric approach to evaluate total costs. This approach aligns with the Board Decision in the 4GIR proceeding.

1.1 Overview of Clearspring Energy's Benchmarking Process

The benchmarking study evaluates Hydro Ottawa's historical and projected total cost amounts. It also evaluates the Company's historical system reliability metrics: the system average interruption frequency index ("SAIFI"), and the customer average interruption duration index ("CAIDI").

These evaluations are conducted by comparing Hydro Ottawa's actual or Custom IR forecasted values with the econometric model's predicted values for each year.[5] For example, the total cost model

[1] Mr. Fenrick conducted the prior Hydro Ottawa and the other Ontario studies while employed at Power System Engineering, Inc. ("PSE). Mr. Fenrick is now a Principal Consultant at Clearspring Energy. PSE continues to contribute to the research, now in a subcontractor role to Clearspring Energy.

[2] Cases EB-2017-0049, EB-2018-0218, and EB-2019-0082.

[3] Case EB-2010-0379.

[4] Cases EB-2014-0116 and EB-2018-0165.

[5] In this report we will use "forecasted" or "projected" costs to refer to Hydro Ottawa's estimates of those values in 2019 to 2025. We will use "predicted," "expected," or "benchmark" costs and reliability to refer to the econometric model's predictions for those metrics.

produces a custom "expected" total cost for Hydro Ottawa for each studied year, and Hydro Ottawa's actual costs for a given year are compared to the expected costs for that year. The total cost model produces expected total costs for past years (based on the parameter estimates and the actual values of the drivers of total costs, e.g. number of customers) and future years (based on the same parameter estimates and the projected values of those same drivers). Clearspring Energy developed three econometric models: total cost, SAIFI, and CAIDI.

Clearspring Energy recommends econometric benchmarking because of its enhanced accuracy relative to unit cost and peer group approaches. The econometric benchmarking method contains the ability to statistically test included variables, includes a relatively large number of variables, and does not require the researcher to select a peer group or exclude large portions of the available data to fashion an appropriate benchmark. The benchmarking method adjusts for service territory conditions and other factors that affect the studied metrics, so that each utility in the study can have custom benchmarked values for those metrics.

Using a large sample of utilities, the econometric model produces an industry-wide estimation of how certain factors (e.g. number of customers, peak demand, etc.) affect the studied metric (e.g. total costs). For the present study, the sample used to estimate the models includes both U.S. and Ontario observations from multiple utilities for multiple years. A dataset which includes U.S. and Ontario observations provides a sample with diversity in the number of customers and other explanatory variables. It is a robust sample that produces an accurate benchmark assessment of Hydro Ottawa's total cost and reliability metrics.

The high-level method for the three models is similar. In each case, the model uses the industry data over the studied period to determine the relationship between the metric and the factors that drive it. For example, the total cost model estimates the industry-wide relationship between total costs and certain variables, based on the utilities included in the sample. The model is then used to predict Hydro Ottawa's "expected" (benchmarked) costs for each year, using the same estimated relationship between total costs and the explanatory variables, and using Hydro Ottawa's values for the variables. The approach for the reliability metrics is similar, although a different set of explanatory variables is used for each model.

The overall approach of our benchmarking process is:

1. We assembled a dataset that includes the historical costs (or reliability) of all the observations, along with the variables that affect cost (or reliability), such as customer totals, peak demands, forestation, congested urban, wage levels, customer density, etc.
2. Using the sample data, Clearspring Energy estimated three econometric models. Each model expresses the relationship between the variables and one of the metrics (total cost, SAIFI, or CAIDI).
3. We can then produce "benchmark" values for Hydro Ottawa for any given year. The benchmarks denote the expected value for an average-performing utility with identical explanatory variable values for that year. For example, if the SAIFI model predicted a value of X for Hydro Ottawa for 2010, that can roughly be translated as: "Given the industry-wide relationship between SAIFI

and the variables that drive it (number of customers, % forestation, rural density, etc.), and given Hydro Ottawa's specific variable values for that year, we would expect an average-performing utility to have a SAIFI of X in 2010."

4. A comparison between the actual values and the benchmarks can then be made for each year.
5. Future years for Hydro Ottawa are also benchmarked and compared to projected costs, using the same model parameter estimates, and *projected* explanatory variable values (instead of *actual* variable values for historical years).

When making the comparison between the actual costs and benchmark costs of Hydro Ottawa, we use the logarithmic percentage difference.[6] A percentage difference finding below zero implies Hydro Ottawa's costs are below the benchmark level for that year, and a positive value means that Hydro Ottawa's costs are above the benchmark level for that year. Similarly for SAIFI and CAIDI, a negative logarithmic percentage difference means that Hydro Ottawa's values are below the benchmark for that year. The equation for the percentage difference is:

$$\%\ Difference = Natural\ Log\ \left(\frac{Actual\ Total\ Cost}{Benchmark\ Total\ Cost}\right)$$

1.2 Total Cost Benchmark Findings

The first model benchmarks total costs for Hydro Ottawa. Total costs are defined as the sum of OM&A expenses and capital costs. The capital cost portion is constructed based on net plant and historical plant additions over time, and includes the estimated economic depreciation and opportunity costs of capital. The components within the calculation of total costs are similar to the components in the distribution portion of revenue requirements.[7] In this study, we use total cost benchmarking. This method is preferred to partial cost benchmarking approaches, such as OM&A benchmarking, which exclude large portions of pertinent costs.

Our total cost econometric benchmarking study results indicate the following:

1. The most recent 3-year average of historical total costs (2016 to 2018) of Hydro Ottawa are below benchmark expectations. The average benchmark score for Hydro Ottawa from 2016 to 2018 is -9.0%.
2. The projected total cost levels during the Custom IR period (2021 to 2025) remain below the benchmark predictions. The average benchmark score for Hydro Ottawa during the Custom IR period is -7.1%.

The following table and graph provide the comparison between Hydro Ottawa's historical and projected total costs and the model's benchmark total costs.

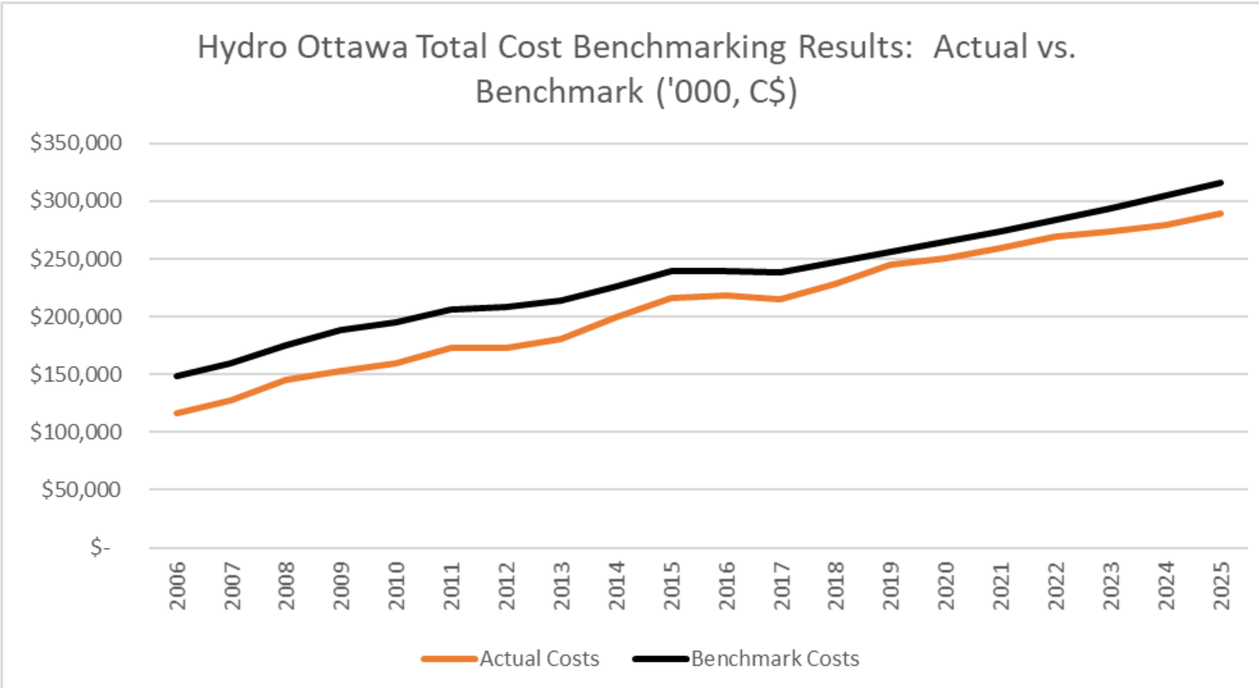
[6] We use the logarithmic percentage rather than the arithmetic percentage because it is the convention within the benchmarking industry. It is the same method used by the Board Staff's benchmarking consultant, Pacific Economics Group. ("PEG")

[7] Total costs are not exactly analogous to revenue requirements because of the generalizations needed to offer a fair analysis between utilities with varying depreciation rates, rate of returns, capital addition patterns, and cost definitions.

Table 1 Hydro Ottawa's Total Cost Performance 2006-2025

Year	% Difference from Total Cost Benchmark
2006	-24.1%
2007	-22.2%
2008	-18.7%
2009	-20.7%
2010	-20.2%
2011	-17.5%
2012	-18.5%
2013	-16.9%
2014	-12.5%
2015	-10.4%
2016	-9.3%
2017	-10.2%
2018	-7.6%
2016-2018 average score	**-9.0%**
2019	-4.5%
2020	-5.6%
2021	-5.6%
2022	-5.3%
2023	-7.1%
2024	-8.7%
2025	-8.9%
2021-2025 average score	**-7.1%**

Figure 1 Historical and Projected Total Costs vs. Benchmarked Costs



1.3 SAIFI and CAIDI Benchmark Findings

Clearspring Energy additionally conducted econometric reliability benchmarking of Hydro Ottawa's SAIFI and CAIDI. The reliability study benchmarks Hydro Ottawa's historical (2010 to 2018) data after major event day ("MED") exclusions are made. The metrics include loss of supply outages to remain consistent with the U.S. dataset definition. The reliability benchmarking used a U.S. and Ontario sample composed of the same utilities as the total cost benchmarking (unless reliability data was not available).[8]

Excluding MEDs from the calculation of the metrics enables the study to gauge reliability performance during normal operating conditions. Clearspring Energy gathered U.S. reliability data and their MED definitions from publicly-available regulatory filings. The Ontario data is gathered from Reporting and Record Keeping Requirements ("RRR") filings.

Clearspring Energy's reliability benchmarking analysis indicates the following:

1. The most recent 3-year average (2016 to 2018) for SAIFI is 11.3% above benchmark expectations.
2. The most recent 3-year average for CAIDI is 13.7% below benchmark expectations.

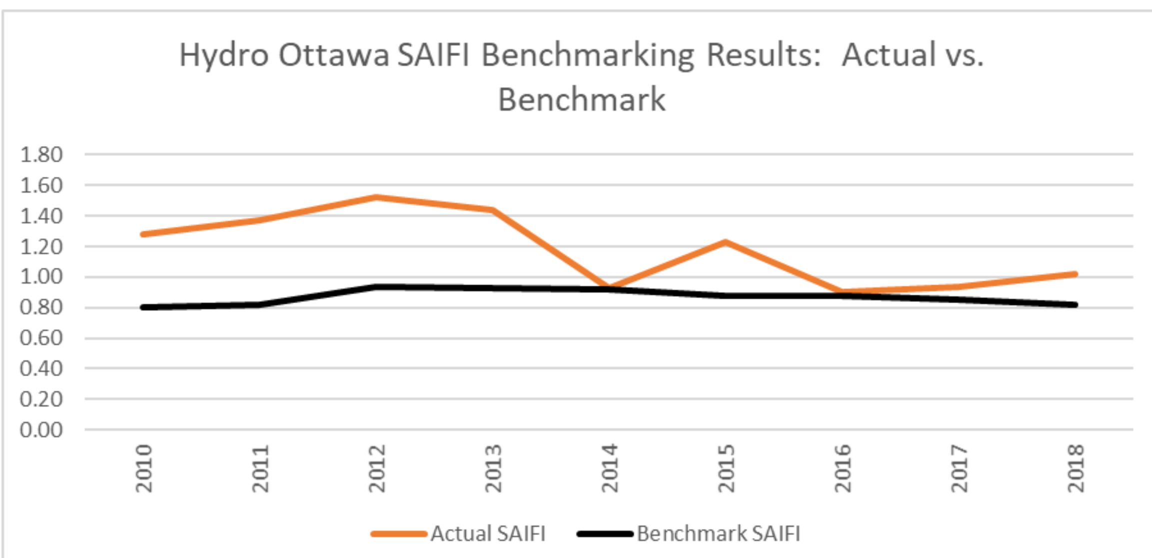
The following table and graph provide the comparison between Hydro Ottawa's actual SAIFI and the model's benchmark SAIFI value.

[8] Ontario distributors began reporting reliability data with MEDs excluded in 2016. We therefore only include Ontario data starting in that year.

Table 2 Hydro Ottawa's SAIFI Performance 2010-2018

Year	% Difference from SAIFI Benchmark
2010	46.5%
2011	51.2%
2012	49.1%
2013	43.7%
2014	1.5%
2015	33.0%
2016	3.0%
2017	9.2%
2018	21.7%
2016-2018 average score	**11.3%**

Figure 2 Actual SAIFI vs. SAIFI Benchmark

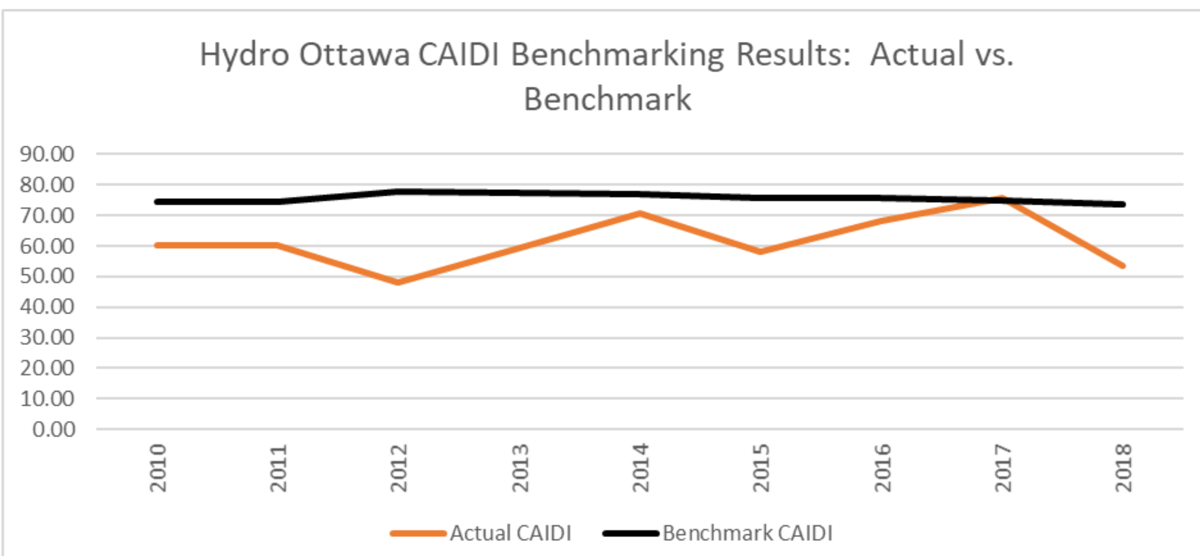


The following table and graph provide the comparison between Hydro Ottawa's actual CAIDI and the model's benchmark CAIDI value.

Table 3 Hydro Ottawa's CAIDI Performance 2010-2018

Year	% Difference from CAIDI Benchmark
2010	-21.7%
2011	-21.6%
2012	-48.2%
2013	-26.7%
2014	-8.8%
2015	-26.7%
2016	-10.4%
2017	1.2%
2018	-31.7%
2016-2018 average score	**-13.7%**

Figure 3 Actual CAIDI vs. CAIDI Benchmark



1.4 Stretch Factor Recommendation

In the 4th Generation IR proceeding, five stretch factor groupings (cohorts) were established based on the most recent average three-year total cost benchmarking scores. A score better than -25% (i.e. costs were more than 25% below benchmark) received the lowest stretch factor of 0.00%. A score between -25% and -10% received a 0.15% stretch factor. Scores that are +/- 10% received 0.30%. Scores between 10% and 25% received a 0.45% stretch factor, and scores exceeding 25% (i.e. costs were 25% or more than benchmark) received the highest stretch factor of 0.60%.

Our total cost study findings for Hydro Ottawa show that during the Custom IR period, the Company's total cost benchmarking score is -7.1%. Based on the 4th Generation IR stretch factors, this suggests a stretch factor of 0.30%. The reliability benchmarking results provide no clear evidence that Hydro Ottawa is producing this better than average cost performance at the expense of reliability outcomes. Therefore, Clearspring Energy's recommended stretch factor for Hydro Ottawa's Custom IR application is 0.30%.[9]

[9] The company requested Clearspring Energy examine how the total cost benchmarking results would change if the "once in a generation" Facilities Renewal Program and the South Nepean Municipal Transformer Station projects had not been pursued. In that hypothetical, the average 2021-2025 score would be -12.5%. This would have changed our stretch factor recommendation from 0.3% to 0.15%. Please see the Appendix for more background and the benchmarking scores with and without these project investments.

2 Total Cost Benchmarking Details

The benchmarking study employed the econometric benchmarking approach. This is the most accurate and fair method when comparing utility cost and reliability levels, because it explicitly adjusts for the quantifiable differences between utility service territories and business conditions. It is also the same method preferred by the Board in the 4GIR Decision.

Simple comparisons of metrics such as rates, unit costs, or reliability indices do not typically allow regulators to compare utilities in a fair manner. For example, comparing a utility's costs to those of a peer group utilities' costs usually presents an inaccurate picture of the target utility's performance. Factors that cannot be controlled by the utility affect costs and reliability performance. Such factors include geographical size, regional wage levels, rural density, or serving a congested urban territory. It is often difficult or impossible to account for these factors using a peer group approach.

Adjusting for these and other influencing factors is necessary to accurately evaluate performance. With this concept in mind, Clearspring Energy has estimated three econometric models from a large sample of utilities (total cost, SAIFI, and CAIDI) using variable parameters that are statistically influential on distribution utility costs and reliability indexes. The benchmarking method adjusts for service territory conditions and other factors that affect the studied metrics.

Using a large sample of utilities, the econometric model produces an industry-wide estimation of how the variables (e.g. number of customers, peak demand, etc.) affect the studied metric (e.g. total costs). For the present study, the sample used to estimate the models includes both U.S. and Ontario observations from multiple utilities for multiple years. A dataset which includes U.S. and Ontario observations provides a sample with diversity in the number of customers and other explanatory variables. It is a robust sample that produces an accurate benchmark assessment of Hydro Ottawa's total cost and reliability metrics.

The high-level method for the three models is similar. In each case, the model uses the industry data over the studied period to determine the relationship between the metric and the factors that drive it. For example, the total cost model estimates the industry-wide relationship between total cost and certain variables, based on the utilities included in the sample. The model is then used to predict Hydro Ottawa's "expected" (benchmarked) costs, using the same estimated relationship between the costs and the explanatory variables, and using Hydro Ottawa's particular values for the variables. The approach for the reliability metrics is similar, although a different set of explanatory variables is used for each model.

Total cost and reliability predictions are calculated by inserting company-specific variable values into the estimated equation for the metric at hand (total cost, SAIFI, or CAIDI) for each year in the study. The benchmark score is defined as the logarithmic percentage difference of the observed data to the predicted value of the data for a given year, as shown below.

$$Benchmark\ Score = \text{Natural Log}\ \left(\frac{Observed\ or\ Projected\ Cost\ Data}{Predicted\ Cost\ Data}\right)$$

2.1 Total Cost Sample

The sample includes Ontario and U.S. utilities that, individually, serve more than 59,806 customers.[10] The total cost sample is comprised of 88 utilities, including Hydro Ottawa. There are 81 U.S. utilities and 7 Ontario distributors in the sample. The sampled years for the U.S. observations include 2002 through 2017.[11] The sampled years for the Ontario observations include 2006 through 2017 except for Hydro Ottawa which has observations through 2025.[12] There are a total of 1,370 observations in the dataset. This is more than suitable for the estimation of a statistically robust econometric model.

The distributors included in the dataset are provided in the following table. The number of customers provided is the number of customers for the utility in 2017 and the utilities that are listed in bold operate in Ontario.

[10] This specific cut-off was used for the Ontario distributors so that it would be consistent with the U.S. sample. The smallest customer count in the U.S. sample is from Black Hills Power, which served 59,807 customers in 2002.

[11] We began the U.S. sample in 2002 because this was the starting period used in the prior Hydro Ottawa sample and the latest Toronto Hydro benchmarking study that our team conducted. Beginning in 2002 provides a sufficiently large sample size, while providing observations that are more contemporary than observations from the 1990s.

[12] Given the definition of the ratcheted peak demand variable as the highest peak demand for the utility in the last five years, 2006 becomes the first available year for the variable, since the peak demand data for Ontario distributors is available starting in 2002. Hydro Ottawa's data is actual through 2018 and then projected from 2019 to 2025.

Table 4 Total Cost Sampled Utilities

Company Name	Number of Customers	Company Name	Number of Customers
Alabama Power Company	1,475,042	**London Hydro Inc.**	157,188
Alectra Utilities Corporation	982,022	Louisville Gas and Electric Company	408,738
ALLETE (Minnesota Power)	146,353	Madison Gas and Electric Company	152,601
Appalachian Power Company	961,229	Metropolitan Edison Company	566,695
Arizona Public Service Company	1,214,627	Mississippi Power Company	193,954
Atlantic City Electric Company	551,332	Monongahela Power Company	400,554
Avista Corporation	379,027	Nevada Power Company	918,452
Baltimore Gas and Electric Company	1,281,044	New York State Electric & Gas Corporation	893,783
Black Hills Power, Inc.	71,977	Niagara Mohawk Power Corporation	1,522,893
Central Hudson Gas & Electric Corporation	293,201	Northern Indiana Public Service Company	466,688
Central Maine Power Company	624,511	Northern States Power Company - MN	1,466,398
Cleco Power LLC	290,212	Northern States Power Company - WI	261,029
Cleveland Electric Illuminating Company	761,997	Ohio Edison Company	1,046,760
Commonwealth Edison Company	3,991,358	Oklahoma Gas and Electric Company	838,252
Connecticut Light and Power Company	1,245,042	Orange and Rockland Utilities, Inc.	231,065
Consolidated Edison Company of New York	3,446,102	Pacific Gas and Electric Company	5,479,889
Consumers Energy Company	1,816,438	PECO Energy Company	1,626,898
Delmarva Power & Light Company	520,657	Pennsylvania Electric Company	589,852
Duke Energy Carolinas, LLC	2,558,843	Pennsylvania Power Company	165,130
Duke Energy Florida, LLC	1,775,327	Portland General Electric Company	870,333
Duke Energy Indiana, LLC	819,569	Potomac Electric Power Company	862,921
Duke Energy Kentucky, Inc.	141,273	PPL Electric Utilities Corporation	1,429,090
Duke Energy Ohio, Inc.	712,328	Public Service Company of Colorado	1,459,152
Duke Energy Progress, LLC	1,547,496	Public Service Company of New Hampshire	513,304
Duquesne Light Company	594,106	Public Service Company of Oklahoma	550,022
El Paso Electric Company	415,602	Public Service Electric and Gas Company	2,243,761
Empire District Electric Company	171,835	Puget Sound Energy, Inc.	1,135,036
Entergy Arkansas, Inc.	708,863	San Diego Gas & Electric Co.	1,434,024
Entergy Mississippi, Inc.	449,068	South Carolina Electric & Gas Co.	715,592
Entergy New Orleans, Inc.	200,137	Southern California Edison Company	5,071,773
EnWin Utilities Ltd.	88,422	Southern Indiana Gas and Electric Company	148,429
Florida Power & Light Company	4,901,871	Southwestern Public Service Company	410,400
Gulf Power Company	459,049	Tampa Electric Company	744,691
Hydro One Networks Inc.	1,320,085	Toledo Edison Company	313,960
Hydro Ottawa Limited	331,777	**Toronto Hydro-Electric System Limited**	767,946
Idaho Power Co.	539,590	Tucson Electric Power Company	422,650
Indiana Michigan Power Company	591,984	Union Electric Company	1,236,974
Indianapolis Power & Light Company	491,347	United Illuminating Company	333,518
Jersey Central Power & Light Company	1,122,087	Virginia Electric and Power Company	2,574,679
Kansas City Power & Light Company	539,408	West Penn Power Company	724,589
Kansas Gas and Electric Company	327,143	Western Massachusetts Electric Company	210,928
Kentucky Power Company	175,705	Wisconsin Electric Power Company	1,142,983
Kentucky Utilities Company	550,636	Wisconsin Power and Light Company	469,631
Kitchener-Wilmot Hydro Inc.	95,757	Wisconsin Public Service Corporation	449,877

2.2 Total Cost Definition

Total cost is defined as the sum of that year's OM&A and the calculated capital costs. OM&A and capital costs for the U.S. distributors are derived using FERC Form 1 filing data.[13] U.S. electric utilities are required to file FERC Form 1 data annually, which includes operation and maintenance expenses broken down into specific cost categories (e.g. distribution, transmission, generation, customer billing, administrative and general). Form 1s also include plant in service and accumulated depreciation information that is used in constructing capital costs. The OM&A and capital cost data for the Ontario distributors comes from RRR filing data or from the OEB's 4GIR benchmarking Excel files.

Projected Hydro Ottawa OM&A data for the years 2019 through 2021 was provided to Clearspring Energy from the Company. OM&A projections subsequent to 2021 use the projected inflation factor index minus a stretch factor. Plant additions projections for Hydro Ottawa through 2025 have been provided to Clearspring Energy by the Company and used to calculate projected capital costs through 2025.

We used a cost definition that is consistent between both the U.S. and Ontario distributors in the sample. The cost definition is the same as the latest one used in the Toronto Hydro total cost benchmarking study led by Mr. Fenrick. Clearspring Energy began with the benchmark-based cost definition used by the Board Staff's consultant ("PEG") in the 4GIR proceeding. To be consistent with the U.S. sample, we then added high-voltage expenses to the cost definition for the Ontario distributors. The FERC Form 1 does not break down high- versus low-voltage distribution expenses, as Ontario reporting does. For the same reasons, contributions in aid of construction ("CIAC") have been excluded from the Ontario distributors' cost definition, due to those expenses not being included in the U.S. Form 1 data. Bad debt expenses (called uncollectible expenses in the FERC Form 1) have been excluded for all utilities, to match the 4GIR benchmark-based definition.

Pension and benefit costs have remained in the cost definition, because these costs appear to not be accurately disaggregated for the Ontario distributors.[14] If we excluded pension and benefit costs, this would likely create an inconsistent treatment between the U.S. and Ontario distributors.

The cost definition also excludes customer service and information ("CSI") expenses from total costs for all utilities. This is due to the possibility that the U.S. utilities include conservation demand management ("CDM") expenses in the CSI expense category. This assures cost consistency between the U.S. sample and the Ontario distributors. The table below summarizes the cost definition treatment.

[13] All FERC Form 1 data was downloaded from SNL Energy's database tool.

[14] In the trial balance data, numerous distributors report zero pensions and benefits in accounts 5645 and 5646 (or if not zero, then implausibly low values).

Table 5 Cost Definitions

Cost Element	Treatment
4th Generation IR Benchmark-Based Costs	This is the starting point for the sample.
CIAC	We subtracted from all Ontario distributor costs, since U.S. cost data does not include CIAC.
High Voltage Expenses	We added to Ontario distributor costs, since U.S. cost data includes distribution high voltage costs.
Customer Service and Information (CSI) Expenses	We excluded CSI expenses for both the U.S. and Ontario distributors given the possible inconsistency in CDM reporting.

2.2.1 Perpetual Inventory Capital Cost Method

Total cost is defined as the sum of the annual OM&A expenses plus capital costs. Clearspring Energy's calculation of capital cost is based on the capital service price approach. This approach has a solid basis in economic theory; it is the same method used in all of the Ontario benchmarking and productivity studies conducted by Mr. Fenrick, and is the same method chosen by PEG in its 4GIR research.[15] The approach allows for a consistent way to account for differences between utilities with respect to historical plant additions and depreciation rates. The service price approach is also prominent in government-sponsored cost research. The Bureau of Labor Statistics of the U.S. Department of Labor uses the capital service price approach in computing multi-factor productivity indexes for the U.S. private business sector and for several subsectors, including the utility services industry.

The cost of capital in each year *(t)* is the product of the capital service price index and capital quantity index at the end of the prior year (*t-1)*. The formula for this is given by:

$$CK_t = WKS_t \cdot XK_{t-1}$$

CK_t is the cost of capital, WKS_t is the capital service price index, and XK_{t-1} is the capital quantity index value in the prior period.

The capital quantity index (*XK*) is constructed based on the value of net plant in a benchmark year, and on gross plant additions in years subsequent to the capital benchmark year. We use 1989 for all U.S. sampled utilities as the capital benchmark year because this is the first available year of publicly available

[15] See Hall and Jorgensen (1967) for a seminal discussion of the use of service price methods for measuring capital cost.

data from SNL Energy. Years prior to 1989 would require extensive effort and could not be easily verified or replicated by another consultant. We used 2002 as the capital benchmark year for the Ontario sampled utilities because this is the first year where data can be readily verified.

A "triangulated weighted average" ("TWA") is used to divide the net plant value in order to adjust the net plant value for inflation. This results in an estimate of the capital stock in 1989 or 2002. Subsequent years use the previous year's capital stock and escalate it by that year's plant additions minus a geometric depreciation assumption. This same method is used both for the Ontario and U.S. distributors. The formulas for the capital quantity index in 1989 and in subsequent years are provided below.[16]

$$XK_{1989}^{i} = \frac{Net\ Plant_{1989}^{i}}{TWA_{1989}^{i}}$$

$$XK_{t}^{i} = XK_{t-1}^{i} * d + \frac{Add_{t}^{i}}{WKA_{t}^{i}}$$

The capital service price (*WKS*) has two components: opportunity cost and depreciation. The capital service price index is thus given by the formula:

$$WKS_t = r_t * WKA_{t-1} + d_t * WKA_t$$

Here, r_t is the allowed rate of return based on the Board's historical calculated returns. This same annual value is also used in the capital service price computation for the U.S utilities in the dataset. Setting the same rate of return for all distributors provides consistency in determining the capital costs, so that decisions by regulators do not enter the benchmark evaluation, which is attempting to assess the performance of the utility itself. The parameter d_t is the economic depreciation rate. We use the same value as PEG did in the 4GIR proceeding, 4.59%, for this parameter in the study.

The asset price deflator (*WKA*) is an index of the price of capital assets in each year used in power distribution. We compute this index using data on differences in the cost of constructing utility plant between regions over time. For U.S. distributors, we use the Handy-Whitman indexes for total power distribution plant, which vary over time and across six geographic regions.[17] For the Ontario distributors, we use the same Handy-Whitman index for total distribution plant in the North Atlantic region and then adjust for the Canadian purchasing power parity in the given year. For future years, we escalate the WKA index using a 50/50 calculation of the projections for the average weekly earnings in Ontario and the GDP-IPI index from the Conference Board of Canada.

We determine the relative levels of utility plant asset prices for 2011 by using the City Cost Indexes for

[16] For the Ontario distributors, the subscripts would change to 2002 in the first equation.

[17] Handy-Whitman indexes are widely used throughout the U.S. utility industry. They measure the construction cost trends for specific utility functions in six different regional areas of the U.S. For more information, please see: https://wrallp.com/about-us/handy-whitman-index

electrical work in the 2012 edition of RSMeans' *Heavy Construction Cost Data*. This is a modification from our research in the last Toronto Hydro case in response to PEG's concerns that the data in the 2012 edition is representative of 2011 rather than 2012. These indexes measure differences among cities in the cost of labour needed to install electrical equipment and differences in equipment prices. The construction service categories covered are raceways; conductors and grounding; boxes and wiring devices; motors, starters, boards, and switches; transformers and bus ducts; lighting; electric utilities; and power distribution. The level of the asset price index for each utility is the RSMeans index value for the headquarter city in the service territory (or the closest available city). This same source is used for both U.S. and the Ontario distributors. The index is already adjusted for currency differences between the two countries.

2.3 Summary of Variables

In general, there are two types of variables used in econometric cost benchmarking: output variables and business condition variables. Output variables measure the output of the utility in question (i.e. what the utility "produces"). Business condition variables quantify the factors that drive costs in a particular service territory, such as regional input prices, highly congested urban areas, forestation, etc.

2.3.1 Output Variables

The two output variables for the study are the total number of customers and the ratcheted peak demand variable. The ratcheted peak demand variable is defined as the system's maximum annual peak demand over the most recent five years.[18] For the U.S. utilities, the output variables are calculated from FERC Form 1s. The historical output data for the Ontario distributors comes from the Board's 4GIR data and RRR data. Hydro Ottawa's projected outputs come from forecasts provided to Clearspring Energy by Hydro Ottawa.

2.3.2 Business Condition Variables: Input Prices

The majority of the business condition variables are discussed in the following section. However, one important business condition variable merits detailed discussion: input prices. Input prices are divided into two categories: capital and OM&A. The capital input price calculation is discussed in detail in the prior section. The OM&A input price captures the regional market price level that each distributor encounters when procuring OM&A inputs, such as employees or materials and services. There are two components used to construct the OM&A input price. These are labour and non-labour.

The labour component is calculated by taking wage levels of numerous job occupations and weighting them based on the U.S. Bureau of Labor Statistics ("BLS") estimates of job occupation weights in the Electric Power Generation, Transmission, and Distribution Industry. The BLS has estimates for wage levels for each job occupation by city and metropolitan area. For the Ontario distributors, we gathered job occupation wage estimates from the 2011 Canadian Census, using wage data from each headquarter or closest available city, translated job occupations to match their U.S. counterparts, and then weighted

[18] For example, the maximum peak demand variable in 2010 for a given utility will be the highest annual peak demand in the years of 2006, 2007, 2008, 2009, or 2010.

the job occupation wages by the BLS estimates. This provides consistency from the U.S. and Ontario regarding labour input prices and also puts the input price in terms of each country's currency. We then escalated labour prices for U.S. utilities using BLS employment cost indexes for the utility sector and escalated Ontario prices using the Ontario average weekly earnings estimates.

The non-labour component of the OM&A input price uses the U.S. gross domestic product price index for the U.S. utilities. The Ontario non-labour component uses the same GDP-PI in each year, but adjusted for the purchasing power parity ("PPP") index. This translates the non-labour input price component into Canadian dollars. To construct the overall OM&A input price we weighted each index using a 70% labour and a 30% non-labour rate. This was the same weighting used by PEG in its 4GIR benchmarking research. Using the capital and OM&A cost shares, Clearspring Energy calculated a total input price index.

Total cost is divided by this comprehensive input price index to adjust for regional input price differences between utilities and to account for annual inflation. Dividing total cost by the input price index imposes the requirement that total costs display linear homogeneity with respect to input prices. As the prices of inputs increase by X%, total cost should increase by that same percentage. For example, if all utility input prices (including labour) increase by 10%, its costs would also increase by 10%. This is derived from economic production theory, which states that costs equal input quantity multiplied by input price.

2.3.3 Other Business Condition Variables

Beyond the two output variables and input prices, the model also contains business condition variables that provide cost adjustments for given service territory conditions. Each variable included in the model is discussed briefly below.

The **percentage of electric customers** measures the percentage of electric customers served by a utility out of total gas and electric customers. This variable measures the economies of scope available from serving both electric and gas customers. Billing and other customer-related activities can be shared between the gas and electric divisions when a utility serves its customers with both commodities. The value is set to 100% for the Ontario observations, since they do not serve natural gas customers.

The **standard deviation of elevation** variable is calculated based on geographic information system ("GIS") elevation topography maps. A higher standard deviation of the elevation indicates increased elevation changes and variance within the utility's service territory. We would expect that a service territory with more hills, mountains, and other elevation changes would be more challenging and costly to serve, ceteris paribus. Therefore, a positive parameter estimate is expected (indicating a positive correlation between standard deviation of elevation and costs).

The **percentage of forestation** variable is based on GIS land cover maps. We used the GlobCover 2009 product produced by the European Space Agency ("ESA") and the Université Catholique de Louvain. These maps are matched with the areas served by each utility to create the forestation variable. We would expect that the higher the level of forestation, the higher OM&A costs required for right-of-way clearing and service restoration activities. GIS variable data is available for all sampled U.S. utilities and for the Ontario distributors included in the sample.

The **congested urban** variable measures the percentage of a utility's service territory that consists of a major urban load center that is "congested." Congested urban areas have physical constraints that necessitate complex and costly subterranean civil infrastructure for housing and operating electric distribution plant. Congested urban areas also often necessitate electrical equipment unique to such subterranean infrastructure. The variable is constructed using a combination of the following factors:

- Engineering knowledge of the physical constraints necessitating a complex and costly subterranean civil infrastructure,
- Classification of geographical areas developed from aerial imagery of urban areas with populations over 200,000, and
- GIS analysis of area classifications within a utility service territory.

The variable measures the percentage of service territory classified as "congested urban" area.

We expect a utility that has a congested urban area within its service territory would experience substantial incremental costs as compared to a utility that does not have such an area within its service territory. The parameter value for this variable is expected to be positive, indicating a positive correlation of percent congested urban with total costs. We also included a quadratic term on the congested urban variable, similar to the quadratic used for the rural density variable below.[19] As a utility has more congested urban service territory, it will have increased "economies of scale" in the special circumstance of serving a highly congested urban territory. We would therefore expect cost impacts to decelerate as the congested urban variable gets larger. This translates into a negative coefficient on the congested urban quadratic term.

The **percentage of smart meters** variable measures the percentage of customers that have an installed smart meter. Smart meters enable hourly or sub-hourly interval use data to be collected from the meter. While installing more capable meters and the necessary infrastructure is expected to increase distribution costs, these meters enable time-of-use ("TOU") electricity rates that can create efficiencies mainly in the realm of power supply. Since this study is focused on distribution total costs, we would expect a positive coefficient on the percent smart meter variable.

The **rural density** variable measures the amount of square kilometres served per customer. As the amount of service territory increases, assets become more spread out and drive times increase. We would expect that costs would increase as the amount of service territory per customer increases. Similar to the congested urban variable, we also included a quadratic term for this variable, because as the rural density becomes more extreme, cost impacts accelerate.

[19] Mr. Fenrick also inserted a quadratic variable on the percentage congested urban variable in his benchmarking research in Toronto Hydro's latest custom incentive regulation application in EB-2018-0165. Pacific Economics Group (PEG) inserted a quadratic variable on the rural density variable in its benchmarking research in Hydro One Distribution's latest custom incentive regulation application in EB-2017-0049.

The **temperature** variable measures the amount of cooling degree days over a base of 80 degrees Fahrenheit (26.667 degrees Celsius) plus the number of heating degree days over a base of 10 degrees Fahrenheit (-12.222 degrees Celsius) in each year of the sample. As extreme weather increases, we would expect costs to also increase.

2.4 Benchmarks for Future Years

The same econometric model and its associated parameter values that are estimated using historical data (and used to develop Hydro Ottawa's historical benchmarks) are also used to calculate the Company's benchmarks for future years. These parameter values are combined with projected variable values to calculate the expected total costs of Hydro Ottawa in the future years of the Custom IR period.

Clearspring Energy was provided OM&A expense, plant addition, customer counts, and peak demand projections from Hydro Ottawa. We then inserted these projections for each future year into the estimated econometric model.

Although some business variables have projections provided by Hydro Ottawa, others do not (e.g. Hydro Ottawa does not project percent forestation of its territory into the future). For the variables with no Hydro Ottawa projections, when projecting costs for future years, the values that enter the total cost model were set at their most recently available historical value. The exception was the temperature variable, which was set at the average cooling degree day and heating degree day value from 2002 to 2018, since 2002 is the first data value we gathered for Hydro Ottawa and 2018 is the last historical observation.

2.5 Model Estimation Procedure and Specification

We assume that the relationship between a utility's cost and the conditions that affect it, called "cost drivers," can be quantified and captured by a statistical function. This function, called a "cost function," allows Clearspring Energy to specify cost as a dependent variable that can be explained by relevant independent or explanatory variables and associated parameters; the latter capture the effect of the independent variables on cost. Such a cost function is estimated using econometric techniques that rest on certain fundamental assumptions.

As implied by the term "independent," one of these assumptions is that the explanatory variables used in the model are factors that are outside the control of utility decision-makers. For instance, the wage paid to labour is driven by market conditions in the service territory and is largely outside the control of a firm's managers. On the other hand, the number of employees hired is within management's control, and thus should not serve as an independent variable.

The data used to estimate this cost relationship can be from a single firm with multiple time observations (time series data), from many firms observed at a single time period (cross-sectional data), or from many firms with multiple time observations (cross-sectional time-series or panel data). The estimation procedure used to estimate model parameters is affected by the type of data used to estimate the model. In our present study, we have a panel dataset with cost data from multiple firms with observations starting in 2002 and extending to 2017.[20] For benchmarks of past years, we use the model to produce benchmarks for each year and compare Hydro Ottawa's benchmark costs with its actual costs.

Additionally, for future years we can take Hydro Ottawa's cost projections through 2025, allowing us to also benchmark those forecasts "out of sample."[21] We use the model (which is based on historical data) and apply the estimated coefficients and projected independent variable values for Hydro Ottawa to calculate a predicted benchmark value. This predicted benchmark value is then compared to Hydro Ottawa's projected total cost amount.

2.5.1 Statistical Tests on Parameter Estimates

The precision of parameter estimates is an important dimension of the cost estimation exercise. It identifies business condition variables that have a statistically significant effect on cost. Standard errors of parameter estimates, which measure the precision with which a parameter is estimated, are used to construct a test of a relevant hypothesis. The hypothesis to be tested is "the explanatory variable in question has no statistically significant effect on cost." This procedure is called the *t*-test. A variable is statistically significant if this hypothesis is rejected at a pre-specified level of confidence. We use a 90% confidence threshold in our research.

A cost model with plausibly signed and statistically significant parameter estimates is ultimately used to assess the cost performance of each firm in the sample. By "plausibly signed" we mean that its sign (positive/negative) accords with our intuitive understanding of the relationship between that parameter and the variable. For example, we would "expect" to see costs rise as the number of customers served increases (i.e. the customer parameter would be positively signed).

Once the industry cost model is estimated, the cost model with estimated parameters is fitted with the business conditions of each utility to generate cost benchmarks, against which actual cost is evaluated. A cost benchmark for a particular utility reflects the performance we would expect from an average hypothetical utility facing the business conditions of that particular utility.

If a given utility's actual cost is below the benchmark cost, its cost performance is better than average—it spent less than a hypothetical utility (with the same particular characteristics) would be expected to spend. If its actual cost is above the benchmark cost, its cost performance is worse than average. A statistical test of a cost efficiency hypothesis, based on the *t*-test, can also be constructed to identify whether the cost performance identified by the above exercise is statistically significantly different from average.

[20] The data extends to 2025 for Hydro Ottawa.

[21] For Hydro Ottawa's OM&A, Clearspring Energy was given projections until 2021 and then we applied the I-X formula to escalate OM&A amounts in years 2022 to 2025.

2.5.2 Model Specification

A translog function is selected for the total cost model estimated in this study. The translog cost function was the same functional form chosen by PEG in its 4GIR benchmarking research. The function's general form, after suppressing time and firm subscripts, is given by:

$$\ln C = \alpha_o + \sum_i \alpha_i \ln Y_i + \sum_j \beta_j \ln W_j + \sum_h \gamma_h \ln Z_h + \frac{1}{2}\left[\sum_i \sum_k \alpha_{ik} \ln Y_i \ln Y_k + \sum_j \sum_n \beta_{jn} \ln W_j \ln W_n\right] + \sum_i \sum_j \alpha_{ij} \ln Y_i \ln W_j + \alpha_t t + \varepsilon$$

In this specification, $\alpha's$ and $\beta's$ are model parameters, and ε is the random noise term. In addition, Y_i quantifies output, W_j input prices, Z_h other business condition variables, and *t* is a time trend term. This form has been widely used in cost function research.[22] A major advantage is its flexibility, which permits it to provide a good approximation for the wide range of functional forms that the data can reflect.[23]

2.5.3 Estimation Approach

The estimation procedure used to estimate model parameters is affected by the type of data used to estimate the model. In our present study, we have an unbalanced panel dataset with cost data from multiple utilities with multiple observations starting in 2002 and extending to 2017 (or 2025 for Hydro Ottawa).

In multivariate regression analysis, the constructed model is designed to use a set of independent (often called explanatory or right-hand-side) variables to "explain" movement in the dependent (often called the left-hand-side) variable. The numerical relationship between an independent variable and the dependent variable is provided through an estimated coefficient value. Under the assumptions of the model, this coefficient value is considered an unbiased estimator of the relationship. Multivariate regression analysis also makes statements about the precision of each coefficient value. Precision in this context is a statement about how confident or statistically valid the coefficient value is. When all the assumptions of multivariate regression are satisfied, the coefficient values are the best (or most precise) unbiased estimators that are available.

Two common issues arise in multivariate regression using real world data: heteroscedasticity and autocorrelation. Neither of these issues cause the coefficient values to be biased. This is important because it means the researcher does not need to worry about correcting the coefficient values: they are not misleading. However, both conditions render the statements about precision problematic. Specifically, the problem with heteroscedasticity and autocorrelation is that they increase the regression

[22] In their Monte Carlo studies of functional forms' performance, Gagne and Ouellette (1998) use the translog as a benchmark because "it is the most widely used" functional form.

[23] See Guilkey, et al. (1983)

variance calculations, which means the researcher is less confident in the calculated coefficient values. For decades, the standard correction procedure involved trying to figure out the nature of each problem and strategically weighting the regression to render heteroscedasticity and autocorrelation less of a problem. One key issue with this strategy is that the researcher may have a hard time truly understanding how to reweight the regression. Additionally, the coefficient values will be different after the reweighting.

More recent treatments for dealing with heteroscedasticity and autocorrelation focus the correction procedures on methods that do not alter the regression or the coefficient values. Instead of reweighting the regression itself, these strategies leave the regression unaltered and focus on altering the way the variances of the coefficients are calculated. These procedures are systematic and do not depend on understanding the underlying reason for the heteroscedasticity and autocorrelation.

For our analysis, we have chosen to estimate the precision of our coefficients using Driscoll-Kraay standard errors.[24] Driscoll-Kraay standard errors have been coded and available in the STATA software suite since 2007.[25] The computer software calculates information crucial to understanding whether each relationship as described by each coefficient can be supported statistically.

[24] Driscoll, J., and A. C. Kraay, 1998. "Consistent covariance matrix estimation with spatially dependent data," *Review of Economics and Statistics* 80: 549–560.

[25] Hoechle, Daniel, 2007 "Robust standard errors for panel regressions with cross-sectional dependence," *The Stata Journal* 7(3): 281-312.

3 Total Cost Benchmarking Model and Scores

The parameter estimates from the total cost model are presented in Table 6. We note that all the parameter estimates are plausibly signed and have reasonable magnitudes. The first order terms of all variables have the theoretically expected signs and are statistically significant at a 90% level of confidence. In fact, all the explanatory variables are statistically significant at a 99% confidence level. The adjusted R-Squared of the model equals a robust 0.966.

Table 6 Total Cost Model Estimates

Variable	Coefficient	Standard Error	T-Statistic	P-Value
Constant	13.012	0.021	615.256	0.000
Number of Customers (N)	0.567	0.009	66.513	0.000
Ratcheted Peak Demand (D)	0.442	0.010	43.586	0.000
N*N	0.991	0.122	8.097	0.000
D*D	1.164	0.156	7.478	0.000
N*D	-2.120	0.277	-7.641	0.000
% Electric Customers in Gas + Electric	0.080	0.025	3.193	0.004
Standard Deviation of Elevation	0.030	0.003	9.800	0.000
% Forestation	0.043	0.003	16.081	0.000
% Congested Urban (CU)	25.912	3.897	6.650	0.000
% AMI	0.040	0.014	2.786	0.010
Rural Density (RD)	0.082	0.003	26.049	0.000
Temperature	0.000	0.000	3.193	0.004
Trend	-0.004	0.001	-4.211	0.000
CU*CU	-763.329	144.403	-5.286	0.000
RD*RD	0.029	0.002	15.834	0.000

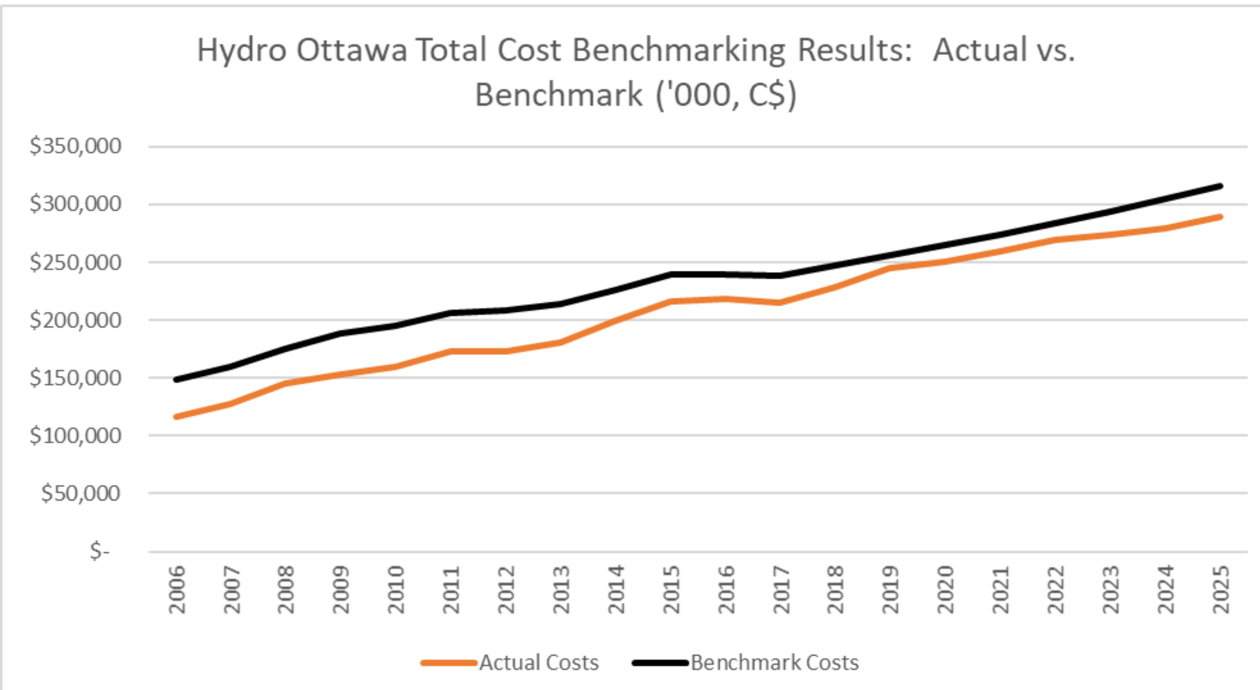
The following table breaks down the historical and forecast year benchmark and Company total costs from 2006 through 2025. The years 2019 to 2025 use the projected and proposed spending during the Custom IR period. We note that the benchmark scores assume that all of the proposed spending will actually be incurred. If spending is less than the proposed amounts, the scores will improve; if spending is more than the proposed amounts, the scores will get worse.

Table 7 2006-2025 Total Cost Benchmark Score for Hydro Ottawa

Year	% Difference from Total Cost Benchmark
2006	-24.1%
2007	-22.2%
2008	-18.7%
2009	-20.7%
2010	-20.2%
2011	-17.5%
2012	-18.5%
2013	-16.9%
2014	-12.5%
2015	-10.4%
2016	-9.3%
2017	-10.2%
2018	-7.6%
2016-2018 average score	**-9.0%**
2019	-4.5%
2020	-5.6%
2021	-5.6%
2022	-5.3%
2023	-7.1%
2024	-8.7%
2025	-8.9%
2021-2025 average score	**-7.1%**

The following graph displays how Hydro Ottawa's actual and projected total costs have compared to the benchmark costs over time and through the Custom IR period, respectively.

Figure 4 Hydro Ottawa Total Cost Actual vs. Benchmark



4 Reliability Benchmarking Models and Scores

Most, if not all, jurisdictions that require reporting of reliability indicators include the metrics of SAIDI, SAIFI, and CAIDI.[26] SAIDI measures the average duration of sustained interruptions per utility customer. SAIFI is a gauge of the average frequency of sustained interruptions per customer. CAIDI evaluates the average duration time per sustained interruption. SAIDI is thus the product of SAIFI and CAIDI.

$$SAIDI = SAIFI * CAIDI$$

The reliability benchmarking study performed by Clearspring Energy focused on the reliability indexes of SAIFI and CAIDI. SAIFI measures the average number of outages a customer experiences per year. It indirectly measures the propensity of the distribution grid to fail. CAIDI measures the average restoration time when an outage does occur. It indirectly measures the Company's response time and preparedness for outage restoration.

Several jurisdictions, including Ontario in recent years, exclude extraordinary events from reliability statistics, with the goal of reducing year over year volatility due primarily to extreme weather. If a day is excluded, it is denoted as a major event day ("MED"). The bulk of MEDs stem from major storms. These severe storms vary in number and intensity from year to year. MED definitions vary by jurisdiction and/or utility; some use the Institute of Electrical and Electronics Engineers ("IEEE") standard 1366 to determine what constitutes a MED.[27] The industry appears to gradually be shifting towards the IEEE standard; however, considerable differences across utilities remain.

The reliability benchmarking study excluded MEDs from the SAIFI and CAIDI metrics but includes loss of supply outages in order to be consistent with the U.S. data. By excluding MEDs from the reliability indexes, we reduce the variance in the indexes associated with large and uncontrollable weather occurrences. The benchmark evaluation in this study is measuring the performance of utilities during the normal operations and not during severe weather events.

The industry reliability data for U.S. utilities is gathered through reports and rate case filings made public by state commissions and, recently, through the EIA Form 861. The Ontario observations are from RRR filings since 2016, which have included reliability data with MEDs excluded.

The following table lists the utilities included in the reliability dataset. All of these utilities were also included in the cost dataset. The reliability dataset is composed of 78 distributors, including Hydro Ottawa.[28] The sample spans the years of 2010 to 2017. Some utilities have data available for all years,

[26] Some U.S. states only require reporting of two of these measures. However, the excluded indicator can still be determined by the researcher.

[27] The IEEE 1366 standard defines the "beta" method. If outages for a certain day exceed 2.5 standard deviations from the normal day, a major event day is declared. A normal day and the standard deviation are determined by the utility's previous five years of normal day data (not including the MEDs).

[28] As with the total cost model, the sample excludes Hydro Ottawa's observations when estimating the model used to calculate the Company's benchmarks.

while others have more limited data available. The utilities operating in Ontario are listed in bold. There are 501 observations in the reliability dataset. This is sufficient to estimate statistically robust parameter estimates.

Table 8 Sampled Utilities for Reliability Benchmarking

Company Name	Number of Customers	Company Name	Number of Customers
Alabama Power Company	1,475,042	Louisville Gas and Electric Company	408,738
Alectra Utilities Corporation	982,022	Madison Gas and Electric Company	152,601
ALLETE (Minnesota Power)	146,353	Metropolitan Edison Company	566,695
Appalachian Power Company	955,861	Monongahela Power Company	390,806
Arizona Public Service Company	1,214,627	Nevada Power Company	918,452
Atlantic City Electric Company	551,332	New York State Electric & Gas Corporation	893,783
Baltimore Gas and Electric Company	1,281,044	Niagara Mohawk Power Corporation	1,348,698
Central Hudson Gas & Electric Corporation	257,812	Northern Indiana Public Service Company	459,863
Central Maine Power Company	624,511	Northern States Power Company - WI	257,668
Cleveland Electric Illuminating Company	750,660	Ohio Edison Company	1,046,760
Commonwealth Edison Company	3,991,358	Oklahoma Gas and Electric Company	838,252
Connecticut Light and Power Company	1,245,042	Orange and Rockland Utilities, Inc.	231,065
Consolidated Edison Company of New York	3,446,102	Pacific Gas and Electric Company	5,479,889
Consumers Energy Company	1,816,438	PECO Energy Company	1,626,898
Duke Energy Carolinas, LLC	2,558,843	Pennsylvania Electric Company	586,984
Duke Energy Florida, LLC	1,775,327	Pennsylvania Power Company	165,130
Duke Energy Indiana, LLC	819,569	Portland General Electric Company	870,333
Duke Energy Kentucky, Inc.	141,273	Potomac Electric Power Company	862,921
Duke Energy Ohio, Inc.	712,328	PPL Electric Utilities Corporation	1,429,090
Duquesne Light Company	594,106	Public Service Company of Colorado	1,459,152
El Paso Electric Company	415,602	Public Service Company of New Hampshire	513,304
Empire District Electric Company	171,835	Public Service Company of Oklahoma	550,022
Entergy Arkansas, Inc.	708,863	Public Service Electric and Gas Company	2,243,761
Entergy Mississippi, Inc.	449,068	Puget Sound Energy, Inc.	1,135,036
Entergy New Orleans, Inc.	200,137	San Diego Gas & Electric Co.	1,434,024
EnWin Utilities Ltd.	88,422	South Carolina Electric & Gas Co.	715,592
Florida Power & Light Company	4,901,871	Southern California Edison Company	5,071,773
Gulf Power Company	459,049	Southern Indiana Gas and Electric Company	145,277
Hydro One Networks Inc.	1,320,085	Tampa Electric Company	744,691
Hydro Ottawa Limited	331,777	Toledo Edison Company	310,305
Idaho Power Co.	539,590	**Toronto Hydro-Electric System Limited**	767,946
Indiana Michigan Power Company	591,984	Union Electric Company	1,215,790
Indianapolis Power & Light Company	491,347	United Illuminating Company	333,518
Jersey Central Power & Light Company	1,122,087	Virginia Electric and Power Company	2,574,679
Kansas Gas and Electric Company	327,143	West Penn Power Company	724,589
Kentucky Power Company	167,599	Western Massachusetts Electric Company	210,928
Kentucky Utilities Company	550,636	Wisconsin Electric Power Company	1,122,771
Kitchener-Wilmot Hydro Inc.	95,757	Wisconsin Power and Light Company	469,631
London Hydro Inc.	157,188	Wisconsin Public Service Corporation	442,246

4.1 Econometric Reliability Benchmarking Variables and Models

The procedure for estimating the two reliability models is much the same as the procedure for the cost models, except that different variables are used. Refer to Section 2 for a general description of the model creation process.

Both the SAIFI and CAIDI models use reliability metrics with MEDs excluded. The SAIFI model's variables, parameter estimates, and statistical tests are presented in the following table. The included variables are signed according to theory and statistically significant at a 90% confidence level. The adjusted R-Squared of the model is 0.462.

Table 9 SAIFI Econometric Model Coefficients

Variable	Coefficient	Standard Error	T-Statistic	P-Value
Intercept	0.477	0.118	4.057	0.004
Number of Customers	-0.020	0.010	-1.888	0.096
% Forestation	0.040	0.017	2.353	0.046
IEEE MED Definition	-36.509	7.863	-4.643	0.002
% Congested Urban	-1.609	0.073	-21.992	0.000
% Plant Underground	0.477	0.118	4.057	0.004

The CAIDI model statistics are presented in the table below. The included variables are signed according to theory and statistically significant at a 90% confidence level. The adjusted R-Squared of the model is 0.440.

Table 10 CAIDI Econometric Model Coefficients

Variable	Coefficient	Standard Error	T-Statistic	P-Value
Intercept	4.148	0.109	37.914	0.000
Number of Customers	0.046	0.008	5.503	0.001
% Forestation	0.073	0.007	10.384	0.000
% Plant Underground	-0.730	0.095	-7.651	0.000
Rural Density	0.067	0.022	3.048	0.016
Average Wind Speeds Above 20 MPH	0.003	0.002	1.861	0.100
Standard Deviation of Elevation	0.093	0.007	13.528	0.000
% Congested Urban	21.889	3.612	6.059	0.000
% AMI	-0.091	0.035	-2.603	0.031

4.2 Econometric Reliability Scores

We find that Hydro Ottawa's most recent 3-year (2016 to 2018) SAIFI value is 11.3% above the benchmark value. The most recent 3-year CAIDI value is 13.7% below the benchmark value.

Table 11 Year-by-Year Reliability Benchmarks vs. Actual

Year	SAIFI (Actual)	SAIFI (Benchmark)	SAIFI (% Difference)	CAIDI (Actual)	CAIDI (Benchmark)	CAIDI (% Difference)
2010	1.28	0.80	46.5%	60.00	74.57	-21.7%
2011	1.37	0.82	51.2%	60.00	74.48	-21.6%
2012	1.53	0.93	49.1%	47.97	77.71	-48.2%
2013	1.43	0.93	43.7%	59.33	77.46	-26.7%
2014	0.93	0.92	1.5%	70.58	77.06	-8.8%
2015	1.23	0.88	33.0%	58.03	75.80	-26.7%
2016	0.90	0.87	3.0%	68.03	75.52	-10.4%
2017	0.93	0.85	9.2%	75.59	74.70	1.2%
2018	1.02	0.82	21.7%	53.60	73.63	-31.7%
2016-2018 Average			**11.3%**			**-13.7%**

Figure 5 Actual and Benchmark SAIFI of Hydro Ottawa Over Time

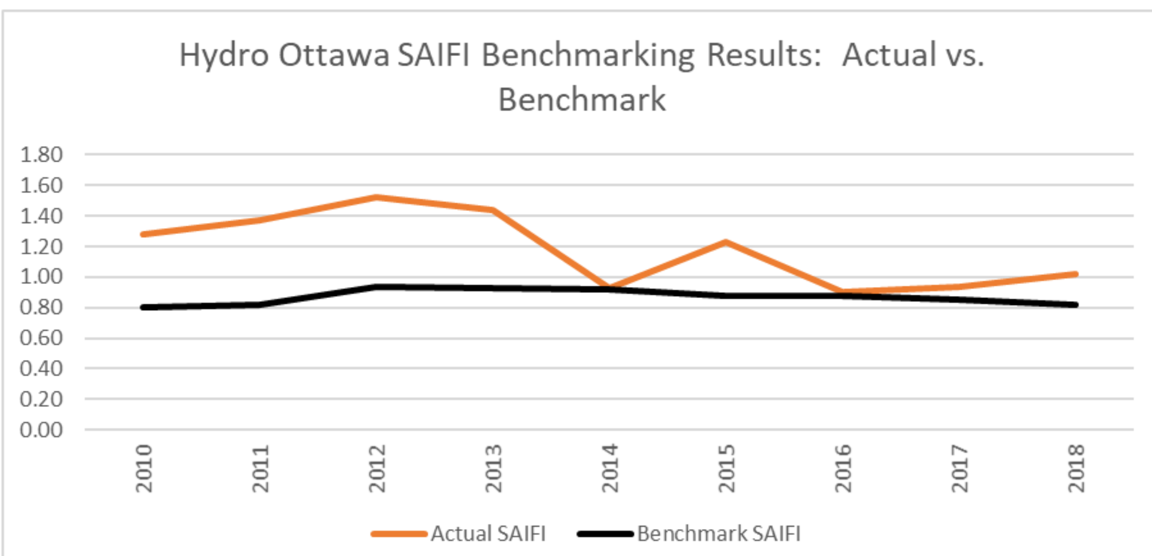
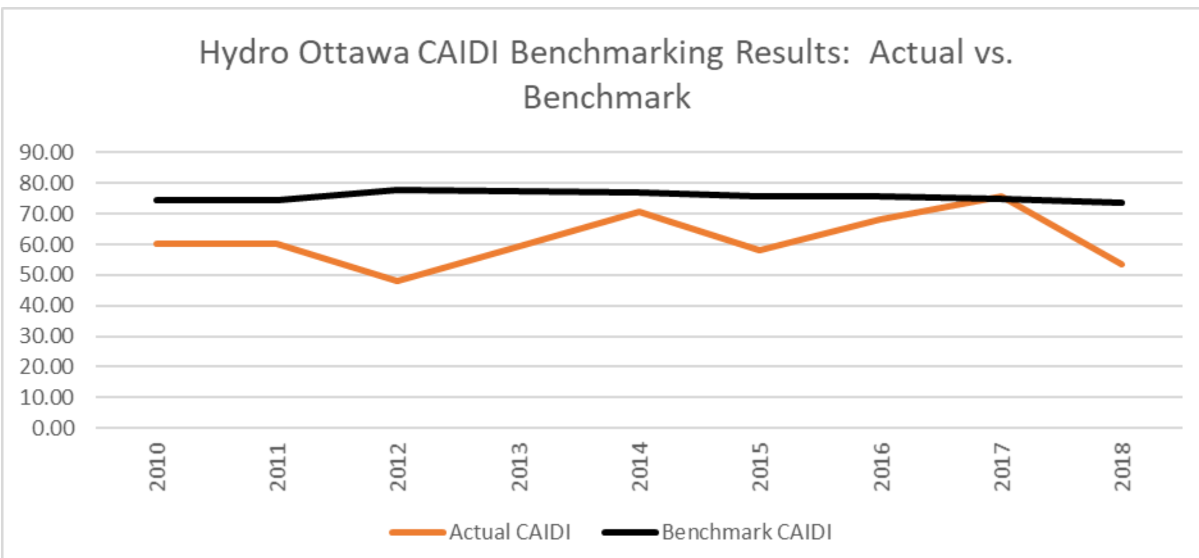


Figure 6 Actual and Benchmark CAIDI of Hydro Ottawa Over Time

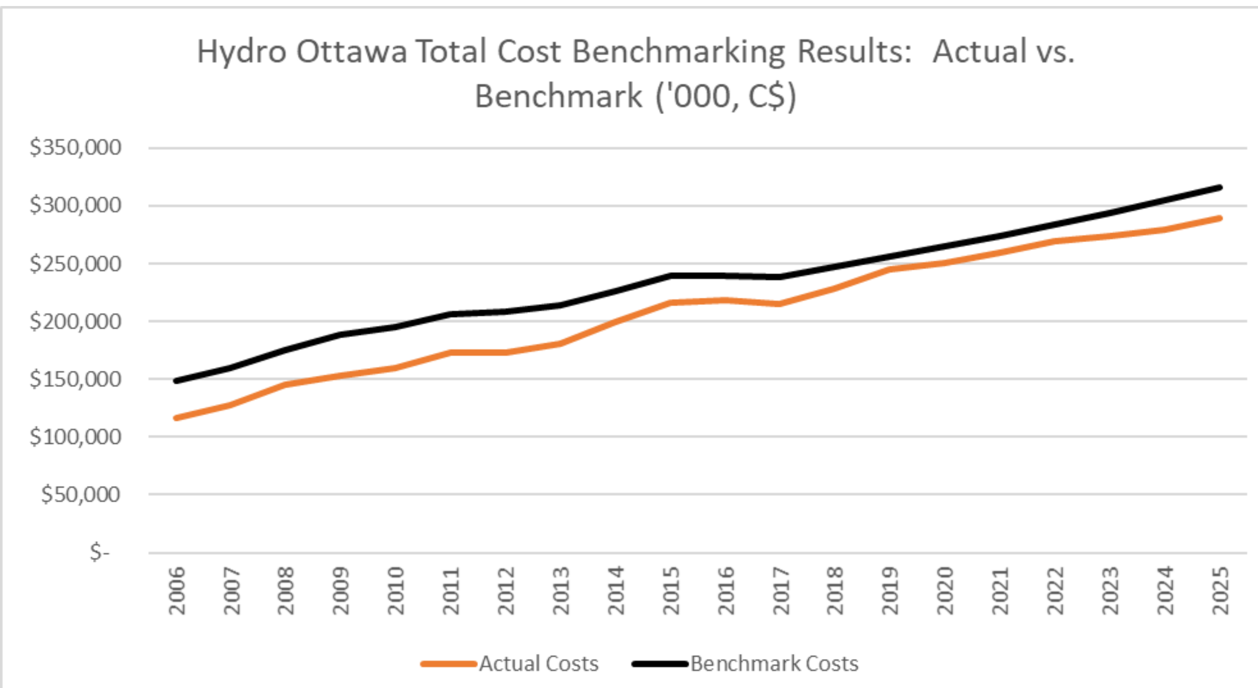


5 Concluding Remarks and Stretch Factor Recommendation

This study provides benchmarking results useful for evaluating Hydro Ottawa's 2021-2025 Custom IR application. The study has estimated total cost and reliability models that explicitly account and adjust for the service territory characteristics of Hydro Ottawa. The models are statistically robust and provide accurate benchmark comparisons.

The total cost results provide evidence that Hydro Ottawa's historical and projected cost levels are reasonable. Hydro Ottawa has consistently remained below its total cost benchmarks and remains below them throughout the Custom IR period, given its proposed spending levels. The graph below illustrates this consistency.

Figure 7 Actual and Benchmark Total Cost of Hydro Ottawa Over Time



The reliability scores show that the Company's SAIFI values are above the benchmarks and their CAIDI values are below the benchmarks. Both metrics have converged towards the benchmarks in recent years.

In the 4th Generation IR proceeding, five stretch factor groupings or cohorts were established based on the most recent three-year total cost benchmarking score. A score better than -25% (i.e. costs were more than 25% below benchmark) received the lowest stretch factor of 0.00%. A score between -25% and -10% received a 0.15% stretch factor. Scores that are +/- 10% received 0.30%. Scores between 10% and 25% received a 0.45% stretch factor, and scores exceeding 25% (i.e. costs were 25% or more than benchmark) received the highest stretch factor of 0.60%.

Our total cost study findings for Hydro Ottawa show that during the Custom IR period, the Company's total cost benchmarking score is -7.1%. Based on the 4th Generation IR stretch factors, this suggests a stretch factor of 0.30%. The reliability benchmarking results provide no evidence that Hydro Ottawa is producing this better than average cost performance at the expense of reliability outcomes. Therefore, Clearspring Energy's recommended stretch factor for Hydro Ottawa's Custom IR application is 0.30%.

Appendix 1: Alternative Results Excluding Large Projects

The Company requested Clearspring Energy to examine what the total cost benchmarking results would be and the impact on our stretch factor recommendation if the Facilities Renewal Program ("FRP") and the South Nepean Municipal Transformer Station ("South Nepean MTS") projects had not been pursued. The project descriptions below were provided to Clearspring Energy by the Company.

1. **Facilities Renewal Program** – The purpose of this program is to (a) consolidate operations and administrative staff; (b) move Hydro Ottawa's operational centers out of high-traffic residential areas to sites with easy access to major highways within the Ottawa area; (c) replace aging buildings; and (d) upgrade operational centers in order to provide better response to customers. Under the program, two parcels of land were purchased, upon which Hydro Ottawa has constructed two regional campuses – namely, the Eastern Operations and Administrative Campus, and the Southern Operations & Warehouse.

   Hydro Ottawa has described this program as a "once in a generation" modernization and operational efficiency initiative. Most of the capital additions for the FRP occur in 2019. This large investment worsens the total cost benchmarking scores throughout the entire Custom IR period.

2. **South Nepean Municipal Transformer Station** – This project consists of two key components: (1) a new municipal transformer station to be constructed by Hydro Ottawa; and (2) upgrades to existing transmission facilities, as well as construction of a segment of new transmission line, by Hydro One. These facilities are required to accommodate customer load growth and increase supply capacity in the South Nepean area of Ottawa, which has already reached the limits of local transformation capacity.

   The capital additions for the South Nepean MTS project occur in 2021 and 2022. Therefore, this large investment will worsen the total cost benchmarking scores beginning in 2021 and then throughout the Custom IR period.

The following table displays the total cost benchmarking results with, 1) all of the Company's capital additions, 2) the FRP capital additions excluded, and 3) the FRP and South Nepean MTS capital additions excluded. The two alternative results with the investments excluded are for information-purposes only. Clearspring Energy's recommended stretch factor of 0.3% is based on the results that include all capital additions.

Table 12 Alternative Benchmarking Results Excluding Large Projects

Year	% Difference (All Capital Additions Included)	% Difference (FRP Excluded)	% Difference (FRP and South Nepean MTS Excluded)
2006	-24.1%	-24.1%	-24.1%
2007	-22.2%	-22.2%	-22.2%
2008	-18.7%	-18.7%	-18.7%
2009	-20.7%	-20.7%	-20.7%
2010	-20.2%	-20.2%	-20.2%
2011	-17.5%	-17.5%	-17.5%
2012	-18.5%	-18.5%	-18.5%
2013	-16.9%	-16.9%	-16.9%
2014	-12.5%	-12.5%	-12.5%
2015	-10.4%	-10.4%	-10.4%
2016	-9.3%	-9.3%	-9.3%
2017	-10.2%	-10.2%	-10.2%
2018	-7.6%	-7.6%	-7.6%
2016-2018 average score	**-9.0%**	**-9.0%**	**-9.0%**
2019	-4.5%	-7.9%	-7.9%
2020	-5.6%	-8.8%	-8.8%
2021	-5.6%	-8.7%	-10.7%
2022	-5.3%	-8.2%	-11.1%
2023	-7.1%	-9.8%	-12.6%
2024	-8.7%	-11.3%	-14.0%
2025	-8.9%	-11.4%	-13.9%
2021-2025 average score	**-7.1%**	**-9.9%**	**-12.5%**

As expected, the 2016 to 2018 average historical results are identical (to the tenth of a percent) with or without the forecasted investments. The 2021 to 2025 average forecasted results show that, if the FRP investment was excluded, the score becomes -9.9%. This is just above the threshold to move the stretch factor recommendation from 0.3% to 0.15%. If both the FRP and the South Nepean MTS investments are excluded, the total cost benchmarking score for 2021 to 2025 averages -12.5%. This would have pushed the stretch factor recommendation to 0.15%.

Appendix 2: Resume of Steve Fenrick

Clearspring Energy Advisors LLC

STEVEN A. FENRICK, Principal

Steve.fenrick@clearspringenergy.com (608.334.5994)

SUMMARY OF EXPERIENCE AND EXPERTISE

I have directed project teams and engaged in research in the fields of performance based regulation, performance benchmarking, DSM, load research and forecasting, and survey design and implementation

I have been a expert witness in a number of cases involving performance-based ratemaking and incentive regulation and peak time rebates.

PROFESSIONAL EXPERIENCE

Clearspring Energy Advisors, LLC– Madison, WI (2019 to Present)

Principal Consultant

Responsible for providing consulting services and expert witness testimony to utilities and regulators in the areas of reliability and cost benchmarking, productivity studies and other empirical aspects of performance-based ratemaking and incentive regulation. Manage activities in the areas of demand-side management programs, peak time rebate programs, load forecasting, and market research.

Power System Engineering, Inc.– Madison, WI (2009 to 2018)

Director of Economics

Responsible for providing consulting services to utilities and regulators in the areas of reliability and cost benchmarking, incentive regulation, value-based reliability planning, demand-side management including demand response and energy efficiency, ran peak time rebate programs, load research, load forecasting, end-use surveys, and market research.

Pacific Economics Group – Madison, WI (2001 - 2009)

Senior Economist

Co-authored research reports submitted as testimony in numerous proceedings in several states and in international jurisdictions. Research topics included statistical benchmarking, alternative regulation, and revenue decoupling. Managed and supervised PEG support staff in research and marketing efforts.

EDUCATION

University of Wisconsin - Madison, WI

Bachelor of Science, Economics (Mathematical Emphasis)

University of Wisconsin - Madison, WI

Master of Science, Agriculture and Applied Economics

PUBLICATIONS & PAPERS

"Peak-Time Rebate Programs: A Success Story", *TechSurveillance*, July 2014 (with David Williams and Chris Ivanov).

"Demand Impact of a Critical Peak Pricing Program: Opt-In and Opt-Out Options, Green Attitudes and other Customer Characteristics:, *The Energy Journal*, January 2014. (With Lullit Getachew, Chris Ivanov, and Jeff Smith).

"Evaluating the Cost of Reliability Improvement Programs", *The Electricity Journal*, November 2013. (With Lullit Getachew)

"Expected Useful Life of Energy Efficiency Improvements", Cooperative Research Network, 2013 (with David Williams).

"Cost and Reliability Comparisons of Underground and Overhead Power Lines", *Utilities Policy*, March 2012. (With Lullit Getachew).

