INTERROGATORY RESPONSE - OEB-1

1-Staff-1

EXHIBIT REFERENCE:

Updated Exhibit 1/Tab 1/Schedule 4/pp. 12-14

Exhibit 8/Tab 10/Schedule 1/Attachment A

Exhibit 8/Tab 10/Schedule 1/Attachment B

SUBJECT AREA: Custom Incentive Rate-Setting Framework

Preamble:

In section 16 of Exhibit 1/Tab 1/Schedule 4, Hydro Ottawa lists the specific approvals that it is seeking in this application (the Application). The first three of these are:

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;

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;

…

In its Application, Hydro Ottawa has forecasted the OM&A adjustment factor, all parameters of the cost of capital, the capital expenditures and capital additions, and the load forecast for each year of the plan, and is seeking approval of these as filed with no updates during the term of the plan.

As Hydro Ottawa is seeking approval of all elements of its base and service revenue requirements for each year of the plan, as well as the load forecast which serves as the billing determinants for determining distribution rates, base distribution rates would be established if Hydro Ottawa's application is approved as filed.

Hydro Ottawa has provided the draft Tariff of Rates and Charges for 2021 in Exhibit 8/Tab 10/Schedule A, and draft Tariffs of Rates and Charges for each of 2022 to 2025 in Attachment B of the same exhibit.

Question(s):

a) Please explain the reason for only seeking approval of the 2021 Tariff of Rates and Charges in this Application.

b) Does Hydro Ottawa contemplate that it will be filing a rate application each year to deal with matters such a Group 1 Deferral and Variance Account balances and dispositions?
   i) If not, please explain why not.

c) If Hydro Ottawa does contemplate filing annual rate applications, please identify what rate-setting matters would be reviewed in those applications.

d) If Hydro Ottawa will be making annual rate applications, please explain the rationale for approving and fixing the OM&A expense factor with the forecasted inflation estimates for each year in this application.

RESPONSE:

a) As part of this Application, Hydro Ottawa is proposing that the OEB approve the distribution rates that will be set in the Tariff of Rates and Charges for the years 2021-2025. Hydro Ottawa has only sought approval for the 2021 Tariff of Rates and Charges in this Application as there will be the need for non-distribution charges to be updated and approved on an annual basis. These charges are included in the list of items in the response to part (c) below.

b) Yes, Hydro Ottawa contemplates filing an annual rate adjustment application.

c) Hydro Ottawa will apply annually for approval of rate orders which would include the following rates and charges:

- Approved Hydro Ottawa Distribution Rates;
- Approved Low Voltage Charges;
- Updated Retail Transmission Rates;
- Updated Retail Service Charges;
- Updated and Approved Specific Service Charges;
- Approved Loss Factor;
- Approved Wholesale Market Service Rates (as of the time of filing);
- Approved Smart Meter Entity Charge (as of the time of filing);
- Clearance of Group 1 Deferral and Variance Accounts per OEB guidelines; and
- Approval of other items or amounts that may be requested by Hydro Ottawa or the OEB in the course of the proceeding.

d) Hydro Ottawa was guided by the following minimum standards as outlined in the *Handbook for Utility Rate Applications*:

- "After the rates are set as part of the Custom IR application, the OEB expects there to be no further rate applications for annual updates within the five-year term, unless there are exceptional circumstances, with the exception of the clearance of established deferral and variance accounts."[1]
- "The adjudication of an application under the Custom IR method requires the expenditure of significant resources by both the OEB and the utility. The OEB

[1] Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 26.

> therefore expects that a utility that applies under Custom IR will be committed to that method for the duration of the approved term and will not seek early termination or in-term updates except under exceptional circumstances and with compelling rationale."[2]

Hydro Ottawa's proposal is in line with these expectations. Please see UPDATED Exhibit: 1-1-10 Alignment with the Renewed Regulatory Framework for the calculations and reasons for the utility's escalation approach.

[2] *Ibid*, pages 26-27.

INTERROGATORY RESPONSE - OEB-2

1-Staff-2

EXHIBIT REFERENCE:

Updated Exhibit 1/Tab 1/Schedule 8

Updated Exhibit 1/Tab 1/Schedule 10

SUBJECT AREA: Custom Incentive Rate-Setting Framework

Preamble:

Hydro Ottawa has proposed a Custom IR plan where, after rebasing in 2021, the revenue requirement and rates for each of 2022 to 2025 would be calculated by:

- Capital is passed through annually by updating the rate base for capital additions and removals each year, and recalculating the capital-related revenue requirement (return of capital – depreciation/amortization, return on capital and associated taxes)
- Aggregate OM&A expenses are updated via a Custom Price Escalator Factor (CPEF) annually for inflation less productivity plus a growth component, with:
  - Inflation being a custom inflation index with weights for labour and non-labour (i.e., materials) reflecting the revenue requirement weights for OM&A; other than that, the inflation factor uses the same methodology as is current used for other inflation factors that the OEB has approved for electricity and gas incentive rate-setting mechanism (IRM) rate regulation
  - The X-factor, for productivity, is composed of a base productivity factor of 0%, as used by the OEB for electricity distribution (and other energy sector) IRM rate regulation, and a stretch factor. Hydro Ottawa has proposed a 0.15% stretch factor, based on the total cost benchmarking analysis of Clearspring Energy Consultants Inc. (Clearspring), as documented in the Appendix to Clearspring's evidence, excluding the two "generational" (capital) projects of Facilities Renewal and the Cambrian municipal transformer station (MTS). This is in contrast to Clearspring's analysis and recommendation of a 0.30%

stretch factor, and a 0.45% stretch factor based on the forecast from the OEB-issued PEG cost benchmarking model.

- Growth ("g") is based on Hydro Ottawa's forecasted average annual increase in the number of metered customers over the plan term, altered by a factor of 0.35 to account for economies of scale in OM&A expenses due to customer growth. The scaling is indicated to be analogous to scaling adjustments approved in other Canadian jurisdictions.
- Hydro Ottawa has forecasted inflation for each year, and proposes to fix the X-factor (both the base productivity and the stretch factor) for the plan term, and has calculated a 2.51% OM&A annual adjustment for each year from 2022 to 2025.

- Hydro Ottawa has forecasted the cost of capital parameters (Return on Equity (ROE), long-term debt rates and short-term debt rate and its portfolio of long-term debt for each year of the plan, as follows:
  - Hydro Ottawa proposes to use the OEB's deemed capital structure of 40% equity, 56% long-term debt and 4% short-term debt.
  - The deemed short-term debt rate is proposed to be fixed at 2.75%, as issued by the OEB for the 2020 rate year, with no updates.
  - Hydro Ottawa has calculated forecasted 10-year and 30-year long term debt rates. The principal-weighted average cost of long-term debt would be based on the portfolio of existing and forecasted long-term debt and the actual or forecasted debt rate for each debt instrument.
  - Hydro Ottawa has forecasted the ROE for each year of the plan to be used in calculating the return on capital for the updated rate base in each year. This would also impact on the grossed-up tax expense.
- Hydro Ottawa has forecasted the number of customers, kWh and kW, by customer class, for each year of the plan, and proposes no further updates. The updated load forecast for each year will be used in the cost allocation to allocate the revenue requirement between customer classes, and then used as the billing determinants to determine fixed and variable distribution rates (and for deferral and variance account (DVA) rate adders and retail transmission service rates (RTSRs)).

Question(s):

a) Please confirm or correct the above summary of Hydro Ottawa's Custom IR plan for adjusting its revenue requirement for each of 2022-2025, following rebasing in 2021.

b) Please identify any precedents that Hydro Ottawa is relying on to fix the OM&A adjustment at the outset and not update the adjustment with the most current Statistics Canada data each year. As is necessary, where precedents are for other jurisdictions, please provide the cited references.

c) As OEB staff understands Hydro Ottawa's proposal, the utility is not proposing to update the inflation forecasts for each year, which it has estimated at an annual rate of 2.26% for 2022-2025 even at the decision and draft rate order stage this year (i.e., for 2021 rates).
   i) Please confirm or correct OEB staff's understanding.
   ii) If confirmed, and assuming Hydro Ottawa's Application is approved as filed, please explain the basis for not updating the inflation factor at the draft rate order stage, when more current information will be available.

d) As OEB staff understands Hydro Ottawa's proposal, the utility is not proposing to update the cost of capital forecasts for each year, including 2021, at the decision and draft rate order stage this year (i.e., for 2021 rates).
   i) Please confirm or correct OEB staff's understanding.
   ii) If confirmed, and assuming Hydro Ottawa's Application is approved as filed, please explain the basis for not updating the cost of capital data at the draft rate order stage, when more current information will be available. Please identify any precedents that Hydro Ottawa is relying on in support of its proposal.

RESPONSE:

a) Hydro Ottawa confirms OEB Staff's understanding of the utility's Custom IR plan for adjusting its revenue requirement for each of 2022-2025, following rebasing in 2021.

b) Hydro Ottawa is following the approach that was approved for use in its 2016-2020 rate term. Hydro Ottawa is not suggesting any updates during the term so as to ensure that the annual update process is as mechanistic as possible, consistent with OEB policy.[1]

c) i) Yes, OEB Staff's understanding of Hydro Ottawa's proposal is correct. The utility is not proposing to update the inflation forecasts for each year, which have been estimated at an annual rate of 2.26% for 2022-2025.

ii) If directed by the OEB, Hydro Ottawa will update its inflation factor at the time that the 2021 draft rate order is provided.

d) i) Hydro Ottawa confirms OEB Staff's understanding of the utility's position on cost of capital parameters. Hydro Ottawa is not proposing to update the cost of capital forecasts for each year, including at the decision and draft rate order stage this year (i.e. for 2021 rates).

ii) If directed by the OEB, Hydro Ottawa will update its cost of capital parameters at the time that the 2021 draft rate order is provided.

[1] Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 26: "After the rates are set as part of the Custom IR application, the OEB expects there to be no further rate applications for annual updates within the five-year term, unless there are exceptional circumstances, with the exception of the clearance of established deferral and variance accounts. For example, the OEB does not expect to address annual rate applications for updates for cost of capital, working capital allowance or sales volumes."

INTERROGATORY RESPONSE - OEB-3

1-Staff-3

EXHIBIT REFERENCE:

Updated Exhibit 1/Tab 1/Schedule 8

Updated Exhibit 1/Tab 1/Schedule 10

Decision and Order EB-2017-0049, March 7, 2019

Decision and Order EB-2018-0165, December 19, 2019

SUBJECT AREA: Custom Incentive Rate-Setting Framework

Preamble:

Hydro Ottawa has proposed a Custom IR plan which is similar to its first Custom IR plan, in that only OM&A expenses are adjusted via an inflation less productivity (which including an overall stretch factor) plus growth (*I* – *X* + *g*) formula, while capital expenditures (capital additions) are fully passed through via the annual updating of the rate base and, hence, the capital-related revenue requirement. Hydro Ottawa has also forecasted the OM&A adjustment formula, as well as the cost of capital parameters, for each year of the plan, and proposes that the forecasted OM&A adjustment and cost of capital parameters be set and fixed for each year of the plan for 2022 to 2025.

Subsequent to the issuance of the Rate Handbook on October 13, 2016, the OEB has approved 5-year Custom IR plans for Hydro One Networks distribution (EB-2017-0049) and Toronto Hydro (EB-2018-0265). For each of these plans, the Custom IR plan as proposed was essentially of a price cap index form, whereby the rate adjustment formula applied to both OM&A and the capital-related revenue requirement. Incremental capital needs were factored into the formula via a capital factor (C-factor), such that the price cap adjustment formula (beyond the rebasing year) becomes I – X + C. The OEB, in its decisions on these recent Hydro One Networks distribution and Toronto Hydro Custom IR plans, approved the general price cap approaches proposed but also determined that an incremental stretch factor (S-factor) on capital was appropriate to incentivize further productivity on the capital budget in the plan. Further, the OEB determined that there would be no updating of the cost of capital beyond the rebasing year during the plan term, and that the inflation adjustment would be done annually based on published Statistics Canada data, as is done for price cap and revenue cap adjustment formulae for other electricity distributors, transmitters, Ontario Power Generation, and Enbridge Gas Distribution.

Question(s):

a) Please provide Hydro Ottawa's rationale for not proposing an S-factor in order to incentivize further cost efficiencies and productivity gains with respect to capital beyond what the utility has forecasted in the capital plan in its distribution system plan (DSP), similar to what the OEB determined should be included in the recently approved Custom IR plans for Toronto Hydro and Hydro One distribution.

b) In light of the OEB's policy for no cost of capital updates during the plan term, and the OEB's decisions for the recent Hydro One Networks distribution and Toronto Hydro Custom IR plan providing for no cost of capital updates during the Custom IR plan term, please explain the rationale for Hydro Ottawa's proposal to forecast at the outset of the five-year plan the cost of capital for each year of the Custom IR plan.

RESPONSE:

a) As outlined in UPDATED Exhibit 2-4-1: Capital Expenditure Summary, Hydro Ottawa went through a rigorous capital expenditure prioritization process. The process involved prioritizing the utility's initially proposed expenditures taking into account customer impacts (including growth), financial impacts, asset needs, resourcing considerations, system reliability (including aging infrastructure) and health and safety considerations. As a result of this process, capital expenditure levels were ultimately reduced by approximately $50M per year for the 2021-2025 period. Some of these savings were achieved by building productivity savings into the capital program over the five-year term. For more information on Hydro Ottawa's productivity initiatives, please see Exhibit 1-1-13: Productivity and Continuous Improvement Initiatives.

In addition, Hydro Ottawa notes that the Renewed Regulatory Framework ("RRF") does not stipulate that all local distribution companies ("LDCs") need to use the same approach in crafting their Custom IR rate applications. The RRF contemplates that utilities would use a <u>custom</u> approach (emphasis added) that suits each LDC's particular circumstances.[1] Although Hydro Ottawa closely monitors the rate proceedings and OEB Decisions related to other regulated utilities, and seeks to incorporate lessons learned where appropriate, the utility is not of the view that a specific OEB Decision for a particular LDC necessarily dictates the approach that must be used by another LDC. Hydro Ottawa's understanding is that, consistent with the principles of administrative law and procedure, the Decisions and Orders issued by individual OEB panels are binding on the parties to the specific proceeding, but are neither binding on other parties nor future OEB panels.

Accordingly, Hydro Ottawa understands that the aforementioned OEB Decisions are applicable to the unique circumstances of the respective rate applications submitted by the utilities in question, and do not impose obligations on Hydro Ottawa to adopt a similar approach with respect to the potential use of an S-factor.

b) As shown in UPDATED Exhibit 5-1-1: Cost of Capital and Capital Structure, the Return on Equity ("ROE") calculation utilizes three components:

- The Consensus Forecast Government of Canada 10-year bond yield;
- The 30-year to 10-year Government of Canada bond yield spread; and
- Change in A-rated Utility Bond Yield Spread from September 2009.

[1] Ontario Energy Board, *Report of the Board - Renewed Regulatory Framework for Electricity Distributors: A Performance-Based Approach* (October 18, 2012), pages 18-19; Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 24.

The ROE calculation in the model utilizes Consensus Forecast forward-looking rates for 10-year bonds on a three-month and 12-month basis. To forecast the ROE over the five-year period of 2021-2025, the October 2019 Consensus Long-Term Forecast was utilized using the average annual yield for 10-year bonds.

Similar to long-term debt, the 30-year Government of Canada bond yield is then calculated using the forecast 10-year bond yield plus 44 bps, which is the five-year historical average spread of the 30-year over 10-year Government of Canada bond yield, as calculated per the OEB Cost of Capital Report.

To determine the change in A-rated 30-year Utility Bond Yield spreads, the five-year historical average spread as utilized in the Cost of Capital calculations up to October 2019 was used. This five-year historical average equals 154 bps.

This approach resulted in Hydro Ottawa using the best available forecast of the specific interest rates for the 2021-2025 period.

INTERROGATORY RESPONSE - OEB-4

1-Staff-4

EXHIBIT REFERENCE:

Updated Exhibit 1/Tab 1/Schedule 8

Exhibit 1/Tab 1/Schedule 10

***Handbook for Utility Rate Applications*, October 13, 2016, pp. 25-26**

SUBJECT AREA: Custom Incentive Rate-Setting Framework

Preamble:

Subsequent to the approval of Hydro Ottawa's first Custom IR plan for 2016-2020,[1] the OEB issued the *Handbook for Utility Rate Applications* (Rate Handbook) on October 13, 2016. The Rate Handbook extended the Renewed Regulatory Framework to rate-regulated utilities, in order to establish greater consistency is rate-setting methodologies to the extent possible and appropriate. The Rate Handbook also added greater clarification on the OEB's policies, principles and expectations with respect to rate-setting options, including for the Custom IR; a section is devoted to the Custom IR option. The Rate Handbook states, on pages 25-26:

> 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).

[1] EB-2015-0019

> 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.

OEB staff have compiled the following table of cohorts and stretch factors for Hydro Ottawa for the period from 2014 to 2020, based on the annual Ontario distributor benchmarking. These are based on the annual reports for the study conducted by Pacific Economics Research Group LLC (PEG), as commissioned by the OEB. The studies are publicly available on the OEB's website.[2]

Table 1-Staff-4-1: Hydro Ottawa's Cohort Ranking and Stretch Factor by Year

Rate Year	3-year data range	Cohort	Stretch Factor
2014	2010-12	3	0.30%
2015	2011-13	3	0.30%
2016	2012-14	3	0.30%
2017	2013-15	4	0.45%
2018	2014-16	4	0.45%
2019	2015-17	4	0.45%
2020	2016-18	4	0.45%

[2] https://www.oeb.ca/industry/rules-codes-and-requirements/performance-assessment

Question(s):

a) Please confirm or correct Hydro Ottawa's cohort ranking and stretch factor for each year from 2014 to 2020, as shown in the above table.

b) Since Hydro Ottawa's proposed Custom IR plan only applies the (inflation-less-productivity-plus-growth) adjustment to OM&A expenses, while capital additions are passed-through through the annual rate base and capital-related revenue requirement update, please explain how Hydro Ottawa's proposed Custom IR plan satisfies the Rate Handbook expectation that the "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)".

c) Hydro Ottawa is proposing a stretch factor lower than what the PEG model would forecast or has been Hydro Ottawa's stretch factor for the period 2014-2020. Please explain how Hydro Ottawa's proposal is consistent with the OEB's general expectation that "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".

RESPONSE:

a) Hydro Ottawa confirms the cohort ranking and stretch factor information for each year from 2014-2020, as shown in the table prepared and referenced by OEB Staff.

b) Hydro Ottawa's capital expenditure forecast is the product of a rigorous asset rationalization process that the utility undertook as a prerequisite to the formulation of its capital expenditure plan. This process resulted in reductions to planned capital spending in the amount of $50M per year, for the 2021-2025 period. Please see the response to part (a) of interrogatory OEB-3 for more details.

In addition, Hydro Ottawa observes that its proposed Custom IR formula for 2021-2025 is largely similar in scope and structure to that which the OEB approved for purposes of the utility's 2016-2020 rates. In approving Hydro Ottawa's Custom IR approach for 2016-2020, the OEB deemed the utility's proposal to be consistent with the Renewed Regulatory Framework ("RRF") and with the RRF's expectations for Custom Incentive Rate-setting applications.[3]

c) Hydro Ottawa believes that the first sentence in the excerpt from the *Handbook for Utility Rate Applications* quoted by OEB Staff is instructive: "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." The inference that Hydro Ottawa draws from this statement is that the custom index, *as the sum of its parts*, constitutes the annual rate adjustment. i.e. it is the aggregation of the custom index's components that serves as the rate adjustment mechanism, as opposed to any individual component doing so on its own.

Accordingly, Hydro Ottawa has interpreted this section of the *Handbook for Utility Rate Applications* to mean that the *total value* of the custom index annual rate adjustment mechanism that is developed by a Custom IR applicant ought to be higher, and certainly no lower, than the total value of the annual rate adjustment mechanism that would otherwise be determined through the 4th Generation IR Price Cap IR formula.

If Hydro Ottawa had opted to establish its 2021-2025 rates using the Price Cap IR approach, its annual rate adjustment mechanism would have been 1.55%, as per the following calculations:

IRM[4] = Inflation - (Total Productivity Factor + Stretch Factor)

IRM = 2.0% - (0% + 0.45% Cohort 4 Stretch Factor)

IRM = 1.55%

[3] Ontario Energy Board, *Decision and Rate Order*, EB-2015-0004 (December 22, 2015), page 1.
[4] IRM stands for "incentive rate-setting mechanism."

As detailed in UPDATED Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework, Hydro Ottawa is proposing to utilize a custom escalator of 2.51% for purposes of its 2021-2025 Custom IR rate-setting formula. As 2.51% is greater than 1.55%, Hydro Ottawa believes that it has fulfilled the general policy expectations set forth in the *Handbook for Utility Rate Applications* regarding the establishment of a custom index for Custom IR rate applications.