"Formulating Appropriate Electric Reliability Targets and Performance Evaluations, *Electricity Journal*, March 2012. (With Lullit Getachew)

"Enabling Technologies and Energy Savings: The Case of EnergyWise Smart Meter Pilot of Connexus Energy", Utilities Policy, November 2012. (With Chris Ivanov, Lullit Getachew, and Bethany Vittetoe)

"The Value of Improving Load Factors through Demand-Side Management Programs", Cooperative Research Network, 2012 (with David Williams and Chris Ivanov).

"Estimation of the Effects of Price and Billing Frequency on Household Water Demand Using a Panel of Wisconsin Municipalities", *Applied Economics Letters*, 2012, 19:14, 1373-1380.

"Altreg Rate Designs Address Declining Average Gas Use", *Natural Gas & Electricity*. April 2008. (With Mark Lowry, Lullit Getachew, and David Hovde).

"Regulation of Gas Distributors with Declining Use per Customer", *Dialogue*. August 2006. (With Mark Lowry and Lullit Getachew).

"Balancing Reliability with Investment Costs: Assessing the Costs and Benefits of Reliability-Driven Power Transmission Projects." April 2011. *RE Magazine*.

"Ex-Post Cost, Productivity, and Reliability Performance Assessment Techniques for Power Distribution Utilities". Master's Thesis.

"Demand Response: How Much Value is Really There?" *PSE whitepaper.*

"How is My Utility Performing" *PSE whitepaper*.

"Improving the Performance of Power Distributors by Statistical Performance Benchmarking" *PSE whitepaper*.

"Peak Time Rebate Programs: Reducing Costs While Engaging Customers" *PSE whitepaper*.

"Performance Based Regulation for Electric and Gas Distributors" *PSE whitepaper*.

"Revenue Decoupling: Designing a Fair Revenue Adjustment Mechanism" *PSE whitepaper.*

EXPERT WITNESS EXPERIENCE

Docket EB-2019-0082, Hydro One Networks Transmission, TFP and Econometric Benchmarking research.

Docket EB-2018-0165, Toronto Hydro Electric System Limited, Econometric Benchmarking research.

Docket EB-2018-0218, Hydro One Transmission Sault St. Marie, TFP and Econometric Benchmarking research.

Docket EB-2017-0049, Hydro One Distribution, TFP and Benchmarking research.

Docket EB-2015-0004, Hydro Ottawa, Custom Incentive Regulation Application.

Docket 15-SPEE-357-TAR, Application for Southern Pioneer Electric Cooperative, Inc., Demand Response Peak Time Rebate Pilot Program.

Docket EB-2014-0116, Toronto Hydro, Custom Incentive Regulation Application.

Docket EB-2010-0379, The Coalition of Large Distributors in Ontario regarding "Defining & Measuring Performance".

Docket No. 6690-CE-198, Wisconsin Public Service Corporation, "Application for Certificate of Authority for System Modernization and Reliability Project".

Expert Witness presentation to Connecticut Governors "Two Storm Panel", 2012.

Docket No. EB-2012-0064, Toronto Hydro's Incremental Capital Module (ICM) request for added capital funding.

Docket No. 09-0306, Central Illinois Light rate case filing.

Docket No. 09-0307, Central Illinois Public Service Company rate case filing.

Docket No. 09-0308, Illinois Power rate case filing.

CONFERENCE PRESENTATIONS

Institute of Public Utilities Advanced Rate Conference at Michigan State University, "Performance Benchmarking". October 2018.

Panel Moderator at WPUI conference on cost allocation and innovative rate designs at Madison WI. June 2018.

Institute of Public Utilities Advanced Rate Conference at Michigan State University, "Performance Benchmarking". October 2017.

Wisconsin Manager's Meeting, "Reliability Target Setting Using Econometric Benchmarking". November 2016.

Institute of Public Utilities Advanced Rate Conference at Michigan State University, "Performance Benchmarking". October 2016.

Wisconsin Electric Cooperative Association (WECA) Conference, "An Introduction to Peak Time Rebates". September 2016.

Institute of Public Utilities Advanced Rate Conference at Michigan State University, "Performance Benchmarking". October 2015.

EUCI conference chair, 2015. "Evaluating the Performance of Gas and Electric Distribution Utilities."

Institute of Public Utilities Advanced Rate Conference at Michigan State University, "Performance Benchmarking". October 2014.

Cooperative Exchange Conference, Williamsburg VA. "Smart Thermostat versus AC Direct Load Control Impacts". August 2014.

EUCI conference chair in Chicago. "The Economics of Demand Response". February 2014.

Institute of Public Utilities Advanced Rate Conference at Michigan State University, "Performance Benchmarking". October 2013.

EUCI conference chair in Chicago. "Evaluating the Performance of Gas and Electric Distribution Utilities." August 2013.

Presentation to the Ontario Energy Board, "Research and Recommendations on 4th Generation Incentive Regulation".

Presentation to the Canadian Electricity Association's best practice working group. 2013

Conference chair for EUCI conference in March 2013 titled, "Performance Benchmarking for Electric and Gas Distribution Utilities."

Presentation to the board of directors of Great Lakes Energy on benchmarking results, December 2012.

Presentation on making optimal infrastructure investments and the impact on rates, Electricity Distribution Association, Toronto, Ontario. November 2012.

Conference chair for EUCI conference in August 2012 titled, "Performance Benchmarking for Electric and Gas Distribution Utilities."

2012 presentation in Springfield, IL to the Midwest Energy Association titled, "Reliability Target Setting and Performance Evaluation".

2012 presentation in Springfield, IL to the Midwest Energy Association titled, "Making the Business Case for Reliability-Driven Investments".

Conference chair for EUCI conference in 2012 titled, "Balancing, Measuring, and Improving the Cost and Reliability Performance of Electric Distribution Utilities". St. Louis.

Conference chair for EUCI conference in 2012 titled, "Demand Response: The Economic and Technology Considerations from Pilot to Deployment". St. Louis.

2012 Presentation in the Missouri PSC Smart Grid conference entitled, "Maximizing the Value of DSM Deployments". Jefferson City.

2011 conference chair on a nationwide benchmarking conference for rural electrical cooperatives. Madison.

2011 presentation on optimizing demand response program at the CRN Summit. Cleveland.

Conference chair for EUCI conference in 2011 titled, "Balancing, Measuring, and Improving the Cost and Reliability Performance of Electric Distribution Utilities". Denver.

2010 presentation on cost benchmarking techniques for REMC. Wisconsin Dells.

HYDRO OTTAWA
UNIT COSTS BENCHMARKING STUDY

FINAL REPORT
9 AUGUST 2019

SECTION I – INTRODUCTION

Hydro Ottawa Limited (hereinafter referred to as "Hydro Ottawa" or "the Company") engaged UMS Group to conduct a third party independent review of its methodology for deriving unit costs and perform benchmarking comparisons of a pre-selected set of asset categories and OM&A programs / practices; namely:

Asset Categories / Capital

- Wood Poles Replacement
- UG Cable (XLPE) Replacement
- OH Switches Replacement
- OH Transformer Replacement
- UG Transformer Replacement
- Station Breaker Replacement

OM&A Programs and Practices

- Vegetation Management
- Pole Test and Inspection
- Overhead Line Patrol
- Station Breaker and Relay Test and Inspection
- Billing-Paper
- Billing-Online
- Meter Maintenance

Establishing Context

In establishing context for the analyses and conclusions contained within this report, UMS Group:

- Reviewed relevant reports, procedures and system performance data provided by the Company, (***see Appendix A***);
- Was provided access to over 30 of the Company's technical and management staff in the form of on-site workshops to address the following topics:
  - How Unit Costs are Calculated,
  - Capital Projects / Program Delivery,

- OM&A Projects / Program Delivery,
- Metering,
- Overview of the 2021-2025 Rate Application,
- Line-of-Sight Performance Management,
- Service Restoration and Vegetation Management,
- Asset Management and Aging Infrastructure, and
- Work Planning and Execution.

- Formed a Peer Group Panel, comprised of 15 electric utilities (based in Ontario, other parts of Canada, and the United States) with system and customer demographics like those of Hydro Ottawa, each dealing with the unique cost drivers that are prevalent in a mix of urban and rural settings (***see Appendix B***).

Comparative Analysis

The actual Peer Group comparisons of unit costs accounted for the fact that though there are similarities among the electric utilities selected, there are also differences to be reconciled, including:

- Regional costs,
- Practices in reporting costs,
- System demographics (e.g.; population density and underground utility congestion), and
- Other external factors (e.g.; mandates and constraints regarding performance of work, weather, and vegetation).

Thus, we developed normalization factors (***see Appendix C***), assuring the completeness and relevance of our benchmarks. In addition, with respect to our assessment of the Company's unit costing practices, we adopted an industry-wide perspective (*i.e.;* not constrained by those of the Peer Group Panel).

UMS Group Qualifications

Hydro Ottawa retained UMS Group, headquartered at 300 Interpace Parkway, Parsippany, NJ, 07054, as an independent expert. With over 30 years of experience conducting comparative performance assessments for the global utilities industry, UMS Group has supported multiple assessments and global benchmarking programs on six continents, working with state and province public utility commissions as well as more than 300 electric, gas and water utilities. UMS Group has augmented its analytical capabilities with a team of industry experts who are knowledgeable in practices related to (1) ascertaining an electric utility's efficiency and effectiveness in comparison to a qualified peer group, and (2) collaboratively developing aggressive, yet achievable performance improvement plans. Among other qualifications, UMS

Group leads several Global Learning and Benchmarking consortia, which together with its portfolio of ongoing client engagements facilitates maintenance of “real-time” proprietary cost and operational performance data, correlated to industry “best practices,” all supported by an analytical framework built on the premise that industry “best performers” are both efficient and effective. Appendix D provides additional details regarding UMS Group’s qualifications and those of the individuals assigned to this effort.

The UMS Group-assigned expert for this effort, Mr. Jeffrey W. Cummings, fully acknowledges his duties as an expert in accordance with Rule 13 and Form A of the Ontario Energy Board’s (“OEB” or “Board”) Rules of Practice and Procedure. In so doing, he acknowledges that it is his duty to provide evidence in relation to this report as follows:

- To provide opinion evidence that is fair, objective and non-partisan;
- To provide opinion evidence that is related only to matters that are within his area of expertise; and
- To provide such additional assistance that the Board may reasonably require, to determine a matter in issue.

He acknowledges that the duty referred to above prevails over any obligation that he may owe to Hydro Ottawa.

Structure of the Report

We have divided the ensuing discussion into three sections:

- Section II – Executive Summary: A summary of our conclusions on the Company’s methodology for deriving unit costs and the benchmarking comparisons with the Peer Group Panel,
- Section III – Project Approach: A description of and rationale for the approaches, methodologies, criteria and frameworks adopted to accomplish the Company’s stated objectives, and
- Section IV – Summary of Results: An expanded discussion of findings, conclusions and recommendations around the topic of unit costs.

We have also provided appendices to supplement the information provided in Sections II through IV in the form of comparative charts, graphs and tables, as well as more in-depth explanations of the bases for our evaluations and supporting analytics.

SECTION II – EXECUTIVE SUMMARY

Overview of Hydro Ottawa's Unit Cost Initiative

Hydro Ottawa retained UMS Group to conduct a review of its methodology for determining the unit costs underlying its distribution system capital and OM&A programs / practices and perform a utility benchmarking study to compare Hydro Ottawa's unit costs with those of a Peer Group Panel. In accomplishing these objectives, UMS Group:

- Conducted a series of workshops / interviews with several Hydro Ottawa stakeholder organizations (e.g., Distribution Engineering & Asset Management, Distribution Policies & Standards, Distribution Design, Maintenance & Reliability, Asset Planning, Program Management & Business Performance, Distribution Operations, Metering Services, Billing, Collection, Meter Data Services, Technology, Payroll & Analytics, Finance & Accounting, Regulatory, and Corporate Planning & Governance),
- Reviewed a myriad of requested reports, procedures and system performance data (***see Appendix A***),
- Established a Peer Group Panel of 15 electric utilities from across North America, largely based on demographics (number of customers, customer density, vegetation, and weather / climate), and factors that add complexity to field execution (e.g.; technical, legislative, regulatory and Bargaining Unit constraints / mandates),
- Designed and administered a survey, seeking unit cost comparators and key accounting and local factors to conduct full-scale normalization (i.e., accounting for elements beyond currency conversion rates and regional cost adjustments), and
- Analyzed the results of the survey, resulting in the benchmark of six asset categories and seven OM&A programs / practices and a comparison of Hydro Ottawa's unit cost methodology with that of representative sampling of industry peers.

The results of this effort are summarized below and expanded upon in Section IV, "Summary of Results," yielding insights from both industry and Hydro Ottawa-specific perspectives.

Industry Perspective Regarding Unit Cost Methodology

Unit costing is a simple concept to grasp. However, the reporting of unit costs for productivity measurement or benchmarking across electric utilities is complex:

- *Asset Categories*: Most utilities map burdened labor (i.e.; vacations, holidays and training less corporate Administrative & General), and material and equipment costs to asset classes based on some form of work order time sheets, and then allocate design, engineering, permitting, warehousing and AFUDC to arrive at a total cost. One can then infer a unit cost by dividing this "fully-loaded" cost by the number of units installed within the same year. Though seemingly straightforward, electric utilities need to account for the (1) carryover of costs from the previous fiscal year, (2) lagging costs applied to uninstalled assets, and (3) different reporting regimens for work performed in-house versus by a third party.

- *OM&A Programs / Practices*: The industry as a whole is consistent in applying salary burdened by supervision, statutory costs and benefits to the costing of OM&A activities. However, there are inconsistencies regarding unitization of these activities. Some utilities manage them as "buckets" with budgets based on historical spending patterns. In these instances, there is little, if any opportunity to determine the number of units inspected, tested or maintained. Therefore, the fact that seven of the fifteen utilities responding to the survey could not provide unit costs for most of the OM&A programs / practices comes as no surprise.

Electric utilities typically use unit costs to provide order-of-magnitude estimates, define staffing levels, create resource-loaded schedules, and/or support financial reporting requirements. Therefore, the above-described methodology has proven adequate. However, as the focus shifts to measuring and comparing performance, inconsistencies in the burdening of capital labor costs, challenges in disaggregating the components of unit costs to arrive at a direct labor unit cost, and lack of transparency into the number of units installed will:

- Preclude effective Performance Management (e.g.; use of fully-loaded unit costs potentially masks productivity improvement or degradation, the inability to unitize OM&A programs / practices limits the monitoring of productivity to budget management, and inconsistencies in the burdening of capital labor costs results in the need for more rigorous "normalization" routines when comparing unit costs across electric utilities),
- Adversely affect management's ability to assess the effectiveness of material procurement policies, and
- Limit insights regarding the trade-offs in using in-house vs. hiring outside contractor resources.

Hydro Ottawa–Specific Perspective Regarding Unit Cost Methodology

Hydro Ottawa recognizes the intent of the Ontario Energy Board (OEB) to evolve its performance benchmarking to allow for a more meaningful review of utility operations via its Activity and Program Based Benchmarking (APB) initiative.[1] In fact, the Company is already taking initial steps to align with the APB approach by selecting many of the Asset Categories and OM&A Programs / Practices identified in the preliminary list of candidates for benchmarking through this initiative.

With respect to the six asset categories selected for this study, Hydro Ottawa exhibits the rigor and transparency necessary to calculate and report unit costs, integrating cost information from its JD Edwards ERP system with the unitization process supported by its materials system. Further, the coordination and rapport that characterizes the interaction between Corporate Financial Planning & Analysis and the Subject Matter Experts within Operations is noteworthy.

[1] **OEB File No. EB-2018-0278**

Thus, we are confident that the unit costs presented in this study are both accurate and defendable:

- Wood Pole Replacement includes only wood poles. We excluded “fully dressed” components such as risers and UG cable.
- UG Cable (XLPE) excludes civil duct banks and associated secondary services.
- Overhead switches focused solely on the more complex / expensive items (3-phase, load break type switches).
- Overhead Transformers focused solely on pole-mounted transformers.
- Underground Transformers excludes the associated civil structures with the installation of pad-mounted transformers.
- Station Breaker Replacement addresses the replacement / installation of the outdoor reclosers and / or breakers, consistent with the Peer Group Panel.

Regarding the seven OM&A programs / practices, Hydro Ottawa conveys a thorough and consistent understanding of the scope of these activities, noting that the more significant programs from a budgetary perspective are performed by outside contractors (i.e.; tracked via contractor invoices).

Augmenting its Unit Cost initiative, Hydro Ottawa applies a best-in-class Performance Management framework to drive alignment between strategic objectives, performance goals, and individual contributions, and has structured this framework around four critical areas of performance:

- Financial Strength,
- Organizational Effectiveness,
- Customer Value, and
- Corporate Citizenship.

In summary, Hydro Ottawa effectively integrates the sources, systems and calculus to report unit costs, and is able to support, if not play a key role in, the implementation of the OEB’s APB initiative.

Unit Cost Benchmarks

Relative to a Peer Group Panel of 15 electric utilities spanning the North American continent (***see Section III and Appendix B***), fully "normalized" comparisons place Hydro Ottawa in the top two quartiles in all but three O&M Program / Practice areas:

- Fourth quartile for Pole Test and Inspection, and
- Hydro Ottawa matches the industry median (straddles between second and third quartiles) in Billing-Online and Meter Maintenance unit costs.

Table II-1: Fully Normalized Benchmark Comparisons

		Quartile			
Category / Program	**Hydro Ottawa Unit Cost 3-YR Weighted Average**	**Top**	**2nd**	**3rd**	**Bottom**
Asset Category (Capital)					
Wood Pole Replacement	$8,524				
UG Cable (XLPE) Replacement	$80				
OH Switches Replacement	$21,871				
OH Transformer Replacement	$7,595				
UG Transformer Replacement	$12,470				
Station Breaker Replacement	$106,386				
OM&A Program / Practice					
Vegetation Management	$3,075				
Pole Test and Inspection[1]	$43				
Overhead Line Patrol	$31				
Station Breaker and Relay Test and Inspection	$2,920				
Billing-Paper	$1.20				
Billing-Online	$0.25				
Meter Maintenance	$173				

NOTE:

1. **During Hydro Ottawa's internal review of the draft UMS Group report, they noted that there is an extenuating explanation for the unit costs of the Pole Test and Inspection program. In 2018, Hydro Ottawa started to use more junior employees to complete the work, whose hourly rates are lower (i.e.; future unit cost analyses of this program will likely yield lower results).**

In confirming the relevance of this study as a proxy for Hydro Ottawa's performance, UMS Group notes that:

- The six asset categories represent almost 72 percent of the system renewal capital budget over the 2016 through 2018 period, and
- Hydro Ottawa spends approximately 48 percent of all preventative and predictive maintenance costs on the OM&A programs / practices that comprise this study, with the exception of meter maintenance, which is a reactive program.

Summary

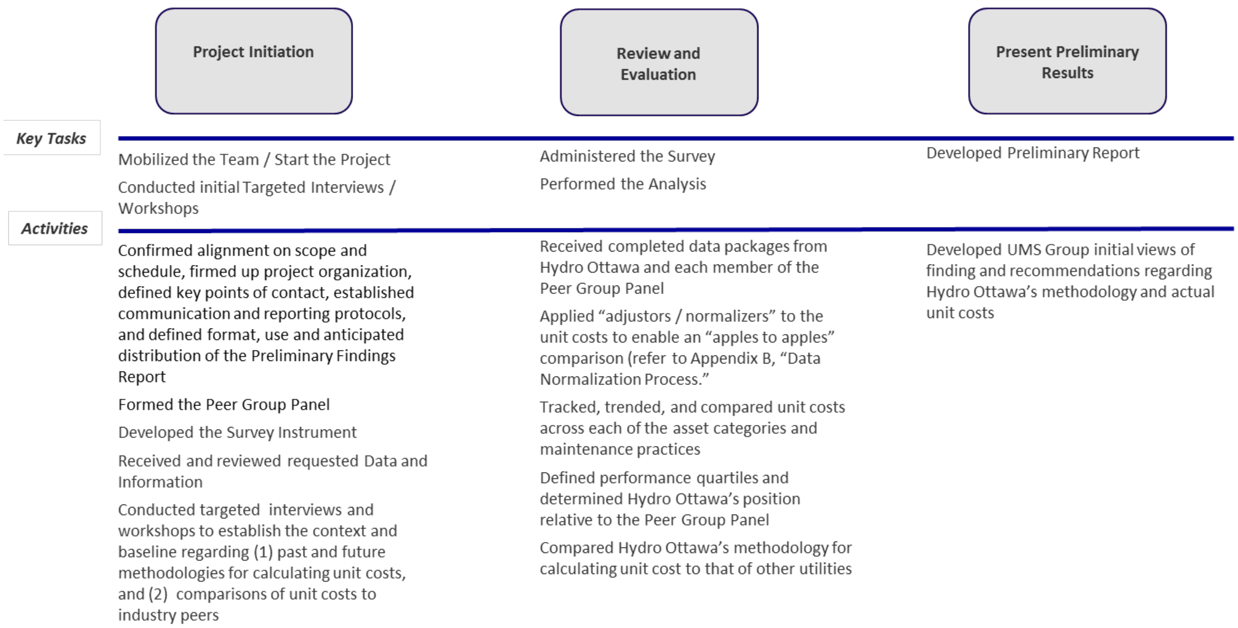
Hydro Ottawa compares favorably to the Peer Group Panel:

- Fully normalized benchmark comparisons reveal that:
  - Within the six Asset Categories, three are in the top quartile and three are in the second quartile, and
  - Across the seven OM&A Programs / Practices areas, only one (Pole Test and Inspection), with an explanatory note, places worse than the Peer Group Median. Two programs (Billing-Online and Meter Maintenance) match the Peer Group Median (i.e.; straddle second and third quartiles).
- The combination of an effective Performance Management Framework espousing line-of-sight between corporate strategy and individual performers, and strong competence in working with the current financial management tools, provides a strong platform for continuous improvement.

SECTION III – PROJECT APPROACH

In order to assess the Company's methodology for deriving unit costs and perform benchmarking comparisons of a pre-selected set of asset categories and OM&A programs / practices, UMS Group developed and executed the following work plan:

Figure III-1: Unit Cost Performance Assessment Overview



From Project Initiation to the Presentation of Results, UMS Group applied several elements of its proprietary and time-tested benchmarking and practices assessment methodology to assess Hydro Ottawa's approach in deriving unit costs, and to benchmark the fully loaded unit costs of a representative cross-section of asset categories and maintenance programs. The following discussion will expound on those aspects of our approach that contributed to our achieving the level of objectivity and relevance committed to in our original proposal.

Peer Group Panel

The Peer Group Panel used for this study consisted of 15 electric utilities; namely:

- AES-Indianapolis Power and Light (Indianapolis, IN)
- AES-Dayton Power and Light (Dayton, OH)
- Alectra Utilities (Mississauga, ON)
- Duquesne Light Company (Pittsburgh, PA)
- ENMAX (Calgary, AB)
- EPCOR (Edmonton, AB)
- FirstEnergy Cleveland Electric Illuminating (Cleveland, OH)

- FirstEnergy Toledo Edison (Toledo, OH)
- Lansing Board of Water and Light (Lansing, MI)
- Puget Sound Energy (Bellevue, WA)
- Portland General Electric (Portland, OR)
- Sacramento Municipal Utility District (Sacramento, CA)
- Seattle City Light (Seattle, WA)
- Toronto Hydro (Toronto, ON)
- Tucson Electric (Tucson, AZ)

In selecting the utilities that comprise this panel, our goal was to provide comparisons that would be relevant to an electric utility of Hydro Ottawa's size and complexity (and where there were inconsistencies, apply industry-accepted normalization processes). Table III-1 illustrates Hydro Ottawa's relative position across the myriad of factors considered in conducting like-for-like unit cost comparisons. Though no two electric distribution systems / organizations are identical, Hydro Ottawa is among the highest percentages within this Peer Group Panel in five areas that can influence comparisons of fully loaded unit costs.

Table III-1: Distribution of Peer Group Panel across Difficulty Factors (including Hydro Ottawa)

Vegetation		
Low	Medium	High
6	9	1
UG Utility Congestion		
Low	Medium	High
1	5	10
Population Density (Customers per Square KM)		
Low (<25)	Medium (25-100)	High (>100)
0	5	11
External Factors		
Low	Medium	High
1	5	10
Weather / Climate		
Mild	Moderate	Harsh
2	12	2

NOTE: To aid in interpreting this Table, the numbers represent the distribution of utilities in the Peer Group (including Hydro Ottawa) across each of the quantitative groupings (e.g.; Low, Medium and High) for each of the Difficulty Factors (i.e.; Vegetation, UG Utility Congestion, Population Density, External Factors and Weather / Climate). The red shading depicts Hydro Ottawa's position, supporting the claim that it is among the highest percentages within this Peer Group Panel in the five areas that can influence comparisons of fully loaded unit costs.

<u>See Appendix B</u> for more detail regarding the categorization of utilities in Table III-1.

Asset Categories and Maintenance Programs

As stated in Section I – "Introduction," the study addressed unit costs for replacing six categories of assets (Capital Replacement) and conducting seven OM&A programs / practices, based initially on a list prepared by Hydro Ottawa, and then modified based on the availability of relevant unit cost information from the Peer Group Panel:

Capital Replacement

- Wood Pole Replacement
- UG Cable (XLPE) Replacement
- OH Switches Replacement
- OH Transformer Replacement
- UG Transformer Replacement
- Station Breaker Replacement

OM&A Programs / Practices

- Vegetation Management
- Pole Test and Inspection
- Overhead Line Patrol
- Station Breaker and Relay Test and Inspection
- Billing (Paper)
- Billing (Online)
- Meter Maintenance

In assessing the viability of these asset categories and OM&A programs / practices to serve as a proxy for Hydro Ottawa's effectiveness and efficiency in performing work, UMS Group considered two perspectives:

- *Contribution to Capital Expenditures and Maintenance Spending*: The six asset categories represent almost 72 percent of Hydro Ottawa's System Renewal Capital Budget over the 2016 through 2018 period. In addition, Hydro Ottawa spent approximately 48 percent of all preventative and predictive maintenance costs in each year on the OM&A programs / practices that comprise this study (exclusive of meter maintenance, which is a reactive program).
- *Impact on Reliability*: UMS Group has conducted several reliability-related assessments over the past 10 years (ranging from reviewing system performance to adjudging response during major storm events, ***see Appendix E***). In conducting these assessments, the primary areas of concern revolve around vegetation management, equipment failures, underground facilities, and the overall conduct of inspection, test and maintenance programs, all of which are represented by the asset categories and OM&A programs / practices that define this study.

It is therefore our view that any conclusions around performance resulting from benchmarking or trending the unit costs of these six asset categories and seven OM&A programs / practices are valid indicators of operating performance.

Survey Instrument

UMS Group identified 23 electric utilities for inclusion in the Peer Group Panel, requiring 12 to assure a valid sample size on which to make meaningful comparisons.

- AES-Indianapolis Power and Light
- AES-Dayton Power and Light
- Alectra Utilities
- Austin Energy
- Duquesne Light Company
- ENMAX
- EPCOR
- FirstEnergy-Cleveland Electric Illuminating Company
- FirstEnergy-Toledo Edison
- Fortis BC
- Lansing Board of Water and Light
- Louisville Gas & Electric-Kentucky Utilities
- London Hydro
- New Brunswick Power
- Northern Indiana Public Service Company
- Nova Scotia Power
- Portland General Electric
- Puget Sound Energy
- Rochester Gas and Electric
- Sacramento Municipal Utility District
- Seattle City Light
- Toronto Hydro
- Tucson Electric

We were successful in soliciting the participation of 15 (highlighted in green font). The Survey Instrument itself (***see Appendix F***) consisted of three tabs:

- *Unit Costs* for the most current three-year period available, requesting the fully loaded installation, test, and inspection costs and number of assets installed / tests and inspections conducted for each asset category and OM&A program / practice. We averaged the responses across the three-year period (weighted by number of replacements, inspections and / or tests each year) to “smooth out” the year-to-year fluctuations that are likely to occur in the course of executing an annual capital investment and the maintenance-spending portfolio.
- *Accounting*, requesting (1) brief descriptions of each electric utility’s method for determining unit costs, (2) listings of costs (in addition to direct labor and material) that were included in the reporting of costs (in-house work), (3) listings of costs included for contracted work, and (4) the bases for the accounting of these costs (i.e.; GAAP or IFRS). This information was then used to inform the normalization process (i.e.; account

for the different methods used to apply indirect and overhead costs to capital projects), briefly described below and further expanded upon in ***Appendix C***.

- *Local Factors*, providing a listing of any technical, legislative, regulatory and bargaining unit constraints / mandates (referred to as “external factors”) that dictate specific practices to be employed in performing work that could have cost ramifications. This information also informed the normalization process briefly described below and further expanded upon in ***Appendix C***.

Hydro Ottawa reviewed the survey instrument, after which UMS Group issued it to each of the electric utilities that agreed to participate in this study. As the completed surveys were returned, UMS Group reviewed the responses and reached out to the respondents as necessary to resolve any apparent outliers and/or address areas where there appeared to be confusion.

Practices Assessment

UMS Group met with several divisions / groups within Hydro Ottawa to gain insights and perspective regarding its practices (past, current and future state) to derive unit costs. We used a variety of sources to compare this input with practices in use across the industry (summarized in Section IV-Summary of Results); namely:

- Insights gleaned from the Peer Group responses in the Accounting Tab of the Survey Instrument, augmented by follow up conversations to clarify / lend context to expressed points-of-view,
- Feedback from electric utilities that are part of our Global Learning Consortia (the focus of which includes benchmarking and the sharing of practices to improve performance and reduce costs), most notably the International Distribution Asset Management Study (IDAMS), International Transmission Operations and Maintenance Study (ITOMS), and International Distribution Benchmark Consortium (IDBC), and
- UMS Group knowledge gleaned from routinely working with over 40 to 50 electric utility organizations on an annual basis.

Benchmarking

UMS Group applied its methodology and a tailored work plan to meet Hydro Ottawa’s specific objective to benchmark unit costs across six asset categories and seven OM&A programs / practices. Data provided by the previously described Peer Group Panel (***see Appendix B***) established Hydro Ottawa’s position with respect to efficiency (cost). We likewise conducted practices interviews to lend context to these comparisons. In so doing, we were able to ascertain Hydro Ottawa’s position relative to the Peer Group Panel, and further inform our views regarding Hydro Ottawa’s methodology to calculate unit costs.

The benchmarking process itself consisted of three steps:

- Data Collection and Analysis: As each electric utility indicated its willingness to participate in the Peer Group Panel for this effort, UMS Group transmitted the survey instrument, configured to ensure consistent responses (i.e.; the questions were tightly structured) and support the "normalization" process (allowing for valid comparison of fully-loaded unit costs). In concert with sending the survey instrument, UMS Group provided "real time" instruction, and over time, conducted follow-up sessions to track progress, provide clarification and address any questions that might arise. Hydro Ottawa was the initial recipient of the Survey Tool, enabling the identification and remediation of any unanticipated areas of confusion / ambiguity / difficulty in completing the data package, and thus, increasing the likelihood of a valid comparison with the Peer Group Panel. As the surveys were completed, UMS Group performed a validation check for data quality, thus increasing the overall credence of the results. As UMS Group detected instances of potential misinformation, omissions, or anomalies, it contacted the respondent and resolved any underlying issues.

- Assure an "Apples-to-Apples" Comparison: The initial formation of a Peer Group Panel represented the first step in assuring valid unit cost comparisons. Table III-1 provides a view of this group relative to five areas that can affect performance (i.e.; Vegetation, UG Utility Congestion, Population Density, External Factors and Weather / Climate). There was not a perfect fit for the 15 electric utilities across all five areas, though each member of the peer group panel was "compatible" with Hydro Ottawa in several of these areas. UMS Group developed data normalization routines to account for any remaining gaps, allowing for valid comparisons of fully loaded unit costs (acknowledging that directional accuracy rather than precision is the acceptable standard in conducting such comparisons). ***Appendix C*** provides transparency to the specific methodologies deployed in accounting for the wide range of factors that can affect these comparisons.

- Present the Results: UMS Group presented Hydro Ottawa's position relative to the Peer Group Panel median. Recognizing that some might prefer more delineation in the ranking, we also provided a more expansive presentation of Hydro Ottawa's position relative to each member of the Peer Group Panel for the fully normalized scenario in ***Appendix G***.

SECTION IV – SUMMARY OF RESULTS

The following discussion summarizes the results of an approach that

- Utilized UMS Group's proprietary and time-tested benchmarking and practices assessment methodology,
- Drew upon our extensive cost and service level database and best practices library,
- Analyzed input from a survey instrument administered to the Peer Group Panel, and
- Captured insights and perspectives from key management staff within the Hydro Ottawa organization.

Assessment of Hydro Ottawa's Unit Cost Methodology

As a precursor to assessing Hydro Ottawa's Unit Cost Methodology it is important to reemphasize that though a simple concept to grasp, there is enough evidence to suggest that the reporting of unit costs for benchmarking across electric utilities is complex:

- Across the industry, past applications of unit costs have not necessarily been part of a performance management / improvement process. Rather, they have been used to provide order-of-magnitude estimates (with no feedback loop to actual execution), and/or support some form of financial reporting (not necessarily linked to managing worker productivity or project / program execution). Further, current data collection processes for cost are heavily biased towards supporting basic finance and accounting functions and are generally not conducive to providing the necessary granularity (from an operations perspective) to manage costs at the project or program level.
- However, pertaining to Hydro Ottawa, we were impressed with the level of rigor and traceability offered by its Corporate Financial Planning and Analysis Group, and do not envision Hydro Ottawa will experience significant challenges in incorporating Unit Costing into its performance measurement framework. Our favorable view is reinforced by the existence of well-documented querying rules that outlined the work breakdown structure (Inventory Class, Inventory Sub Class, Parent Program and Components for each of the Asset Categories; and similarly the Parent Program and Components / Notes for the OM&A Programs / Practices) used to collect costs and report quantities.
- Practices regarding the burdening of capital labor costs are inconsistent across the industry (e.g.; the industry treats training, meetings, conferences, and Administrative and General, and AFUDC / CWIP costs differently), rendering use of publicly available raw information to conduct such comparisons only marginally useful.
- Maintenance program costs are not always unitized or traceable back to actual installations. Rather, electric utilities often manage them as programs with budgets based on historical spending patterns with little, if any, visibility on units inspected, tested or maintained. As the vast majority of Hydro Ottawa's maintenance programs / practices

are either contracted or related to number of customers (e.g.; billing), Hydro Ottawa is able to provide the unitization necessary to compute a unit cost.

Therefore, any industry comparisons of unit costs across electric utilities will require some degree of normalization. However, internal trending through application of a consistent methodology can be an integral part of any electric utility's internal performance management program by tracking changes in performance related to project / program execution. Hydro Ottawa already has an excellent approach to "line-of-sight" performance management, starting with four critical areas of performance:

- Financial Strength,
- Customer Value,
- Organizational Effectiveness, and
- Corporate Citizenship,

These performance areas drive the Company's 5-Year Strategic Objectives and Outcomes / Annual Performance Goals, and translate these specific targets into individual performance goals. Independent of any industry comparisons, Hydro Ottawa has the framework in place to drive productivity improvements through unit cost performance management.

Benchmarking of Hydro Ottawa's Unit Costs

In accordance with the approach outlined in the previous section, UMS Group benchmarked Hydro Ottawa's Unit Costs, summarized in Table IV-1. The Company compares favorably (better than the median) across 10 of the 13 asset classes and OM&A program / practice categories. Regarding the three categories with less than favorable results:

- There is an extenuating explanation regarding the Pole Test and Inspection unit costs, currently residing in the fourth quartile. In 2018, Hydro Ottawa started to use more junior employees to complete the work, whose hourly rates are lower, and
- Billing-Online and Meter Maintenance match the Peer Group Median (i.e.; straddle second and third quartiles).

Table IV-1: Hydro Ottawa and Peer Group Panel Comparisons

Category and Program / Practice	Units	Hydro Ottawa Unit Cost	Peer Group Unit Cost Median
Asset Categories (Capital)			
Wood Poles Replacement	Each	$8,524	$8,766
UG Cable (XLPE) Replacement	Meter	$80	$97
OH Switches Replacement	Each	$21,871	$25,395
OH Transformers Replacement	Each	$7,595	$9,995
UG Transformer Replacement	Each	$12,470	$21,122
Station Breakers Replacement	Each	$106,386	$106,580
OM&A Programs and Practices			
Vegetation Management	Line KM	$3,075	$3,451
Pole Test and Inspection	Each	$43	$25
Overhead Line Patrol	Line KM	$31	$43
Station Breaker and Relay Test and Inspection	Each	$2,920	$3,196
Billing-Paper	Each	$1.20	$1.42
Billing- Online	Each	$0.25	$0.25
Meter Maintenance	Each	$173	$173

NOTE: Red shading identifies the OM&A program and practice that resides in the fourth quartile. Yellow shading identifies the two OM&A programs and practices that match the Peer Group median.

We provide a more detailed presentation of these results in ***Appendix G***.

Implications of the Study

In reviewing our assessment of the Company's Unit Cost methodology, the subsequent benchmarking across six asset categories and seven OM&A programs / practices, and taking stock of industry practices, the following assertions apply:

- The asset categories and OM&A programs / practices selected by the Company represent a valid proxy for trending its performance.
- Within these asset categories and OM&A programs / practices, continued refinement is called for in the reporting, collecting and synthesizing of cost and installation data, particularly as the industry drives to adopt unit costing as a means for trending and comparing performance.
- The industry (particularly in North America and certainly in the U.S.) has not matured to the point where (1) common methodologies exist in deriving unit rates, or (2) management of unit rates is a conscious part of any performance improvement programs.
- Benchmarking is directionally accurate in identifying opportunities for improvement and/or validating current cost and service levels. In applying this methodology to unit costs, absent detailed specifications regarding their calculation (which were developed for this study but not practical when conducting less rigorous comparisons of publicly

available data), there are a wide array of variables to consider, rendering such an effort difficult.

Appendix A – Supporting Material

UMS Group used the following information and data provided by Hydro Ottawa to support the study:

- Unit Cost Survey – Hydro Ottawa
- Hydro Ottawa Quick Facts and Stats-2018 End of Year
- Customer Count and Service Territory Size
- 3-YR System Renewal Capital Budget and Total Capital Budget Profiles
- 3-YR Preventative and Predictive Maintenance Budget and Total Maintenance Budget Profiles
- For the Asset Categories (Capital), the annual investment levels over the past three years
- For the Maintenance Programs (OM&A), the annual spending levels over the past three years
- 2015-2017 SAIDI and SAIFI contributions from Cause Code 5 - Defective Equipment
- 2015-2017 SAIDI and SAIFI contributions from Cause Code 3 - Tree Contact
- 2015-2017 SAIDI and SAIFI
- Hydro Ottawa 2016-2020 Distribution System Plan
- Hydro Ottawa 2017 Annual Report
- Hydro Ottawa-Asset Management Plan – Distribution Underground Transformer
- Hydro Ottawa 2016-2020 Strategic Direction
- Balanced Scorecard / Performance Tracking Reports (Corporate and Departmental Level)
- Hydro Ottawa List of Asset Components
- Hydro Ottawa Corporate Policy on Capitalization
- Hydro Ottawa Scorecard for 2016 and 2017 (as filed with the OEB)

Appendix B – Peer Group

The Peer Group Panel used for this study consisted of 15 electric utilities; namely:

- AES-Indianapolis Power and Light (Indianapolis, IN)
- AES-Dayton Power and Light (Dayton, OH)
- Alectra Utilities (Mississauga, ON)
- Duquesne Light Company (Pittsburgh, PA)
- ENMAX (Calgary, AB)
- EPCOR (Edmonton, AB)
- FirstEnergy-Cleveland Electric Illuminating (Cleveland, OH)
- FirstEnergy-Toledo Edison (Toledo, OH)
- Lansing Board of Water and Light (Lansing, MI)
- Puget Sound Energy (Bellevue, WA)
- Portland General Electric (Portland, OR)
- Sacramento Municipal Utility District (Sacramento, CA)
- Seattle City Light (Seattle, WA)
- Toronto Hydro (Toronto, ON)
- Tucson Electric (Tucson, AZ)

In selecting the utilities that comprise this group, we strove to provide results based on comparisons that would be relevant to an electric utility of Hydro Ottawa's size and complexity (and where there are inconsistencies, apply industry-accepted normalization processes – ***see Appendix C***). Table B-1 illustrates Hydro Ottawa's relative position across the myriad factors that require consideration in conducting like-for-like unit cost comparisons of Electric Distribution Companies. Though no two Electric Distribution Systems / Organizations are identical, Hydro Ottawa is among the highest percentages within this peer group for all five factors that can influence comparisons to unit costs.

Table B-1: Distribution of Peer Group Panel across Difficulty Factors (including Hydro Ottawa)

Vegetation		
Low	Medium	High
6	9	1
UG Utility Congestion		
Low	Medium	High
1	5	10
Population Density (Customers per Square KM)		
Low (<25)	Medium (25-100)	High (>100)
0	5	11
External Factors		
Low	Medium	High
1	5	10
Weather / Climate		
Mild	Moderate	Harsh
2	12	2

NOTE: To aid in interpreting this Table, the numbers represent the distribution of utilities in the Peer Group (including Hydro Ottawa) across each of the quantitative groupings (e.g.; Low, Medium and High) for each of the Difficulty Factors (i.e.; Vegetation, UG Utility Congestion, Population Density, External Factors and Weather / Climate). The red shading depicts Hydro Ottawa's position, supporting the claim that it is among the highest percentages within this Peer Group Panel in the five areas that can influence comparisons of fully loaded unit costs.

We used the following extracts to categorize the Peer Group utilities in terms of **Vegetation**:

Figure B-1: US Vegetation Density

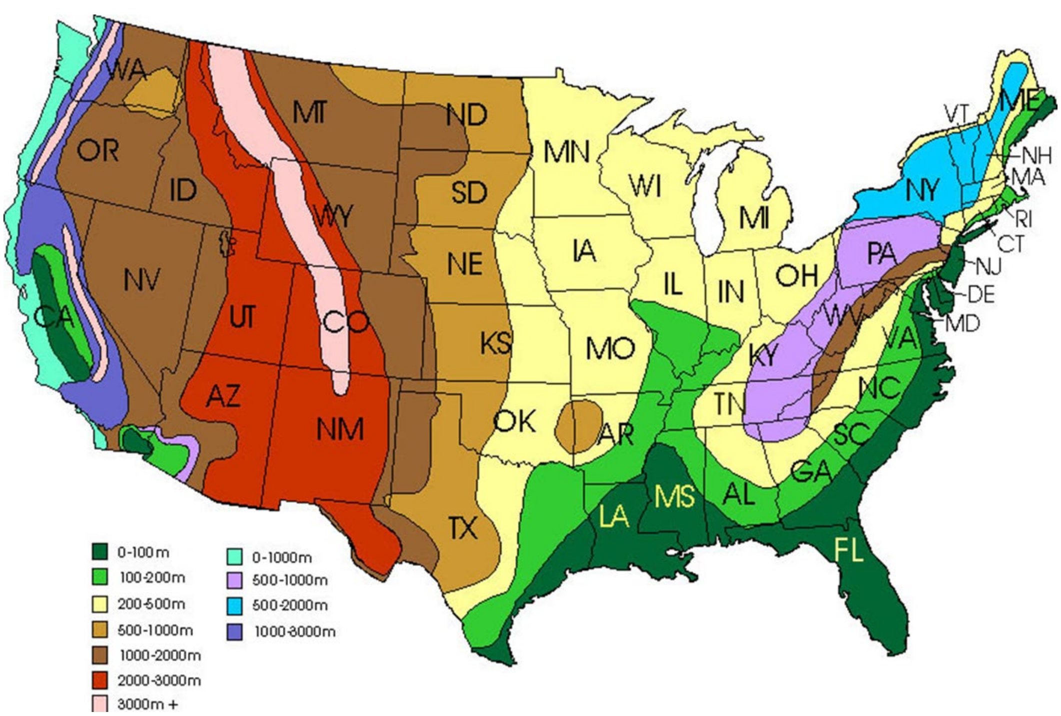
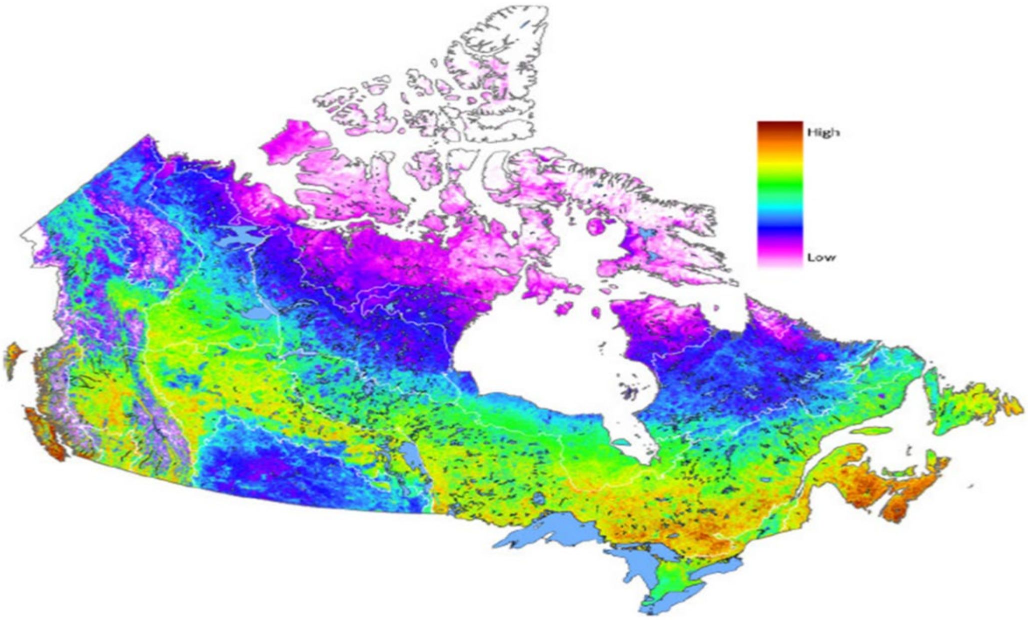
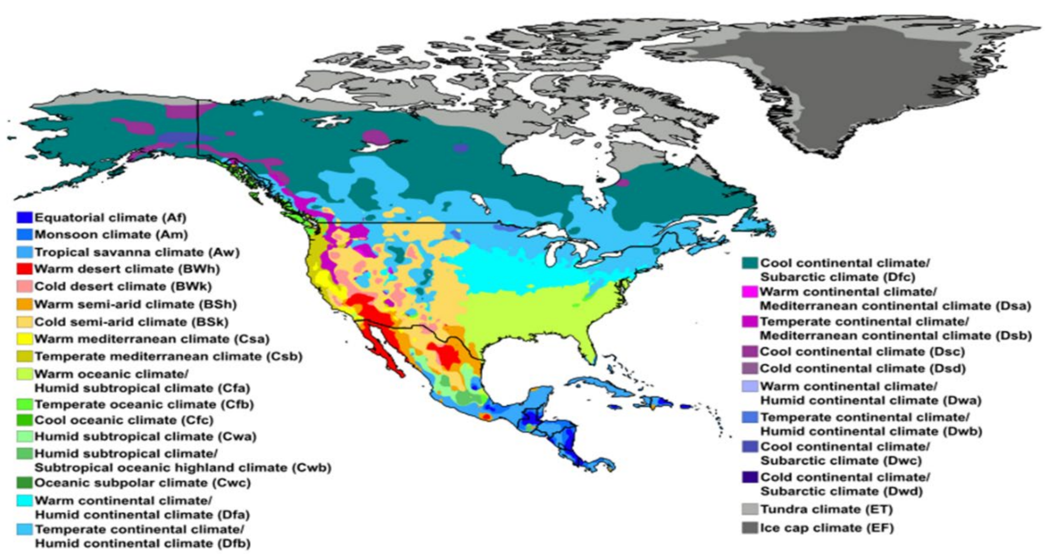


Figure B-2: Canadian Vegetation Density



In addition, with respect to **Weather / Climate**:

Figure B-3: North American Climate Map



The **External Factors** rating reflected responses to our queries regarding applicability of an array of factors that have an adverse effect on field productivity. Based on the responses, we assessed the level of difficulty confronting each utility (high, medium or low).

Table B-2: Summary of External Factors Ratings

External Factors	HO	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Excessive travel time (over 30 mins.)	x		x	x	x	x		x	x		x	x	x	x	x	x
Road restrictions which limit working hours	x	x	x	x	x			x	x	x	x	x	x	x	x	
High water table		x						x		x	x	x	x	x		x
Working next to energized lines (requiring dedicated observer, gloves, etc.)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Requirements to perform work off hours (i.e., night/weekend)	x			x	x	x		x	x	x	x	x	x	x	x	x
Changed standards requiring rebuilds rather than like-for-like (i.e., clearances)	x	x		x	x		x	x	x		x	x	x	x		x
Excessive switching requirements (i.e., to isolate on dual radial construction)	x	x		x	x	x	x	x	x	x	x	x			x	
Shoring requirements for UG work	x								x		x	x	x	x	x	
Limitations on tree trimming (e.g.; unusually tight clearances)	x	x				x				x	x	x	x	x		
Prior use of lead cables	x	x	x			x	x		x			x			x	
High fault currents (impacting equipment sourcing)	x	x	x			x			x	x		x	x	x	x	
Paid duty for police presence on public roads	x	x	x	x	x	x				x	x	x	x	x	x	x
Extensive use of submersible transformers		x						x	x		x	x				
Environmental regulations	x	x	x			x		x	x	x	x	x	x	x		x
Insufficient IT Enablement							x				x					
Union Work Rules	x		x			x			x	x	x		x	x	x	x
City consent requirements (i.e., customer notification, restoration, progressive clean-up, etc.)	x	x		x	x	x	x		x	x	x	x	x	x	x	x
Level of Difficulty	High	High	Medium	Medium	Medium	High	Low	Medium	High	High	High	High	High	High	High	Medium

NOTE: We applied "alpha" designations to mask the identity of any specific utility in the Peer Group Panel (a commitment that we must adhere to throughout the process, as guarantees of confidentiality were required to garner their participation in the study).

In addition, the following table substantiates the groupings (High, Medium and Low) of the Peer Group Panel based on **Population Density**.

Table B-3: Peer Group Panel Population Density

Peer Group Panel	Number of Customers	Service Territory (Sq. KM)	Population Density
AES-IPL	480,000	1,368	**351.0**
AES-DPL	520,000	6,000	**86.7**
Alectra	1,000,000	1,800	**555.6**
Duquesne Light Company	586,000	2,116	**276.9**
ENMAX	850,000	1,087	**782.0**
EPCOR	397,000	9,500	**41.8**
FirstEnergy CEI	700,000	4,403	**159.0**
FirstEnergy Toledo Edison	309,000	10,057	**30.7**
Lansing Board of Water and Light	100,000	130	**769.2**
Puget Sound Energy	1,000,000	15,540	**64.4**
Portland General Electric	862,000	10,360	**83.2**
SMUD	625,000	1,431	**436.8**
Seattle City Light	425,000	342	**1,243.1**
Toronto Hydro	761,000	630	**1,207.9**
Tucson Electric	424,000	2,991	**141.8**
Hydro Ottawa	**331,777**	**1,116**	**297.3**

We based the categorization of **UG Utility Congestion** (High, Medium and Low) on each utility's response to a direct inquiry from UMS Group.

Appendix C – Unit Cost Benchmarking (Normalization)

Prior to conducting comparative analyses with the Panel Group Panel (***see* Appendix B**), it was necessary to "normalize" the unit cost performance across all participating electric utilities. The selection of the panel accounted for key criteria to facilitate proper comparisons (*e.g.;* mix of urban and rural centers, cross-section of public and investor-owned utilities, climate and number of customers served, existence of an underground network, and externally imposed mandates / constraints that affect productivity). Yet, no two electric utilities or the specific factors that affect their costs are ever identical - thus, the need to "normalize."

Defining the "Normalizing" Variables

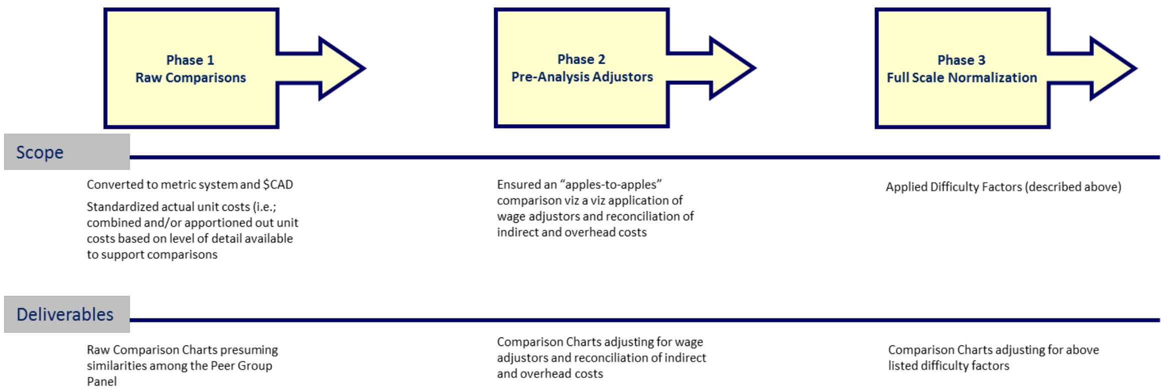
For this study, we established two categories of variables:

- Cost-Related Variables:
  - *Regional Cost Differences* (applying regional cost adjustors based on average wages in each of the major cities that comprise the Peer Group Panel).
  - *Accounting Practices* (relating to the handling of indirect costs and overhead allocations vis-a-vis unit costs for asset replacements and / or the conduct of OM&A programs / practices).
- Difficulty Factors, acknowledging that system and city-specific demographics play a role in worker productivity:
  - *Population Density* (potentially impacts accessibility, increases awareness of public safety, and creates added distractions during the performance of work),
  - *Underground Utility Congestion* (increases the propensity for third-party damage and accounts for the impact of tight spaces, both factors that can contribute to the slowdown of work),
  - *External Factors* (accounts for varying degrees of technical, legislative, regulatory and bargaining unit constraints / mandates that dictate the specific practices to be employed in performing work, many of which inhibit the flow of work),
  - *Weather* (accounts for the differences between harsh and temperate climates and their impact on productivity), and
  - *Vegetation* (besides the direct correlation to one of the OM&A programs / practices being benchmarked, accounts for the challenges that increased vegetation might pose in gaining access to critical assets).

Applying the "Normalizing" Variables

In applying these variables, we instituted a three-phased approach:

Figure C-1: Three-Phased Data Normalization Process



Raw Comparisons (Phase 1) involved, where appropriate, the conversion from imperial to metric units and US to Canadian dollars. As we opted to adopt a three-year average, the conversion rate of $US to $CDN at the end of each year was applied (accounting for the ever-changing conversion rate over the three-year period). For purposes of this study, we used a $0.76 USD to $1.00 CAD conversion rate.

Pre-Analysis Adjustors (Phase 2) involved the application of regional cost adjustors and accounting for the different methods used by electric utilities to apply indirect and overhead costs to unit costs. Our sources included the Board of US Labor Statistics and, for Canada, www.payscale.com. Using the "average wage" of the major city served by each utility as a proxy, we decreased the unit costs at electric utilities higher than the City of Ottawa and increased all others. These changes were all proportionate to their variance from the average wage for the City of Ottawa, applied to the labor component of the unit cost (Table C-1).

Table C-1: Labor and Non-Labor Cost Split

Asset Category / O&M Program / Practice	Labor Costs	Non-Labor Costs
Asset Categories (Capital)		
Wood Poles Replacement	60%	40%
UG Cable (XLPE) Replacement	50%	50%
OH Switches Replacement	40%	60%
OH Transformer Replacement	50%	50%
UG Transformer Replacement	50%	50%
Station Breaker Replacement	40%	60%
OM&A Programs / Practices		
Vegetation Management	70%	30%
Pole Test and Inspection	70%	30%
Overhead Line Patrol	70%	30%
Station Breaker and Relay Test and Inspection	60%	40%
Billing-Paper	35%	65%
Billing-Online	100%	0%
Meter Maintenance	90%	10%

In further adjusting for the differences in Accounting Practices, we queried each of the utilities as to what non-direct labor and material were and were not included in the unit costs, distinguishing between utility and outside contractor-performed work. Table C-2 illustrates the differences across the Peer Group Panel.

Table C-2: Composition of Unit Costs
(In addition to Direct Labor and Material)

Cost Components	HO	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Design and Permitting costs																
Project Management and Supervisory costs																
Other project-related costs (e.g.; Fleet and Warehouse)																
Other labor-related costs (e.g.; training, conferences, and meetings)																
Employee-related costs (e.g.; vacation, sick time, insurances and pension)																
Administrative and General costs																
AFUDC / CWIP																
Adjustment Factor	1.00	1.02	1.02	0.95	0.95	1.02	0.95	0.95	0.98	0.95	0.95	1.00	1.00	1.00	0.95	0.98

The adjustment factors, ranging between 0.95 and 1.02, reflect comparisons with Hydro Ottawa. For those utilities with more categories in their Unit Costs calculation than Hydro Ottawa, we reduced the unit costs by up to five percent. We increased those with fewer categories in their Unit Costs calculation than Hydro Ottawa by up to two percent. There was no noted difference in applying loaders to work performed by outside contractors.

Full-Scale Normalization (Phase 3) applied the previously described difficulty factors in further normalizing unit costs across all 15 participating electric utilities. Table C-3 provides the basis for these adjustments.

Table C-3: Full Scale Normalization

Utility	Population Density	UG Utility Congestion	External Factors	Weather / Climate	Vegetation
Impact	High/Medium/Low	High/Moderate/Low	High/Medium/Low	High/Moderate/Low	High/Medium/Low
Source of Impact Assessment	Table B-3	Peer Group Survey	Table B-2	Table B-3	Figures B-1 and B-2
AES-IPL	High	High	Medium	Moderate	Low
AES-DPL	Medium	Moderate	Medium	Moderate	Low
Alectra	High	Moderate	High	Moderate	Medium
Duquesne Light Company	High	High	High	Moderate	High
ENMAX	High	Moderate	Medium	Harsh	Low
EPCOR	Medium	High	High	Harsh	Low
FirstEnergy CEI	High	High	High	Moderate	Medium
FirstEnergy Toledo Edison	Medium	Low	Medium	Moderate	Medium
Lansing Board of Water and Light	High	Moderate	Low	Moderate	Low
Puget Sound Energy	Medium	High	High	Moderate	Medium
Portland General Electric	Medium	High	High	Moderate	Medium
SMUD	High	High	High	Low	Medium
Seattle City Light	High	High	High	Moderate	Medium
Toronto Hydro	High	High	High	Moderate	Medium
Tucson Electric	High	Moderate	Medium	Low	Low
Hydro Ottawa	High	High	High	Moderate	Medium

In addition, Table C-4 outlines the framework used in applying these normalizing factors.

Table C-4: Difficulty Factor Scoring Criteria

Domain	Weighting	Metric	Source	Ordinal Ranking Assignment
Population Density	20%	Customers per KM^2 translated to High / Medium Low	Table B-3	High: 6 Medium: 5 Low: 4
UG Utility Congestion	20%	High / Moderate / Low	Peer Group Survey	High: 6 Moderate: 5 Low: 4
External Factors	20%	High / Medium /Low	Table B-2	High: 6 Medium: 5 Low: 4
Weather / Climate	20%	Harsh / Moderate / Mild	Figure B-3	High: 6 Moderate: 5 Low: 4
Vegetation	20%	High / Medium / Low	Figures B-1 and B-2	High: 6 Medium: 5 Low: 4

In applying the domain rankings to specific Asset Categories and OM&A Programs / Practices, it is important to note that depending on the operating environment for each category / program, not all the domains in Table C-4 applied. Tables C-5 and C-6 account for this further refinement to the normalization process.

Table C-5: Domain Applicability Matrix by Asset Category / Maintenance Program

Operating Environment	Asset Category / OM&A Program / Practice	Domain				
		Population Density	UG Utility Congestion	External Factors	Weather / Climate	Vegetation
Overhead (OH)	• Wood Pole • OH Switches • OH Transformer • Station Breaker • Pole Test and Inspection • OH Line Patrol • Station Breaker and Relay Test and Inspection • Meter Maintenance	X		X	X	X
Underground (UG)	• UG Cable (XLPE) • UG Transformer	X	X	X	X	
Vegetation Management	• Vegetation Management			X	X	X
General	• Billing-Paper • Billing-Online					

Table C-6: Full-Scale Normalization Factors (by Domain and Operating Environment)

Peer Group Panel	Population Density	UG Utility Congestion	External Factors	Weather / Climate	Vegetation	OH Adjustment		UG Adjustment		VM Adjustment	
						Score	Factor	Score	Factor	Score	Factor
AES-IPL	6	6	5	5	4	20	**1.09**	22	**1.04**	14	**1.13**
AES-DPL	5	5	5	5	4	19	**1.14**	20	**1.13**	14	**1.13**
Alectra	6	5	6	5	5	22	**1.00**	22	**1.04**	16	**1.00**
Duquesne Light Company	6	6	6	5	6	23	**0.95**	23	**1.00**	17	**0.94**
ENMAX	6	5	5	6	4	21	**1.05**	22	**1.04**	15	**1.06**
EPCOR	5	6	6	6	4	21	**1.05**	23	**1.00**	16	**1.00**
FirstEnergy CEI	6	6	6	5	5	22	**1.00**	23	**1.00**	16	**1.00**
FirstEnergy Toledo Edison	5	4	5	5	5	20	**1.09**	19	**1.17**	15	**1.06**
Lansing Board of Water and Light	6	5	4	5	4	19	**1.14**	20	**1.13**	13	**1.19**
Puget Sound Energy	5	6	6	5	5	21	**1.05**	22	**1.04**	16	**1.00**
Portland General Electric	5	6	6	5	5	21	**1.05**	22	**1.04**	16	**1.00**
SMUD	6	6	6	4	5	21	**1.05**	22	**1.04**	15	**1.06**
Seattle City Light	6	6	6	5	5	22	**1.00**	23	**1.00**	16	**1.00**
Toronto Hydro	6	6	6	5	5	22	**1.00**	23	**1.00**	16	**1.00**
Tucson Electric	6	5	5	4	4	19	**1.14**	20	**1.13**	13	**1.19**
Hydro Ottawa	6	6	6	5	5	22	**1.00**	23	**1.00**	16	**1.00**
					Average Adjustment		**0.99**		**0.99**		**0.98**

Table C-7 presents the outputs of full normalization (all three phases) across the six asset categories and seven OM&A programs / practices, noting that we have intentionally masked the Peer Group Panel to comply with our commitment regarding the confidential handling of this information.

Table C-7: Full Scale Normalization

Asset Category / Capital	Unit of Measure	Labor Factor	HO	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Wood Poles Replacement	Each	0.6	$ 8,524	$ 8,920	$ 11,935	$ 9,238	$ 9,915	$ 10,429	$ 7,968	$ 6,931	$ 8,896	$ 7,921	$ 10,689	$ 7,025	$ 8,210	$ 8,635	$ 9,132	$ 8,253
UG Cable (XLPE) Replacement	Meter	0.5	$ 80	$ 87	$ 97	$ 92	$ 80	$ 126	$ 119	$ 95	$ 106	$ 116	$ 111	$ 92	$ 86	$ 105	$ 115	
OH Switches (Manual and Remote / Motor Operated)	Each	0.4	$ 21,871	$ 28,280	$ 36,211	$ 25,848	$ 24,050	$ 27,626	$ 31,432	$ 21,756		$ 20,446		$ 20,290	$ 25,395	$ 28,524	$ 25,170	
OH Transformer Replacement	Each	0.5	$ 7,595	$ 8,659	$ 10,825	$ 9,065	$ 9,283	$ 12,242	$ 10,734	$ 10,179		$ 10,786		$ 11,222	$ 9,250	$ 12,445	$ 9,483	$ 9,810
UG Transformer Replacement	Each	0.5	$ 12,470	$ 20,278	$ 27,942	$ 17,151	$ 22,930		$ 24,098	$ 20,322	$ 25,825	$ 20,930		$ 20,471	$ 26,004	$ 25,616	$ 17,909	$ 21,314
Station Breaker Replacement (SF6, Oil and Vacuum)	Each	0.4	$ 106,386	$ 114,587	$ 116,277	$ 111,204	$ 112,807		$ 108,022	$ 84,243		$ 106,774		$ 82,118	$ 105,908	$ 102,472	$ 93,793	
OM&A Program / Practice																		
Vegetation Management	Kilometer	0.7	$ 3,075	$ 4,529	$ 4,229	$ 3,211	$ 3,451		$ 5,027	$ 3,356		$ 3,160	$ 3,877	$ 1,976	$ 4,464	$ 3,200	$ 4,283	
Pole Test and Inspection	Each	0.7	$ 43	$ 22	$ 43	$ 25	$ 25	$ 14	$ 47	$ 18		$ 41		$ 17			$ 38	
Overhead Line Patrol	Kilometer	0.7	$ 31	$ 47	$ 45	$ 58	$ 57		$ 33	$ 44		$ 32		$ 41			$ 41	
Station Breaker and Relay	Each	0.6	$ 2,920	$ 3,459	$ 3,504	$ 2,936	$ 2,882		$ 3,616	$ 3,431		$ 3,311	$ 2,831				$ 3,082	
Billing - paper	Bills	0.6	$ 1.20	$ 1.66	$ 1.62	$ 1.42	$ 1.66		$ 1.41	$ 1.10		$ 1.69	$ 1.38				$ 1.34	
Billing - online	Bills	0.6	$ 0.25	$ 0.23	$ 0.34	$ 0.35	$ 0.38		$ 0.22	$ 0.16		$ 0.31					$ 0.25	
Meter Maintenance	Each	0.6	$ 173	$ 173	$ 185	$ 152	$ 147		$ 171		$ 181				$ 130		$ 184	

Appendix D – UMS Group and Project Team Qualifications

UMS Group is an International Utility Management Consulting firm founded in 1989 to serve the global utility industry. We specialize in enterprise-level value creation, performance management solutions, and utility asset management. We are a private employee-owned company incorporated in New Jersey with headquarters in Parsippany, New Jersey, and major branch offices in Australia, The Netherlands, and The Philippines. We managed this project out of UMS Group's Headquarters Office, located at Morris Corporate Center 1, 300 Interpace Parkway, Suite C380, Parsippany, NJ 07054.

We bring to our clients a unique knowledge of global industry best practices, an advanced library of diagnostic methodologies and performance benchmarking data, and a strong base of utility strategic and operational expertise. We combine experienced utility consultants and seasoned industry professionals with world class tools and intellectual capital to assist our clients in diagnosing problems, designing solutions, and implementing change.

We offer:

- A team of senior consultants who have "been there and done that" in implementing change in difficult cultural, political, and labor environments.
- Strong insights into key trends and directions across the global utility industry and comprehensive understanding of the underlying drivers and emerging technology and strategies for creating competitive advantage.
- Time-tested and accepted methodologies for conducting current state assessments in four core areas which we believe are the key to achieving best practices or best-in-class performance: Operating (and Accountability) Model, Business Processes and Practices, Competencies, and Technology, Data and Information Management.
- A comprehensive set of tools and approaches that quickly and effectively build on performance insights gained from assessments, to create actionable improvement strategies and plans.
- Experience in the successful development and implementation management of projects and initiatives that drive improvements in the performance of operations, business and financial, customer service, and asset management.

Our specific product and service offerings fall under the categories of **Performance and Asset Management**.

Performance Management

- Performance diagnostics (i.e. *comparative analyses*) to identify areas in which to improve operational efficiencies (cost level) while increasing operational effectiveness (service level).

- Enterprise-wide and function-specific *benchmarking* to substantiate rate case filings, identify reliability improvement initiatives including service interruption mitigation and restoration, and support Capital and O&M budget submittals to external stakeholders.
- Development of *operational dashboards* to provide line-of-sight performance tracking between corporate strategy and specific investment and spending programs.

Asset Management

- Asset Management Business Architecture, Strategy and Planning: Major *Strategic Asset Management Transformations* facilitated by UMS Group, have achieved significant cost reductions/productivity improvements, process efficiency and effectiveness improvements, system reliability and customer satisfaction improvements and OPEX and CAPEX optimization. This practice competency has given rise to many decision support tools and a corporate performance dashboard design and implementation practice.
- Life-Cycle Investment Decision-Making and Optimization: Services range from improving practices and methodologies related to *aging infrastructure* to refining existing tools / installing new tools to aid in *Capital Investment and O&M Program Portfolio Optimization* supporting the notion of maximizing value enterprise-wide (comprehensive accounting of benefits aligned to corporate strategy) while operating within a pre-established budget and risk profile.
- Assess Management Program Assessments: As an *endorsed Assessor and Trainer by the Institute of Asset Management*, UMS Group has conducted a significant number of PAS 55 / ISO55000 assessments, comparing utilities' compliance with basic asset management policies and practices. We view this standard as a lens in ensuring all asset management activities within a utility support the achievement of its business plan, at optimal cost and on a sustainable basis.

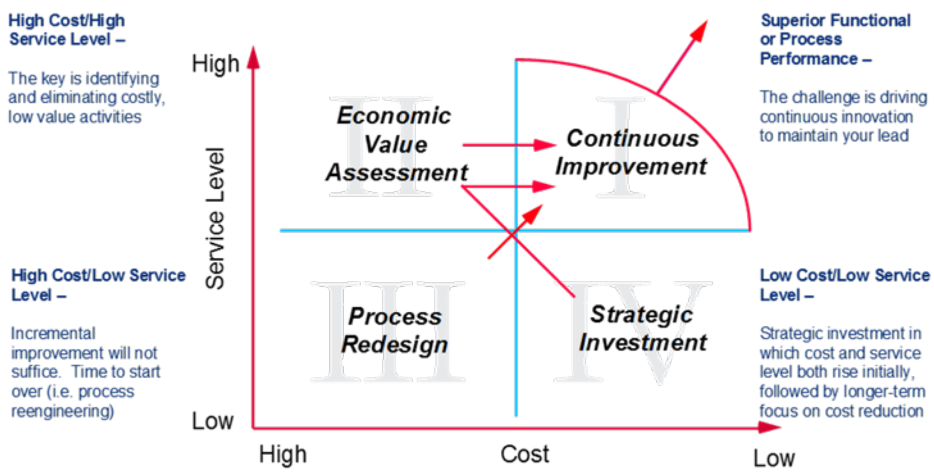
UMS Group Competencies and Skills

UMS Group has consistently demonstrated the following key competencies and skills required to complete a unit cost measurement and benchmarking effort in the utility industry:

- *Operational Knowledge of the Industry*: The ability to effectively converse with the utility Subject Matter Experts (critical to discovering the information under the numbers) requires a certain level of conversance with the factors that drive unit costs. The core team of four consultants that contributed to this effort combine for over 130 years of experience, three of whom have worked (either as full-time staff or in a consulting capacity) within utility organizations.
- *Development of a Performance Management Framework*: UMS Group has perfected the use of a 2-dimensional view of performance, calling for the simultaneous measurement

of cost and service level in conducting performance diagnostic and comparative analyses. Though this effort was largely cost-oriented, one still had to factor for the reality that maintaining an acceptable level of service (*e.g.;* reliability, power quality and customer service) is vital; and therefore, any comparisons to a Peer Group Panel had to factor for varying levels of customer expectations.

Figure D-1: UMS Group Performance Management Framework



- *Data Normalization*: Comparative Analysis (*i.e.;* Benchmarking), performed correctly, is directionally accurate in that it points towards areas where well-targeted intervention can result in improved performance (in this case reduced unit costs), and provides a point for real-time performance comparisons. However, one needs to account for normalizing for factors such as customer density, amount and accessibility of vegetation, and weather in presenting any comparisons (in the form of adjustments and / or mitigating statements). Specifically, regarding unit costs, there are issues to address with peer data in ensuring an "apples-to-apples" comparison including the use of burdened vs unburdened rates, inclusion of equipment costs, work performed energized or de-energized, comparability of work performed, etc. In forming the Peer Group Panel, we can reduce, but never eliminate these types of variances. Being able to assess the extent to which these factors negate exact comparisons and draw on years of benchmarking experience was critical to managing the presentation and interpretation of these results.

We have accomplished similar projects with clients in various markets around the world. The following table summarizes the successful completion of a cross section of relevant projects,

Table D-1: Recent UMS Group Comparative Analyses / Benchmarking Efforts

Client / Project	Relevant Analyses
Toronto Hydro Electric System Limited (THESL) Unit Cost Benchmarking	**Asset Categories:** • Wood Pole Replacement • UG Cable (XLPE) • OH Switches (Manual and Remote / Motor Operated) • Pole Top Transformer Replacement • Padmount / UG Transformer Replacement • Network Transformer / Protector Replacement • Breaker Replacement (SF6, Oil and Vacuum) **OM&A Programs / Practices:** • Vegetation Management • Pole Test and Treat • Overhead Line Patrol • Vault Inspection
ATCO Electric PBR Rate Filing Support	• Capital Additions • Investment levels for Asset Replacement/ End of Life, Clearance and Safety, and Reliability • System Performance Risk Mitigation • Transmission Construction Costs and Practices
ATCO Electric T&D Performance Diagnostics	• T& D Capital Maintenance Program Frequency • Distribution Projects Efficiency and Budget Adherence • Vegetation Management Spending Levels and Performance • O&M Productivity (internal comparison and external benchmarks)
Dayton Power and Light (AES) Generation and T&D Performance Diagnostics T&D System Refurbishment and Replacement Risk Assessment	• Capital Investment Levels • O&M Spending Levels • System Reliability Performance • Maintenance Performance • Workforce Productivity (Unit Costs) • Aging Infrastructure Trends and Comparisons • Reliability and Equipment Failure • Adequacy of Capital Investment and O&M Spending Levels
FirstEnergy (JCP&L) Investment, O&M Spending and Performance Comparison Study	• Capital Investment Levels • O&M Spending Levels • Reliability Performance • Aging Infrastructure Analysis
Indianapolis Power and Light Company (AES) Generation and T&D Benchmarking	• Generation Plant Performance Gap Assessment • Generation Asset Management Gap Analysis and Transformation Plan • T&D Asset Management Maturity • T&D Staffing Productivity (Unit Costs)
Lansing Board of Water and Light Power Production and Energy Delivery High Level Performance Diagnostic	• Cost and Service Level Comparison • Infrastructure Renewal Analysis • System Maintenance Performance • Aging Workforce Analysis • Worker Productivity (Unit Costs) • Organizational Effectiveness
Nova Scotia Power Enterprise-wide Performance Diagnostic	• O&M Spending Comparison • Capital Investment Levels Comparison • Investment Renewal Comparison • Asset Recovery Comparison • Reliability and Availability Comparison • Work Planning and Execution • Maintenance Program Effectiveness • Workforce Productivity (Unit Costs) • Aging Workforce Analysis
PSE&G-NJ and PSE&G-LI O&M Reduction Program Support Efficiency Improvement and Cost Reallocation Project	• O&M Spending Assessment • Workforce Management Assessment • Overtime Analysis / Comparisons • Organizational Effectiveness Review • Workforce Productivity (Unit Costs) • Aging Workforce Comparisons
PSE&G-LI Efficiency Improvement and Cost Reallocation Project	• Organization Redesign • Work Management • Asset Management • O&M Cost Reduction • Aging Workforce / Succession Planning
SaskPower Business Renewal Initiative: Capital Efficiency and O&M Spending Assessments (Generation, T&D and Customer Service)	• Capital Investment Levels • O&M Spending Levels • System Reliability Performance • Worker Productivity (Unit Costs) • Maintenance Performance • Aging Infrastructure Trends and Comparisons • Aging Workforce Comparisons

Experience Summaries of UMS Group Core Team

Representing over 130 years of electric utility experience, the individuals provided by UMS Group are knowledgeable in unit costing practices, and conversant with the analytics necessary to perform the comparative analyses required to support an objective, independent third-party assessment. The following table provides a high-level view of their qualifications.