Hydro Ottawa acknowledges that it calculated the value for its custom escalator using a stretch factor other than the 0.45% assigned to utilities which are grouped within Cohort 4, as per the PEG model. Hydro Ottawa believes that it has provided strong evidence in support of its proposed approach, as outlined in the following pieces of evidence in this Application:

- UPDATED Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework;
- Attachment 1-1-12(A): Econometric Benchmarking Study of Hydro Ottawa's Total Cost and Reliability; and
- Attachment 1-1-12(E): PEG Benchmarking Forecast.

INTERROGATORY RESPONSE - OEB-5

1-Staff-5

EXHIBIT REFERENCE:

Updated Exhibit 1/Tab 1/Schedule 10/pp. 12-17

FORTISBC Inc. Multi-Year Performance Based Ratemaking Plan For 2014 Through 2018, Decision, September 15, 2014

FORTISBC Energy Inc. Multi-Year Performance Based Ratemaking Plan For 2014 Through 2018, Decision, September 15, 2014

SUBJECT AREA: Custom Incentive Rate-Setting Framework

Preamble:

On pages 12 to 16 of this exhibit, Hydro Ottawa documents its calculation of the CPEF and its components of inflation (I), X (base productivity and stretch) and growth (g). On pages 15-16, tables for the forecasted inflation for the CPEF are provided:

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

Table 5 – 2017-2025 AWE Index

Year	AWE	Hydro Ottawa Non-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 – Hydro Ottawa's Labour/Non-Labour Split (2017-2025)

Year	GDP-IPI (Non-Labour)	AWE (Labour)	Average
2017	2.78%	0.73%	1.76%
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%	2.40%
2022	2.33%	2.42%	2.38%
2023	2.30%	2.41%	2.36%
2024	2.30%	2.41%	2.36%
2025	2.30%	2.41%	2.36%
2017-2025 Average	**2.23%**	**2.29%**	**2.26%**

On page 17, Hydro Ottawa states that:

> Hydro Ottawa does not intend to update the inflation factor over the course of its 2021-2025 rate term.

Question(s):

a) For which years are data actuals as opposed to forecasts?

b) For Tables 4 and 5, the source identified is the Conference Board of Canada. Are all data from the Conference Board of Canada? If not, please identify the source for each datum.

c) Please provide the source of the Conference Board of Canada forecast, and the date of the forecast.

d) In Table 4, what is the derivation of the Adjusted GDP-IPI shown in the right-most column?

e) In Table 5, what is the derivation of the Adjusted AWE shown in the right-most column?

f) In Table 6, OEB staff observes that it is the Adjusted GDP-IPI and Adjusted AWE which are used to calculate the inflation factor. Why has Hydro Ottawa used the adjusted data rather than the unadjusted data? Also, what is the formula for calculating the inflation factor shown in the right-most column?

g) On an assumption that 2017 and 2018 data are actuals, OEB staff has prepared the following table comparing the (unadjusted) GDP-IPI and AWE from Tables 4 and 5 against the same variables as published by Statistics Canada and used in the calculation of the distribution Input Price Index for 2020 IRM and Custom IR applications. The Statistics Canada data were downloaded on September 13, 2019.

Table 1-Staff-5-1

Year	Hydro Ottawa's data from Tables 4 and 5		Statistics Canada data used for OEB 2020 IPI Calculation	
	GDP-IPI	AWE	GDP-IPI	AWE
	Annual % Change			
2017	2.50%	0.82%	1.4%	1.9%
2018	1.67%	3.40%	1.6%	2.9%

On page 14 of this exhibit, Hydro Ottawa documents that it is using the same series as the OEB uses for the Input Price Index calculations:

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.*

Please explain why Hydro Ottawa's data vary so much from the published Statistics Canada data used by the OEB in its IPI calculations.

h) In support of its growth factor, Hydro Ottawa references decisions from British Columbia, Alberta, and Québec. One of the referenced decisions was a British Columbia Utilities Commission (BCUC) decision for FortisBC Inc.'s (Fortis BC's) 2014-2019 Performance-Based Regulation (PBR) plan. In that application, FortisBC was proposing to forecast inflation for the coming rate year as part of the annual rate update. In its decision, the BCUC panel stated in its determinations, with respect to the utility's proposal to forecast inflation over the plan term:[1]

[1] *FORTISBC Inc. Multi-Year Performance Based Ratemaking Plan For 2014 Through 2018, Decision, September 15, 2014*, p. 32

> From the evidence presented it is clear there is no perfect way to determine the I-Factor. Therefore, the best that can be expected is to derive a proxy that best estimates the impact of inflation on the Companies for the full PBR period.
>
> The problem with the forecast approach proposed by Fortis is that there will almost always be a variance between forecast and actual. Fortis has not disputed this but has argued that its actual costs are very much influenced by forecast as they often make binding commitments in advance of a given year and these take into account forecasted inflation. The Commission Panel accepts that this may be the case but it is not unique to Fortis as actual inflation measures reflect this spending behaviour on a broader basis. BCPSO makes a similar point as it observes that "actual inflation differs from forecast inflation and therefore actual increases are not driven by forecasts." In the view of the Panel, a significant problem with Fortis' proposed reliance on forecast rates of inflation lies in the fact that any variances which do occur are compounded each year. This may not be too serious where there is some assurance that over time these forecast errors will balance out. However, this is not the case. Instead, it is reasonable to assume that over the PBR period future forecasts may be significantly skewed either up or down relative to actuals and, as stated by BCPSO, wins or losses may have little to do with gains or losses in efficiency. **Considering the potential for a significant impact on the I-X formula resulting from this, the Commission Panel denies Fortis' proposal to rely on forecast data in the determination of the I-Factor. [Emphasis in original.]**

A similar determination on forecasting inflation was made by the BCUC for FortisBC Energy Inc.'s PBR plan for 2014-2019.[2]

[2] *FORTISBC Energy Inc. Multi-Year Performance Based Ratemaking Plan For 2014 Through 2018, Decision*, September 15, 2014 pp. 32-33

While acknowledging the lag in using actual data, the OEB, and other regulators have generally relied on using actual historical data from accredited sources such as national statistical agencies, for estimating inflation for rate adjustment formulae.

Hydro Ottawa is proposing to forecast inflation for each year of the whole plan term in this Application, and is seeking approval in this Application with no updates in annual rate applications for 2022 to 2025. Please explain why Hydro Ottawa believes that its proposal does not raise similar concerns of forecasting error and possible bias as the BCUC has noted in the referenced decisions, in light of the extended forecasting period.

RESPONSE:

a) The data for 2017 and 2018 are actuals, while the data for 2019 through 2025 are forecasts.

b) Yes, all of the data in Tables 4 and 5 is sourced from the Conference Board of Canada.

c) The GDP-IPI and AWE data was pulled from the Conference Board of Canada in May 2019.

d) Please note that there was an error in the Adjusted GDP-IPI calculation that was originally submitted. Hydro Ottawa has therefore revised Table 4, as presented below.

Table 4 – AS ORIGINALLY SUBMITTED – 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%

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

Year	GDP-IPI	Hydro Ottawa Non-Labour Weighting	Adjusted GDP-IPI
2017	2.50%	44.46%	1.11%
2018	1.67%	44.46%	0.75%
2019	1.19%	44.46%	0.53%
2020	2.33%	44.46%	1.04%
2021	2.11%	44.46%	0.94%
2022	2.10%	44.46%	0.93%
2023	2.07%	44.46%	0.92%
2024	2.07%	44.46%	0.92%
2025	2.07%	44.46%	0.92%

The Adjusted GDP-IPI shown in the right-most column has been derived by applying Hydro Ottawa's Non-Labour weighting factor of 44.46% to the Conference Board of Canada's GDP-IPI percentages for each year, as follows:

GDP-IPI x 44.46% = Adjusted GDP-IPI

e) Please note that there was an error in the Adjusted AWE calculation that was originally submitted. Hydro Ottawa has therefore revised Table 5, as presented below.

Table 5 – AS ORIGINALLY SUBMITTED – 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%

Table 5 – AS REVISED – 2017-2025 AWE (Ontario) Index

Year	AWE	Hydro Ottawa Labour Weighting	Adjusted AWE
2017	0.82%	55.54%	0.46%
2018	3.40%	55.54%	1.89%
2019	2.61%	55.54%	1.45%
2020	2.77%	55.54%	1.54%
2021	2.75%	55.54%	1.53%
2022	2.72%	55.54%	1.51%
2023	2.71%	55.54%	1.51%
2024	2.71%	55.54%	1.51%
2025	2.71%	55.54%	1.51%

The Adjusted AWE shown in the right-most column has been derived by applying Hydro Ottawa's Labour weighting factor of 55.54% to the Conference Board of Canada's AWE percentages for each year, as follows:

AWE x 55.54% = Adjusted AWE

f) The formula for the inflation factor shown in the right-most column is the following:

Inflation factor = (Adjusted GDP IPI + Adjusted AWE)

Please note that, due to the revisions addressed in parts (d) and (e) above, Table 6 has been revised, as presented below.

Table 6 – AS ORIGINALLY SUBMITTED – 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%**

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

Year	GDP-IPI (Non-Labour)	AWE (Labour)	Total
2017	1.11%	0.46%	1.57%
2018	0.74%	1.89%	2.63%
2019	0.53%	1.45%	1.98%
2020	1.04%	1.54%	2.57%
2021	0.94%	1.53%	2.47%
2022	0.93%	1.51%	2.44%
2023	0.92%	1.51%	2.43%
2024	0.92%	1.51%	2.43%
2025	0.92%	1.51%	2.43%
2017-2025 Average	**0.89%**	**1.43%**	**2.33%**

Hydro Ottawa has used the Adjusted GDP-IPI and Adjusted AWE factors to calculate the inflation factor. After an analysis of both historical and forecasted OM&A expenditure data over the 2016-2020 period, Hydro Ottawa determined that a unique labour/non-labour weighting of 55.54% labour and 44.46% non-labour is appropriate. Please see Table 3 in UPDATED Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework for a breakdown of Hydro Ottawa's labour/non-labour allocation.

The formula for calculating the inflation factor shown in the right-most column of Table 6 is as follows:

Adjusted GDP-IPI + Adjusted AWE

Each yearly total is then used to calculate an average inflation factor for the 2017-2025 period.

As a result of the revisions made to the Adjusted GDP-IPI and Adjusted AWE values, the average inflation factor is calculated to be 2.33%. Hydro Ottawa acknowledges that its original calculation was incorrect. However, the utility proposes to maintain its original request for a 2.26% inflation factor, which ultimately renders its Custom Price Escalation Factor to be lower than it would otherwise be if it were to use the correct calculation of 2.33%.

g) Hydro Ottawa has not conducted a detailed analysis of why these two forecasts would be different. However, as a general comment, forecasts can differ because of several factors including the following:

- Preparation occured at different times;
- Preparation relied on different methodologies; and
- The baskets of goods to which the forecasts apply are different.

Hydro Ottawa opted to use the Conference Board of Canada's forecast from May 2019, as this is consistent with the forecasts used by Clearspring Energy Advisors in the Total Cost and Reliability Benchmarking Study, as submitted in Attachment 1-1-12(A): Econometric Benchmarking Study of Hydro Ottawa's Total Cost and Reliability.

h) As noted in the BCUC's decision on FortisBC's application, "From the evidence presented it is clear there is no perfect way to determine the I-Factor. Therefore, the best that can be expected is to derive a proxy that best estimates the impact of inflation on the Companies for the full PBR period."

Hydro Ottawa agrees that there is no perfect way to forecast the inflation factor. The utility has taken the approach set forth in this Application because it considers the approach to be a reasonable and balanced methodology. Moreover, Hydro Ottawa's approach aims to ensure the annual update process is as mechanistic as possible, consistent with OEB policy.[3]

[3] Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 26: "After the rates are set as part of the Custom IR application, the OEB expects there to be no further rate applications for annual updates within the five-year term, unless there are exceptional circumstances, with the exception of the clearance of established deferral and variance accounts."

INTERROGATORY RESPONSE - OEB-6

1-Staff-6

EXHIBIT REFERENCE:

Updated Exhibit 1/Tab 1/Schedule 10/page 17

Decision and Order EB-2017-0049, March 7, 2019

Decision and Order EB-2018-0165, December 19, 2019

SUBJECT AREA: Custom Incentive Rate-Setting Framework

Preamble:

Hydro Ottawa has proposed to adopt the base X (base productivity) factor of 0%, as established by the OEB for electricity distribution incentive regulation most recently in the *Supplemental Report of the Board on Rate Setting Parameters and Benchmarking under the Renewed Regulatory Framework for Ontario's Electricity Distributors* (EB-2010-0379),[1] and which the OEB has reaffirmed in recent decisions for custom IR plans. Hydro Ottawa has noted that this base X factor is based on analyses of Total Factor Productivity (TFP) for the electricity distribution sector.

Hydro Ottawa specifically references the Hydro One Networks distribution Custom IR plan for 2018-2022 and the OEB's decision in that case reaffirming the 0% base X-factor.[2]

Question(s):

a) Please confirm Hydro Ottawa's understanding that TFP analyses relate to productivity growth for all outputs (products and services produced and offered by the firm) relative to all inputs (capital, labour and materials) used in the production and delivery of those products and services.

[1] *Report of the Board on Rate Setting Parameters and Benchmarking under the Renewed Regulatory Framework for Ontario's Electricity Distributors* (EB-2020-0379), issued November 23, 2013, corrected December 4, 2013.
[2] Decision and Order EB-2017-0049, March 7, 2019.

b) Please confirm that the approved Hydro One Networks' distribution Custom IR plan[3] uses an adjustment formula that applies to all inputs (i.e., capital, including capitalized labour, and expensed labour and materials).

c) Please confirm that the Custom IR plan more recently approved for Toronto Hydro-Electric System Limited (Toronto Hydro),[4] similar uses an adjustment formula that applies to all inputs (i.e., capital, including capitalized labour, and expensed labour and materials).

d) Please confirm that Hydro Ottawa's proposed Custom IR plan differs from both the Hydro One Networks distribution and Toronto Hydro Custom IR plans in that Hydro Ottawa proposes that the adjustment formula only apply to OM&A. If not confirmed, please explain.

e) Does Hydro Ottawa consider that partial factor productivity (PFP) with respect to OM&A and all outputs would be equal to TFP? Please explain your response.

f) Please provide all evidence that Hydro Ottawa has on its PFP with respect to OM&A.

g) Please explain the rationale for Hydro Ottawa's assertion that the base X-factor of 0% used by the OEB is appropriate for an OM&A adjustment formula.

RESPONSE:

a) Hydro Ottawa confirms OEB Staff's understanding that TFP analyses relate to productivity growth for all outputs (products and services produced and offered by the firm) relative to all inputs (capital, labour, and materials) used in the production and delivery of those products and services.

[3] Decision and Order EB-2017-0049, March 7, 2019.
[4] Decision and Order EB-2018-0165, December 19, 2019.

b) Hydro Ottawa confirms that the approved Hydro One Networks' distribution Custom IR plan uses an adjustment formula that applies to all inputs. Hydro Ottawa also observes that Hydro One Networks included a Custom Capital Factor in its adjustment formula. Hydro Ottawa has not included a capital component in its Custom Price Escalation Factor ("CPEF") for the 2021-2025 rate term, as the CPEF is being applied to OM&A only.

c) Hydro Ottawa confirms that the Custom IR plan recently approved for Toronto Hydro, similar to that of Hydro One Networks distribution, uses an adjustment formula that applies to all inputs. Hydro Ottawa also observes that Toronto Hydro included a "C" factor to provide funds incremental to "I-X" necessary to reconcile Toronto Hydro's capital need within a PCI framework. Hydro Ottawa has not included a "C" factor in its CPEF, as the CPEF is being applied to OM&A only.

d) Insofar as its adjustment formula applies to OM&A only, Hydro Ottawa confirms that its proposed Custom IR plan differs from that of Hydro One Networks distribution and Toronto Hydro. Nevertheless, Hydro Ottawa wishes to emphasize that, in preparing its Custom IR application, the utility's approach did include a significant adjustment to the capital expenditure levels. Please see the response to interrogatory OEB-3 for further details.

e) It is Hydro Ottawa's understanding that partial factor productivity ("PFP") with respect to OM&A and all outputs would be very close in value, if not equal to, TFP. The utility is basing this understanding upon information that it has come across in the rate application proceedings for other electricity distributors in Ontario. For example, in the proceeding associated with Hydro One Networks distribution's 2018-2022 Custom IR rate application,[5] one of the expert consultants involved – Power System Engineering ("PSE") – presented information on the TFP growth of Ontario's electricity distribution sector. During the interrogatory phase of that proceeding, PSE was requested to

[5] Hydro One Networks Inc., *2018-2022 Custom Incentive Rate-setting Distribution Rate Application*, EB-2017-0049 (March 31, 2017).

elaborate on this information and present results for PFP of both capital and OM&A inputs.[6] Whereas PSE's analysis had calculated a -0.9% TFP for the 2002-2015 period, it found an OM&A PFP rate of -0.8%. As such, PSE's finding for OM&A PFP was similar to that of the TFP.

f) In supplemental analysis performed for Hydro Ottawa, Clearspring Energy Advisors ("Clearspring") did re-run their models, splitting out OM&A from capital. In terms of OM&A, the partial factor productivity was very similar to the findings for overall cost efficiency (i.e. 0.15 stretch factor). However there are limitations with this approach, as Clearspring's model is built to account for both OM&A and capital variables. For a true analysis, the variables would therefore need to be optimized for OM&A only. Once again, however, Hydro Ottawa emphasizes that it did not utilize a PFP approach.

g) As a part of EB-2010-0379, in its *Report of the Board: Rate Setting Parameters and Benchmarking under the Renewed Regulatory Framework for Ontario's Electricity Distributors*, and based upon the Total Factor Productivity ("TFP") study undertaken by Pacific Economics Group ("PEG"), the OEB determined the appropriate industry-wide TFP to be zero in Ontario. In addition, at the request of the OEB, Hydro One Networks retained Power System Engineering Inc. ("PSE") as part of proceeding EB-2017-0049 to conduct a TFP study. PSE updated the previous work done by PEG and ultimately found that the Ontario industry-wide TFP declined by 0.9% over the 2002-2015 period.[7]

Given that these two recent Ontario Industry TFP studies rendered recommendations of a 0% TFP, Hydro Ottawa did not think it appropriate nor cost-effective to conduct another TFP assessment.

Finally, Hydro Ottawa believes that there is a reasonable basis upon which to assert that the base X-factor of 0% is appropriate for use in an OM&A adjustment formula, in light of

[6] *Ibid*, Hydro One Networks distribution's response to OEB Staff Interrogatory #33 (filed February 12, 2018).
[7] Power System Engineering Inc., *Total Factor Productivity Study of the Electric Distribution Functions of Hydro One and the Ontario Industry* (November 4, 2016), pages 40-42. This was submitted as Exhibit A-3-2-1 in EB-2017-0049.

the fact that this approach was approved as part of the utility's 2016-2020 Custom IR application. In its Decision and Rate Order on that application, the OEB found that the "application and settlement proposal prepared by the parties meet the expectations of the [Renewed Regulatory Framework for Electricity Distributors] for a Custom IR."[8] As such, the approach in Hydro Ottawa's 2021-2025 application with respect to the use of a base X-factor of 0% in an OM&A adjustment formula represents the continuation of a rate-setting formula for the utility that has previously met with OEB approval.

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

INTERROGATORY RESPONSE - OEB-7

1-Staff-7

EXHIBIT REFERENCE:

Updated Exhibit 1/Tab 1/Schedule 10/pp. 20-24

SUBJECT AREA: Custom Incentive Rate-Setting Framework

Preamble:

Hydro Ottawa has incorporated a growth factor (*g*) into its proposed OM&A adjustment formula, so that the CPEF (Custom Price Escalation Factor) is of the form:

$$CPEF = I - \left(X + stretch_{factor}\right) + g$$

A growth factor was also incorporated into the formula for Hydro Ottawa's current Custom IR plan for 2016-2020.

Hydro Ottawa has assumed a 1.34% average annual growth in number of customers from 2012 to 2020 (forecasted). Hydro Ottawa has then applied a factor to account for economies of scale; the factor used is 0.35, which OEB staff would interpret as the elasticity of customer growth for OM&A expenses. Based on this, Hydro Ottawa then proposes a g-factor of 0.40%, which Hydro Ottawa then assumes for all years that the CPEF is applied (i.e., 2022 to 2025).

Hydro Ottawa references precedents with respect to an Enbridge Gas Distribution plan in 2007, and more recent decisions in British Columbia, Québec, and Alberta on utility incentive rate-setting plans.

Question(s):

a) In Table 7 (Exhibit 1/Tab 1/Schedule 10/page 20), are the data shown for 2019 actuals or estimates? If estimates please update Table 7 with 2019 actuals.

b) Please calculate the average annual growth in customers based on actuals for 2012-2019, based on Table 7, including any update in a).

c) Please provide further details, and data used, in deriving the estimate of 0.35 for the customer growth elasticity of OM&A expenses.

d) Does Hydro Ottawa also agree that there are economies of scale with respect to capital additions? In other words, there would, all else being equal, normally be less than a 1% growth in capital for a 1% growth in the number of customers. In other words, both OM&A expenses and capital are inelastic with respect to customer growth. Please explain your reasons.

e) In the FortisBC and FortisBC Energy decisions that OEB staff have referenced in 1-Staff-5 and which Hydro Ottawa references in this exhibit of its application, the BCUC determined that an adjustment factor (i.e., customer growth elasticity of capital additions) of 0.5 should apply.[1] Hydro Ottawa has proposed no adjustment should apply to the capital additions it has forecasted per its DSP and proposes by approved in this application for the whole of the five year Custom IR plan.

Considering that it is relying on these precedents for its OM&A growth adjustment, please explain, with reasons, why Hydro Ottawa has not proposed a similar growth adjustment, including an economies of scale factor, for its forecasted capital budget as documented in its DSP.

[1] *FORTISBC Inc. Multi-Year Performance Based Ratemaking Plan For 2014 Through 2018, Decision*, September 15, 2014, p. 116-119, and *FORTISBC Energy Inc. Multi-Year Performance Based Ratemaking Plan For 2014 Through 2018, Decision*, September 15, 2014 pp. 119-123.

RESPONSE:

a) Hydro Ottawa confirms that the 2019 figures that appear in Table 7 are 2019 actuals.

b) The average annual growth in customers based on actuals for 2012-2019 remains 1.34%, as the 2019 data included in Table 7 shows 2019 actuals.

c) For further information on the development of the scaling factor used by Hydro Ottawa, please see UPDATED Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework (pages 20-24).

   Hydro Ottawa believes that the robust information provided regarding expected growth within the City of Ottawa and the utility's service territory serves as an adequate basis upon which to extrapolate an appropriate scaling factor for the utility.

d) Hydro Ottawa agrees that there are economies of scale with respect to capital additions (i.e. all else being equal, there would normally be less than a 1% growth in capital for a 1% growth in the number of customers). This is a sound application of economic theory to the regulated utility context.

e) Hydro Ottawa used a different approach for capital expenditures, as outlined in response to part (a) of interrogatory response OEB-3. Hydro Ottawa wishes to emphasize that its internal capital expenditure rationalization process resulted in savings of $50M per year over the 2021-2025 period. As a result, the utility believes that an adequate and reasonable basis exists to apply an adjustment factor to OM&A alone for purposes of the rate-setting approach for its 2021-2025 Custom IR rate term.

INTERROGATORY RESPONSE - OEB-8

1-Staff-8

EXHIBIT REFERENCE:

Updated Exhibit 1/Tab 1/Schedule 8/pp. 29-30

Updated Exhibit 1/Tab 1/Schedule 10/pp. 26-27

Updated Exhibit 9/Tab 1/Schedule 3/pp. 3, 17

Exhibit 9/Tab 2/Schedule 1/pp. 6-8

EB-2015-0004, Decision and Rate Order, December 22, 2015

SUBJECT AREA: Custom Incentive Rate-Setting Framework

Preamble:

In this Application, Hydro Ottawa is proposing an asymmetrical Earnings Sharing Mechanism (ESM) with a deadband of +150 basis points above the allowed Return on Equity (ROE).

In its current Custom IR plan for 2016-2020, Hydro Ottawa is subject to an ESM with no deadband; all earnings above the allowed ROE on a regulated basis are to be shared 50:50 between shareholders and ratepayers. This ESM was part of the settlement proposal for Hydro Ottawa's Custom IR, which settlement proposal was accepted by the OEB in its Decision and Rate Order EB-2015-0004, issued December 22, 2015.

In Exhibit 9/Tab 2/Schedule 1, on pages 6-7, Hydro Ottawa states:

> If the utility's actual Return on Equity ("ROE") differs from the approved ROE, Hydro Ottawa proposes returning any excess earnings based on the following (which is consistent with the OEB's recent Decision and Order on THESL's [Toronto Hydro's] 2020-2024 rate application[7]):

- Under earning – borne entirely by the shareholder
- 0 - 150 basis points – fully retained by shareholder
- Above 150 basis points – 50:50 sharing between ratepayer/shareholder

The above would be based on overall earnings at the end of the Custom IR rate term (i.e. end of 2025), as per the direction signaled in the OEB's Handbook for Utility Rate Applications.[8]

7 Ontario Energy Board, *Decision and Order*, EB-2018-0165 (December 19, 2019), pages 42-43.
8 Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 28.

For both the 2016-2020 Custom IR plan and the proposed 2021-2025 plan, any overearnings are tracked in Account 1508 sub-account Earnings Sharing Mechanism, as noted in Exhibit 9/Tab 1/Schedule 1.

In its Decision and Order EB-2018-0165, the OEB approved Toronto Hydro's ESM with a threshold of 100 basis points:

> The OEB approves a cumulative, asymmetrical ESM using an ROE-based calculation with all earnings in excess of 100 basis points over the approved ROE shared 50:50 with ratepayers.[1]

Question(s):

a) Why is Hydro Ottawa proposing a different ESM from its 2016-2020 Custom IR plan?

[1] EB-2018-0165, *Decision and Order*, December 19, 2019, p. 193

b) Please confirm that Hydro Ottawa's ESM proposal is consistent with what the OEB approved for Toronto Hydro in the EB-2018-0165 Decision and Order with the exception of the threshold of 150 basis points proposed by Hydro Ottawa. If there are other differences, please identify and document them and the reasons for the differences.

c) What is the basis for the deadband threshold of 150 basis points above the allowed ROE? This should also address why Hydro Ottawa is proposing a different deadband threshold than that proposed by and approved by the OEB for Toronto Hydro in that distributor's 2020-2024 Custom IR plan.

d) As documented under the Custom IR plan and further detailed in Exhibit 5, Hydro Ottawa has forecasted the cost of capital parameters, including the ROE for each year of the plan. For 2025, Hydro Ottawa has forecasted an ROE of 9.46%. Please confirm that Hydro Ottawa's Custom IR proposal is that the ESM would be triggered if the achieved ROE, on a regulated basis, exceeds each year's forecasted ROE by over 150 basis points. In other words, under Hydro Ottawa's proposals in its Application, for 2025, the ESM would only be triggered if actual ROE on a regulated basis was over 10.96% (= 9.46% + 150 b.p.).

RESPONSE:

a) The OEB's *Handbook for Utility Rate Applications* states the following: "Utilities that achieve productivity improvements above what is expected are allowed to keep certain earnings above the approved Return On Equity ("ROE"). However, the OEB expects utilities filing a Custom IR application to propose one or more mechanisms to protect customers from utility earnings that become excessive."[2]

In addition, "The OEB does not require a Custom IR to include an earnings sharing mechanism, except in the context of deferred rebasing periods as part of electricity

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

distributor consolidation."[3] Hydro Ottawa notes that the *Handbook for Utility Rate Applications* only indicates that local distribution companies ("LDCs") which defer rebasing for more than five years must include an Earnings Sharing Mechanism ("ESM") on a 50:50 basis above 300 basis points. The OEB has indicated that this is "designed to protect customers and ensure that they share in any increased benefits from consolidation during the deferred rebasing period."[4]

Although an ESM is not required, Hydro Ottawa feels that an ESM, with an appropriate deadband, is responsive to both customer and shareholder needs. Hydro Ottawa notes that it proposed a similar ESM in the utility's 2016-2020 Custom IR Plan, which was agreed to during the settlement process.[5] Each Custom IR rate plan is established so as to balance both the customer and the utility's needs, and as a result, its components may not look identical to that of the previous term.

b) Hydro Ottawa confirms that the ESM proposed in this Application is consistent with what the OEB approved for Toronto Hydro in the Decision and Order issued in that specific proceeding.[6] The lone exception is with respect to the threshold of 150 basis points proposed by Hydro Ottawa. Hydro Ottawa is proposing a cumulative, asymmetrical ESM using an ROE-based calculation with all earnings in excess of 150 basis points over the approved ROE shared 50:50 with ratepayers.

c) Hydro Ottawa wishes to note that the Renewed Regulatory Framework ("RRF") does not stipulate that all LDCs need to use the same approach in crafting their Custom IR rate applications. The RRF contemplates that utilities would use a custom approach that suits each LDC's particular circumstances.

[3] Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 28.
[4] *Ibid.,* Appendix 3 page v.
[5] Hydro Ottawa Limited, *2016-2020 Custom Incentive Rate-Setting Approved Settlement Proposal*, EB-2015-0004 (December 7, 2015).
[6] Ontario Energy Board, *Decision and Order*, EB-2018-0165 (December 19, 2019).

As indicated in the response to part (a) above, Hydro Ottawa believes that an ESM, with an appropriate deadband, is responsive to both customer and shareholder needs. Hydro Ottawa believes the proposal provides a balance between protecting customers from excess earnings while continuing to promote improved productivity.

Hydro Ottawa notes that in the aforementioned Decision and Order for Toronto Hydro's 2020-2024 Custom IR plan, there were many different opinions from Toronto Hydro, OEB Staff, intervenors, and the OEB Panel members with respect to many aspects of the ESM that was proposed by Toronto Hydro and ultimately approved (including on the matter of what constitutes a reasonable deadband). Hydro Ottawa's ESM proposal should be evaluated as part of the utility's specific Custom IR rate plan and not in the context of Toronto Hydro's approved plan, which differs from Hydro Ottawa's in many ways. Hydro Ottawa is proposing a different deadband than that of Toronto Hydro. However, half the deadband is expected to safeguard customers with an amalgamated deferred rebasing term. For more information regarding Hydro Ottawa's ESM proposal, please refer to UPDATED Exhibit 1-1-8: Executive Summary (pages 29-30) and the detailed description in Exhibit 9-2-1: New Deferral and Variance Accounts (pages 6-8).

d) Hydro Ottawa confirms that the ESM would be triggered if the achieved ROE exceeds each year's forecasted ROE over 150 basis points on a regular basis. Hydro Ottawa also confirms, as an example, per its proposal in 2025 that the ESM would only be triggered if achieved ROE on a regular basis was over 10.96%, which is the forecasted 9.46% plus 150 basis points.

Similarly, Hydro Ottawa notes that at the current deemed ROE of 8.52%, an additional 300 basis points would result in an amalgamated utility being triggered for an earning sharing at 11.52%, resulting in a higher trigger for shared earning than Hydro Ottawa is proposing.

INTERROGATORY RESPONSE - OEB-9

1-Staff-9

EXHIBIT REFERENCE:

Updated Exhibit 1/Tab 1/Schedule 8
Updated Exhibit 1/Tab 1/Schedule 10
Updated Exhibit 9/Tab 1/Schedule 1/page 9
Exhibit 9/Tab 1/Schedule 3/pp. 4, 17-18
EB-2015-0004, Decision and Rate Order, December 22, 2015

SUBJECT AREA: Custom Incentive Rate-Setting Framework

Preamble:

Hydro Ottawa had an Efficiency Adjustment Mechanism (EAM) as part of its current 2016-2020 Custom IR plan. The purpose of the EAM was to track any over-recoveries of the revenue requirement through distribution rates for any year(s) in that plan when Hydro Ottawa's efficiency ranking dropped below cohort 3, which was assumed for all years in the 2016-2020 plan.

Over-recoveries were recorded and tracked in an EAM sub-account of Account 1508, and the balance to be disposed of at the end of the plan term. In Updated Exhibit 9/Tab 1/Schedule 1, at page 9 and on pages 17-18 of Exhibit 9/Tab 1/Schedule 3, Hydro Ottawa discusses continuation of the 2016-2020 EAM, as final audited actuals for 2020 would only be known at the time of, and disposition applied for in, Hydro Ottawa's 2022 rate application.

OEB staff's reading of Hydro Ottawa's proposed 2021-2025 Custom IR plan, in Exhibit 1/Tab 1/Schedules 8 and 10 indicates that Hydro Ottawa is not proposing an EAM for the 2021-2025 Custom IR plan.

Question(s):

a) Please confirm that Hydro Ottawa's proposal to "continue" with Account 1508 sub-account Efficiency Adjustment Mechanism is solely with respect to allow for tracking of the final account balances and subsequent disposition of 2020 balances of the EAM for the 2016-2020 Custom IR plan. In the alternative please explain.

b) Please confirm that Hydro Ottawa is not proposing an EAM as part of the 2021-2025 Custom IR plan.

c) Please provide detailed reasons as to why Hydro Ottawa is not proposing an EAM for its 2021-2025 Custom IR plan.

d) If Hydro Ottawa is proposing to continue with an EAM as part of the 2021-2025 plan, please provide details on how Hydro Ottawa proposes that it would operate.

RESPONSE:

a) Hydro Ottawa confirms that the proposal to continue Account 1508 sub-account Efficiency Adjustment Mechanism ("EAM") is to allow for any tracking of the final account balances and subsequent disposition of any 2020 balances of the EAM for the 2016-2020 Custom IR plan.

b) Hydro Ottawa confirms that an EAM is not proposed as part of the utility's 2021-2025 Custom IR plan.

c) As a preface to its response, Hydro Ottawa observes that the preamble to this interrogatory stands to benefit from additional clarification as to the role played by the EAM in the utility's 2016-2020 rate plan. The following paragraph from the Approved Settlement Agreement governing the 2016-2020 rate term is instructive for this purpose:

> *"To maintain balance, and to enhance the incentive for both productivity and customer focus, the Parties have agreed to add three important adjustment mechanisms to Hydro Ottawa's Custom IR plan: an asymmetrical Earnings Sharing Mechanism (ESM) with no dead band; an asymmetrical capital variance account for certain capital investments; and an efficiency adjustment that will operate as a proxy stretch factor if Hydro Ottawa's efficiency ranking declines during the Custom IR term. The intention of these adjustment mechanisms is to maintain the alignment between the interests of the utility and the interests of its customers."*[1]

As signalled in this language, the context of the inclusion of the EAM in the 2016-2020 rate plan was to help enhance incentives for productivity and customer focus, and to ensure alignment of interests between Hydro Ottawa and its customers.

With this understanding in place, Hydro Ottawa can confirm its rationale for not having included an EAM in its 2021-2025 Custom IR rate plan.

First and foremost, as noted in part (a) of the response to interrogatory OEB-3, the Renewed Regulatory Framework ("RRF") permits an electricity distributor to tailor its Custom IR rate plans to suit its own unique circumstances. Within the orbit of discretion that is granted to distributors in this regard is the option to incorporate such features as an EAM. Hydro Ottawa is not aware of any mandatory requirement in the *Handbook for Utility Rate Applications*[2] or OEB Filing Requirements that obligates a distributor to incorporate an EAM into its Custom IR plan.

Secondly, Hydro Ottawa maintains that its proposed 2021-2025 rate plan has several features which help to ensure alignment of the utility's interests with those of its customers, and that customers can have confidence that there are strong measures in place to maintain the utility's focus on productivity and efficiency gains. For example,

[1] Ontario Energy Board, *Decision and Rate Order*, Schedule A - Consolidated Settlement Proposal, EB-2015-0004 (December 22, 2015), pages 9-10.
[2] Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016).

there is a robust slate of productivity and continuous improvement initiatives planned for the 2021-2025 period, along with a custom OM&A escalator that has been embedded into the utility's rate-setting formula. These measures should be viewed through the lens of the significant productivity gains achieved during Hydro Ottawa's 2016-2020 rate term, which underscore the utility's ability to continuously improve the efficiency of its business operations and to yield outcomes that are desired by customers – in particular, cost savings.

What's more, Hydro Ottawa is proposing to sustain the use of the two other efficiency-related measures that were inserted into its 2016-2020 rate plan alongside the EAM – namely, the asymmetrical Earnings Sharing Mechanism and the capital variance account. On the whole, Hydro Ottawa would argue that there are numerous mechanisms in place to protect and advance the interests of customers during the impending five-year rate term and that sustained use of the EAM is thus not essential to ensuring this important outcome is achieved.

Finally, as described in UPDATED Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework, while Hydro Ottawa acknowledges and accepts the value of total cost benchmarking as a measure of productivity and efficiency, 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. In light of these enduring limitations in the PEG model, Hydro Ottawa does not believe that the inclusion in its 2021-2025 rate plan of an EAM which is tethered to PEG's methodology is appropriate or warranted. For more details in support of Hydro Ottawa's approach, please see Attachment 1-1-12(E): PEG Benchmarking Forecast.

d) Please see the response to part (b) above.

INTERROGATORY RESPONSE - OEB-10

1-Staff-10

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment A/p. 1

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

In the Overview provided on page 1 of its study, Clearspring states:

> 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").

Question(s):

a) Please confirm Clearspring's understanding that, consistent with its previously approved Custom IR plan for the term 2016-2020, Hydro Ottawa has proposed a plan that is a pass-through of forecasted budgeted capital costs (capital additions), subject to a Capital Variance Account (CVA), and applies a price cap-like (actually revenue cap-like) "inflation less productivity plus growth" (I – X + g) annual adjustment to aggregate OM&A expenses. When was Clearspring made aware of Hydro Ottawa's proposal that the incentive adjustment mechanism would only apply to OM&A expenses?

b) Why does Clearspring believe that the results of its benchmarking of Hydro Ottawa's <u>total</u> costs with comparator U.S. and Ontario utilities is appropriate for establishing the stretch factor for <u>OM&A expenses alone</u>? Please elaborate on the conceptual basis that would justifies this assumption.

RESPONSE:

a) Clearspring confirms its understanding of Hydro Ottawa's 2021-2025 Custom IR plan, per the description given by OEB Staff. Clearspring became aware of the proposed treatment of capital and OM&A expenses after the company filed the Application.

b) Clearspring was requested by Hydro Ottawa to perform a total cost and reliability benchmarking study and formulate a stretch factor recommendation based on that research. Total cost benchmarking is a more comprehensive measure of cost performance than OM&A cost benchmarking alone. Total cost benchmarking is also used in Clearspring's other Custom IR research, and in the 4th Generation IR cost definition. Evaluating cost at the total cost level avoids the pitfalls of utilities having different capitalization methods, and different definitions of OM&A costs or other costs. Benchmarking total costs also sidesteps issues with possible substitution between capital and OM&A expenses.

In addition, Hydro Ottawa notes that the utility is building upon the Custom IR approach utilized and approved in its 2016-2020 application, which applied a custom escalation formula to its OM&A expenses alone. Furthermore, the Renewed Regulatory Framework ("RRF") does not stipulate that all local distribution companies ("LDCs") need to use the same approach in crafting their Custom IR rate applications. The RRF contemplates that utilities would use a custom approach (emphasis added) that suits each LDC's particular circumstances.[1]

[1] Ontario Energy Board, *Report of the Board - Renewed Regulatory Framework for Electricity Distributors: A Performance-Based Approach* (October 18, 2012), pages 18-19; Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 24.

INTERROGATORY RESPONSE - OEB-11

1-Staff-11

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment A/pp. 10-11

Exhibit 1/Tab 1/Schedule 12/Attachment C

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

At p.10 of its study, Clearspring describes the sample of 81 U.S. utilities and 7 Ontario distributors, including Hydro Ottawa, which Clearspring has used for its total cost benchmarking model. Table 4 on p. 11 of the study lists these along with the 2017 number of customers served by each utility.

In Exhibit 1/Tab 1/Exhibit 12/Attachment C, Hydro Ottawa provides its own benchmarking of its performance with respect to certain cost category metrics, service quality and reliability and certain financial metrics. In its analysis, Hydro Ottawa has benchmarked itself against eleven other Ontario distributors; these distributors are mostly larger distributors. These are:

- *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.

The six Ontario distributors whose names are italicized above are included in Clearspring's sample, but the other five distributors are not.

Question(s):

a) Was Clearspring aware of the Ontario distributors that Hydro Ottawa had itself selected as a peer group for Hydro Ottawa's own benchmarking?

b) If yes to a), please explain why Clearspring did not also include the other five Ontario distributors in its data set.

RESPONSE:

a) During the course of Clearspring's econometric benchmarking research, Clearspring was not aware that Hydro Ottawa was conducting its own study, nor was it aware of the peer group selected in that study. After Clearspring finalized its research and produced a report, it became aware of the other benchmarking exercise. Clearspring's study was an independent study that was not influenced by Hydro Ottawa, and Clearspring did not modify its study methods, sample, or any aspect of the research based on the other benchmarking analysis.

b) Clearspring was not aware of the peer group when conducting its research. Clearspring's criterion for including the Ontario observations was that the distributor needed to have data available for the explanatory variables and meet the minimum customer count threshold of 59,807, which is the lowest customer count in the U.S. sample.