Table D-2: UMS Group Core Team

Name	Project Role / Title	Years of Experience	Areas of Expertise
Jeff Cummings	Executive Sponsor and SME (Preparation and Presentation of Report)	39	• Regulatory Support • Comparative Analysis / Benchmarking • Strategic and Operational Planning • T&D Grid Resiliency and Revitalization • Electric Distribution Reliability • Capital Investment and O&M Program Planning and Prioritization • Asset Lifecycle Planning • Maintenance Program Optimization • Repair vs. Replacement Criteria • Labor Relations
Steven Morris	Project Manager and Subject Matter Expert	31	• Cost and Service Level Comparative Assessments • O&M Program Spending • Staffing Level Analyses and Benchmarking • Capitalization Practices related to Major Maintenance • Substation Maintenance and Construction • Distribution Construction Unit Cost Benchmarking • Economic Modeling for Asset Replacement and Maintenance Decision Support • Regulatory Support
Brett Shaw	Project Engineer	34	• Comparative Assessments (Benchmarking Diagnostics) • Energy Delivery • Industry Learning Consortia • Asset Management Transformations • Asset Risk and Performance Diagnostics • Work Planning and Execution • Work Productivity Assessments • Overtime Root Cause Analysis • Contract Administration
Thomas Myers	SME-Inspection, Test and Maintenance	34	• Technology Selection and Implementation • Enterprise Analytics • Asset Lifecycle Planning • Capital Investment and O&M Program Planning • Service Restoration • Inspection, Test and Maintenance Program Optimization • GIS Implementation and Operation • Work Planning and Execution

Appendix E – UMS Group Reliability Performance Assessments

UMS Group has established credentials in electric distribution reliability, as illustrated by the following engagements:

- *Pacific Gas and Electric:* UMS Group conducted a third-party expert review of Pacific Gas and Electric's distribution reliability to determine what had happened in the areas of *Equipment Failure* and *3rd Party Damage*, and what, if anything, could be done to help mitigate the reliability target shortfalls for the current year. Specifically, we reviewed restoration performance, weather effects, "Blue Sky" SAIFI trends, outage causes, equipment failure-caused outages, number of outages, customer interruptions, customer minutes, and worst performing circuits over a three-year time frame. Key findings and recommendations were presented in the areas of Equipment Failure (OH Conductor, Transformers and UG Cable), and Third Party Damage (Vehicles and Metallic Balloons).

- *Public Service Electric and Gas – Long Island:* PSE&G-LI retained UMS Group to review its reliability in the context of pre-established performance targets and changes during the year preceding the project. Specifically, they tasked UMS Group with determining the underlying cause of an apparent performance degradation over a three-year period, focused on those factors related to PSEG LI approaching (and in the case of SAIFI exceeding) the minimum performance level specified in its contract with LIPA. As part of this review, UMS Group recommended specific actions to reverse the trend and return to previous stronger levels of performance. These recommendations revolved around vegetation management (danger tree removal and use of herbicides), UG cable replacement, animal guarding, vehicle-caused outages, and creating a repository to store asset management information.

- *Israel Electric Company:* UMS Group provided an expert opinion regarding Israel Electric Company's (IEC's) restoration performance during a major storm event in October 2015. Filed with the Israeli courts, our opinion addressed IEC's comparable position in restoration time, restoration rate, immediate response, restoration practices deployed, and overall prudence of its decisions in the events leading up and during the storm. We not only provided incontrovertible proof of prudence, but also through comparisons with other major storm events in North America and Europe, presented a compelling argument that IEC excelled in its performance.

- *FirstEnergy Pennsylvania Operating Companies:* The FirstEnergy Pennsylvania Operating Companies engaged UMS Group to conduct an independent review and assessment of its internal and external mutual assistance activities, including a review of the mutual assistance provided to and received from other electric distribution companies (EDCs). An initial list of 26 outages covering 13 storm events was developed, based on number of customers impacted (minimum of 5 percent), with due regard to including all four Operating Companies within Pennsylvania. We applied our standard multi-tiered diagnostic framework to:

- Compare the FE PA OPCOs practices relating to Mutual Assistance with those in use at comparable electric distribution organizations, and
- Assess execution of these practices, initially at a high level to address issues of equity in their application across the FE PA OPCOs' service territories and electric utility industry, and then on a storm-by-storm / outage-by-outage basis to identify specific opportunities for improvement, either programmatic or event driven.

UMS Group reviewed (1) FirstEnergy's most current E-Plan, (2) specific service restoration information for the 26 outages contained within FirstEnergy's Outage Management System (OMS), and (3) all previously filed Major Event Reports (MERs) for these specific outages / storm events, and was afforded complete access to the Company's technical and management staff. UMS Group concluded that notwithstanding a number of opportunities to fine-tune / improve its practices that at the highest level, the FE PA OPCOs' use of Mutual Assistance fell well within an industry-based range of reasonableness. Our review confirmed that plans were reasonably conceived, for the most part actions were properly executed (some exceptions were noted in the final report), and the results were generally appropriate (although with the benefit of hindsight, we did acknowledge that marginal improvement opportunities may have been possible). As with the above-mentioned Focused Reliability Audits, the respective Commission Staffs and FirstEnergy accepted all findings and recommendations as presented.

- *Jersey Central Power and Light:* In support of a recent Base Rate Case Filing, JCP&L hired UMS Group to provide an independent, third-party assessment of its investment and spending levels and reliability performance as compared against the other FirstEnergy electric utilities, other New Jersey electric utilities, and other peer group utilities. Our efforts objectively demonstrated that JCP&L's reported reliability had shown consistent improvement since 2004 and that its performance ranged between top quartile and median relative to two comparable peer groups. We were also successful in showing JCP&L's effectiveness in implementing asset management-related initiatives, and industry-leading service restoration processes; appropriately bridging the gap between reported reliability and the customer experience related to two extraordinary storm events in 2011 (Hurricane Irene and the October 31st Snow Storm). Further, his analyses illustrated that the capital investment and O&M spending levels were appropriate for the level of service required by the Regulator (BPU). In conjunction with filing written direct testimony, Mr. Cummings provided direct and rebuttal testimony at rate hearings conducted in October 2013 and supported JCP&L's outside counsel in the preparation of final briefs. Related to this effort, he prepared a written report adjudging the prudence of decisions made during the 2011 extraordinary storm events and Super Storm Sandy, from which the utility received a favorable outcome.

- *Met-Ed, Cleveland Electric Illuminating, and Penelec:* UMS Group has also performed several detailed reliability assessments for other FirstEnergy Operating Companies (Met-Ed, CEI and Penelec). We conducted this work for FirstEnergy with the approval / concurrence of respective State Regulators to address concerns around reliability and had extensive interaction with commission staffs. In each of these efforts, UMS Group assessed actual reliability performance, relevant OM&A practices, spending and investment levels, and overall approaches to Asset Management against industry “best practices.” Each utility and their respective Commission Staffs accepted our recommendations as presented in comprehensive reports and formal presentations to the PA and OH Commission Staffs.

Appendix F – Peer Group Panel Survey

Unit Costs Tab

For the most current three-year period for which you have data, please indicate the number of units and associated costs assigned to the designated categories and programs.

Asset Category / Capital	Unit of Measure	Year 1		Year 2		Year 3		Comments
		No. of Units	Cost	No. of Units	Cost	No. of Units	Cost	
Wood Poles Replacement	Each							
UG Cable (XLPE) Replacement	Meter							
OH Switches Replacement	Each							
OH Transformer Replacement	Each							
UG Transformer Replacement	Each							
Station Breaker Replacement	Each							

Maintenance Programs / OM&A	Unit of Measure	Year 1		Year 2		Year 3		Comments
		No. of Units	Cost	No. of Units	Cost	No. of Units	Cost	
Vegetation Management	Kilometer							
Pole Test and Inspection	Each							
Overhead Line Patrol	Kilometer							
Station Breaker and Relay	Each							
Billing-Paper	Customer							
Billing-Online	Customer							
Meter Maintenance	Each							

Accounting Tab

The following information will be used to apply adjustors based on how each utility calculates unit cost and the factors that comprise unit cost.

	Calculation of Unit Costs	Response	Comments
1	Which of the following methods do you use to determine unit rates for your asset categories and / or maintenance programs?		
	Divide total spent by number of units		
	Average individual costs of separate work orders		
	Other (please describe)		
2	In addition to Direct Labor and Material, which of the following costs are included in your unit costs for **In-House work**?	**Response (Please indicate "Y" or "N")**	**Comments**
	Design and Permitting costs		
	Project Management and Supervisory costs		
	Other project-related costs (e.g.; Fleet and Warehouse)		
	Other labor-related costs (e.g.; training, conferences and meetings)		
	Employee-related costs (e.g.; vacation, sick time, insurances and pension)		
	Administrative and General costs		
	AFUDC / CWIP		
	Other (please describe)		
3	In addition to Contractor's cost, which of the following costs are included in your unit costs for **Contracted work**?	**Response (Please indicate "Y" or "N")**	**Comments**
	Contractor Management/Supervision costs (please indicate in comments if these costs include overheads per question 2)		
	Permitting and Design Costs		
	Other (please describe)		
4	Do you "net out" customer contributions from your unit costs?		
5	Do you use GAAP or IFRS accounting? (please specify which in Comments)		

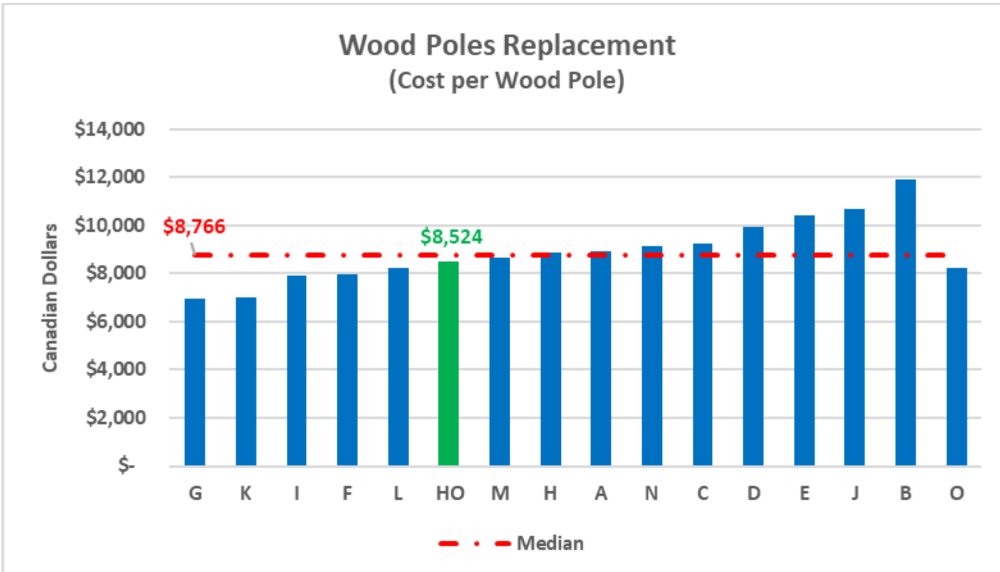
Local Factors Tab

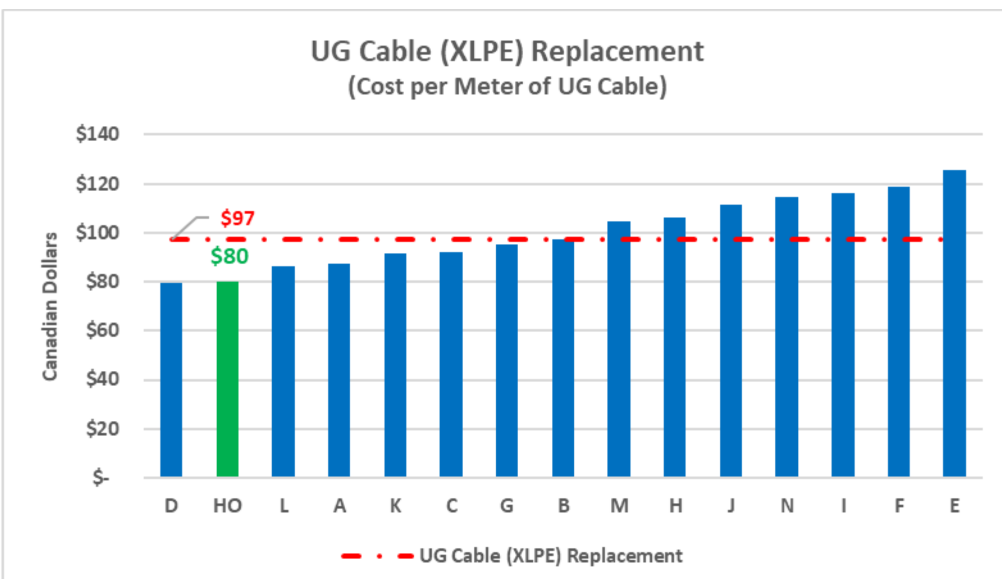
The following table lists some of the more common factors that negatively impact worker productivity. Please indicate which ones apply to your operating and working environment and / or add others that are unique to your service territory.

Local Factors	"X" to those that apply	Comments
Which of the following factors impact the cost of you performing inspections and replacement work?		
Excessive travel time (over 30 mins.)		
Road restrictions which limit working hours		
High water table		
Working next to energized lines (requiring dedicated observer, gloves, etc.)		
Requirements to perform work off hours (i.e., night/weekend)		
Changed standards requiring rebuilds rather than like-for-like (i.e., clearances)		
Excessive switching requirements (i.e., to isolate on dual radial construction)		
Shoring requirements for UG work		
Limitations on tree trimming (e.g.; unusually tight clearances)		
Prior use of lead cables		
High fault currents (impacting equipment sourcing)		
Paid duty for police presence on public roads		
Extensive use of submersible transformers		
Environmental regulations		
Insufficient IT Enablement		
Union Work Rules		
City consent requirements (i.e., customer notification, restoration, progressive clean-up, etc.)		
Other (please specify in Comments)		

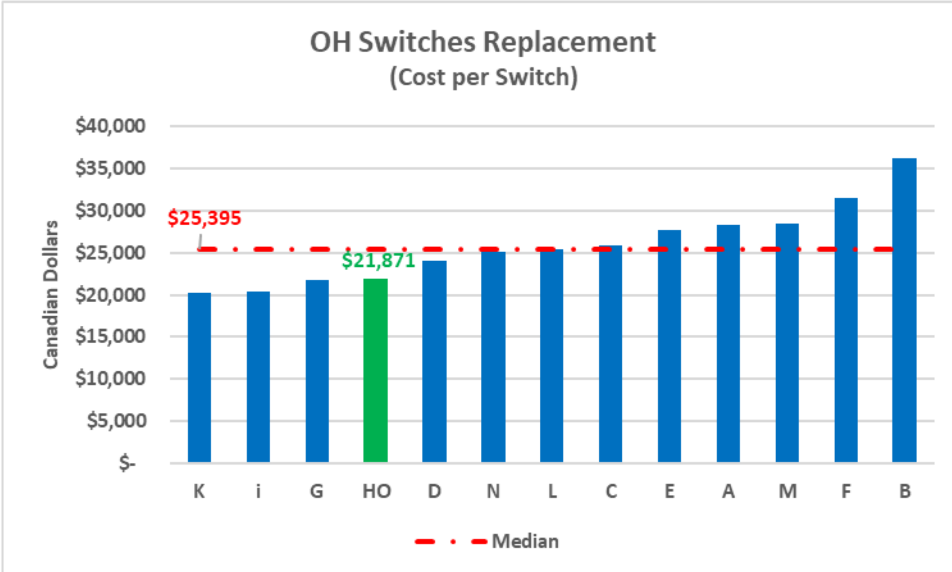
Appendix G – Detailed Benchmarking Results

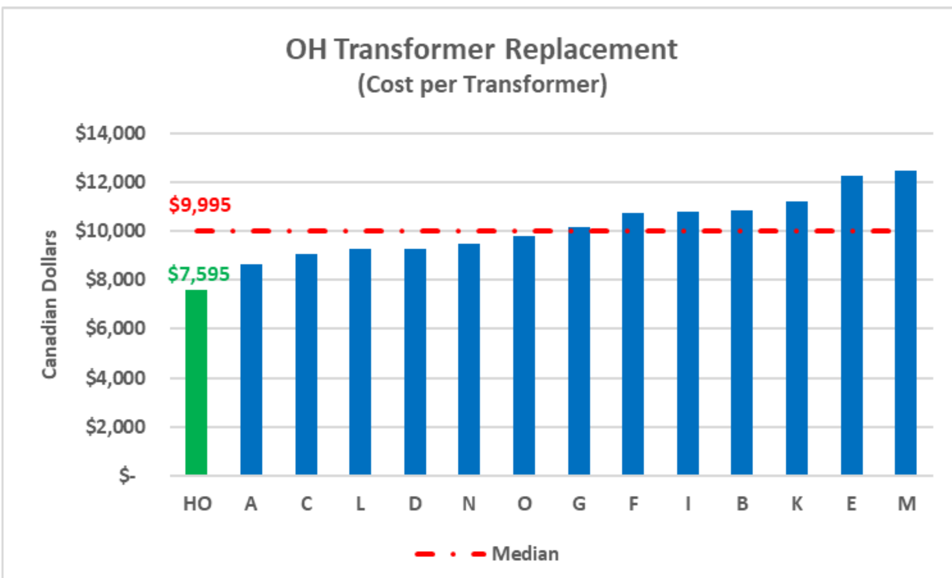
The following charts, presenting the unit costs for each of the utilities (in ascending order), show Hydro Ottawa's (Green) position relative to each of the electric utilities and the Peer Group Panel and full-scaled "normalized" median value (Red).





NOTE: The use of a letter designation for each member of the Peer Group Panel provides the confidentiality assured in soliciting participation for this study.





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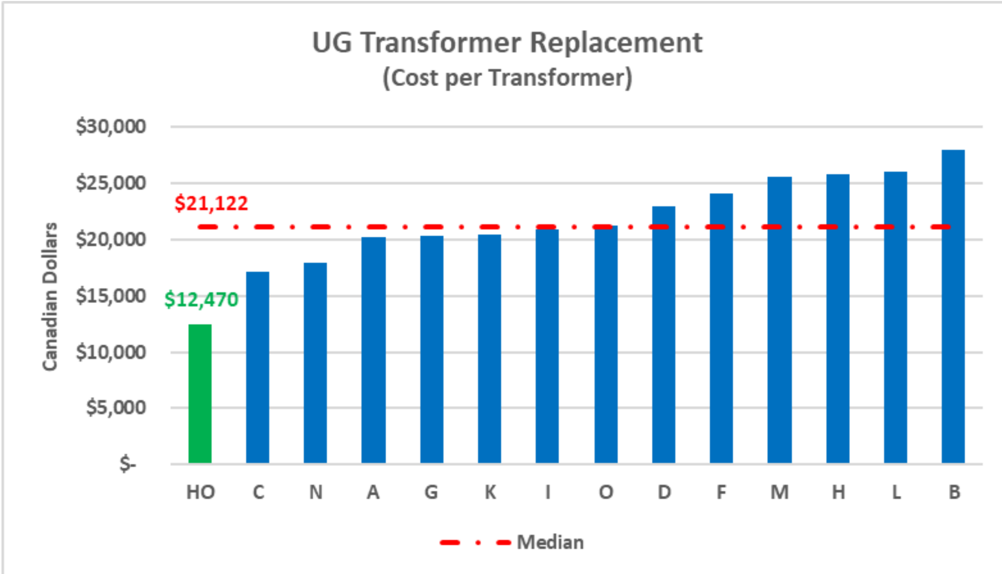

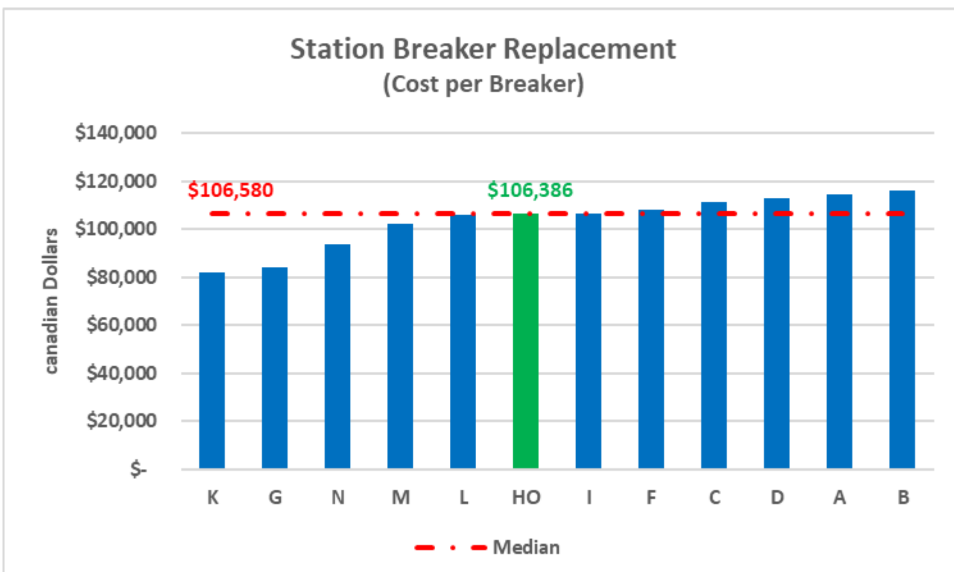

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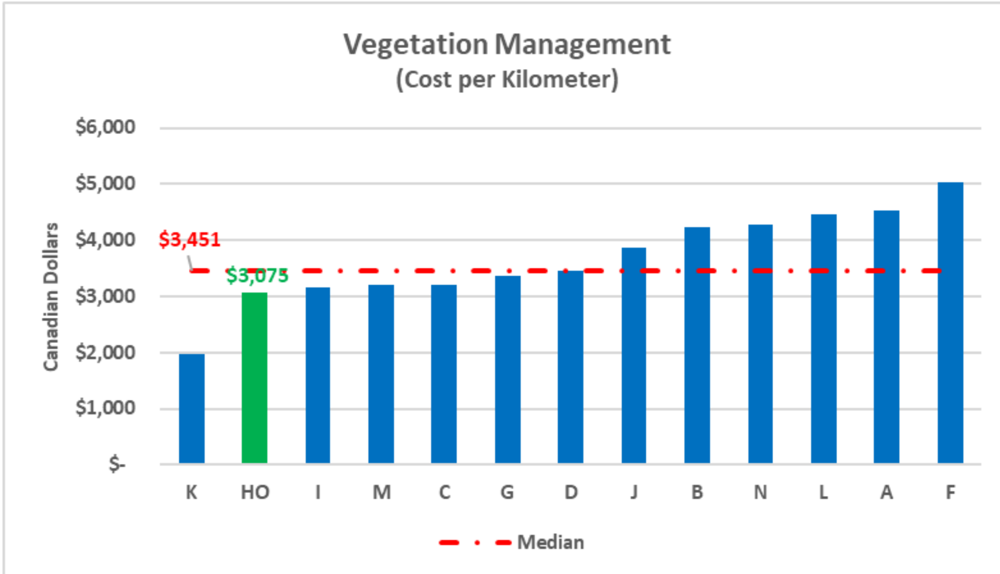

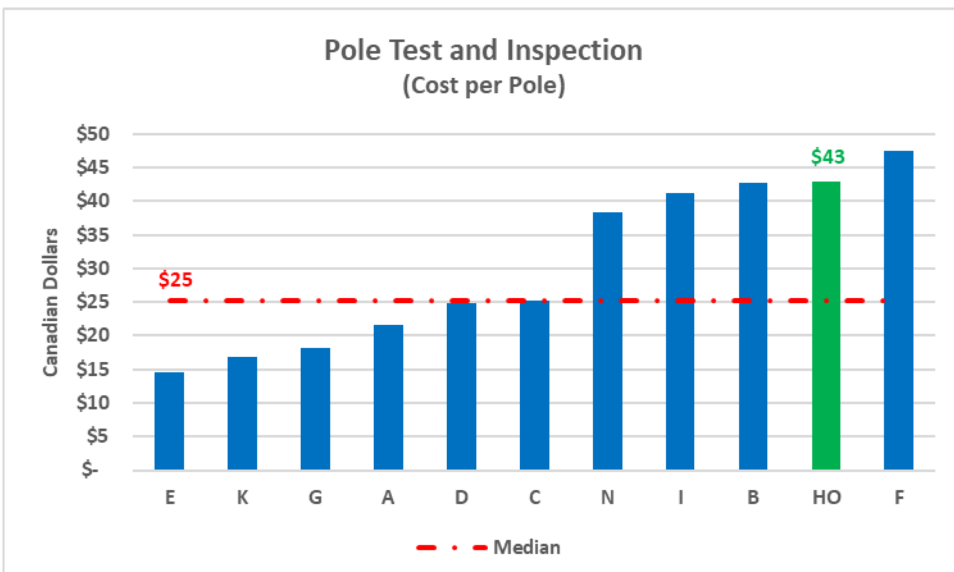

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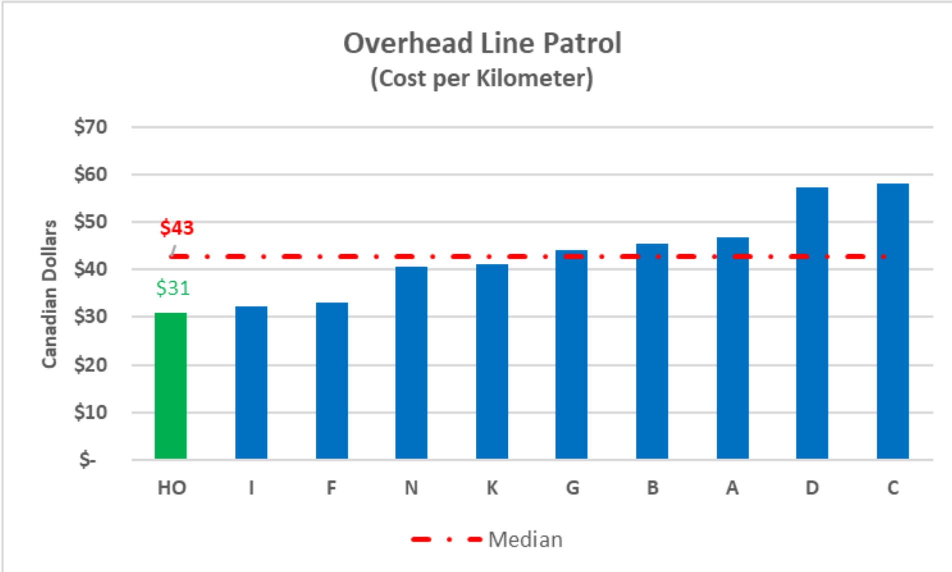

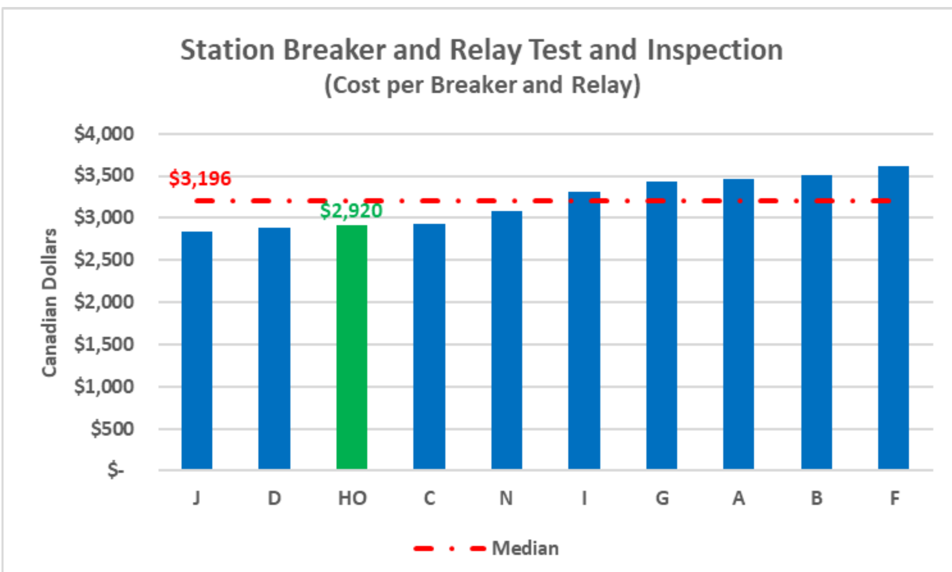

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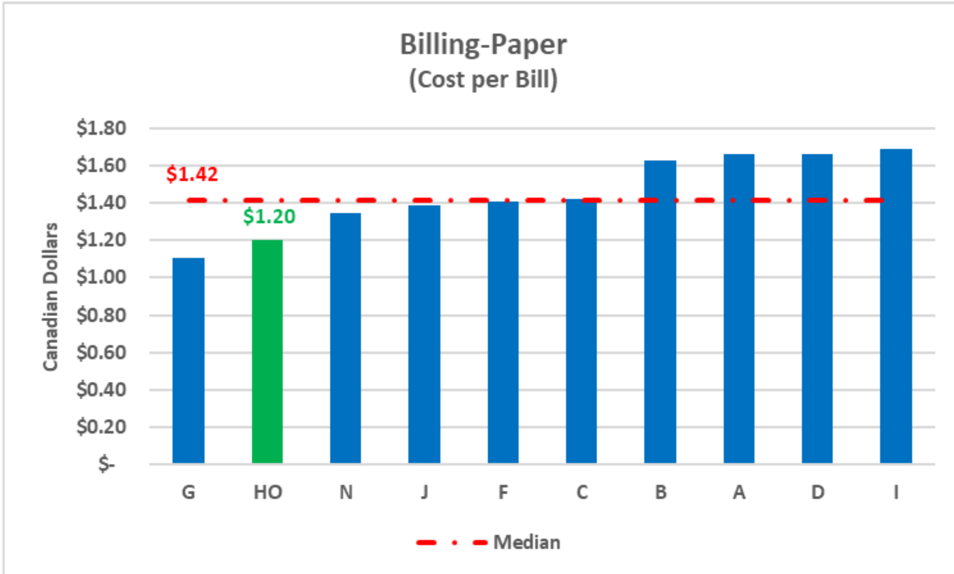

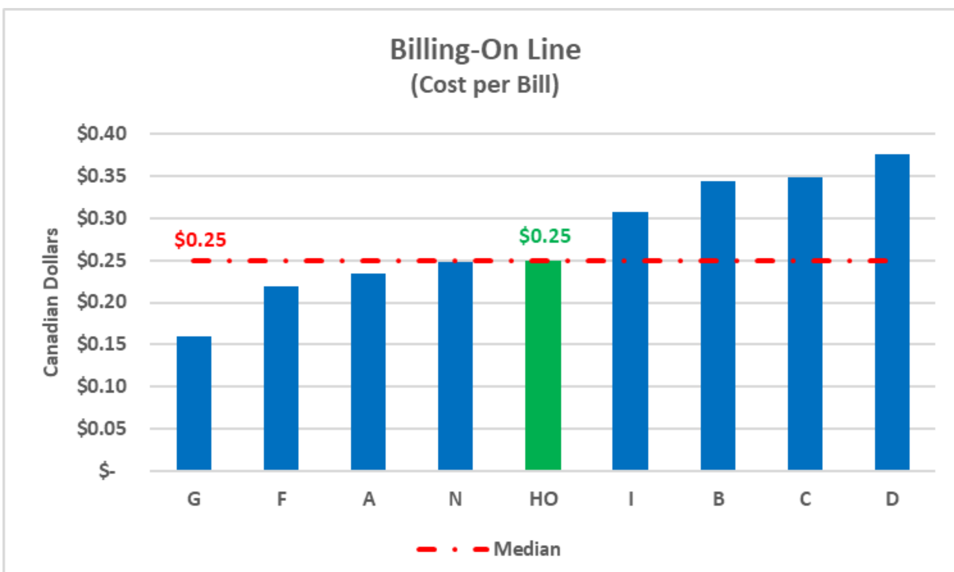

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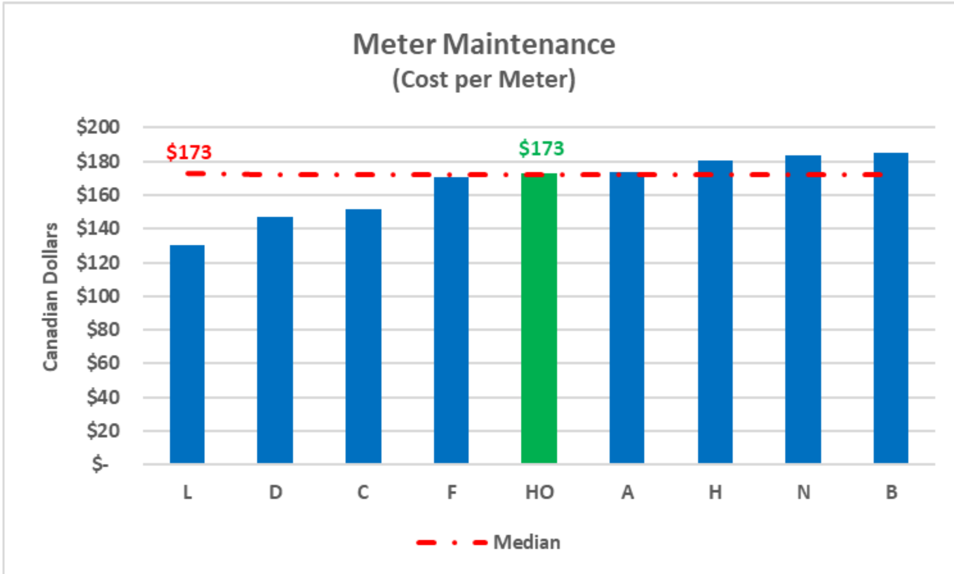

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ELECTRICITY UTILITY SCORECARD

1. INTRODUCTION

A key tool of the OEB's Renewed Regulatory Framework ("RRF") is the Electricity Utility Scorecard ("scorecard"). The scorecard is a mechanism which facilitates the OEB's performance monitoring and distributor benchmarking. The scorecard contains five years of data, and assesses a distributor's effectiveness and improvement in achieving the four performance outcomes of the RRF: Customer Focus, Operational Effectiveness, Public Policy Responsiveness, and Financial Performance. As a key part of the RRF, the scorecard enables the OEB to align the needs of a sustainable, financially viable electricity sector with the expectations of customers, who want reliable service at a reasonable price.

Since the inception of the scorecard in 2013, Hydro Ottawa's performance in the categories measured by the scorecard has been strong, with notable achievement in its reliability and customer focus measures. Over the last five years of scorecard performance, the utility has met 91% of those measures with defined targets, whether industry-wide or distributor-specific, and has made significant performance improvements in its scorecard measures. In 2014, 55.6% of those measures on the scorecard with trend indicators were showing that Hydro Ottawa's performance was either consistent or improving. In 2015, that percentage increased to 77.8%. From 2016-2018, Hydro Ottawa met or exceeded 100% of its scorecard measures that include targets, with 100% of those measures showing performance improvement or consistent trending. Those measures with consistent trending are those that cannot be improved upon (i.e. zero public safety incidents).

Table 1 below summarizes Hydro Ottawa's annual scorecard target results, indicating whether a target was met or not met, as well as the utility's five-year trend as published yearly by the OEB on the scorecard. Hydro Ottawa's performance improvement as expressed on the OEB's scorecard demonstrates the utility's commitment to continuous improvement and to providing value for its customers and shareholder.

Table 1 – Summary of Hydro Ottawa's Scorecard Targets Met/Not Met (2014-2018)

Performance Categories	Measures	2014	2015	2016	2017	2018
Service Quality	New Residential/Small Business Services Connected on Time	→	→	→	→	→
	Scheduled Appointments Met on Time	↓	↑	↑	↑	↑
	Telephone Calls Answered on Time	↓	↓	↑	↑	↑
Customer Satisfaction	Billing Accuracy	→	↑	↑	↑	↑
Safety	Level of Compliance with O. Reg. 22/04	↑	→	→	→	→
	Number of General Public Safety Incidents*	→	→	→	→	→
	Rate per 1000 km of line*	→	→	→	→	→
System Reliability	Average Number of Hours that Power to a Customer is Interrupted*	↑	↑	↓	↓	↓
	Average Number of Times that Power to a Customer is Interrupted*	↑	→	↓	↓	↓
Percentage of Flat/Improving Trends		**55.6%**	**77.8%**	**100%**	**100%**	**100%**

* Note that a downward trend indicates performance improvement for the following four measures: Number of General Public Safety Incidents, Rate per 1000 km of line, Average Number of Hours that Power to a Customer is Interrupted, and Average Number of Times that Power to a Customer is Interrupted.

This Attachment discusses Hydro Ottawa's performance in each of the scorecard measures in detail. It furthermore analyzes the utility's performance year-over-year, as well as compared to both a peer group of distributors in Ontario and all distributors in the province, where possible.

Unless otherwise noted, the analysis in this Attachment is focused on the period of 2014-2018.

2. PEER GROUP SELECTION

In determining an appropriate peer group of local distribution companies ("LDCs") in Ontario, Hydro Ottawa reviewed its position relative to four main distributor characteristics: (1) total number of customers, as published in the OEB's 2018 Electricity Distributor Yearbook ("yearbook"); (2) Gross Property, Plant and Equipment, as published in the OEB's 2018 yearbook; (3) efficiency ranking, as presented in the Pacific Economics Group ("PEG") econometric benchmarking model,[1] and (4) membership in the Coalition of Large Distributors ("CLD"). Distributor peers were chosen if they appeared in at least two of the four characteristic groups and at least two distributors were chosen from each characteristic group. This peer group helps to provide context and perspective relative to Hydro Ottawa's performance on the scorecard.

Based on this selection process, as outlined in Table 2 below, Hydro Ottawa established a comparative peer group that consists of the following Ontario distributors:

- Alectra Utilities Corporation
- Burlington Hydro Inc.
- EnWin Utilities Ltd.
- Hydro One Networks Inc.
- Kitchener-Wilmot Hydro Inc.
- London Hydro Inc.
- Oakville Hydro Electricity Distribution Inc.
- Thunder Bay Hydro Electricity Distribution Inc.
- Toronto Hydro-Electric System Limited
- Veridian Connections
- Waterloo North Hydro Inc.

[1] Pacific Economics Group, *Empirical Research in Support of Incentive Rate-Setting: 2018 Benchmarking Update* (August 15, 2019).

Table 2 – Criteria for Peer Group Selection

Source	Criteria	Distributors	Value
2018 Yearbook	Total Customers (top 10)	Hydro One Networks Inc.	1,333,601
		Alectra Utilities Corporation	991,102
		Toronto Hydro-Electric System Limited	772,624
		Hydro Ottawa Limited	335,320
		London Hydro Inc.	159,039
		Veridian Connections	121,826
		Kitchener-Wilmot Hydro Inc.	96,827
		EnWin Utilities Ltd.	88,978
		Oakville Hydro Electricity Distribution Inc.	72,108
		Burlington Hydro Inc.	67,940
2018 Yearbook	Property Plant & Equipment (Gross) (top 10)	Hydro One Networks Inc.	$12,489,379,660
		Toronto Hydro-Electric System Limited	$5,333,499,789
		Alectra Utilities Corporation	$4,241,982,950
		Hydro Ottawa Limited	$1,244,860,354
		London Hydro Inc.	$503,465,229
		Kitchener-Wilmot Hydro Inc.	$387,749,042
		Waterloo North Hydro Inc.	$383,813,462
		Veridian Connections Inc.	$322,385,817
		EnWin Utilities Ltd.	$312,252,487
		Burlington Hydro Inc.	$281,800,009
PEG Report (August 2019 Update)	Stretch Factor Assignment by Group	Atikokan Hydro Inc	Stretch Factor = 0.45% Group IV
		Canadian Niagara Power Inc.	
		Chapleau Public Utilities Corporation	
		Festival Hydro Inc.	
		Hydro One Networks Inc.	
		Hydro Ottawa Limited	
		PUC Distribution Inc.	
		Thunder Bay Hydro Electricity Distribution Inc.	
		Wellington North Power Inc.	
CLD	CLD Members	Alectra Utilities Corporation	
		Hydro Ottawa Limited	
		Hydro One Networks Inc.	
		Toronto Hydro-Electric System Limited	
		Veridian Connections Inc.	

3. CUSTOMER FOCUS

3.1. SERVICE QUALITY

3.1.1. New Residential and Small Business Services Connected on Time

As per section 7.2 of the *Distribution System Code* ("DSC"), all new low voltage connections must be completed within five days of all service conditions being met, or at such later date as agreed to by the customer and distributor, at least 90% of the time. From 2014-2018, Hydro Ottawa connected an average of 4,414 low voltage customers per year, which were all completed within a five day timeframe or as scheduled with the customer. It is Hydro Ottawa's process to always schedule a new low voltage connection within five days, or at a later date if requested by the customer. The utility's consistent performance in this Service Quality Requirement ("SQR") is above both the five-year peer group average of 97.6%, and the five-year industry average of 98.3%.

In light of the City of Ottawa's continued year-over-year growth, Hydro Ottawa expects that requests for new connections will steadily increase over the 2021-2025 period. Hydro Ottawa aims to continue its strong performance in connecting new low voltage customers on time over the term of this Application.

Table 3 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Percentage of New Residential and Small Business Connections Completed on Time *(Industry Average: 90%)*

	2014	2015	2016	2017	2018	5-Year Average
Peer Group Average	96.7%	97.6%	96.8%	98.6%	98.4%	*97.6%*
Provincial Average	98.0%	98.5%	98.3%	98.3%	98.3%	*98.3%*
Hydro Ottawa	100%	100%	100%	100%	100%	*100%*

Figure 1 – Peer Group and Hydro Ottawa Results: Percentage of New Residential and Small Business Connections Completed on Time *(Industry Target: 90%)*

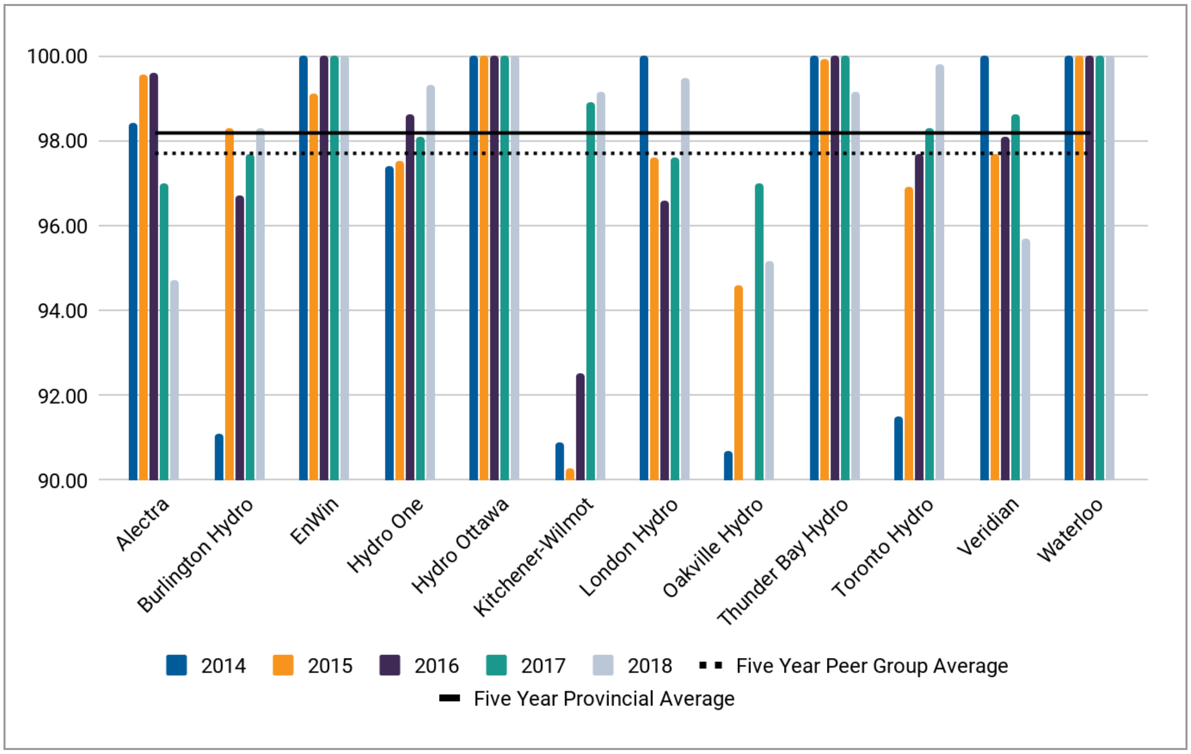
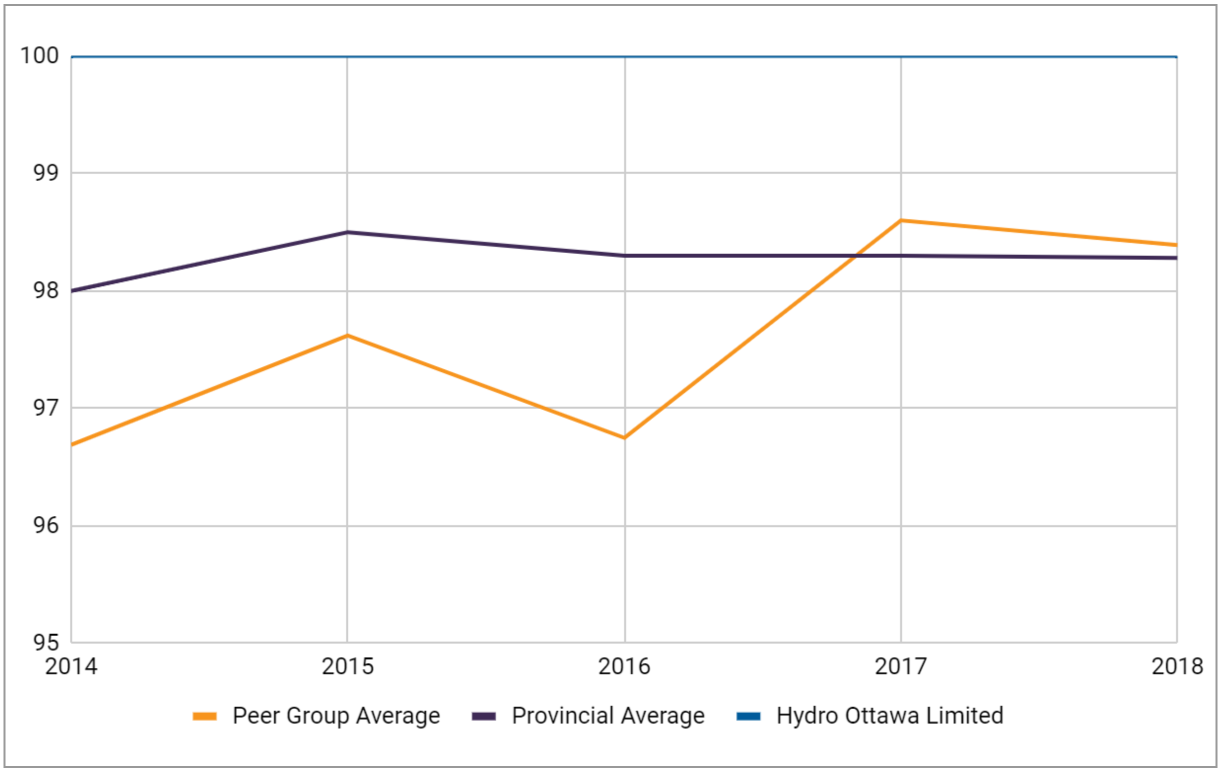


Figure 2 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Percentage of New Residential and Small Business Connections Completed on Time

(Industry Target: 90%)



3.1.2. Scheduled Appointments Met On Time

As required by section 7.4 of the DSC, Hydro Ottawa aims to schedule all appointments with customers – and meet those appointments – within a window of time that is no greater than four hours. On average, over the 2014-2018 period, the utility scheduled over 4,000 appointments per year. Recent years have witnessed an increase in appointments scheduled, with over 6,000 appointments scheduled in 2018 alone. On average, Hydro Ottawa has been able to meet 98.8% of scheduled appointments on time over the 2014-2018 period. Appointments that are missed are predominantly a result of significant emergencies or inclement weather events that redirect resources to power restoration efforts.

The five-year average for Hydro Ottawa's performance under this SQR was 0.5% below the peer group average and 0.2% below the provincial average. In the years 2016, 2017, and 2018, the utility was able to meet over 99% of its scheduled appointments, and was thus on par with, or exceeded, the peer group and provincial averages. Hydro Ottawa's performance in meeting appointments has shown an improvement since 2014 and 2015.

Table 4 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Percentage of Scheduled Appointments Met on Time *(Industry Target: 90%)*

	2014	2015	2016	2017	2018	5-Year Average
Peer Group Average	99.1%	98.9%	99.4%	99.2%	99.7%	*99.3%*
Provincial Average	99.0%	98.9%	99.0%	99.10%	99.15%	*99.0%*
Hydro Ottawa	98.3%	97.1%	99.6%	99.4%	99.7%	*98.8%*

Figure 3 – Peer Group and Hydro Ottawa Results: Percentage of Scheduled Appointments Met On Time *(Industry Target: 90%)*

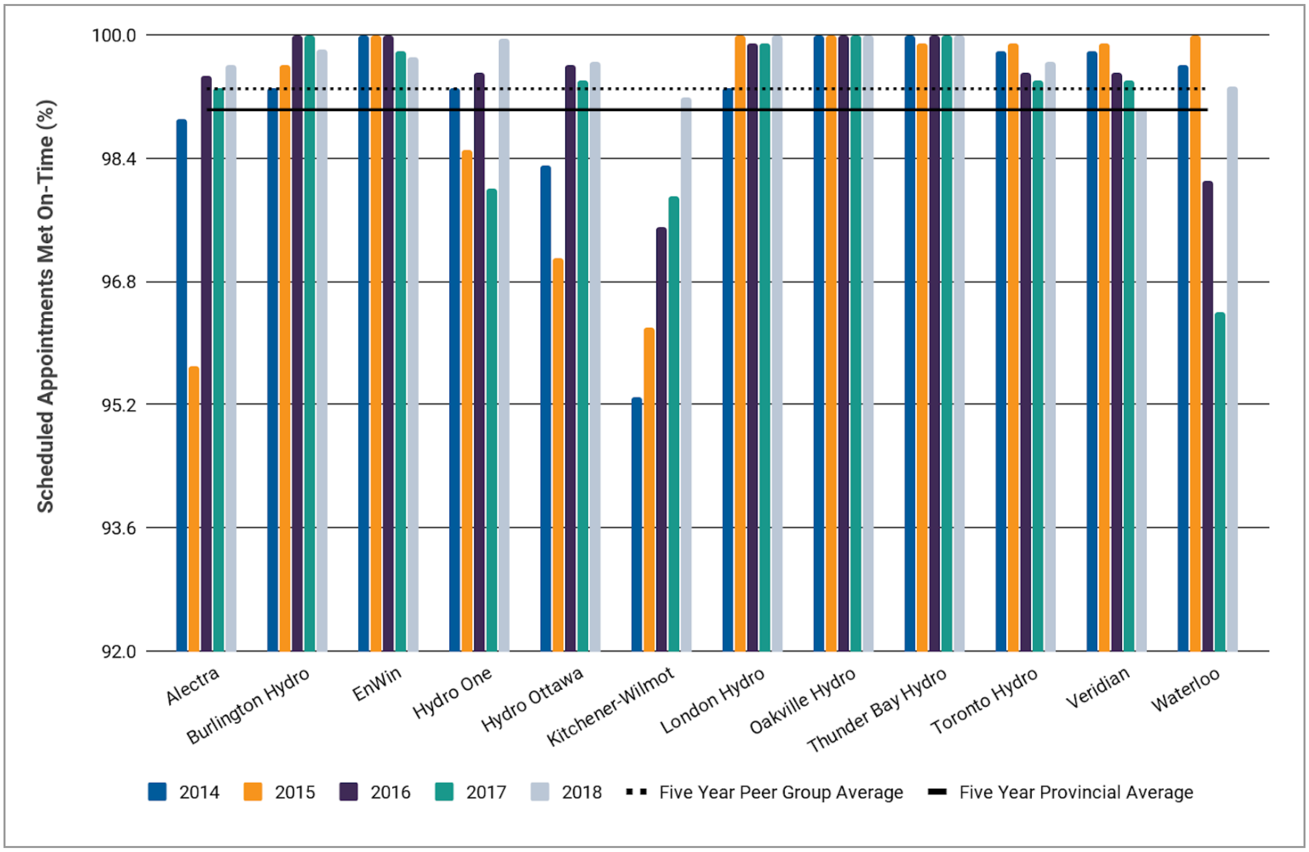
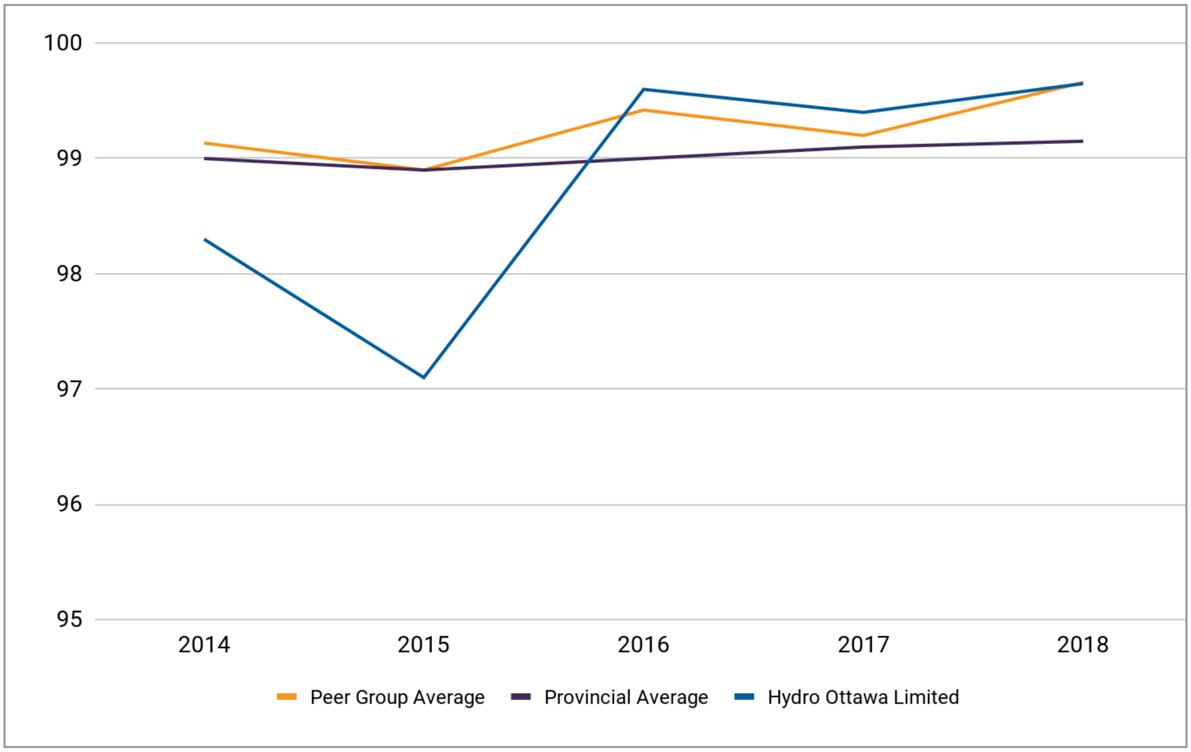


Figure 4 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Percentage of Appointments Met on Time *(Industry Target: 90%)*



3.1.3. Telephone Calls Answered On Time

Section 7.6.1 of the DSC requires that distributors answer all telephone calls within 30 seconds, 65% of the time. Between 2014 and 2018, Hydro Ottawa answered an average of more than 276,000 calls annually, and on average those calls were answered within 30 seconds 84.1% of the time. This exceeds the peer group average by 4%, is slightly below the provincial average, and significantly exceeds the industry target of 65%.

As can be seen in Figures 5 and 6, on a year-over-year basis, Hydro Ottawa's performance under this SQR has shown improvement from 2014-2018. In 2017, the utility engaged a new provider for its Customer Contact Centre, and also expanded its contact centre hours to include Saturdays. Since its transition to a new contact centre, Hydro Ottawa has seen an improvement in the number of calls answered within 30 seconds. Ultimately, the utility expects call volumes to decline in the future, due to the implementation of improved self-service options, including web chat functionality, voice biometric technology, and its smart speaker skill, which are expected to enhance customer convenience.

Table 5 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Percentage of Telephone Calls Answered on Time *(Industry Target: 65%)*

	2014	2015	2016	2017	2018	5-Year Average
Peer Group Average	77.4%	79.4%	76.9%	81.1%	83.4%	*80.1%*
Provincial Average	84.7%	86.1%	84.9%	87.3%	88.15%	*85.8%*
Hydro Ottawa	80.3%	82.5%	83.8%	85.1%	88.7%	*84.1%*

Figure 5 – Peer Group and Hydro Ottawa Results: Percentage of Telephone Calls Answered on Time *(Industry Target: 65%)*

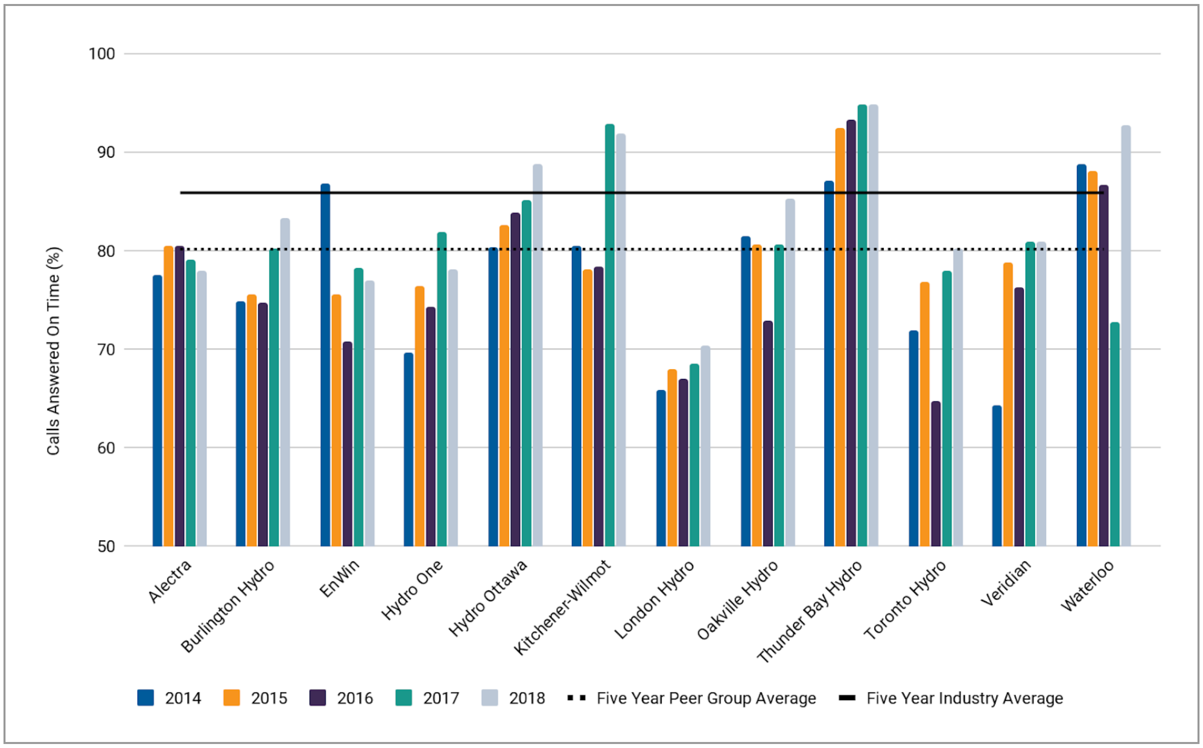
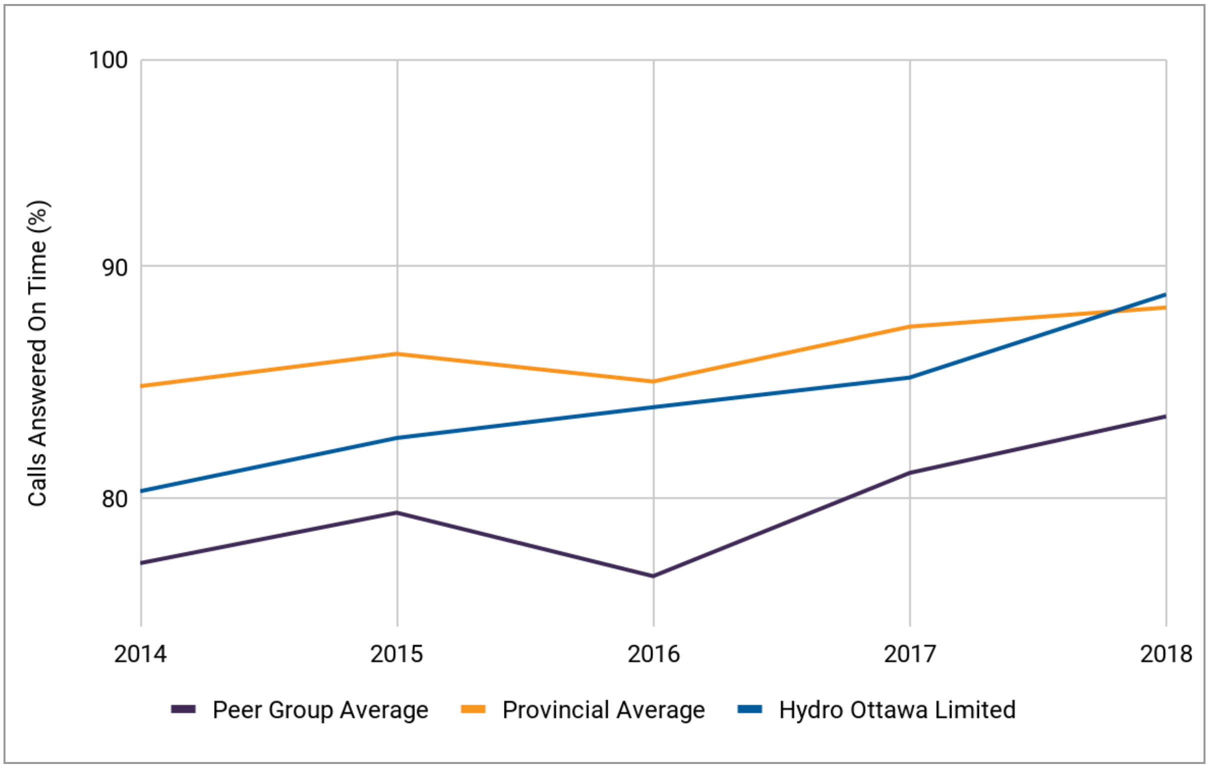


Figure 6 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Percentage of Telephone Calls Answered on Time *(Industry Target: 65%)*



3.2. CUSTOMER SATISFACTION

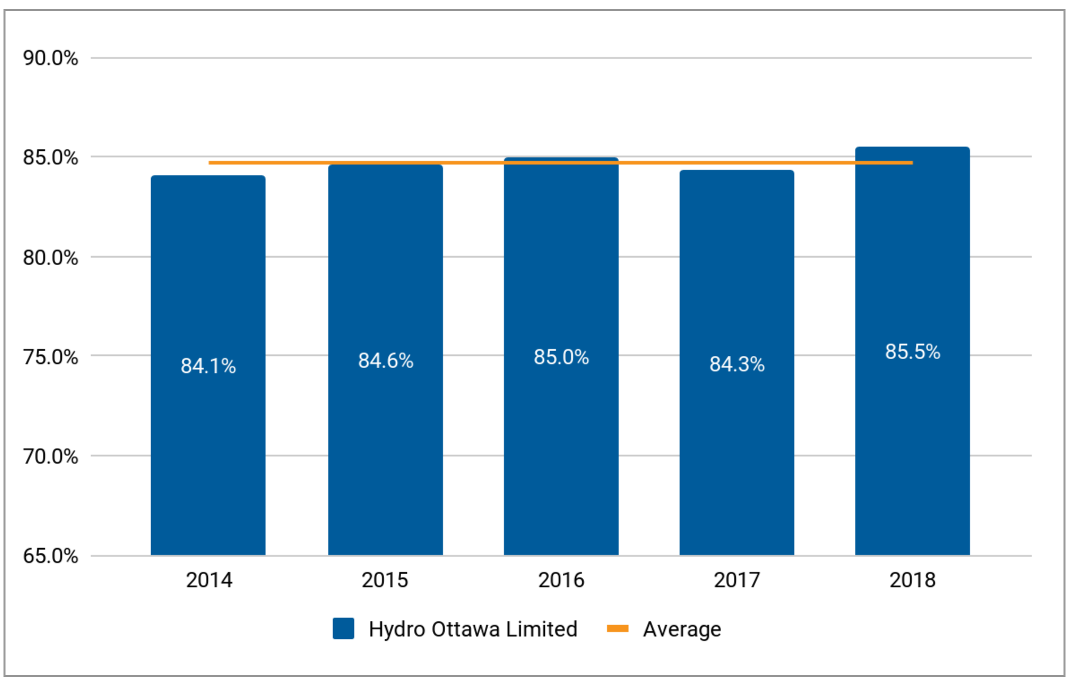
3.2.1. First Contact Resolution

First Contact Resolution is intended to be a measure of a distributor's effectiveness at satisfactorily addressing customers' complaints. Currently, the First Contact Resolution measure is undefined, and the OEB allows distributors discretion as to how this metric is reported. Hydro Ottawa derives its First Contact Resolution score from a monthly transactional survey. Customers who have recently contacted Hydro Ottawa by phone are chosen at random throughout the year to participate in a customer satisfaction survey. The customers who indicate that their issue was resolved on first contact are included under First Contact Resolution.

Given the varied methodologies for tracking and reporting First Contact Resolution, comparability among the peer group and provincial averages is moot. However, on average between 2014 and 2018, 84.7% of Hydro Ottawa customers contacted in the transactional survey indicated that their issue was resolved upon first contact. Hydro Ottawa showed continual improvement in this area throughout the 2014-2018 period, with a drop of less than 1% in 2017, which can be attributed to the transition to a new contact centre.

Hydro Ottawa's 2018 score for First Contact Resolution is the highest it has been over the last five years. Over the 2021-2025 period, the utility intends to improve its First Contact Resolution score, and to explore new methods of tracking First Contact Resolution via other communications platforms, such as web chat and social media.

Figure 7 – First Contact Resolution



3.2.2. Billing Accuracy

As defined in section 7.11 of the DSC, a bill is considered to be accurate if it contains correct customer information, meter readings, and rates information. Hydro Ottawa strives to always produce accurate bills for its customers, and consistently surpasses the industry Billing Accuracy target of 98%. There are a limited number of instances beyond Hydro Ottawa's control that occasionally require a customer to be rebilled, including meter communication issues and out-of-date customer information. Nevertheless, over the 2014-2018 period, Hydro Ottawa's Billing Accuracy score has consistently been above the industry target, peer group average, and provincial average (the only exception being 2014, where the utility's score was 99.6% and the provincial average was 99.7%).

Since its switch from bi-monthly to monthly billing in 2015, Hydro Ottawa has produced an average of nearly four million bills annually. Over the 2014-2018 period, an average of 99.8% of bills produced were accurate. Since 2014, Hydro Ottawa's billing accuracy score has increased by 0.3%.

Table 6 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Billing Accuracy *(Industry Target: 98%)*

	2014	2015	2016	2017	2018	5-Year Average
Peer Group Average	99.1%	99.4%	99.7%	99.7%	99.7%	*99.5%*
Provincial Average	99.7%	99.1%	99.4%	99.8%	99.7%	*99.5%*
Hydro Ottawa	99.6%	99.8%	99.9%	99.9%	99.9%	*99.8%*

Figure 8 – Peer Group and Hydro Ottawa Results: Billing Accuracy *(Industry Target: 98%)*

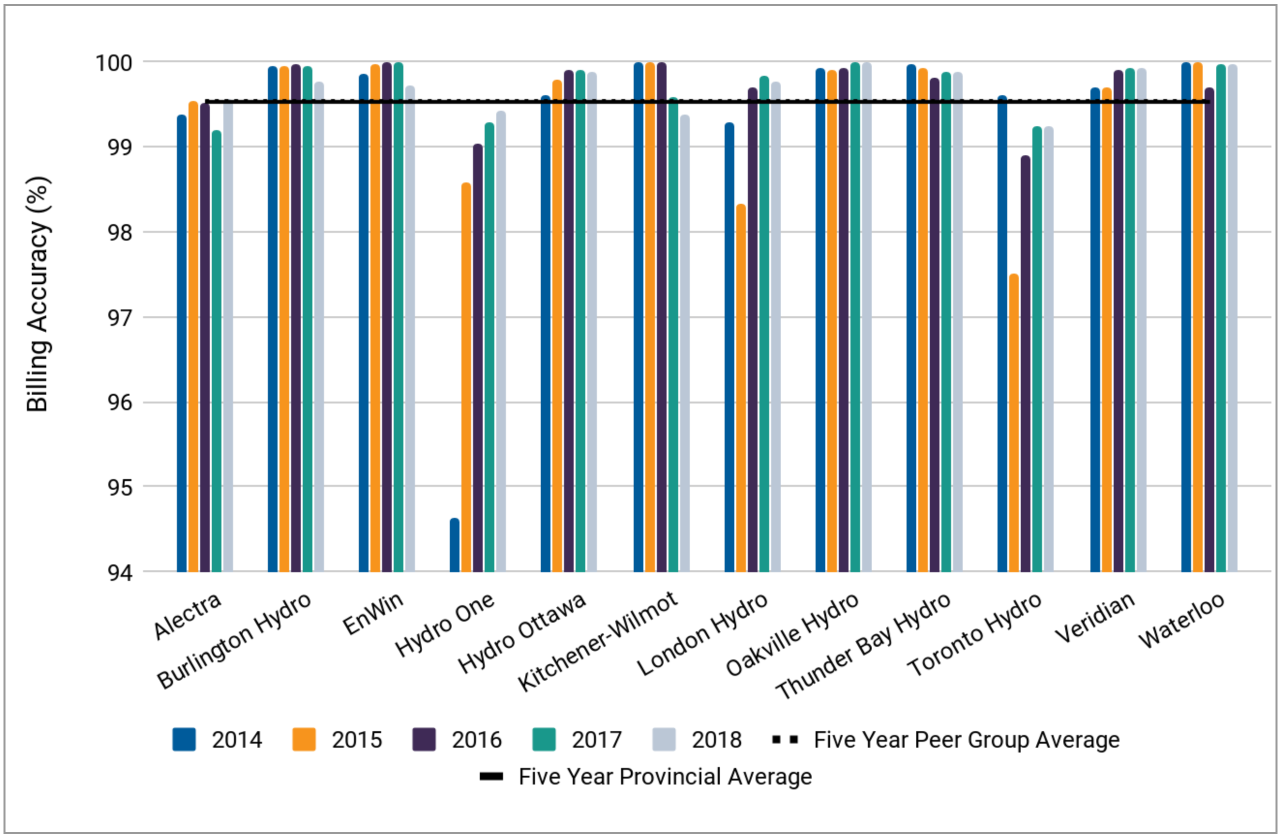
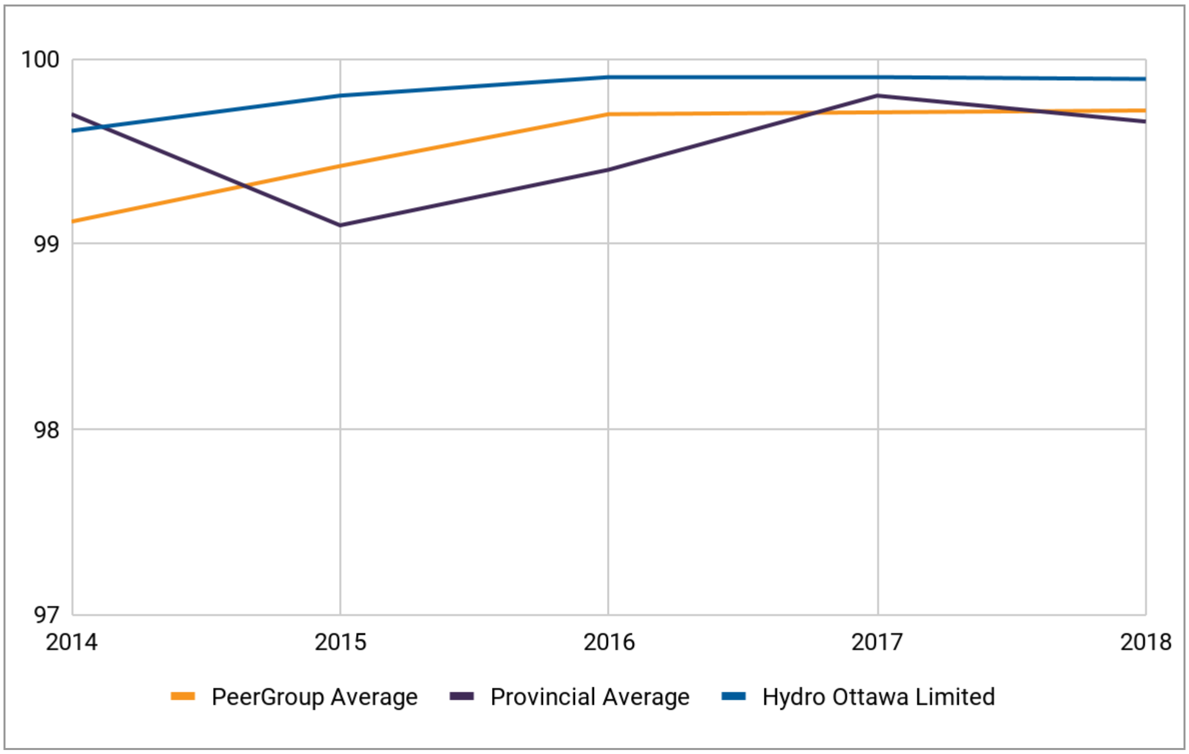


Figure 9 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Billing Accuracy *(Industry Target: 98%)*



3.2.3. Customer Satisfaction Survey Results

The OEB requires distributors to survey customers as to their level of satisfaction and report the results to the OEB on a biennial basis at a minimum. While distributors currently have discretion to determine how to conduct their customer satisfaction surveys, the OEB expects distributors to adhere to the following principles:

- Surveys must, at a minimum, canvass customer satisfaction in the following key areas: (a) power quality and reliability; (b) price; (c) billing and payment; (d) communications; and (e) the customer service experience.
- Distributors must follow good survey practices. Examples of such include the following: (a) survey goals are clear and specific; (b) selected samples well represent the population to be studied; (c) care is taken in matching question wording to the concepts

being measured and the population studied; (d) appropriate statistical analytic and reporting techniques are used; and (e) all methods of the survey are disclosed to allow for evaluation and replication.

Given the varied methodologies of tracking and reporting Customer Satisfaction Survey results, comparability among the peer group and provincial averages is moot.