INTERROGATORY RESPONSE - OEB-12

1-Staff-12

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment A

EB-2018-0165, Exhibit 1/Tab 4/Schedule 2/p. 26/Table 5

2006 and 2017 Yearbooks, OEB Website

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

On page 10, in describing its sample of U.S. and Canadian utilities for the total cost benchmarking analysis, Clearspring states:

> The sample includes Ontario and U.S. utilities that, individually, serve more than 59,806 customers.[10]

Footnote 10 states:

> 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.

OEB staff has also provided, as an attachment, Table 5 from the evidence of PSE, Mr. Fenrick's former employer, in its evidence filed in Toronto Hydro's 2020-2024 Custom IR plan. This table lists the firms included in the total cost benchmarking report filed in that application.

OEB staff has populated the following table of certain Ontario distributors from the 2006 and 2017 Yearbooks, available on the OEB's website at https://www.oeb.ca/utility-performance-and-monitoring/natural-gas-and-electricity-utility-yearbooks:

Table 1-Staff-12-1: Customers for Selected Ontario Electricity Distributors

Ontario Distribution Utility	2006 Number of Customers	2017 Number of Customers
Burlington Hydro	60,749	67,122
Energy+ (Cambridge and North Dumfries Hydro + Brant County Power)	57,903 (48,619 + 9284)	64,724
Guelph Hydro	58,941	55,239
Oakville Hydro	58,220	70,491
Veridian Connections	107,231	120,457
Veridian Connections + Whitby Hydro	142,178 (107,231 + 34,947)	162,955 (120,457 + 42,498)

Question(s):

a) Was the 59,807 customer limit applied for all years and for each utility?

b) Since the Ontario distributors have a time frame of 2006 to 2018, how was the 59,807 customers served threshold used to identify what Ontario distributors to include in the sample.

c) Please confirm that, for U.S. utilities, DTE Electric Company and MDU Resources Group Inc., that were included in the sample in the Toronto Hydro Study, have been omitted from the current study in this case. Please explain why these two utilities have been removed.

d) Please confirm the following differences with respect to Ontario distributors that have been included in the total cost benchmarking sample for this current Hydro Ottawa sample, versus the sample for PSE's study in the Toronto Hydro Custom IR application:
   i. Alectra has been included, replacing predecessor utilities of Enersource Hydro Mississauga and Horizon Utilities.

a. Please confirm the definition of Allectra used in the current study – does its composition include Enersource Hydro Mississauga, PowerStream, Horizon Utilities, Hydro One Brampton Networks and Guelph Hydro-Electric System or just the previous four utilities?

b. Please explain how Clearspring combined the data of the predecessor utilities, including how the Congested Urban variable was updated for this utility.

ii. Hydro One Networks was added to Ontario distributors.

e) For the changes to Ontario distributors identified in d) above, please provide the reasons for the changes.

f) From the table provided above with respect to Ontario distributors not included in Clearspring's sample, please explain the reasons for why these distributors were not included:

i. Burlington Hydro, which grew from 60,749 customers in 2006 to 67,122 customers in 2017

ii. Energy+, formed from Cambridge and North Dumfries Hydro and Brant County Power, with a combined number of customers served 57,9034 in 2006 to 64,724 in 2017

iii. Oakville Hydro, with 58,220 customers in 2006 increasing to 70,491 in 2017

iv. Veridian Connections, with or without Whitby Hydro, with which it merged in 2019 under the new name Elexicon Energy Inc. Veridian Connections alone had 107,231 customers in 2006, increasing to 120,457 in 2016. Combined, Veridian Connections and Whitby Hydro has 142,178 customers in 2006 and 162,955 in 2017.

RESPONSE:

a) Yes, the minimum customer threshold limit was applied to all observations within the dataset.

b) The threshold was applied to all the observations within the dataset for any year.

c) This is confirmed. These two utilities were excluded due to the absence of weather variables. The change in sample and results is negligible.

d) The inclusion and composition of Ontario distributors that include predecessor distributors matches how the RRR data was reported in 2017. 2017 is the last year of the sample for the Ontario distributors. In 2017, Alectra's definition is based on the four predecessor utilities of Enersource Hydro Mississauga, PowerStream, Horizon Utilities, and Hydro One Brampton Networks. Guelph Hydro reported data in 2017 separately and, accordingly, was not added to the Alectra definition.

   In the case of the Ontario data, Clearspring calculated the cost and other variable data by summing all the predecessor utility data to formulate a consistent utility that is composed of predecessors, based on the 2017 RRR reporting. For example, Alectra is now composed of the four distributors discussed above. For the entire sample period, Clearspring summed the four distributors' data mentioned above in each year of the sample to calculate a hypothetical Alectra utility for the entire sample period.

   In this exercise, the predecessor companies also had predecessor companies that were likewise added in along the span of the sample period. An example of this is Barrie Hydro Distribution ("Barrie Hydro"). Barrie Hydro was acquired by PowerStream, which began including Barrie Hydro's data in its own RRR reporting in 2009. For years prior to 2009, Clearspring added in Barrie Hydro's RRR data to the Alectra definition. The congested urban variable was calculated similarly, in that predecessor data was added in so as to formulate the proper definition based on the 2017 RRR filing. In the case of

Alectra, Enersource and Horizon had service territory designated as congested urban. These two congested urban areas were summed and then divided by Alectra's total service territory based on the 2017 RRR filing.

Clearspring confirms that Hydro One Networks was added to the Ontario sample relative to the Toronto Hydro study submitted in its recent distribution application.[1] In the Toronto Hydro study, the Ontario sample selection criteria was based on whether the utility included some congested urban service territory, and Hydro One does not contain any congested urban service territory. However, PEG and others raised a concern in that proceeding. They maintained that only including utilities with congested urban territory is not consistent with the development of the U.S. sample, which included utilities both with and without congested urban service territory. To address this concern, Clearspring has made a consistent sample definition based on the minimum customer threshold that is consistent with the U.S. sample. This is the rationale for including Hydro One Networks – it has all variables available and exceeds the minimum customer threshold.

e) Please see the response to part (d) above.

f) All of the cited Ontario distributors lacked geographic information system data for the forestation and standard deviation of elevation variables. This reason, along with some of their observations being below the minimum customer threshold, is why these observations were excluded from the sample.

[1] Toronto Hydro-Electric System Limited, *2020-2024 Custom Incentive Rate-setting Distribution Rate Application*, EB-2018-0165 (August 15, 2018).

INTERROGATORY RESPONSE - OEB-13

1-Staff-13

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment A

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

On pages 7-8 of its study, Clearspring provides its recommendation for the stretch factor for Hydro Ottawa, starting on page 8:

> 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]

Footnote 9 states:

> 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.

In its proposed Custom IR plan as documented in Exhibit 1/Tab 1/Schedules 8 and 10, Hydro Ottawa is proposing a stretch factor of 0.15% (i.e., excluding the impacts of the Facilities Renewal Program and the Cambrian MTS capital projects).

Questions:

a) Please explain, with reasons, why Clearspring is recommending the 0.30% stretch factor.

b) Please confirm that the Facilities Renewal and Cambrian MTS projects are in large part, **capital** projects.

c) Since the Facilities Renewal and Cambrian MTS projects are largely **capital** in nature, please explain, conceptually, why inclusion or exclusion of these projects should have any impact on the proposed stretch factor for the **OM&A expense adjustment formula**.

d) For the analysis excluding the Facilities Renewal and Cambrian MTS projects documented in the Appendix of Clearspring's report, please identify whether Clearspring undertook to also identify and exclude similar material "generational" projects for the other 81 U.S. utilities and six Ontario distributors in the total cost benchmarking analysis.
   i. If exclusions were made for other utilities in the sample, please provide detailed documentation identifying the utility, the time period involved and the magnitude of the adjustments via a suitable metric (i.e., percentage change in rate base).
   ii. If exclusions were not made for other utilities in the sample, does not Clearspring consider that making such exclusionary adjustments only for Hydro Ottawa biases the total cost benchmarking results in favour of Hydro Ottawa? Please explain your reasons.

RESPONSE:

a) The 0.3% stretch factor recommendation results from the total cost benchmarking finding of -7.1% during the Custom IR period. This finding includes the full costs of Hydro Ottawa, including the two capital projects (namely, Cambrian MTS and Facilities Renewal Program). Based on the 4th Generation IR framework, this total cost benchmarking result indicates a 0.3% stretch factor.

b) Hydro Ottawa confirms that the Facilities Renewal Program and Cambrian MTS are, in large part, capital projects.

c) The cited facilities are primarily capital projects and thus are included in the total cost definition. They therefore influence the total cost benchmarks and stretch factor recommendation. Please see the response to interrogatory OEB-10 part (b) regarding the OM&A escalation and the appropriate stretch factor.

d) Exclusions to the sample for similar "generational" projects were not made. The analysis in the Appendix of Clearspring's report examines what the utility's benchmarking results would be if the two capital projects had not been pursued by Hydro Ottawa. The results are accurate and not biased when answering that hypothetical question. On page 34 of the total cost benchmarking report, Clearspring states the following:

> "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."

INTERROGATORY RESPONSE - OEB-14

1-Staff-14

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment A

Distribution Rate Application Filing Requirements – Chapter 2

Exhibit 3/Tab 1/Schedule 1/Attachment C/p. 5

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

On page 18 of its study, Clearspring provides the following short summary of the temperature variable included in its total cost benchmarking model:

> 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.

The OEB's own filing requirements for electricity distributors recognizes the importance of heating degree days (HDD) and cooling degree days (CDD), and most utilities include HDD and CDD variables (for weather normalization) in their load forecast models filed in support of cost of service and Custom IR applications to rebase rates. The OEB provides the following guidance in Chapter 2 of its filing requirements:

Explanation of the weather-normalization methodology proposed including:

- If monthly Heating Degree Days (HDD) and/or Cooling Degree Days (CDD) are used to determine normal weather, the monthly HDD and CDD based on: a)

10-year average and b) a trend based on 20-years. If the applicant proposes an alternative approach, it must be supported.

- Definitions of HDD and CDD, including:
  - Climatological measurement point(s) (i.e. identification of Environment Canada weather station(s)) and why these are appropriate for the distributor's service territory
  - Identification of base degrees from which HDDs and CDDs are measured (e.g. 18° C or other)
- In addition to the proposed test year load forecast, the load forecasts based on 10-year average and 20-year trends in HDD and CDD
- Rationale to support the weather-normalization methodology chosen

The distributor identifies the thresholds for HDD and CDD, and these are often different. In its load forecast provided in Exhibit 3 in this Application, Hydro Ottawa has used 13°C for HDD and 18°C for CDD.

Question(s):

a) OEB staff observes that the thresholds of 80°F (26.667°C) for CDD and 10°F (-12.222°) for HDD used by Clearspring are at the extremes of thresholds that Ontario distributors have used. Please explain how Clearspring identified the HDD and CDD thresholds chosen.

b) OEB staff also observe, based on experience with cost of service and rebasing applications, IESO system demand data and forecasts, and Ontario's electricity Conservation and Demand Management programs over the years, that energy consumption and demand for heating and for cooling purposes are generally quite different. Further, most distributors in Ontario are either clearly winter-peaking or summer-peaking; OEB staff would expect that this would generally also hold for most electric utilities in the U.S. and Canada.

   i. What U.S. utilities in the sample are winter peaking?

ii. With a threshold of 10°F for HDD, it would seem that HDD would provide little contribution for utilities serving more southerly latitudes, including utilities in much of California, Arizona, Nevada, Texas, New Mexico, Oklahoma, Georgia, Florida and the Carolinas. In contrast, more northerly states would have a greater mix of CDD and HDD. What is the rationale for summing HDD and CDD into a single "weather" variable rather than maintaining as separate variables?

c) Clearspring also using ratcheted peak demand (*D*) as an "output" variable to explain a utility's total costs. *D* and D^2 are both regressor variables in Clearspring's total cost model. Ratcheted peak demand is defined as the maximum peak system demand in the year or any year prior to it, on the basis that the utility has constructed and operates the system to accommodate at least that peak and, once built as such, the assets are sunk. Please explain why the ratcheted system peak demand does not overlap and mask the effect of Clearspring's HDD+CDD variable in explaining a firm's total costs.

RESPONSE:

a) The CDD and HDD bases approximated the extreme weather variable that was included in the Hydro One Networks distribution benchmarking research found in EB-2017-0049.[1] The government data source used in that proceeding is no longer available, and Clearspring switched to data sources that produced observations in Fahrenheit rather than Celsius. The determined cut-offs also produced the correct signs and tightest confidence intervals relative to the other examined temperature cut-offs.

b) The rationale for the extreme weather variable in a cost benchmarking exercise is different than the rationale for including a HDD or CDD variable when estimating or forecasting energy consumption. The extreme weather variable in a cost benchmarking exercise attempts to measure harsh conditions that lowers the productivity (and raises costs) of work crews. When extreme cold temperatures occur, crews will need to take

[1] Hydro One Networks Inc., *2018-2022 Custom Incentive Rate-setting Distribution Rate Application*, EB-2017-0049 (March 31, 2017).

intermittent breaks to stop work and “warm up” in the trucks or other heated locations. Work may also need to be deferred to less optimal times due to extreme weather conditions. When weather is more moderate, these losses in productivity do not occur.

However, in the context of energy forecasting, moderate temperatures will still influence the model predictions. In some of Clearspring’s short-term load forecasting models, moderate temperatures can actually have a larger marginal influence on energy demand than the extreme temperatures, due to air conditioning loads or electric heat loads running at maximum capacity in some locations at the extreme temperatures. This reduces the marginal impact of energy demand relative to more moderate ranges as temperatures get even more extreme.

Given the focus is on measuring extreme temperatures, the more southern utilities will have far lower values of HDD, but higher values of CDD. In either case, the extreme weather will result in lower productivity as crews are required to warm up or cool down to avoid adverse health impacts.

c) As stated in part (b) above, the intention of the extreme weather variable is not to approximate peak demands or load factors, but rather to account and adjust for a more challenging work environment that is expected to lower productivity and increase utility costs, due to the uncontrollable environmental weather conditions.

INTERROGATORY RESPONSE - OEB-15

1-Staff-15

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment A/pp. 5-6, 26-32

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

Clearspring provides its analysis and summary tables of reliability benchmarking on pages 26 to 31 of its report.

Table 9 on page 28 provides summary estimated coefficient statistics of the SAIFI model, and Clearspring indicates that the model has an adjusted R^2 of 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

Table 10 on page 29 provides similar estimated coefficient statistics for the CAIDI model, and the adjusted R^2 is stated to be 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

Question(s):

a) Please provide full regression model summary tables for each of Tables 9 and 10, showing statistics such as the F-statistic, Durbin-Watson, etc.

b) OEB staff observe that, while some of the variables in the SAIFI and CAIDI models are also used in the total cost benchmarking model, others are not. Clearspring has not provided definitions for the additional variables.

For each of the following variables used only in the SAIFI and/or CAIDI models please provide definitions of the variable, including identification of the source, the scale of the variable, whether it is expressed in logarithmic or untransformed form, whether the variable is a binary (indicator) variable, and whether the variable is based on a snapshot in time for each utility, or whether it varies over time as well as across utilities (for example, OEB staff understand that the Congested Urban variable is based on a recent snapshot in time, and thus has the same value for a specific utility for all years, despite the fact that some utilities, like Toronto Hydro, Commonwealth Edison, and Consolidated Edison may see changes over the sample period):

i. % Plant Underground

ii. Average Wind Speeds Above 20 MPH
iii. IEEE MED [Major Event Day] Definition

c) What other variables did Clearspring test in its analyses for the SAIFI and CAIDI reliability models?

d) Clearspring does not include any factors related to system age, unitized OM&A expenditures, or other utility characteristics that are under the firm's control, other than %Underground and %AMI in its reliability models. Please explain why Clearspring does not consider operational and system characteristics that are under the control of utility's management, as explanatory variables for differences of utilities' reliability performance over time and across utilities.

e) Please describe Clearspring's methodology for testing various model specifications and variables for its reliability modelling. How has Clearspring satisfied itself that the variables included in its final models are the best clear drivers of SAIFI and CAIDI performance, and, both individually and in combination, proxy other business condition and utility operational and system characteristics (of the sampled utilities) that the included variables may be correlated with?

f) For the SAIFI model, %Underground has a positive and statistically significant coefficient estimate. *Ceteris paribus*, this would imply that the average frequency of sustained service interruptions (i.e., of 1 minute or more) increases (i.e., poorer reliability performance) with more undergrounding. This would seem counter-intuitive, since one of the reasons for undergrounding, which is more expensive to install and replace, is to improve reliability by reducing tree, animal, and human contact, and protect the infrastructure from many weather-related factors. Please explain the rationale for the positive % Undergrounding coefficient.

g) On pages 5-6, and again on pages 30 and 32, Clearspring summarizes the results of the reliability benchmarking, stating the Hydro Ottawa is 11.3% above the benchmark (i.e., poorer performance) for SAIFI but 13.7% below the benchmark (i.e., superior performance) for CAIDI, and that both results are converging towards the benchmark.

i. Does Clearspring have any other conclusions or recommendations based on its reliability model analysis? If so, please provide.

ii. Did Clearspring use the results of the reliability modelling in its conclusions and recommendations for Hydro Ottawa's Custom IR proposal including the recommended stretch factor? If so, please explain.

iii. How has Hydro Ottawa taken account of the results of Clearspring's reliability modelling into:

a. Hydro Ottawa's operational and capital planning;

b. Hydro Ottawa's Custom IR plan, and capital and operational plans and budgets as proposed in this Application?

RESPONSE:

a) Below are the full model results for the SAIFI model (Table 9 of the Clearspring report) that are produced by the STATA software. STATA is a popular third-party econometric software that can be purchased at a moderate price and used by non-experts wanting to replicate Clearspring's results.

```
Regression with Driscoll-Kraay standard errors   Number of obs     =       501
Method: Pooled OLS                               Number of groups  =        78
Group variable (i): snlid                        F(  5,       8)   =  19219.57
maximum lag: 2                                   Prob > F          =    0.0000
                                                 R-squared         =    0.4660
                                                 Root MSE          =    0.3246
```

lsaifi	Coef.	Drisc/Kraay Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnret	-.0197666	.0104708	-1.89	0.096	-.0439123	.0043791
lpforgis1	.0396272	.0168428	2.35	0.046	.0007875	.0784668
ieee	.1995744	.0378555	5.27	0.001	.1122794	.2868694
pctcu	-36.50868	7.862769	-4.64	0.002	-54.64026	-18.37711
pctug	-1.608777	.0731515	-21.99	0.000	-1.777465	-1.440089
_cons	.4772404	.1176272	4.06	0.004	.2059916	.7484893

Below are the full model results for the CAIDI model (Table 10 of the Clearspring report) that are produced by the STATA software.

```
Regression with Driscoll-Kraay standard errors   Number of obs     =       501
Method: Pooled OLS                               Number of groups  =        78
Group variable (i): snlid                        F(  8,       8)   =1109029.91
maximum lag: 2                                   Prob > F          =    0.0000
                                                 R-squared         =    0.4492
                                                 Root MSE          =    0.2271
```

lcaidi	Coef.	Drisc/Kraay Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnret	.0460754	.0083734	5.50	0.001	.0267663	.0653844
lpforgis1	.0729813	.0070284	10.38	0.000	.0567738	.0891887
pctug	-.7304541	.0954662	-7.65	0.000	-.9505995	-.5103086
lsqkm_nret	.0670955	.0220135	3.05	0.016	.0163322	.1178589
wind20	.0031077	.0016703	1.86	0.100	-.0007441	.0069596
lelevstd	.0925091	.0068383	13.53	0.000	.0767399	.1082782
pctcu	21.88866	3.612378	6.06	0.000	13.5585	30.21881
pctami	-.0909058	.0349262	-2.60	0.031	-.1714458	-.0103658
_cons	4.148388	.1094149	37.91	0.000	3.896077	4.400699

b) The percentage of plant underground is calculated by taking the sum of the gross plant in-service value of Underground Conduit (FERC account 366) and Underground Conductors and Devices (FERC account 367), and dividing that sum by the Total Distribution gross plant in service (sum of FERC accounts 360 to 374). This data is gathered from the FERC Form 1s for the U.S. sample and the RRR data for the Ontario sample. The variable is calculated in each year and for each utility. It is not transformed in the model and is not a binary variable.

The average wind speeds above 20 mph are reported from weather stations mapped to each county within each service territory. The values are summed by the amount that average wind speeds in each day exceed 20 mph. If the average wind speed for the day is below 20, the value for the day is set to “0”. This is similar to how HDD or CDD values are calculated. Clearspring then takes a county population weighted average based on the service territory served by each utility. In the case of the Ontario utilities, Clearspring only mapped to the headquarter city, except for Hydro One Networks, where Clearspring mapped to three locations spread apart its service territory (Thunder Bay, Sudbury, and Algonquin Provincial Park). The value was not transformed in the model. The variable does vary for each observation so is calculated in each year and for each utility. The data is gathered from the same source for both the U.S. and Ontario samples. That data is from the daily summaries of the Global Historical Climatology Network that can be located from the website of the U.S. National Oceanic and Atmospheric Administration.[1]

The IEEE Major Event Day ("MED") variable is based on if the reliability data is calculated using the IEEE MED definition. If the dataset for a particular utility observation uses the IEEE definition, the variable is set to "1"; if not, the variable is set to "0". For the U.S. sample, the data are gathered from publicly available reports filed by the utilities or the EIA-861 form. The Ontario sample is gathered from the RRR filings. The IEEE variable is a binary or indicator variable but does vary sometimes by year for the same utility (for example, if the utility changed its MED definition during the sample period).

c) Beyond the variables included in one or both of the models, to the best of Clearspring's recollection, Clearspring considered and tested two other variables. These are the other two wind variables that we constructed "average wind speeds over 10 mph" and "average wind speeds over 30 mph". The wind speeds at 20 mph (wind20) performed the best in both models; however, the wind20 variable was not statistically significant in the SAIFI model so Clearspring did not include it in that model.

d) In conducting a performance assessment, it is typically not desirable to include variables that are under the control of utility management. The aim is to adjust and control for the external or exogenous factors the utility is faced within its service territory. If operational variables are included, the study would cease to be a performance benchmarking evaluation. Those types of models and variables can be useful in the context of

[1] https://www.ncdc.noaa.gov/data-access/quick-links#ghcn.

estimating the impacts of operational decisions and investments, but that was not the intention of Clearspring's study.

The two variables cited in the question (% underground and % AMI) are in a "grey area" of whether they are under the control of management or are external. Placing lines underground is often dictated to the utility from items like municipal codes and the terrain of the service territory, yet in some instances this could be a discretionary decision. Further, the percentage of underground lines cannot be significantly influenced by management in the short-term.

The percentage of AMI meters are sometimes mandated by regulatory agencies, as in Ontario. In that case, installing AMI meters is not a decision that is under the control of management, but a situation external to management and a viable candidate for inclusion into the model. There are some circumstances where the decision is under the control of management; in that case, the variable would be in the "grey area".

e) Clearspring's methodology in determining model specification begins with the theoretical underpinnings of possible external factors driving the studied metric. In the case of reliability metrics, these are items such as weather conditions, vegetation levels, undergrounding of lines, etc. Clearspring then narrowed this list based on the data that can be gathered and processed into variables. These variables are then inserted and statistically tested for inclusion. Clearspring examines whether the parameter estimate for the variable aligns with the theoretical underpinnings and examines the t-statistics and p-values to ascertain statistical significance. Clearspring's principle for including a variable in the model is that the first order term for the variable must be correctly signed according to theory and statistically significant at a 90% confidence level (p-value less than 0.1). Given this process, Clearspring has put forth what it believes are the best available models to evaluate the reliability performance of Hydro Ottawa.

f) Clearspring offers its apologies, as this was a typo in its report. Clearspring accidently reported the wrong coefficient, standard errors, t-stats, and p-values in the graphic. An observer will notice the percent undergrounding statistics match those of the intercept term when they should be different. The correct parameter value for the percent undergrounding variable is -1.609. Please see part (a) of this response for the corrected model statistics for the SAIFI model.

g) i) and ii) The stretch factor did not directly factor in the reliability results; rather, Clearspring used the OEB's 4th Generation IR framework for formulating its stretch factor recommendation, which is based on total cost benchmarking results.

iii) Hydro Ottawa has not taken into account the results of the benchmarking study performed by Clearspring for operational and capital planning.

As described in UPDATED Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework, Hydro Ottawa has incorporated into its rate-setting formula for the 2021-2025 Custom IR term the stretch factor calculated by Clearspring that is normalized to account for two once-in-a-generation capital projects. The value of this stretch factor is 0.15%. This stretch factor is one of the two components comprising the utility's X Factor. Please see UPDATED Exhibit 1-1-10 for further details.

INTERROGATORY RESPONSE - OEB-16

1-Staff-16

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment A/pp. 10

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

Clearspring notes on the cover page that its report was completed on September 30, 2019, with some updating in November 2019. On p. 10, Clearspring notes that the data range for the 81 U.S. utilities is 2002-2017 and that for the six other Ontario distributors is 2006-2017. For Hydro Ottawa, 2018 actuals and 2019-2025 forecasts are also used.

Question(s):

a) Please explain why Clearspring has not updated the dataset with 2018 actuals for U.S. and Ontario distributors other than Hydro Ottawa.

b) Based on the utilities sampled, and certain variables such as Congested Urban, % Forestation, etc., it appears that the data set and total cost model is an update of PSE's evidence as filed in and considered in the Toronto Hydro 2020-2024 Custom IR application in 2019 (EB-2018-0165). Please confirm this. In the alternative, please explain the differences.

c) With the exception of utility inclusions and exclusion, for which information is requested in other interrogatories, please document any changes in data, variable definitions and variable construction that Clearspring has made from the data set used in its total cost benchmarking from that used in the recent Toronto Hydro Custom IR application.

RESPONSE:

a) At the time Clearspring commenced the research for Hydro Ottawa, the latest available year for the data was 2017.

b) Yes, Clearspring considers this as an update with some improvements regarding variable and sample adjustments to incorporate feedback from the Toronto Hydro application[1] and to account for extreme weather challenges. Clearspring also made some minor revisions to the congested urban variable and has moved to using the more modern and transparent Driscoll-Kraay approach to econometric modeling that was used in the firm's Hydro One Networks research.[2]

c) Clearspring has made minor revisions to the percent congested urban variable but has used the same definition and variable construction methods. The other variable definitions have not been modified, with the exception of the ratcheted peak demand variable. Clearspring has modified the ratcheted peak demand variable to be based on the highest value for the previous five-years rather than over the full span of the sample. This variable change was considered in response to comments in past proceedings made by the School Energy Coalition ("SEC"). SEC stated its concern regarding the fact that the ratcheted peak demand variable could not decline over the sample period based upon the prior definition. Clearspring notes that this variable change had a small impact on Hydro Ottawa's total cost benchmarking score. If Clearspring reverted to the prior definition, the total cost benchmarking score would be -5.3% during the Custom IR period, versus the reported -7.1%.

Clearspring encourages intervenors to comment on this definition of the ratcheted peak demand variable, and whether this variable construction is preferred to the previous

---

[1] Toronto Hydro-Electric System Limited, *2020-2024 Custom Incentive Rate-setting Distribution Rate Application*, EB-2018-0165 (August 15, 2018).
[2] Hydro One Networks Inc., *2018-2022 Custom Incentive Rate-setting Distribution Rate Application*, EB-2017-0049 (March 31, 2017).

definition. Another option could also be to define the variable as the maximum of the prior 10 years' worth of peak demand data.

INTERROGATORY RESPONSE - OEB-17

1-Staff-17

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment A

EB-2018-0165 Exhibit 1/Tab 4/Schedule 2

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

OEB staff has prepared Table 1-Staff-17-1: Total Cost Model Estimates from PSE's Total Cost Benchmarking and Reliability Benchmarking report filed in Toronto Hydro's 2020-2024 Custom IR application below.[1] The counterpart is Table 6 on page 23 of Clearspring's report filed in Attachment A of Exhibit 1/Tab 1/Schedule 12. The table compares the model specifications, coefficient estimates and *t*-statistics as filed in the two applications.

[1] EB-2018-0165.

Table 1-Staff-17-1: Comparison of Toronto Hydro and Hydro Ottawa Total Cost Benchmarking Analyses

Application	**Toronto Hydro 2020-24 Custom IR**		**Hydro Ottawa 2021-25 Custom IR**	
	EB-2018-0165		**EB-2019-0261**	
Data Range (for estimation)	2002-2016 (U.S. utilities) 200-2016 (Canadian distributors)		2002-2016 (U.S. utilities) 200-2016 (Canadian distributors)	
Variable	Coefficient	*t*-statistic	Coefficient	*t*-statistic
Constant	12.780	535.646	13.012	615.256
Number of Customers (N)	0.715	67.903	0.567	66.513
N^2	0.213	15.334	0.991	8.097
Ratcheted Peak Demand (D)	0.261	24.040	0.442	43.586
D^2	0.145	25.346	1.164	7.478
N × D	-0.308	-23.501	-2.120	-7.461
% Electric Customers (of Gas and Electric) (%E)	0.407	17.431	0.080	3.193
$\%E^2$	0.348	10.766	[redacted]	[redacted]
Standard Deviation of Elevation (El)	0.102	6.816	0.030	9.80
El^2	-0.007	-3.942	[redacted]	[redacted]
% Forestation (%F)	0.081	18.163	0.043	16.081
$\%F^2$	0.007	12.977	[redacted]	[redacted]
% Congested Urban (%CU)	160.845	19.0382	25.912	6.650
$\%CU^2$	-5664.714	-12.751	-763.329	-5.286
% AMI (Customers with smart meters)	0.109	2.581	0.040	2.786
$\%AMI^2$	-0.029	-0.642	[redacted]	[redacted]
% Underground (%UG)	-0.077	-4.676	[redacted]	[redacted]
$\%UG^2$	-0.002	-0.482	[redacted]	[redacted]
%UG × %CU (UGU)	104.843	10.564	[redacted]	[redacted]
UGU^2	6080.017	7.620	[redacted]	[redacted]
Rural Density (RD)	[redacted]	[redacted]	0.082	26.049
RD^2	[redacted]	[redacted]	0.029	15.834
Temperature (HDD + CDD)	[redacted]	[redacted]	0.000	3.193
Ontario (Binary Variable)	-0.304	-35.592		
Trend	-0.005	-8.463	-0.004	-4.211

The blacked-out cells indicate that the variable was omitted in the final model in each study.

OEB staff observes that there are several differences between the total cost benchmarking models from the Toronto Hydro Custom IR and that in Clearspring's evidence filed in this Application.

Question(s):

a) Please re-file Table 6 in this proceeding with a standard regression table format, including summary statistics such as F-statistic, R^2, adjusted R^2, Durbin-Watson statistic, etc.

b) Please confirm or correct the table above.

c) The Temperature variable, contained only in the total cost benchmarking model filed in this Application, has an estimated coefficient of 0.000, but is statistically significant.
   i. What is the value of the estimated coefficient expressed in scientific notation? (i.e., $X.XXX \times 10^y$)?
   ii. What is the unit of measurement, and is the variable transformed in the estimated total cost benchmarking model?

d) Undergrounding was contained in the Toronto Hydro model, but has been dropped in the current model; this also includes quadratic and cross-product terms (i.e., interaction with congested urban). This seems counter-intuitive, as undergrounding of distribution services increases capital costs, but should also, intuitively, result in increased reliability and lower OM&A. Also, in recent decades (e.g. from the 1970s or 1980s), many municipalities have undergrounding requirements (for at least new developments) also for aesthetic reasons. OEB staff observes that Clearspring has retained the undergrounding variable in the SAIFI and CAIDI reliability models. Please explain why Clearspring has omitted %Undergrounding from its total cost benchmarking model.

e) % Congested Urban had an estimated coefficient of 160.845 in PSE's total cost model filed in EB-2018-0165, but the coefficient estimate has decreased to 25.912. Based on the estimated standard deviations, the change in the coefficient estimate would appear to be material. Quadratic and cross-product terms of %Congested Urban have been omitted from the model filed in this Application. Please provide an explanation for the change in variable specification (i.e. omission of quadratic and cross-product terms for %Congested Urban) and the change in the estimated coefficient.

RESPONSE:

a) Below is the STATA econometric statistics for the total cost model. STATA is a popular third-party econometric software tool that can be purchased for modest cost and used by non-experts to replicate Clearspring's results.

```
Regression with Driscoll-Kraay standard errors   Number of obs     =      1370
Method: Pooled OLS                               Number of groups  =        88
Group variable (i): snlid                        F( 15,     23)    =8701841.18
maximum lag: 2                                   Prob > F          =    0.0000
                                                 R-squared         =    0.9664
                                                 Root MSE          =    0.1714
```

lctotwtot	Coef.	Drisc/Kraay Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnretm	.5668	.0085217	66.51	0.000	.5491716	.5844284
lmaxpk5m	.4419774	.0101403	43.59	0.000	.4210007	.4629541
lnretm_lnretm	.9912226	.1224142	8.10	0.000	.7379895	1.244456
lmaxpk5m_lmaxpk5m	1.163894	.1556507	7.48	0.000	.8419064	1.485882
lnretm_lmaxpk5m	-2.119509	.2773963	-7.64	0.000	-2.693347	-1.545671
lpctelec	.0802008	.0251186	3.19	0.004	.028239	.1321627
lelevstd	.0295919	.0030195	9.80	0.000	.0233456	.0358382
lpforgisl	.0433124	.0026934	16.08	0.000	.0377407	.0488842
pctcu_same	25.91242	3.896735	6.65	0.000	17.85141	33.97343
pctami_same	.0402553	.0144486	2.79	0.010	.0103661	.0701445
lsqkmm_nretm	.0823276	.0031605	26.05	0.000	.0757895	.0888657
weather	.0000728	.0000228	3.19	0.004	.0000257	.00012
trend	-.0043707	.0010381	-4.21	0.000	-.0065182	-.0022232
pctcu_pctcu	-763.3288	144.4029	-5.29	0.000	-1062.049	-464.6086
lsqkmm_nretm_lsqkmm_nretm	.0287345	.0018147	15.83	0.000	.0249805	.0324885
_cons	13.01198	.0211489	615.26	0.000	12.96823	13.05573

b) Clearspring confirms the table prepared by OEB Staff comparing the total cost benchmarking analyses for Toronto Hydro and Hydro Ottawa.

c) As the STATA table shows in part (a) of this interrogatory response, the parameter estimate on the weather variable is 0.0000728, which is $7.28 * 10^{-5}$ in scientific notation. The variable measures the sum of the HDDs and CDDs in each day above the given thresholds for each year and for each utility in the sample.

d) Clearspring endeavors to find the proper balance in its benchmarking research between accuracy and aligning with the aim of producing a simple and straightforward assessment for the OEB to use in its decision-making process. Clearspring attempts to narrow differences between its research and that of PEG when differences are negligible to provide a clearer picture of the research for the OEB and intervenors. One area that PEG had concerns with in the Toronto Hydro case[2] was the presence of both a percent undergrounding variable and a congested urban variable, along with the interaction terms. One reason cited by PEG was that undergrounding is not fully exogenous. Undergrounding is in a "grey area" where it is partly external (or exogenous) and partly a decision of management (endogenous). Exogenous variables are wanted in the analysis but not endogenous ones. Clearspring has eliminated the percent undergrounding variable and the interaction terms, given PEG's concerns that the variable is redundant with the congested urban variable and the fact that the variable resides in this "grey area".

e) Clearspring has kept the quadratic term for the percent congested urban variable in the model, because for utilities with extreme values of this variable (such as Toronto Hydro), it is important to have the curvature in this variable. This has precedent, and not only in Toronto Hydro benchmarking. PEG also included a quadratic variable for rural density in the Hydro One Networks distribution application to account for the extreme values of that

[2] Toronto Hydro-Electric System Limited, *2020-2024 Custom Incentive Rate-setting Distribution Rate Application*, EB-2018-0165 (August 15, 2018).

utility. Clearspring followed PEG's lead and included a quadratic rural density variable along with the quadratic congested urban variable.

This enables the model to be applied to all large Ontario distributors that have moderate rural density and congested urban territory (e.g. Hydro Ottawa), and to other large distributors on the extremes of these two variables (e.g. Hydro One Networks and Toronto Hydro). As discussed in part (d) of this interrogatory response, Clearspring dropped the percent undergrounding variable from the model, as well as the interaction of undergrounding and percent congested urban.

INTERROGATORY RESPONSE - OEB-18

1-Staff-18

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment A

EB-2017-0049, Decision and Order, March 7, 2019

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

Clearspring has included Hydro One Networks in its sample. This utility was not in the sample for PSE's total cost and reliability benchmarking evidence filed in Toronto Hydro's recent Custom IR application (EB-2018-0165). However, PSE did file similar total cost benchmarking evidence for Hydro One Networks' Custom IR plan for distribution rates for 2018-2022 considered by the OEB in EB-2017-0049. The OEB issued its decision on March 7, 2019.

Hydro One Networks' data was, for obvious reasons, part of the sample for the total cost benchmarking in EB-2017-0049. OEB staff and its consultant, PEG, raised a concern in that proceeding with respect to the service territory documented for Hydro One Networks being larger than the land are for the province of Ontario, and also noted that there were extensive areas in northern Ontario, as well as large park areas in the province not serviced by Hydro One Networks. The OEB, in Decision and Order EB-2017-0049, noted:[1]

> One issue of concern raised by PEG and OEB staff was the use by PSE of service area as a business condition variable for the benchmarking analysis. PEG highlighted a threshold issue of "whether the territory is the area which the utility must stand ready to serve if demand arises or the (often much smaller) area it actually serves".[55] OEB staff noted that "Hydro One is claiming huge unserved areas of the province as its service territory in spite of the fact that

[1] EB-2017-0049, Decision and Order, March 7, 2019, p. 28

> there is no electrification and no likelihood of electrification in the foreseeable future". OEB staff submitted that a better parameter to use would be density expressed as customers per km of line. OEB staff however, agreed with PEG's assessment that there is not enough information to suggest a stretch factor other than 0.45%. OEB staff submitted that Hydro One should be directed to improve its information on its actual served territory. QMA supported OEB staff's submission.[56]
>
> [55] Exhibit M1, page 23.
> [56] QMA, *op. cit.*, pp. 7-8.

The OEB stated, in its findings:[2]

> **There are large areas of the province in which there is no electricity distribution system and the OEB agrees that this unserved service area is an issue when using service area as a business condition variable for benchmarking. The extent to which this is also an issue for the comparator distributors used by PSE, which included U.S. investor-owned utilities and rural electric cooperatives, is unknown.** There is also no evidence on the record on the accuracy of reported data for circuit-kilometres of line.
>
> Concerns have been expressed by parties about both potential variables, service area and density. The OEB has the benefit of two different econometric analyses, one that used service area and the other circuit-kilometres of line. Both of these reports recommended a productivity factor of 0% and a stretch factor of 0.45%. It is not necessary at this time for the OEB to make a determination on the appropriate business condition variables to use for TFP and benchmarking analyses. **[Emphasis added]**

[2] *Ibid.*, p. 29

Question(s):

a) What revisions has Clearspring made to Hydro One Networks' data included in this study relative to the data used in the total cost benchmarking study filed in EB-2017-0049?

b) Clearspring is still using service territory as a business condition variable through the Rural Density variable, defined as square kilometres of service area per customer.[3] Has, and if so, how has Clearspring addressed the concerns acknowledged by the OEB in the EB-2017-0049 Decision and Order regarding unserved territory for Hydro One Networks (and possibly other utilities).

RESPONSE:

a) Clearspring has not made any revisions to Hydro One Networks' service territory data for this Application.

b) Clearspring did not address the concerns for this study. Clearspring is using the same value for the service territory variable as was used in the Hydro One Networks application.[4] This provides a consistent definition across all utilities. If some reduction was made to Hydro One Networks' measured service territory, this would likely have the impact of improving Hydro Ottawa's total cost benchmarking score.

[3] Exhibit 1/Tab 1/Schedule 12/Attachment A, p. 17
[4] Hydro One Networks Inc., *2018-2022 Custom Incentive Rate-setting Distribution Rate Application*, EB-2017-0049 (March 31, 2017).

INTERROGATORY RESPONSE - OEB-19

1-Staff-19

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment A

SUBJECT AREA: Total Cost and Reliability Benchmarking

On page 20 of its evidence, Clearspring notes that the total cost model uses a translog function form, expressed mathematically as:

$$\ln C = \alpha_o + \sum_i \alpha_i \ln Y_i + \sum_j \beta_j \ln W_j + \sum_h \gamma_h \ln Z_h + \frac{1}{2}\left[\sum_i \sum_k \alpha_{ik} \ln Y_i \ln Y_k + \sum_j \sum_n \beta_{jn} \ln W_j \ln W_n\right] + \sum_i \sum_j \alpha_{ij} \ln Y_i \ln W_j + \alpha_t t + \varepsilon$$

Clearspring has included a Rural Density variable in its model. On page 17, this is defined as:

> The rural density variable measures the amount of square kilometers 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.

As OEB staff would understand it, the rural density variable is thus defined as:

$RD = \frac{A}{N}$

where A is the square kilometers of service territory and N is the number of customers.

Clearspring includes N, N^2, RD and RD^2 as explanatory business condition variables in its model.