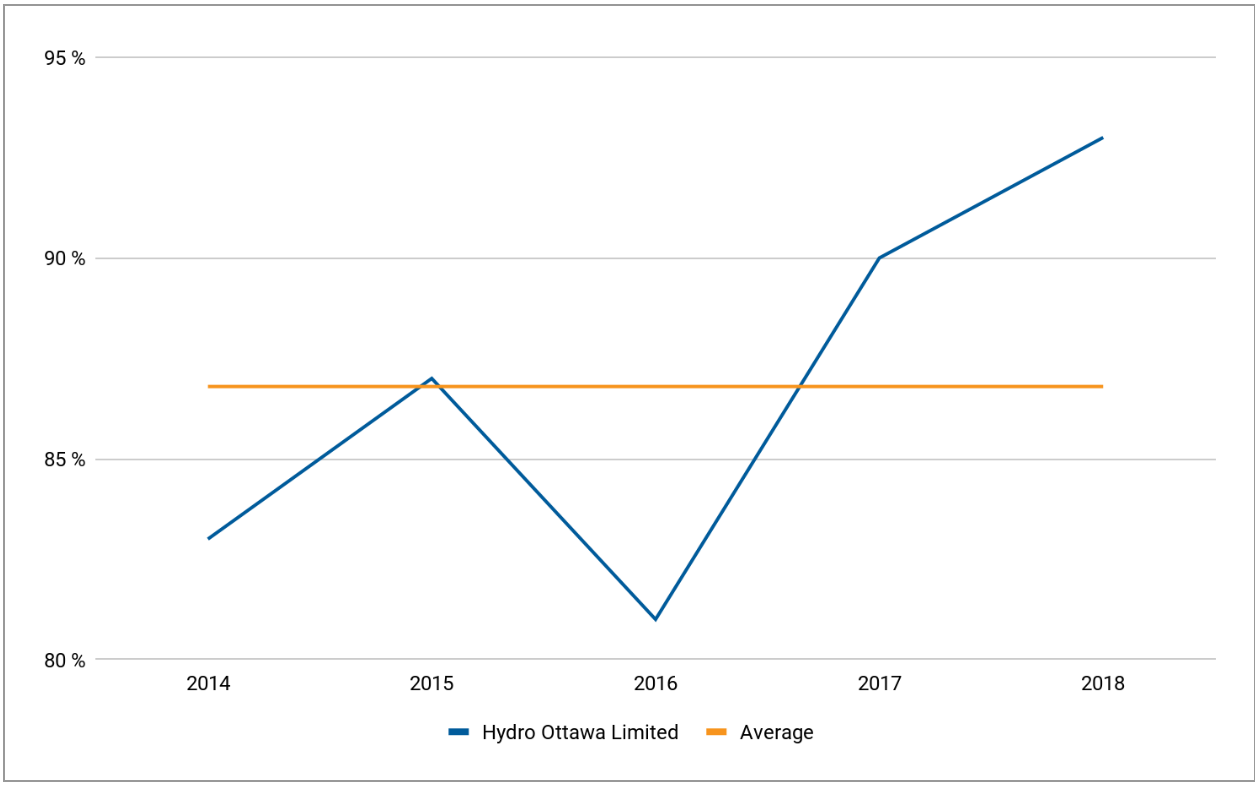
However, in terms of year-over-year analysis, for over a decade and a half Hydro Ottawa has engaged a third party to conduct customer satisfaction surveys. These surveys provide valuable insight into customer needs and preferences, and support the planning and improvement of customer service offerings provided by the utility. The survey questions cover a wide variety of relevant topics in line with the OEB's guiding principles, including reliability, power outages, price, billing and payment, communications, customer service, and corporate image. Hydro Ottawa makes use of this information to gain insight into customer expectations, to further develop customer engagement activities, and to identify the most effective means of communicating with customers. Feedback from these surveys is incorporated into Hydro Ottawa's planning process and ultimately forms the basis of plans which address customer needs and service offerings. A final report of survey outcomes confirms customer satisfaction levels and identifies areas for improvement. While the requirement is to report on a biennial basis to the OEB, Hydro Ottawa reports its Customer Satisfaction Survey results annually.

While Hydro Ottawa's Customer Satisfaction Survey results have shown some fluctuation over the 2014-2018 period, the results indicate that customer satisfaction has risen steadily since 2014 and has improved overall by 10% since that time.

The significant decrease in customer satisfaction that was observed in 2016 merits explanation. Consistent with historical findings, the final report provided to Hydro Ottawa in 2016 indicated that a customer's ability to pay is directly correlated to overall satisfaction. Given the steady increases in electricity costs (beyond distribution rates) that had been accumulating prior to

2016, customers expressed concern regarding their increasing bills, despite their efforts to reduce consumption. In the face of province-wide public dissatisfaction with electricity costs, Hydro Ottawa continued to improve its customers' experience through various initiatives, such as the launch of a new smartphone app, expanded customer contact centre hours, and enhanced web and social media communications. In addition, subsequent customer satisfaction and public polling research found that the introduction of rate mitigation programs by the provincial government in 2016 and 2017 had the effect of attenuating many of the concerns of Ontario consumers with respect to electricity prices. In turn, Hydro Ottawa's Customer Satisfaction Survey results increased significantly in 2017 and 2018.

Figure 10 – Customer Satisfaction Survey Results



4. OPERATIONAL EFFECTIVENESS

4.1. SAFETY

4.1.1. Level of Public Awareness

The Level of Public Safety Awareness measure was introduced to the Electricity Distributor Scorecard in 2015 and is based upon a standardized, public survey which must be conducted, at a minimum, biennially. The Electrical Safety Authority ("ESA") and some electricity distributors assisted the OEB in creating the survey. Distributors are required to survey not only their own customers, but the general public within their service territory.

Helping customers understand the importance of staying safe and using electricity wisely is a priority for Hydro Ottawa. The utility works to continuously enhance public awareness of electrical safety through three primary vehicles: (a) its corporate website and social media platforms; (b) a well-established student education program; and (c) active participation in hazard-specific education campaigns, such as the utility's annual promotion of the Ontario Regional Common Ground Alliance's ("ORCGA") Dig Safe Month, the ESA's Powerline Safety Month, Smart-as-a-Fox videos and the ESA's Holiday Safety Campaign.

To date, Hydro Ottawa has completed two Public Safety Awareness surveys. Both the 2016 and 2018 surveys resulted in a public safety awareness score of 70%. Hydro Ottawa acknowledges that this is one of the lower scores in the province, and is the lowest score among the established peer group, as depicted in Table 7.

Table 7 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Public Safety Survey Results

	2015	2016	2017	2018	4-Year Average
Peer Group Average	79.8%	79.8%	80.3%	80.3%	*82.0%*
Provincial Average	81.1%	81.1%	82.4%	82.3%	*81.7%*
Hydro Ottawa	70.0%	70.0%	70.0%	70.0%	*70.0%*

Hydro Ottawa will conduct a third survey in 2020 and plans to augment its public safety awareness efforts over the next two years by developing a communications strategy focused on increasing public awareness about electricity safety. Ultimately, Hydro Ottawa aims to continue to position the utility as a reliable and trusted source for safety information for Ottawa's residents, communities, and businesses, while ensuring a reliable supply of electricity throughout its service territory.

By leveraging channels such as community and industry events, social media, and both a mainstream and digital advertising campaign, Hydro Ottawa will focus on extending the utility's public safety efforts to the broader Ottawa community through a holistic and long-term strategy. Hydro Ottawa will also be developing additional messaging on emergency preparedness, covering topics such as floods, tornadoes, and winter storms, as they have become more frequent and severe over the past few years due to the effects of climate change. In addition, Hydro Ottawa will continue with recently expanded activities related to the promotion of public safety awareness to children and youth through in-school presentations, online presence, and contests, similar to the ongoing and long-standing internal operational and employee safety approach. Finally, this strategy will continue to reiterate the top six safety messages measured by the OEB as part of the public safety awareness survey throughout Hydro Ottawa's service territory.

Hydro Ottawa's goal is to incrementally increase its public safety awareness score from 70% to 77% by 2022.

4.1.2. Level of Compliance with Ontario Regulation 22/04

The Compliance with Ontario Regulation 22/04 component of the public safety measure addresses the level of distributor compliance to *Electrical Distribution Safety, O. Reg. 22/04.* This includes Audit, Declaration of Compliance, Due Diligence Inspections, Public Safety Concerns, and Compliance Investigations. These five elements are evaluated by the ESA's Powerlines Department under different timeframes, and are not normalized based on the distributor's size. As a whole, these elements determine the compliance status that is reported by the ESA each year under this metric. The target for each distributor is to be deemed "Compliant" with O. Reg. 22/04.

Hydro Ottawa has been deemed Compliant with O. Reg. 22/04 each year over the 2014-2018 period. The 2018 ESA audit report of the utility's compliance with the regulation highlighted four items: (a) Hydro Ottawa was compliant in the five key compliance sections examined; (b) the utility had implemented the action plans developed for the recommendations cited in the 2017 audit; (c) equipment and plans or standard design drawings used in the construction of the utility's distribution system were approved, and (d) constructed plant was inspected and certified safe before being put into use. The audit confirmed that Hydro Ottawa has a genuine interest in improving health and safety, and that the utility continued to effectively implement its health, safety, and environment management system, and maintain certification to the Occupational Health and Safety Assessment Series 18001 standard. ESA's 2018 audit report also highlighted that Hydro Ottawa continues to be active in the community promoting conservation and demand management, educating children and youth about electricity safety, helping to mitigate the impact of energy costs for those in need, and making other contributions to the quality of life in Ottawa.

Over the course of the 2021-2025 period, Hydro Ottawa intends to maintain and uphold its commitment to safety by maintaining Compliance under O. Reg. 22/04.

Table 8 – Hydro Ottawa Level of Compliance with O. Reg. 22/04[2]

	2015	2016	2017	2018	2018
Hydro Ottawa	C	C	C	C	C

4.1.3. Serious Electrical Incident Index

The Serious Electrical Incident Index component of the public safety measure is intended to address the resultant impact in improving public electrical safety on the distribution network over time. A "serious electrical incident" is defined by Section 12 of O. Reg. 22/04, and only equipment which is applicable to Section 12 is considered. A serious electrical incident will appear as part of this scorecard component if it was determined by the ESA that a member of the public was involved in the incident (i.e. caused a death or critical injury, or had the potential to cause death or critical injury). A serious electrical incident will not appear as part of this scorecard component if it was determined by the ESA that the incident was initiated by a non-distributor worker and there were no deaths or critical injuries involving a member of the public.

Both the actual number and normalized rate of serious electrical incidents occurring on a distributor's network are shown on the scorecard. Performance targets for the serious electrical incident component of the scorecard is distributor-specific and is based on each distributor's historical data and prior performance.

[2] The letter "C" in this table denotes "Compliant."

Historically, the number of serious electrical incidents involving the general public in Hydro Ottawa's service territory has been very low, due in part to the utility's public education initiatives outlined above. For the last five years, Hydro Ottawa's serious electrical incident component has been consistently below both the provincial and peer group averages. Given the utility's historical performance in this area, its target is zero, and thus any incident deemed to be serious by the ESA within Hydro Ottawa's territory will render a result of the target not being met.

In 2014, one reported electrical incident was deemed to have the potential to be a serious electrical incident because it occurred in a public space. In 2015, one reported electrical incident was deemed to be serious on account of a member of the public requiring hospital treatment after coming into contact with an open wire secondary conductor while accessing the roof of a commercial business. From 2016 through 2018, no incidents have been deemed to be serious electrical incidents by the ESA. The number of incidents is expected to continue to remain low.

Table 9 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Number of Serious Electrical Incidents

	2014	2015	2016	2017	2018	5-Year Average
Peer Group Average	1.25	1.42	1.83	1.83	3.58	*1.98*
Provincial Average	0.31	0.31	0.34	0.39	0.78	*0.43*
Hydro Ottawa	1	1	0	0	0	*0.40*

Table 10 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Normalized Number of Serious Electrical Incidents *(Incidents per 10, 100, or 1000 km of line)*

	2014	2015	2016	2017	2018	5-Year Average
Peer Group Average	0.112	0.187	0.255	0.308	0.629	*0.298*
Provincial Average	0.046	0.054	0.051	0.061	0.175	*0.077*
Hydro Ottawa	0.182	0.182	0.000	0.000	0.000	*0.073*

Figure 11 – Peer Group and Hydro Ottawa Results: Normalized Number of Serious Electrical Incidents *(Incidents per 10, 100, or 1000 km of line)*

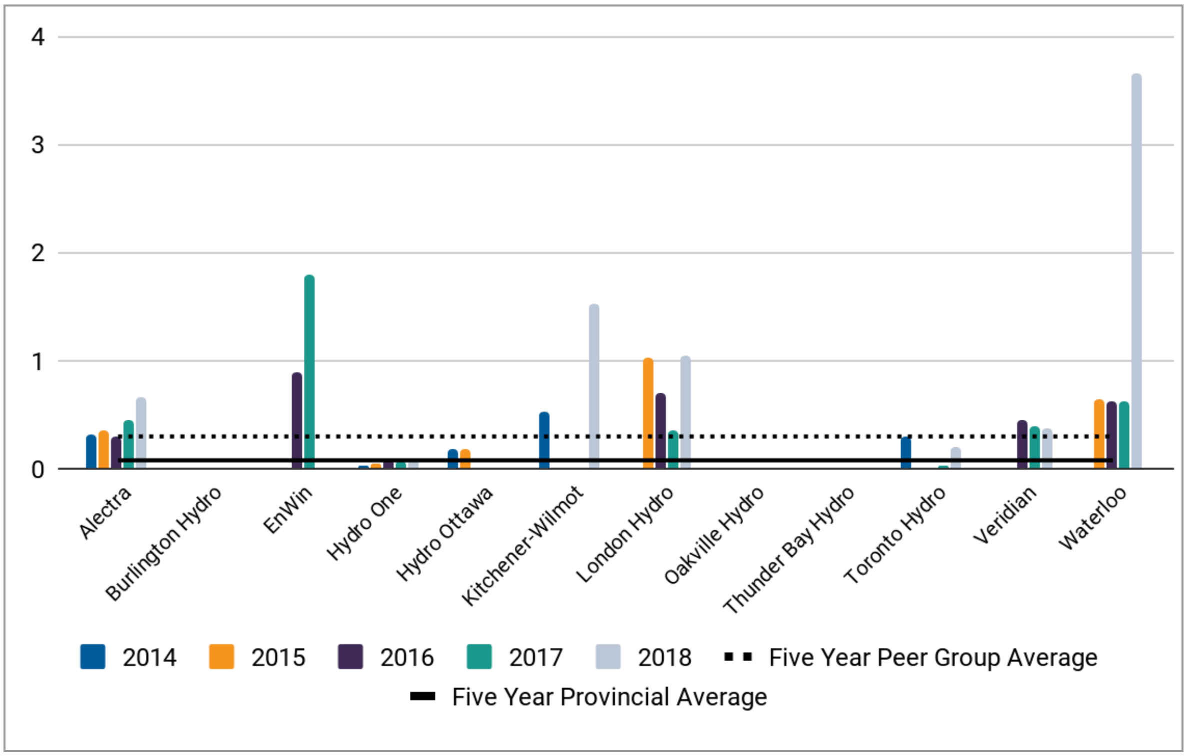
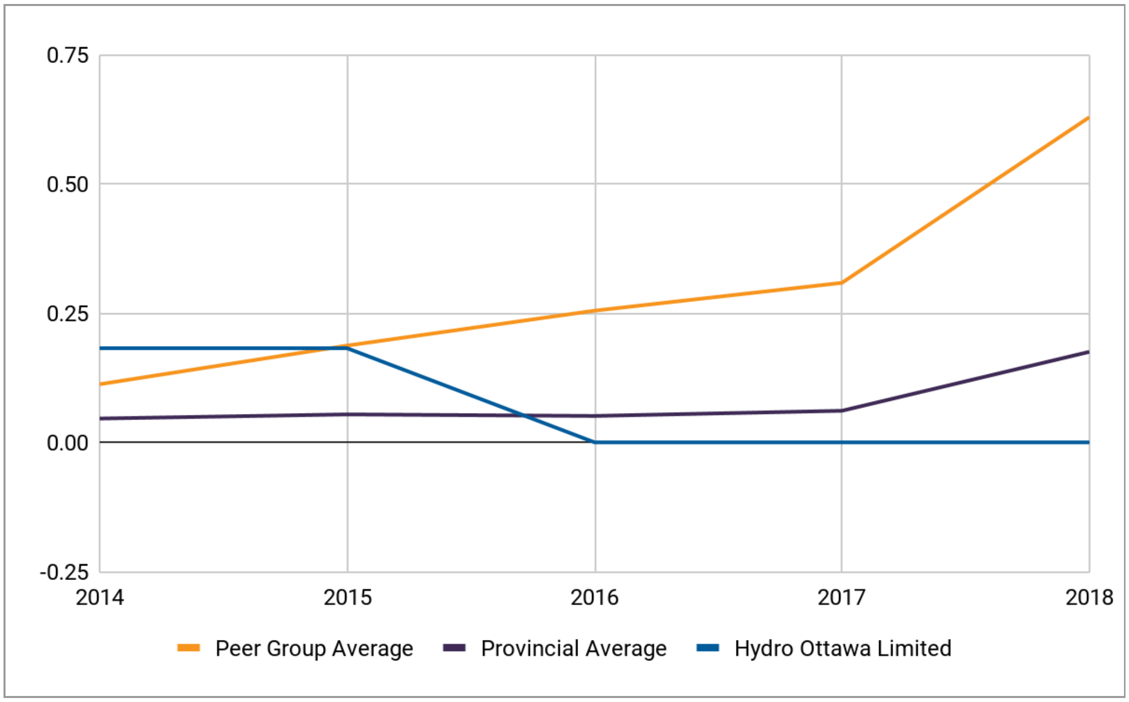


Figure 12 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Serious Electrical Incidents *(Normalized for Incidents per 10, 100, or 1000 km of line)*



4.2. SYSTEM RELIABILITY

4.2.1. Average Number of Hours that Power to a Customer is Interrupted

The scorecard includes a System Average Interruption Duration Index ("SAIDI"), which is an industry-wide standard that is used to measure the average number of hours that power to a customer is interrupted annually. In order to facilitate customer understanding and transparency, the OEB employs a plain language definition of SAIDI as the label for this scorecard metric, in lieu of the term itself. This component of the scorecard is adjusted for both Loss of Supply and Major Event Days.

Distributor-specific targets are included on the scorecard, which are based on each distributor's own historical performance. Over the 2014-2018 period, Hydro Ottawa consistently exceeded its distributor-specific target for SAIDI. Hydro Ottawa consistently exceeded both the provincial average and peer group average, and furthermore showed continual year-over-year improvement.[3] The average Hydro Ottawa customer experienced 1.02 outages per year, on average, during the 2014 to 2018 period. In 2017, the utility's SAIDI measure increased to 1.11, which can mainly be attributed to defective equipment.

Hydro Ottawa strives to maintain or improve its system reliability performance indicators from year to year. Towards this goal, Hydro Ottawa's asset management practices are essential for managing the reliability impact of its assets by ensuring infrastructure renewal is keeping pace with need. Hydro Ottawa continues to seek improvements by assessing and implementing new methods of operation to increase system resilience and invest in grid technology to reduce restoration times when outages do occur. In 2018, Hydro Ottawa customers experienced less than one hour (0.85) of interruption on average.

Table 11 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Average Number of Hours that Power to a Customer is Interrupted

	2014	2015	2016	2017	2018	5-Year Average	Hydro Ottawa Target (2018)
Peer Group Average	1.59	1.61	1.53	1.53	1.59	*1.57*	
Provincial Average	1.35	1.49	1.41	1.53	1.63	*1.48*	
Hydro Ottawa	1.08	1.08	1.00	1.11	0.85	*1.02*	*1.42*

[3] Note that for Average Number of Hours that Power to a Customer is Interrupted and Average Number of Times that Power to a Customer is Interrupted, a lower number indicates "better" reliability, while a higher number indicates "worse" reliability.

Figure 13 – Peer Group and Hydro Ottawa Results: Average Number of Hours that Power to a Customer is Interrupted

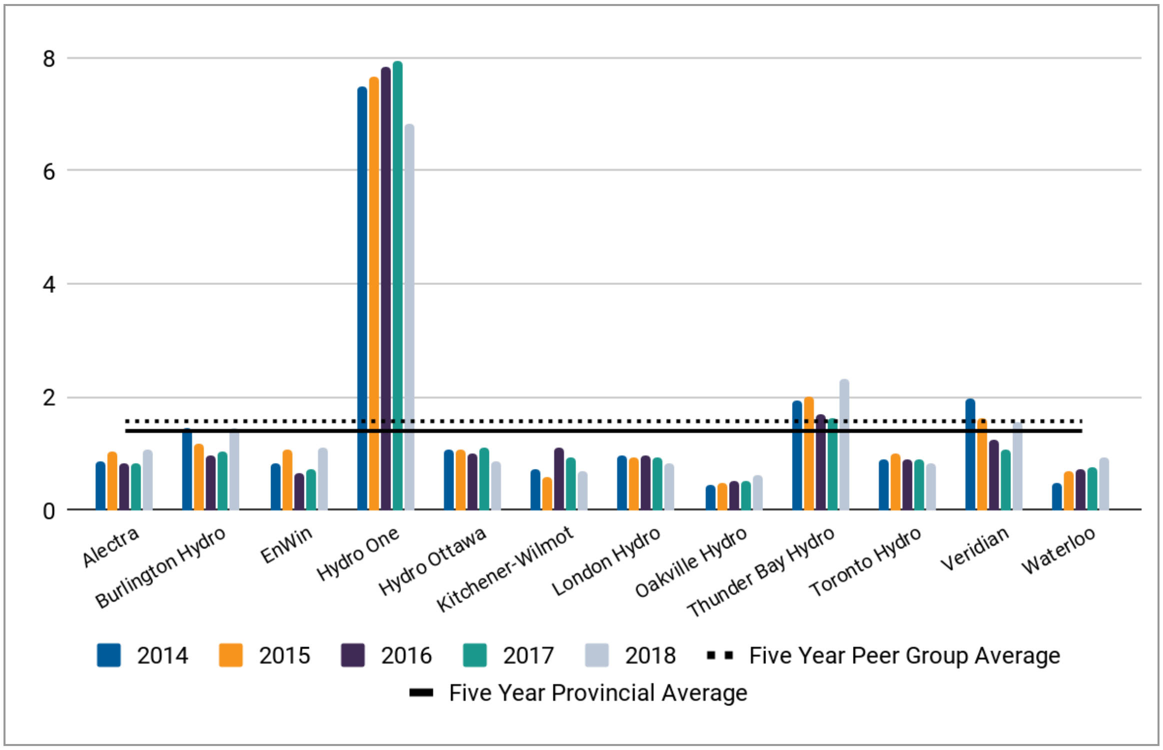
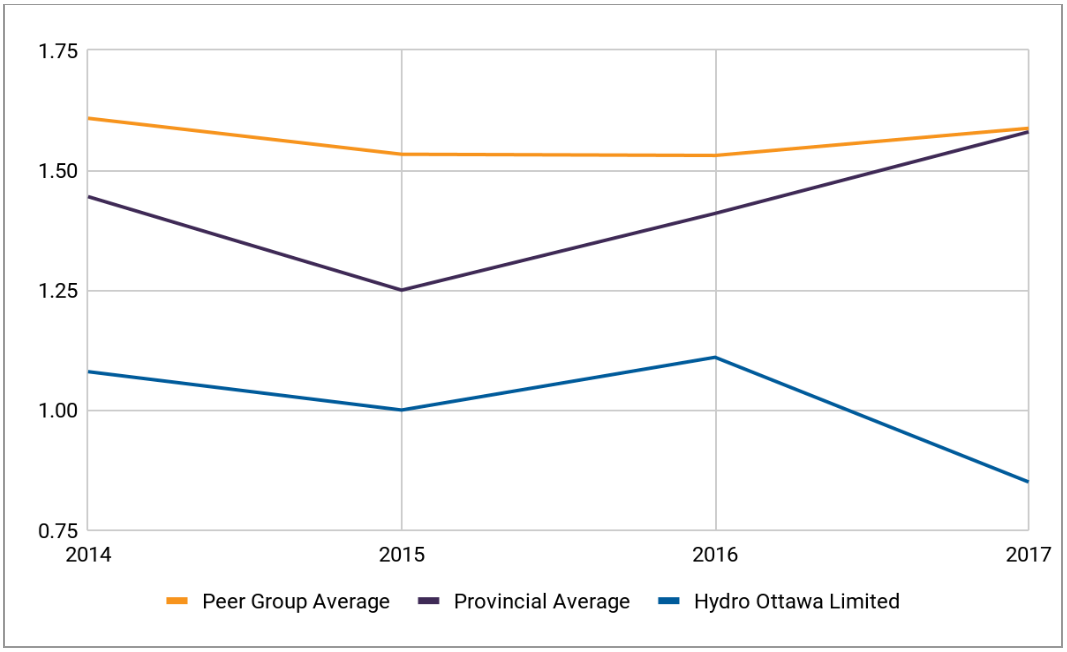


Figure 14 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Average Number of Hours that Power to a Customer is Interrupted



4.2.2. Average Number of Number of Times that Power to a Customer is Interrupted

The scorecard also includes a System Average Interruption Frequency Index ("SAIFI"), which is an industry-wide standard that is used to measure the average number of times that power to a customer is interrupted annually. In order to facilitate customer understanding and transparency, the OEB employs a plain language definition of SAIFI as the label for this scorecard metric, in lieu of the term itself. This component of the scorecard is adjusted for both Loss of Supply and Major Event Days.

Distributor-specific targets are included on the scorecard, which are based on each distributor's own historical performance. Over the 2014-2018 period, Hydro Ottawa consistently met and exceeded its distributor-specific target for SAIFI. In 2018, the frequency in which the utility's customers experienced an outage increased slightly from 0.73 to 0.78 times per year, which can mainly be attributed to defective equipment. However, Hydro Ottawa's SAIFI remains well below its distributor-specific target, the provincial SAIFI average, and the peer group average. Hydro Ottawa continually assesses the distribution system's service reliability. Where issues are found, the appropriate analysis and action is undertaken to address weaknesses and improve performance. System reliability is integral to all work undertaken as part of system planning and asset management processes.

Table 12 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Average Number of Times that Power to a Customer is Interrupted

	2014	2015	2016	2017	2018	5-Year Average	Hydro Ottawa Target (2018)
Peer Group Average	1.41	1.40	1.32	1.34	1.43	*1.38*	
Provincial Average	1.04	1.11	1.09	1.12	1.13	*1.10*	
Hydro Ottawa	0.73	0.71	0.74	0.73	0.78	*0.74*	*1.04*

Figure 15 – Peer Group and Hydro Ottawa Results: Average Number of Times that Power to a Customer is Interrupted

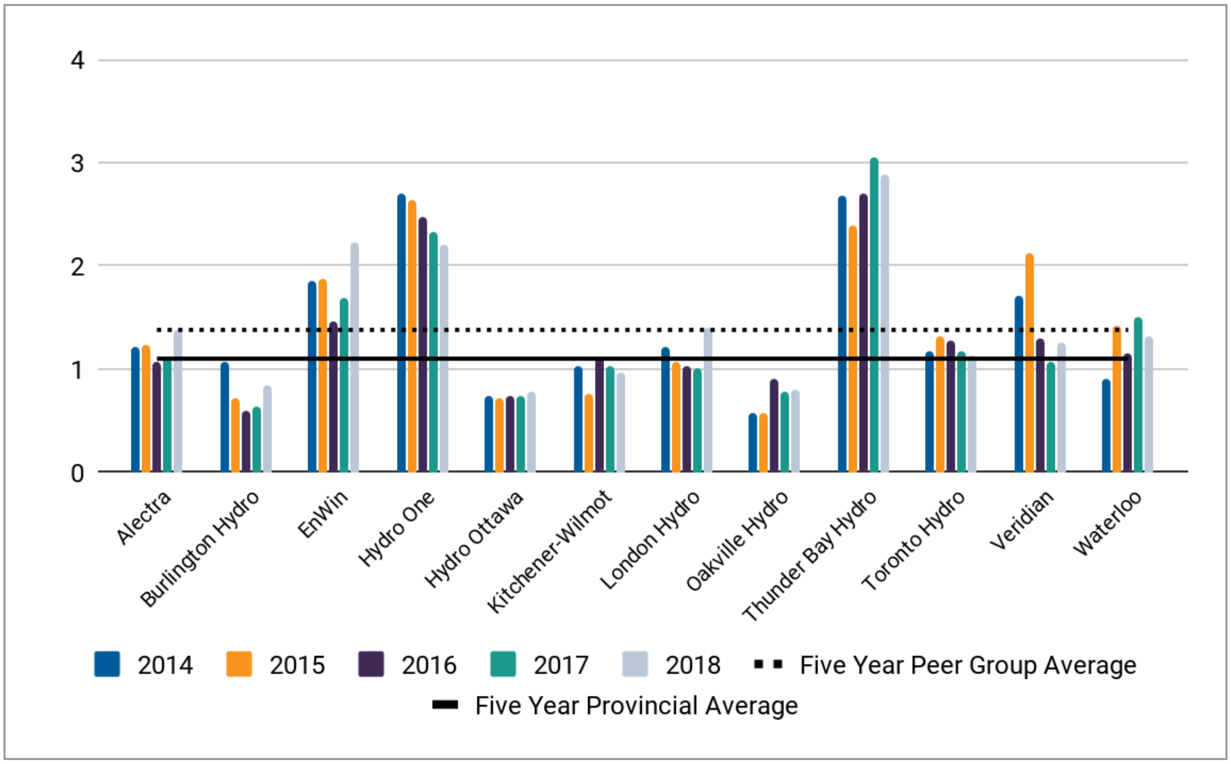
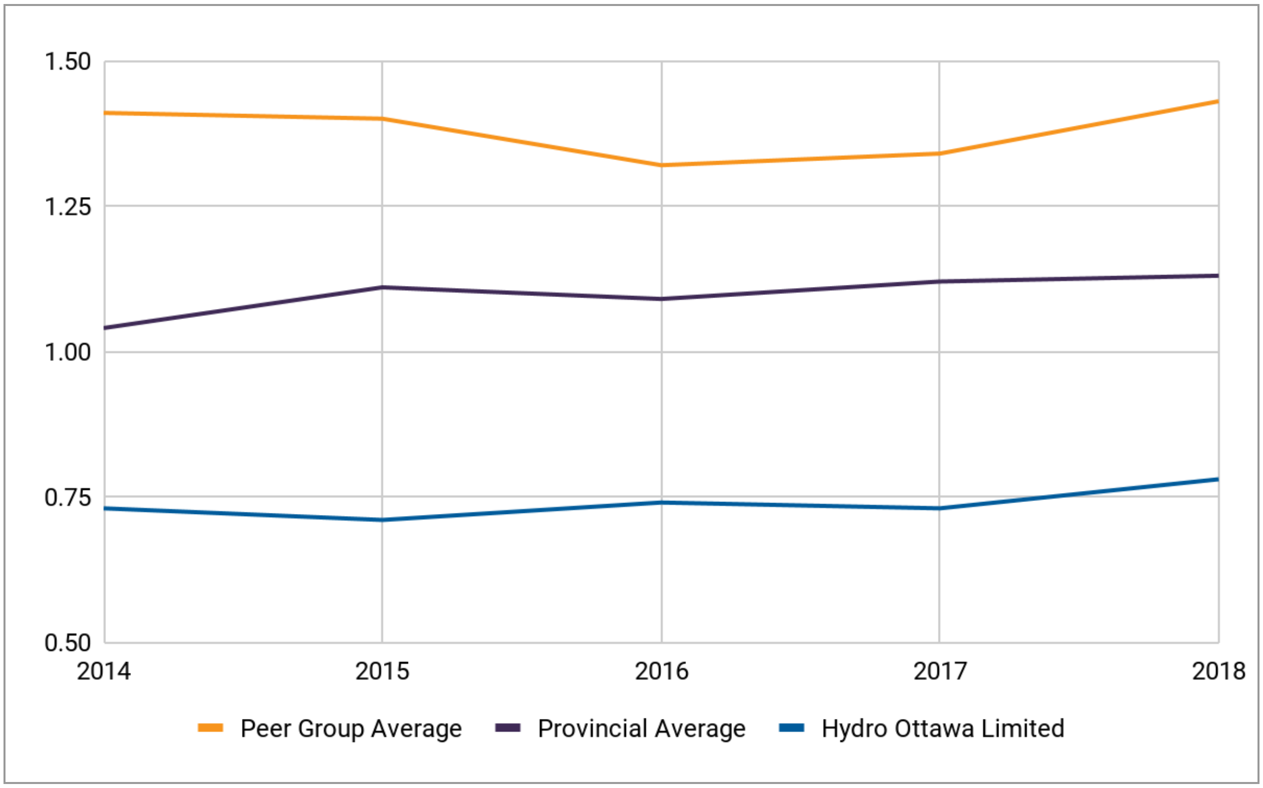


Figure 16 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Average Number of Times that Power to a Customer is Interrupted



4.3. ASSET MANAGEMENT

4.3.1. Distribution System Plan Implementation Progress

The OEB includes an Asset Management measure on the scorecard. Distributors are required to measure Distribution System Plan Implementation Progress and report on such progress annually. Distributors are permitted discretion as to how this measure is implemented, and must describe their methodology annually in the scorecard's accompanying Management Discussion and Analysis. Targets have not been set for this measure.

Hydro Ottawa's Distribution System Plan ("DSP"), which can be found in Exhibit 2-4-3, forecasts capital expenditures that are required to maintain and expand its system to serve current and future customers over the 2021-2025 period. The DSP details Hydro Ottawa's prioritization process, tools, and methods which ultimately direct the utility's capital expenditure planning process.

For the 2014-2018 period, the Distribution System Plan Implementation Progress measure assessed Hydro Ottawa's effectiveness at planning and implementing its previous DSPs. The utility measures the progress of its DSP implementation as a ratio of actual total capital expenditures made in a calendar year over the total amount of planned capital expenditures for that calendar year in the System Renewal and System Service categories. The measure excludes unplanned asset failures (plant failures), System Access, and General Plant investments.

Hydro Ottawa strives for its Distribution System Plan Implementation Progress measure to be as close to 100% as possible, which ultimately signals good planning and execution of its DSP. For the 2014-2018 period, Hydro Ottawa achieved a 98% Distribution System Plan Implementation Progress measure. From 2014 to 2017, Hydro Ottawa's actual versus planned spending remained fairly constant at 94% or 95%. In 2018, Hydro Ottawa completed 113% of its planned project spending. Increased expenditures in 2018 were driven by required scope changes at two large station projects as well as required changes in the timing of expenditures. The 2019 and 2020 plans have been adjusted accordingly to keep on track with the 2016-2020 DSP requirements.

Given the flexibility the OEB provides on the methodology of reporting Distribution System Plan Implementation Progress, direct comparisons between distributors on this measure is not always possible. Some distributors use a qualitative approach, such as "on track" or "in progress", while others provide a quantitative result similar to Hydro Ottawa's approach. Consequently, peer group and provincial averages, as shown in Table 13 and Figures 17 and 18 below, have been calculated to exclude all distributors which employ a qualitative measurement of this metric.[4]

While imperfect, this method of comparison allows Hydro Ottawa to review its results relative to distributors which use a similar calculation methodology for this measure. Hydro Ottawa's results are comparable to both the peer group and provincial averages.

Table 13 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Distribution System Plan Implementation Progress

	2014	2015	2016	2017	2018	5-Year Average
Peer Group Average	101%	103%	88%	87%	93%	*94%*
Provincial Average	84%	91%	89%	86%	89%	*88%*
Hydro Ottawa	94%	94%	94%	95%	113%	*98%*

[4] The number of distributors in Ontario that use a quantitative measure varies per year. The yearly provincial averages were calculated using the following number of distributors per year: 2014, 28; 2015, 31; 2016, 33; 2017, 34; and 2018, 37.

Figure 17 – Peer Group and Hydro Ottawa Results: Distribution System Plan Implementation Progress

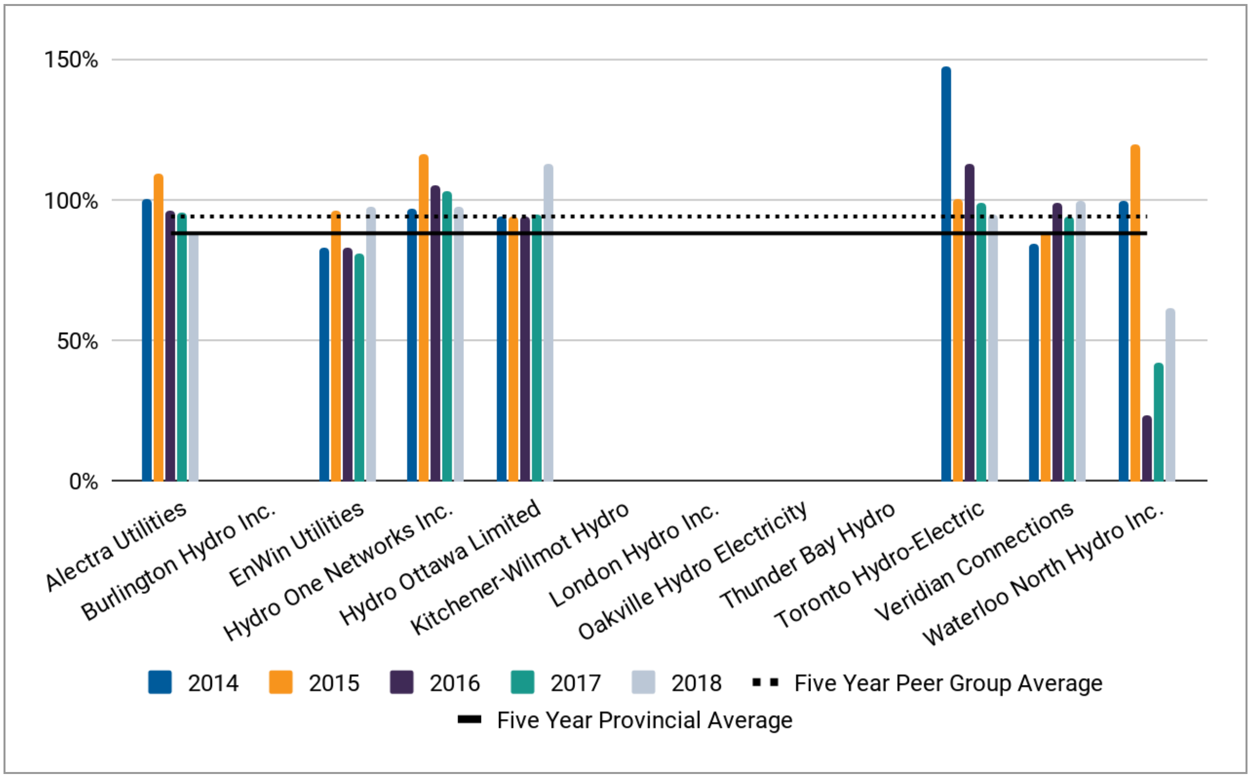
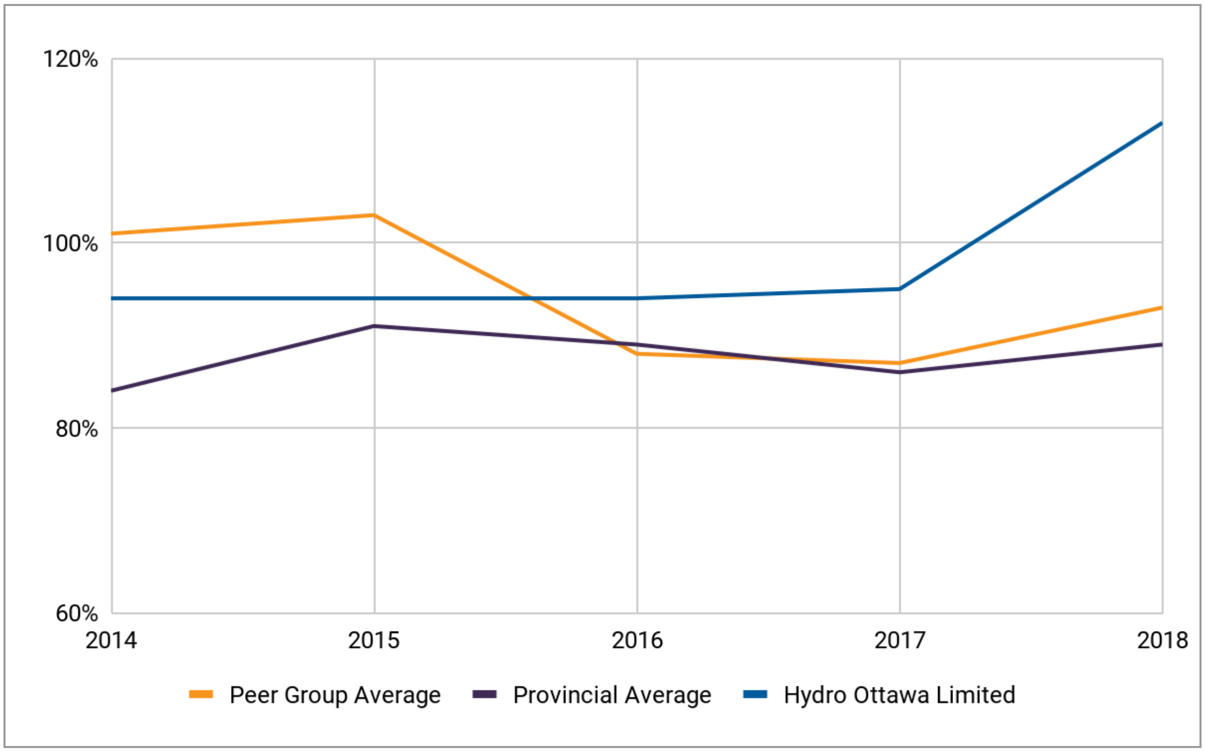


Figure 18 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Distribution System Plan Implementation Progress



4.4. COST CONTROL

4.4.1. Efficiency Assessment

The total costs for Ontario distributors are evaluated by the Pacific Economics Group ("PEG") on behalf of the OEB to produce a single efficiency ranking. Distributors are divided into five groups based on the magnitude of difference between their respective actual and predicted costs. In 2014, Hydro Ottawa's results placed the utility in Cohort 3, which is considered "average efficiency" and is defined as having actual costs within +/- 10% of predicted costs. In 2014, Hydro Ottawa's actual costs were evaluated by the PEG model to be 9.4% higher than predicted costs. The utility's ranking was thus less than 1% away from the +/- 10% efficiency assessment threshold between Cohorts 3 and 4.

In 2015, PEG assessed Hydro Ottawa's actual costs to be 12.1% above predicted costs, which consequently pushed the utility into Group 4. Under the PEG model, Group 4 is defined as having actual costs between 10% and 25% above predicted costs. In the years 2016, 2017, and 2018, Hydro Ottawa remained in Group 4 with increasing differences between actual and predicted costs of 14.5%, 15.8%, and 16.8%, respectively.

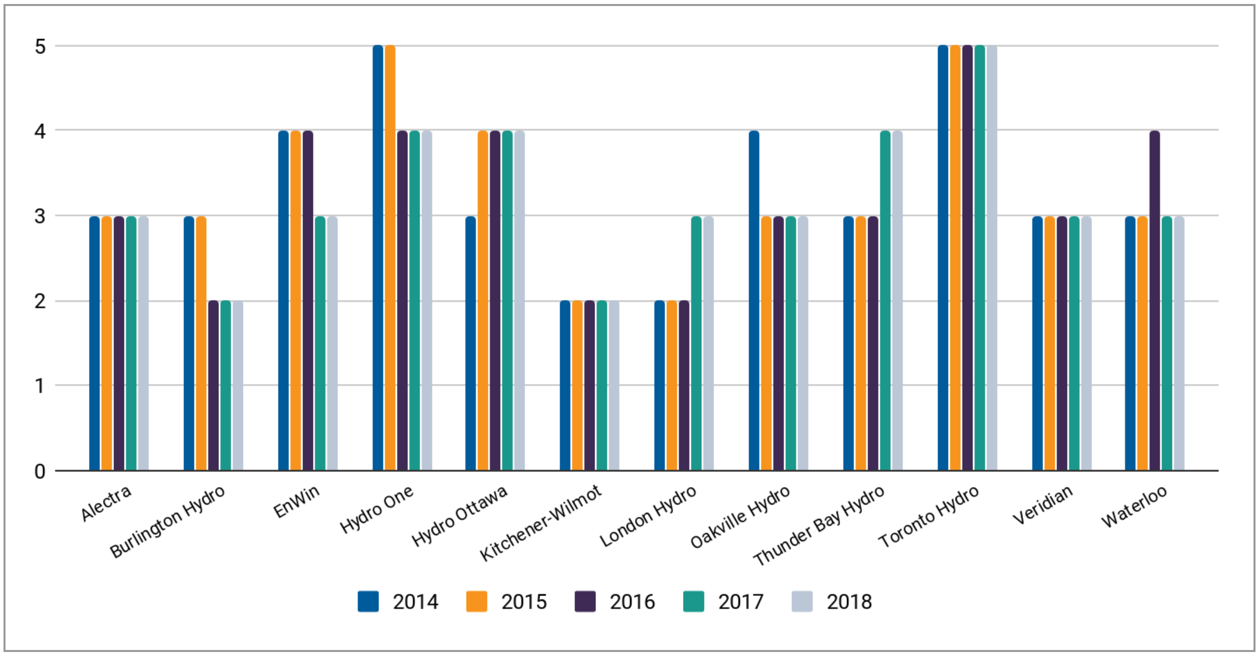
Hydro Ottawa is currently experiencing a sustained need for significant capital investments in its distribution system, which negatively impacts its efficiency assessment. While all efforts are made to keep operating costs under control and find productivity improvements where possible, Hydro Ottawa's capital investment program is necessary to address its aging infrastructure and expanding customer growth. As further explained in Attachment 1-1-12(E): PEG Benchmarking Forecast, under the PEG model it is expected that Hydro Ottawa will remain in Cohort 4 for the foreseeable future. While Hydro Ottawa does not dispute the value of total cost benchmarking as a measure of productivity and efficiency, as part of this Application the utility is submitting an alternative total cost benchmarking study. For additional information on the rationale for this approach, and the results that were yielded under this separate analysis, please see Attachment 1-1-12(E).

As of 2018, the number of Ontario distributors in each cohort is as follows:

- Cohort 1 (Actual costs are more than 25% *below* predicted costs): 6 distributors
- Cohort 2 (Actual costs are between 10% and 25% *below* predicted costs): 19 distributors
- Cohort 3 (Actual costs are within 10% of predicted costs): 26 distributors
- Cohort 4 (Actual costs are between 10% and 25% *above* predicted costs): 9 distributors
- Cohort 5 (Actual costs are more than 25% *above* predicted costs): 3 distributors

Figure 19 presents the peer group's Efficiency Assessments over the 2014-2018 period.

Figure 19 – Efficiency Assessments *(1 = Most Efficient, 5 = Least Efficient)*



4.4.2. Total Cost per Customer

Total Cost per Customer is likewise evaluated by PEG on behalf of the OEB. This metric is calculated as the sum of a distributor's capital and operating costs according to the PEG model, and divided by the total number of customers that a distributor serves.

As of the end of 2018, Hydro Ottawa had slightly over 335,000 customers within its service territory. For the 2014-2017 period, Hydro Ottawa's Total Cost per Customer remained below both the peer group average and the provincial average.

In 2017, Hydro Ottawa's Total Cost per Customer decreased from its 2016 result by $11 per customer. Hydro Ottawa's focus on productivity and cost reduction initiatives, along with the overall Strategic Direction to deliver reliable service while operating efficiently and effectively in order to keep rates competitive, contributed to the utility's decrease in total costs despite inflation and other cost increases.

In 2018, the utility's metric score increased slightly above the provincial average, but remained below the peer group average. Hydro Ottawa's Total Cost per Customer for 2018 was the highest it has been over the 2014-2018 period. As discussed above, this result was anticipated due to the utility's capital investment program that has been addressing aging infrastructure and significant customer growth in the service territory.

Over the five-year period, Hydro Ottawa's average Total Cost per Customer, according to the PEG model, was $659 per customer.

Table 14 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Total Cost per Customer (As per the PEG Model)

	2014	2015	2016	2017	2018	5-Year Average
Peer Group Average	$682	$693	$709	$697	$731	*$702*
Provincial Average	$647	$669	$680	$670	$678	*$669*
Hydro Ottawa	$623	$656	$664	$653	$701	*$659*

Figure 20 – Peer Group and Hydro Ottawa Results: Total Cost per Customer (As per the PEG model)

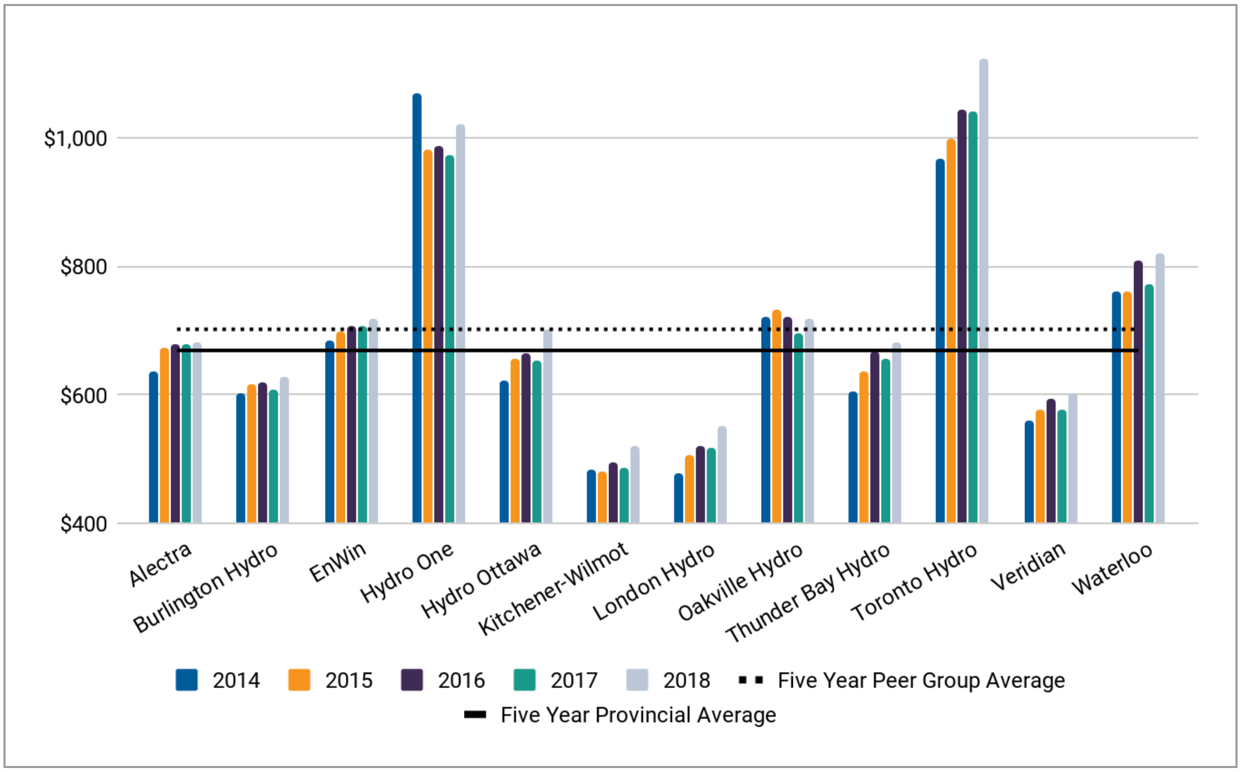
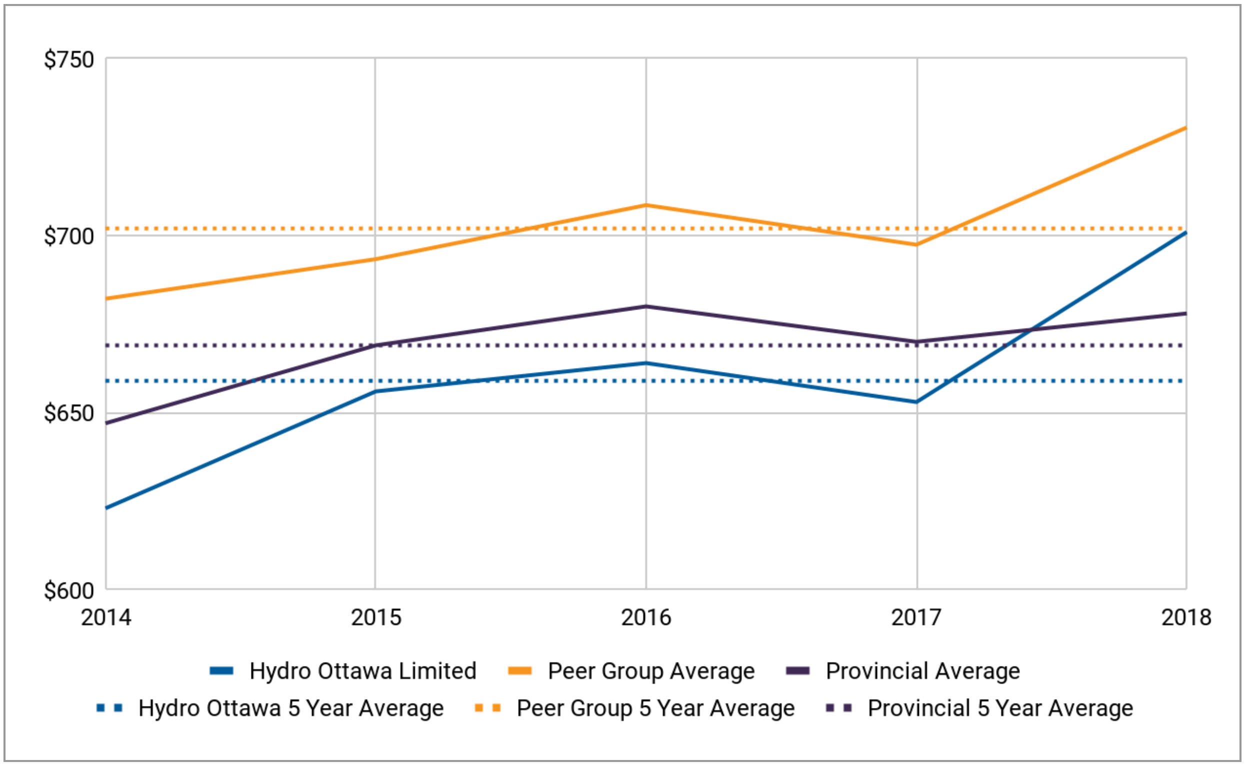


Figure 21 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Total Cost Per Customer (As per the PEG Model)



4.4.3. Total Cost per km of Line

Total Cost per km of Line is also evaluated by PEG on behalf of the OEB. This metric is calculated as the sum of a distributor's capital and operating costs according to the PEG model, and divided by the total kilometres of distribution line within the distributor's service territory.

Over the 2014-2018 period, Hydro Ottawa's total cost per km of line was higher than the peer group average and provincial average. It should be noted, however, that this measure (as calculated by PEG) does not account for Hydro Ottawa's unique service territory size. Its physical territory is comprised of a geographically diverse area with significant population dispersion, and a unique mix of 40% urban core and 60% rural service areas.

What's more, Hydro Ottawa would also emphasize that it only reports primary lines to the OEB, and thus the PEG model excludes any secondary lines within Hydro Ottawa's service territory. Legacy information from the utility's predecessor utilities has presented limitations in reporting accurate secondary line information. For example, only certain portions of secondary lines in the downtown core are captured in Hydro Ottawa's Geographical Information System. Secondary lines are therefore not counted at all in Hydro Ottawa's circuit kilometres of line, as there would be a significant discrepancy between recorded secondary lengths and actual secondary lengths. If secondary service lines were to be included in PEG's calculations, it can reasonably be assumed that the utility's cost per km of line would be significantly lower.

Table 15 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Total Cost per km of Line (As per the PEG Model)

	2014	2015	2016	2017	2018	5-Year Average
Peer Group Average	$31,594	$33,061	$29,678	$25,759	$27,105	*$29,440*
Provincial Average	$28,425	$29,519	$29,304	$27,350	$27,372	*$28,394*
Hydro Ottawa	$36,169	$38,154	$38,794	$37,950	$40,766	*$38,367*

Figure 22 – Peer Group and Hydro Ottawa Results: Total Cost per km of Line (As per the PEG Model)

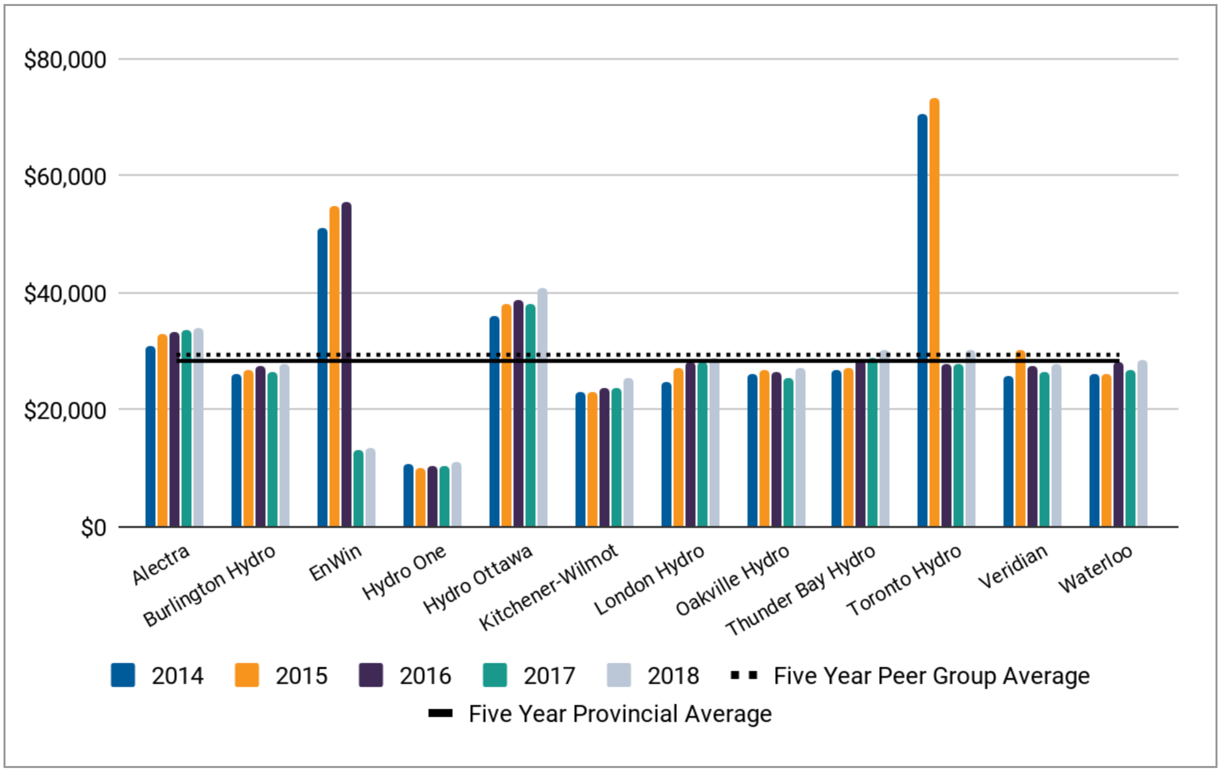
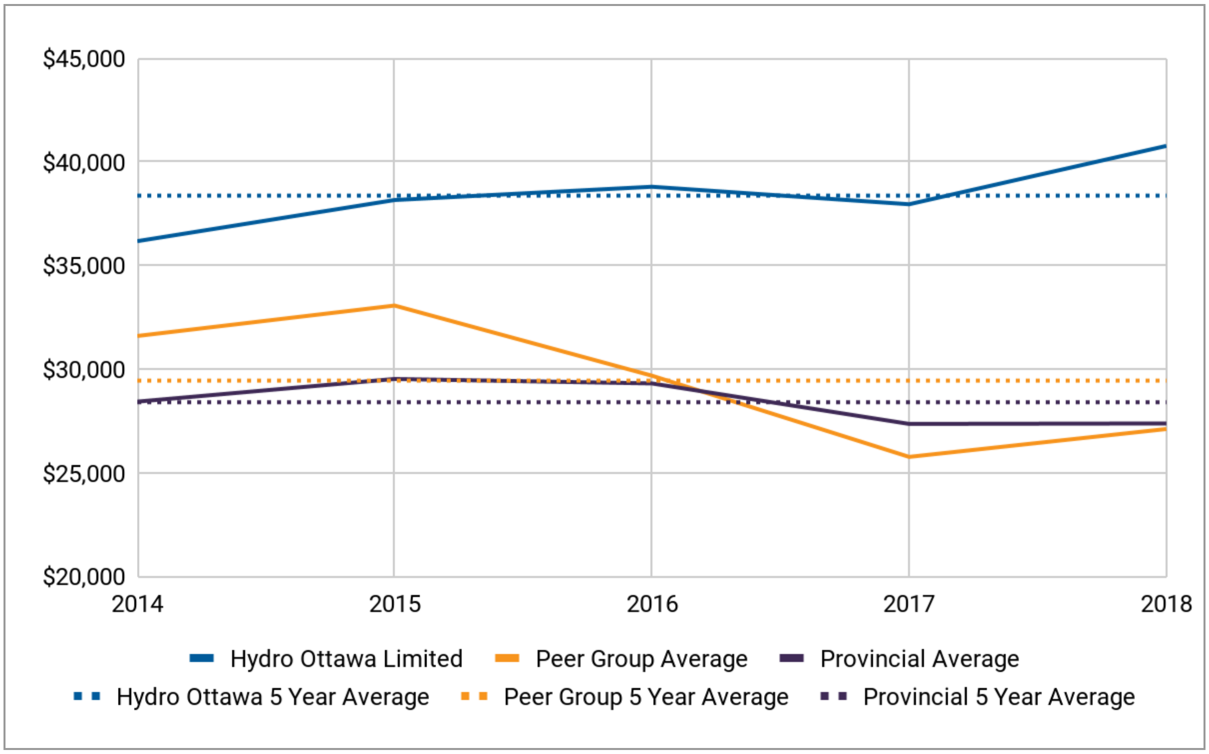


Figure 23 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Total Cost per km of Line (As per the PEG Model)



5. PUBLIC POLICY RESPONSIVENESS

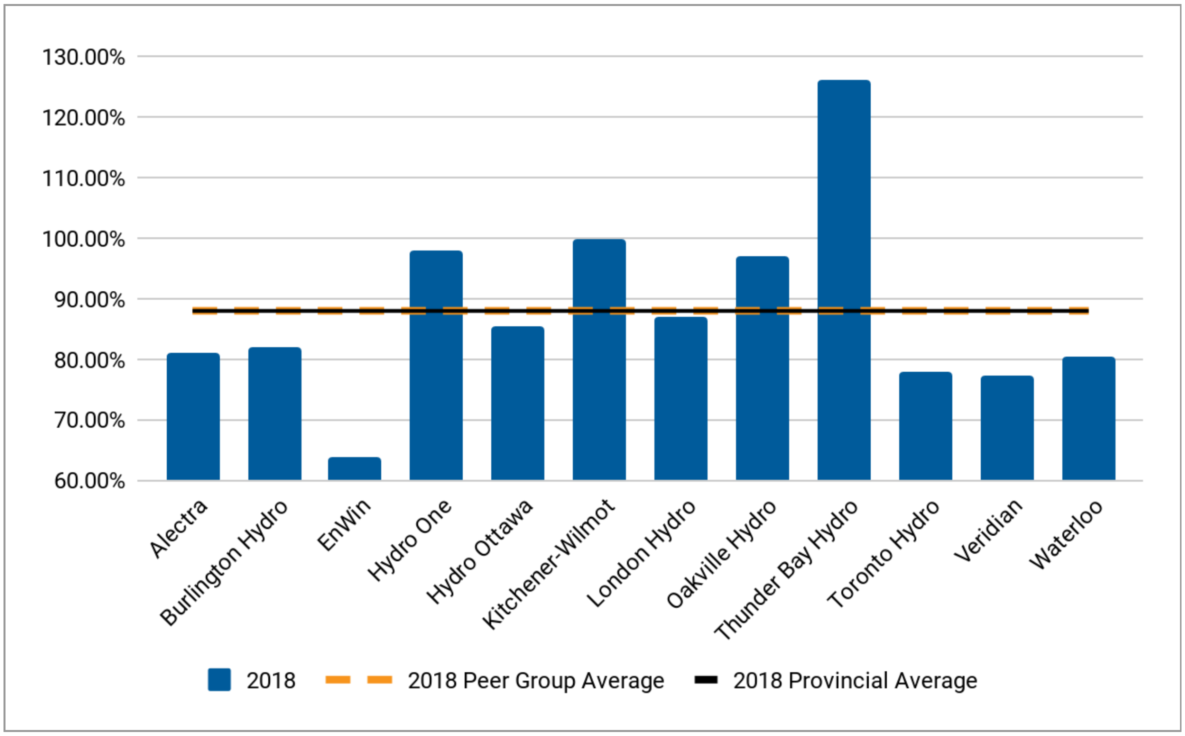
5.1. CONSERVATION AND DEMAND MANAGEMENT

5.1.1. Net Cumulative Energy Savings

Under the Conservation First Framework ("CFF"), distributors in Ontario were each allocated Conservation and Demand Management ("CDM") targets to achieve over the 2015-2020 period. Hydro Ottawa was allotted a CDM target of 395 GWh to be achieved by 2020. As of the end of 2018, Hydro Ottawa had achieved a cumulative total of 335 GWh of CDM savings, representing 85% of its target, with two years remaining under the CFF.

On average, both the peer group and distributors province-wide achieved 88% of their CDM targets by the end of 2018, as shown below in Figure 24. The CFF was discontinued effective March 21, 2019 by Ministerial directive, and a new framework for centralized delivery of energy efficiency programs through the Independent Electricity System Operator ("IESO") began on April 1, 2019.

Figure 24 – Percentage of Overall CFF Target Achieved (2018)



5.2. CONNECTION OF RENEWABLE GENERATION

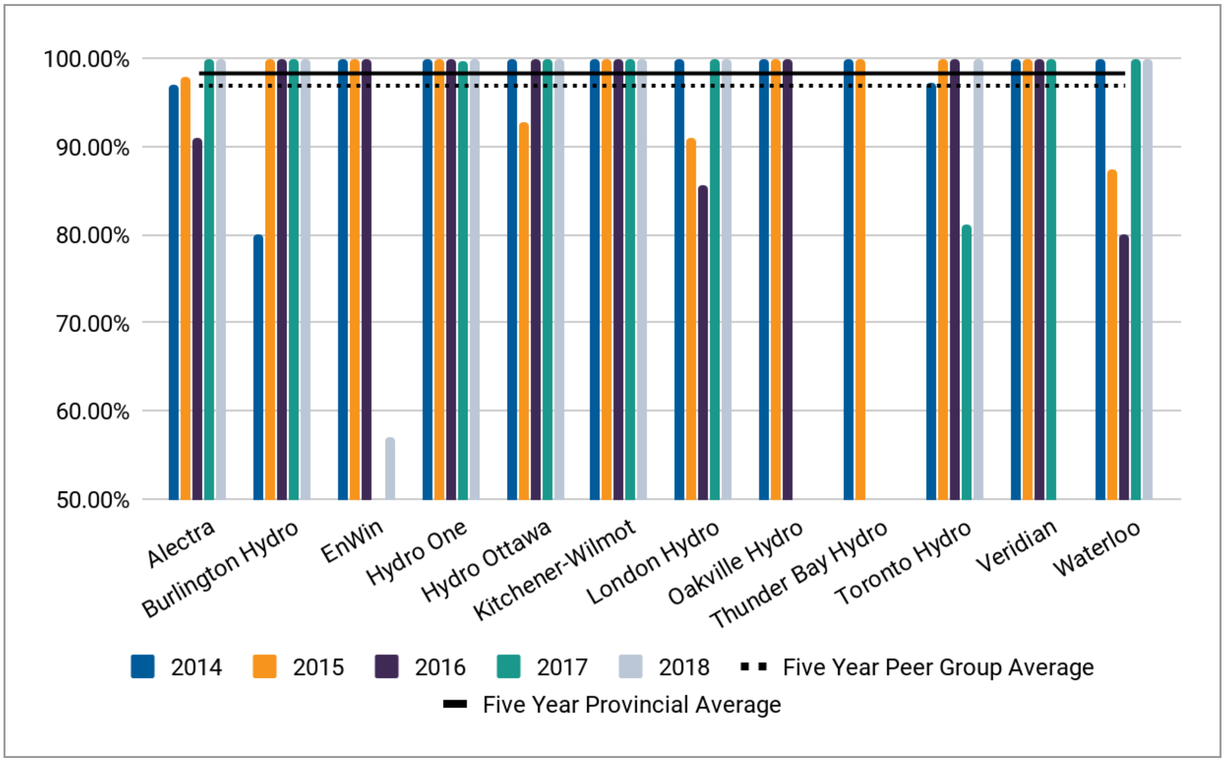
5.2.1. Renewable Generation Connection Impact Assessments Completed On Time

Electricity distributors are required to conduct a Connection Impact Assessment ("CIA") for large generation facilities that exceed 10 kW within OEB-defined timelines, as set out in the DSC. A CIA consists of an assessment, a detailed cost estimate, and an Offer to Connect within the time prescribed. Timelines vary from 60 to 90 days, depending on a number of variables such as the size of the project and whether system expansion or reinforcement is required.

Hydro Ottawa performs all CIA work internally and regularly reviews its processes for continuous improvement to benefit the customer. Over the 2014-2018 period, Hydro Ottawa completed 79 CIAs for projects with a total nameplate capacity of 55,173 kW. All but one of those CIAs were completed within the prescribed timeline. One CIA completed in 2015 exceeded the DSC's prescribed timeline as a result of modifications to the customer's project plan. The delay was thus a result of a change in the customer's needs midway through the project. The revised connection timeline was met to the customer's satisfaction. Hydro Ottawa considers this one scenario to be an anomaly and anticipates that it will continue to complete its CIAs within the timelines prescribed by the DSC.

Figure 25 below presents an overview of Hydro Ottawa and its peer group's CIA performance metrics over the 2014-2018 period, and includes both the peer group and provincial averages.

Figure 25 – Peer Group and Hydro Ottawa Results: Percentage of Connection Impact Assessments Completed on Time

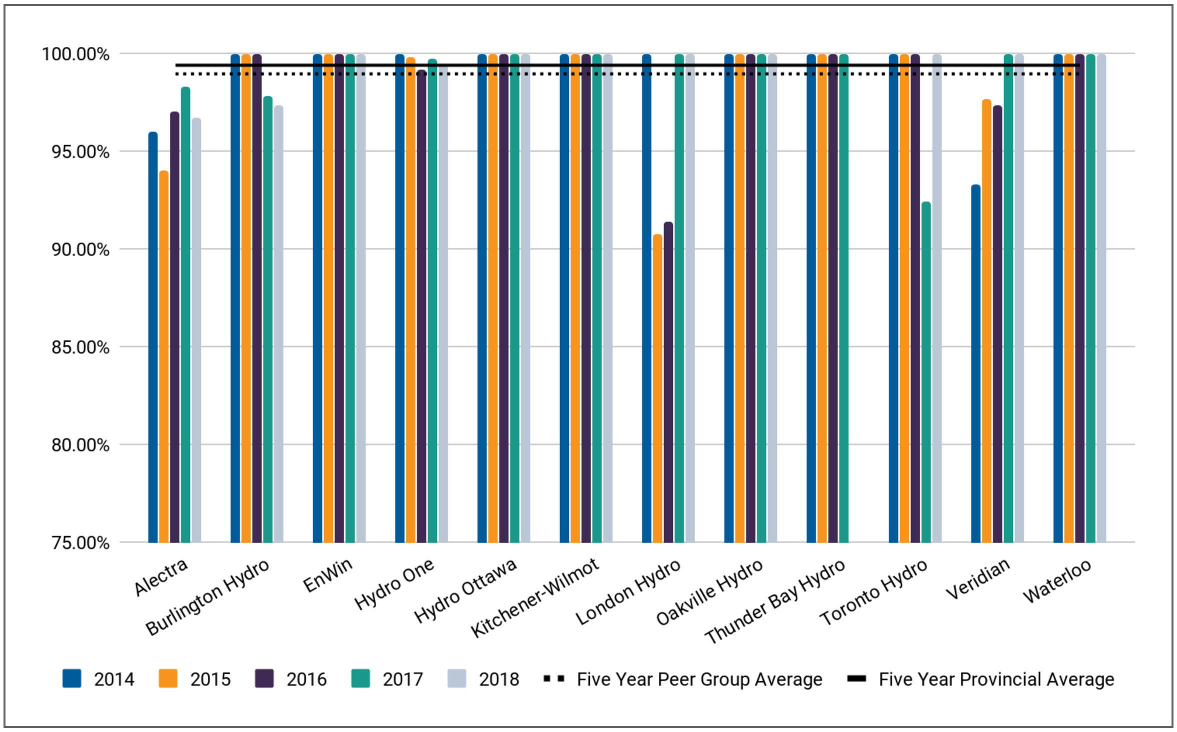


5.2.2. New Micro-Embedded Generation Facilities Connected on Time

As per the DSC, the connection of new micro-embedded generation facilities must be completed within five business days, or at such later date as agreed to by the customer and the distributor. This service condition must be met at least 90% of the time. Over the 2014-2018 period, Hydro Ottawa connected 301 micro-embedded generation facilities (less than 10 kW), all of which were connected within the prescribed timeframe or at an agreed upon date with the customer (i.e. 100% timely completion rate). This was consistently above the peer group and provincial averages. Hydro Ottawa anticipates that it will continue to connect any micro-embedded generations facilities in accordance with the timelines set out by the OEB.

Figure 26 below provides an overview of connection performance standards of the peer group over the 2014-2018 period.

Figure 26 – Peer Group and Hydro Ottawa Results: Connection of New Micro-Embedded Generation Facilities on Time



6. FINANCIAL PERFORMANCE

6.1. FINANCIAL RATIOS

6.1.1. Liquidity: Current Ratio

The Current Ratio is a liquidity ratio that measures a company's ability to pay short-term obligations, or those due within one year. Liquidity ratio indicates what a company has in current assets to cover the liabilities. Over the 2014-2018 period, on average, Hydro Ottawa's liquidity current ratio was 1.02, having fluctuated between 0.8 and 1.24. Reduced liquidity can be attributed to a reduction in accounts receivable and an increase in accrued liabilities.

Table 16 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Liquidity - Current Ratio

	2014	2015	2016	2017	2018	5-Year Average
Peer Group Average	1.33	1.33	1.36	1.40	1.30	*1.35*
Provincial Average	1.41	1.51	1.5	1.44	1.49	*1.47*
Hydro Ottawa	0.86	1.04	1.196	1.23	0.8	*1.02*

Figure 27 – Peer Group and Hydro Ottawa Results: Liquidity - Current Ratio

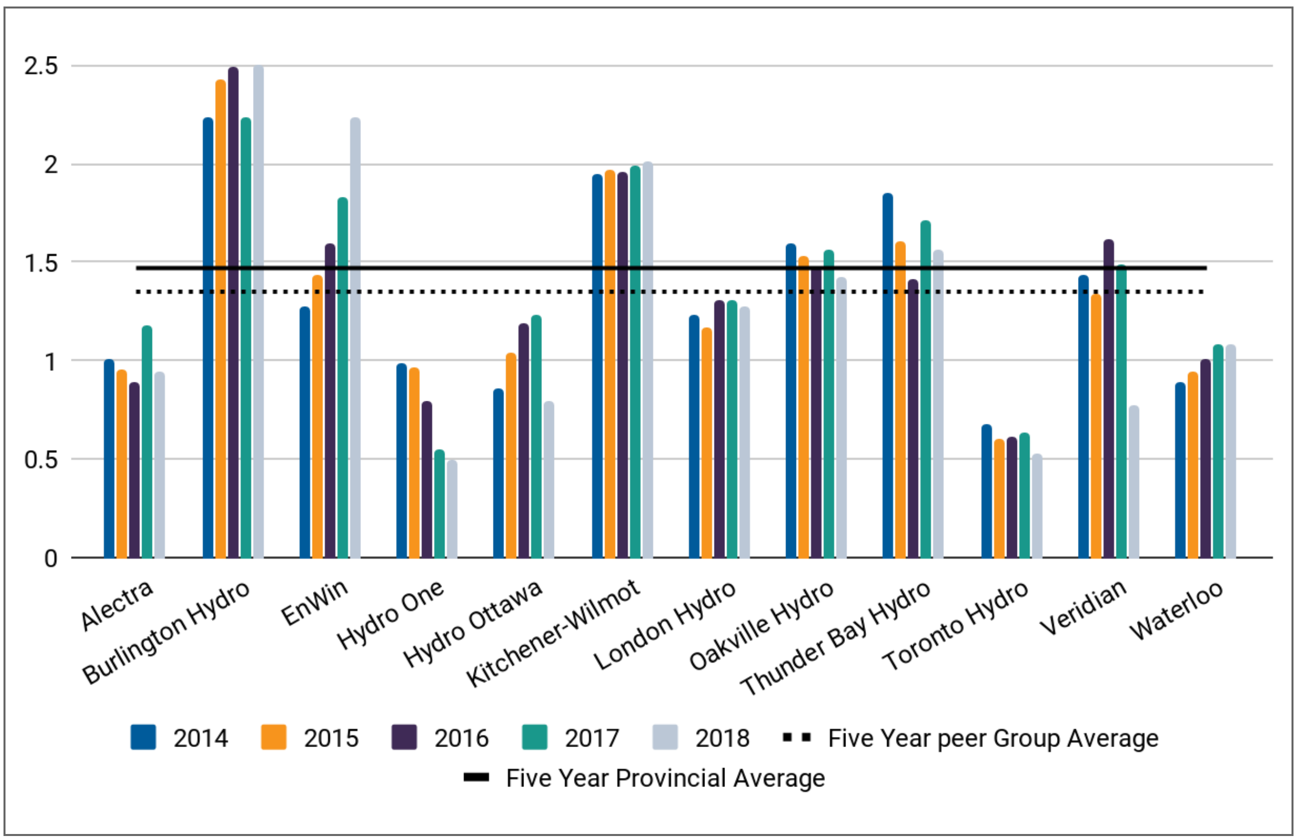
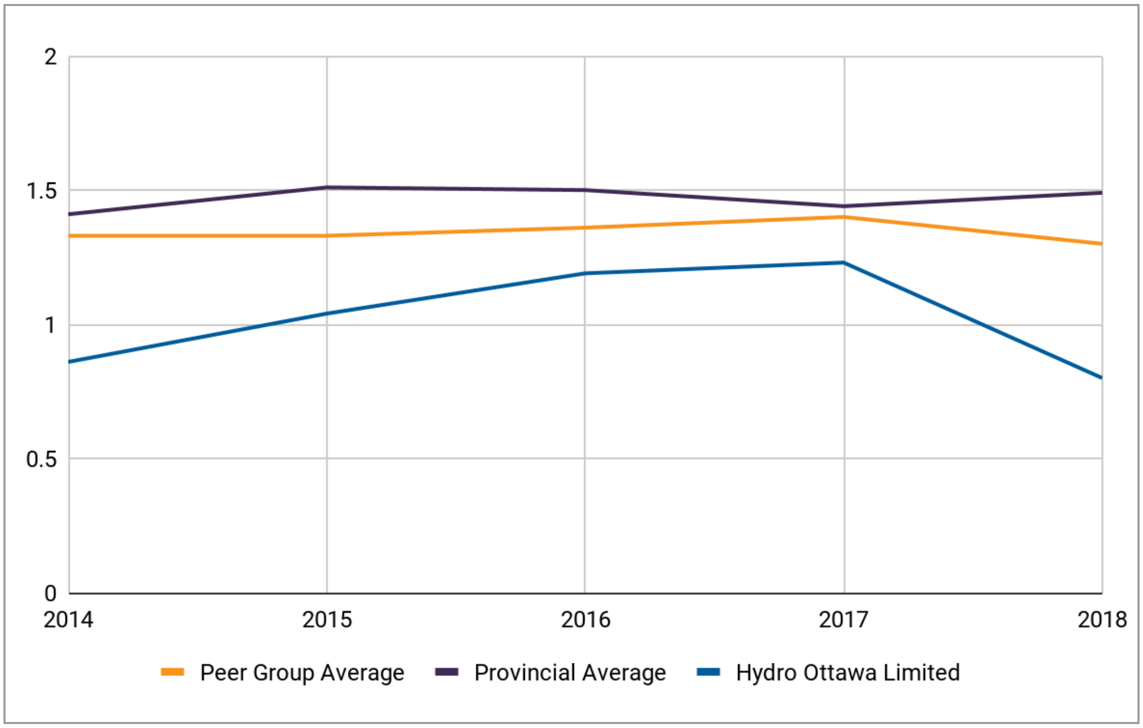


Figure 28 – Peer Group and Provincial Averages and Hydro Ottawa Results: Liquidity - Current Ratio



6.1.2. Leverage: Total Debt to Equity Ratio

The OEB uses a deemed capital structure of 60% debt and 40% equity for electricity distributors when establishing rates. A debt to equity ratio of more than 1.5 indicates that a distributor is more highly leveraged than the deemed capital structure. Hydro Ottawa seeks to maintain its financial health and the viability of its assets to performance standards set by the OEB for the ultimate benefit of its customers. Since 2015, Hydro Ottawa has carried a higher debt to equity ratio as a result of the ongoing significant capital expenditure program that is necessary to replace aging distribution system infrastructure.

Although Hydro Ottawa is more highly leveraged than the deemed capital structure, the utility has been able to mitigate its cost of borrowing due to favourable interest rates on its long-term debt. Hydro Ottawa expects that it will continue to maintain a high debt to equity ratio through the 2021-2025 period while its capital infrastructure replacement program continues.

Table 17 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Leverage - Total Debt to Equity Ratio

	2014	2015	2016	2017	2018	5-Year Average
Peer Group Average	1.09	1.06	1.06	1.04	1.06	*1.06*
Provincial Average	0.96	0.97	0.95	0.93	0.97	*0.96*
Hydro Ottawa Limited	1.65	1.61	1.65	1.73	1.86	*1.7*

Figure 29 – Peer Group and Hydro Ottawa Results: Leverage - Total Debt to Equity Ratio

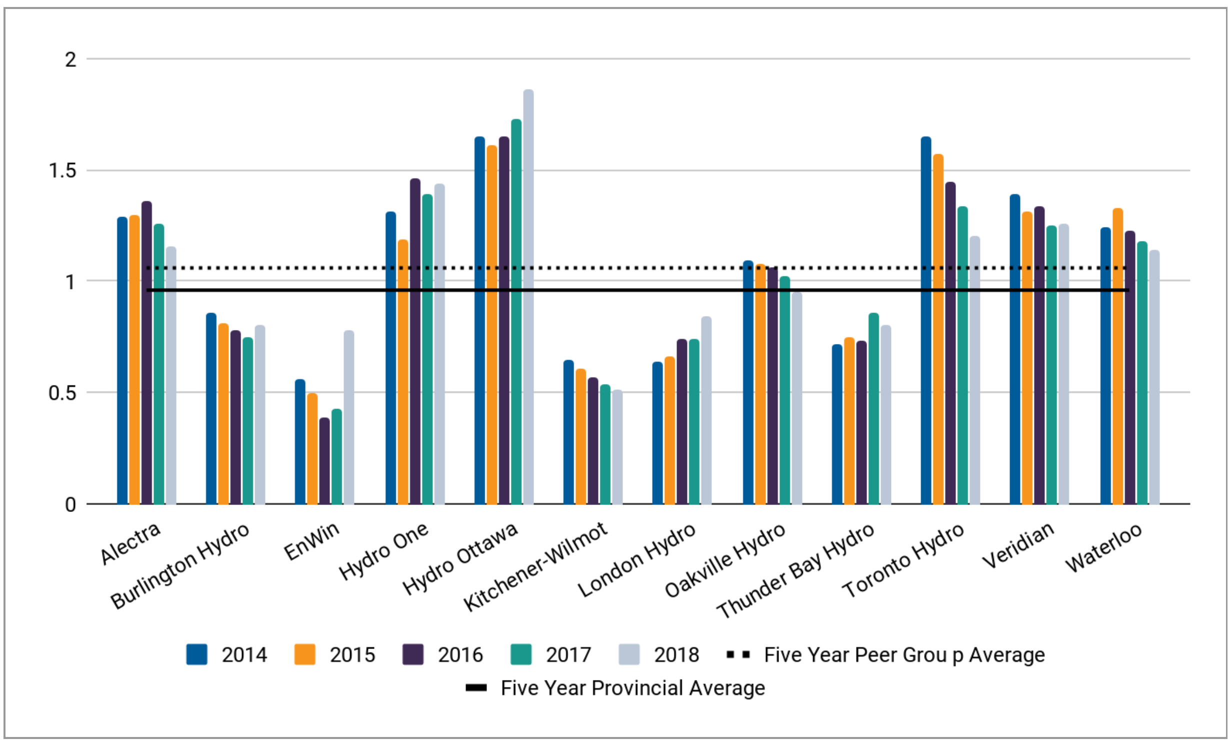
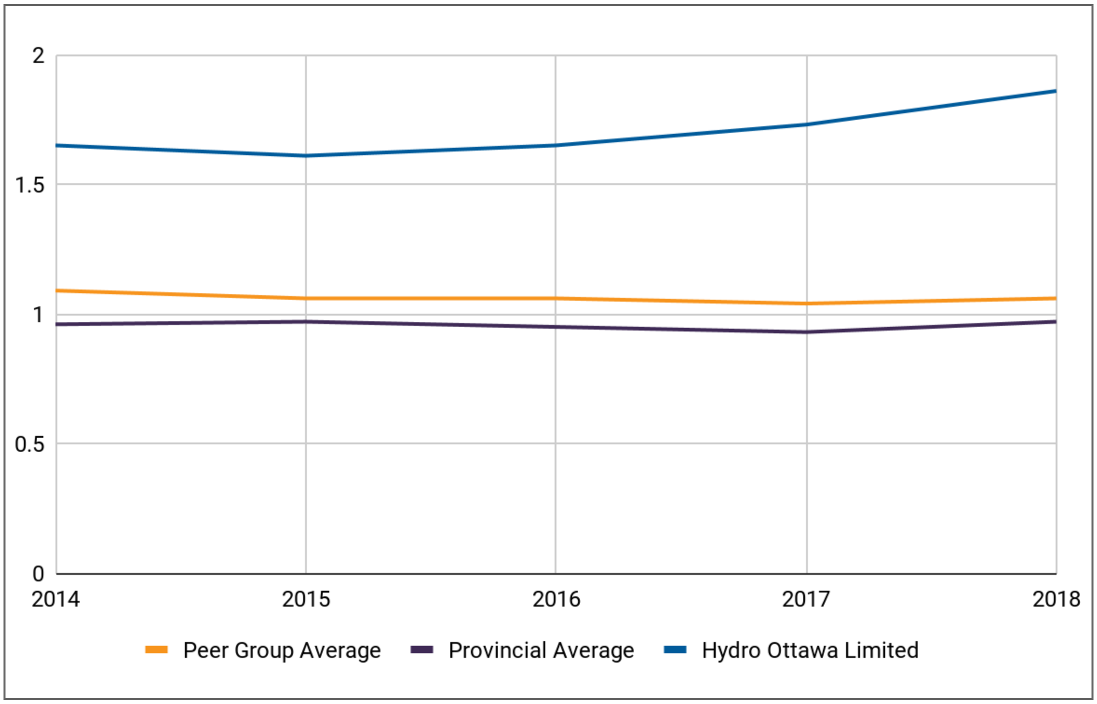


Figure 30 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Leverage - Debt to Equity Ratio



6.1.3. Profitability: Regulatory Return on Equity

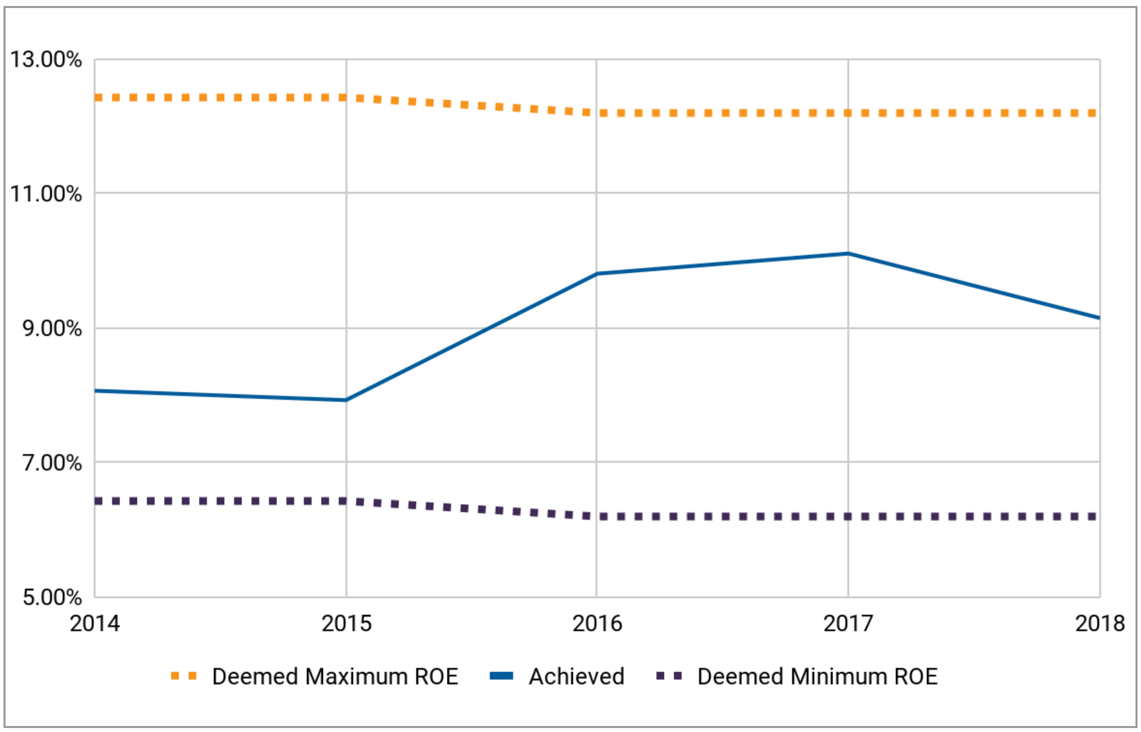
The OEB allows distributors to earn within +/- 3% of their deemed Return on Equity ("ROE"). When a distributor performs outside of its deemed range (whether underearning or overearning), the OEB may trigger a regulatory review. In 2014 and 2015, Hydro Ottawa's deemed ROE was 9.42%. For the years 2016, 2017, and 2018, the utility's deemed ROE was 9.19%, as per the approvals issued by the OEB with respect to Hydro Ottawa's 2016-2020 Custom Incentive Rate-Setting application.

Over the 2014-2018 period, Hydro Ottawa's Achieved ROE remained well within the +/- 3% allowable range, thus demonstrating prudent spending and value for both customers and the utility's shareholder.

Table 18 – Hydro Ottawa's Achieved vs. Deemed ROE

	2014	2015	2016	2017	2018
Hydro Ottawa Deemed	9.42%	9.42%	9.19%	9.19%	9.19%
Hydro Ottawa Achieved	8.06%	7.92%	9.80%	10.10%	9.14%
Difference	*-1.36%*	*-1.50%*	*+0.61%*	*+0.91%*	*-0.05%*

Figure 31 – Hydro Ottawa's Achieved vs. Deemed ROE



Hydro Ottawa compares favourably to both the peer group and the province in its Achieved ROE over the 2014-2018 period, as reflected in Figures 32 and 33 below.

Figure 32 – Peer Group and Hydro Ottawa Results: Achieved ROE

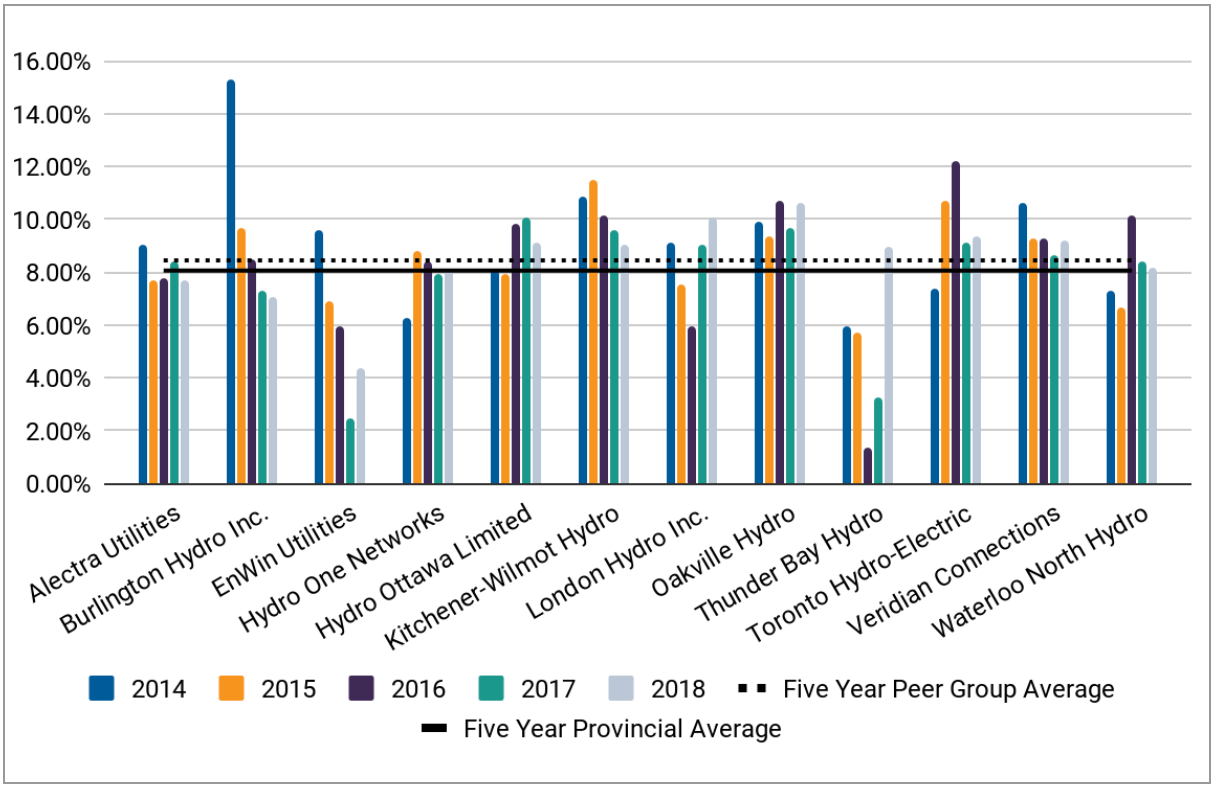
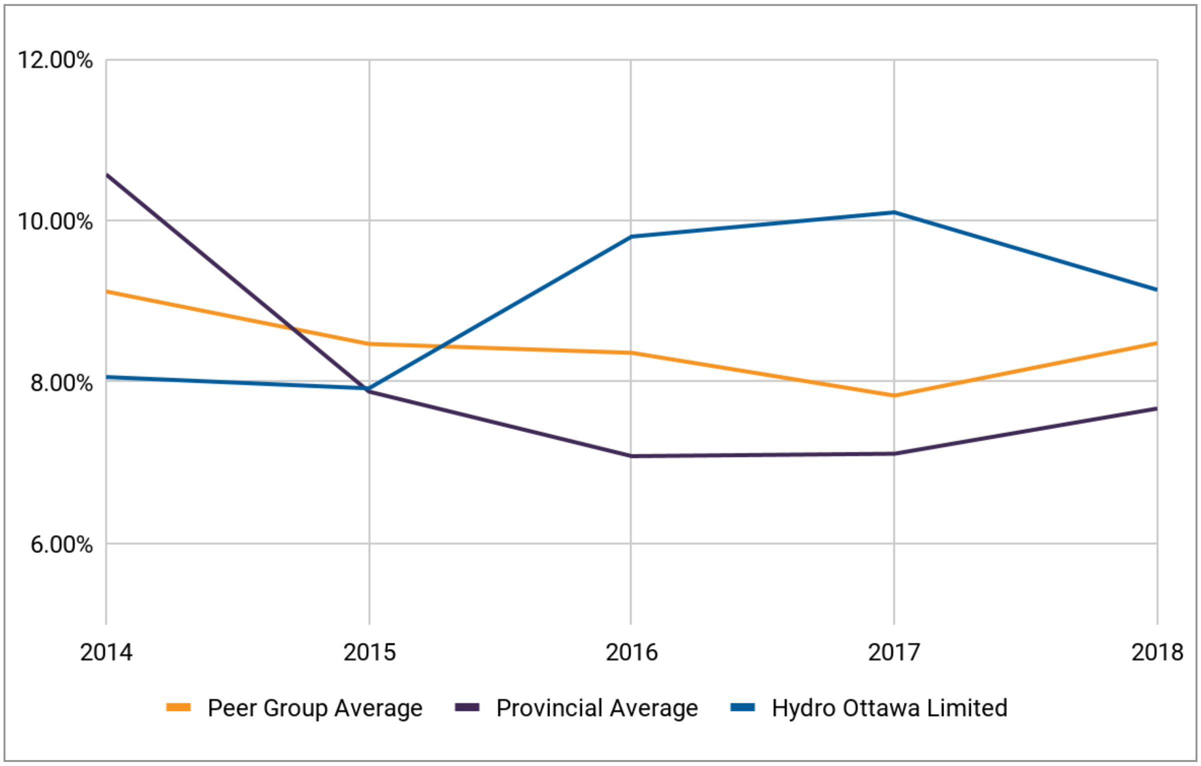


Figure 33 – Peer Group and Provincial Averages vs. Hydro Ottawa Results: Achieved ROE



ONTARIO ENERGY BOARD ELECTRICITY DISTRIBUTOR YEARBOOK AND PERFORMANCE DASHBOARD

1. INTRODUCTION

Annually, the OEB issues an Electricity Distributor Yearbook ("yearbook") that contains financial and operational data for electricity distributors in Ontario. First launched in 2005, the yearbook provides a detailed look at the entire electricity distribution system in Ontario for a given calendar year. The comprehensive data as published in the yearbook presents an opportunity for distributors to compare and benchmark both individual year-over-year performance, as well as performance trends relative to other Ontario Local Distribution Companies ("LDCs").

Using the yearbook as a basis, the analysis in this Attachment provides an overview of where Hydro Ottawa is situated in four key areas as compared with the rest of the province as a whole, as well as a specified peer group.[1] The areas examined below were chosen for analysis so as to align with the OEB's "Consolidated Key Metrics of Ontario's Electricity Distributors' Sector" as presented in the opening industry overview pages of the 2018 yearbook.[2] In addition, select information that allows for direct comparison from the "Unitized & Other Statistics" section of the yearbook has been included, as well as information derived from the OEB's online Performance Dashboard.[3]

Hydro Ottawa generally compares very favourably amongst its peer group and within the province across these key areas. Key financial ratios on the balance sheet and income statement indicate that Hydro Ottawa is in a strong financial position and compares favourably to the provincial and peer group averages in most areas. As a result of its significant capital expenditure program required to replace aging distribution system infrastructure, Hydro Ottawa has carried a higher debt to equity ratio than the deemed capital structure. Although Hydro

[1] The peer group that is utilized is the same as that which is defined in Attachment 1-1-12(C): Hydro Ottawa's Electricity Utility Scorecard Analysis 2014-2018, section 2.
[2] Ontario Energy Board, *2018 Yearbook of Electricity Distributors* (August 19, 2019), pages 5-13.
[3] https://www.oeb.ca/utility-performance-and-monitoring/electricity-utility-performance-dashboard.

Ottawa is more highly leveraged than the deemed capital structure, the utility has been able to mitigate its cost of borrowing due to favourable interest rates on its long-term debt.

While Hydro Ottawa is one of the largest LDCs in the province, both geographically and in terms of customer count, its operations, maintenance and administration ("OM&A") per customer and its Distribution Revenue per customer have remained lower than both the provincial and peer group averages for the last five years. In terms of reliability, yearbook comparisons highlight Hydro Ottawa's unique location, in that it is completely surrounded by the service territory of Hydro One Networks Inc. ("HONI"). As a result, Loss of Supplycontinues to be the leading cause code for both System Average Interruption Duration Index ("SAIDI") and System Average Interruption Frequency Index ("SAIFI"). Occurrences of Loss of Supply in Hydro Ottawa's service territory are nearly double the provincial average in terms of SAIDI, and nearly quadruple the provincial average in terms of SAIFI. Hydro Ottawa also experienced three Major Event Days ("MEDs") in 2018. Consequently, MED contributions to SAIDI and SAIFI in the utility's service area are both significantly above provincial averages in 2018. Notwithstanding this, however, Hydro Ottawa's overall SAIDI and SAIFI have remained below the OEB's prescribed targets on the Electricity Utility Scorecard for the last five years.[4]

As exhibited in the OEB's online Performance Dashboard rate comparison, Hydro Ottawa's average estimated monthly bill for residential customers remains below the provincial and peer group averages. Furthermore, it falls below the average of the OEB's selected North American jurisdictions.

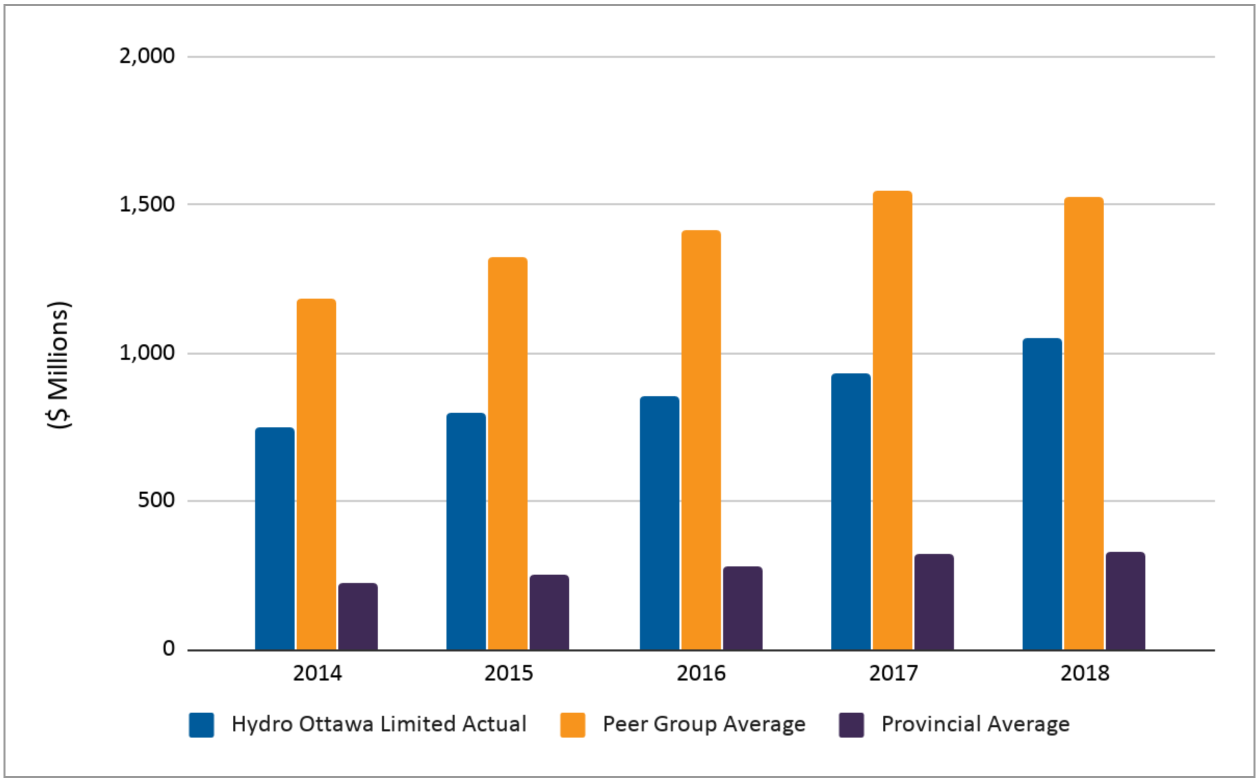
2. BALANCE SHEET

Figures 1 through 5 below compare Hydro Ottawa to the province and its peer group in terms of Net Property, Plant & Equipment, Current Ratio, Debt to Equity Ratio, and Debt Ratio for the years 2014-2018.

[4] For further detail on reliability metrics and scorecard targets, please see Attachment 1-1-12(C): Hydro Ottawa's Electricity Utility Scorecard.

Hydro Ottawa's average Property, Plant & Equipment is significantly higher than the provincial average, but below the peer group average for the years 2014-2018, as shown in Figure 1.

Figure 1 – 2014-2018 Net Property, Plant & Equipment



In terms of financial ratios, Hydro Ottawa's Current Ratio is on par with the provincial average, yet lower than the peer group average. Its Debt to Equity Ratio is higher than both the provincial and peer group averages. The utility's Debt Ratio and Interest Coverage Ratios are both lower than the provincial and peer group averages.

Figure 2 – 2014-2018 Current Ratio *(Current Assets/Current Liabilities)*

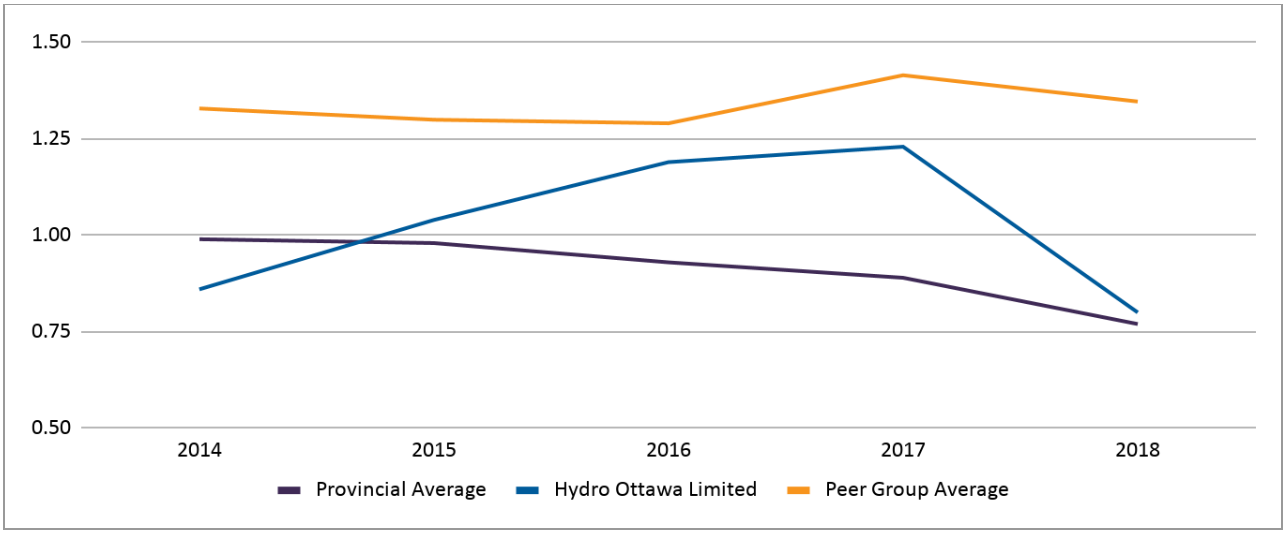


Figure 3 – 2014-2018 Debt to Equity Ratio *(Debt/Total Equity)*

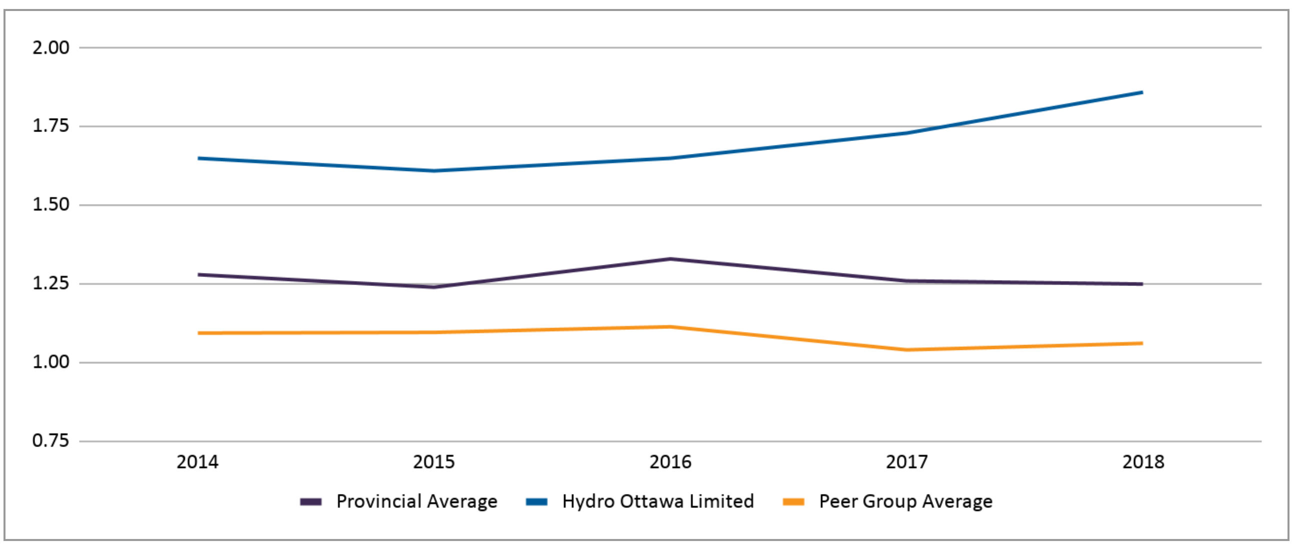


Figure 4 – 2014-2018 Debt Ratio *(Debt/Total Assets)*

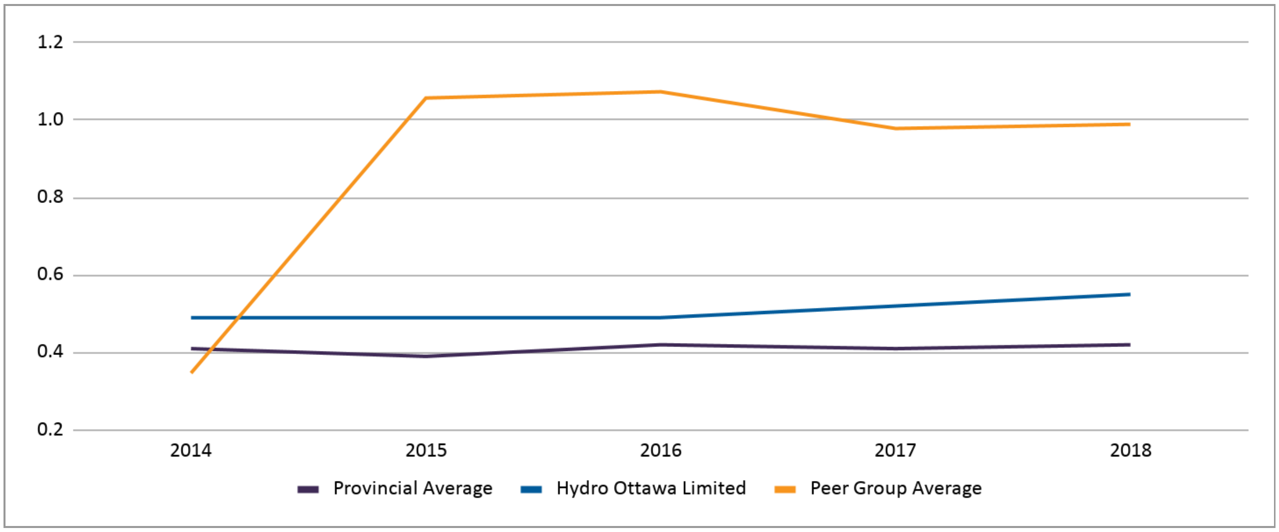
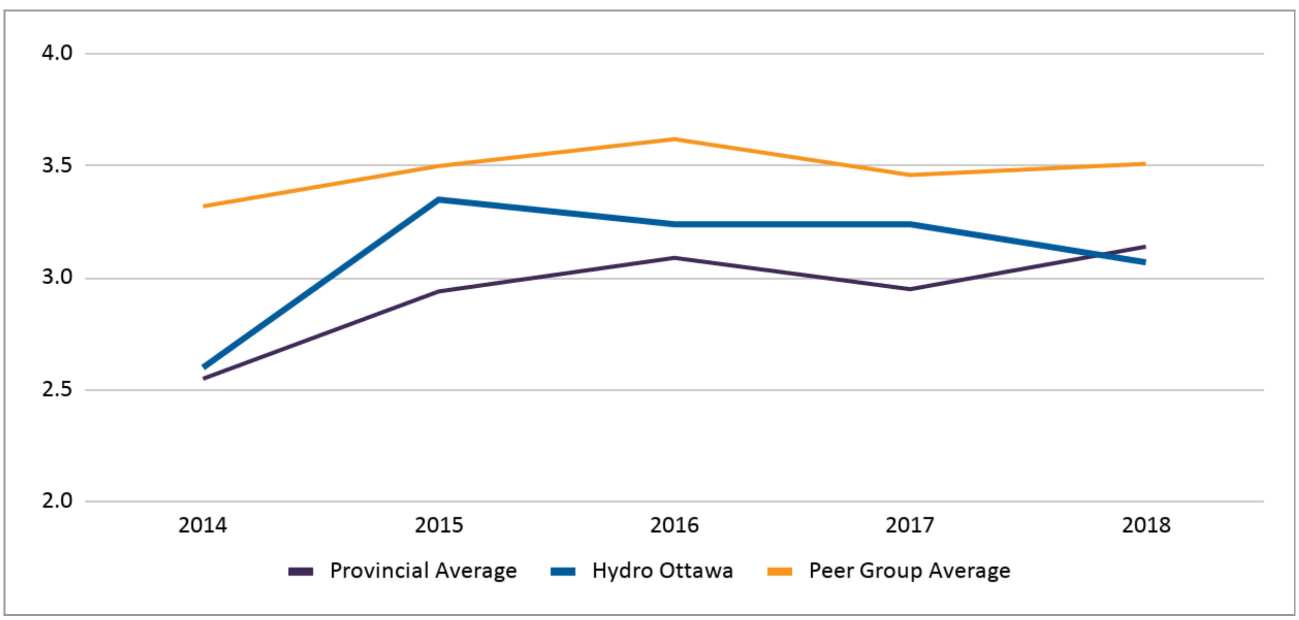


Figure 5 – 2014-2018 Interest Coverage *(EBIT/Interest Charges)*



3. INCOME STATEMENT

Figures 6 and 7 below show Hydro Ottawa's Return on Assets and Return on Equity relative to the province and its peer group for the years 2014-2018. Hydro Ottawa's Return on Assets is lower than both the provincial and peer group averages, while its Return on Equity is higher than the provincial and peer group averages.

Figure 6 – Financial Statement Return on Assets *(Net Income/Total Assets)*

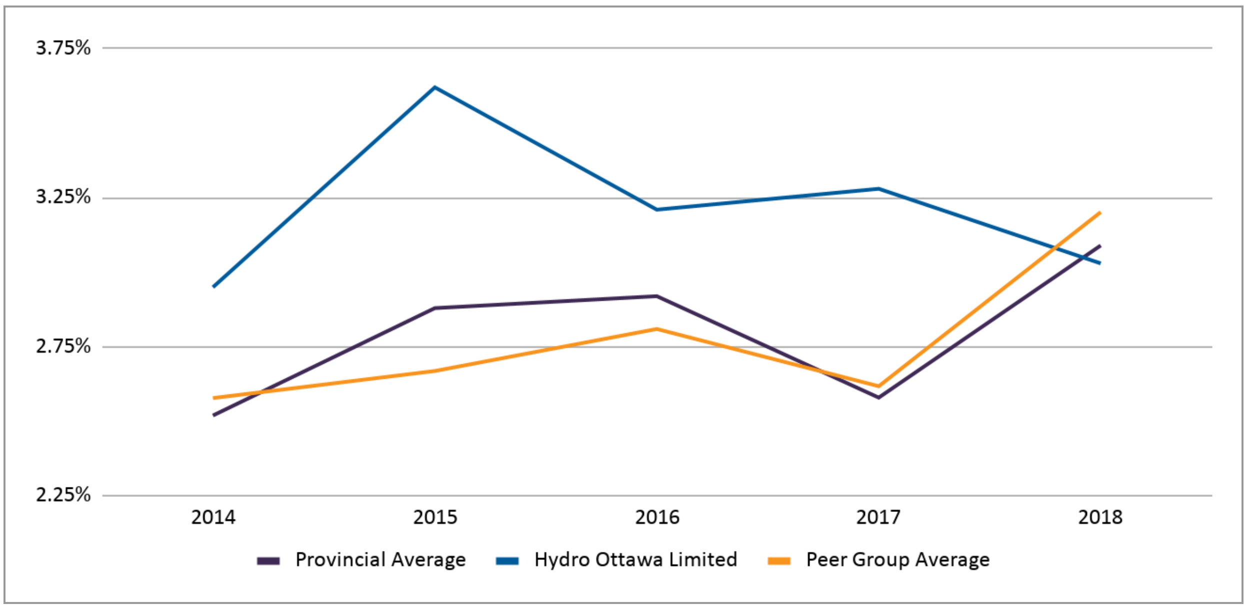
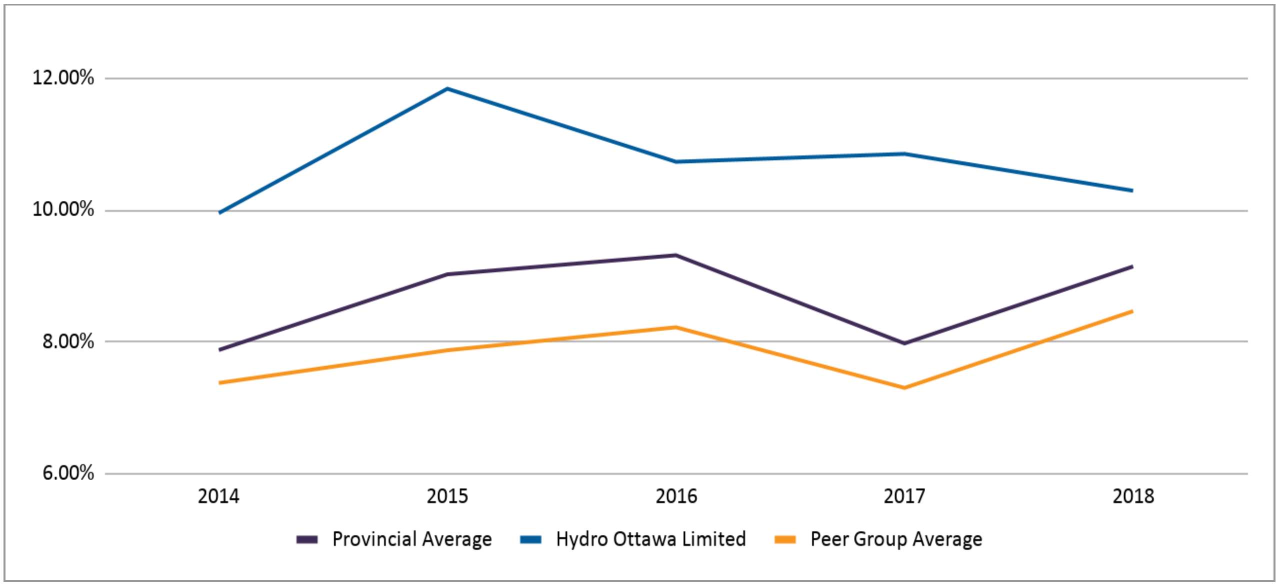


Figure 7 – Financial Statements Return on Equity *(Net Income/Shareholder Equity)*



4. RELIABILITY

Figure 8 below shows Hydro Ottawa's cause code contributions for both SAIDI and SAIFI in 2018. Subsequently, Figure 9 shows the provincial average cause code contributions to SAIDI and SAIFI in 2018 which is derived from the 2018 yearbook. Loss of Supply is the leading cause of outages in Hydro Ottawa's service territory for both SAIDI and SAIFI, and surpasses the provincial average.[5]

[5] For a comprehensive analysis and discussion of Hydro Ottawa's reliability metrics, cause codes and Major Events, please see Exhibit 2-4-6: Service Quality and Reliability Performance. Further discussion of Hydro Ottawa's historical reliability performance can be found in section 4.3 of Exhibit 2-4-3: Distribution System Plan.

Figure 8 – Hydro Ottawa SAIDI and SAIFI by Cause Code (2018)

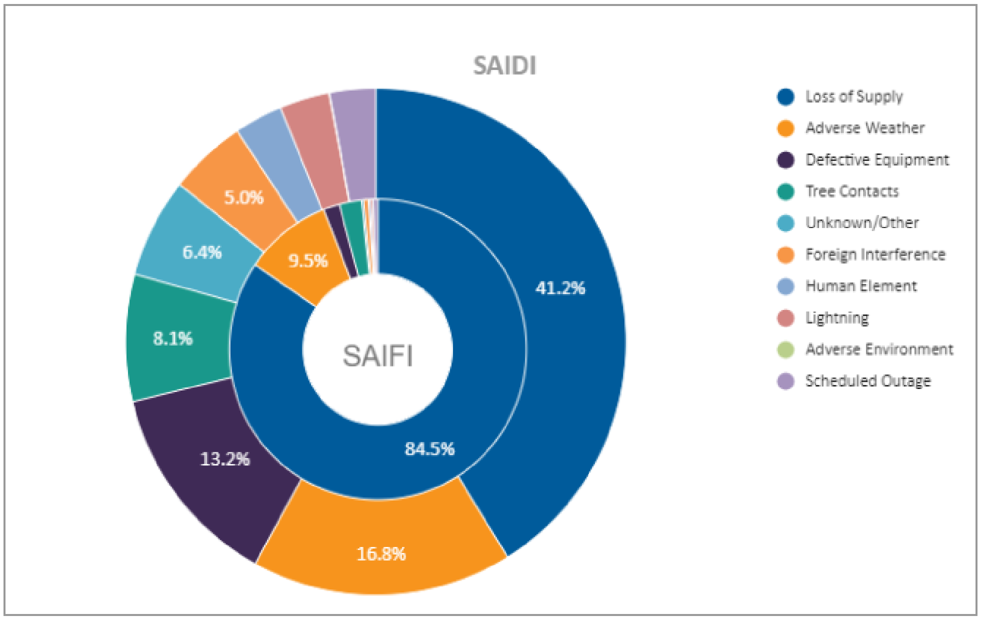


Figure 9 – Provincial SAIDI and SAIFI by Cause Code (2018)

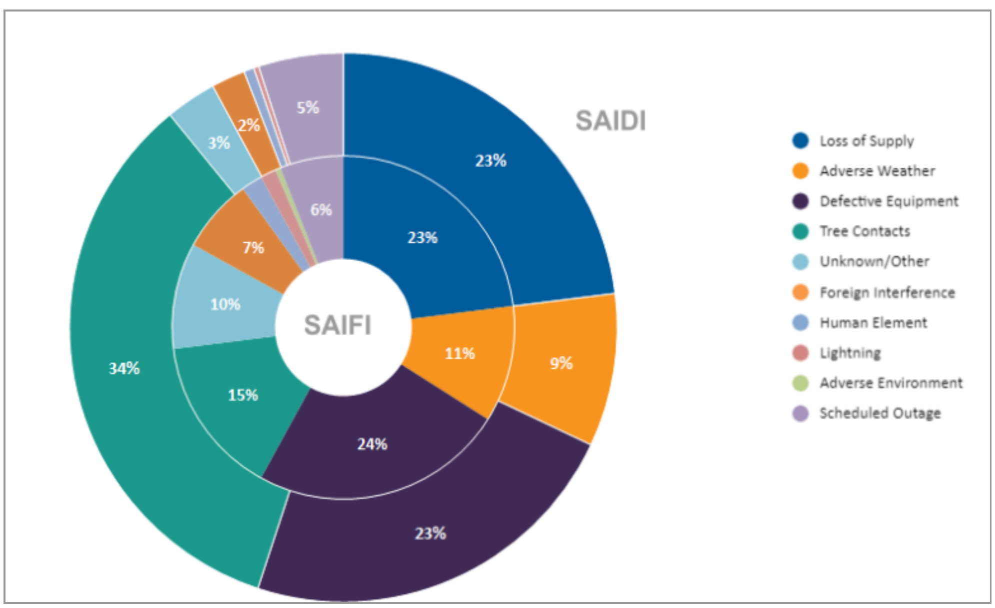
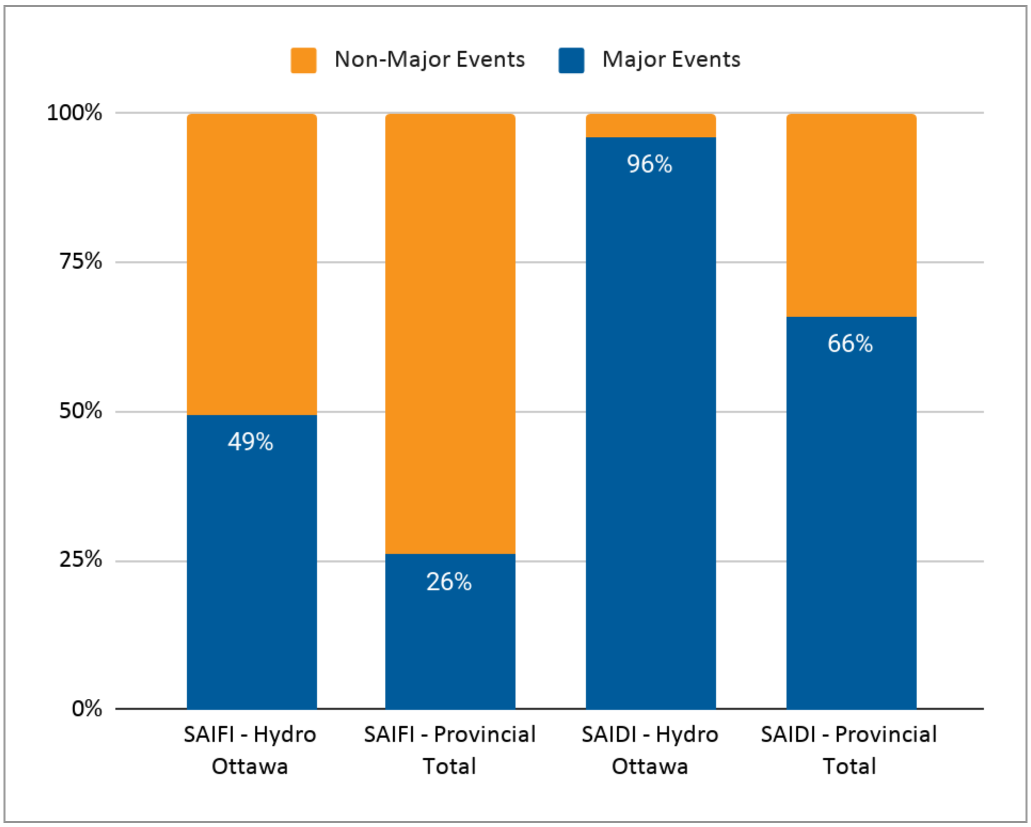


Figure 10 illustrates the contribution of Major Events to both SAIDI and SAIFI in 2018, and compares Hydro Ottawa to the provincial average. Major Event contribution to reliability in the utility's service territory is much higher than the provincial averages.

Figure 10 – Major Events Contribution to Reliability (2018)



5. UNITIZED STATISTICS

5.1. OPERATIONS, MAINTENANCE & ADMINISTRATIVE EXPENSES

Figures 11 and 12 express Hydro Ottawa's OM&A per customer, as calculated in the yearbook for the years 2014-2018, relative to the rest of Ontario as well as the peer group. Hydro Ottawa's average OM&A per customer over this period remains lower than both the provincial and peer group averages.

Figure 11 – 2014-2018 Average OM&A per Customer

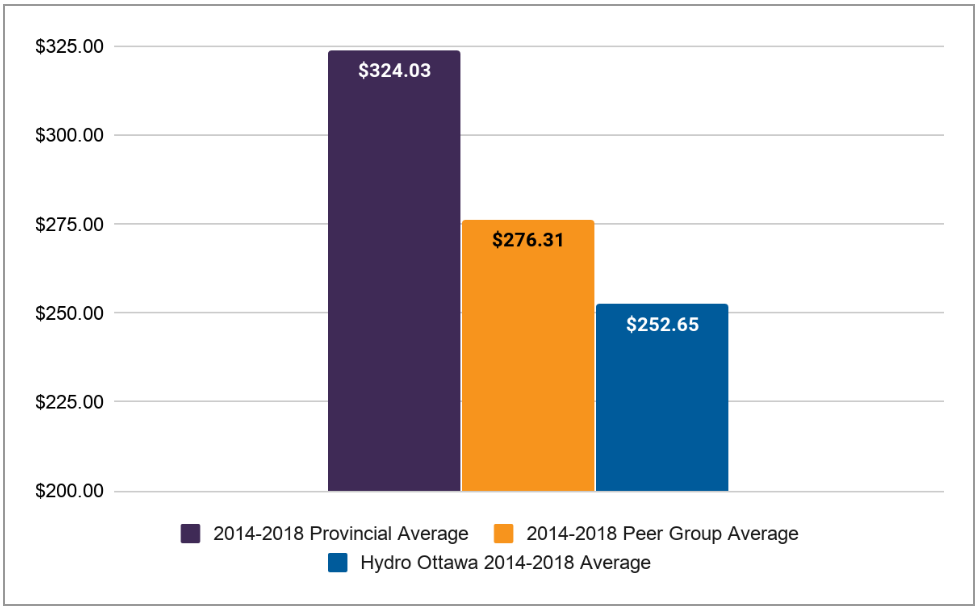
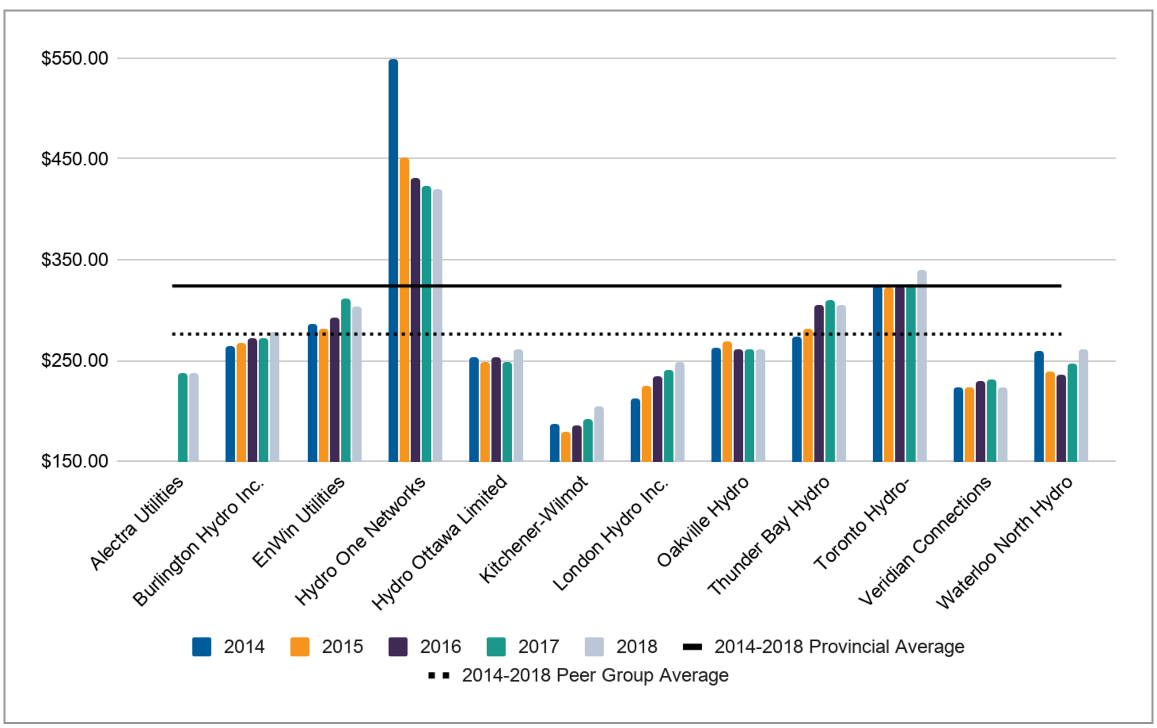


Figure 12 – 2014-2018 OM&A Expenses per Customer



5.2. DISTRIBUTION REVENUE

Figures 13 and 14 display Hydro Ottawa's Distribution Revenue per customer, as calculated in the yearbook for the years 2014-2018, relative to the rest of Ontario as well as the peer group. Hydro Ottawa's average Distribution Revenue per Customer is below both the provincial and peer group averages.

Figure 13 – 2014-2018 Average Distribution Revenue per Customer

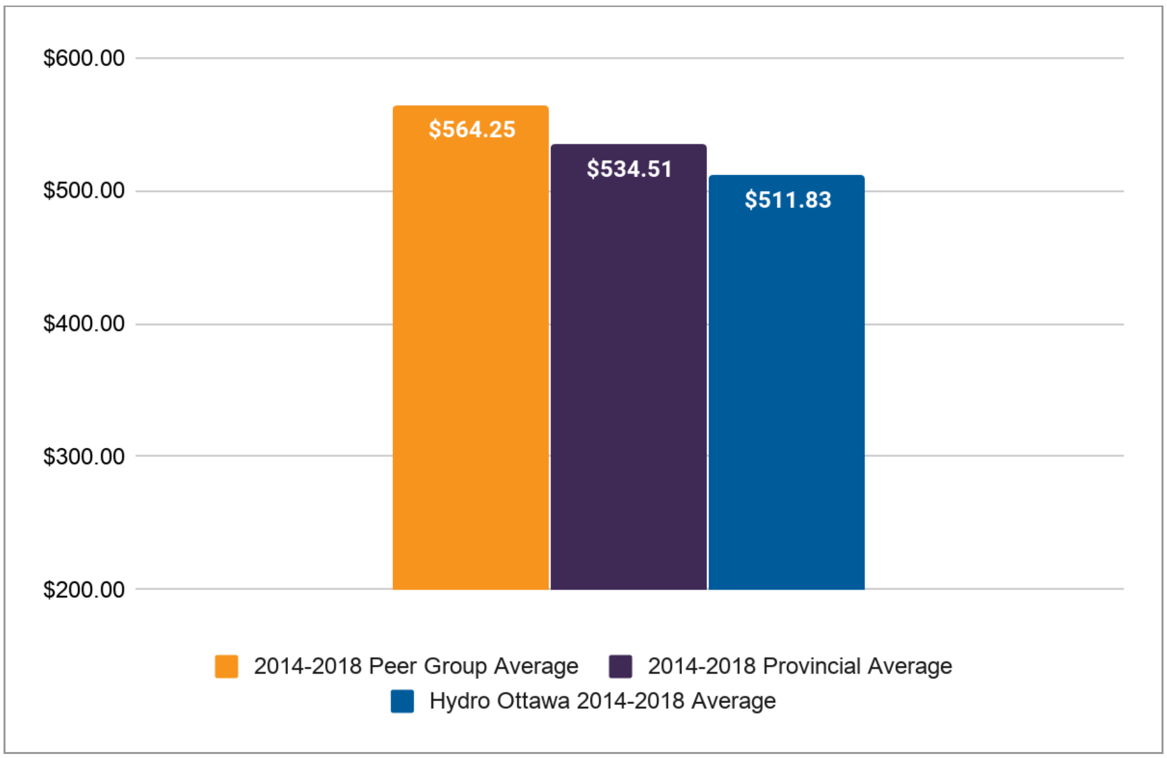
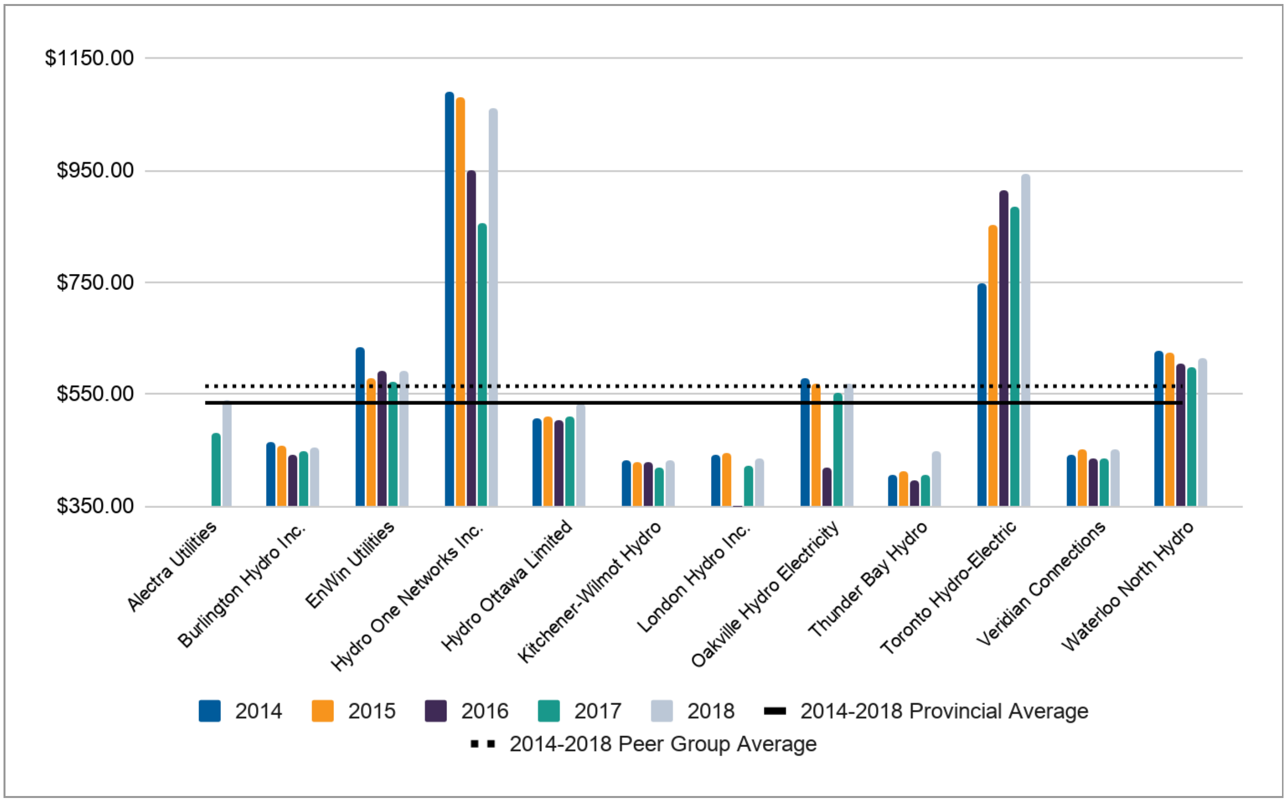


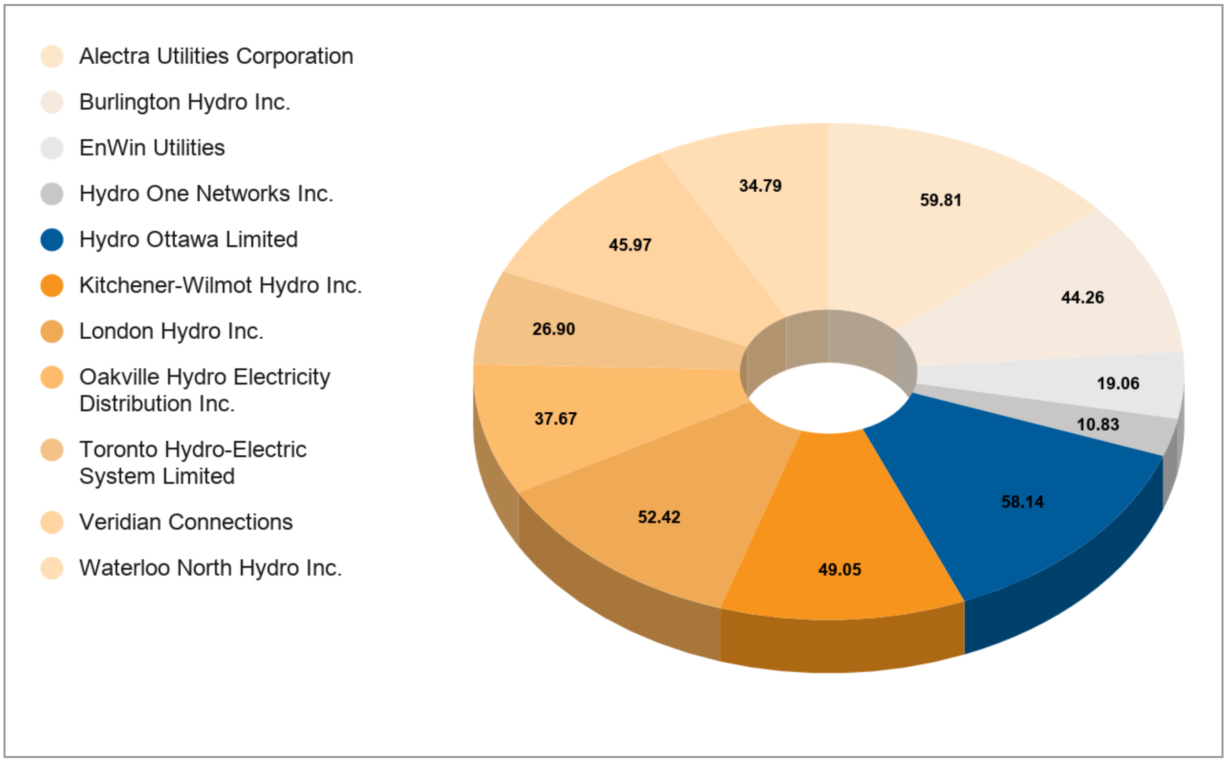
Figure 14 – 2014-2018 Total Distribution Revenue per Customer



5.3. CUSTOMERS PER KILOMETRE OF LINE

Figure 15 displays the number of customers per kilometre of line in Hydro Ottawa's service territory relative to the number of customers per kilometre of line in the peer group. Hydro Ottawa has the second highest number of customers per kilometre of line in Ontario at 58.14.

Figure 15 – Number of Customers per km of Line (2018)



6. ELECTRICITY UTILITY PERFORMANCE DASHBOARD

On its website, the OEB maintains an Electricity Utility Performance Dashboard ("Dashboard") for residents and consumers to access at-a-glance statistics about their utility. The Dashboard includes all scorecard metrics, as well as available rates comparison information.[6] At the date of compilation, the most recent available rates data on the Dashboard is for 2017.

Figure 16 below expresses the estimated total monthly bill for residential customers (before tax) for Hydro Ottawa and the peer group. Hydro Ottawa is below the peer group average.

[6] For a comprehensive analysis of Hydro Ottawa's scorecard metrics, please see Attachment 1-1-12(C): Hydro Ottawa's Electricity Utility Scorecard.

Figure 17 presents the estimated monthly bill for small commercial customers (before tax) for Hydro Ottawa and the peer group. Hydro Ottawa's estimated monthly bill for small commercial customers is essentially on par with the peer group average.

Figure 18 reveals the estimated total monthly bill for residential customers of Hydro Ottawa, select Ontario and other municipalities/service areas in North America. The average of the selected group is $115.05 per month. Hydro Ottawa's estimated total monthly bill for residential customers is nearly 20% lower than the group, at $95.25 per month.

Figure 16 – 2017 Estimated Total Monthly Bill - Residential (Before Tax)

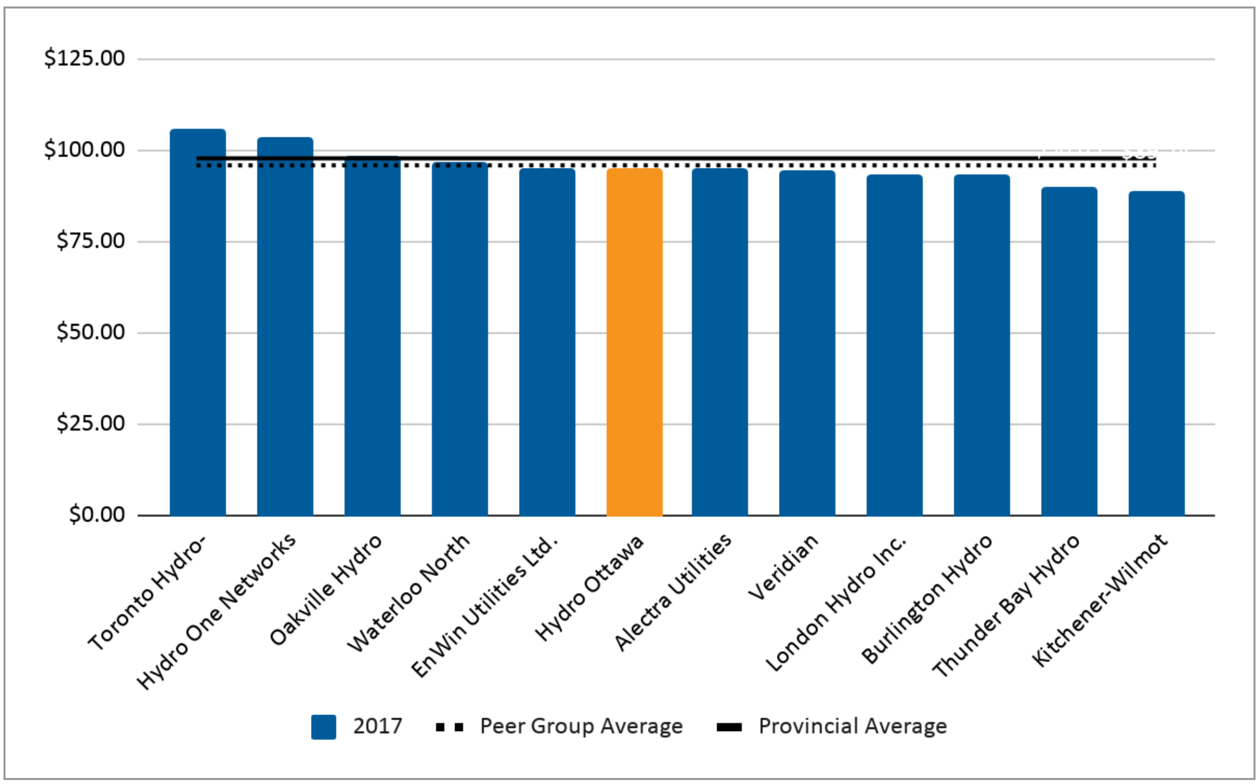


Figure 17 – 2017 Estimated Total Monthly Bill - Small Commercial (Before Tax)

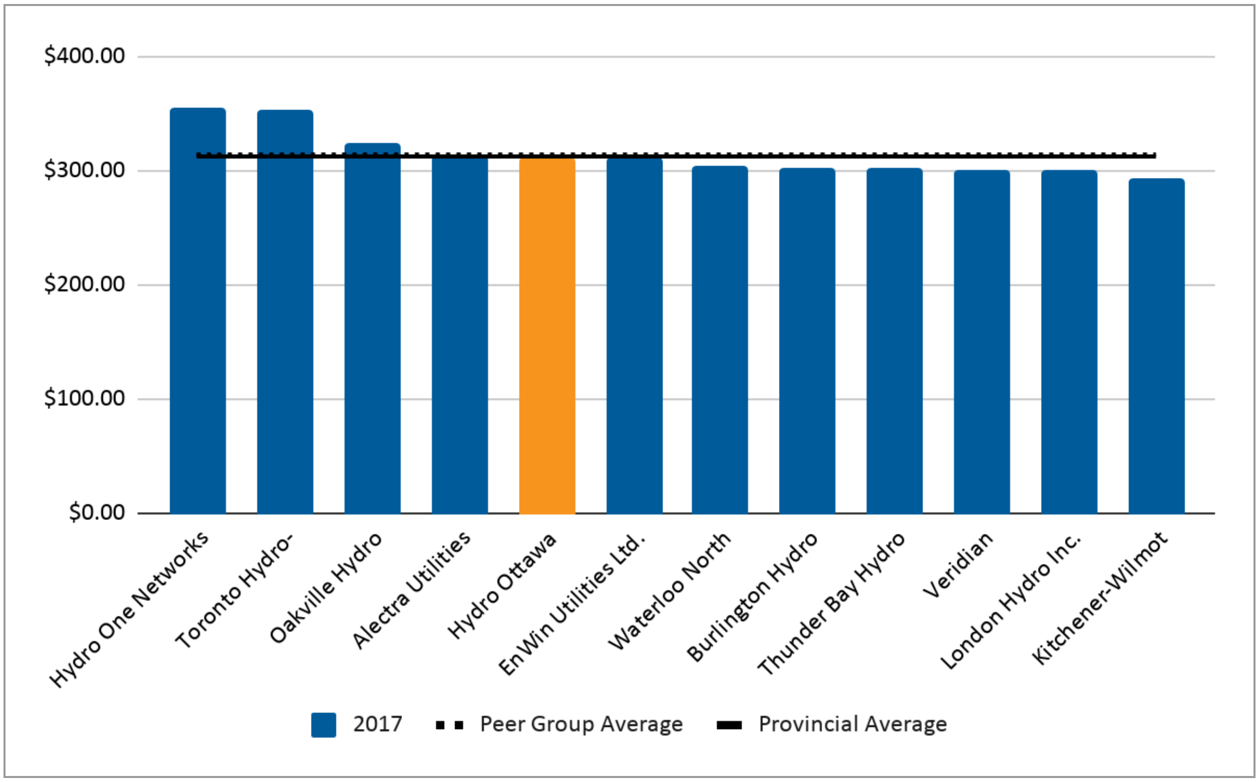
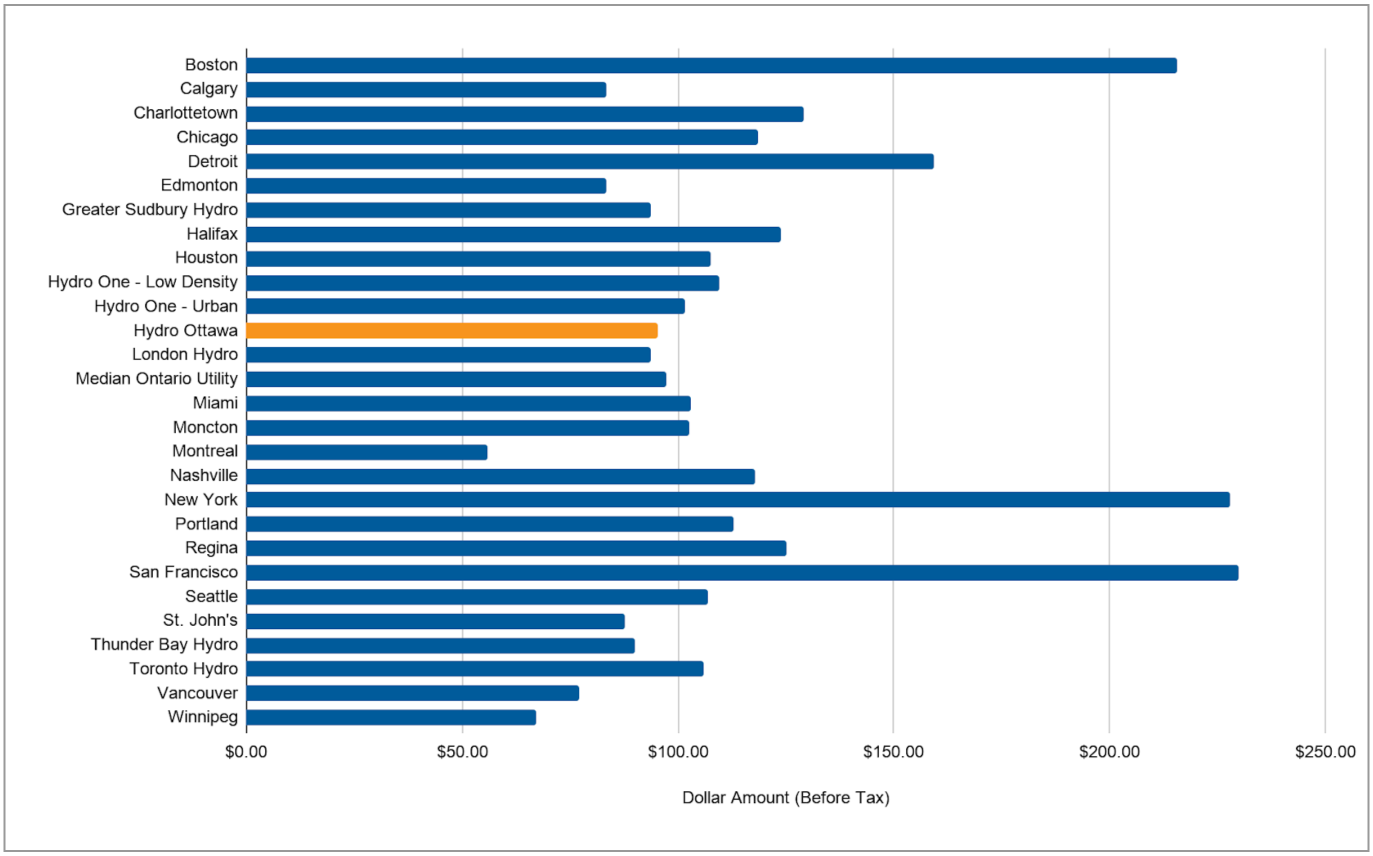


Figure 18 – 2017 Estimated Total Monthly Bill Amount for Residential Customers in Select Jurisdictions in Canada and the United States



PEG BENCHMARKING FORECAST

1. INTRODUCTION

Section 2.1.8 of the *Chapter 2 Filing Requirements for Electricity Distribution Rate Applications*, as updated on July 12, 2018 and addended on July 15, 2019 ("Filing Requirements"), stipulates that an applicant "must provide a forecast of its efficiency assessment using the PEG forecasting model for the test year for the purposes of providing the OEB with a directional indication of efficiency."