Question(s):

a) On page 17 of its evidence, Clearspring states that, in the translog function form shown above, "*α*'s and *β*'s are model parameters". Please confirm that the coefficients *γ*'s for the business condition variables are also estimated model coefficients. In the alternative, please explain.

b) Please confirm or correct OEB staff's understanding that rural density variable is constructed as $= \frac{A}{N}$.

c) Assuming b) is confirmed, OEB staff note the following mathematical specification of Clearspring's model, with respect to the N and RD variables and the quadratic forms (i.e., ignoring all other terms):

$$\ln ln\ (C)\ = \ldots + \ \gamma_1 \ln ln\ (N)\ \ + \gamma_2 ln^2 (N) + \gamma_3 \ln ln\ (RD)\ \ + \ \gamma_4 ln^2 (RD) + \ldots$$

$$= \ldots + \ \ \gamma_1 \ln ln\ (N)\ \ + \gamma_2 ln^2 (N) + \gamma_3 \ln ln\ (A/N)\ \ + \ \gamma_4 ln^2 (A/N) + \ldots$$

$$= \ldots + \ \ \gamma_1 \ln ln\ (N)\ \ + \gamma_2 ln^2 (N) + \gamma_3 (A) - ln(N)]\ \ + \ \gamma_4 [ln(A) - ln(N)]^2 + \ldots$$

$$= \ldots + \gamma_1 \ln ln\ (N)\ \ + \gamma_2 (N)\ \ + \gamma_3 \ln ln\ (A)\ \ - \gamma_3 \ln ln\ (N)\ \ + \gamma_4 \times [ln^2 (A) - 2 \times (\ln ln\ (A)\ \ \times \ln ln\ (N)\ ) + (N)\ ) + \ldots$$

$$= (\gamma_1 - \gamma_3) \ln ln\ (N)\ \ + (\gamma_2 + \gamma_4)(N)\ \ + \gamma_3 \ln ln\ (A)\ \ + \gamma_4 (A)\ \ - 2\gamma_4 (\ln ln\ (A)\ \ \times \ln ln\ (N)\ ) + \ldots$$

In other words, the inclusion of *N* and *RD* and associated quadratic terms is essentially equivalent to including *N* (the number of customers), *A* (the service territory of the utility) and the interaction between the two terms. The only explicit addition is the cross-product of ln(*A*) and ln(*N*). Please confirm or correct OEB staff's understanding of Clearspring's model specification. If confirmed, please explain why Clearspring preferred its model specification as opposed to entering *N* and *A* as separate variables in the model.

d) With the functional form estimated, the parameter coefficients for these variables correspond with the elasticities. Based on this and Table 1-Staff-12-1 (from interrogatory 1-Staff-12, please confirm or correct that the estimated customer elasticity of total costs is 0.567 – 0.082 = 0.485.

RESPONSE:

a) Clearspring confirms that the coefficients γ's for the business condition variables are also estimated model coefficients.

b) Clearspring confirms the construction of the rural density variable. It is logged prior to insertion into the model.

c) There is little difference in the two approaches. Clearspring calculated the density variable as area divided by customers because it believes this way of formulating the density variable was the most transparent and understandable for intervenors and the OEB to evaluate the variable as a business condition measure of customer density. If PEG or another researcher chooses to include "A" separately without dividing by "N", that is a perfectly acceptable approach as well.

d) It is unclear if the question wants an interaction term between A and N or not. Clearspring took a short-cut from the mathematical equation and simply re-ran the econometric model with "A" not being divided by "N". Without an interaction term, the customer elasticity of costs at the sample mean is 0.502. With the interaction term, the customer elasticity of costs at the sample mean is 0.482.

INTERROGATORY RESPONSE - OEB-20

1-Staff-20

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment A/ pp. 10-12

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

On page 10 of its study, Clearspring states:

> 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. The sampled years for the Ontario observations include 2006 through 2017 except for Hydro Ottawa which has observations through 2025.

In footnotes on page 10 of its study, Clearspring states:

> [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.

On page 12 of its study, Clearspring states:

Pension and benefit costs have remained in the cost definition, because these costs appear to not be accurately disaggregated for the Ontario distributors.

Question(s):

a) Please discuss the rationale for the Ontario utilities that Clearspring chose to add to the sample for the econometric total cost and reliability benchmarking work. Doesn't the accuracy of an econometric cost model prediction depend on the diversity of data used in model estimation as well as on the similarity of the business conditions of the subject utility to sample norms? What is the consequence for the ranking of Hydro Ottawa of adding data for these Ontario distributors to the sample?

b) Please confirm that the inclusion of data for additional Ontario distributors has the disadvantage of constraining the definition of cost and the array of available business condition variables to those that are feasible for the Ontario distributors?

c) Did the sample selection process take into account large transfers of utility plant from transmission to distribution and vice versa, for some of the U.S. utilities in the sample? Would the perpetual inventory method for calculating distributor capital cost include plant formerly classified as transmission? If so, please explain.

d) In what year does the calculation of the ratcheted peak demand variable for the US utilities begin?

RESPONSE:

a) The econometric benchmarking approach does require diversity in the variable data and is most accurate at the sample means of the included business condition variables. If the Ontario distributors are eliminated from the analysis, Clearspring would have no reason to believe the results would be significantly different than those reported.

b) Yes. Most notable is the inability to subtract out the pensions and benefits for the Ontario distributors, and this does impact the cost definition. However, this will likely have a small impact on the study results. Clearspring believes that adding Ontario observations to the dataset outweighs the small impact of not being able to subtract out pensions and benefits from the cost definition.

c) Clearspring did not take into account large transfers between T and D or vice versa. Clearspring has not limited the sample in any way due to the transfers, and has not for its other studies. Clearspring also notes that it appears that PEG did not exclude or adjust for transfers in the Toronto Hydro application[1] or the last Hydro One Transmission application.[2] Making no adjustments is the cleanest and most appropriate approach. This uses the classification of the plant as it enters rate base regardless of whether it is later re-classified or transferred. This means that there would be no capital costs included in the cost definition that were formerly classified as transmission.

d) In every year of the sample, the ratcheted peak demand is the maximum value for the last five years, including the same year of the observation. For example, in 2010 the peak demand value is the highest of 2006, 2007, 2008, 2009, or 2010. In 2017, it will be the highest of 2013, 2014, 2015, 2016, or 2017.

[1] Toronto Hydro-Electric System Limited, *2020-2024 Custom Incentive Rate-setting Distribution Rate Application*, EB-2018-0165 (August 15, 2018).
[2] Hydro One Networks Inc., *2020-2022 Transmission Revenue Requirement and Rate Application*, EB-2019-0082 (March 21, 2019).

INTERROGATORY RESPONSE - OEB-21

1-Staff-21

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment A/page 12

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

On page 12 of its study, Clearspring states:

> Pension and benefit costs have remained in the cost definition, because these costs appear to not be accurately disaggregated for the Ontario distributors.

PEG seeks some additional information regarding Hydro Ottawa's accounting for pensions and other benefits. PEG is seeking a reasonable method for controlling for differences between the level of benefits provided by Hydro Ottawa vs. typical US distributors.

Question(s):

a) In the context of other projects for the OEB, PEG has found that some distributors put all pension and benefit expenses into A&G accounts and some fully distribute them to individual OM&A accounts to "fully load" labor costs in these categories. Which method does Hydro Ottawa use in its accounting?

b) Are total company contributions to OMERS and/or other pension funds associated with OM&A labour (i.e. not capitalized) available? If so, please provide for the sample period. If this is not possible, please provide for a recent year.

c) Are total company contributions to health and other insurance policies associated with OM&A labour available? If so, please provide for the sample period. If this is not possible, please provide for a recent year.

d) What is Hydro Ottawa's understanding as to how the per-employee level of pensions and other (both current and post-employment) benefits that it provides differs from that of U.S. investor-owned electric utility norms?

RESPONSE:

a) Hydro Ottawa distributes its pension and benefit expenses to individual operations, maintenance and administration accounts to "fully load" its labour costs in these categories.

b) Hydro Ottawa distributes its OMERS and/or other pension contribution costs to "fully load" its labour charge-out rates. Consequently, Hydro Ottawa is unable to determine the amount of OMERS contributions associated with operations, maintenance and administration labour, as opposed to labour that is capitalized.

c) Hydro Ottawa distributes its health and other insurance contribution costs to "fully load" its labour charge-out rates. Consequently, Hydro Ottawa is unable to determine the amount associated with operations, maintenance and administration labour, as opposed to labour that is capitalized.

d) Hydro Ottawa has not investigated this issue and is not aware of differences between the levels of its pension and benefits and those of U.S. investor-owned utilities.

INTERROGATORY RESPONSE - OEB-22

1-Staff-22

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment A/ pp. 10-12

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

On page 12 of its study, Clearspring states:

> 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.

Question(s):

a) Please discuss the high voltage operations and related expenses of Hydro Ottawa which are addressed by the cost benchmarking study, and explain the dividing line between the operations and assets of Hydro Ottawa and Hydro One.

RESPONSE:

a) Hydro Ottawa does not own and/or operate any high voltage transmission lines. Hydro One Networks ("HONI") owns and operates all high voltage transmission supplying Hydro Ottawa's distribution system. The demarcation line between Hydro Ottawa and HONI is typically marked on devices located within or just outside of the stations.

This is in contrast to many of the U.S. utilities in the sample, which are fully vertically-integrated from generation to transmission to distribution.

INTERROGATORY RESPONSE - OEB-23

1-Staff-23

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment A

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

On pages 13-14 of its study, Clearspring states:

> 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 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.

Question(s):

a) Mr. Fenrick has done numerous electric utility benchmarking studies using U.S data and, in these studies, has developed many business condition variables that are not easily verified or replicated by another consultant. Please explain then why the development of an earlier benchmark year, such as those used by NERA and Christensen Associates as well as PEG, is uniquely unwarranted because it "would require extensive effort" and face review challenges.

RESPONSE:

a) Clearspring has expended a significant amount of research effort in the past developing variables that account for the cost challenges found within utility service territories. Arguably the clearest example of this is the percent congested urban variable. In the 2014/2015 research for Toronto Hydro and Hydro Ottawa, a “simple” binary variable was used to account for urban challenges. This was viewed by the intervenor community as too simplistic. While the OEB agreed that an urban variable does have some merit, it expressed interest in seeing additional research conducted before such a variable can be accepted as a meaningful adjustment to the assessment of cost benchmarking performance.[1] In response, Power System Engineering (the firm at which Mr. Fenrick was previously employed) then conducted extensive research to calculate a better variable that would clearly increase the accuracy of the benchmarking analysis. Clearspring readily admits that the variable cannot be easily verified because it was not easily constructed and required hundreds of person-hours examining Google Earth maps of building heights to identify clusters of buildings seven stories or greater within each utility’s service territory. This was a “block by block” examination that was a tremendous undertaking. PEG used this variable in its research in the latest Toronto Hydro application because it also, presumably, believes accounting for this challenge is important.

If there is a simpler variable that accurately accounts for the congested urban challenges of utilities and can be easily verified, Clearspring would encourage PEG to develop it or explain how it can be easily constructed. Clearspring will happily use the simpler variable if a significant amount of accuracy is not sacrificed.

The striking difference between Clearspring’s sophisticated variable constructions and the discussion on the capital benchmark year is that there is no clear accuracy increase

[1] Ontario Energy Board, *Decision and Order*, EB-2018-0165 (December 19, 2019), page 29.

by moving to the older capital data, especially when the potential for data entry errors is considered. Clearspring uses a capital benchmark year of 1989 using readily and electronically accessible and verifiable data sources. This benchmark year dates back over 30 years and is more than sufficient for an accurate measurement of capital costs. Clearspring notes that in PEG's benchmarking research in the most recent Hydro One Networks Distribution rate proceeding,[2] it used the same capital benchmark year that PSE did, and PEG fully supported the accuracy of its study at the time.

In several proceedings, PSE/Clearspring has requested PEG to provide the source capital addition data dating back to 1964. PEG has consistently refused. If a consultant is going to raise concerns such as those referenced above and employ old data, Clearspring believes that the consultant should provide parties with the data sources so that the correctness of the data can be verified.

Clearspring observes that PEG has a history of making consequential mistakes with this older capital data. In the Hydro One Sault Ste. Marie proceeding,[3] PEG made a crucial mistake in its total cost benchmarking dataset when dealing with this older capital data. In Exhibit L1, Tab 1, Schedule 6 (i), PEG admitted to this error and stated:

> "This was due to an error in which the older plant additions data were not corrected for mergers by aggregating the historical data for predecessor companies. This led to flawed data in the benchmarking calculations and explains most of the observations in other questions. The resolution of consistency issues between the studies led to a non-negligible change in PEG's benchmarking work that improved the cost performance of Hydro One."[4]

This error by PEG was unnecessary. Using the older data did not significantly add to the accuracy of PEG's study. The results will be minimally impacted because this involves

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[2] Hydro One Networks Inc., *2018-2022 Custom Incentive Rate-setting Distribution Rate Application*, EB-2017-0049 (March 31, 2017).

[3] Hydro One Sault Ste. Marie, *Application for Electricity Transmission Revenue Requirement beginning January 1, 2019*, EB-2018-0218 (July 26, 2018).

[4] Pacific Economics Group, Interrogatory Responses in EB-2018-0218, Exhibit L1-1-6 (March 18, 2019), p. 6.

collecting and using data from 1964-1989 to better estimate capital stock additions in those specific years. These are years that are 40 and 50 years in the past. Most of these capital additions are already depreciated out of the capital stock by now, and so make very little difference to the accuracy of the analysis. Even if PEG collected all this data correctly (which is an unknown) and had a better estimate of the capital additions from 40 and 50 years ago, this would have a small impact on the calculated total costs of the sample. Using the 1989 data is more than sufficient for an accurate total cost benchmarking study.

In the recent Hydro One Networks Transmission application,[5] PSE requested that PEG describe the process PEG undertook to gather the old capital data. In Exhibit L1, Tab 1, Schedule 5 (f) PEG stated the following:

> "These data were gathered decades ago and PEG is not sure where each book was obtained except that the vast majority came from the Wendt Engineering Library at UW Madison. This library is easily accessible to consultants in the Madison, WI area. Some plant additions data from 1990-1993 were obtained from electronic sources no longer commercially available, but can be verified from the published data."[6]

PEG is trusting a decades-old dataset to be correct, with no ability for other parties to verify or correct erroneous data and for no strong analytical reason. Clearspring has chosen to use verifiable data sources that are electronically available.

Clearspring would encourage PEG to adopt this same position for three reasons:

1) If properly done, using a 1989 or a 1964 capital benchmark year will have a minimal impact on the results.

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[5] Hydro One Networks Inc., *2020-2022 Transmission Revenue Requirement and Rate Application*, EB-2019-0082 (March 21, 2019).
[6] Pacific Economics Group, Interrogatory Responses in EB-2019-0082, Exhibit L1-1-5 (March 18, 2019), p. 3.

2) The data going back to 1964 cannot be easily verified. PEG cannot tell Clearspring the book titles used and no longer has the source data to provide for verification because the data was gathered “decades ago.”
3) Data is not electronically available and was probably entered decades ago, which drastically increases the chance for errors, although no one is able to know since the data cannot be readily verified.

INTERROGATORY RESPONSE - OEB-24

1-Staff-24

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment A

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

Clearspring states on pp. 15-16 of their report that

> The labour component [of the OM&A input price index] 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. 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.

Question(s):

a) Why were the weights on the OM&A input price index fixed 70/30 for all utilities in the econometric sample when time-varying weights for U.S. utilities, which account for the majority of data in the sample, are readily available and the OM&A cost shares of Hydro

Ottawa were quite different from 2016 to 2020? Is it possible to construct Company-specific weights for Hydro Ottawa for all years of the sample period? If so, please provide these calculations.

b) Why was the American GDPPI used to construct the material and service input price index for the sampled Ontario distributors when Ontario IRMs commonly use the gross domestic product implicit price index for final domestic demand ["GDP-IPI (FDD)"] as an inflation measure for these inputs, and Clearspring uses an Ontario-specific labor price index in its calculations?.

c) Is the Ontario labor price index ["AWE (Ontario)"] designed to track pension and benefit prices as well as salary and wage prices?

RESPONSE:

a) Clearspring uses a 70/30 weighting for the OM&A cost shares for the entire sample. This is consistent with the benchmarking research done in the 4th Generation IR proceeding and all PSE/Clearspring benchmarking research in Ontario afterwards. Clearspring used the RRR data for the Ontario distributors, and it is not possible to construct customized weights. The impact of using different weights would be negligible.

b) Clearspring has calculated the input prices consistent with its other benchmarking research. Clearspring calculates the input price levels using company-specific locations. For the Ontario distributors, Clearspring uses the specific location in which they operate. Clearspring does use American indexes adjusted for the Canadian Purchasing Price Parities ("PPPs") to determine the escalation of those indexes year-over-year. This creates a consistent method for calculating the input price inflation across the entire sample. This contrasts with PEG's typical approach, which will use different input price inflation indexes for the Ontario and U.S. observations, with different definitions and growth rates for those indexes. This inconsistency can create significant errors in PEG's work, especially if they are using an older year to set the input price levels between the Ontario and U.S. utilities.

c) To Clearspring's knowledge, the Ontario labor price index ["AWE (Ontario)"] is not designed to track pension and benefit prices as well as salary and wage prices. Nevertheless, the impact on the results if the index did track pensions and benefits would be negligible.

INTERROGATORY RESPONSE - OEB-25

1-Staff-25

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment A

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

Clearspring states on p. 16 of their report that

> Beyond the two output variables and input prices, the model also contains business condition variables that provide cost adjustments for given service territory conditions…
>
> The standard deviation of elevation variable is calculated based on geographic information system ("GIS") elevation topography maps…
>
> The percentage of forestation variable is based on GIS land cover maps.

Question(s):

a) Please prepare a table that compares the 2018 values of each variable in Clearspring's model to the U.S., Canadian, and full sample means.

b) Please provide step by step explanations of how the forestation and elevation variables were constructed, with sufficient detail that a consultant can replicate them.

c) How is forestation treated in urban areas, where trees may or may not line the streets and lines may or may not be undergrounded?

d) Is this variable computed without regard to how population is clustered in the service territory?

RESPONSE:

a) Please see Table A for a comparison of the 2018 values of each variable in Clearspring's model to the U.S., Canadian, and full sample means.

Table A – Forestation Variable Comparison

	Hydro Ottawa	Total Sample Average	U.S.Sample Average	Ontario Sample Average
% Forestation	58.5%	57.1%	58.5%	37.6%
Elevation Standard Deviations	17.5	139.0	146.3	38.7

Both variables are time invariant, meaning they are snapshots in time that do not change from year to year. They only change from utility to utility based on the forestation or topography changes within each respective utility's service territory.

b) The calculation of the variables does require a geographic information system ("GIS") expert. The standard deviation of elevation uses GIS elevation topography maps and then calculates the standard deviations of the recorded elevations, measured in feet, within the service territory of each utility. Clearspring used Platts GIS mapping services to set the boundaries of each utility service territory.[1]

The percentage of forestation also uses Platts GIS mapping services to set the boundaries of each utility's service territory. Clearspring used the GlobCover 2009 product produced by the European Space Agency ("ESA") and the Université Catholique de Louvain to designate the land cover types within the territory. The areas designated as forested were summed and then divided by the total service area.

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[1] For more information, please see the following website: https://www.spglobal.com/platts/en/products-services/oil/map-data-pro.

From the ESA data source, Figure A below shows the land types in their mapping product. Clearspring designated 50, 60, 70, 90, and 100 as forested. Clearspring did not include "40" because the Ontario data did not include 40 and most U.S. utilities did not have "40" in their service territories.

Figure A – ESA Land Types

11 - Irrigated croplands
14 - Rainfed croplands
20 - Mosaic Croplands/Vegetation
30 - Mosaic Vegetation/Croplands
40 - Closed to open broadleaved evergreen or semi-deciduous forest
50 - Closed broadleaved deciduous forest
60 - Open broadleaved deciduous forest
70 - Closed needleleaved evergreen forest
90 - Open needleleaved deciduous or evergreen forest
100 - Closed to open mixed broadleaved and needleleaved forest
110 - Mosaic Forest-Shrubland/Grassland
120 - Mosaic Grassland/Forest-Shrubland
130 - Closed to open shrubland
140 - Closed to open grassland
150 - Sparse vegetation
160 - Closed to open broadleaved forest regularly flooded (fresh-brackish water)
170 - Closed broadleaved forest permanently flooded (saline-brackish water)
180 - Closed to open vegetation regularly flooded
190 - Artificial areas
200 - Bare areas
210 - Water bodies
220 - Permanent snow and ice
230 - No data

c) Within city centers, it is likely that one would see more 190-Artificial areas and 150-Sparse vegetation. There may be pockets of forestation even within cities.

d) The variable is calculated without regard to population clusters. It is a percentage of service territory variable, rather than one weighted by population.

INTERROGATORY RESPONSE - OEB-26

1-Staff-26

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment A/p. 17 and Clearspring Working Papers

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

In its review of Clearspring's Working Papers, PEG noticed some oddities in the calculation of the percentage of smart meters variable. For example, Clearspring's working papers indicate that five utilities (Alabama Power, Pennsylvania Power, Gulf Power, PP&L Electric Utilities, and Black Hills Power) have each undertaken a nearly complete (e.g., 95% or higher) smart meter deployment in the course of a single year. Clearspring's working papers also show that a sixth utility, Southern California Edison, managed to deploy more than 3.75 million smart meters in a single year.