This Attachment sets forth the results from the aforementioned assessment. In addition, this Attachment offers observations on the benchmarking approach that is employed in the Pacific Economics Group's ("PEG") model, and provides rationale in support of Hydro Ottawa's use of an alternative study to evaluate the utility's total cost performance.

2. PEG BENCHMARKING FORECAST MODEL – BACKGROUND

As part of the ongoing implementation and refinement of its policies governing incentive rate-making for electricity distributors, the OEB has engaged PEG to conduct annual benchmarking of the total cost performance of all regulated distributors in Ontario.

The PEG model renders a comparison of each distributor's "actual" total costs relative to their predicted costs. Each distributor is then assigned to one of five cohorts, with the best cost performers placed in Cohort 1 and the poorest cost performers placed in Cohort 5. These rankings are used to assign stretch factors, which are one of two components comprising the "X factor." The X factor serves as a means of embedding expected productivity gains into the rate-setting framework for a distributor.

Accordingly, the intent of the stretch factors that are yielded through the PEG model is to incentivize distributors to continuously enhance their performance, to reward distributors for cost efficiency improvements commensurate with their performance, and in turn, to help lower distribution rates for customers.

In addition to the rankings of distributors' efficiency and total cost performance, other key metrics that the PEG model generates are Total Cost per Customer and Total Cost per Km of Line. Together, these three metrics serve as critical inputs into the Electricity Utility Scorecard produced by the OEB on an annual basis for each distributor in Ontario. The metrics are included under the Cost Control category on the Electricity Utility Scorecard, which is intended to help measure the performance of distributors relative to the Operational Effectiveness outcome under the Renewed Regulatory Framework ("RRF").

3. PEG BENCHMARKING FORECAST MODEL – RESULTS

Hydro Ottawa has completed the PEG forecasting model and has included the results on the last page of this Attachment.

As shown in those results, the model predicts that Hydro Ottawa will remain in Cohort 4 for the duration of its 2021-2025 Custom IR rate term. Cohort 4 denotes those distributors whose actual costs are 10-25% above predicted costs, within the PEG model framework. Under the model, the percentage difference between actual and predicted costs for Hydro Ottawa peaks in 2023, with actual costs forecasted to be 23.97% above predicted costs (based on a three-year average of actual costs).

4. COMMENTS ON PEG BENCHMARKING FORECAST MODEL

Hydro Ottawa does not dispute the value of total cost benchmarking as a measure of productivity and efficiency, and as a method of cost control. However, Hydro Ottawa respectfully submits that there are certain limitations in the PEG model that prevent the model from taking into account unique features of the utility and its operating environment. In turn, this precludes the model from yielding a fully accurate and comprehensive assessment of the utility's efficiency and cost performance. Hydro Ottawa believes that there are several reasons to justify this view.

First, the PEG model's peer group is comprised exclusively of Ontario-based distributors. The practical effect of this peer group composition is that several distinguishing characteristics of Hydro Ottawa in the Ontario context are overlooked in the model and its analysis. For example, Hydro Ottawa has a unique service territory, which is distinct not only as the fifth physically largest in the province, but also in its urban/rural split, with 40% classified as the former and 60% as the latter. What's more, with respect to the total number of customers served, Hydro Ottawa is the only distributor in Ontario which serves twice as many customers as the utility immediately below it in the rankings, while also serving less than half as many customers as the utility immediately above it. As a result, the uniqueness of several aspects of the utility's operating profile in a provincial context means that a fulsome assessment of Hydro Ottawa's cost efficiency and performance may not be feasible under a benchmarking approach for which the peer group is restricted to Ontario.

Secondly, there are limitations in the PEG model as it relates to the use of specific business condition variables. These variables seek to quantify factors that influence and drive the costs incurred by a utility, in light of its particular business and service territory conditions. The PEG model finds that there is a statistically significant relationship between a distributor's total costs and the following five business condition variables:

- number of customers served;
- peak demand;
- kWh deliveries;
- average circuit km of line; and
- percent of customers added over the last 10 years.[1]

While Hydro Ottawa generally recognizes the merit and reasonableness of utilizing these variables, the utility respectfully contends that they are nevertheless insufficient to account for differences in the particular business and operating conditions across utility service territories.

[1] Pacific Economics Group, *Spreadsheet Model for Benchmarking Ontario Power Distributors - User's Guide* (May 2015), page 41.

Few, if any, of these variables are well-suited to considering and making adjustments for the spectrum of challenges and constraints that a utility may face in operating a distribution network. Operational constraints may be related to matters of geography, topography, weather and climate patterns, density of the customer base, and technology (to name a few). The fact that such constraints and considerations are overlooked in the PEG model is a source of concern for Hydro Ottawa, insofar as it impedes the ability of the model to paint an exact picture of a utility's efficiency based on a diverse, robust, and pertinent set of variables.

Finally, Hydro Ottawa observes that several years have elapsed since the PEG benchmarking model, in its current form, was first introduced. As noted in PEG's most recent update report to the OEB on distributor stretch factor assignments, the methodology and parameters employed by the model remain essentially the same as what they were in 2013, when the OEB established the current framework for total cost benchmarking of distributors.[2] Hydro Ottawa respectfully submits that, in the absence of any meaningful modifications or refinements to the PEG model in the ensuing years, the examination of alternative benchmarking models and methodologies, which may have the benefit of updated parameters and/or principles, is warranted.

5. CLEARSPRING ENERGY ADVISORS' ECONOMETRIC BENCHMARKING OF HYDRO OTTAWA'S TOTAL COST PERFORMANCE

In order to inform the development of the proposals and evidence set forth in this Application, Hydro Ottawa engaged a third party expert to perform a separate study of the utility's total cost benchmarking performance. In so doing, the utility was motivated by the reasons discussed in section 4 above. In addition, the OEB has explicitly signalled that the Filing Requirements are not binding on Custom IR applicants.[3] Accordingly, the OEB's policy can be interpreted as allowing for the submittal of additional or alternative total cost benchmarking evidence, separate

[2] Pacific Economics Group, *Empirical Research in Support of Incentive Rate-Setting: 2018 Benchmarking Update - Report to the Ontario Energy Board* (August 2019), pages 2-4.
[3] Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 25: "A Custom IR application is by its very nature custom, and therefore no specific filing requirements have been established."

and apart from the standard requirement for a utility to complete the PEG benchmarking forecast model.

For this purpose, Hydro Ottawa retained Clearspring Energy Advisors ("Clearspring"), a firm with robust expertise and credentials in econometric benchmarking. The lead author of the study was Mr. Steve Fenrick, who has more than 20 years of experience with performance and econometric benchmarking (including the PEG model), and who has served as an expert witness in numerous utility rate application proceedings before the OEB.

A copy of the study prepared by Clearspring is included in this Application as Attachment 1-1-12(A): Econometric Benchmarking Study of Hydro Ottawa's Total Cost and Reliability. For Hydro Ottawa's analysis and interpretation of the results of this study, please see Exhibit 1-1-12: Benchmarking.

Clearspring utilizes an econometric benchmarking approach that is very similar to that which is employed in the PEG model, and is therefore wholly consistent with the general benchmarking paradigm with which the OEB is familiar. However, whereas the PEG model is hindered by certain limitations (as discussed above), Clearspring's approach is not.

For example, the peer group in Clearspring's study is more expansive and is more conducive to assessing the efficiency of a utility with Hydro Ottawa's profile and characteristics. The peer group is comprised of almost 90 utilities, including more than 80 U.S. utilities and seven of the largest utilities in Ontario. Among other things, relative to the PEG model, this peer group boasts a much bigger share of utilities with customer counts and/or service territory sizes that are of similarly large scale as those of Hydro Ottawa.[4] What's more, alongside a peer group with a more substantive composition, Clearspring's model has the benefit of a more populous and robust dataset. Data samples for the U.S. utilities cover the 2002-2017 period, with samples for

[4] In this regard, it should be noted that, of the other 62 utilities in PEG's Ontario dataset, 57 of these utilities (which is over 90% of the PEG sample) serve less than 100,000 customers. Moreover, 46 of the utilities serve less than 50,000 customers.

the Ontario utilities covering 2006-2017. Altogether, the study is underpinned by 1,370 data observations – a sufficiently rigorous number to ensure the statistical significance of the model.

Furthermore, in Hydro Ottawa's view, the business condition variables applied by Clearspring enable a greater measure and depth of insight into utility costs than those which are utilized by PEG. These variables include the following:

- standard deviation of elevation;
- percentage of forestation;
- congested urban;
- percentage of smart meters;
- rural density; and
- temperature.

Variables such as these are better equipped to account and adjust for quantifiable differences between the service territories and business conditions of different utilities than a mere examination of such variables as number of customers served and average circuit km of line. As noted in Clearspring's report, for example, it can be expected that a service territory with greater elevation changes would be more challenging and costly to serve, while increased levels of forestation would translate into higher operations, maintenance and administration ("OM&A") expenses for right-of-way clearing and service restoration.[5] Such differences, however, cannot be acknowledged or accounted for under the PEG model.

A third strength of Clearspring's model is that it estimates parameter values using the latest electricity distributor data that is available at the time of the study. In contrast, the results yielded by the PEG model do not have the benefit of fresh data. In its latest calculation of stretch factor assignments for Ontario distributors (i.e. 2019 assignments for the 2020 incentive rate mechanism for rate-setting), PEG states that its "parameters were estimated using Ontario

[5] Attachment 1-1-12(A): Econometric Benchmarking Study of Hydro Ottawa's Total Cost and Reliability, pages 16-17.

LDC data from 2002-2012."[6] The vintage of the data underpinning a key design element of the PEG model therefore serves as an additional consideration favouring Clearspring's approach.

Finally, one other advantage of Clearspring's analysis that substantially sets it apart from that of PEG is the examination of Hydro Ottawa's total cost benchmarking projections in isolation of once-in-a-generation capital projects that are being executed concurrently. As discussed in more detail in Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework and Exhibit 1-1-12: Benchmarking, Hydro Ottawa is presently in the unusual position of having to undertake two of the largest and most costly capital expenditures in its history – the Facilities Renewal Program and construction of the Cambrian Municipal Transformer Station ("MTS"). In turn, the effects of these projects and their costs on the utility's total cost scoring are lopsided and distortive, and skew the scoring results in a way that would not otherwise occur if these projects were being implemented at separate junctures over a more prolonged time horizon. Whereas the customized benchmarking analysis performed by Clearspring is able to take these exceptional circumstances into consideration, the blanket, "one size fits all" approach employed through the PEG model is not.

6. CONCLUSION

For the reasons outlined above, Hydro Ottawa respectfully submits that, relative to the PEG model, the study prepared by Clearspring is better-suited to providing an accurate, effective assessment of Hydro Ottawa's efficiency. Clearspring's analysis is therefore an appropriate tool for evaluating the utility's total cost benchmarking performance and assigning the utility a stretch factor in the context of this Application.

[6] Pacific Economics Group, *Empirical Research in Support of Incentive Rate-Setting: 2018 Benchmarking Update - Report to the Ontario Energy Board* (August 2019), page 2.

Summary of Cost Benchmarking Results

Hydro Ottawa Limited

Cost Benchmarking Summary	**2018 (History)**	**2019 (Bridge)**	**2020 (Bridge)**	**2021 (Test)**	**2022 (Test)**	**2023 (Test)**	**2024 (Test)**	**2025 (Test)**	
Actual Total Cost	235,095,117	252,967,886	263,441,939	279,566,433	290,163,161	296,980,087	305,120,381	311,313,312	311,313,312
Predicted Total Cost	195,913,974	203,379,556	211,049,855	219,007,827	227,262,115	235,844,557	244,766,542	251,223,287	251,223,287
Difference	39,181,143	49,588,331	52,392,084	60,558,606	62,901,046	61,135,530	60,353,840	60,090,025	60,090,025
Percentage Difference (Cost Performance)	**18.2%**	**21.8%**	**22.2%**	**24.41%**	**24.43%**	**23.05%**	**22.04%**	**21.45%**	**21.45%**
Three-Year Average Performance	18.2%	20.0%	20.7%	22.80%	23.67%	23.97%	23.17%	22.18%	22.00%
Stretch Factor Cohort									
Annual Result	4	4	4	4	4	4	4	4	
Three Year Average			4	4	4	4	4	4	

Hydro Ottawa Limited
EB-2019-0261
Exhibit 1
Tab 1
Schedule 12
Attachment F
ORIGINAL

Hydro Ottawa
IT Budget Assessment Benchmark

Catherine Taylor, Associate Director, Gartner
Nick Lal, Managing Partner, Gartner
6 March 2019
Project: 330054500

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Background and IT Budget Assessment Methodology

Background

- Hydro Ottawa's Information and Technology organization is responsible for the development and implementation of technology initiatives that support the advancement of Hydro Ottawa's business strategy and priorities.
- Hydro Ottawa has outlined the importance of technology in its 2016-2020 Strategic Direction. Hydro Ottawa has a digital strategy which is aligned with the strategic direction for the organization.
- The 2018 financial results for Information and Technology reflects investments in the strategy intended to improve reliability and functionality of systems used by Hydro Ottawa employees as well as direct customer facing improvements.
- The Information and Technology organization includes functions such as Technology Planning and Governance, Cybersecurity, Grid Technology, Enterprise Architecture, System Development and Integration, Billing and Billing Infrastructure and IT/OT Operations.
- Hydro Ottawa is interested in assessing its overall information technology (IT) spending in terms of enterprise level metrics and the distribution of IT spending. The IT Budget Assessment will enable Hydro Ottawa to understand and compare IT spending within the organization. The assessment will include comparison and analysis of metrics and spending and staffing distributions aimed at providing insight into how IT spending at Hydro Ottawa aligns with peer organizations. The peer organizations used for comparison are pulled from the Gartner Benchmarking database.

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IT Budget Assessment Methodology — Project Approach

- Using industry, revenue, and employee data, Gartner will compare Hydro Ottawa against similar organizations, and will require the following inputs:
  - IT budget spending (capital and operations)
  - Revenue and operating expense
  - Number of employees
  - IT staffing levels
- Functional areas in scope include:
  - Data Center (Computing and Storage)
  - End User Computing and Service Desk
  - Voice and Data
  - Applications Development and Support
  - IT Management and Administration

- Metrics available from this analysis include:
  - IT Budget as a % of Revenue
  - IT Budget as a % of Operating Expense
  - IT Budget Per Company Employee
  - Distribution of IT Budget – by Category (hardware, software, outsourcing and personnel)
  - Distribution of IT Budget – by Domain (data center, end user computing, service desk, voice, data, applications development, applications support, corporate IT management, finance and administration)
  - Distribution of IT Support – by Domain (data center, end user computing, service desk, voice, data, applications development, applications support, corporate IT management, finance and administration)
  - IT Employees as a % of Company Employees
  - IT Contractor Usage
  - Capital Vs. Operational Budget
  - Run, Grow, Transform Budget

IT Budget Assessment Methodology — Gartner Approach

Project Plan

1 Project Initiation
- Planning
- Kickoff
- Data collection

2 Data Collection
- IT Spending Metrics Data Collection
- Data Collection Assistance
- Status Meetings
- Interviews

3 Data Validation
- Data Validation Review
- Peer Group Review
- Data correction
- Data Freeze

4 Analysis
- Spending Drivers Analysis
- Discussion of opportunities and findings
- Preliminary Report

5 Deliver Results
- Final Report
- Presentation of Report Findings

- Using Gartner's Cost Model for IT Spending, Gartner will collect IT spending and staffing data and perform a cost analysis report use Gartner benchmarking databases.
- The preliminary report will validate data and assumptions, working toward a final report deliverable.
- Timeframe for results range from four weeks onward depending access to data.

IT Budget Assessment Methodology — Key Definitions

- The IT Budget Assessment follows the Gartner Benchmarking chart of accounts. In order to match the Gartner Benchmark chart of accounts, the data presented in the benchmark will not completely align with the official Information and Technology budget or organization. For example, the Gartner Benchmark chart of accounts has historically excluded operational technology.
- IT Budget Definition
  - The total budget at the end of the twelve month budget period for information technology to support the enterprise. IT Budget can come from anywhere in the enterprise that incurs IT costs, and it is not limited to the IT organization. It is calculated on an annualized “cash out” basis and therefore contains capital budget, and operational expenses. Gartner definitions for IT budget include all IT services, for example:
    - Hardware, software, personnel (including travel and benefits and training), contractors and consultants, outsourcing, disaster recovery, occupancy, data and voice communications/transmission, associated with supporting information technology within the enterprise.
    - Costs for the facilities being used by the staff supporting the enterprise. Some examples include office space, furniture, electricity, maintenance, property taxes, security, and office supplies. Occupancy costs for space dedicated to IT functions such as the data center and IT service desk are also included.
    - The data center (servers, storage etc), client devices (desktops, laptops, tablets, thin clients, handhelds), voice and data networks (including but not limited to voice and data transmission, fixed and mobile telephony, Internet access services), IT service desk, application development and maintenance. IT Support functions such as the office of the CIO, supervisory management, finance and administrative costs, such as purchasing, asset management, process management, and marketing of IT services.

IT Budget Assessment Methodology — Hydro Ottawa Profile

- Hydro Ottawa Business Information
  - Revenue and operating expense include power recovery and cost of power in accordance with Gartner Benchmarking definitions
  - Data reflect 2018 financial results
  - Revenue: $1.081 billion
  - Business Operating Expense: $973 million
  - Company Employees: 657
  - 2018 Number of Customers: 335,457
- Hydro Ottawa Information and Technology Information
  - Excludes operational technology in accordance with Gartner Benchmarking chart of accounts
  - Capital: $9.253 million
  - Operations: $16.992 million
  - Total Capital and Operations: $26.245 million
  - IT Employees (full time equivalents): 55

IT Budget Assessment Methodology — Peer Group Profile

- Hydro Ottawa is compared against a peer group of other electric utility organizations.
- Nine organizations were selected for the peer group. Five are located in US cities, two in Australia cities, and two in Canadian cities.
- Peer Group Demographics:
  - Peer Group Average Revenue: $1.372 billion
  - Peer Group Average Operating Expense: $1.158 billion
  - Peer Group Average Company Employees: 1,157
  - Peer Group Average Number of Customers: 391,747

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Executive Summary

Executive Summary
IT Budget Assessment Results

- For fiscal 2018, Hydro Ottawa's IT budget expressed as a percentage of revenue and operating expense is lower compared to the peer group and the 25th percentile (lowest) of the peer group. IT budget expressed per company employee is similar to the peer group.

Metric	Hydro Ottawa	Peer - Avg	Peer 25th	Observation
IT Budget as a % of Revenue	2.4%	3.7%	2.7%	Below 25th percentile
IT Budget as a % of Operating Expense	2.7%	4.5%	3.4%	Below 25th percentile
IT Budget per Company Employee	$39,947	$39,151	$34,757	Similar to peer average

- In fiscal 2018, Hydro Ottawa is allocating over half (53%) of the budget to transformation (45%) and growth (8%) initiatives and 47% to run. The peer group average has a higher allocation to run at 69% and 31% to growth (22%) and transformation (9%). There is variation among individual peer group members however with some reporting lower run allocations.
- Hydro Ottawa initiatives reflected in the fiscal 2018 data include:
  - Telecom master plan, Data Center infrastructure and control room upgrades, application upgrades, PC/peripheral replacement, Customer Care and Billing, security, outage mobile app, data loss.
  - Some of these initiatives result in a higher proportion of the budget going to hardware for fiscal 2018. In future years the hardware allocation is expected to decrease.

RESTRICTED

Executive Summary
IT Budget Assessment Results

- Hydro Ottawa has a lower ratio of IT full time equivalent staff (FTEs) as a percentage of company employees compared to the peer group average at 8.4% versus 10.1%.
  - Hydro Ottawa reported a higher allocation to outsourcing and managed services compared to the peer group average. The benchmark does not convert managed services contracts to an adjusted IT FTE. As a result, organizations using more managed services than a peer group using more in-house or staff augmentation will have a lower IT FTE per company employee ratio.
  - The peer group average reports a higher usage of contractors for staff augmentation (33% of FTEs on average are external) than Hydro Ottawa.
- By functional area, Hydro Ottawa has a higher allocation of FTEs to application development, and a lower allocation to infrastructure functions such as server and storage. Hydro Ottawa's usage of managed services along with the fiscal 2018 project portfolio also impacts the staff distribution by function.
  - Compared to the peer group average, Hydro Ottawa is allocating more FTE resources to application development, however as in the run, grow and transform allocation, there is variation among the individual peer group members.
  - Hydro Ottawa and the peer group average allocate a similar percentage of resources to IT management and administration roles – these are roles associated with the business of IT, as well as organization wide roles such as cyber security.
  - Industry trends suggest that the allocations of resources to management and administration may increase as organizations shift to cloud services and roles such as business relationship, data and analytics, digital transformation, privacy and security increase.

Executive Summary
Utility Industry CIO Agenda for 2019

- Gartner surveyed 106 global utility CIOs to identify CIO priorities for 2019. The survey results can be considered when interpreting the benchmark results. Survey respondents indicated the following:
  - Strong business prioritization on internal improvements.
  - Digital remains the highest ranking single priority this year, followed by operational excellence and cost optimization.
  - Digital ambitions are focused on optimization initiatives and less on digital transformation. Given utilities' asset-intensive nature and large customer bases, the application of digital technologies to improve performance and reduce costs continues to gain momentum.
    - Some examples of digital initiatives in the customer domain that contribute to operational excellence and cost optimization include opening new digital interaction channels and providing customers with an up-to-date insight into emergency restoration activities.
  - Data analytics, artificial intelligence (AI) and the Internet of Things (IoT) rank at the top of game-changing technology areas for utility businesses. Cloud also remained in contention. There is an overall theme of the connection of monitoring and controlling an increased number of intelligent devices to linear networks of wires and poles.
  - The top two technology areas for increases in funding were business intelligence and cyber/information security. This is reflective of the bimodal nature of utility information and technology operations – gathering, analyzing and acting on asset and customer information, while protecting it from an ever-increasing threat universe.
  - Customer experience is the third area of increased funding.
  - Survey results also indicate that utilities as a group are behind other industries in modernizing legacy systems of record. This is apparent in the benchmark peer group results where there are varying levels of application investment.

Executive Summary
Discussion of Opportunities

- The benchmark results indicated that Hydro Ottawa has a number of initiatives to support optimization and transformation. This is in line with Gartner Research findings and recommendations:
  - According to Gartner Research, utility information and technology budgets will increasingly shift from maintaining infrastructure and applications for on-premises delivery toward digital initiatives that support optimization of the core business processes and digitally enabled innovation and transformation. Consequently, restructure your IT investment portfolio to reduce the run-the-business portion and increase emphasis on the grow and transform portions of your IT budget. Hydro Ottawa data for fiscal 2018 reflects this shift.
  - Utilities will have to maintain the balance between addressing trends that drive and enable traditional utility business process optimization and those that address the need for digital innovation initiatives and considerations. Reliable service mandates remain.
  - With the number of projects underway, consider the following best practices to keep efforts on track and maximize benefits:
    - Manage stakeholder expectations carefully due to the number of transformation and modernization initiatives currently underway. It will take time as well as stakeholder involvement and senior management sponsorship to fully implement projects and realize the benefits.
    - Conduct a project portfolio review if needed to understand metrics such as the number of mandatory projects, number of transformation projects, number of growth projects, etc.
    - Ensure that the impact of new projects on ongoing operating expenses (full total cost of ownership) is understood. According to Gartner Research, new capital projects add 25 percent annually to operating expenses on average.
    - Measure benefits realized from transformation projects. Develop a small set of meaningful metrics, such as business productivity improvement, improvement maintenance, customer impact.

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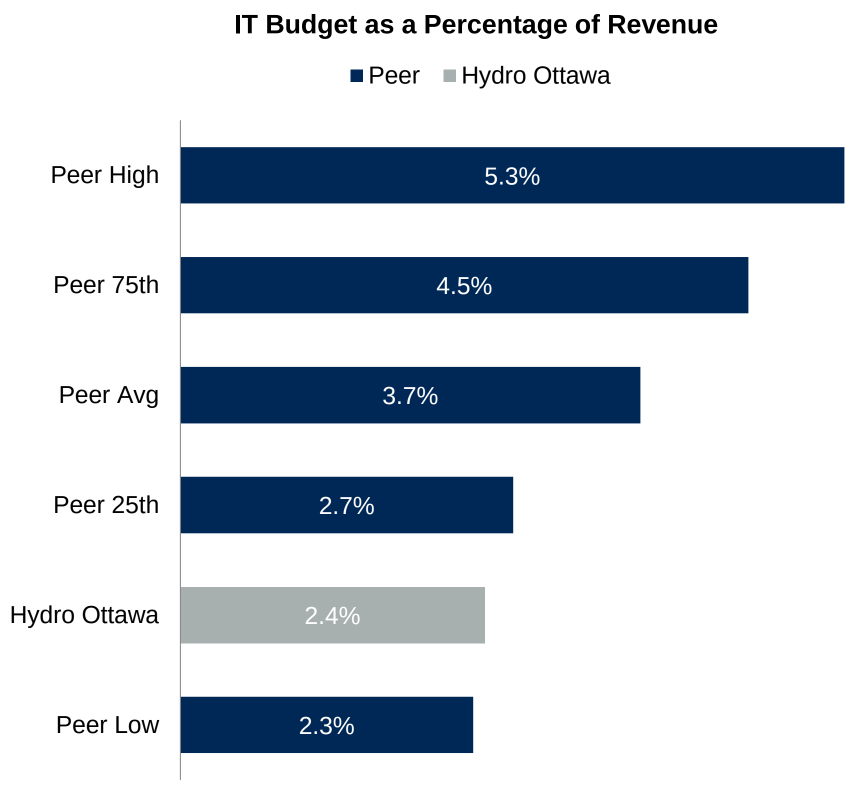
Executive Summary
Discussion of Opportunities

- Maintaining and accelerating the transformation roadmap will depend on ensuring that the information and technology operating model aligns with the organization's digital ambition. Best practices include:
  - Assess the current strategy and execution maturity level to determine alignment with digital ambition. Identify any gaps between the current and target state and develop plans to fill the gaps. For many utilities gaps exist in the following:
    - Talent and workforce: may need new skills and capabilities, such as in data analytics or the Internet of Things (IoT). Other capabilities include Cloud and vendor management.
      - With a cloud emphasis in Hydro Ottawa, a review of skills and capabilities is suggested. Best practices to realize benefits include investments in cloud strategy and architecture, cloud product management and cloud financial expertise.
    - How work gets done – there is a movement toward digital product management and business-IT product teams.
    - Financial models to enable more spending on innovation and more operating expense associated with I&T (versus capital expense). Results suggest Hydro Ottawa has taken action on this.
    - The organization's culture will need to become more innovative and take on a greater degree of risk while maintaining stability and reliability. Movement beyond digital optimization toward digital transformation requires business involvement. This widens the scope and complexity of organizational change management required.

Gartner

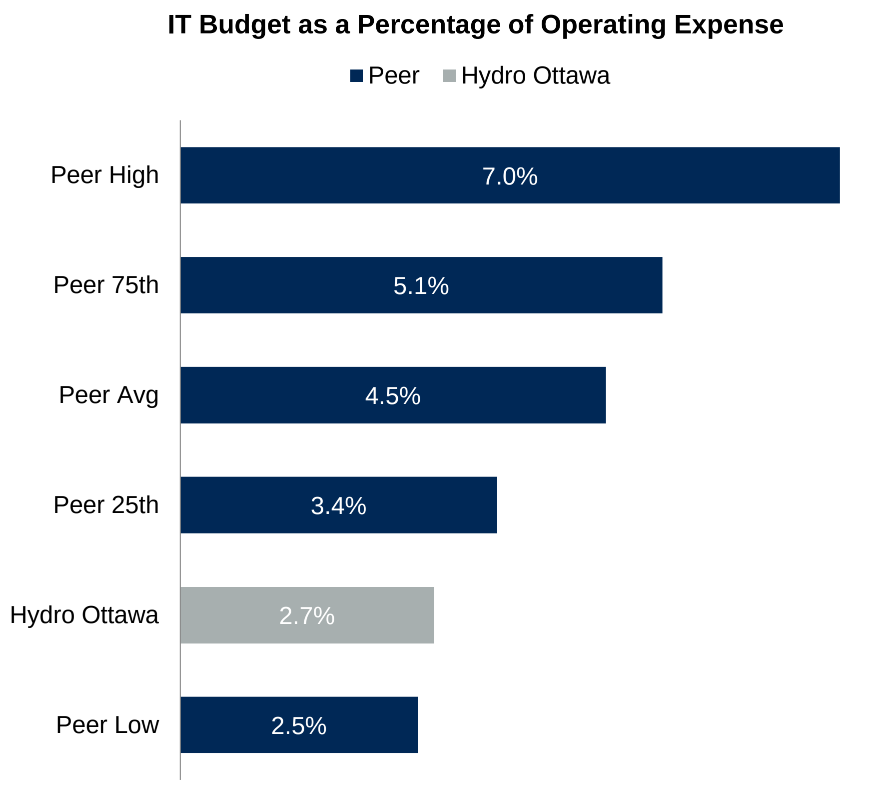
IT Budget Assessment Detailed Results

IT Budget as a Percentage of Revenue



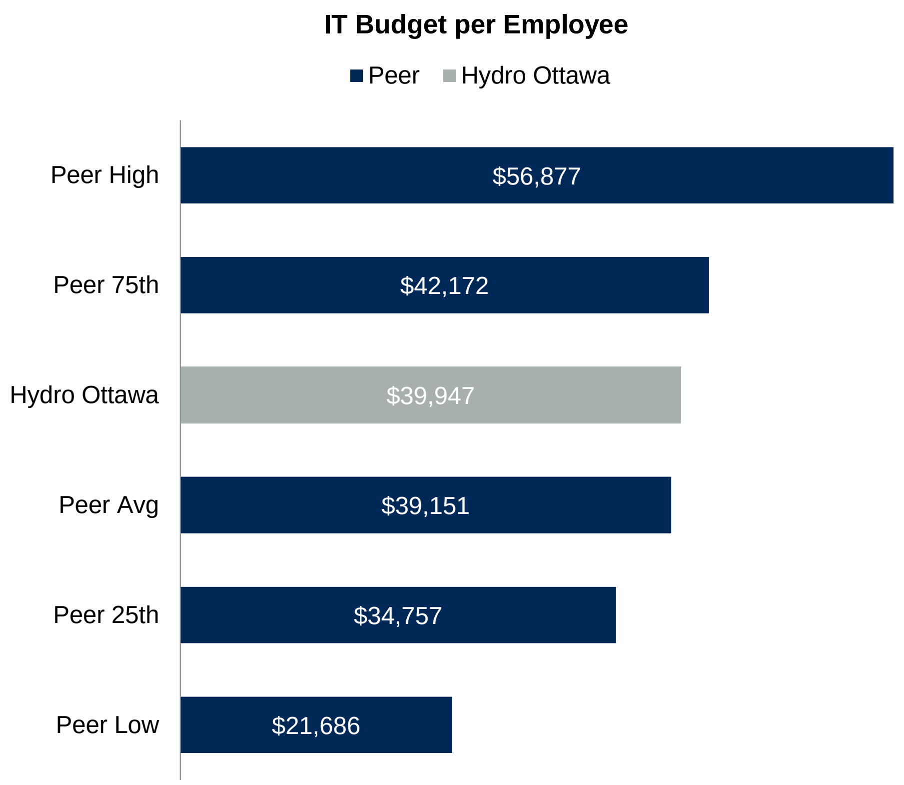
- IT budget as a percentage of revenue is a common measure of IT's role in the business, and a measure to assess the comparative level of spending with industry peers.
- Being above or below average does not necessarily mean spending is "too high" or "too low," but significant variances should be analyzed to justify spending levels (e.g., investment in business transformation). Low investment could indicate underserved business needs.
- Hydro Ottawa is below the average and the 25th percentile of the peer group.
- Definitions:
  - Calculation: IT Budget/Organization Revenue
  - Revenue includes power recovery in order to match Gartner definitions
  - IT Budget includes capital and operations spending for technology during the study period, including labour, software, hardware, telecommunications expenses

IT Budget as a Percentage of Operating Expense



- IT budget as a percentage of operational expenses provides a view of the role IT plays in business spending patterns. The greater the amount of operating expenses is dedicated to IT, the greater the business will require visibility into IT investments. For most organizations in the utility industry, technology enables business processes throughout the organization.
- Hydro Ottawa is below the average and 25th percentile of the peer group.
- Definitions:
  - IT Budget/Organization Operating Expenses
  - Operating Expenses includes cost of power in order to match Gartner definitions
  - IT Budget includes capital and operations spending for technology during the study period, including labour, software, hardware, telecommunications expenses

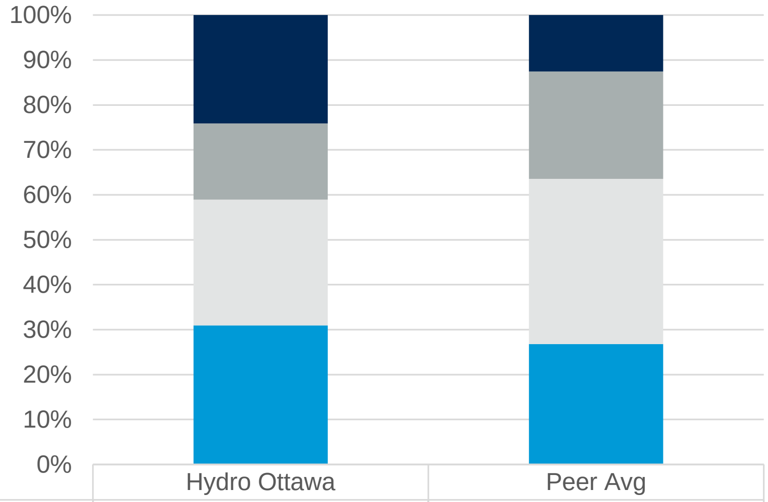
IT Budget per Employee



- IT budget per employee provides insight into the amount of technology support an organization's workforce receives.
- High spending can imply higher levels of automation and/or higher investment in IT in general. Low spending levels can be related to higher overall staffing levels and/or lower IT investment than peers.
- Large variations within industry groups can represent different business models for service or product delivery.
- Hydro Ottawa budget per employee is similar to the peer group average.
- Hydro Ottawa has fewer organization employees than the peer group average. Differences in this metric between Hydro Ottawa and the peer group appear to be driven by the differences in employee numbers.
- Definitions:
  - IT Budget/Organization Employees
  - Organization Employees includes Hydro Ottawa employees
  - IT Budget includes capital and operations spending for technology during the study period, including labour, software, hardware, telecommunications expenses

IT Budget Distribution by Cost Category

IT Budget Distribution by Cost Category

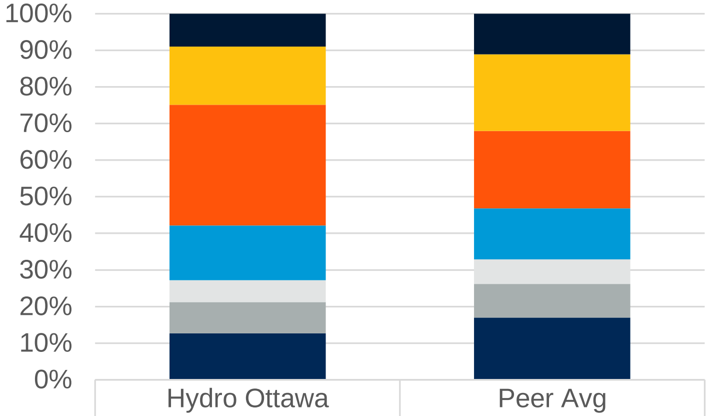


	Hydro Ottawa	Peer Avg
Hardware	24%	13%
Software	17%	24%
Personnel	28%	37%
Outsourcing	31%	27%

- During fiscal 2018 Hardware and Outsourcing costs are higher than Hydro Ottawa's run-rate due to a long-term investment in a fibre optic infrastructure project.
- This measure can be helpful in adding context to the IT investment strategy from a sourcing perspective, in terms of accounting-based resources that may be insourced (for example, IT hardware, software, personnel and occupancy/facilities costs) versus services delivered by a third party (for example, outsourced services and data/voice transmission costs).
- As an organization increases or decreases the level of third-party/outsourced services, it may find an inverse effect in its associated personnel, hardware and/or software expenditures, depending on the scope of third-party services retained and on business requirements.
- The cyclical nature of capital investments in IT hardware and software may also play a significant role in an organization's IT spending outlay.
- Definitions:
  – Allocates the IT budget among the different asset categories

IT Budget Distribution by Area

IT Budget Distribution by Area

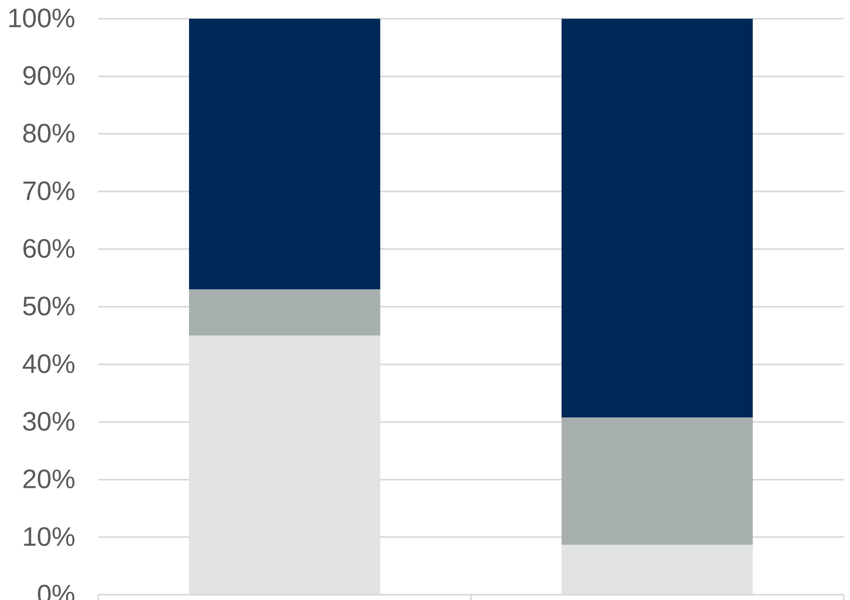


	Hydro Ottawa	Peer Avg
IT Management and Administration	9%	11%
Application Support	16%	21%
Application Development	33%	21%
Voice and Data	15%	14%
Service Desk	6%	7%
End User Computing	9%	9%
Enterprise Computing	13%	17%

- During fiscal 2018 End User Computing costs are higher than Hydro Ottawa's run-rate due to peripheral replacements in preparation for Hydro's Facilities Renewal Program.
- The distribution of IT budget spending into these categories helps to define the relative level of IT resources required per year to support the technology environment portfolio.
- This is often leveraged in tandem with IT resource planning exercises, wherein spending and staff resource allocations can be viewed in terms of IT infrastructure (data center, end-user computing, IT service desk, voice and data network) versus applications (application development and application support) versus IT overhead (IT management, IT finance and IT administration).
- While this measure is helpful in identifying relative volumes of IT resource consumption by IT functional area, as compared to industry, it does not aid in identifying whether resources are being leveraged in a cost-effective or productive manner.
- Definitions:
  - Allocates the IT budget among the different functional areas

IT Budget Distribution by Run, Grow and Transform

IT Budget Distribution – Run, Grow and Transform



	Hydro Ottawa	Peer Avg
Run	47%	69%
Grow	8%	22%
Transform	45%	9%

- The distribution of IT spending to “run”, “grow” and “transform” the business provides a view of the investment profile in business terms (how IT will enable the business to grow or transform revenue, operating income and/or profit margins). Hydro Ottawa has a lower allocation to run compared to the peer group average.
- A common misconception with this measure is that an IT initiative that may transform the IT organization, such as data center modernization, should be classified as a "transform the business" investment. While these IT initiatives do transform the IT organization, they should primarily be classified as "run the business" investments because they support pre-existing IT services.
- IT transformation often leads to new business process improvements that enable the business to grow or build new revenue streams. Therefore, these costs would need to be evaluated and distributed based on IT service and business performance.
- Definitions:
  - Allocation of the IT budget by run, grow and transform categories
    - Run: Essential (and generally non-differentiated) business processes.
    - Grow: Improvements in operations and performance, within current business models
    - Transform: New markets, new products and new business models

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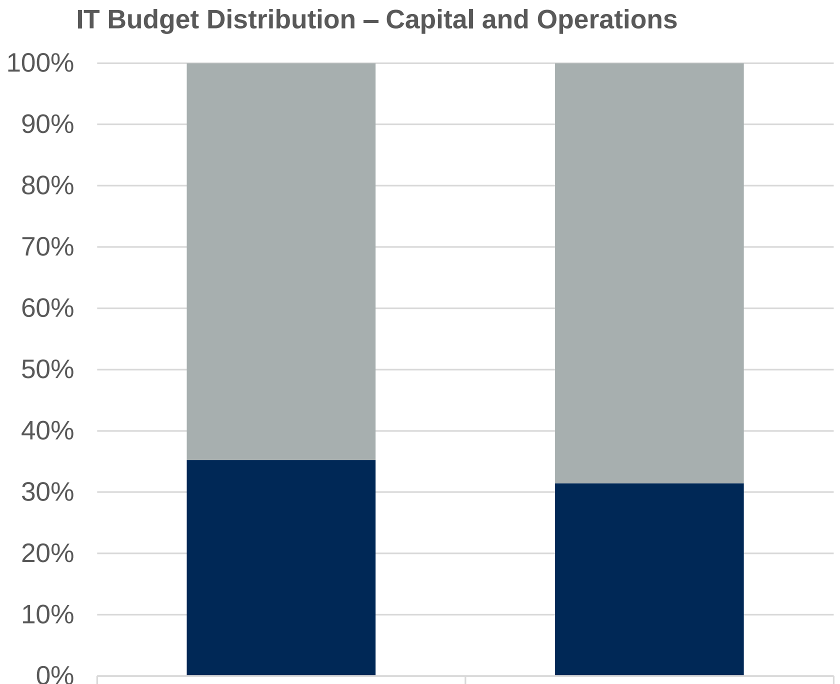
IT Budget Distribution by Capital and Operations



	Hydro Ottawa	Peer Avg
Operations	65%	69%
Capital	35%	31%

- Hydro Ottawa's capital allocation is focused on hardware with expenditures in data center, telecom, and other hardware refresh occurring in the 2018 fiscal period.
- This metric can provide visibility into the cyclical nature of capital investments (such as hardware, software and large service contracts) compared with recurring operational expenses (such as personnel, facilities and maintenance expenses).
- The challenge is in leveraging this information to communicate the linkage between IT investment and business results, because it is a traditional accounting view of IT cash flow and does not highlight how IT investment enables improved business performance.
- Cloud adoption and resulting variances in approaches to accounting can have an impact the capital and operations distribution. A shift to cloud may result in expenses that were previously capitalized now reported as ongoing expenses. Hydro Ottawa is using a cloud adoption approach that allows for capitalization.
- Definitions:
  - Distribution of IT capital and IT operations budget

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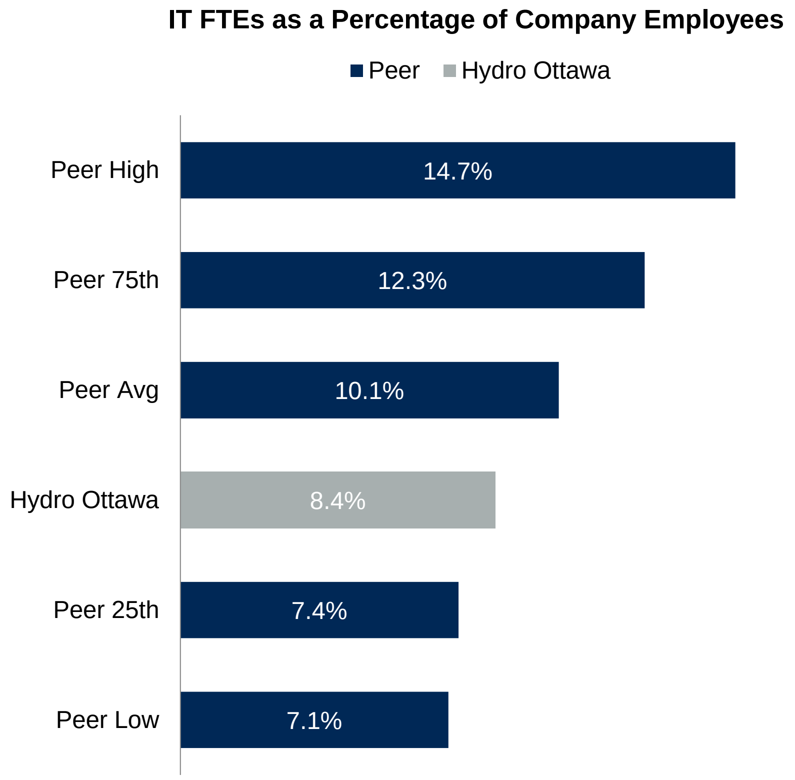
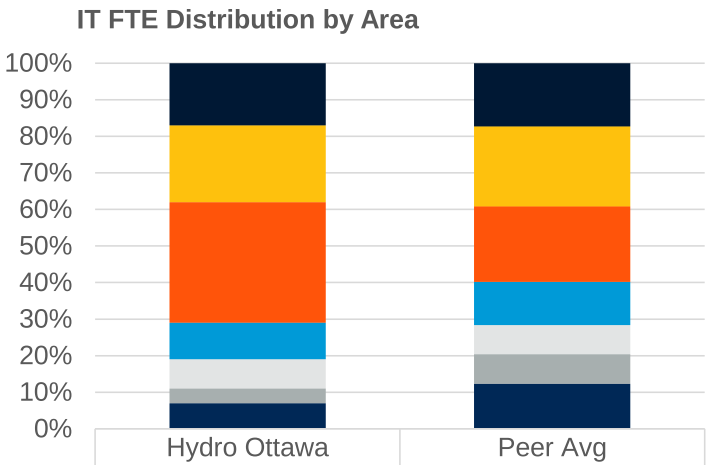
IT FTEs as a Percentage of Company Employees



- The percentage of IT employees in the organization compared to the total number of employees indicates the role IT support provides to the business. This measure can be heavily influenced, however, by the level of outsourcing an organization may have.
- The peer group is using less outsourcing than Hydro Ottawa on average as reflected in the distribution of the budget by category. The peer group also uses more contract staff augmentation for IT than Hydro Ottawa.
- Organizations using less outsourcing have a higher ratio of IT FTE as a percentage of company employees, since outsourcing contracts are not converted to full time equivalents.
- The peer group has a higher number of company employees on average compared to Hydro Ottawa.
- Definitions:
  - IT FTE/Company Employees
  - IT FTE includes in-house and contractor FTEs, does not include managed services adjusted FTEs
  - Company employees includes organization employees

IT FTEs Distribution by Area



	Hydro Ottawa	Peer Avg
IT Management and Administration	17%	17%
Application Support	21%	22%
Application Development	33%	21%
Voice and Data	10%	12%
Service Desk	8%	8%
End User Computing	4%	8%
Enterprise Computing	7%	12%

- By viewing human resources (IT FTEs) within the context of the total portfolio, organizations are able to identify which environment is the most labor-intensive as a percent of the IT labor pool. Typically, application activities (development and support) demand the most resources from both cost and staffing perspectives. The degree to which an organization outsources should be considered alongside such staffing metrics.
- Hydro Ottawa allocates more of the FTEs to applications development compared to the peer group average.
- Usage of managed services providers at Hydro Ottawa will impact the FTE distribution.
- Definitions:
  - Distributes the inhouse and contractor FTE among the functional areas

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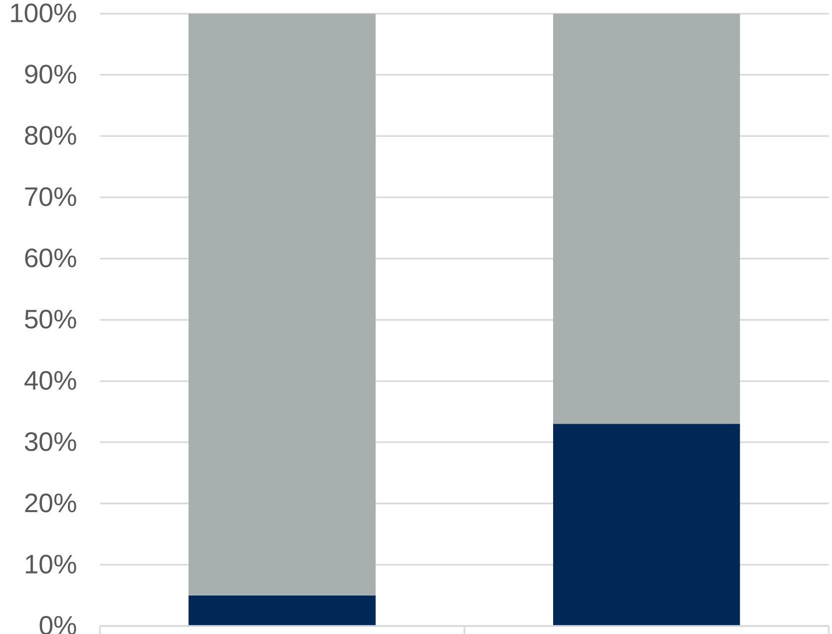
IT FTEs Distribution by Inhouse and Contractor

IT FTE Distribution – Inhouse and Contractor



	Hydro Ottawa	Peer Avg
Inhouse	95%	67%
Contractors	5%	33%

- The distribution of IT FTEs (insourced versus contractor) can help provide a view of the IT staffing strategy.
- IT contract labor or contractor usage can be an effective approach to maintaining flexibility and agility when business conditions are changing. However, keeping contractors for extended periods can be costly and limit process standardization.
- Hydro Ottawa uses less contractor/staff augmentation than the peer group average.
- Definitions:
  - Contractor FTE/Inhouse FTE
  - Contractors are staff augmentation, not outsourcing or managed service contract labour

RESTRICTED

Appendix

IT Budget Assessment Model
2019 CIO Survey
Suggested Gartner Research

IT Budget Assessment Model

- Organization Profile
- Organization Revenue and Expense
- Organization Company Employees
- IT Budget
  - IT Capital Investment
  - IT Operations Spending
- IT Staffing
  - Total FTE
  - Contractor Percentage

General Information	
Enterprise Name	
Primary Industry Classification	
Organizational Scope of This Assessment	
Currency of Financial Data Entered	Select Currency
Fiscal Year	
Fiscal Year End (Month)	
Organization Profile for:	-1
Annual Revenue	0
Business Operational Expense	0
Organization Profile for:	0
Total Employees	0
Total IT Budget for:	0
IT Capital Investment	0
IT Operational Budget	0
IT Depreciation & Amortization	0
Total IT Staffing for:	0
Total IT full time equivalents (include insourced and contractors)	0
What percent of the IT FTEs listed above are contractors?	0%

Refer to “Gartner IT Spending Instruction Guide.doc” for additional information

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IT Budget Assessment Model

- Distribution of IT Capital and Operations Budget
- Run, Grow and Transform Distribution
- Distribution of Spending by Functional Area/IT Domain
- Percentage of Support (FTE in-house and contractors) to Functional Areas/IT Domain

IT Spending Allocation

Of your total Capital and Operational IT Budget, what percent of your IT Budget listed above is spent on:

	0
Hardware	0%
Software	0%
Personnel Salaries & Benefits (incl. Occupancy)	0%
Outsourcing (incl. Transmission)	0%
Total should equal 100%	0%

What percent of your total Capital and Operational IT Budget is to Run, Grow, and Transform the Business?

	0
Run	0%
Grow	0%
Transform	0%
Total should equal 100%	0%

Of your total Capital and Operational IT Budget, what percent of your IT Budget listed above is spent on:

	Percent Budget	**Percent Support (Full Time Equivalents)**
Enterprise Computing and Storage	0%	0%
End-User Computing	0%	0%
IT Service Desk	0%	0%
Voice Network	0%	0%
Data Network	0%	0%
Application Development	0%	0%
Application Support	0%	0%
Corporate IT Management	0%	0%
IT Finance & Administration	0%	0%
Total should equal 100%	0%	0%

Refer to “Gartner IT Spending Instruction Guide.doc” for additional information

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Gartner Utilities CIO Survey

Top Priorities for 2018 and 2019

Percentage of Respondents

	Utilities (n = 87)		Top Performers (n = 225)		Typical Performers (n = 2,244)		Trailing Performers (n = 274)	
1	Digital	22%	Digital	31%	Digital	23%	Revenue/business growth	24%
2	Operational excellence	21%	Revenue/business growth	20%	Revenue/business growth	21%	Operational excellence	15%
3	Cost optimization/reduction	15%	Operational excellence	16%	Operational excellence	13%	Cost optimization/reduction	11%
4	Business model change	11%	Customer experience	11%	Customer experience	9%	Digital	10%
5	Industry-specific	11%	Data and analytics	7%	Cost optimization/reduction	8%	Business or financial goals	8%
6	Revenue/business growth	9%	New products and services	7%	Business or financial goals	7%	Modernization (of legacy systems)	7%
7	Customer experience	9%	Cost optimization/reduction	7%	Business model change	6%	Data and analytics	7%
8	Business or financial goals	8%	Artificial intelligence or machine learning	6%	Industry-specific	6%	Industry-specific	7%
9	ERP	6%	Business model change	6%	Data and analytics	5%	ERP	6%
10	Modernization (of legacy systems)	6%	Industry-specific	6%	New products and services	5%	Business model change	5%

Base: All answering, excluding "prefer not to answer"; n varies by segment
Showing the 10 most common answers per segment, coded open-text responses, multiple responses allowed
Q: What would you say is your organization's top priority for 2018 and 2019?
ID: 368223

Game-Changing Technologies

Percentage of Respondents

	Utilities (n = 99)		Top Performers (n = 230)		Typical Performers (n = 2,329)		Trailing Performers (n = 276)	
1	Data analytics (including predictive analytics)	33%	Artificial intelligence/ machine learning	40%	Artificial intelligence/ machine learning	25%	Artificial intelligence/ machine learning	24%
2	Artificial intelligence/ machine learning	26%	Data analytics (including predictive analytics)	23%	Data analytics (including predictive analytics)	25%	Data analytics (including predictive analytics)	21%
3	Internet of Things	17%	Cloud (including XaaS)	12%	Cloud (including XaaS)	10%	Cloud (including XaaS)	14%
4	Cloud (including XaaS)	10%	Digital transformation	10%	Internet of Things	10%	Internet of Things	11%
5	Automation	8%	Mobile (including 5G)	7%	Digital transformation	9%	Digital transformation	7%
6	Mobile (including 5G)	5%	RPA	6%	Mobile (including 5G)	6%	Industry-specific	5%
7	Business intelligence	4%	Internet of Things	6%	Automation	5%	Business intelligence	5%
8	Industry-specific	3%	Blockchain	5%	Blockchain	4%	Automation	5%
9	RPA	3%	Automation	3%	Industry-specific	4%	Blockchain	5%
10	Information technology	2%	Information technology	3%	Business intelligence	3%	Mobile (including 5G)	5%

Base: All answering, excluding "prefer not to answer"; n varies by segment
Showing the 10 most common answers per segment, coded open-text responses, multiple responses allowed
Q: Which technology area do you expect will be a game changer for your organization?
ID: 368223

Gartner

Gartner Research References

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- “Utility Digital Transformation Primer for 2019,” Published: 5 February 2019 ID: G00375742
- “Top 10 Trends Driving the Utility Industry in 2019,” Published 26 February 2019 - ID G00382917
- “2019 CIO Agenda: Utility Industry Insights,” Published 15 October 2018 - ID G00368223
- “Is Your Current I&T Operating Model Right for Your Digital Ambition?” Published: 29 June 2018 ID: G00356906
- “Use Gartner Frameworks to Align Utility I&T Operating Models With Enterprise Business Models,” Published 22 October 2018 - ID G00368105 -
- “5 Utility CIO Actions to Accelerate Your CloudFirst Strategy,” Published: 21 February 2018 ID: G00351253
- “What CIOs Need to Know About Cloud Computing Roles and Competencies,” Refreshed 2 February 2018, Published 18 August 2016 - ID G00310409

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HEALTH WEALTH CAREER

2019 MARKET BENCHMARKING

HydroOttawa

TABLE OF CONTENTS

INTRODUCTION

- As part of the Total Compensation Program Review, Hydro Ottawa has asked Mercer Canada ("Mercer") to conduct a market benchmarking review to assess the competitiveness of Hydro Ottawa's average salaries and target total cash compensation for its unionized and management group roles against relevant market comparators.
- As such, Mercer has used data from 2019 Canadian Mercer benchmark databases as well as MEARIE data (as provided by Hydro Ottawa) from 2016 for the management positions, and from 2017, 2018 and 2019 for the unionized positions to conduct its review.
- In addition, Mercer reviewed the employer-paid portion of insurance and wellness benefits, as well as pension, paid to all positions within the organization. This information was used to calculate the cost of benefits as a percentage of payroll, and compared to typical market norms.

METHODOLOGY
DATA SOURCES & DATA CONFIDENTIALITY

Market Data Sources

- The market review was conducted using data from the following published survey sources:

Survey Source	Data Cuts
2019 Canadian Mercer Benchmark Database ("MBD")	All MBD data; **Excluding** Mining
Mercer Ontario Society of Professional Engineers (OPSE) National Engineering Survey	All National Engineering data
MEARIE Survey Data ("MEARIE")	All Organizations

- MBD and National Engineering survey data is effective 2019 and has not been aged
- MEARIE survey data is effective 2016, 2017, 2018 and 2019 and has been aged by a total of 8.00%, 5.06%, 2.8% and 0% respectively to reflect the annual median salary increases since 2017 (as reported in Mercer's *Compensation Planning Surveys)*
- Throughout this report, data is incumbent-weighted and reported in thousands of dollars

Hydro Ottawa Data

- The average salary for each position at Hydro Ottawa has been used to compare positions to the market median job rate (P50)

Data Confidentiality

- To ensure statistical integrity and maintain data confidentiality, Mercer's standard reporting procedures do not report results where there are an insufficient number of observations; Mercer's standard reporting requirements are:
  - Three organizations to report a market average (mean)
  - Four organizations to report a median (50th percentile); and
  - Five organizations to report a quartile (25th and 75th percentiles)

EXECUTIVE SUMMARY

- Fifteen (15) jobs were reviewed including those core to the business, as well as technical, professional and para-professional roles that support the business. The jobs included in the study are representative of both management and non-management with five (5) management jobs and ten (10) non-management jobs at different levels of each category reviewed.
- The jobs that are core to the operational business – Manager, Distribution Operations, Supervisor, Distribution Operations, Professional Engineer and the trades jobs of Power Line Technician and System Operator were all found to be very well aligned with the utility market comparators and, in the case of the Professional Engineer job, also with the general industry market comparators.
- Some jobs, generally unionized support roles, were found to be higher than the general industry market comparators but in most cases were still at market (+/-10%) of P50 of the utility market comparators.
- Key professional roles such as Senior Procurement Agents, Management Accountants, Network Administrators were also found to be very well aligned with both the utility and general industry market comparators.
- Employer-paid benefits (i.e. insurance and wellness benefits and pension contributions) are generally aligned with what is typically seen in the market for non-executive employees. Specifically, when compared to the Ontario Public Sector where such benefits account for 20% to 22% of base salary, Hydro Ottawa's benefits were found to be within 19% to 21% of base salary.

MARKET BENCHMARKING

MARKET BENCHMARKING RESULTS

Incumbent(s) below market (< 10%)
Incumbent(s) within +/- 10% of the market
Incumbent(s) above market (> 10%)

- The table below compares Hydro Ottawa's average salary for each job against the market's job rate and target total cash compensation (base salary + short-term incentive).

All compensation data in $CAD (000's)

			JOB RATE[1]						TARGET TOTAL CASH COMPENSATION					
HYDRO OTTAWA POSITION TITLE	BENCHMARK POSITION TITLE	Data Source	Hydro Ottawa	P25	P50	P75	AVG	As % of P50	Hydro Ottawa	P25	P50	P75	AVG	As % of P50
Manager, Distribution Operations	No Match	MBD	$117	--	--	--	--	--	$129	--	--	--	--	--
	Manager Operations	MEARIE		$111	$121	$125	$119	97%		$118	$126	$134	$126	102%
Supervisor, Distribution Operations	No Match	MBD	$110	--	--	--	--	--	$110	--	--	--	--	--
	Line Supervisor	MEARIE		$103	$105	$110	$106	105%		$106	$110	$113	$109	100%
Distribution Engineer	Electrical Engineering - Senior Professional (P3)	MBD	$103	$91	$98	$104	$100	105%	$103	$87	$100	$116	$104	103%
	Project Engineer	MEARIE		$101	$104	$109	$104	99%		$101	$104	$109	$105	99%
System Operator	No Match	MBD	$97	--	--	--	--	--	$97	--	--	--	--	--
	System Control Operator	MEARIE		$89	$93	$100	$94	104%		--	--	--	--	--
Network Administrator	IT Data/Voice Network Administration - Senior Professional (P3)	MBD	$94	$75	$89	$91	$85	105%	$94	$84	$93	$102	$94	101%
	Systems / Program Administrator or Applications / Systems Support Professional	MEARIE		$81	$90	$102	$92	104%		$82	$92	$107	$94	102%
Powerline Technician	Electrical Engineering Technologist/Technician - Senior Para-Professional (S3)	National Engineering	$90	$80	$86	$93	$86	104%	$90	$77	$88	$90	$84	103%
	Lineperson	MEARIE		$86	$88	$92	$88	102%		--	--	--	--	--
Management Accountant	Accounting - Senior Professional (P3)	MBD	$91	$81	$88	$98	$88	104%	$91	$82	$92	$109	$95	99%
	Accountant	MEARIE		$94	$101	$108	$101	90%		--	--	--	--	--
Communications Advisor	General Communications & Corporate Affairs - Experienced Professional (P2)	MBD	$84	$66	$73	$78	$73	115%	$84	$61	$74	$85	$74	114%

"--" indicates insufficient market data

1. *Base Salary used instead of job rate for National Engineering survey as job rates are not collected*

MARKET BENCHMARKING RESULTS (CONT.)

Incumbent(s) below market (< 10%)
Incumbent(s) within +/- 10% of the market
Incumbent(s) above market (> 10%)

- The table below compares Hydro Ottawa's average salary for each job against the market's job rate and target total cash compensation (base salary + short-term incentive).

All compensation data in $CAD (000's)

			JOB RATE[1]						TARGET TOTAL CASH COMPENSATION					
HYDRO OTTAWA POSITION TITLE	BENCHMARK POSITION TITLE	Data Source	Hydro Ottawa	P25	P50	P75	AVG	As % of P50	Hydro Ottawa	P25	P50	P75	AVG	As % of P50
Supervisor, Billing & Supervisor, Collections	Blend[2]	MBD	$88	$68	$71	$84	$75	125%	$88	$68	$75	$85	$76	117%
	Supervisor Customer Service and/or Billing and/or Collections	MEARIE		$91	$97	$101	$95	91%		$91	$100	$104	$98	88%
Senior Procurement Agent	Procurement - Experienced Professional (P2)	MBD	$77	$70	$77	$84	$78	100%	$77	$64	$77	$91	$79	100%
Warehouse Attendant	Warehouse Shipping & Receiving - Senior Para-Professional (S3)	MBD	$75	$50	$54	$85	$65	138%	$75	$51	$60	$82	$67	125%
	Stockkeeper	MEARIE		$67	$73	$78	$73	103%		--	--	--	--	--
IT Service Desk Technician	General IT User Support - Entry Professional (P1)	MBD	$73	$54	$58	$65	$59	127%	$73	$53	$61	$71	$64	121%
	Systems / Program Administrator or Applications / Systems Support Professional	MEARIE		$81	$90	$102	$92	81%		$82	$92	$107	$94	80%
GIS/CAD Technician	Geographic Information Systems (GIS) - Entry Professional (P1)	MBD	$69	--	$73	--	$68	95%	$69	--	$65	--	$65	106%
	Technical DraftsPerson	MEARIE		$57	$61	$64	$61	112%		--	--	--	--	--
Customer Contact Agent	General Customer Service - Experienced Para-Professional (S2)	MBD	$60	$45	$49	$51	$50	123%	$60	$41	$46	$53	$48	129%
	Blend[3]	MEARIE		$58	$62	$69	$63	98%		--	--	--	--	--
Billing Service Associate	Billing & Invoicing - Experienced Para-Professional (S2)	MBD	$59	$44	$49	$55	$49	121%	$59	$43	$48	$56	$50	123%
	Billing Clerk/ Cust Accts Rep	MEARIE		$60	$64	$69	$63	92%		--	--	--	--	--

"--" indicates insufficient market data
2. Blend of Billing & Invoicing - Team Leader (Para-Professionals) (M1) and Credit & Collections - Team Leader (Para-Professionals) (M1)
3. Blend of Customer Service Rep. and Customer Service Clerk

EMPLOYER PAID BENEFITS

EMPLOYER PAID BENEFITS
BENEFITS COSTING

- Hydro Ottawa provided Mercer with the employer-paid portion of insurance and wellness benefits, as well as pension, paid to all positions within the organization. As seen below, the positions have been grouped by their level and as a result, benefit costs and base salaries have been averaged accordingly.

Benefit	Employee Group			
	Upper Management - Levels 5 and 6	Middle Management - Levels 3 and 4	Union Members – Levels 5, 6, and 7	Union Members – Levels 2, 3, and 4
Average Insurance (Health, Dental, Vision, etc.)	$8,791	$8,326	$7,695	$7,743
Average Wellness Spending	$45	$45	$45	$45
Average Contribution to Pension Plan	$14,728	$11,225	$9,606	$7,140
Average Total Cost of Benefits	**$23,564**	**$19,596**	**$17,616**	**$14,928**
Average Annual Salary (all employees)	**$122,899**	**$98,899**	**$87,808**	**$70,838**
As a Percentage (%) of Median Base Salary	**19%**	**20%**	**20%**	**21%**

Normative Comparative Reference Point (as a % of base salary)

Ontario Public Sector:
- Non-executive employees = 20-22%

Observations:
- Hydro Ottawa benefits offerings are generally aligned with what we typically see in the market.

Positioning is slightly below the reference point for the "Upper Management" group by 1%.

JOB MATCHES – HYDRO OTTAWA AND MBD

BENCHMARK MATCHES

Client Name POSITION #	Client Name TITLE	MBD Code	MBD Position title	Description MBD	Job Family	Career Stream	Mearie Code
1	Manager, Distribution Operations	none	--	--	--	--	Manager Operations
2	System Operator	none	--	--	--	--	System Control Operator
3	Distribution Engineer	ENS.03.015.P30	Electrical Engineering - Senior Professional (P3)	Electrical Engineering researches, develops, designs, and tests electrical components, equipment, systems, and networks. Designs electrical equipment, facilities, components, products, and systems for commercial, industrial, and domestic purposes.	Engineering & Science	Professional	Project Engineer
4	Supervisor, Distribution Operations	none	--	--	--	--	Line Supervisor
5	Network Administrator	ITC.08.031.P30	IT Data/Voice Network Administration - Senior Professional (P3)	IT Data/Voice Network Administration work focuses on planning the network implementation, determining physical and logical layouts, installing, configuring, and maintaining ICT data and voice networks including: •Meeting end user needs by ensuring the uptime, performance, resource availability, and security of the networks managed within established budgets and operational guidelines •Determining and diagramming the physical layout which illustrates the physical location of and the connections between devices participating on the network •Determining and diagramming the logical layout which documents the communication protocols (e.g., IP, TCP, POP3, etc.) and type of service/application (email, file transfer, web browsing, etc.) for each segment of the network •Automating routine tasks using scripting and writing basic computer programs to address more complex systems software configuration and enhancement	IT, Telecom & Internet	Professional	Systems / Program Administrator or Applications / Systems Support Professional
6	Powerline Technician	ENS.10.038.S30	Electrical Engineering Technologist/Technician - Senior Para-Professional (S3)	Responsible for supporting the development, design, and testing of electrical components, equipment, systems, and network that includes facilities, components, products, and systems for commercial, industrial, and domestic purposes. Specialization Match Note: Technologists apply engineering principles in the implementation of products, systems, and processes. This differs from Engineers who use theoretical aspects of engineering principles to research and conceptually design products, systems, processes, etc. Some countries may require Technologists to have a formal certification or registration and/or a formal Technologist Degree to practice as a Technologist. Professional Technicians have a Technical Degree and some incumbents have a combination of both education/experience. Para-Professional Technicians are	Engineering & Science	Para-Professional	Lineperson
7	Communications Advisor	CCA.02.001.P20	General Communications & Corporate Affairs - Experienced Professional (P2)	General Communications & Corporate Affairs includes work managed or performed across multiple Communications & Corporate Affairs sub-families. Specializations in this sub-family typically perform work related to both internal and external communications, including developing the content for and producing written and visual communications. The internal portion of the work is focused on company-wide communications to employees related to organization values/strategy/performance and employee programs, policies, and tools. The external communications portion of the work includes aspects of one or more of the following: •Public Relations •Government Relations •Community Relations/Corporate Responsibility •Investor Relations In some organizations, incumbents may also develop materials for marketing/advertising communications.	Communications & Corporate Affairs	Professional	

BENCHMARK MATCHES

Client Name POSITION #	Client Name TITLE	MBD Code	MBD Position title	Description MBD	Job Family	Career Stream	Mearie Code
8	Management Accountant	FIN.06.001.P30	Accounting - Senior Professional (P3)	Accounting includes work across multiple areas of Accounting including: •Ensuring compliance with financial transaction recording standards (e.g., general ledger, cash payments/collections, tax transactions, etc.) •Control/reconciliation of accounts and records (balance sheet, P&L, bank accounts, etc.) •Accounting reports/schedules for internal audiences (management reporting) and/or for external audiences (compliance reporting) including consolidation of financial statements, cash flow reporting, budget reporting, etc.) In some organizations, Accounting work may also include: •Cost accounting/budgeting (allocation of direct/indirect costs, variance analysis, budget preparation, etc.) •Accounts Payable/Receivable and/or Credit & Collections	Finance	Professional	Accountant
9	Supervisor, Billing & Supervisor Collections	FIN.09.005.M10	Billing & Invoicing - Team Leader (Para Professionals) (M1)	Billing & Invoicing work is focused on designing and ensuring compliance with billing and invoicing processes including: •Information verification (e.g., ensure accuracy of billing information, negotiated terms and compliance with current legislation) •Monitoring customer accounts (e.g., ensure payments made on time, report on overdue accounts, etc.) •Resolving billing discrepancies (e.g., investigate and resolve billing & invoicing errors, recommend process improvements to avoid future errors, etc.) •May include collections activities Specialization Match Note: Para-Professional incumbents verify information (e.g., ensure accuracy of billing information, negotiated terms, etc.) and complete invoice data entry.	Finance	Management	Supervisor Customer Service and/or Billing and/or Collections
		FIN.10.001.M10	Credit & Collections - Team Leader (Para Professionals) (M1)	Credit & Collections work is focused on administering, designing, and ensuring compliance with credit and collections processes including: Credit •Researching credit history (e.g., collect personal/business data for analysis, run credit reports, etc.) •Applying acceptable credit lines and payment terms to new customer and/or supplier accounts Collections •Collection and maintenance of customer accounts (e.g., track account status, report on outstanding balances, prioritize collection activity) •Follow up overdue accounts (e.g., initiate demand letters, outbound phone calls to delinquent accounts, external debt collection, etc.)	Finance	Management	Supervisor Customer Service and/or Billing and/or Collections
10	Senior Procurement Agent	SCN.03.001.P20	Procurement - Experienced Professional (P2)	Accountable for obtaining goods/services required by the organization including: •Indirect Operations (e.g., Office Supplies, Computers, Travel, Maintenance, Machine Parts, etc.) •Direct Operations (e.g., Raw Materials and Services for Manufacturing, Production or Construction; Products for Retail, etc.) Procurement processes include: •Product/Service Sourcing •Supplier Selection •Pricing/Terms Negotiation •Order Processing •Contract Administration •Supplier Performance Management •May include Strategic Sourcing Specialization Match Note: Para-Professional incumbents administer the transactions associated with obtaining goods and services and do not negotiate pricing or terms.	Supply Chain	Professional	
11	Warehouse Attendant	SCN.05.029.S30	Warehouse Shipping & Receiving - Senior Para-Professional (S3)	Warehouse Shipping & Receiving includes: •Receiving/inspecting goods and verifying items against the shipment record •Gathering, verifying, and packing items for shipment according to specifications and the applicable transportation method •Recording received and shipped items	Supply Chain	Para-Professional	Stockkeeper
12	IT Service Desk Technician	ITC.10.001.P10	General IT User Support - Entry Professional (P1)	Responsible for providing day-to-day technical support to employees for a range of hardware and software related systems. Responds to and diagnoses problems through discussion with users, which includes trouble shooting, fault rectification and problem escalation. Provides effective and timely resolution of users' problems, queries or complaints. Assists in hardware and software evaluation and recommends upgrades or improvements to IT infrastructure.	IT, Telecom & Internet	Professional	Systems / Program Administrator or Applications / Systems Support Professional

BENCHMARK MATCHES

Client Name POSITION #	Client Name TITLE	MBD Code	MBD Position title	Description MBD	Job Family	Career Stream	Mearie Code
13	GIS/CAD Technician	ENS.08.001.P10	Geographic Information Systems (GIS) - Entry Professional (P1)	Develops and maintains geospatial databases. Uses GIS to perform spatial analysis, database development, extraction and manipulation. Converts data received from internal and external sources to make them usable in the GIS. Maintains metadata and documentation, performs topology checks and other data quality checks to identify and correct errors or omissions in data	Engineering & Science	Professional	Technical Draftsperson
14	Customer Contact Agent	CSV.02.001.S20	General Customer Service - Experienced Para-Professional (S2)	General Customer Service includes post-sale technical and/or non-technical customer service and support across multiple sub-families for business and/or end-consumer customers including: Remote Customer Service: Providing customer service and support via phone, online chat, or text including: •Call center-based customer support in response to a high volume of low complexity inquiries •Customer issues analysis and resolution (typically performed in an office environment) in response to a lower volume of higher complexity inquiries Distribution Center Customer Service: Performed in a distribution center, product returns/repair center, or field walk-in customer service facility including: •Acting as liaison between customers, production and distribution departments related to specific customer orders •Providing technical and non-technical customer support in a walk-in service center Incumbents matching to this specialization are not	Customer Service & Contact Center Operations	Para-Professional	Blend of Customer Service Rep. and Customer Service Clerk
15	Billing Service Associate	FIN.09.005.S20	Billing & Invoicing - Experienced Para-Professional (S2)	Billing & Invoicing work is focused on designing and ensuring compliance with billing and invoicing processes including: •Information verification (e.g., ensure accuracy of billing information, negotiated terms and compliance with current legislation) •Monitoring customer accounts (e.g., ensure payments made on time, report on overdue accounts, etc.) •Resolving billing discrepancies (e.g., investigate and resolve billing & invoicing errors, recommend process improvements to avoid future errors, etc.) •May include collections activities Specialization Match Note: Para-Professional incumbents verify information (e.g., ensure accuracy of billing information, negotiated terms, etc.) and complete invoice data entry.	Finance	Para-Professional	Billing Clerk/ Cust Accts Rep

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PRODUCTIVITY AND CONTINUOUS IMPROVEMENT INITIATIVES

1. INTRODUCTION

Numerous aspects of the Renewed Regulatory Framework ("RRF") underscore the OEB's firm expectations for continuous improvement and productivity on the part of rate-regulated utilities. For example, in its description of the second core category of performance outcomes under the RRF, Operational Effectiveness, the OEB articulates its vision that "continuous improvement in productivity and cost performance is achieved; and utilities deliver on system reliability and quality objectives."[1] Similarly, the *Handbook for Utility Rate Applications* reinforces the understanding that "a key objective of incentive regulation is to drive productivity improvements within the utilities."[2] Furthermore, the various rate-setting methods that are made available under the RRF apply a productivity factor to electricity distributors which is derived from industry productivity trends determined by the OEB. These productivity factors are entrenched in the rate adjustment mechanisms governing utility proposals and reflect the OEB's expectation that standard business practice for distributors will involve the achievement of incremental productivity gains.