On page 4 of its petition in Pennsylvania Public Utilities Commission Docket No. M-2009-2123945, PP&L Electric Utilities stated:

> In the Spring of 2002, PPL Electric implemented an advance meter pilot to approximately 10,000 customers in the Allentown/Bethlehem, Pennsylvania area. Under the pilot, PPL Electric tested the technical capabilities of its smart meter equipment and established procedures for system-wide deployment of its AMI system.
>
> Later in 2002, PPL began full scale deployment of its AMI system, and by September 2004 had installed smart meters for all of its metered customers. The PPL Electric AMI system consists of meters, communications, infrastructure, computer services and applications that allow the Company to remotely read the meters for all of its customers.

Question(s):

a) How did Clearspring differentiate between smart meter deployment and automated meter deployment?

b) Did Clearspring rely on any information beyond the data reported in the EIA-861 (e.g., Institute for Energy Efficiency's periodic reports on smart meter deployments, plans, and proposals, utility smart meter filings with regulators or the federal government, or utility press releases on smart meter deployments)? If so, please provide this supplemental information.

c) Was Clearspring aware that PP&L Electric Utilities Corporation had completely deployed AMI as of 2004? If it was aware, why didn't Clearspring report a value other than zero for this utility for years prior to 2007? Is Clearspring aware of any other sampled utilities that had undertaken sizable smart meter deployments prior to 2007? What is the impact on the AMI parameter estimate of these inaccurate zeros?

d) For each of the other utilities listed in the preamble, please verify that these rapid smart meter deployments are reasonable and provide any evidence that supports your assessment.

RESPONSE:

a) Clearspring used the EIA-861 information to determine the % AMI variable. The EIA-861 form breaks out meters classified as "Automated Meter Reading" (AMR) and "Advanced Metering Infrastructure" ("AMI"). Clearspring only used the meters designated as AMI in the construction of the % AMI variable.

b) No. Clearspring depended on the EIA-861 data, which became available starting in 2007, for the construction of the variable.

c) No. Clearspring only used the EIA-861 data, and AMI reports were not available prior to 2007. Clearspring set AMI values to zero prior to 2007. Clearspring notes that PPL had fully deployed as of 2007, according to the EIA-861 data. It is likely that PPL did deploy AMI meters prior to 2007. Clearspring would not expect a large impact on the AMI parameter estimate since there are only three utilities in the entire sample that have above "0" values in 2007 for the variable, and PPL was the only utility that fully deployed by 2007. PPL has a value of 99% in 2007, Arizona Public Service has a value of 27%, and Florida Power & Light has a value of 1%. Any of these possible revisions to the % AMI variable will have a negligible impact on the Hydro Ottawa result.

d) Clearspring depended on the EIA-861 reporting for the variable construction and did not conduct independent research to determine whether the reporting by the utilities was accurate or not. Any of these possible revisions to the % AMI variable will have a negligible impact on the Hydro Ottawa result.

INTERROGATORY RESPONSE - OEB-27

1-Staff-27

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment A

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

Clearspring states on page 17 of their report that

> The congested urban variable measures the percentage of a utility's service territory that consists of a major urban load center that is "congested."

The OEB commented on page 29 in the December 19, 2019 decision and order in EB-2018-0165 that it had reservations about the Congested Urban variable. It stated:

> "An updated, improved, congested urban variable was introduced by PSE and used by PEG. As noted by SEC, this variable significantly improved Toronto Hydro's cost benchmarking performance. The OEB accepts that a well-constructed congested urban variable may be appropriate for Toronto Hydro. However, the OEB concludes that the congested urban variable needs further research and refinement before it can be accepted as a meaningful adjustment to the assessment of cost benchmarking performance."

Question(s):

a) Please discuss any improvements to the congested urban variable made since the study filed in the EB-2018-0165 case for Toronto Hydro.

b) If not already provided, please provide the estimated congested urban area for all sampled distributors.

c) To inform the panel, please perform a variation on the cost benchmarking work that removes the Congested Urban variables and prepare tables analogous to 6 and 7 from the Clearspring report.

RESPONSE:

a) Clearspring re-examined some of the congested urban boundaries and made some minor revisions to the variable. However, the definition and construction remained the same relative to the Toronto Hydro application.[1]

b) Please see the Clearspring working papers. The variable can be found in the "Modeling Dataset.xlsx" file, in the "TC Modeling Dataset" worksheet, in column BA with the heading "pctcu".

c) Table A below shows the model statistics if the % congested urban variable and quadratic are eliminated from the model. Table B below shows Hydro Ottawa's results when this model specification is used.

[1] Toronto Hydro-Electric System Limited, *2020-2024 Custom Incentive Rate-setting Distribution Rate Application*, EB-2018-0165 (August 15, 2018).

Table A – Total Cost Model Estimates (With % Congested Urban Variables Removed)

Variable	Coefficient	Standard Error	T-Statistic	P-Value
Constant	13.001	0.028	457.183	0.000
Number of Customers (N)	0.546	0.021	25.527	0.000
Ratcheted Peak Demand (D)	0.461	0.022	20.757	0.000
N*N	1.018	0.072	14.162	0.000
D*D	1.202	0.088	13.662	0.000
N*D	-2.183	0.153	-14.232	0.000
% Electric Customers in Gas + Electric	0.084	0.023	3.702	0.000
Standard Deviation of Elevation	0.030	0.005	5.692	0.000
% Forestation	0.043	0.004	11.134	0.000
% Congested Urban (CU)				
% AMI	0.044	0.016	2.755	0.006
Rural Density (RD)	0.077	0.006	13.786	0.000
Temperature	0.000	0.000	3.438	0.001
Trend	-0.005	0.001	-4.035	0.000
CU*CU				
RD*RD	0.035	0.002	15.862	0.000

Table B – 2006-2025 Total Cost Benchmark Score for Hydro Ottawa (Using Model Specification in Table A)

Year	% Difference from Total Cost Benchmark
2006	-24.8%
2007	-22.9%
2008	-19.5%
2009	-21.6%
2010	-21.1%
2011	-18.6%
2012	-19.6%
2013	-18.0%
2014	-13.7%
2015	-11.6%
2016	-10.4%
2017	-11.4%
2018	-8.8%
2016-2018 AVERAGE SCORE	**-10.2%**
2019	-5.7%
2020	-6.8%
2021	-6.9%
2022	-6.6%
2023	-8.4%
2024	-10.0%
2025	-10.2%
2021-2025 AVERAGE SCORE	**-8.4%**

INTERROGATORY RESPONSE - OEB-28

1-Staff-28

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment A/p.17-18

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

On pages 17-18 of its study, Clearspring states:

> "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.
>
> 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."

Question(s):

a) What is the source of the area measure for US and Ontario distributors?

b) Please explain the origin and calculation of the variables pctsubic, pctpark, pctrural, pctsubrc, pcturban, pctcore that are found in the Clearspring working papers. Are these variables suitable for use in benchmarking? If not, why not?

c) What shares of the area that Hydro Ottawa serves can be considered urban, suburban, and rural?

d) What are the sources for the degree day data for US and Ontario distributors?

e) Please briefly describe how weather stations were assigned to distributors. If multiple stations were assigned, please describe how the data were weighted to arrive at a single value for each distributor.

f) Please provide working papers for the temperature variable including the mapping of weather stations if not already provided.

RESPONSE:

a) The area is calculated using geographic information system ("GIS") coordinates of each utility's service area provided by Platts.[1]

b) Only the value of the congested urban variable ("PCTCU") that was calculated should be included in the total cost benchmarking model. The other sub-component territories should not be used in an econometric total cost model. We did not have the research time to examine the other areas on a block-by-block basis similar to the method for the PCTCU variable. The values are placeholders for the service territory of each utility.

c) Please see the response to part (b) above. The percentage of area that is designated as congested urban for Hydro Ottawa is 0.115%.

d) The data source is the same for both the U.S. and Ontario observations and is from the daily summaries of the Global Historical Climatology Network ("GHCN") that can be

[1] For more information, please see: https://www.spglobal.com/platts/en/products-services/oil/map-data-pro.

located from the website of the U.S. National Oceanic and Atmospheric Administration. This is the same source as the wind speed variable.[2]

e) Please see the response to part (b) of interrogatory OEB-15. The county population weightings and county weather station mappings are the same for the temperature and wind speed variables.

f) Please see two files added to the working papers. The first is titled, "OEB-28(A), f SAS Code.docx." This contains the SAS code used by Clearspring to bring in the raw daily weather for all of the weather stations in the analysis to calculate the county-level weather values for the variables for each year and for each county. The second file, "OEB-28(B), f Excel Worksheet.xlsx", brings in the output of the SAS file and maps the observations to each county and then population weights those county mappings to calculate the variable value.

[2] Please see the following: https://www.ncdc.noaa.gov/data-access/quick-links#ghcn.

INTERROGATORY RESPONSE - OEB-29

1-Staff-29

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment A

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

On pp. 20-21 of its study Clearspring states

> 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 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. Driscoll-Kraay standard errors have been coded and available in the STATA software suite since 2007. The computer software calculates information crucial to understanding whether each relationship as described by each coefficient can be supported statistically.

Question(s):

a) Please confirm that autocorrelation reduces the efficiency of parameter estimates and explain what efficiency means in this context, ideally with the aid of a figure.

b) Is efficiency an important criterion for choosing an estimation procedure as well as bias?

c) Please confirm that an estimator being unbiased means that the expected value is the true value of the coefficient: $E(\mathbf{b}) = \boldsymbol{\beta}$

d) Amongst linear unbiased estimators, aren't those with minimum variance (i.e. more efficiency) often called the best linear unbiased estimators (or BLUEs) in econometric textbooks?

e) While an estimator may be unbiased, if it is not a BLUE, then it means that there is a wider distribution (i.e., variance) of the estimate. Using a BLUE would yield an unbiased estimate with a tighter distribution around the true value. In this case, why does Clearspring assert that, if using any unbiased estimator, it is reasonable to say that "it means the researcher does not need to worry about correcting the coefficient values: they are not misleading"?

f) Isn't it fair to say that, in developing distributor cost benchmark models, "the researcher may have a hard time truly understanding" how to model the impact of weather or urban congestion?

g) Millo (2017) suggests that Driscoll-Kraay standard errors are accurate only in large samples.[1] Is Clearspring's sample sufficiently large to produce reliable standard errors?

h) Were the parameters of the model used to benchmark Hydro Ottawa estimated with a sample that included Hydro Ottawa data?

RESPONSE:

a) Autocorrelation will distort the standard errors of the parameter estimate, even though the parameter estimate itself remains unbiased and cannot be improved upon. For this reason, Clearspring conducts the Driscoll-Kraay ("DK") method to correct the standard errors due to autocorrelation, heteroskedasticity, and cross-sectional correlation. The DK method does not influence the parameter estimates and only adjusts the standard errors of the variable. The ordinary least square ("OLS") parameter estimates are used in the DK approach and not manipulated based on underlying assumptions.

The DK approach is the more modern and transparent approach to dealing with autocorrelation, heteroskedasticity, and cross-sectional correlation and can be replicated in several popular econometric software packages, including STATA. The steps to replicate Clearspring's model results in STATA are as follows:

1. Load in the "TC Modeling Dataset" that is provided in the Clearspring working papers in the "Modeling Dataset.xlsx" spreadsheet.

[1] Millo, G. (2017). Robust Standard Error Estimators for Panel Models: A Unifying Approach. Journal of Statistical Software, 82(3): 1-26. doi:10.18637/jss.v082.i03

2. Define the variables found in the equation by logging “ctotwtot”, “nretm”, “maxpk5m”, “pctelec”, “elevstd”, “pforgis1”, and “sqkmm/nretm”.
3. Calculate the quadratic and interaction terms by calculating five variables:
    a. lnretm_lnretm = log(nretm)*log(nretm)/2,
    b. lnretm_lmaxpk5m = log(nretm)*log(maxpk5m)/2, and
    c. lmaxpk5m_lmaxpk5m = log(maxpk5m)*log(maxpk5m)/2
    d. pctcu_pctcu = pctcu*pctcu
    e. lsqkmm_nretm_lsqkmm_nretm = lsqkmm*lsqkmm
4. After these variables are calculated, enter the following command: “xtscc lctotwtot lnretm lmaxpk5m lnretm_lnretm lmaxpk5m_lmaxpk5m lnretm_lmaxpk5m lpctelec lelevstd lpforgis1 pctcu pctami lsqkmm_nretm weather trend pctcu_pctcu lsqkmm_nretm_lsqkmm_nretm”
5. STATA will then provide an output that should match Clearspring’s reported statistics, and which uses the DK method for adjusting the standard errors.

b) Bias is far more important than efficiency in this context. Efficiency impacts the measured standard errors, but bias will impact the parameter estimates, and thus the benchmarking results. In this context, Clearspring’s econometric model has statistically significant variables, all at the 99% confidence level. Adding a tiny amount of efficiency into the estimation procedure will have no impact on the included variables. It is only if the researcher introduces possible bias by making underlying assumptions that do impact the parameter estimates in an attempt to address autocorrelation (such as in the older Generalized Least Squares or “GLS” approach) that the research may become biased and influenced by those decisions and assumptions of the researcher.

Clearspring would further add that the GLS or Feasible GLS (“FGLS”) methods that PEG sometimes employs are inappropriate on an unbalanced or balanced dataset where the time periods (T) are fewer than the cross sections (N), which is the case in this benchmarking dataset. In a 2007 article published in *The Stata Journal*, the author states the following[2]:

> "In an early attempt to account for heteroskedasticity as well as for temporal and spatial dependence in the residuals of time-series cross-section models, Parks (1967) proposes a feasible generalized least-squares (FGLS)–based algorithm that Kmenta (1986) made popular. Unfortunately, however, the Parks–Kmenta method, which is implemented in Stata's xtgls command with option panels(correlated), is typically inappropriate for use with medium- and large-scale microeconometric panels for at least two reasons. First, this method is infeasible if the panel's time dimension, T, is smaller than its cross-sectional dimension, N, which is almost always the case for microeconometric panels. Second, Beck and Katz (1995) show that the Parks–Kmenta method tends to produce unacceptably small standard error estimates."

In that same section, the author states:

> "Therefore, Driscoll and Kraay's approach eliminates the deficiencies of other large-T–consistent covariance matrix estimators such as the Parks–Kmenta and the PCSE approach, which typically become inappropriate when the cross-sectional dimension N of a microeconometric panel gets large."

Clearspring maintains that transparency and enabling results to be easily replicated by off-the-shelf econometric software are important considerations. Econometric benchmarking is already a complex exercise. There is no reason to needlessly make it more complex. Clearspring uses the OLS parameter estimates as the basis for the

[2] Hoechle, Daniel, "Robust Standard Errors for Panel Regressions with Cross-Sectional Dependance" *The Stata Journal* (2007) 7 no. 3, pp. 281-312. Available at: https://journals.sagepub.com/doi/pdf/10.1177/1536867X0700700301.

benchmark calculations, just as the Driscoll-Kraay method suggests. These can be easily replicated by individuals in several professions with a basic understanding of econometrics and the use of off-the-shelf software. Please see Clearspring's replication steps in part (a) of this interrogatory response.

c) Clearspring confirms that an estimator being unbiased means that the expected value is the true value of the coefficient.

d) Clearspring confirms that, amongst linear unbiased estimators, those with minimum variance are often called the best linear unbiased estimators in econometric textbooks.

e) As confirmed in part (c) of this interrogatory response, the OLS estimates are unbiased and cannot be improved upon. Just because an estimator can narrow the standard errors (incorrectly in the case of FGLS) does not mean the parameter values that it produces are any better or should be trusted more than the OLS estimates. In fact, if the researcher makes decisions and assumptions that are untrue (which is a possibility with FGLS), the researcher will unwittingly cause the parameter estimates to be biased and worsen the coefficient estimates and harm the accuracy of the benchmarking results.

Clearspring's approach is not to alter the OLS estimates because they are unbiased and cannot be improved upon. Clearspring does address the efficiency issue by producing Driscoll-Kraay standard errors that adjust the standard errors for autocorrelation, cross-sectional correlation, and heteroskedasticity.

As the 2007 *Stata Journal* article cited in part (b) above signalled, PEG's FGLS method is inappropriate in this benchmarking context, and is even more inappropriate because the small-sample properties of the Driscoll-Kraay method outperform the alternatives. Page 10 of the journal article states the following:

> "Even though coverage rates of Driscoll and Kraay standard errors are typically below their nominal value, Driscoll and Kraay standard errors

> have considerably better small-sample properties than those of commonly applied alternative techniques for estimating standard errors when cross-sectional dependence is present. This result holds, irrespective of whether a panel dataset is balanced.”

f) It is possibly fair to share that, in developing distributor cost benchmark models, the researcher may have a hard time truly understanding how to model the impact of weather or urban congestion. This is why the researcher should strive to not include unnecessary assumptions that do not offer increased accuracy. Inclusion of the congested urban variable is far more defensible, as it offers a large improvement in benchmarking accuracy since it captures the substantial cost challenges of serving congested urban areas. With items such as this estimator issue and the 1964 capital benchmark issue, PEG seeks to substantially complicate the benchmarking analysis with no clear benefits in accuracy of doing so.

g) The 2007 *Stata Journal* article cited in part (b) above stated that as T increases, the Driscoll-Kraay method improves. However, in that article they ran Monte Carlo simulations and determined that even with small values of T (they investigated T = 5, T= 10, T = 15, and T = 25) the Driscoll-Kraay method still outperforms the other alternatives in correcting for autocorrelation, cross-sectional correlation, and heteroskedasticity. In its study for Hydro Ottawa, Clearspring used the value of T = 16. Clearspring also notes that the *Stata Journal* article signalled that PEG’s preferred approach (FGLS) is inappropriate given that T<N.

The Millo article cited in this interrogatory itself starts in the first paragraph of the introduction by stating that the Driscoll-Kraay estimator is usually preferred in the study of moderately-sized panel time series analysis in macroeconomics. It is true that, if T were larger, then the Driscoll-Kraay method would produce slightly more efficient standard error estimate. However, this is irrelevant since all of Clearspring’s variables are statistically significant at a 99% confidence level and the DK estimator is still the preferred estimator to use. The t-statistics and explanatory power of Clearspring’s econometric model are robust. The variables are already statistically significant at a 99% confidence level. Gaining a bit more efficiency does not impact the benchmark results whatsoever.

A couple of years ago, Mr. Fenrick of Clearspring had a professor from the University of Wisconsin-Madison (Dr. Kyle Stiegert, who teaches graduate level econometric courses) provide him with his expert recommendation on the most appropriate estimator to use in the context of econometric benchmarking. The Driscoll-Kraay method is what Dr. Stiegert recommended as the best estimator to use. It is the more modern method of estimating unbalanced panel datasets in the presence of autocorrelation, cross-sectional correlation, and heteroskedasticity. It also has been programmed into popular software packages like STATA and uses the OLS parameter estimates, making it far easier to replicate, and it is not subject to researcher manipulations.

Due to Dr. Stiegert's recommendation, Clearspring now uses this method in all of its econometric benchmarking research. Clearspring would encourage PEG or other experts to simply use the OLS estimates to calculate the benchmarks and the Driscoll-Kraay approach to calculate standard errors in every application regardless of results.

Given that improving the standard errors is typically irrelevant in this context, Clearspring would further recommend that practitioners simply use OLS, which would greatly simplify and increase the transparency of the benchmarking process. This would allow individuals and stakeholders with far less econometric knowledge to easily replicate results with off-the-shelf software and give them confidence that this is not just a "black box" exercise produced by experts.

h) Hydro Ottawa data was excluded when calculating the benchmark for Hydro Ottawa. This is the standard benchmarking approach and makes the benchmark external to the studied utility.

INTERROGATORY RESPONSE - OEB-30

1-Staff-30

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment A and Clearspring Working Papers

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

PEG is concerned about the shift to MIFRS accounting for Ontario distributors in the previous decade when U.S. utilities did not face similar accounting changes.

Question(s):

a) Please discuss how the shift to MIFRS accounting has affected Hydro Ottawa's cost data.

b) In Clearspring's view, should Ontario data be restricted to post-MIFRS years? Please explain your response.

RESPONSE:

a) The shift to Modified International Financial Reporting Standards ("MIFRS") had a minimal impact on Hydro Ottawa's total cost data (defined as the sum of the annual OM&A expenses plus capital costs), as the primary change when Hydro Ottawa adopted IFRS was to move costs that had been previously capitalized to OM&A.

b) Based on the evidence that Clearspring has seen, its view is that Ontario data should not be restricted to post-MIFRS years. As discussed in part (a) above, the impacts are likely to be small and not worth the loss in available years and data. Eliminating all of those years from the analysis would move the capital benchmark year for the sample to a far more recent period and compromise the accuracy of a total cost study.