The information contained in this Schedule is intended to facilitate the OEB's assessment of the strength of Hydro Ottawa's productivity and continuous improvement initiatives, both past and future.

The summary set forth below is both retrospective and prospective in nature – i.e. surveying productivity and continuous improvement accomplishments from the 2016-2020 rate period, as well as identifying those that are planned for 2021-2025.

The scope of this Schedule covers both operations, maintenance and administration ("OM&A") expenditures as well as capital expenditures, and is anchored in Hydro Ottawa's understanding that the goal of productivity and continuous improvement initiatives is to achieve savings,

[1] Ontario Energy Board, *Report of the Board - Renewed Regulatory Framework for Electricity Distributors: A Performance-Based Approach* (October 18, 2012), page 2.
[2] Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 27.

efficiencies, and reductions, especially – but not exclusively – in relation to costs. Wherever possible, Hydro Ottawa has sought to quantify the benefits associated with the productivity or continuous improvement measure in question. While this has not been achievable in each instance, the utility has nevertheless been able to factor these initiatives in the aggregate into its proposed Custom Incentive Rate-Setting ("Custom IR") approach described in detail in Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework.

For purposes of formulating a holistic understanding of productivity and continuous improvement at Hydro Ottawa, in both historical and forward-looking contexts, this Schedule should be read in conjunction with the following pieces of evidence included in this Application:

- Attachments 1-1-10(A), 1-1-10(B), and 1-1-10(C): 2016, 2017, and 2018 Annual Summaries: Achieving Ontario Energy Board Renewed Regulatory Framework Performance Outcomes (respectively) – these Attachments consist of annual summaries of initiatives and outcomes from Hydro Ottawa's 2016-2020 rate plan which align with the performance outcome categories enshrined in the RRF. The bulk of the information included in these summaries is comprised of productivity and continuous improvement-related matters, and is therefore germane to the focus of this Schedule. Indeed, the content in the retrospective synopsis below of the utility's key productivity achievements from the 2016-2020 period draws heavily from these Attachments.

  In addition, Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework includes a comprehensive overview of the Custom Price Escalation Factor through which Hydro Ottawa is proposing to embed productivity gains into the annual rate adjustment mechanism for its 2021-2025 rate plan.

- Exhibit 1-1-11: Proposed Annual Reporting - 2021-2025 – this Exhibit provides details on the framework for performance measurement and reporting that Hydro Ottawa is proposing for its next Custom IR rate term. A critical component of this framework is a

Custom Performance Scorecard that is comprised of 26 measures which will track the utility's performance across key RRF outcome categories.

- Exhibit 2-4-3: Distribution System Plan – Section 4 of Hydro Ottawa's Distribution System Plan ("DSP") addresses performance measurement for continuous improvement. In addition, Attachment 2-4-3(E): Material Investments catalogues the numerous project and program proposals that meet the materiality threshold specified in OEB filing requirements. Productivity serves as a key driver for many of these proposals.

- Exhibit 4-1-2: Summary of Corporate Divisional Functions – this Exhibit describes the primary functions and activities of each Division within Hydro Ottawa. A concise narrative on the productivity agenda for each Division over the course of 2021-2025 is likewise included.

What's more, appended to this Schedule is the utility's *Digital Strategy*. This document identifies priorities and goals for leveraging information and operational technology in support of core business objectives over the coming five-year rate period. One of the principal themes anchoring the strategy is increasing productivity through greater automation of processes and platforms. Additional information on the Digital Strategy is provided in section 3.3.1 below. The document in its entirety can be found in Attachment 1-1-13(B).

As a final point of introduction, it merits observation that Hydro Ottawa has adopted numerous controls to provide the OEB, customers, and other stakeholders with robust assurance that productivity, cost control, and continuous improvement objectives have been firmly integrated into the utility's business planning process, and the resultant capital and operational plans, for the 2021-2025 rate period. These include, but are not limited to, the following:

- Internal Guidelines for 2021-2025 Priorities and Budgets – in preparing their plans and budgets for the five-year rate term, each Division within the utility was mandated to demonstrate productivity savings in a quantitative and/or qualitative fashion and to identify initiatives dedicated to continuous improvement. Please see Attachment 1-1-9(A): Corporate Memorandum - 2020-2025 Priorities and Budget Guidelines for details.

- Custom IR Framework – the Custom Price Escalation Factor utilized in this Application will embed productivity savings for customers by capping any increases to operational funding. The productivity escalator that has been applied to OM&A expenditure levels for 2022-2025 is 2.51%. As a result, OM&A spending was reduced by approximately $13.1 million over the term of the Custom IR rate plan. (For more details on projected OM&A expenditures for the upcoming five-year rate term, please see Exhibit 4-1-1: Operations, Maintenance and Administration Summary).

- Performance Management Framework – Hydro Ottawa will continue to administer a framework that ensures accountability in the monitoring and reporting of corporate productivity against a defined set of targets and metrics. Instrumental in this effort will be the sustained use of a customized Corporate Productivity Scorecard, wherein the utility has established relevant key performance indicators ("KPIs") that are monitored for the purpose of measuring continuous improvement in areas that are of strategic concern. A copy of the Corporate Productivity Scorecard is included in as Attachment 1-1-13(A).

2. KEY PRODUCTIVITY IMPROVEMENTS – 2016-2020

Over the course of its 2016-2020 Custom IR rate term, Hydro Ottawa increased its operational efficiency and productivity in a host of ways. What follows below is an abridged showcase of the most consequential achievements, in terms of the scale of savings, efficiencies, and cost reductions yielded, as well as the uniqueness of the initiative(s).

At the outset, it merits observation that Hydro Ottawa achieved the following outcomes and their attendant benefits all while maintaining a static number of permanent full-time employees over the course of 2016-2020.

2.1. CUSTOMER SERVICE

Hydro Ottawa's core strategic objective is to deliver value across the customer experience by providing reliable, responsive, and innovative services at competitive rates. In an industry now driven by advancing technology, growing customer expectations, and increasing competition, achieving this objective is critical to the utility's future success.

Productivity in relation to customer service is therefore focused on identifying and implementing process improvements, automation, and incrementally offering new self-serve features for customers. These initiatives are designed to enhance customer service, to respond to identified customer preferences, and to increase Hydro Ottawa's operational efficiency and effectiveness.

For Hydro Ottawa, offering customers the ability to self-serve has reduced call volumes and Customer Contact Centre costs and will continue to deliver cost savings in numerous ways for the utility and customers alike. These savings are detailed in the examples that follow.

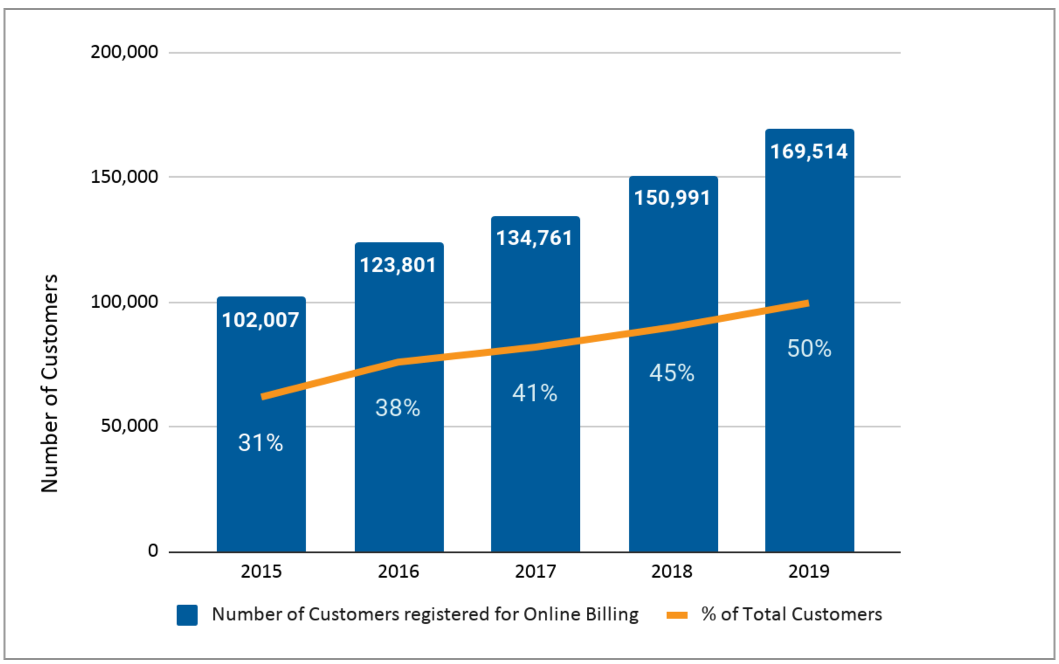
2.1.1. Online Billing Enhancements

Online billing provides customers with email notification that their bill is ready and allows them to view and manage their bills online. Higher levels of online billing penetration are very beneficial to productivity and operational effectiveness – the more customers enroll, the more Hydro Ottawa's costs decrease in terms of printing and postage (and the more customers benefit with the ease of self-serve).

As of December 31, 2019, 169,514 customers were enrolled in online billing. This represents almost 50% of all customers, making Hydro Ottawa an industry leader in this area. Currently, OM&A annualized savings associated with the online billing program stand at more than $1.9M (i.e. 169,514 multiplied by annual savings of $11.24 per customer in 2019). This level of enrollment represents a significant increase from 102,007 customers (31.5%) at the end of 2015. Hydro Ottawa projects a 63% enrollment in online billing by 2025.

Online billing also yields ancillary benefits from the perspective of corporate citizenship, which is another key strategic objective for the utility. Since 2015, Hydro Ottawa has partnered with the Children's Hospital of Eastern Ontario ("CHEO") on an annual "Go Paperless" campaign to encourage customers to adopt online billing and support a critical community cause. Between 2015 and 2018, this strategic partnership has raised more than $400K for the CHEO Foundation and garnered industry recognition.[3] What's more, this initiative supports Hydro Ottawa's roadmap to environmental sustainability through the "greening" of its customer service practices by offering more online services.

Figure 1 – Customer Accounts with Online Billing



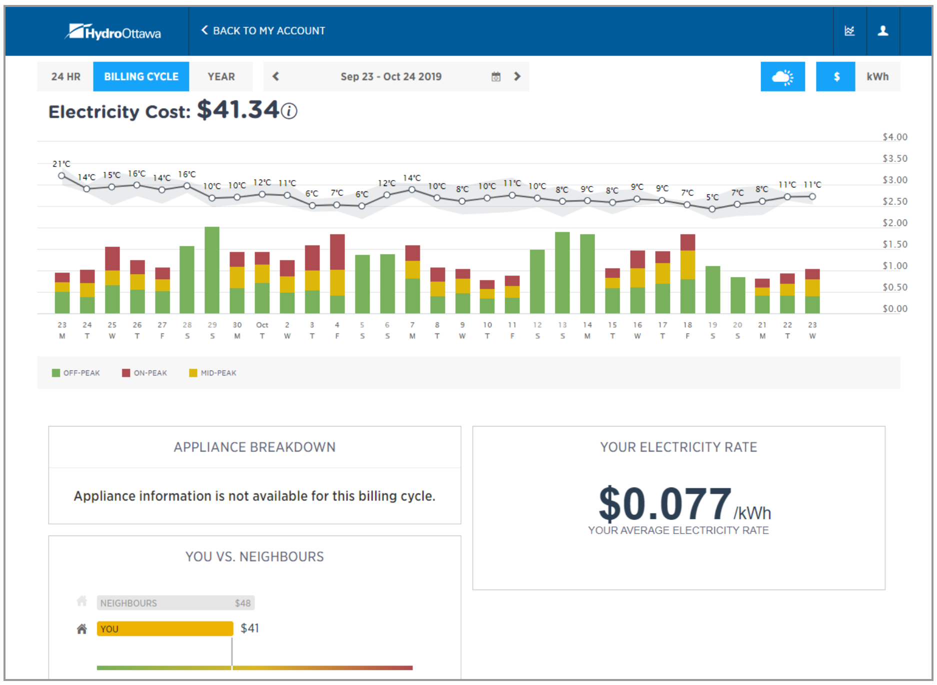
2.1.2. MyAccount

MyAccount is a web-based customer service portal, which offers a wide range of convenient, flexible self-service options and customer preferences management. These include the ability to view electricity consumption data and usage patterns, compare bills based on various

[3] This $400K donation is not rate-recoverable. Please see Exhibit 4-2-6: Charitable and Political Donations for more information on the accounting treatment of the utility's charitable donations.

parameters (e.g. consumption, rates, bill dates, weather), establish and manage customer profile/account information, and utilize the Web Chat feature allowing for real-time online interactions with customer contact agents. Customer Service representatives encourage customers to sign-up for the MyAccount service and assist customers with registration.

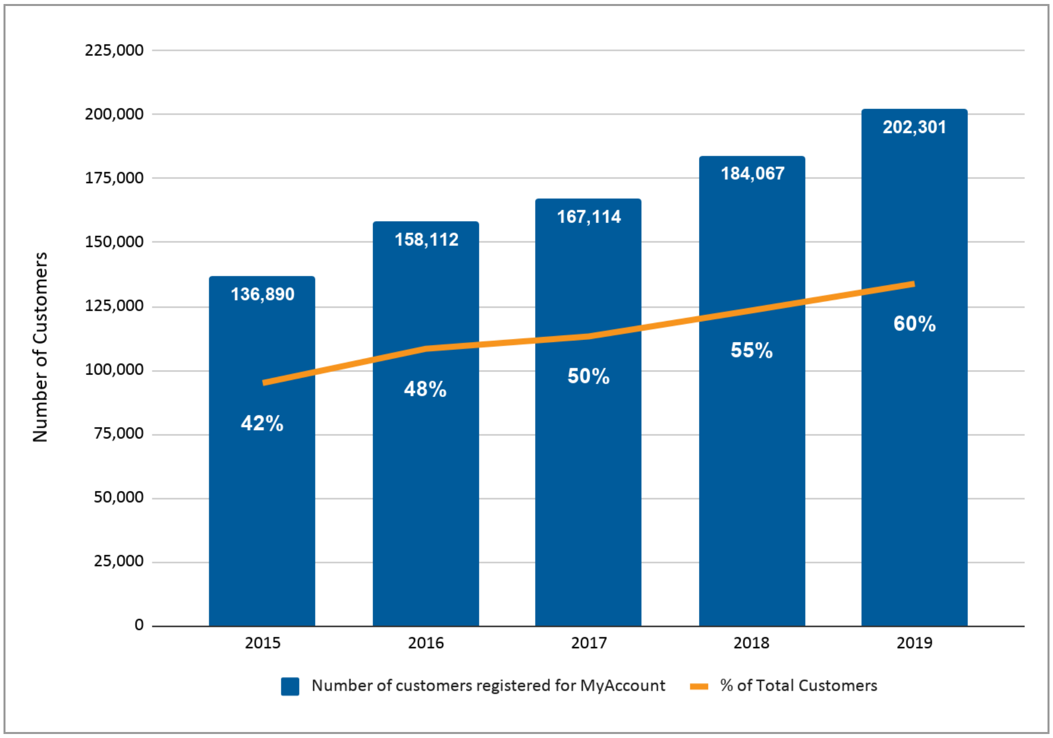
Figure 2 – MyAccount's Presentation of Customer Information



A new feature introduced in 2017 was a social login capability. This update allows increased customer choice and convenience as customers can now sign-in to their online MyAccount using email, Facebook, or Google. The new login process serves as the gateway enabling Hydro Ottawa to offer a number of new and improved service offerings online.

In 2018, the level of effort required of customers to create an online account was significantly reduced, when Hydro Ottawa eliminated the need for a customer to have a physical bill in hand. Today, a customer only requires a valid email address to complete a registration within moments, which includes online billing enrollment as an option. The timeliness of the rollout was vital in supporting Hydro Ottawa's 2018 "Go Paperless" campaign and its Move-In/Move-Out (start/stop service) redesign.

Figure 3 – Number of Customers Registered with MyAccount



The MyAccount portal has proven to be a win-win, for the purposes of both customer experience and organizational productivity. For their part, customers value the ease, convenience, and electricity management insights they gain from this online tool. More than 202,000 customers (59% of Hydro Ottawa's overall customer base) were registered for this service as of December 31, 2019.

2.1.3. Customer Contact Centre Enhancements

In step with its commitment to improving the customer experience and achieving operational efficiencies, Hydro Ottawa migrated to a new Customer Contact Centre service provider in 2017. Hydro Ottawa had contracted contact centre services from the same vendor for over 10 years. Accordingly, due diligence and best practice called for going to the market to ensure that the utility and its customers were securing the greatest value for money and were able to access the latest service offerings.

Under the arrangement with the new service provider, Hydro Ottawa and its customers are benefiting through improved customer service, lower costs, and operational efficiencies. These include more timely responses to customer inquiries, the availability of additional agents during emergency events, more options for self-serve features and omni-channel communications, and elimination of long distance charges for customer calls. In addition, hours of operation for the contact centre were expanded to include 9:00 am to 3:00 pm on Saturdays, making Hydro Ottawa one of the first local distribution companies ("LDCs") in Ontario to offer contact centre service to customers on Saturdays.

Hydro Ottawa's Interactive Voice Response ("IVR") system measures its performance and customer satisfaction by collecting and reporting on customer abandonment, transfer, wait, and hold times. The utility analyzes these metrics to identify trends and opportunities for improvement.

To date, the system has significantly improved customer service overall (as attested to, in part, by the results from annual customer satisfaction surveys – please see Exhibit 1-2-1: Customer Engagement Overview for more information). More contact centre agents are available because they are not required to handle as many routine inquiries. As a result, other customer inquiries are answered faster and more efficiently, even during periods of high call volumes. Agents are also more readily available to handle complex customer issues.

With more customers using the new IVR system and "Voice ID" service, the number of calls into Hydro Ottawa's Customer Contact Centre has decreased. As of December 31, 2019, more than 1,900 customers have adopted Voice ID to access their account information, translating into more than $16K in annual OM&A savings.

Finally, migration of the Customer Contact Centre contributed significantly to the substantial reduction in OM&A costs achieved by Hydro Ottawa in 2017. The utility estimates that this initiative yielded approximately $400K in OM&A savings in that year, and will produce more than $300K in annual savings in the years ahead, depending on call volumes.

2.1.4. Hydro Ottawa Mobile Application

In 2017, Hydro Ottawa introduced a mobile app that allows customers to track their electricity usage and costs, access their billing information, learn energy conservation tips, and find out about current power outages. It is the first app in North America that offers customers all of these features in a single, intuitive, and bilingual tool. Developed for both the Android and Apple platforms, the app is fully integrated with the utility's online and email channels, providing a seamless, cohesive customer experience. Customers can also securely login to the app from their social media accounts (Facebook and Google Plus), without the need to remember a password.

Hydro Ottawa launched the app as part of a local social benchmarking program funded through the Conservation First Framework ("CFF").

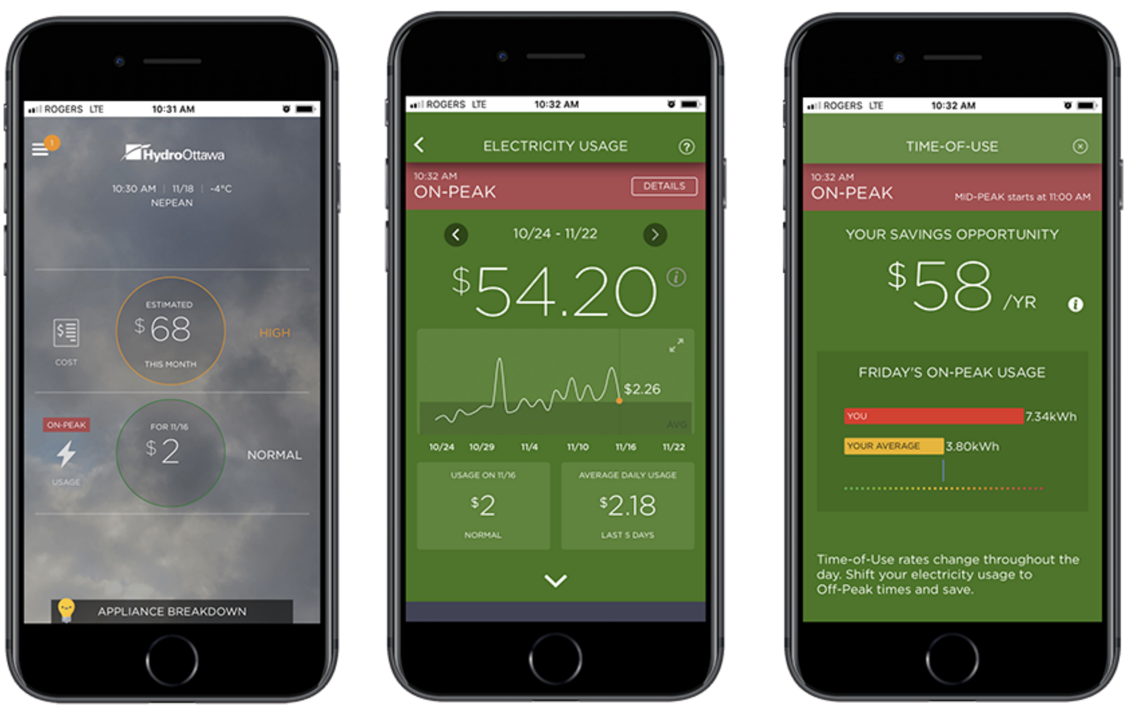
Key features of the app include the following:

- Access to data – breakdown of customer electricity usage and costs (overall and disaggregated for individual appliances), as well as trends in usage from bill-to-bill;
- Useful alerts – customer receipt of notifications about usage along with insights to help reduce consumption;
- Similar home comparison – ability for customers to view consumption relative to similar homes in their neighbourhood;
- Cost projections – avoiding bill surprises with a daily cost projection for electricity charges;
- Account information – account balance and up to two years of billing history; and
- Outage map – access to latest information on power outages.

In addition, the app's patented disaggregation analytics enable customers to track the power output and cost of up to 12 individual home appliances, without the added expense of any hardware, such as sensors. This helps customers to identify their appliances using the most energy and to evaluate their appliance usage over time to see how it changes based on the season, weather, and their behaviour.

As of December 31, 2019, more than 35,000 customers have downloaded the app. Nearly 1,100 additional customers sign up each month, reporting that they find the app to be intuitive and helpful.

Figure 4 – Hydro Ottawa Mobile App



2.1.5. Service Desk Manager

A central application to manage the entire lifecycle of a customer's request for service – intake, design, and execution – is integral to fulfilling the operational needs of the Service Desk. This application is utilized every day and is a fundamental part of the activities and workflows for not only the Service Desk team, but also Work Schedulers, Layout Technicians, Field Technicians, Distribution System Designers, Area Distribution Supervisors, Inspectors, and Geographic Information System ("GIS") Technicians.

Hydro Ottawa's legacy Service Desk management tool required an upgrade. Accordingly, it has recently been replaced as part of the initial transition to the new Customer Relationship Management system (see section 3.1.1 below for more details on this latter initiative).

Productivity benefits expected to accrue from this migration include the following:

- Revamping website service request forms to simplify and streamline the customer experience;
- Enabling authentication for both contractors and customers, eliminating the need to manually key-in basic customer information;
- Integrating Google address autocomplete to cross reference with Hydro Ottawa's GIS system, so as to eliminate manual address entry and improve data quality;
- Implementing workflow with customer communication at key stages of a job's lifecycle, including receipt of payment and readiness for appointment booking;
- Migrating service layout quotations from JD Edwards into Salesforce, facilitating a 360 degree view of the customer's interactions with Hydro Ottawa and creating a foundation for onboarding additional in-take processes across the organization, such as vault maintenance and forestry services;
- Retiring a legacy system and mitigating the support risk of maintaining an inflexible and aging tool;
- Leveraging rich case management and skills routing in Salesforce to ensure the right people are engaged at the right time;
- Allowing the Service Desk team to manage requests entirely within Salesforce for improved visibility and cycle time through automation;
- Substantially reducing manual effort and improving data accuracy when processing jobs through integration with key systems;

- Providing an out-of-the-box mobile application to manage requests and to respond to requests outside of office hours;
- Allowing the Service Desk to take on higher value work focused on improving the customer experience;
- Implementing a "Voice of the Customer" ("VOC") automated survey at the close of a job;
- Enhancing reporting capabilities with Service Level Agreements ("SLAs") and Key Performance Indicators ("KPI") embedded into processes for easy tracking and measuring; and
- Accelerating the ability to enable customer/partner self-service capability.

The implementation of this new system will result in annual cost savings of approximately $110K across the Service Desk and Layouts functions. Prior to implementation, Service Desk had operated at a 20% resource deficit. Any additional capacity realized from savings will be redirected to higher value work. This includes proactively reaching out to customers with regards to payment follow-up, outbound job scheduling, and customer satisfaction.

Moreover, as the new Service Desk management application matures, Hydro Ottawa plans to further leverage it by making it the central intake system for other service requests, including forestry, customer vault maintenance, and telecom make-ready requests (among others).

2.1.6. Move-In/Move-Out Requests

Certain aspects of the resident demographic in Ottawa (e.g. high student population and national seat of government) mean that Hydro Ottawa typically processes tens of thousands of Move-In/Move-Out ("MIMO") requests from customers on an annual basis. Accordingly, the utility regularly searches for opportunities to improve and simplify the MIMO process.

Recent steps that Hydro Ottawa has undertaken in this regard include encouraging customers to submit MIMO requests through the MyAccount online portal. This has had the benefit of enabling customers to submit a request efficiently and at their own convenience, reducing the amount of information a customer must enter, eliminating the need for Customer Service representatives to manage paper requests, increasing the number of customers with a valid MyAccount (which is critical as Hydro Ottawa looks to expand self-service functionality), and boosting enrollment in online billing. What's more, the addition of an address validation feature – which ensures that the address selected by a customer actually exists within Hydro Ottawa's system – has helped achieve further improvements, by minimizing the need for call backs to verify information provided by customers.[4]

These enhancements, combined with the processing of approximately 50% of MIMO requests by Hydro Ottawa's external Customer Contact Centre, will allow the utility to reduce the account set-up charge for customers during the 2021-2025 rate period. (See Exhibit 3-2-1: Other Revenue Summary for details).

Another noteworthy reform occurred in late 2015, when Hydro Ottawa implemented its Landlord Reversion ("LLR") program that enables property owners and management companies to manage the electrical service for their rental units more effectively. By signing an agreement to participate, property owners and managers authorize Hydro Ottawa to automatically transfer responsibility for a rental unit's electricity service to them when a tenant moves out. This ensures that the electricity remains in service at the property and that a new tenant does not have to request reconnection and pay the associated fees. Under this program, the account set-up fees are also waived for the owners and property managers.

The LLR program has led to a reduction in the number of complaints from property owners and managers. Moreover, the potential for a new tenant moving into a property that has disconnected service has been removed, resulting in a better experience for new customers.

2.1.7. Outage Alerts

Hydro Ottawa's outage alerts program is web-based and provides emails or text messages to the utility's employees when outages occur. Information regarding the outages are delivered in a

[4] This latter change also represents one of the latest steps in moving towards a fully automated process in which customer address information that is housed within Hydro Ottawa's Customer Information System ("CIS") will be validated with the GIS system.

consistent and expeditious manner with the necessary details to facilitate internal communication efforts. Local media, City Councillors, and Key Account clients are also subscribed to the email service. The re-sharing of this information through stakeholder channels provides customers with an alternate source of outage information, reducing the need for direct contact with Customer Service representatives.

2.1.8. Real-Time Outage Response Communications

In light of the increased frequency and severity of extreme weather events during the 2016-2020 period, Hydro Ottawa has sought to continuously improve the tools available in its outage communications toolbox. The introduction of several new features in recent years is worth noting.[5]

Real-Time Restoration Footage

One new tool has been the use of real-time footage of crews restoring power following a significant weather event. Utilizing a live-streaming video platform, Periscope, Hydro Ottawa is able to share footage from a crew's location to its 36,000 followers on Twitter. This service is proving to be increasingly effective in communicating the utility's responsiveness during outage events and, in turn, is becoming increasingly popular with customers.

[5] Hydro Ottawa has recently earned several awards for outage communications best practices and innovation from national and international industry associations, including Chartwell, CSWeek, the Edison Electric Institute, and the Electricity Distributors Association.

Figure 5 – Screenshot of Real-Time, Live-Streamed Drone Footage of Power Restoration

Twitter Bot

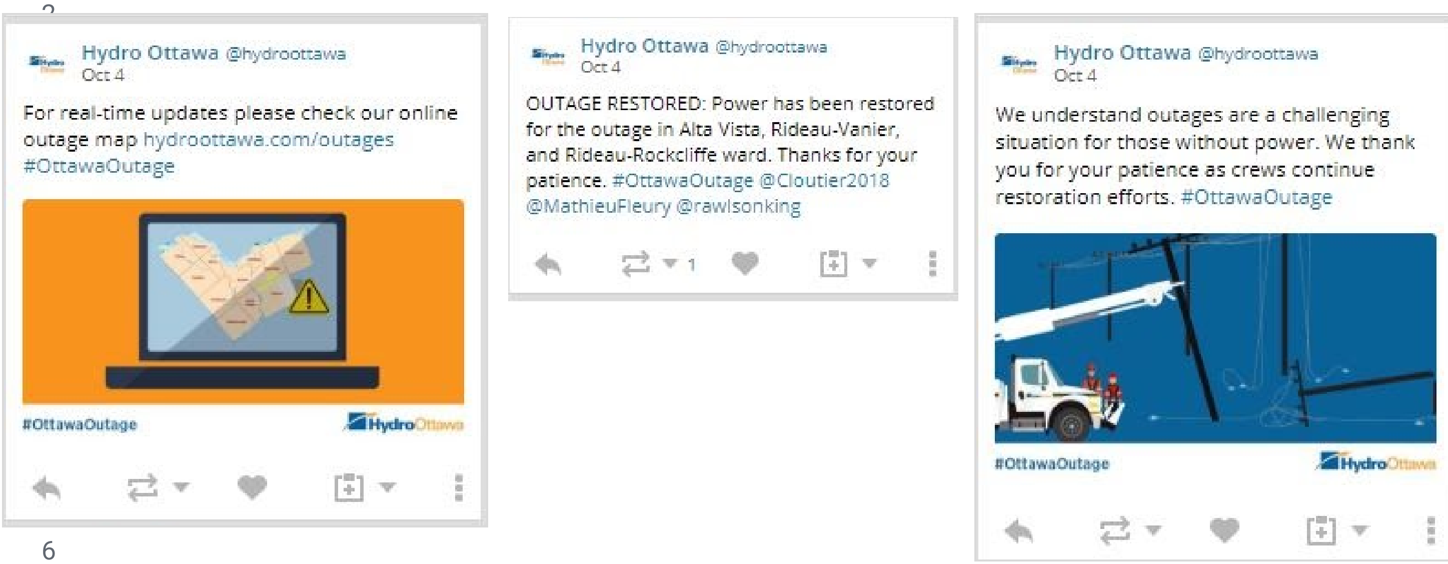
Leveraging Twitter has also been instrumental in another major outage communications initiative – creation and deployment of an automated Twitter Bot.

Previously, in order to provide the latest power outage information on a 24/7 basis, members of Hydro Ottawa's Customer Service, Communications, and Public Affairs teams would monitor outage events on an on-call, rotational basis after regular business hours. These employees received a stipend for handling this added responsibility. When the number of outages escalated due to storms or other emergency situations, the utility's Crisis Communications team was convened to manage communications.

To eliminate this stipend, alleviate the extra workload, and speed up the communications of vital outage information after hours, Hydro Ottawa developed a Twitter Bot in partnership with Hootsuite, a third-party vendor specializing in a social media management platform that provides a dashboard of social media activities and their interactions among different platforms.[6] A Hootsuite Twitter Bot is an automated program that tweets and interacts with Twitter users to keep them up to date on the latest news and developments, around the clock.

[6] https://hootsuite.com.

Figure 6 – Sample Tweets from Hootsuite Twitter Bot



This Hootsuite Twitter Bot, which resides within Hydro Ottawa's Hootsuite dashboard, pulls data from an Application Programming Interface that was built internally and interfaces directly with the utility's Outage Management System ("OMS"). Based on a threshold of 500+ customers, the Bot automatically posts tweets throughout an outage event, using an inventory of messages for different use cases or events. These include messages that acknowledge the occurrence of widespread outages, links to the latest outage details on Hydro Ottawa's outage map, mobile app, and IVR, as well as power restoration messages when events are closed. The solution includes # (hashtag) references and @ (at) mentions to City Councilor Twitter accounts, so that the outage automatically appears in their respective Twitter feeds. As an added feature, the inventory of messaging also includes tips for safety, conservation, and self-serve options.

Tweets from the Bot are sent out within five to 10 minutes of an event reported in the OMS. This Bot is not used during regular business hours, when Hydro Ottawa's Twitter followers would likely prefer and expect to interact with Hydro Ottawa employees. There is also a manual "kill" switch that shuts down the Bot in favour of human intervention.

The $25K one-time cost of integrating this system into the utility's Hootsuite dashboard will be offset within two years thanks to the elimination of the on-call stipend for employees. These former stipends for after-hours service were budgeted at $250 a week, or $13K a year. More importantly, Hydro Ottawa's Hootsuite Twitter Bot enables the utility to remain the trusted voice of authority on power outages in the community on a 24/7 basis, from the outset of an event through to restoration.

2.1.9. Power Outage Reporting

There are three ways for customers to report an outage to Hydro Ottawa: customers can call the utility's outage line, report online, or report through the mobile app.

With respect to phone calls to the outage line, Hydro Ottawa has an intelligent IVR application that provides customers with an efficient and effective way to report an outage and/or to obtain information about an existing outage. Customers can easily access outage information without speaking to a Customer Service representative (although agents are available for power outage inquiries 24/7). This ability to solicit first-hand insight into an outage incident allows Hydro Ottawa to streamline its power outage business process and to leverage the diagnostic capabilities of its OMS.

New self-serve IVR enhancements introduced in 2017 deliver a more streamlined customer experience. Customers now hear a consistent "voice" across Hydro Ottawa's system and are able to speak to a system which uses a natural language format.

This upgraded outage communications IVR solution also offers a number of efficiency gains. For example, this service has reduced the average outage call duration by up to 90% (from three minutes per call to 30 seconds for most calls). These enhancements have also reduced the number of blocked calls (i.e. busy signal) to 0.45% and reduced the number of customers who experienced a dropped call to less than 0.01%.

In addition, the number of phone calls that the system can handle simultaneously has almost doubled, with near real-time logging of outages through the IVR rather than the previous file transfer process. This translates into faster processing of outage reports and more expedited power restoration times. Further, the new system allows for faster daily customer telephone number updates rather than the weekly updates of the past.

Moreover, additional productivity gains were made possible in January 2019, when Hydro Ottawa moved from a manual outage message recording process to an automated one using text-to-speech technology. Manual recordings were billed at a handle time rate of $0.86 per minute at an average of almost 4.5 minutes per message. Automated text-to-speech messages are now billed at a flat rate of $2.50 per message. Cost savings are projected to average approximately $1.24 per recorded announcement. From an operational efficiency standpoint, automated outage communication messages are broadcasted to the customer through the utility's IVR system in under two minutes of the internal outage notification. In the past, an agent was required to read and record the outage notification and manually upload the recording to the IVR system within four minutes.

Since implementing text-to-speech automated messages, the customer outage experience has improved. Previously, due to manual effort, both upload time and recording quality did not always meet standard messaging requirements. Human effort opened up the risk for inconsistency and room for error through mispronounced street names and time stamps, speed of the recorded reading, and distracting background noise. With the new automated process, customers can now call the Power Outage Information and Reporting line and be greeted with clear and timely outage information. The text-to-speech engine has proven to be an adaptive program that produces quick, cohesive, and easy-to-understand messaging in both English and French, to meet customers' outage communication needs.

In late 2018, online and mobile application outage reporting were added to the list of available channels for customer convenience. Customers can now report a power outage online through MyAccount or through the Hydro Ottawa mobile app in real-time. This aligns with Hydro Ottawa's objective to provide choice and convenience to customers, while offering the added benefit of further optimizing the means through which the utility receives outage notifications from customers. As of December 31, 2019, 3,928 reports had been received online, and 1,066 were received through the mobile app. In addition, 371 included specific details related to the source of the problem (e.g. "noise," "flash," "branches," "equipment," etc.)

2.1.10. Power Outage Map

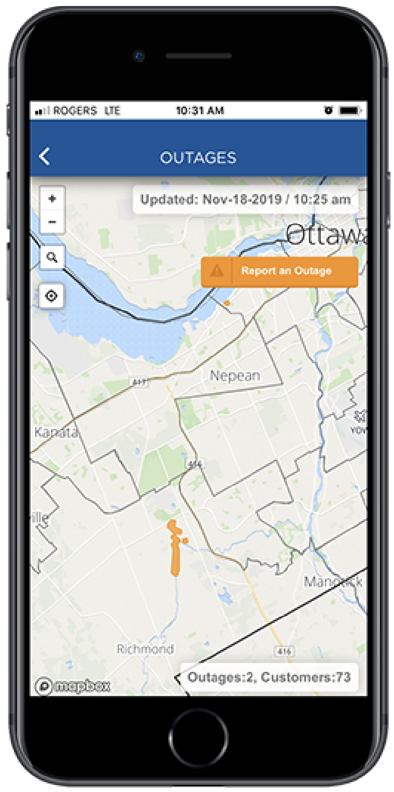
Hydro Ottawa's website, hydroottawa.com, includes an automated power outage map that provides details of confirmed and unconfirmed outages that impact more than 10 customers, aggregated for privacy.[7] This map is also available on the utility's mobile application. Details include the area affected, number of customers affected, estimated time of restoration ("ETR"), and status of crews. This feature enhances the timeliness of outage reports and updates on the progress of the restoration process, thereby adding value to the customer experience. What's more, the automated nature of the map eliminates the need for employees to perform manual updates and thus frees-up employees to focus on higher complexity tasks in support of restoration.

As a result of the tornadoes that occurred in September 2018, Hydro Ottawa further enhanced its outage map functionality. A vulnerability was uncovered when the website was subject to extremely high volumes of traffic.[8] The utility worked with the OMS vendor to transition the hosting of the outage map to the Microsoft Azure Cloud platform, which is better equipped to handle sustained high-traffic volumes. In addition, Hydro Ottawa introduced new features that were not previously supported, such as an address search that will zoom to the address entered and pin the location, a current location identifier, and visuals that distinguish between planned and unplanned outages.

In 2019, hydroottawa.com was moved to a new platform. This will allow Hydro Ottawa to investigate further outage map enhancements and a long-term outage map solution.

[7] The outage information displayed on the map is aggregated, in order to safeguard customer privacy.
[8] To put the post-tornado online traffic in context, it should be noted that Hydro Ottawa's website experienced the equivalent of an average year's worth of site traffic in the 24-hour period following the touching down of the tornadoes.

Figure 7 – Hydro Ottawa's Power Outage Map on Mobile



2.1.11. Payment Options

Hydro Ottawa offers many different options to allow customers to make simple, on-time payments. For example, Hydro Ottawa's IVR enables customers to make a credit card payment over the phone, at their convenience. On hydroottawa.com, customers can also directly link to a credit card payment service.

In early 2018, several enhancements were introduced to further improve the customer experience. These included the following:

- New IVR prompts with a natural language format;
- The ability to pay Service Invoices and Customer Layout Invoices, in addition to electricity bills;
- A redesign of the payment portal to make the portal mobile-friendly; and

- The introduction of American Express, in addition to Mastercard and Visa, for credit card payments.

These services support the utility's focus on providing 24/7 accessible services that are driven by the customer and provide them with choice and control. In 2019, $11.2M dollars in credit card payments were received through the IVR and online. At present, more than 94% of customers pay their bill using some form of electronic funds transfer, including 27% of customers enrolled in the convenience of an Automated Payment Plan.

The efficiency gains of these enhancements have been particularly discernible with respect to payment of Service Invoices and Customer Layout Invoices. Prior to the expansion of credit card payment capability for these and other transactions on the operational side of the business, the processing of these invoices was time-consuming and costly. Along with the costs of processing cheques, each main work location had a payment lock box which required emptying twice per day. Arrangements needed to be made to have the payments securely delivered to Hydro Ottawa's head office in order to begin processing (which, among other things, included sorting, verifying, and sending to a clearinghouse based in Toronto). This process could take upwards of two to three days before the utility could advise customers that payment had been received and the customer's requested work could move forward. In contrast, Hydro Ottawa now has the capability to view the status of a customer's payment in real-time. This has improved the speed and accuracy of applying payments to Service Invoices and Customer Layout Invoices (including for urgent requests), and has likewise reduced wait times for customers wanting to book appointments.

In addition, Hydro Ottawa completed the implementation of a customer self-serve Automated Payment Plan management tool. Built within MyAccount, this new tool is fully mobile-friendly and addresses previous technical challenges experienced when customers were looking to register or make changes to their Auto Pay and/or Equal Monthly Payment Plans. Available 24/7, the new solution is interactive and provides a smoother, integrated customer experience. Along with the customer convenience, Hydro Ottawa will benefit from 50% less manual effort and estimated operational cost savings of up to $40K per year. This is the result of being able to retire the services of a third-party vendor that managed the registration forms as well as an administration tool to retrieve all submitted requests.

Going forward, Hydro Ottawa will continue to explore and evaluate other payment options as technology advances and new channels emerge.

2.1.12. Bill Print Provider Transition

Following a competitive Request for Proposals process, Hydro Ottawa transitioned to a new provider in 2018 for the provision of bill printing and distribution services. This includes printed mail and online billing and communications, as well as inventory management, reporting, and tracking.

This transition has yielded several operational efficiencies. For example, the need for pre-printed letterhead for the Customer Care & Billing System ("CC&B") standard letters was eliminated. Going forward, all 13 customer letter types, ranging in subject matter from Arrears Payment Agreements to Ontario Electricity Support Program ("OESP") Renewal, are formatted on black and white corporate letterhead and then printed and distributed on an as-needed basis. In tandem with this transition, Hydro Ottawa reviewed and updated all of these standard customer letters to ensure that the letters reflect current business processes, customer communications best practices, and OEB requirements.

With regards to corporate stationery, Hydro Ottawa's four collection notices were also reviewed and updated. These now have a consistent "look and feel" that is better aligned with the utility's brand guidelines. These notices, along with other corporate stationery, are housed in an online store, thereby improving print quality and control, and contributing to reduced OM&A.

Finally, the new bill print provider is able to supply Hydro Ottawa with custom reports that help the utility manage its inventory for pre-printed bill stock and envelopes, reducing the risk of waste when these forms require changes. Other reports streamline the Canada Post invoice reconciliation process for bill and letter production.

2.1.13. Outbound Calling for 48-Hour Disconnection Warnings

Hydro Ottawa implemented an automated outbound calling system to replace its previous hand-delivery of 48-hour disconnection warnings. As part of the new approach, the utility no longer dispatches a truck to the service address for residential and small commercial customers who are within 48 hours of service disconnection.

With this solution, all 48-hour disconnection warnings are considered 100% delivered, so long as there is a working customer telephone number.

This new automated process involves Hydro Ottawa's CC&B system generating a contact note with the corresponding time and date stamp of the call, along with the telephone number dialed and the balance outstanding. All calls are delivered in the customer's language of choice.[9]

Through this new approach, Hydro Ottawa became one of the first utilities in Ontario to fully integrate an automated outbound calling system into its collections processes. From a cost savings perspective, this solution has helped to achieve significant savings. Utilizing the autodialer costs $0.25 per call, in contrast to the $80 associated with the labour and truck roll required to hand-deliver a notice. This functionality, along with business process changes and the elimination of paper-based notices, will achieve savings of $432K annually. In addition, the use of this tool has enabled Hydro Ottawa to discontinue a contract with an external service provider that had been retained to support delivery of 48-hour disconnection warnings and service reconnections. Expected savings associated with discontinuation of this contractual arrangement are approximately $300K per year. The movement away from paper-based notices also helps reduce the utility's environmental footprint.

[9] Hydro Ottawa wishes to emphasize that, during the disconnection moratorium period in which LDCs are prohibited from disconnecting residential customers for reason of non-payment, automated calls to customers continue. However, calls are utilized strictly for purposes of extending payment reminders which help customers manage their arrears.

As a result of this automation, Hydro Ottawa has observed a 50% payment rate within a few days of the call being received by the customer.

2.1.14. Digital Assistant and Smart Speaker Devices

The next "big thing" in customer service is the emergence of digital assistants and smart speakers, such as Amazon's Alexa and Google Home. With increasing competition and lower prices, the number of Canadians with smart speakers in their homes is growing exponentially. In fact, research suggests that the adoption rates for smart speakers are already outpacing those for smartphones and tablets.

While many customers initially invested in smart speakers to listen to music, they also use a smart speaker's voice-activated digital assistants to ask about the weather, news, and traffic, manage schedules, make phone calls, and control other electronic devices within the home. As a result, many companies are creating "skills" to communicate with their customers through this convenient and easy-to-use channel.

In August 2018, Hydro Ottawa introduced its smart speaker skill, for both the Amazon Alexa and Google Home smart speaker platforms. In doing so, it became the first utility in Canada to launch a smart speaker skill for both platforms.

Integrated with the utility's CC&B and OMS systems, Hydro Ottawa's smart speaker skill answers the most common questions asked by customers (e.g. current electricity rates and Time-of-Use period; bill balance; date of last bill payment; due date for next payment; current outages; seasonal conservation tips; and contact information and hours of operation for Hydro Ottawa).

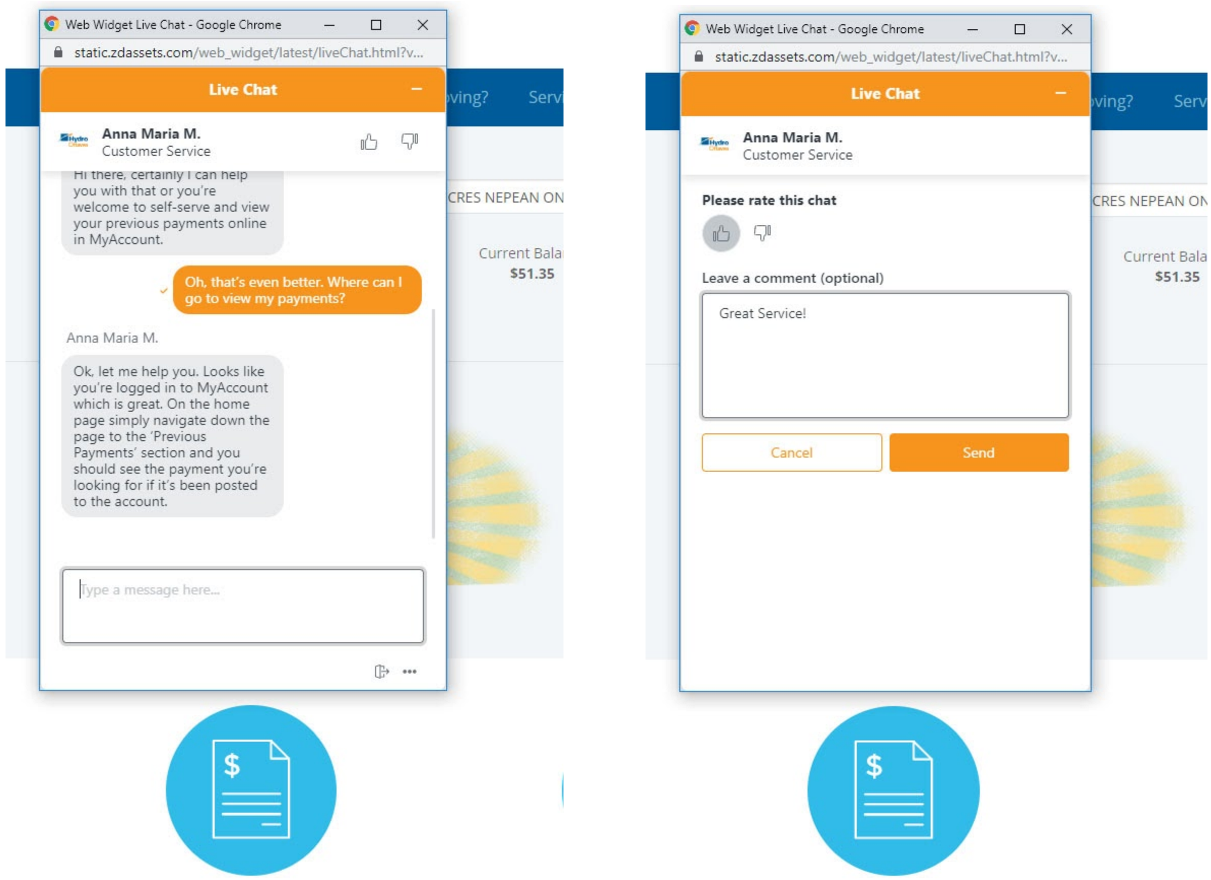
For purposes of supporting continuous improvement at the utility, the smart speaker skill is advantageous in several ways. The skill system collects metrics on its performance, such as customer retention, poorly handled messages, customer pathways, and most importantly, queries posed by customers that the skill was unable to answer in an anonymized manner. In addition, it collects usage analytics which are utilized to ensure that the most requested information is also available on other Hydro Ottawa customer communications channels, such as its website and the mobile app. These data inputs offer Hydro Ottawa insights into customer needs, preferences, and expectations, and will thus enable the utility to continue evolving its smart speaker skill and other service offerings in order to best serve customers' interests.

As of December 31, 2019, more than 2,800 customers have accessed Hydro Ottawa's smart speaker skill, with an average of 230 customers using the skill every month.

2.1.15. Web Chat

To provide customers with another communications channel and a convenient way to do business with the utility, Hydro Ottawa introduced Web Chat in 2019. Web Chat allows customers registered for MyAccount to connect one-on-one, in real-time, on desktop or mobile, with a Customer Service representative. The feature also gives customers the option of downloading a transcript of the chat for their reference and providing feedback through a short survey.

Figure 8 – Screenshot of Web Chat Feature



2.1.16. Customer Information System Enhancement

Oracle CC&B is the core system at Hydro Ottawa which provides billing of electricity revenue. CC&B is large, complex, and highly-integrated across the utility, with linkages to metering infrastructure, corporate web and mobile applications, and provincial systems like the Independent Electricity System Operator's ("IESO") Meter Data Management Repository. As the utility's essential CIS system, this application is adaptable to accommodate Hydro Ottawa's evolving customer service strategy.

By the end of the utility's 2016-2020 Custom IR term, Hydro Ottawa will have concluded a series of enhancements to CC&B, with the goal of continuing to enhance the services that are provided to customers and ensuring compliance with the system vendor's maintenance contract. In 2017, for example, CC&B upgrades included completion of system migration to a cloud-based platform, integration of direct deposit functionality, and implementation of an auto-dialer solution to replace hand-delivery of 48-hour disconnection warnings (see section 2.1.13 above).

An upgrade of CC&B to version 2.7 will likewise be completed in 2020. Once implemented and stabilized, the new base functionality will be leveraged to provide more opportunity for future enhancements that will improve organizational effectiveness, support the utility's customer service strategy, and help maintain regulatory compliance.

This major enhancement of the CIS system will achieve the following benefits:

- Lower operating costs through reduced need for customization due to age of current system;
- Provide overall operational savings of approximately $1M, as a result of a new contractual agreement;
- Support regulatory changes and maintain compliance with respect to rate changes, new customer service rules, IESO market renewal, Ontario's net metering program, and new customer rate classes;
- Establish or strengthen points of interface with other customer-facing systems such as CRM, MyAccount, IVR/telephony, mobile applications, and 24/7 self-serve capabilities;
- Strengthen foundation for all customer information presentment tools that include the Hydro Ottawa app, MyAccount, and Mobile Workforce Management;
- Accommodate surrounding systems' upgrades and/or changes;
- Ensure cyber-security safeguards are in place;
- Deliver on customer expectations for service quality and responsiveness, providing customers with greater choice, control, convenience, and communication options; and
- Keep pace with changes in technology to stay at the forefront of evolving customer experience expectations.

In addition to enriching customer knowledge and enhancing 24/7 self-serve capabilities, these enhancements will assist in streamlining and automating existing business processes. Moreover, they will provide Hydro Ottawa with improved analytics to glean more meaningful insights into customer needs, which in turn, can be incorporated into business strategies.

2.1.17. Duplicate Invoices

Thanks to the availability of electronic bills and MyAccount, duplicate bills are now disseminated by email rather than mail, eliminating the need for printing and postage. In addition, customers are able to avoid charges for duplicate invoices altogether by logging into MyAccount and retrieving a bill copy on a self-serve basis. At present, while Hydro Ottawa continues to charge customers for the provision of duplicate invoices, this charge is set to be reduced during the next rate period, largely on account of the aforementioned productivity improvements. Please see Exhibit 8-7-1: Specific Service Charges for more information.

2.2. DISTRIBUTION OPERATIONS, ENGINEERING & ASSET MANAGEMENT

2.2.1. Mobile Workforce Management

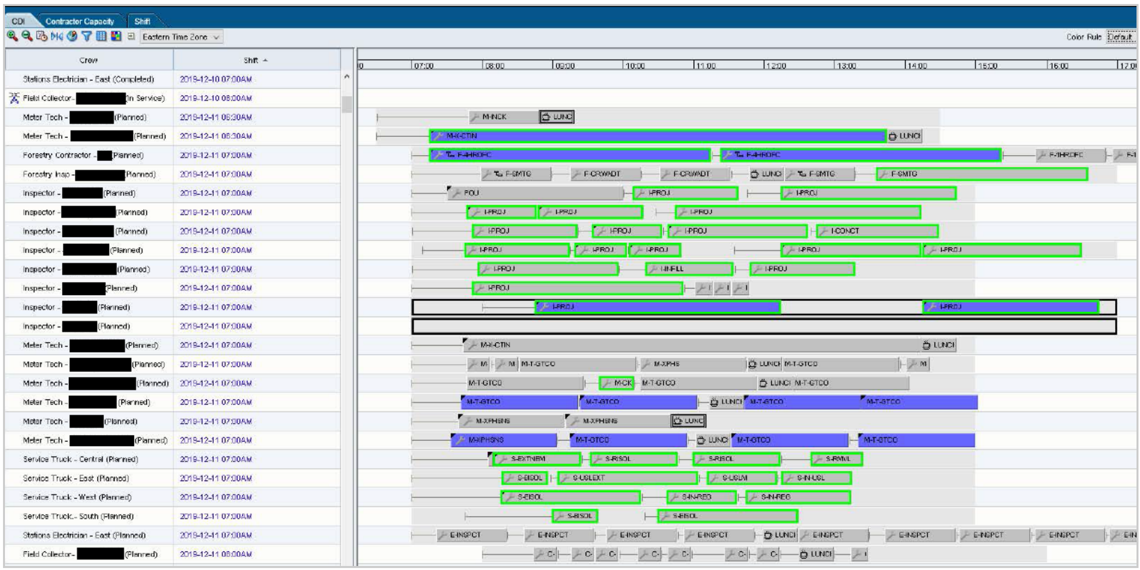
Mobile Workforce Management ("MWM") went live in December 2015. MWM is an automated scheduling and dispatch software designed to optimize the scheduling and routing of work and crews by matching the right work with the right skillset and tools/equipment, in order to increase productivity and enhance customer service. It also continually optimizes those schedules and routes throughout the day, as new work arrives or field activities are cancelled.

Prior to the adoption of MWM, field staff were required to manually schedule their day, plan routes each morning, and access information about each specific job prior to completing the task. This was occurring despite the fact that Hydro Ottawa had an electronic tool at its disposal for dispatching field work electronically (i.e. the Intergraph Outage Management System). Furthermore, any new issues or priority work that was received throughout the day would require a manual reshuffling of schedules and more re-routing. For the Collections group, in particular, this manual effort resulted in Hydro Ottawa relying heavily on contractors in order to meet the high-volume demand related to customer disconnections.

In light of these and other inefficiencies associated with the prior solution that was in place, the decision was made to switch to MWM. Overall, the transition has been a good success. For example, during the first year of use (2016), the Collections group completed 146% more field activities with internal resources than it was able to do in 2015. As a result of this increased productivity, the utility was able to let the contract lapse with the external service provider that had previously been retained to provide support for field collections activities. In addition, the Metering group was able to complete 4% more field activities but achieved this outcome using 6,200 fewer labour hours.

In addition to improving productivity, there have been enhancements to the customer experience. Prior to MWM implementation, service truck appointments were booked in three time slots each morning (8:30 a.m., 9:30 a.m., and 10:30 a.m.). MWM permits Hydro Ottawa to offer more choice in appointment windows for customers, since it takes more factors into account (e.g. typical driving time, work duration, and location of jobs). In the past few years, Hydro Ottawa has been meeting over 90% of its service truck appointments, with arrival windows as short as 30 minutes.

Figure 9 – Screenshot of MWM Dashboard (With Employee Names Redacted)



2.2.2. Outbound Calling for Planned Work Projects and Vegetation Management Programs

On any given day, Hydro Ottawa plans multiple outages to complete its maintenance and capital projects, as well as vegetation management. For customers, this can be very impactful. Hydro Ottawa's commitment is to provide customers with at least 48 hours notice of the outage, so that they can plan accordingly. Historically, the utility often used Power Line Technicians to hand-deliver planned outage notices at the premises of affected customers. Over time, the use of highly-skilled employee resources for this purpose proved to be time-consuming and sub-optimal from a cost-effectiveness perspective.

Accordingly, in 2017 Hydro Ottawa launched an initiative to complete customer notifications using an alternative solution that reduces costs, leverages existing technology and platforms, and supports the utility's broader adoption of digital solutions, as opposed to paper-based ones.

The solution allows Hydro Ottawa to utilize an existing platform to make outbound calls to all phone numbers associated with a customer account in order to inform them of the planned outage. Pole and transformer nomenclature is used to extract a list of impacted customers from the utility's GIS system. A software solution called Touch Logic enables the uploading of the list of customers and phone numbers, along with the date, time, and duration of the planned outages. Hydro Ottawa records different messages for service desk and forestry work, along with cancellation notifications in the event that a project is impacted by weather or other circumstances. Once a campaign is completed, the system generates a complete record of all calls made.

The benefits of this initiative include the following:

- Timely dissemination of planned outage notifications (and cancellations, where appropriate);
- Ability to disseminate notifications on an expedited basis, in the event of such occurrences as emergency tree removals;
- Elimination of the need to coordinate the printing of hard copy notices and to manually fill out door knocker cards;
- Redirection of skilled resources to higher-priority capital and maintenance work;
- Optimization of existing technology and platforms, as opposed to the introduction of another solution or system into the utility's IT architecture; and
- Support for corporate-wide migration to a paperless environment.

In September 2018, this solution was able to demonstrate its value in a unique and momentous way. On September 21, severe weather – including the touchdown of multiple tornadoes in Ottawa – resulted in widespread outages to more than 174,000 customers (approximately 50% of the total customer base). This solution enabled Hydro Ottawa to rapidly notify 50,000 customers about a planned work outage related to post-tornado restoration. A communication of this magnitude would not have been possible without the outbound calling solution.

Figure 10 – Damage from 2018 Tornado Event

In 2018 alone, this automated outbound calling solution resulted in approximately $100K in avoided costs. Overall, this initiative has achieved several key outcomes, including reduced operating costs and greater efficiency through leveraging existing technology.

Going forward, Hydro Ottawa is extending this service to include text and email options, in step with the utility's efforts to facilitate communications in the customer's channel of choice.

2.2.3. ISO 55000 Certification

ISO 55000 is an international standard for Asset Management Systems.[10] Over the last few years, a signature continuous improvement initiative of Hydro Ottawa's asset planning group has been the journey towards achieving accreditation under the standard. In 2016, Hydro Ottawa contracted an external party to assess the utility's asset management practices against the requirements of ISO 55000. The exercise resulted in a gap analysis report and development of a roadmap which would enable Hydro Ottawa to improve its practices and move towards compliance with the standard. Based on the results, a working group was established with the

[10] https://www.iso.org/standard/55088.html.

mandate of maturing the utility's asset management practices to become ISO 55000 compliant. More recently, a subsequent gap analysis was commissioned to evaluate progress against the goal of certification. A copy of this latter report has been appended to this Application as Attachment 2-4-3(J): ISO 55000 Gap Analysis.

Ultimately, the efficiency gains expected to emerge from this initiative and certification with ISO 55000 consist of enhanced system reliability, expedited restoration, improved public and employee safety, reduced asset lifecycle costs, and resource optimization.

2.2.4. Distribution System Climate Risk and Vulnerability Assessment

As a matter of practice, Hydro Ottawa routinely examines opportunities and threats to its distribution grid to ensure assets are able to operate effectively and deliver value throughout their lifecycle. In order to drive continuous improvement in its existing asset management system, Hydro Ottawa initiated a project in 2018 to perform a distribution system climate risk and vulnerability assessment and, based upon the results of this assessment, develop a Climate Change Adaptation Plan. The utility launched a competitive procurement process to select an external service provider to prepare the following deliverables: (i) an overview of how climate change impacts are likely to affect Hydro Ottawa's distribution system; (ii) processes by which the utility can continue efforts to better understand its risks and take proactive steps to manage them, and enhance the resilience of its distribution system to climate change; and (iii) an Adaptation Plan, following a recognized protocol for climate impact assessment, to improve the resilience of Hydro Ottawa's system.

Copies of these deliverables are included in this Application as Attachment 2-4-3(H): Distribution System Climate Risk and Vulnerability Assessment and Attachment 2-4-3(I): Hydro Ottawa Climate Change Adaptation Plan. The utility's 2021-2025 Distribution System Plan speaks to how the key findings and recommendations from these reports will be incorporated into Hydro Ottawa's capital plans over the next five years. Please see Exhibit 2-4-3 for additional information in this regard.

2.2.5. Remote Disconnect

For several years, Hydro Ottawa has been installing remote disconnect/reconnect meters, with the aim of reducing costs and gaining efficiencies in the disconnection process. Using advanced metering infrastructure ("AMI") technology, Hydro Ottawa is able to remotely disconnect and reconnect meters. Every meter connected to the AMI network can be accessed through the internet using secure log-in credentials. Remote disconnect/reconnect meters are installed in hard-to-access locations and premises that have high Move-In/Move-Out trends.

This network allows Hydro Ottawa to connect directly to a meter, or hop through the network to a collector meter, to select single or multiple premises scheduled for disconnection. Remote disconnect and reconnect technology allows the utility to restore electricity service more expeditiously for its customers.

Customer service and safety is paramount. To ensure the safety of customers when reconnecting service, a phone call is placed to the customer, who must positively respond to a short list of questions. The Customer Service representative remains on the phone until the customer confirms that the power is back on.

As of December 31, 2019, this technology has been installed in approximately 38,000 premises in Hydro Ottawa's service territory (representing 11% of all premises served by the utility). The use of remote disconnect/connect meters has helped contribute to the cost savings referenced in section 2.1.13 above, by eliminating the need for a trip to a customer's premise to physically disconnect or reconnect the service. Among other things, these savings will have the practical effect of allowing Hydro Ottawa to maintain its current charges during the 2021-2025 rate period for reconnection during regular business hours and reduce its charges for after-hours reconnection.

2.2.6. Gatekeeper/Collector Meter Consolidation

"Gatekeepers," also commonly known as Collector meters, are an integral component of the utility's AMI network. These devices are strategically deployed throughout Hydro Ottawa's service territory to ensure adequate coverage to read all non-Gatekeeper meters.

Hydro Ottawa's original plan for deploying smart meters in 2008 called for approximately 350 Gatekeepers. However, by January 2016, 587 Gatekeepers were in use, primarily on account of growth in areas with poor Local Area Network coverage. The utility subsequently initiated a Gatekeeper Consolidation Project, in which each neighbourhood in the service territory was analyzed. The analysis examined the number of meters deployed compared to Gatekeeper capacities and the resulting redundancy. Neighbourhood by neighbourhood, the utility removed Gatekeepers at a strategic pace to ensure network health remained constant. After 18 months of review, Hydro Ottawa had removed 155 Gatekeepers without any negative impacts to its network. Meter reading percentages remained constant and Hydro Ottawa saved approximately $10K per month in communication charges.

Table 1 – Indicative Savings Resulting from Gatekeeper Consolidation

	Jan 2016	Jun 2017	Variance
Total # Gatekeepers	587	432	(155)
Total Communication Cost (monthly)	$34,024	$23,288	$(10,736)

2.2.7. Cable Chamber Inspections

Hydro Ottawa inspects cable chambers on a five-year cycle. The inspections have typically been completed by contractor resources. In 2018, the inspections were completed by employees in the Underground Group. The internal resources were able to complete the inspection program for approximately 50% of the cost of external resources, resulting in a savings of approximately $100K. Further, in many instances, the team was able to complete the inspection and any minor maintenance while on-site, eliminating the need for an additional truck roll as in previous years.

Figure 11 – Hydro Ottawa Crew Preparing for Chamber Inspection

2.3. INFORMATION TECHNOLOGY & OPERATIONAL TECHNOLOGY

2.3.1. Enterprise Resource Planning Project

Numerous functional areas within Hydro Ottawa rely upon the enterprise resource planning ("ERP") system to achieve their operational mandates. These include finance, accounting, inventory and supply chain management, work order management, and human resources.

Originally deployed in 2003, over time it was determined that a more agile, flexible, and integrated ERP environment was required, in order to meet the evolving needs of the business and to mitigate the complexities associated with managing ongoing system modifications and customizations. The underlying objective of the ERP replacement project was therefore to shift away from time-consuming, manual, and paper-based processes which required multiple employees to execute, and adopt a digital solution with self-service capability that would simplify business practices and put more and better information into the hands of employees. In many ways, the implementation of an enhanced ERP system was not simply a technology initiative, but also an important opportunity for business transformation.

The upgraded ERP system consists of two integrated software solutions – Workday for human capital management and JD Edwards for all other core ERP functions (e.g. finance, accounting, and supply chain). Hydro Ottawa has been recognized for its successful implementation of Workday through the receipt of several awards, including Most Innovative Use of Human Resources Technology at the Canadian HR Awards and the Innovation in Human Resources Practices from Electricity Human Resources Canada.

For a comprehensive summary of the project scope and benefits, please see Attachment 1-1-10(C): 2018 Annual Summary - Achieving Ontario Energy Board Renewed Regulatory Framework Performance Outcomes.

2.3.2. SCADA System Upgrade

Supervisory Control and Data Acquisition ("SCADA") systems are critical to the reliable operation of a local distribution network, as they equip system operators with real-time access to system status and control, and play an essential role in the monitoring and controlling of distribution stations and equipment.

September 2018 marked the completion of a project launched in 2015 to upgrade this core asset. The successful achievement of this milestone was preceded by several years' worth of project planning, training, testing, configuration, and evaluation of data conversion by a dedicated internal team working in concert with the vendor. Hydro Ottawa's revitalized SCADA capability is set to yield numerous benefits with respect to situational awareness, system control, and system restoration. Within just a few weeks of the final cut-over, the new system had the opportunity to showcase its strengths, following the tornadoes that touched down in the Ottawa-Gatineau region on September 21, 2018. The SCADA system performed exceptionally well in providing system operators with visibility into the condition of Hydro Ottawa's grid and outages affecting customers.

2.3.3. Cybersecurity Program

During the 2016-2020 period, Hydro Ottawa made considerable strides in strengthening the protection of its information and operational systems against cybersecurity risks, and in enhancing its overall cybersecurity posture.

For example, in 2016 the utility began implementing core components of the Cyber Security Framework developed by the U.S. National Institute of Standards and Technology ("NIST"). This had the effect of making Hydro Ottawa one of the early adopters of the NIST Framework among utilities in Ontario. This, in turn, placed the utility in a favourable vantage point when the OEB ultimately adopted the NIST Framework in 2018 as the foundation for a made-in-Ontario regulatory regime for assessing and reporting utilities' cyber security capabilities.

Several other major cyber-related initiatives have involved partnerships with external experts and parties, and engagement in collaborative forums. Similar to the implementation of the NIST Framework, Hydro Ottawa has likewise been at the vanguard of early participants in IESO programs, such as the Project Lighthouse data-sharing service.[11] The utility has also actively contributed to the exercise planning process for the scenarios that play out in Ontario, as part of the biennial grid security exercise known as GridEx which is hosted by the North American Electric Reliability Corporation.[12] Hydro Ottawa's consistent participation in GridEx has enabled the utility to regularly test its state of readiness for responding to cyber and physical security incidents, and to continuously refine and align its business continuity, crisis management, and incident management plans. Additional activities with third-party partners involved the retention of independent experts to provide a range of cybersecurity services, such as program maturity and gap assessments, incident response, penetration testing, managed security services, auditing, and alert and detective capabilities.

Hydro Ottawa has been equally active in bolstering its internal practices and processes. Since 2016, the utility has tagged all incoming external emails to internal email accounts, so as to give

[11] http://www.ieso.ca/en/Powering-Tomorrow/Data/IESO-opens-the-door-to-sector-wide-cybersecurity-offensive.
[12] https://www.nerc.com/pa/CI/CIPOutreach/Pages/GridEx.aspx.

employees a clear indication of messages originating from external sources. Training is made available to employees on an ongoing basis, along with resources such as a dedicated email address for reporting incidents of email phishing. Table top exercises with the Executive Management Team have also been held to raise awareness and nurture incident response capabilities at the most senior levels of the organization. And in 2018, Hydro Ottawa adopted a new cybersecurity policy defining a formal set of requirements which must be met by any user who is granted access to corporate electronic assets.

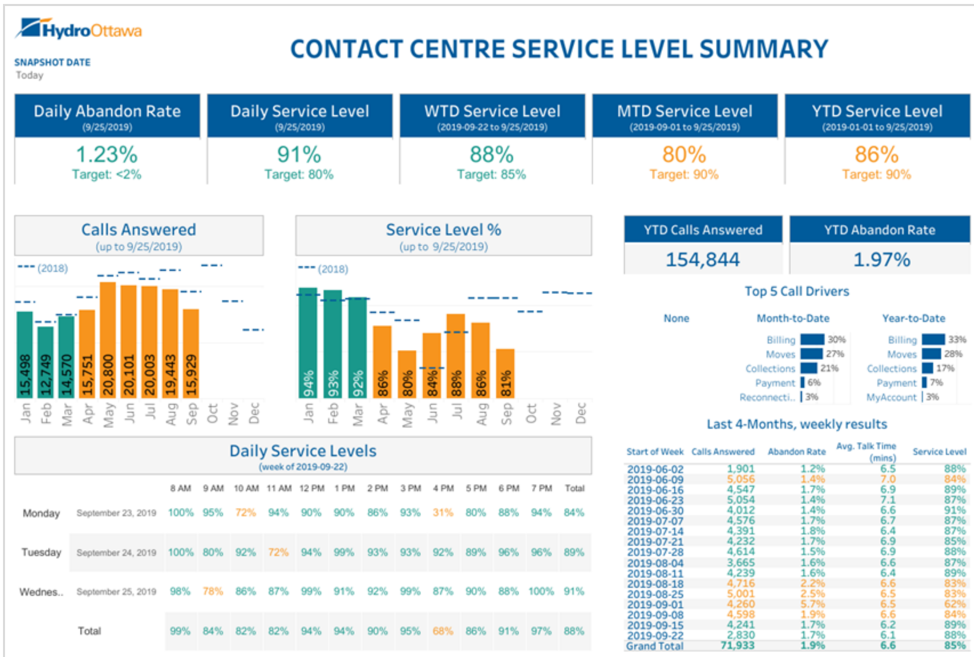
Taken together, the foregoing initiatives have helped to ensure that the utility's cybersecurity program remains at a best-in-class level within the industry and that Hydro Ottawa is effectively mitigating the risks emanating from an increasingly sophisticated threat landscape.

2.3.4. Data Visualization and Analytics

Hydro Ottawa introduced data visualization software in 2017. This powerful platform helps simplify raw data into an easily understandable format. It can connect to almost any database and the data analysis created is in the form of dashboards and worksheets.

The adoption and integration of this software into Hydro Ottawa's business intelligence workflow has been an iterative process. The current dashboard connects to relevant data sources and is refreshed daily. For example, following key data governance parameters and design principles, the information currently available includes key performance metrics on Customer Contact Centre data that include daily service levels and abandonment rates. Hydro Ottawa is planning to augment the current suite of reports and interactive dashboards with the transition of existing Excel reports to this data visualization software. The utility also intends to expand connectivity with new applications, such as Salesforce and Google Analytics.

Figure 12 – Screenshot of Daily Contact Centre Service Level Dashboard Summary



The efficiencies achieved through this software support Hydro Ottawa's focus on continuous improvement. As data visualization is deployed, employees will be able to decrease their reliance on manually manipulating data in Excel. The reports and dashboards are housed in a central and accessible location, providing insightful and tailored data in an easily digestible format to key stakeholders, including the executive and senior management teams.

This initiative provides Hydro Ottawa with a business intelligence solution that will drive enhancements to the user experience, create operational efficiencies through report automation, and allow for business decisions to be supported through data-driven insights.

2.3.5. New Platform for Content Management System

In 2019, Hydro Ottawa completed the replacement of hydroottawa.com's legacy content management system ("CMS") with an enterprise-level, highly rated, open-source technology hosted in the cloud. Hydro Ottawa's ability to maintain an online presence under any circumstances, especially during significant weather or other impactful events, is paramount, and has been a challenge in the past. The new CMS promotes greater collaboration within the organization through more intuitive management tools to create and publish content. With this new system in place Hydro Ottawa is able to re-direct efforts to higher-value, customer-facing initiatives. Internal web development and creative resources will turn more focus to improving self-serve options, expanding online account services, and supporting innovative programs.

This project provides an industry-leading technology solution, enabling Hydro Ottawa to become digitally sustainable for the foreseeable future, while reducing the cost of ownership for its digital environments. This new CMS will increase customer engagement online through an improved user interface, ensuring the user experience translates to all user endpoints including desktop computers, laptops, mobile tablets, and browser-enabled cell phones.

2.3.6. Fleet GPS Solution Implementation

In 2003, Hydro Ottawa adopted a Global Positioning System (“GPS”) and telematics system for fleet management. After 12 years of utilization, the system had reached its end-of-life, with vendor support no longer provided. Accordingly, the utility launched a GPS Evaluation & Implementation Project in 2016 to install and configure a new fleet service GPS solution.

The scope of the project encompassed the following: supply and installation of new Automatic Vehicle Locator tracking devices; installation of Wi-Fi hotspot devices; integration with Hydro Ottawa’s existing fleet management application and internal outage map; adoption of a web-enabled electronic process for logging hours of service and preparing Driver’s Vehicle Inspection Reporting for all bucket trucks; and ongoing technical support for these solutions.

Following final integration and training, the project was closed-out in 2018. Efficiencies that have already been achieved include paperwork reduction for commercial vehicle operator’s registration compliance-related activities, improvements in real-time location of vehicles on Hydro Ottawa’s situational awareness map, and reduction of connection costs with Wi-Fi hotspots in vehicles. Longer-term projected benefits include optimization of the utility’s fleet with real-time data on vehicle position, speed, and fuel use; reduced fuel and maintenance costs; and improved driver behaviour, which in turn will increase safety and security.

2.3.7. Information Management Strategy

Over the last few years, Hydro Ottawa continued its implementation of a multi-year initiative to proactively address challenges and opportunities related to long-term information management ("IM") requirements and needs within the utility. Much of this initiative has been based on the findings of an expert consultant's assessment of the maturity level of Hydro Ottawa's IM programs and practices. Actions undertaken in response to the external findings included the adoption of a formal IM vision statement, as well as the establishment of four strategic priorities that have since guided the utility's IM strategy: (1) IM Governance: (2) IM Processes; (3) IM Communications and Training; and (4) IM and IM-related Technology. What's more, the utility has formally recognized IM as a corporate business program through consistent governance and oversight, the hiring and retention of IM subject matter experts, and the development and implementation of processes to monitor and audit IM performance. In 2018, Hydro Ottawa adopted an official IM corporate policy, identifying the principles and directives that guide IM at the utility, and establishing safeguards and parameters to the information that Hydro Ottawa holds in its custody or control in the conduct of its business activity.

The benefits of this more structured and disciplined approach to IM were manifested during the migration of the utility's workforce and paper records to its new facilities. A cleanup effort resulted in the safe disposition of a large volume of outdated material, representing a 78% disposal rate and reducing operational costs such as external storage.

The fruits of the revitalized IM strategy will likewise be on display in 2020, when Hydro Ottawa adopts new online collaboration tools that will offer email, calendar, instant messaging, and a structured document repository that will make files easier to locate, update, and share. The Google-hosted solutions of G Suite and AODocs will facilitate productivity gains by supporting the utility's "Anything, Anytime, Anywhere" philosophy of supplying tools to the workforce where and when they are needed, making a wider range of collaboration features available (including options for real-time collaboration), providing built-in capability for voice and video calls, and offering a highly scalable environment.[13]

2.4. HUMAN RESOURCES

2.4.1. Workforce Planning

Over the course of 2016-2020, Hydro Ottawa strengthened the integration of strategic workforce planning into its annual corporate planning and budgeting processes. Through its workforce modelling, Hydro Ottawa has sought to proactively identify and address any supply gaps in its workforce which risk adversely impacting organizational effectiveness. In turn, this modelling played – and continues to play – a crucial role in improving overall productivity and containing costs.

During this period, a number of strategies were successfully executed in support of maintaining a sufficient talent pipeline for the utility and stabilizing the total number of full-time permanent employees. For example, since 2016 the total number of permanent full-time equivalents ("FTEs") has remained relatively static, with the same level forecasted into 2021. Management permanent FTEs are decreasing and non-management permanent FTEs are slightly increasing. This has been realized alongside ongoing sustainment and replenishment of the trades workforce, by using vacancies as they become available and focusing on productivity, efficiency, and effectiveness of operations. At the onset of the rate term, workforce modelling had forecasted a need for 65 trades hires. By the end of 2020, Hydro Ottawa will have met its needs through the filling of these positions. What's more, the utility has been increasing its usage of temporary employees which provides it with more flexibility to address seasonal and other workloads, and can be more easily adjusted upwards or downwards as required.

2.4.2. New Human Resources Service Delivery Model

In conjunction with the implementation of Workday, a new digital solution for the human capital management ("HCM") component of Hydro Ottawa's enhanced ERP system (see section 2.3.1 above for more details), the utility rolled out a new operating and service delivery model for

[13] https://gsuite.google.com/, https://www.aodocs.com/.

human resources ("HR") in early 2018. The new, more agile HR operating and service delivery model is aligned to the business, leverages the self-service capabilities of Workday, and better enables HR and its stakeholders to execute on the utility's *2016-2020 Strategic Direction*.

Tailored to address the needs of Hydro Ottawa's continually evolving business, the rapid pace of shifting employee demographics, and increasing access to technology, the new model consists of the following tiered service delivery approach:

- **HR Technology:** Workday and other employee-focused technologies provide employees and people leaders with direct access to their information and the ability to transact anytime, anywhere through self-service on any device.

- **HR Service Centre:** serves as the first point of contact for employees and people leaders for all HR enquiries, with a dedicated telephone extension and email address.

- **HR and Safety Partners:** the business-facing strategic HR and Safety Partners, aligned to the utility's divisions/groups, work together to provide advisory and consultative services to people leaders, bringing solutions on employee and safety-related issues consistent with best practices for the type of work performed. The Partners leverage the HR Centres of Expertise to bring the right combination of service, support, and guidance to their customer groups.

- **HR Centres of Expertise:** consist of HR specialists with deep technical, legislative, and regulatory knowledge and insight in functional HR areas, who design and develop strategies to drive leading people policies, programs, processes and tools, and provide innovative solutions to customer/business needs.

- **HR Leadership:** senior HR leadership establishes and implements a roadmap in alignment with the utility's Strategic Direction, so as to ensure an effective and constantly learning organization, with the right skill sets and organizational capacity to deliver on business priorities.

The adoption of an enhanced Human Resources Service Delivery Model lends valuable capacity and support to fostering a culture of innovation, continuous improvement, productivity, and customer service within Hydro Ottawa.

2.4.3. Safety Performance

Safety performance planning, monitoring, and continuous improvement are undertaken through a mix of proactive and responsive activities including workplace/worksite inspections, tailboard conferences, jobsite coaching, pre-construction meetings, audits, and investigations of incidents, injuries, and hazards/near misses. With its changing workforce demographic, including increased numbers of new apprentices and younger workers in recent years, Hydro Ottawa has enhanced its proactive training, coaching, and monitoring activities as part of its effort to more proactively manage safety risks through pre-construction planning support, independent review of work practices, and timely jobsite coaching, where required.

Hydro Ottawa is automating the manual processes and workflows associated with these and other Occupational Health, Safety, and Environmental ("OHSE") activities in a cloud-based OHSE software solution, and eliminating the paper forms and paper-based recording in the field related to these activities. Once fully implemented in 2020, along with the corresponding enhanced reporting functionality and data analytics, Hydro Ottawa anticipates being able to more efficiently and effectively report on the findings and follow-up actions resulting from these activities and to make more informative and timely decisions with respect to additional OHSE training, communications, and programming needs.

2.4.4. Labour Efficiencies

The International Brotherhood of Electrical Workers ("IBEW"), Local 636 represents Hydro Ottawa's unionized employees. In 2017, Hydro Ottawa and the IBEW, Local 636 reached a renewed four-year collective agreement that resulted in several labour efficiencies. These included the expansion of normal hours of operation, reduction in hours of rest time when employees work overnight, and a simplified process for the reassignment of employees to a different work location for training purposes. In addition, the negotiated wage increases are on average 22% lower than the increases from the previous four-year collective agreement.

2.4.5. Environmental Sustainability

In step with its strategic objective of Corporate Citizenship, Hydro Ottawa has undertaken numerous actions during the 2016-2020 rate term to continuously improve its environmental performance and reduce its environmental impact. For example, Hydro Ottawa consistently achieved a non-hazardous waste diversion rate above 90%. The utility has also sought to transition away from the use of fossil fuel-powered equipment and tools by field crews in favour of rechargeable battery-powered units. In addition, new technology solutions were leveraged to optimize the efficiency and performance of the utility's vehicle fleet, and to reduce the need to dispatch crews to perform such tasks as disconnection and reconnection of customers. Technology was also a major consideration in the design and construction of new administrative and operations facilities. As a result, the facilities consume significantly less energy and water than buildings designed according to standard codes (40% and 55%, respectively), employ centralized waste collection systems in lieu of waste management at the office/desk level, and are equipped with web-based tools to facilitate virtual meetings and reduce the need for employee travel. (See section 2.5.1 below for more detail on these facilities).

One of the most prominent sustainability initiatives undertaken during this period was participation as a charter member in Carbon 613. Launched in 2016, the Carbon 613 network is a made-in-Ottawa, target-based sustainability program that supports local businesses in setting and achieving sustainability goals, while enhancing their competitive advantage and stimulating the low-carbon economy. The program is one of eight such programs across Ontario. Members of Carbon 613 commit to reducing their greenhouse gas ("GHG") emissions by setting a baseline and GHG-reduction target, taking action to achieve that target, tracking and reporting annual emissions, and publicly disclosing emissions data.

In addition, as of the end of 2019, Hydro Ottawa had submitted its application for designation as a Canadian Electricity Association ("CEA") Sustainable Electricity Company©.[14] The twin pillars of this designation are adherence to the ISO 14001 Environmental Management standard and ISO 26000 Social Responsibility guidelines. In addition, companies must declare their commitment to sustainable development, establish a governance framework for social responsibility, secure verification from a third party that their organization complies with the designation criteria, and report regularly and transparently on their performance. Hydro Ottawa anticipates a successful outcome on its application sometime in 2020.

In light of its sustained focus on excellence in environmental stewardship, Hydro Ottawa has consistently been recognized as one of Canada's Greenest Employers (2011-2016, 2018, and 2019).

2.5. MISCELLANEOUS

2.5.1. Facilities Renewal Program

With the approval secured in its 2016-2020 Custom IR application, Hydro Ottawa embarked upon a Facilities Renewal Program. Under the program, two parcels of land were purchased, upon which Hydro Ottawa constructed two regional campuses. The sites are ideally situated in commercial and light-industrial areas that will increase emergency responsiveness, given their proximity to major highways and interchanges. The East Campus is home to the utility's Main Offices, East Operations Centre, and cable storage facility. The South Campus houses the South Operations Centre, Metering, Transformer Shop, and Warehousing. The Facilities Renewal Program has also involved the sale of certain existing facilities.

This program has served and will continue to serve as a key modernization and operational efficiency initiative. It encompasses consolidation of administrative functions, relocation from obsolete, end-of-life facilities, modernization of the work environment, and provision for future growth. Performance outcomes will include the following: improved productivity; enhanced service through more strategically-located and better-equipped facilities; greater workplace

[14] https://electricity.ca/deliver/sustainability/become-sustainable-electricity-company/.

sustainability, innovation, and flexibility; and augmentation of the focus on the customer across the business.

For more information on this program and its benefits, please see Attachment 2-1-1(A): New Administrative Office and Operations Facilities.

2.5.2. Electric Vehicle Initiatives

In step with the utility's commitment to innovation, sustainability, and customer value, and in response to robust public policy and consumer demand signals, Hydro Ottawa has undertaken several projects in recent years to promote the use of electric vehicles ("EVs") and to enhance the utility's understanding of the impacts of EVs on the grid.

Foremost among these initiatives was the launch of a residential EV charging pilot in 2018, in partnership with FLO, Canada's largest EV charging network provider. This program has granted Hydro Ottawa valuable insights into the behavioural trends of EV users, especially as they relate to EV charging for each month and season.

Similarly, Hydro Ottawa also collaborated with Natural Resources Canada on multiple studies over the duration of the Custom IR rate term. These studies examined the impact of direct current fast charging EV chargers on the local distribution network in Ottawa, with effects analyzed all the way down to individual transformers. Although the findings are specific to the unique circumstances of Ottawa, the studies will yield important learnings that can be applied across Ontario and Canada.

Key take-aways from these projects have helped to inform Hydro Ottawa's decision to increase the standard size of distribution transformers that are installed in residential areas, so as to provide higher capacity for future EV penetration (i.e. from 50 kW connecting a maximum of 10 customers to 100 kW connecting a maximum of 12 customers). In addition, the utility has adjusted its demand forecast to reflect the expected penetration of EVs in its service territory.

For more information on the two aforementioned initiatives and their outcomes, please see Exhibit 2-4-3: Distribution System Plan.

Other recent activities undertaken by the utility to better understand the grid impacts of increased EV penetration, as well as the needs and preferences of EV users in its service territory, include partnering with Ottawa-based educational institutions to survey local EV owners regarding EV usage and public charging infrastructure access.

3. PLANNED PRODUCTIVITY INITIATIVES – 2021-2025

Whether through harnessing the potential of new technologies and solutions to better serve customers, elevating standards of business performance and excellence, or rationalizing and re-purposing resources, Hydro Ottawa is set to continue strengthening its culture of continuous improvement over the course of its next five-year rate plan. This section outlines a range of productivity initiatives that are planned for execution during that period.

Of note, it is anticipated that additional productivity initiatives will be conceived, proposed, and implemented during the upcoming five-year period beyond those that are enumerated below. This is consistent with the utility's experience from its 2016-2020 rate term, insofar as numerous initiatives were launched during that term which were not identified in the corresponding Custom IR application. What's more, this confident expectation on Hydro Ottawa's part is firmly anchored in an ongoing cycle and rhythm of continuous improvement at the utility, which accounts for the need to plan for and respond to new circumstances that arise in the business and operating environments, shifts in customer preferences, unforeseen and unexpected public policy developments, and evolutions in the technological systems underpinning frontline and back-office functions.

3.1. CUSTOMER SERVICE

3.1.1. Customer Relationship Management

In step with its chief corporate strategic objective to place the customer at the centre of everything it does, Hydro Ottawa is embarking upon a service automation journey utilizing a digital platform in CRM to enable a 360-degree view of customer activity across the organization. This initiative involves the deployment and utilization of Salesforce, recognized as an industry leading solution for connecting sales, service, and marketing activities on a unified “mobile first” cloud platform.

The purpose of this initiative is to provide a single, end-to-end picture of the customer’s journey aggregated from across various channels, systems, and data silos. By providing a unified view of all customer touchpoints, Hydro Ottawa will gain greater customer insight to deliver more personalized and engaging customer experiences, improve customer intelligence, and achieve corporate performance objectives. This strategic approach will enable the utility to synchronously manage across the traditional customer-interfacing organizational boundaries – namely, customer service, sales, marketing, field service, and technical and operational support.

Productivity gains that are expected to accrue from this initiative include the following:

- Leveraging Salesforce as a central hub to record customer communication preferences, so as to improve personalization and customer choice;
- Launching a foundational platform upon which to integrate other customer channels, touch points, and technology (including social media engagement);
- Collapsing a number of applications into a single, unified platform, thereby reducing systems, vendors, integrations, and complexity;
- Enabling Customer Service staff to better collaborate and respond to customer activities in real-time; and
- Driving Key Account case management improvements.

3.2. DISTRIBUTION OPERATIONS, ENGINEERING & ASSET MANAGEMENT

3.2.1. Workforce Adjustments through Grid Modernization and Business Process Enhancements

The Chief Electricity Distribution Officer (“CEDO”) Division within the utility, through all of its various groups, is challenged daily to look for innovative ways to modernize infrastructure and business processes to enable more efficient service offerings to customers. The method is often a re-evaluation of work processes, skill sets, and available and future tools that can allow for a different and often more streamlined way of working. Through this evaluation, areas of potential overlap and adjustment can be identified. Following the recent consolidation of administrative and operational facilities, this internal evaluation process revealed the presence of overlaps in certain work groups that could be condensed. In addition, future system automation that will be in place within the timeframe of the adjudication of this Application will allow for autonomous system decision-making and less need for human interference. Through these adaptations, CEDO can realize an attrition-based readjustment between 1-2% or up to seven positions.

3.2.2. Crew Wrench Time Analysis and Productivity Improvements

This project will analyze day-to-day activities of the utility's current Power Line Technician and Power Cable Technician workforce through the use of GPS data analytics. Through this initiative, Hydro Ottawa will separate these work groups into separate categories and perform analysis that will focus on work centres, as well as travel and set-up times, with the aim of benchmarking total time spent working (i.e. "wrench time"). In 2019, additional GPS devices were added to all vehicles providing increased, detailed information analytics that were previously unavailable. This additional information will allow for enhanced granularity of vehicle usage and allow the utility to determine start and stop times, in addition to engagement and disengagement of various vehicle functions. Through this analysis, Hydro Ottawa will identify factors that are having the greatest impact on wrench time and that are potentially serving as barriers to optimizing total wrench time. This analysis will enable the identification and prioritization of processes, systems, and resource improvements to increase wrench time on a daily basis. Hydro Ottawa's objective is to increase wrench time by 4% or approximately 15 minutes per day per crew. This represents more than $520K of additional value annually for a staff of 110 Power Line Technicians and Power Cable Technicians.

3.2.3. Seasonal Construction Shifts

Hydro Ottawa will explore implementing seasonal construction shifts for certain resources and crews to take advantage of the increased amount of daylight in the spring and summer months to increase crew productivity and improve customer service.

Field staff at Hydro Ottawa work an average of 40 hours per week, or 80 hours every two weeks, within the normal hours of operation of 6:00 a.m. to 6:00 p.m., Monday to Friday. The majority of staff works an eight-hour shift from 7:00 a.m. to 3:00 p.m. In lieu of this arrangement, the utility intends to pilot an approach in which heavy construction crews would work four 10-hour days per week. This will lead to a reduction in total crew travel time and the number of truck set-ups and tear-downs on large projects.

For Hydro Ottawa's service trucks, seasonal construction shifts will likewise improve customer service and choice. Service trucks are two-person crews in smaller line trucks that complete service isolations and re-energizations, service removals, and in-fill service connections. These activities are dispatched using Hydro Ottawa's Mobile Workforce Management system based on appointments booked by customers or their electricians. Working longer shifts per day will increase the capacity for appointments in a day, thereby enhancing the customer experience by providing customers access to more appointment windows within a shorter timeframe. It will also permit the crews to complete the vast majority of the service re-energizations during regular hours, as opposed to overtime costs being incurred or 24/7 crews performing the work.

Hydro Ottawa's plant inspection function would also benefit from seasonal construction shifts. Civil contractors, like the majority of the construction industry, work long days in order to be as efficient as possible. By having Plant Inspectors work four 10-hour days, capacity for inspections will increase during regular hours, permitting civil contractors to build and form longer runs of duct banks prior to concrete pours, reducing the time required to complete jobs. The majority of the inspections would also be completed during regular hours.

It is anticipated that implementing these measures will result in a targeted 5% reduction in overtime costs for those crews working the seasonal shifts, while also enhancing the customer and contractor experience.

Seasonal construction shifts will be considered on a project-by-project basis, with particular consideration given to City of Ottawa by-laws. Certain arterial roads in the city have access restrictions that limit lane closures and encroachments to the window of 9:00 a.m. to 3:00 p.m. In these situations, an eight-hour day would be most efficient for execution.

3.2.4. AMI Analytics & Integration Management

Since the adoption of smart metering technologies in 2006, Hydro Ottawa has sought to leverage AMI data as a means of driving operational efficiencies and improving the accuracy of customer bills. To date, however, the utility's information technology ("IT") architecture has not included any specific platform to enable the detailed AMI analytics that are required to fully optimize the use of AMI data and maximize the value that can be derived from it. As Hydro Ottawa migrates towards an "always-on" cellular communication back-haul of AMI data, the volume of data available to the utility will vastly increase in size. In order to take full advantage of this opportunity, the utility must invest in data storage, analytics, and integration solutions.

Hydro Ottawa is therefore undertaking a project to select, configure, and deploy a cloud-based data analytics platform that will provide the necessary solutions (including those which possess artificial intelligence and machine learning capabilities) and integrate with new and existing business systems. Following project completion, the utility will enjoy greater access to AMI data and the ability to optimize functionality from the existing metering population. As a result, operational efficiencies and improvements will be achieved across a range of core business functions – billing, collections, meter data services, field operations, asset planning, and finance. Enhanced analytics will offer new insights and capabilities for purposes of early outage detection, automated troubleshooting, field service dispatching, Move-In/Move-Out process, distribution modelling, load forecasting, revenue forecasting, unbilled estimates, loss allocations, and rate design. What's more, this initiative will help position Hydro Ottawa to better prepare for and accommodate the introduction of greater complexities into the AMI and metering domains, as distributed energy resources and EVs continue to proliferate.

3.2.5. AMI System Phone Line Reduction

This project will involve the removal of over 400 residential self-contained meters used for mesh data collection (known as "gatekeepers"). These devices, which are responsible for gathering and sending data to the Metering team for analysis and billing, will be replaced with 350 pole mounted data collection gatekeeper nodes. The new nodal devices will offer numerous advantages and benefits. For example, they will have significantly better communication reach, as they will transfer the data through cellular communication rather than costly hardwired connections that are prone to ground disturbances and potential failure as the asset ages. In addition, these upgraded modules will contain backup power to enhance resiliency during power interruptions, improve outage management capabilities and potentially utilize our fiber network. They will also be serviceable by line staff.

Cost savings generated by this initiative include reductions in labour and fleet costs associated with telephone line maintenance, as well as reduced telecom charges directly associated with those lines.

3.2.6. Reduction in Fleet Assets

Hydro Ottawa operates a diverse fleet of 234 vehicles. The fleet consists of a combination of heavy construction vehicles, light construction vehicles, cube vans, and passenger vehicles such as vans, pickups, and cars.

Hydro Ottawa intends to leverage the Geotab GPS units in each of the vehicles to analyze the utilization of all types and classes of vehicles to identify opportunities to rationalize and right-size the fleet, where appropriate. The utility's overall objective is a reduction of at least six vehicles, representing approximately 2% of the fleet.

This initiative is particularly timely and relevant given the recent relocation of resources to Hydro Ottawa's new east and south operations centres. The intention is to improve utilization of specialized construction vehicles through sharing of those resources amongst work groups. The initiative will also include an analysis of the usage patterns of pickups, vans, and cars to determine where low-utilization vehicles can be removed from service or re-deployed to replace older vehicles in the fleet that may have higher maintenance and operational costs.

3.2.7. Vegetation Management Savings

Hydro Ottawa anticipates annual savings of $100K in the vegetation management program through the 2021-2025 period. The storm hardening efforts that were undertaken in 2014 and 2015 have allowed Hydro Ottawa to maintain close control of the growth through two-year and three-year trim cycles. It is now anticipated that Hydro Ottawa will be able to continue to refine and reduce the trim cycles in areas showing slower than expected growth.

In addition to the expected savings, Hydro Ottawa will continue to generate revenue during the upcoming five-year rate term as a result of the customer service offering that was developed in 2018, known as the Extended Trim Program. Through this program, when notifying customers of routine tree trimming that will be conducted in their area, Hydro Ottawa offers to conduct trimming of nuisance trees on customers' property at a cost-effective rate.

3.2.8. Cable Locates Savings

Locate requests throughout Hydro Ottawa's service territory have continued to climb year-over-year, as a result of a strong local economy and the rising deployment of "fiber-to-the-home" technology by telecommunications companies.[15] In turn, the cost of the cable locate program has continued to climb proportionally. Hydro Ottawa is therefore exploring opportunities to improve the number of permit requests that are cleared or approved without the need for a field locate. It is anticipated that through these process refinements, Hydro Ottawa will be able to reduce the number of truck rolls by up to 10% without compromising safety.

[15] FTTH, also called "fiber to the premises" ("FTTP"), is the installation and use of optical fiber from a central point directly to individual buildings – such as residences, apartment buildings, and businesses – in order to provide high-speed internet access.

In parallel, Hydro Ottawa will continue to increase the number of Alternate Locate Agreements ("ALAs") in place with approved excavators. The ALA outlines specific terms and conditions whereby an approved excavator can dig without receiving a traditional marked field locate. ALAs were implemented in May 2018, with Hydro Ottawa realizing a savings of more than $55K during that year. It is anticipated that the savings will continue to grow through expanded use of the service.[16]

3.3. INFORMATION TECHNOLOGY & OPERATIONAL TECHNOLOGY

3.3.1. Digital Strategy

In order to provide structure to the identification of priorities and goals for leveraging information and operational technology in support of its business objectives for the 2021-2025 period, Hydro Ottawa has adopted a formal Digital Strategy. This new Digital Strategy revolves around four central themes: an enhanced customer experience; evolution of the grid; increased productivity through automation; and participation in energy innovation and technology.

The focus on enhanced productivity serves as a continuation of the business process optimization that Hydro Ottawa has undertaken in recent years, with manual processes and legacy platforms being replaced by more advanced digital solutions. This transition and transformation will remain ongoing over the course of the upcoming five-year rate term. In addition, the utility will seek to apply such solutions as artificial intelligence and machine learning towards predicting bills, informing customers of outages, tracking a truck to a service call, and performing lifecycle management for IT assets used by employees. In line with emerging industry best practice, the Digital Strategy also calls for continued allocation of over half of Hydro Ottawa's IT budget to "transform" and "grow" initiatives – which are concentrated

[16] A recent initiative that will be complemented by these planned actions for 2021-2025 is the extension of the validity period for locates. Whereas Hydro Ottawa had previously applied a 30-day expiration timeframe for locates, in 2019 the utility extended the validity period to 60 days. This action was a response to feedback from customers and other stakeholders, as well as to internal analysis showing that the 30-day validity period was leading to a growing volume of relocate requests. Subsequent to this change, Hydro Ottawa has observed a reduction in relocate ticket volume and associated costs.

on exploring new products, services, and business models – as opposed to initiatives which simply involve maintaining existing business processes under a status quo approach.[17]

For more information, and to view a copy of the Digital Strategy, please see Attachment 1-1-13(B).

3.3.2. Web and Multi-Channel Development

Web and Multi-Channel Development initiatives will enhance existing technology and introduce new solutions to allow Hydro Ottawa's customers to communicate and interact with the utility on their channel of choice. The platforms encompassed in this project include email, telephone, Web Chat, Chat Bot (software utilizing artificial intelligence that carries out interactive conversations based on pre-made phrases), knowledge base, digital assistant, SMS, and social media.[18] This initiative is part of Hydro Ottawa's vision to move towards a more decentralized, customer-centric, and technologically-advanced service, providing more value to its customers. Customers expect near real-time feedback and interaction, on a 24/7 basis, using their communication channel of choice. Hydro Ottawa will continue to monitor and interact with customers across these multiple channels, the analytics from which will provide the utility with granular insights into customer behaviour, preferences, and needs.

3.3.3. Migration of ERP System to the Cloud

An effective ERP solution is critical to the successful operation of Hydro Ottawa's ongoing business operations. Having gone live in 2018, the utility's current on-premise system – JD Edwards – will have reached the end of its useful life in 2023 and will thus require an upgrade across technology components. Hydro Ottawa intends to migrate to a new cloud-based platform to improve agility and operational efficiencies, and eliminate the need to continually upgrade its ERP system every five to seven years. Expected benefits include enhanced IT resource utilization to focus on higher-value activities; cost savings through leaner processes and

[17] For more information on this industry best practice, and Hydro Ottawa's fulfillment thereof, please see the IT Budget Assessment Benchmark report prepared by Gartner, which is included in this Application as Attachment 1-1-12(F).

[18] Gartner, an IT research and consultancy firm, estimates that 85% of online conversations will be with Chat Bots in 2020.

in-platform planning and reporting; increased operational effectiveness through simplified user interfaces, superior performance, and standardized processes; improved 24/7 service and support; and increased productivity through collaboration technologies inherent with cloud-based ERP adoption.

3.3.4. Field Service Management

This project involves the replacement of the on-premise Mobile Workforce Management ("MWM") system with a cloud-based system. Hydro Ottawa went live with the first phase of MWM in 2016. Within a year of go-live, the vendor acquired a cloud-based solution from a competing utility and announced that it would no longer invest in the existing MWM product and would eliminate technical support at some point in the future.

With upwards of 40 crews at Hydro Ottawa utilizing this technology, there is significant risk to productivity if the transition to an effective replacement solution does not occur. The utility is therefore seeking an enterprise-grade field service management system which will improve the level of functionality and interoperability currently available, and extend its use across the organization at a reasonable total cost of ownership over the next five to 10 years.

The utility is using this initiative as an opportunity to obtain a range of ancillary benefits that extend beyond the simple replacement of a solution. For example, adoption of a cloud-based system will facilitate expanded use of the tool across a larger number of work groups than those which were recently using MWM. Hydro Ottawa will also ensure that enhanced mobile functionality and reporting and dashboard capabilities are features offered by the new solution. A full review and evaluation of several products in the field service management space will be completed prior to the selection of a solution for implementation.

3.3.5. Distribution Management System Enhancements

This Distribution Management System ("DMS") project follows on the heels of the SCADA replacement project from the 2016-2020 rate period.[19] Hydro Ottawa not only upgraded its

[19] Please see section 2.3.2 above for details on the SCADA system upgrade.

SCADA system with a modern platform, but it also installed the foundational element of a DMS system, which is an electronic map within the platform that is fully integrated with the GIS system.

This project will seek to build upon the success of the SCADA upgrade by incorporating additional functional modules into the DMS software platform that will utilize the map and SCADA telemetry to develop analysis products and automation functions. This initiative is primarily targeted at operational efficiency within the system control room and improving Hydro Ottawa's performance in the management of its distribution assets, both during normal day-to-day operations as well as during outage events.

The DMS system is anticipated to help reduce overall system losses, and in turn, reduce Hydro Ottawa's overall revenue requirement. What's more, with automation tools at their fingertips, System Operators will be able to focus greater attention on safety-related critical decisions and spend significantly less time on minor or routine activities.

3.3.6. Outage Management System Replacement

Hydro Ottawa's current Outage Management System ("OMS") platform has been in use for over 10 years and is in need of a significant upgrade. While the existing system is functional, there are several gaps that need to be addressed in order to modernize the utility's response and reporting mechanisms.

In conjunction with the enhancements described in section 3.3.5 above, OMS functionality will be integrated into the same platform as the SCADA and DMS systems. This will have the practical effect of reducing the number of tools that a System Operator must manage on an ongoing basis, generating higher quality of information for control room employees to supply to field crews and management, and improving the overall response to outages. In turn, in the event of an outage, this will help translate into both the duration and number of customers affected being minimized.

3.3.7. Self-Healing Grid

Notwithstanding the significant progress that Hydro Ottawa has made in successfully deploying and utilizing grid modernization technologies, the current distribution system still has limited continuous monitoring and outage visibility capabilities. Without devices providing real-time, actionable intelligence, the utility will not be able to optimally leverage future grid automation technology.

Accordingly, Hydro Ottawa is proposing to install sensors and remotely-operated devices on its network. These devices will increase system-wide outage visibility, and enable sectionalizing and fault finding. Strategic locations for device installation will be identified via an annual system-wide review of operations and performance.

From a productivity perspective, the major gains will be minimizing the frequency of dispatching crews to perform line patrols to pinpoint the source of outages, enhancing the ability of system operators to locate outages in real-time from the control room, and expediting the identification of outages requiring manual switching. Other benefits will include reduced outage durations, improvement in reliability performance, reduced contact with failed equipment for crews in the field, provision of more accurate estimated times of restoration to customers, and the ability to notify customers of high-risk areas to avoid while crews are engaged in restoration activity.

3.3.8. IT Lifecycle Management & Ongoing Enhancements

A critical determinant of productivity in any modern workplace, especially in the electric utility industry, is the availability of high-quality IT assets, services, and support. Accordingly, in order to ensure reliable, robust support for core business functions and operations, Hydro Ottawa administers programs dedicated to the lifecycle monitoring and management of IT infrastructure assets.

The IT Asset Lifecycle Management Program ensures equipment that is reaching end-of-life or usefulness are identified and replaced on an established schedule. This prevents unscheduled outages, which adversely impact business operations and productivity, by proactively scheduling systems and equipment for replacement. Ongoing Enhancements involves the upgrading or replacement of aging equipment as well as the introduction of new technologies that are leveraged to increase the efficiency and effectiveness of IT operations.

Through this disciplined, systematic approach to ensuring access to IT infrastructure assets and systems, Hydro Ottawa is able to support the 24/7 operational requirements demanded by business units across the organization and thereby provide a firm foundation for efficiency and productivity in the workplace.

3.4. HUMAN RESOURCES

3.4.1. Workforce Planning

Looking ahead to 2021-2025, key priorities for workforce planning will be sustaining rather than replenishing the utility's trades workforce, replacing mid-level experienced front-line supervisors/managers, and responding to the changing skill sets required in light of the technological innovations and digital transformation in the electricity sector. To ensure a prudent approach to training and hiring, and with an eye towards limiting overall headcount increases within the organization, Hydro Ottawa will engage in workforce planning based upon the following principles:

- Increase overall productivity to ensure greater availability of productive time, while also establishing initiatives to gain efficiencies that increase the quality of the time worked;
- Hire apprentices and fill other positions by using vacancies as they become available, including the redistribution of vacancies from support functions to the trades;
- Where available in the labour market, attract and hire journeypersons to fill vacancies, with the aim of reducing the overall required training investment in apprenticeships and leverage qualified resources with a shorter lead time to achieve maximum productivity;
- Balance hiring with the appropriate use of overtime to supplement labour gaps, and continue to leverage contracted services where cost-effective and available to meet demand; and

- Increase the efficiency of work through innovative practices and the introduction of new technologies and automation.

3.4.2. Leveraging Technology for Business Process Automation & Training

In step with its Strategic Direction and Digital Strategy, Hydro Ottawa will continue to embrace existing and new technological solutions to streamline business processes for the delivery of HR services. This will entail leveraging its current HCM system to continue to automate what have in the past been time-consuming, manual, and paper-based processes; expanding the system's self-service capabilities; and integrating and introducing other HR technologies (such as the cloud-based OHSE software solution discussed in section 2.4.3 above). This will position the utility to make more effective and timely people and safety-related decisions through access to powerful data and analytics, including predictive analytics.

Similarly, Hydro Ottawa is set to substantially enhance the administration and delivery of employee training through eLearning over the next few years. eLearning has proven to be a successful and popular means of conducting training, as it can be tailored to the unique scheduling needs of specific groups of employees, and thereby optimize work time and productivity. For example, inclement weather days can be leveraged for purposes of delivering fast-deploy refresher training modules for trades, while employees in management, administrative, and clerical roles can complete eLearning at a time and workstation of their choosing (consistent with the utility's "Anything, Anytime, Anywhere" philosophy of supplying tools to the workforce). With the shift to an online library of eLearning courses and integration with the utility's HCM system, Hydro Ottawa is well-equipped to enhance the delivery of legislated, business, and leadership skills training through eLearning, and thus more effectively and efficiently fulfill the training needs of employees.

4. CONCLUSION

Responsibly controlling costs and focusing on cost-effective delivery of outcomes that matter to customers remain core priorities for Hydro Ottawa. Amidst the unique confluence of demands, pressures, and constraints on operations, the utility is placing increased emphasis on incorporating productivity and continuous improvement gains, so as to offset increasing expenditures and boost organizational capacity. Hydro Ottawa is therefore committed to ensuring that productivity and continuous improvement serve as hallmarks of its 2021-2025 rate plan.

CORPORATE PRODUCTIVITY SCORECARD

	Measures	Description	2014	2015	2016	2017 A	2018	2019 Target	Q2 Target	Q2 Actual	Assessment	Notes
Labour Utilization	Productive Time	% of Billable Hours / Total Regular Hours	71%	74%	74%	73%	72%	≥ 74%	74%	73%	X	Below target and prior year due to the office relocation; over 3,000 hours reported on office move administrative WO
	Labour Allocation to CAPEX	% of Labour Time on Capital Activities / Total Productive Time	60%	61%	62%	60%	58%	≥ 60%	60%	57%	X	Below target and prior year due to more WFO instead of capital work (i.e. flood mitigation for Portage)
	Average Sick Days per FTE (annualized)	Total Sick Days / Total Employees	5.9	6.3	5.9	6	7.1	≤ 6.0	6.8	7.3	▲	Exceeded target, however improvement from Q1 of 8.2 and prior year of 7.6.The improvement is explained by a number of long tenured employees who retired.
	e-Learning Training per employee (annualized)	Number of hours of e-learning / Total Employees	N/A	N/A	N/A	1	1.8	≥ 2.0	2	2.2	●	Achieved target.Increase in Q2 due to the summer student on-boarding

	Measures	Description	2014	2015	2016	2017 A	2018	2019 Target	Q2 Target	Q2 Actual	Assessment	Notes
OM&A	Bad Debt as a % of Total Electricity Revenue	Bad Debt / Total Electricity Revenue	0.18%	0.01%	0.13%	0.20%	0.13%	≤ 0.12%	≤ 0.12%	0.04%	●	Below target and improvement in Q2 due to the OEB disconnection ban period ended.Less Finalled accounts in 2019
Asset Efficiency	Technology Infrastructure Cost per Employee	(External IT support costs + computer hardware & software depn) / # of FTE	$21.5 K	$23.3 K	$24.4 K	$22.8 K	$26.5 K	≤ $24.9K	≤ $24.3K	$26.3K	▲	Exceeded target and slightly below prior year.Total costs below budget, but headcount also lower, therefore higher costs per employee
Profitability Metrics	EBITDA as a % Revenue *	EBITDA $ / Total Revenue - Hydro Ottawa Limited	44%	46%	52%	53%	54%	≥ 54%	52%	51%	X	Below target and prior year.Lower EBITDA due to lower distribution revenue and large increase in leak remediation costs
	Inventory Turnover Ratio and Value	Cost of Materials Used / Average Inventory	1.83	1.73	2.27	1.93	1.55	≥ 2.00	≥ 1.94	1.51	X	Below target and prior year due to the move and associated warehouse shut-downs.

Hydro Ottawa

Digital Strategy

2021-2025

INTRODUCTION

This Digital Strategy identifies Hydro Ottawa's priorities and goals for leveraging information and operational technology in support of its business objectives over the 2021-2025 period.

This strategy builds upon the accomplishments achieved as part of the successful execution of the 2016-2020 Digital Strategy and is consistent with the key areas of focus outlined in the 2016-2020 Strategic Direction. The new Digital Strategy revolves around four central themes: an enhanced customer experience; evolution of the grid; increased productivity through automation; and participation in energy innovation and technology. These themes are anchored in the recognition that the electricity service model is in the midst of significant transformation and the role of electric utilities will be transformed along with it.

Against the backdrop of ongoing technological disruption across the sector, Hydro Ottawa will maintain a firm focus on our core mission and mandate over the next five years: to create value for our shareholders, our customers and our community through excellence in the delivery of electricity and related services.

STRATEGIC CONTEXT

Choosing and deploying the right technologies is a crucial aspect of business success for modern utilities. At Hydro Ottawa, our technology decisions are based on two basic considerations: enhancing service to our customers, and creating efficiencies that will increase our competitiveness and improving functionality to be more agile and resilient in the face of industry disruption. Over the course of the next five years, these twin imperatives will continue to drive Hydro Ottawa's decisions in adopting innovative technologies that solve business problems and enhance customer value.

However, looking ahead to the 2021-2025 horizon, Hydro Ottawa's decision-making with regards to preferred technological solutions will take place in a landscape that looks very different from the present five year window governing the company's activities and priorities. The business environment of 2021-2025 will be one in which rapid evolution and growing complexity will increasingly define the operational and information technology systems that underpin utilities' performance.

The business systems and processes supporting frontline operations and back-office functions will accelerate their migration towards digital, mobile-friendly, and cloud-based solutions. Core operational technology (OT) systems will harmonize with enterprise information technology (IT) systems, to the point where they may overlap inextricably. Automation will become the new normal, with artificial intelligence and robotics becoming more readily available and the internet of things (IoT) embedded into the transactions and routines of everyday life.

While utilities navigate this shifting terrain, they will simultaneously be compelled to mitigate the risk of technologies becoming obsolete – whether as a result of thirdparty providers discontinuing maintenance services for legacy solutions or existing tools having reached the end of their useful lives.

Meanwhile, the maturing implementation of smart grid equipment and devices, alongside the proliferation of distributed energy resources (DERs), will foster a more dynamic ecosystem of transactions, participants, and flows of energy, information, and communications. And as the "Smart City" movement gathers momentum, stakeholder expectations will heighten for utilities to enable the connectivity which harnesses the power of data and technology to enhance the quality of life for communities.

This emerging landscape will be challenging for utilities that fail to adapt. But it also presents a market for new products and services and unprecedented opportunities to enhance customer value and service. To realize these opportunities, utilities will need to make significant changes in the way they do business. In particular, they will need to increase their focus on meeting customer needs, and creating a more effortless and engaging customer experience.

This emerging landscape will be challenging for utilities that fail to adapt.

Utilities will need to expand customer value by providing a broader range of products and services, in keeping with the growing range of energy options available to customers. And they will need to consider strategic partnerships that complement and supplement their core strengths.

Fortunately, as it prepares to enter a new five-year chapter of activity and growth, Hydro Ottawa is starting from a position of strength in terms of readiness for the challenges and opportunities ahead. During the 2016-2020 period, Hydro Ottawa achieved significant progress in delivering upon several interrelated strategies that will serve as a springboard for the implementation of this new Digital Strategy.

First and foremost was the predecessor version of this strategy, which focused on improving the customer experience, supporting new products and services, and promoting operational excellence. Signature accomplishments included an investment of over $30 million in IT/OT projects, a shift from a focus on operations to a posture of innovation, substantial deployment of cloud-based solutions, and maturation of the company's cybersecurity and information management (IM) programs.

In addition, the last five years witnessed important milestones in Hydro Ottawa's Customer Experience Strategy, which is aimed at achieving five strategic imperatives: developing a customer centric culture, knowing our customers, improving customer touchpoints, providing leading services and products, and enhancing our technologies and processes.

Finally, through its Smart Energy Strategy, the company was able to better structure its efforts to enhance grid reliability and resilience, transition our customers to a net zero carbon future, and leverage our infrastructure and people to improve customer services.

A key piece of this strategy was a Grid Transformation Plan that set out a prudent and measured approach to Smart Grid development, building on the advanced metering, grid intelligence and self-healing technologies already deployed by the company.

The success of the last five years provides a robust foundation for achieving the goals set forth in this refreshed strategy for the 2021-2025 period. An important bridge between the company's present and future plans will be our enduring aim to be the trusted energy advisor for our customers – large and small – and our community.

Through the priorities and proposals laid out in this Digital Strategy, Hydro Ottawa will continue the digital transformation of our business to offer service to our customers anytime and anywhere, in a more engaging and effortless manner. We will improve our use of data to offer personalized service and improve customer-facing operations. And we will work to align culture, business structure, processes and technology in the service of the customer.

We believe Hydro Ottawa's experience and core capabilities, and its position as a City-owned utility, make it uniquely suited to this role. As the energy needs and options of our customers and our community evolve, and as signature projects and developments proceed, Hydro Ottawa will play a leading role in helping our City to transition to a smart energy future.

As our business changes to adapt to the needs of our customers and market, the target business model will evolve into a structure with unique business needs and a different culture. As we seek to digitally change the experience for our customers, so too will it be important to change the experience for our employees. Improving productivity, enhancing efficiency and agility, and improving collaboration will therefore likewise serve as key areas of focus going forward.

STRATEGIC PLANNING INPUTS

This Digital Strategy has been informed by a number of planning and regulatory processes as well as IT planning sub-committees and programs within the organization. The following serve as critical inputs into the Digital Strategy:

1. Hydro Ottawa Strategic Direction
2. Customer Experience Strategy & Roadmap
3. Smart Energy Strategy & Roadmap
4. Meter to Cash Steering Committee
5. ERP Steering Committee
6. Information Management Program
7. Cybersecurity Program
8. Business Continuity Program
9. Workforce & Talent Management Program
10. Rate Application Program
11. IT Planning and Programs
12. Meetings with Envari

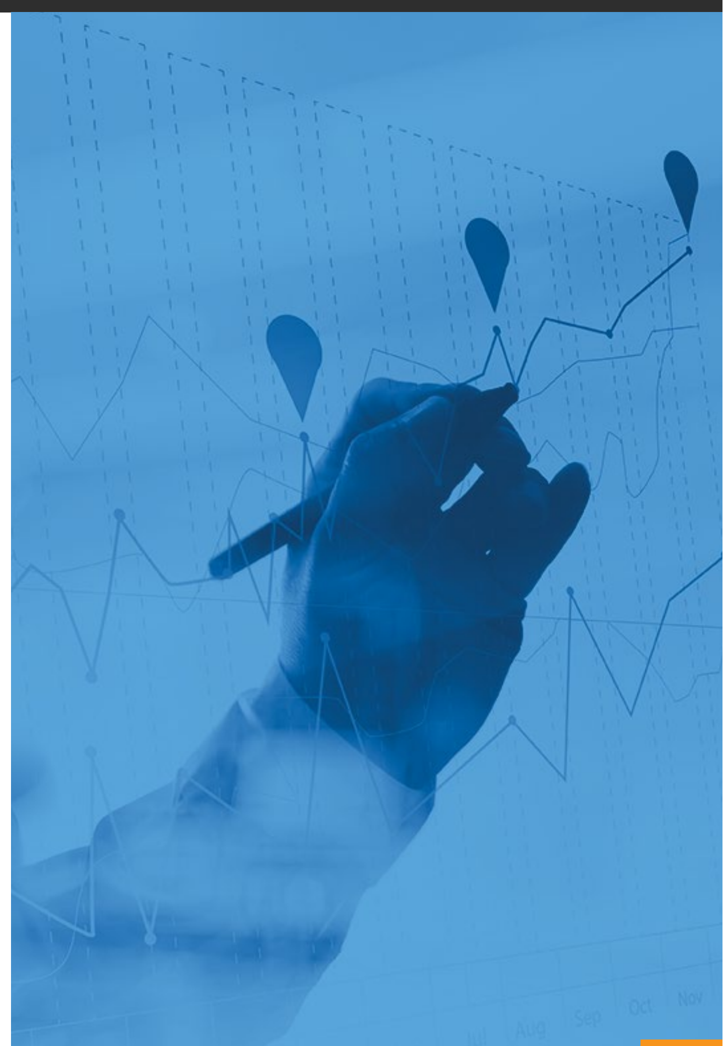
In addition to the aforementioned inputs, Hydro Ottawa's Digital Strategy is influenced by the current IT and technology landscape. The Digital Strategy will follow certain principles to ensure best practice and ease of deployment to market.

Buy vs. Build - The company will seek out solutions that best fit our business needs and that are readily available (COTS – Commercial off the Shelf Software). Only in rare exceptions will the company build any applications needed.

Cloud vs. On Premise – In all purchase decisions, cloud options will be considered first and foremost so as to simplify internal infrastructure and avail of the more turnkey options offered by cloud solutions.

Configure vs. Customize – Wherever possible, Hydro Ottawa will adopt best practice and alter our business processes to conform to best practice (ie. configure) as opposed to customizing new technologies to conform to non-standard practices.

Technology decisions will continue to be supported by a business case and will need to contribute to one or more pillars of Hydro Ottawa's corporate strategy - namely, Customer Value, Financial Strength, Organizational Effectiveness and to Hydro Ottawa's strong sense of Corporate Citizenship.



KEY COMPONENTS OF THE DIGITAL STRATEGY

The 2021-2025 Digital Strategy will build on the foundation established by Hydro Ottawa's technology investments over the course of 2016-2020.

During that time frame, the company's priorities consisted of moving to a digital workplace, leveraging business process automation to increase productivity, advancing technology on the grid, and creating simple to use customer centric applications and platforms.

Based upon the success of the last five years, and with a focus on the unique challenges and opportunities on the horizon, Hydro Ottawa's 2021-2025 Digital Strategy will be centered around four themes:

1. There will be a continued journey to build on the award winning customer-centric offerings that Hydro Ottawa has delivered to its customers. **Enhancements to the customer experience** will be consistent with expectations for simplicity, ease of convenience and cost effectiveness.

2. Hydro Ottawa will continue to support **evolution of the grid** with emerging technologies that will improve reliability, reduce outages, and better equip our control centre to deal with unpredictable severe weather events.

3. "Price" and the "Increasing cost of electricity" rank as major concerns for our customers. Accordingly, this strategy seeks continued evolution of the business systems within the company to **increase productivity and automation**, and to yield significant cost savings as a result.

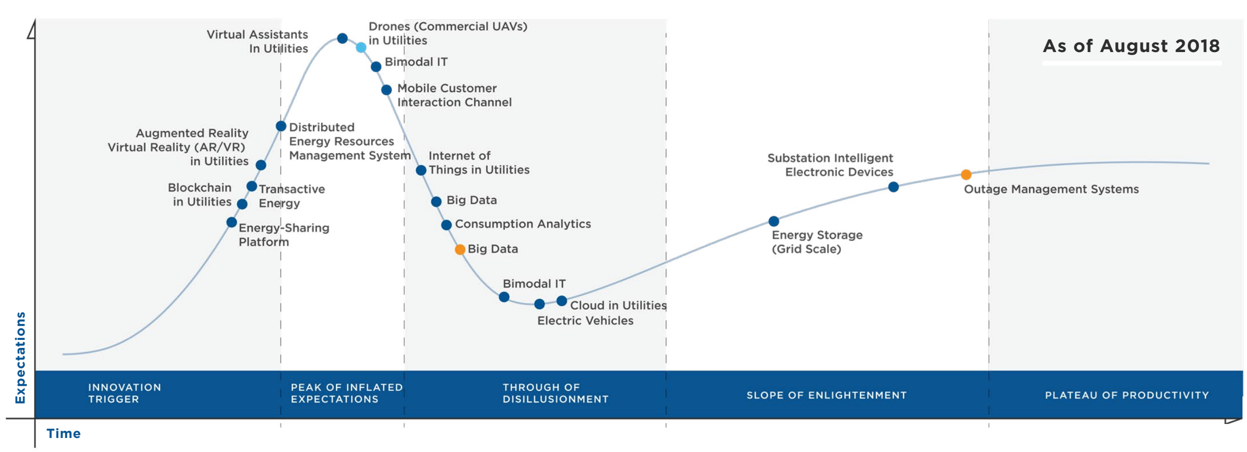
4. The company will continue to pursue opportunities to participate in best-in-class **energy innovation projects**. This will include investments in pilots around Distributed energy resources (DERS) as well as other "behind the meter" technologies.

In order to execute on these four pillars of the strategy, a strong foundation in the form of a **modern technology infrastructure** and a **secure environment** will be very important. The digital strategy will also require robust IT processes in the area of Change and Quality management. **Operational excellence** will be paramount to the success of the digital strategy providing for a continued shift from operations to innovation.

The 2021-2025 Digital Strategy will be highly influenced by the evolution of technology and customer expectations. A number of **emerging technologies** today will be mature technologies tomorrow. Likewise, a number of relevant technologies today will plateau, be unsupported or need to be retired during the upcoming five-year period. Hydro Ottawa will therefore track and implement a number of technologies as outlined in the "Utility Technology Hype Cycle" below.

YEARS TO MAINSTREAM ADOPTION:

LESS THAN 2 YEARS | 2 TO 5 YEARS | 5 TO 10 YEARS
MORE THAN 10 YEARS | OBSOLETE BEFORE PLATEAU



1. ENHANCING THE CUSTOMER EXPERIENCE

The customer experience platform will continue to be influenced by market leaders largely in the technology industry. Customers are becoming accustomed to these evolving experiences and will expect no different from their utilities. Over the last few years, Hydro Ottawa has made huge strides in being an award winning industry leader in the area of customer experience. In particular, significant work has been accomplished on residential service offerings.

In 2018, the average customer spent less than 10 minutes on an annual basis interacting with their utility. These were largely around two areas of interest – "Billing" and "Outages". Any new customer experience strategy will thus need to contemplate a data-driven approach to evolving the customer experience. Hydro Ottawa will embrace platforms that will employ **Artificial Intelligence and Machine Learning** to predict bills, inform customers of outages, deliver visibility into repairs in their areas, track a truck to a service call, order services and obtain quotes online.

Hydro Ottawa's website, outage maps and social media platforms are key assets to communicate outages today. These will be made more resilient in the face of large outages. In addition, personalized notification in the form of text messages and emails will be used where possible. A move to a cloud Content Management System will enable further personalization of websites, creation of micro sites as well as efficiencies in content management.

Investments will be made in the customer service back office. It is anticipated that the Telephony and interactive voice recognition (IVR) system will be moved to a **Cloud IVR system**. This will ensure scalability during widespread outages. Continuous changes to the regulatory landscape will require enhancements to our **customer information and billing systems**. The advent of **Robotics** will enable the automation and augmentation of the customer experience through the use of Bots such as Chatbots, Bots that will process customer moves and Bots which could assist with the billing process.

Hydro Ottawa's billing eco-system is a part of a larger **advanced metering infrastructure (AMI)** strategy that Hydro Ottawa is currently reviewing. Hydro Ottawa is 100% smart metered. However as an early adopter of smart meter technology our meters are ageing. A refreshed strategy will contemplate upgrades of back office metering, load profile and aggregation systems.

Hydro Ottawa will also continue its journey to building a state-of-the-art **customer relationship management (CRM) system** that will incorporate a 360-degree view of the customer. This system will enable service capabilities for its call center and field crews, in addition to enabling self-service for our customers over the long term.

Hydro Ottawa will embrace platforms that will employ artificial intelligence and machine learning to improve the customer experience, predict bills, manage outages and enhance customer service.

2. EVOLUTION OF THE GRID

Hydro Ottawa has invested significantly in creating a "Smart Grid." The company has developed a Smart Energy strategy that encompasses a number of initiatives that are set for continued development over the coming years. In 2018, Hydro Ottawa formed a Smart Energy Steering Committee with a crossfunctional leadership group in order to build a vision and roadmap for future investments in smart solutions. The vision is to be a "leading partner in a smart energy future delivering 100% reliable and innovative service solutions." This Smart Energy strategy combines the company's aspirations to evolve its grid whilst being a leader in energy services.

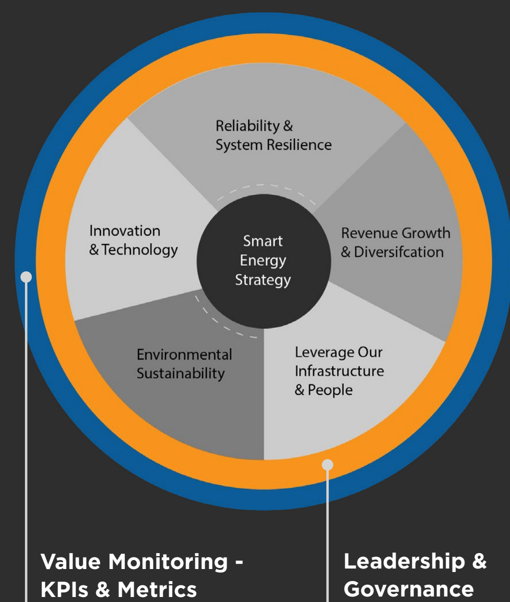
The strategic outcomes include:

- **100% Reliable Service -** Develop enhanced grid reliability, and service offerings to enable provision of 100% reliable electrical service guarantee.
- **Customer Energy Solutions -** Position Hydro Ottawa as the provider of proactive and innovative energy solutions that are driven by our customers' needs, preferences, and objectives.

The Smart Energy strategy leverages technology to align with both current and future markets, positioning Hydro Ottawa to be best in class. Moving closer to 100% reliability is a key goal through automation of the grid. The strategy also focuses on environmental sustainability by transitioning our customers to a net zero future. Hydro Ottawa also aspires to diversify and grow revenues by being a trusted energy advisor to our customers. The goal is to do this by leveraging our knowledge, infrastructure and people.

A number of key initiatives will be undertaken to achieve these goals. Continued investments will be made on Hydro Ottawa's telecommunications network. Deployment of a **Field Area Network (FAN)** will augment the fibre optic network to connect the grid across offices, substations and customers.

A new **Mobile Workforce Management** platform will optimize dispatch for both planned and unplanned work. A **Self- Healing Grid** will require deploying tools to enable fault isolation and restoration with or without operator intervention.



The Digital Strategy will contemplate making significant improvements to **Outage Intelligence**. This will be achieved by building system and tools which are automatically able to locate system damage and identify a root cause of the outage on the distribution system. This will be coupled with **Outage Analytics** that will enable us to better leverage our data.

Hydro Ottawa was an early adopter of Smart Meters. As a result a majority of meters deployed are first generation and do not have 'Last Gasp'. 'Last Gasp' enables the meter to communicate with the system room and inform the system controllers that there is an outage. Given the exorbitant costs to replace all meters in its territory, Hydro Ottawa will review and implement other AMI and communication solutions to bridge the gap presented by the current meters. These include a number of projects including replacing the **AMI head end, Upgrade meters to fibre/ cell communications to ensure more real time communication, Upgrade OMS, and finally selective replacement of meters.**

In addition an initiative will be kicked off to review and select a **Data analytics platform** to better understand meter, outage and load data.

3. INCREASING PRODUCTIVITY THROUGH AUTOMATION

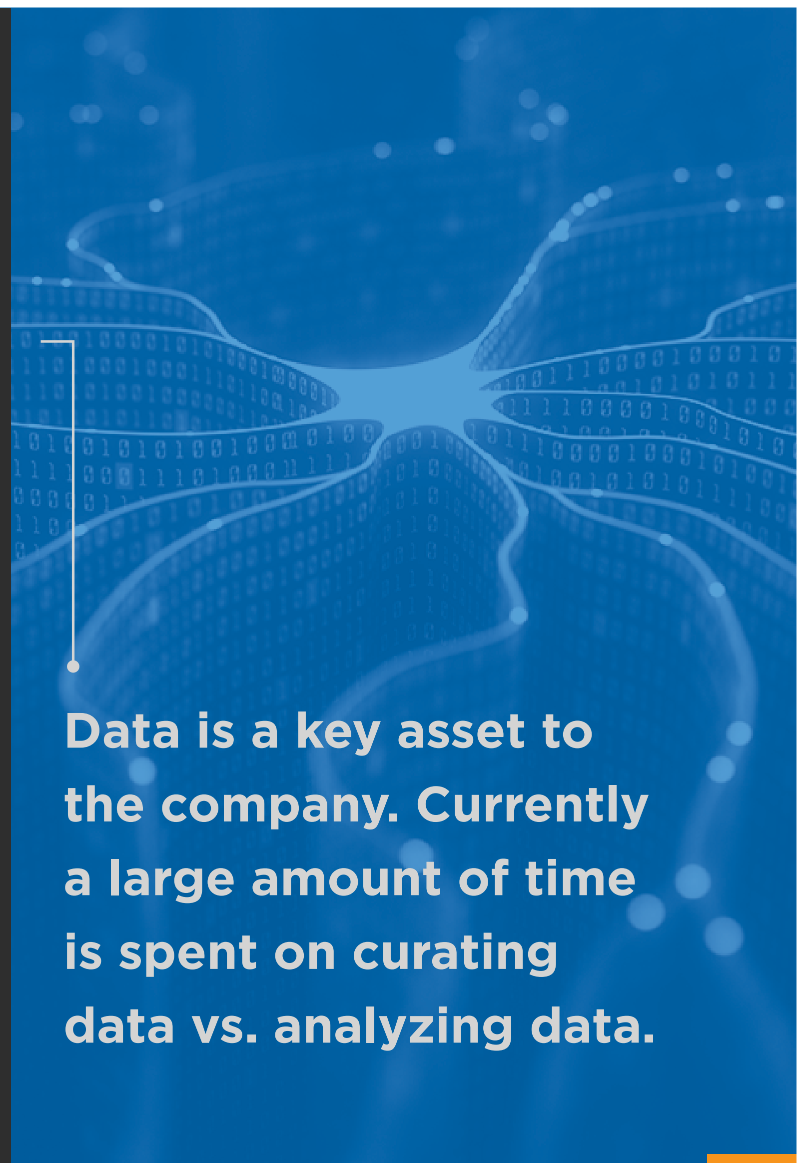
Price and electricity costs remain the largest concern for our customers. The 2021-2025 Digital Strategy will strive to reduce these costs or keep them flat, by improving productivity through automation.

The journey to business process optimization commenced in the 2016-2020 timeframe with the introduction of new platforms for various divisions within the business. However there is still an opportunity to optimize processes that are manual in nature. This Digital Strategy will contemplate new platforms across the organization to replace legacy ones. A significant investment will be made in an **enterprise resource planning (ERP) solution** with the possibility of moving to the cloud. This could entail moving to a multi-system architecture to accommodate requirements for an **asset management and planning system**. A business process review will also examine creating efficiencies in workflows and **project management** for our design teams. A multi-system architecture will require a robust **System Integration Platform** and possibly **Robotic Process Automation (RPA)** to complement the inter-system functionalities.

Efforts will also be made to better manage IT service and to maintain IT equipment and assets. A new **IT Service Management** tool will auto discover assets, assist with lifecycle management and support cybersecurity whilst improving productivity for our employees.

Data is a key asset to the company. Currently a large amount of time is spent on curating data rather than analyzing data. The last Digital strategy has built a foundation of systems to capture data that can be used for customer insights, energy management, outage intelligence, load forecasting, asset management and financial management of the company. A multi-year data strategy is contemplated for purposes of identifying business requirements and a platform needed to serve both the internal and external needs of the company. This will culminate in the adoption of **data-warehouses, data lakes,** and **analytical platforms** to serve the various domains.

A number of existing systems will require continued maintenance, upgrades, feature enhancements due to regulatory, business and government mandated requirements. Our Billing, Metering, Finance, HR, Safety, Facility and Security systems will require continued "care and feeding" which will require ongoing investments and innovations.



Data is a key asset to the company. Currently a large amount of time is spent on curating data vs. analyzing data.

4. PARTICIPATION IN ENERGY INNOVATION & TECHNOLOGY

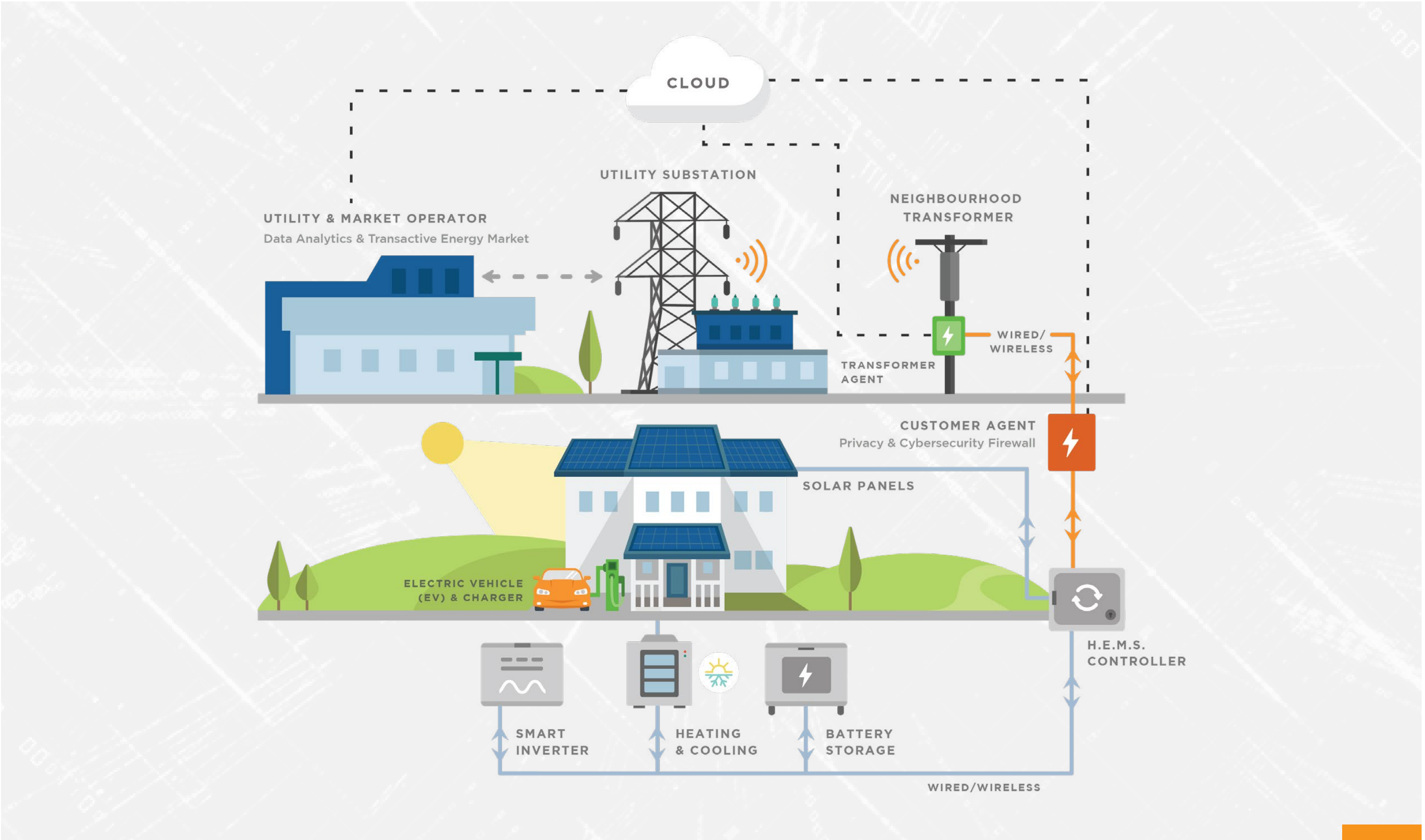
As discussed earlier, the energy landscape is changing rapidly. The advancement of solar and storage, coupled with the increased adoption of electric vehicles (EVs) will create unique challenges for utilities in the future. Utilities will struggle to manage their assets and to remain relevant in the advent of distributed electricity models where it will be possible for customers to generate, manage, share, and trade in electricity. Although this is currently economically unfeasible for most customers due to lengthy buyback periods, it is expected that large firms could bring more costeffective solutions to the general customer population in the next 5-7 years.

The role of the utility in the future will be shaped by these technology advancements, coupled with evolutions in regulatory frameworks. It will be important for Hydro Ottawa to be able to partake in research and development, including energy pilots, in order to create an eco-system of partners and solutions to prepare for such developments in the future.

Some of the key areas to address are:

- Installation and management of solar and storage
- Interoperability between behind the meter technologies and the grid
- Transactional processing of energy including translating them into bills
- Management of micro grids
- Management of EV infrastructure

Hydro Ottawa has had strong relationships with Industry, Academia, and Government and is in a unique position to facilitate the research, development and innovation around these areas. Over the past five years, Hydro Ottawa has participated or led several innovation projects supported by the Ontario Ministry of Energy Smart Grid Fund and Natural Resource Canada (NRCan) in pursuit of new technology and new ways of doing business. The company continues to partner with many of these organizations in applying for grants and pursuing an innovation mandate.



Utilities and their customers are facing challenges that an evolving grid and utility business model can relieve. For the grid to become democratic, resilient and cost effective, it needs to evolve from the traditional centralized system to one supplemented by decentralization. This means the distribution utility becomes a distribution system operator (DSO) utilizing a transactive network that overlays the entire grid, whereby demand response with market signals encourages prosumers' to produce energy, perhaps trade between themselves and, most importantly help cost effectively shore up the grid. Hydro Ottawa created a project called "The GREAT-DR" (The Grid Edge Active Transactional–Demand Response) in order to establish a platform and strategic template for such an evolution to occur.

The GREAT-DR version 1.0 is the first step in the development of an end-to-end smart energy network platform that benefits the prosumer, distributor, transmitter, product manufacturers, generators and market operator. The GREAT-DR seeks to optimize management of energy sources and loads while taking into account customer preferences and needs. It promotes effective grid management, resiliency and prosumerism. The beneficial outcomes are many: absorption of more electrified loads and sources (including transportation, storage, and generation); reduction in greenhouse gas emissions and the facilitation of net-zero carbon communities; amelioration of grid resiliency and flexibility; optimization of grid asset use for more value; democratization of the grid to encourage prosumers; standardization for interoperability with the grid; and a multi-benefit largely decentralized non-wires solution.

Hydro Ottawa's recently launched MiGen Transactive Grid initiative builds on the success of the GREAT-DR 1.0 and expands the scope of efforts in data collection. The three areas of focus under MiGen will be the following; to refine the architecture and implementation while increasing the adoption of customers to simulate larger loads; incorporate additional loads and equipment, such as EV charging infrastructure; and build a market place infrastructure and advanced analytics using Artificial Intelligence and a Transactive Energy loyalty program for customer benefit. The GREAT-DR started with partial funding from the Ontario Smart Grid Fund and the LDC Tomorrow Fund, along with support from collaborating academia and industry partners. New partners have joined the MiGen Transactive Grid team to grow the platform capability with the help of funding from NRCan.

INFRASTRUCTURE & SECURITY

A digital strategy needs to be built on a foundation that is secure.

As the electricity distributor to the nation's capital, Hydro Ottawa is aware of the importance of cybersecurity. The regulator has also called for mandatory certification of a utilities cybersecurity posture on an annual basis. Hydro Ottawa will continue to work on advancing its cybersecurity program. Areas of focus will include Employee Awareness, Supply Chain, Governance, Data Management and a defence in depth strategy. In addition the cybersecurity team will augment services with an eco-system of partners to ensure technical, legal and communication support during an incident.

Data is a key asset to the company. The security and privacy of customer and employee data are important to the company. Hydro Ottawa will continue to review its practices on how it collects, retains, disposes and manages its data. The information management program and the privacy program will define, manage and implement policies, procedures and platforms necessary to securely manage data.

Climate change has meant an increase in the number of extreme weather conditions. This poses a threat to physical infrastructure such as data centers and system control rooms that control the grid. Currently both Hydro Ottawa's primary and secondary data centers are in Ottawa. Hydro Ottawa will pursue a strategy of geo redundancy to meet its business continuity requirements. A secondary data center will be created outside Ottawa using a hosted data center model. Consideration will also be given to increase the use of Infrastructure as a (IaaS) in the cloud.

SUPPORTING NEW BUSINESSES

In its pursuit of excellence and best in class status, the company's digital program will open up opportunities to provide services to other utilities. Billing, customer experience, and cybersecurity are a few of the services that Hydro Ottawa plans to offer its peers in the sector. It is expected that these services will assist smaller utilities in procuring best in class platforms at a fraction of the cost.

IT WORKFORCE PLANNING AND TALENT MANAGEMENT

As Hydro Ottawa's Digital Strategy evolves so too will the corresponding "People" strategy, Newer technologies and platforms will call for an evolution of skillsets. The Chief Information and Technology Officer (CITO) Division's "people" strategy will focus on keeping headcount flat with an emphasis on working within the headcount envelope that exists today. All new technology projects will continue to include business cases that will contemplate a support model post implementation. Due consideration will be given to new technologies so that they do not increase headcount for the organization as a whole, but instead either reduce headcount or transfer them to areas of higher value. In addition an eco-system of partners will be engaged to support the ongoing technology needs of the organization. This will ensure that Hydro Ottawa has a variable cost model that supports the organization during technology transformations and major projects.

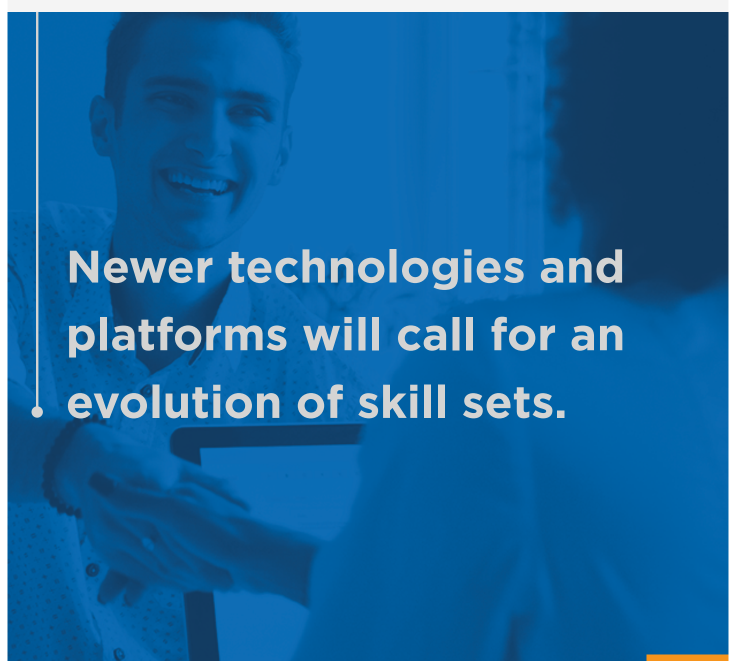
In order to achieve the business outcomes needed the IT and OT teams will need to continually evolve in terms of their skillsets, processes, and engagement. Technologies such as the Cloud, Artificial Intelligence, Blockchain, DERS, IoT and Robotics will create platforms that will require different skills- for example, Cloud Specialists, Business Analysts, Data Scientists, Integration Engineers.

There will also be a continued reliance on stakeholders from other divisions to ensure that they partake in requirements gathering, testing and QA. This could mean employees from other divisions work being assigned to IT project work for periods of time.

The future support model will contemplate transformation of skillsets through training, attrition and in some cases eliminating existing positions in exchange for new ones. Over the next 5 years approximately 27% of employees will retire. Retirements will be looked at as an opportunity to introduce new talent and skills to the company. In addition efforts will be made to build a pipeline of talent by continuing to hire co-op students in areas where there is the highest skill demand such as cloud, data analytics, cybersecurity and system integration, IoT and grid engineering.

The CITO Division will be a key partner with other business stakeholders in addressing the business, market and regulatory changes through the use of technology.

As the electricity distributor to the nation's capital, Hydro Ottawa is aware of the importance of cybersecurity.



FINANCIAL MANAGEMENT

Hydro Ottawa has undertaken significant investments in technology over the last few years to improve customer experience and employee productivity. Many of these systems have been implemented in the cloud versus on-premise. While their deployment helps to reduce capital expenditures, cloud systems have led to an increase in operating costs.

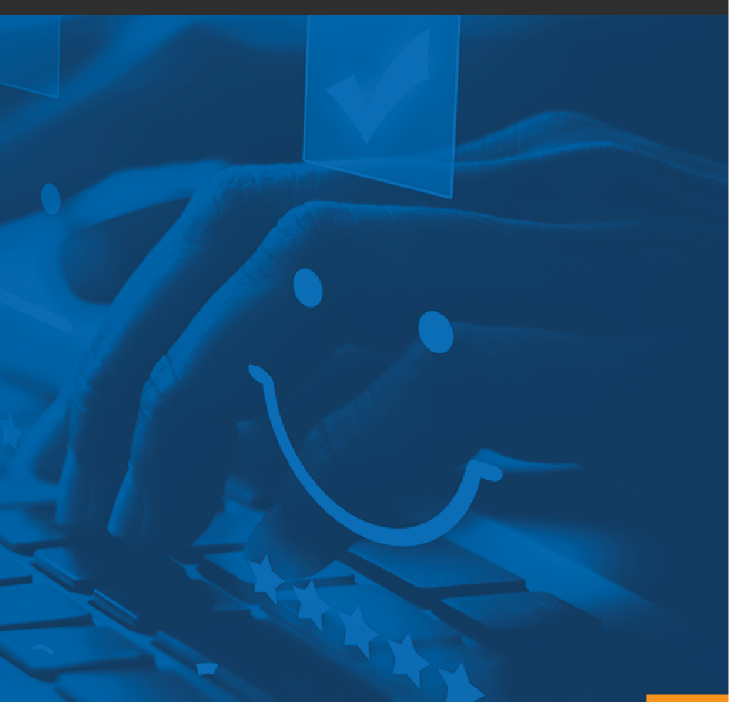
Cloud systems require commitments to operating costs vs reduction in capital. This is a departure from the financial compensation model where utilities typically get a regulated return on capital. Escalating operating costs continue to be a challenge in a regulated model.

Hydro Ottawa contracted the services of Gartner to conduct an IT Benchmarking study and to assess its overall information technology spend in comparison to a similar peer group of electrical utilities. The results of the benchmarking study show that Hydro Ottawa has optimized its costs and has streamlined IT operations. This is evidenced by the IT budget as a percentage of revenue and operating expense metrics both being below the 25th percentile relative to the peer group average. In 2018, HOL allocated over half of the IT budget to “Transform” and “Grow” initiatives which is in alignment with the industry shift that Gartner has identified based on their research and a survey of 106 utility CIOs. This is in sharp contrast to the peer group average where over two-thirds of the budget are allocated to “Run” initiatives.

In spite of current spending levels being lower than the peer group, Hydro Ottawa is concerned about escalating operational costs. Hence all contracts for software and services will continue to be re-negotiated to ensure financial efficiencies. Cloud systems will be deployed to ensure quicker go to market efficiencies and all large projects will need business cases that clearly articulate the financial and non-financial value propositions.

CONCLUSION

The 2021-2025 timeframe will be a period of technology transformation and enhancement for Hydro Ottawa and its customers. The focus will continue to be the enhancement of customer experiences, improvement in Grid reliability, increase in productivity and participation in innovation.



DIGITAL ROADMAP

BUSINESS OBJECTIVES	FINANCIAL STRENGTH	ORGANIZATIONAL EFFECTIVENESS	CUSTOMER VALUE	CORPORATE CITIZENSHIP
IT/OT STRATEGIC ACTION	Monetize Technology Assets And Resources — Reduce And Optimize Costs	Improve Processes To Optimize Business Effectiveness — Leverage Data To Improve Productivity	Improve Customer Experience And Outage Management — Strengthen Grid And Improve Reliability	Support Regulatory Compliance — Participate In Innovation

ROADMAP	2020	2021	2022	2023	2024	2025

ORGANIZATIONAL EFFECTIVENESS

- Mobile Workforce Management
- Cloud ERP
- Occupational Health, Safety and Environment
- Asset Management & Planning
- AODOCs, GSuite, IM Program
- Robotic Process Automation (RPA)
- IT Service Management
- Data Strategy - Data Warehousing & Analytics Platform
- Backup Data Center
- Cybersecurity

CUSTOMER VALUE

- A1 & Machine Learning
- Content Management Platform
- Cloud IVR
- AMI Strategy & Enhancements To Billing System
- CRM System
- DMS Enhancements (Reliability)

CORPORATE CITIZENSHIP

- Green IT

Metrics

- Number of processes digitized
- Number of compliance issues
- Customer satisfaction score
- SAIDA & SAIF
- Productivity reports
- Number of cyber events

Risks

- Talent shortages
- Operating vs. capital
- Cybersecurity
- Change management and culture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