The impact of the shift to MIFRS will be less pronounced with total cost benchmarking than with benchmarking that is only focused on capital or OM&A expenses. Different capitalization policies will shift OM&A and capital expenditures more individually, but with total cost benchmarking, these will partially balance out. Over time, the differences in capitalization of expenses will lessen, even though they are likely small to begin with.

INTERROGATORY RESPONSE - OEB-31

1-Staff-31

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment A and Clearspring Working Papers

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

PEG seeks additional data to facilitate alternative benchmarking approaches.

Question(s):

Please provide the following data for Hydro Ottawa.

a) Gross plant value, gross plant additions, and accumulated depreciation for as many years as available.

RESPONSE:

a) Please see Hydro Ottawa's gross plant, gross plant additions, and accumulated depreciation for 2014-2019 in Table A below. Hydro Ottawa converted its accounting system in 2014 and transitioned to International Financial Reporting Standards ("IFRS") on January 1, 2014. Therefore Hydro Ottawa can readily provide information starting in 2014. Note that, upon transition to IFRS, accumulated depreciation was netted to cost thereby making data for years pre-2014 not comparable.

1 **Table A – Gross Plant, Gross Plant Additions and Accumulated Depreciation ($'000s)**

Year	Gross Plant Value	Gross Plant Additions	Accumulated Depreciation
2014	$721,226	$109,859	$(33,361)
2015	$842,224	$122,336	$(71,581)
2016	$922,123	$81,598	$(111,437)
2017	$1,013,285	$97,686	$(148,273)
2018	$1,112,335	$101,251	$(193,961)
2019	$1,294,465	$215,016	$(227,434)

INTERROGATORY RESPONSE - OEB-32

1-Staff-32

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 8

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

PEG seeks some additional information regarding Hydro Ottawa's expected capital costs related to new additions during the proposed plan in order to determine if an incremental capital supplemental stretch factor is appropriate.

Question(s):

a) Please confirm the values for gross plant additions and the total capital-related annual revenue requirement in each year in the table below, which is similar to one we have used to calculate S factors in recent proceedings.[1] If these data are incorrect, please provide the correct values and references to the sources for the correct values.

b) Please provide the missing data related to the costs of these new additions in the table below for the years 2022-2025 in Excel format, using the spreadsheet also being filed as an attachment to this interrogatory.

[1] See, for example, the OEB's recent Custom IR plan decisions for Hydro One Transmission (EB-2019-0082) and Toronto Hydro (EB-2018-0165). A table similar to this one was filed as part of OEB Staff's Revised S Factor Working Papers in EB-2019-0082 on October 25, 2019.

Capital-Related Revenue Requirement of Hydro Ottawa's Proposed Plant Additions

		Test Year	Custom IR Plan Year			
		2021	2022	2023	2024	2025
				$		
Rate Base [1]						
*	**Gross Plant Additions**	73,189,280	124685374	78653701	83348385	122558762
*	**Accumulated Depreciation**					
	New Additions Rate Base					
Capital-Related Annual Revenue Requirement (New)						
	Interest Expense [D]					
	Return on Equity [E]					
	Depreciation Expense [F]					
	PILs/Taxes [G]					
	Total [H = D + E + F + G]	**0**	**0**	**0**	**0**	**0**
Capital-Related Annual Revenue Requirement (Total Proposed) [I]		125,847,062	138,043,112	149,152,864	156,168,702	160,419,141

Comments

Source for gross plant additions for 2021-2025 is Updated Exhibit 2-2-1, Attachments E-J, as updated May 5, 2020. The 2021 value for gross plant additions was divided in half to reflect the half year rule.
Source for the capital related annual revenue requirement is Exhibit 6-1-1, page 9 of Attachments A-D, p. 10 of Attachment E. This was calculated by subtracting the OM&A expenses from the service revenue requirement in each year.

RESPONSE:

To facilitate PEG's contemplation, Hydro Ottawa has provided the responses below. However, Hydro Ottawa wishes to emphasize that the Renewed Regulatory Framework ("RRF") does not stipulate that all local distribution companies ("LDCs") need to use the same approach in crafting their Custom IR rate applications. The RRF contemplates that utilities would use a custom approach (emphasis added) that suits each LDC's particular circumstances.[2] For further details, please refer to the response to interrogatory OEB-3.

a) The values for gross plant additions in the table provided by the OEB are correct.

b) Please see excel Attachment OEB-32(A): Capital-Related Revenue Requirement - Proposed Additions. In responding to the question, Hydro Ottawa has changed the Gross Plant Additions line in row 8, and has included the total Gross Plant Additions in year 2021 as well the Accumulated Depreciation value in row 9, which includes annual

[2] Ontario Energy Board, *Report of the Board - Renewed Regulatory Framework for Electricity Distributors: A Performance-Based Approach* (October 18, 2012), pages 18-19; Ontario Energy Board, *Handbook for Utility Rate Applications* (October 13, 2016), page 24.

and any prior years' depreciation related to the cumulative Gross Plant Additions. These changes will provide the actual "New Additions Rate Base" value for each year as calculated for the proposed revenue requirement.

INTERROGATORY RESPONSE - OEB-33

1-Staff-33

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 8

SUBJECT AREA: Historical Capital Expenditures

Preamble:

Hydro Ottawa's capex has been markedly higher on average since 2012.

Question(s):

a) Please provide data on Hydro Ottawa's targeted and actual return on equity, total capex, and the number of customers served for as many years as are available.

b) For the years for which data are available, please decompose the capex into the four categories that are requested in the OEB's DSP guidelines.

RESPONSE:

a) Table A below provides a summary of Hydro Ottawa's targeted and actual return on equity ("ROE"), total capex, and the number of customers served for the 2012-2019 period.

Table A – Targeted and Actual ROE, Total Capex & Number of Customers Served

	2012	2013	2014	2015	2016	2017	2018	2019
ROE Approved	9.42%	9.42%	9.42%	9.42%	9.19%	9.19%	9.19%	8.98%
ROE RRR	9.41%	7.80%	8.06%	7.92%	9.80%	10.10%	9.14%	8.82%
Net Capex ($'000,000s)	$87.4	$109.3	$105.8	$83.6	$99.1	$120.5	$165.6	$115.9
Number of Customers[1]	309,534	314,722	319,536	323,919	327,880	331,777	335,320	339,771

b) Table B provides a breakdown of 2012-2020 capex into the four categories that are prescribed in the OEB's DSP guidelines.

Table B – Capital Expenditures by OEB Category ($'000,000s)

	2012	2013	2014	2015	2016	2017	2018	2019
System Access	$30.9	$37.7	$35.5	$43.1	$37.8	$30.9	$40.9	$49.3
System Renewal	$29.6	$29.5	$37.4	$37.4	$42.6	$43.8	$54.9	$30.5
System Service	$21.4	$23.9	$19.3	$17.1	$17.7	$24.8	$29.8	$25.8
General Plant	$27.2	$40.5	$32.8	$10.1	$20.4	$38.3	$56.7	$35.1
Contributions	($21.7)	($22.3)	($19.3)	($24.1)	($19.5)	($17.3)	($16.7)	($24.8)
TOTAL	**$87.4**	**$109.3**	**$105.8**	**$83.6**	**$99.1**	**$120.5**	**$165.6**	**$115.9**

[1] Number of customers reflects year-end reporting, as per OEB Reporting and Record Keeping Requirements.

INTERROGATORY RESPONSE - OEB-34

1-Staff-34

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedules 8/page 8

Exhibit 1/Tab 1/Schedule 10/page 20

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

On page 8 of the first reference, Hydro Ottawa states that:

> [t]he company requested Clearspring Energy examine how the total cost benchmarking results would change if the "once in a generation" Facilities Renewal Program [FRP] 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%.

Hydro Ottawa also states on p. 20 of the second reference, that:

> [s]eeing 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.

Question(s):

a) Hydro One's net plant value has grown much slower than its gross plant value, due in part to rapid growth in its accumulated depreciation. As the years of apparent high capex continue, please confirm that large amounts of accumulated depreciation and the enlarged rate base will place a material drag on continued rapid capital cost growth.

b) If customers must fully compensate Hydro Ottawa for rising capital cost when productivity growth is unusually slow due to a capex surge, why should they not by some means enjoy slower revenue growth when it is completed?

RESPONSE:

a) Hydro Ottawa can confirm that accumulated depreciation reduces the rate base and capital cost growth. Given the same amount of capital spending, all else being equal, when the rate base starts at a higher level the capital cost growth will be lower.

b) Hydro Ottawa has put forth a plan based on its capital needs and system requirements. Hydro Ottawa anticipates that it will continue to request the appropriate revenue required in the future to fulfill the capital needs on the utility's system from its customers.

INTERROGATORY RESPONSE - OEB-35

1-Staff-35

EXHIBIT REFERENCE:

Exhibit 2/Tab 4/Schedule 3

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

Hydro Ottawa provides an extensive discussion of its system age in its distribution system plan, stating on p. 136 that "19% of all assets have reached their expected service life and now pose a higher risk of failure." In work for various clients, PEG is developing the capability to consider asset age in its cost models.

Question(s):

a) Please provide a detailed explanation of how the summary statistics on the prevalence of older assets and poorly-performing assets are computed.

b) Figures like 6.4 in the DSP suggest that Hydro Ottawa has a detailed knowledge of the age of its system components. We would like to estimate the size of the Company's plant additions in each year between 1950 and 1983, including those that have already been replaced, for the following major asset categories if available: station transformers (including high voltage), wood poles, overhead distribution cables, underground cables, underground transformers, and services."

   i) Please provide these data if available.

   ii) In the alternative, please provide the available data for the earliest year for which a figure like Figure 6.4 can be constructed (e.g. 2015).

RESPONSE:

a) The summary statistics on the prevalence of older assets are computed through a multi-step process that is similar for all asset types considered. The results of this process are shown in section 6.1 of Exhibit 2-4-3: Distribution System Plan.

The process of determining the summary statistics begins with extracting the list of assets under consideration from Hydro Ottawa's Geographic Information System ("GIS"), including the assets' orientation (Overhead, Underground, or Stations), unique identifier, and the calendar date of installation. Further, each asset type has a predetermined expected life representing a tolerance of increased probability of failure.

The asset's calendar age is computed and used in combination with the asset's expected service life to assign it to one of the three following categories: more than 10 years of expected life remaining; less than 10 years of expected life remaining; or reached expected life. For assets for which there is no record of installation age, an estimated age is assigned using statistical averaging.

b) Using historical data, the net number of assets installed and removed from the distribution system can be determined for 2003-2019 inclusive. Note the number of services was estimated based on the number of metered customers connected to the distribution system for the year indicated. The values presented represent the net difference in the number of assets present in the distribution system from the previous year. For example, the 2003 totals for 2003 are the marginal differences in the quantity of assets between 2003 and 2002. The data can be found in Attachment OEB-35(A): Asset Demographics.

INTERROGATORY RESPONSE - OEB-36

1-Staff-36

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 8

SUBJECT AREA: Custom Incentive Rate-Setting Framework

Preamble:

Hydro Ottawa lists an “expanding customer base” and “continued growth across the City of Ottawa” as rationales for a Custom IR plan and “significant levels of capital investment”.

Question(s):

a) The number of customers served by Hydro Ottawa averaged 1.4% annual growth from 2012 to 2020 but was forecasted to average 0.88% growth during the plan even before the onset of the Coronavirus recession. PEG found in a recent study of U.S. power distributor productivity that customer growth averaged 0.93% in the 1997-2017 period.[1] How does Hydro Ottawa’s expected customer growth warrant special ratemaking treatment of growth-related capex?

b) Would Hydro Ottawa spend the same amount on growth-related capex in the next five years if the budget for such capex was not effectively preapproved and accorded variance account treatment?

c) Do utilities serving rapidly growing metro areas tend to have faster or slower productivity growth?

[1] Lowry, M.N., *PBR Plan Design for National Grid in Massachusetts*, March 22, 2019, filed as Exhibit AG-MNL-2 in Massachusetts Department of Public Utilities D.P.U. 18-150, p. 40.

d) Couldn't some of Hydro Ottawa's growth-related capex (e.g., those associated with new streetcar lines or highway construction) be addressed through the ICM or the Z-factor mechanism?

RESPONSE:

a) Hydro Ottawa's Application does not reflect the impact of the COVID 19 pandemic. At this point, there is not enough information, analysis or understanding of the potential impacts of the pandemic to accurately forecast what the impact on the 2021-2025 timeframe may be. Any impact will mainly be with respect to 2020 results. The utility's expectations are that the forecasts for 2021-2025 will not be materially changed. Please see the response to interrogatory SEC-1 for additional information on how Hydro Ottawa is assessing the impacts of COVID-19 on its business and operations.

The growth in Ottawa has been at the high end of cities in Ontario. Page 21 of UPDATED Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework states the following: "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%).[2] Moreover, the City's *Official Plan* predicts a population growth rate of 16% between 2016 and 2031.[3]"

For additional context on the growth factor included in Hydro Ottawa's Custom IR rate-setting formula, please see the response to interrogatory OEB-7.

b) Hydro Ottawa will plan and spend the capital resources required to meet customer growth, deal with aging infrastructure and maintain a safe and reliable system. In many cases, the capital expenditures are demand-related capital expenditures and are required to be made.

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[2] Statistics Canada, *Focus on Geography Series, 2011 Census* (2012). Statistics Canada Catalogue no. 98-310-XWE2011004. Ottawa, Ontario. Analytical products, 2011 Census.
[3] City of Ottawa, *Official Plan: Volume 1* (May 2003), page 2-3.

c) Hydro Ottawa has not conducted any detailed studies that would be required to answer this specific question with respect to productivity growth.

d) As outlined in the *Handbook for Utility Rate Applications*, "[t]here is no threshold test or eligibility requirement for a Custom IR application."[4] Instead, the test for the adequacy of the application is the extent to which its features contribute to the achievement of the Renewed Regulatory Framework's goals and whether it meets the following standards:

- Term: A Custom IR must have a minimum term of five years. The OEB has determined that this term supports a longer term approach to planning to smooth expenditures and pace rate increases, strengthens efficiency incentives and supports innovation. Longer terms can be proposed with appropriate mechanisms for consumer protection…

- 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

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

> considered to be incomplete and not processed until that information is provided.[5]

As stated on pages 8-9 of UPDATED: Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework, "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 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."

[5] *Ibid*, pages 25-26.

INTERROGATORY RESPONSE - OEB-37

1-Staff-37

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 8 p. 1

Exhibit 1/Tab 1/Schedule 10/pp. 7-9

SUBJECT AREA: Total Cost and Reliability Benchmarking

Preamble:

Hydro Ottawa has requested a Custom IR plan for the second time in a row.

Question(s):

a) When does Hydro Ottawa expect its capex to fall to normal levels on a real per customer basis?

b) When does Hydro Ottawa expect that it will no longer need the Custom IR form of regulation?

c) Is it a goal of Hydro Ottawa to eventually operate without Custom IR? If not, why not?

RESPONSE:

a) Hydro Ottawa continually evaluates the levels of capital expenditure required to ensure that it can meet customer needs (including customer growth), deal with aging infrastructure, and ensure the safe operation of the system. The reasons for the levels of expenditures in this Application are detailed in Exhibit 2-4-3: Distribution System Plan. As Hydro Ottawa nears its next re-basing period, it will fully update its Distribution

System Plan and propose a level of capital expenditures that meets the criteria outlined above.

b) Hydro Ottawa will evaluate the form of rate-setting application that best suits its customer and operational needs as the utility approaches its next re-basing. Hydro Ottawa evaluates these options on a continual basis.

c) Please see the response to part (b) above.

INTERROGATORY RESPONSE - OEB-38

1-Staff-38

EXHIBIT REFERENCE:

Updated Revenue Requirement Work Form (RRWF) and Models

SUBJECT AREA: OEB Models

Upon completing all interrogatories from Ontario Energy Board (OEB) staff and intervenors, please provide an updated RRWF in working Microsoft Excel format with any corrections or adjustments that the Applicant wishes to make to the amounts in the populated version of the RRWF filed in the initial applications. Entries for changes and adjustments should be included in the middle column on sheet 3 Data_Input_Sheet. Sheets 10 (Load Forecast), 11 (Cost Allocation), 12 (Residential Rate Design) and 13 (Rate Design) should be updated, as necessary. Please include documentation of the corrections and adjustments, such as a reference to an interrogatory response or an explanatory note. Such notes should be documented on Sheet 14 Tracking Sheet, and may also be included on other sheets in the RRWF to assist understanding of changes.

In addition, please file an updated set of models that reflects the interrogatory responses.

RESPONSE:

A response to this interrogatory will be provided in full during the week of June 8th, 2020.

INTERROGATORY RESPONSE - OEB-39

1-Staff-39

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment B/page 3

SUBJECT AREA: UMS Unit Cost Benchmarking Study

Preamble:

On page 3 of its study, UMS states that: "[i]n addition, with respect to our assessment of the Company's [i.e., Hydro Ottawa's] unit costing practices, we adopted an industry-wide perspective (i.e.; not constrained by those of the Peer Group Panel).

Question(s):

a) Please explain what UMS means by this statement, how this was done, and how it shows up in the results of UMS' unit cost benchmarking analyses.

RESPONSE:

a) The purpose of the statement was to highlight a difference between how UMS Group approached the two elements that defined its scope for this effort:

    1. Conduct a review of Hydro Ottawa's methodology for determining the unit costs underlying its distribution system capital and OM&A programs/practices; and
    2. Perform a utility benchmarking study to compare Hydro Ottawa's unit costs with those of a Peer Group Panel.

The comparison of Hydro Ottawa's unit cost was, by design, appropriately reflective and limited to the unit cost information provided by each member of the Peer Group Panel.

However, in executing the first item, UMS Group saw the opportunity to expand its comparisons beyond that of the Peer Group Panel, and thereby increase the likelihood of gaining a more thorough view of what is possible in the area of unit costing. The methodology behind unit costing is agnostic to specific asset categories and OM&A programs/practices, or those elements that render the formation of a Peer Group Panel necessary (e.g. vegetation, UG utility congestion, population density, weather/climate, and other external factors). Therefore, UMS Group leveraged information available from its Industry Study Groups and recent utility-specific operational assessments, and thus gained a more comprehensive point of comparison for Hydro Ottawa. UMS Group used these insights to inform the statements made in the Executive Summary ("Industry Perspective Regarding Unit Cost Methodology" and "Hydro Ottawa-Specific Perspective Regarding Unit Cost Methodology") and the Summary of Results ("Assessment of Hydro Ottawa's Unit Cost Methodology") sections of the report.

INTERROGATORY RESPONSE - OEB-40

1-Staff-40

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment B/pp. 12-13/Figures B-1 and B-2

SUBJECT AREA: UMS Unit Cost Benchmarking Study

Preamble:

In UMS' Unit Cost Benchmarking Study, Figure B-1 is labelled as US Vegetation Density. Figure B-2 is labelled as Canadian Vegetation Density.

Question(s):

a) What is the scale shown for Figure B-1 in the bottom left-hand corner, with ranges of 0-100m, 100-200m, etc. How does the right column of the scale differ from the left-hand column of the scale? What is the unit of measurement?

b) The scale for Figure B-2 is labelled from low to high. What are the units of measurement for this scale?

c) How has UMS used these figures to categorize its sample utilities into cohorts according to vegetation?

d) If the US and Canadian maps use different scales, how did UMS ensure consistency of categorization for US and Canadian utilities in its sample?

RESPONSE:

a) The right hand scale applies to those areas with a comparably wide range with respect to vegetation density, whereas the left hand scale applies to those areas where one can apply a tighter range. As an example, the area that spans the west coast varies widely between 0 and 1,000m. Given the scale of the map, to present it in any further detail (consistent with the left-hand column) would render it non-decipherable.

b) The units are meters, based on area-weighted height.

c) UMS Group used this map as a starting point for determining difficulties related to vegetation, and supplemented/adjusted this information with its knowledge of the service territory and the challenges each of the U.S. utilities encounters in managing vegetation. There were several instances where this additional knowledge and perspective overrode the information inferred in Figure B-1.

d) UMS Group is knowledgeable of the service territories of each of the Canadian utility participants and was able to draw parallels to the level of vegetation among the U.S. utility participants in order to effectuate the categorizations. Similar to the approach described in the response to part (c) above, UMS Group used the information in Figure B-2 as a starting point, but augmented this perspective with its own view of the challenges posed by vegetation for each specific utility.

INTERROGATORY RESPONSE - OEB-41

1-Staff-41

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment B/pp. 18-19

SUBJECT AREA: UMS Unit Cost Benchmarking Study

Preamble:

On pages 18-19 of its study, UMS provides the following discussion under the "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.

Question(s):

a) Why has UMS labelled these as “assertions”? Who is making these assertions?

b) Please clarify UMS’ intention in providing this discussion.

RESPONSE:

a) UMS Group made these assertions with the intent of establishing context for the report, with the key points being the following:

1. The scope of the study (i.e. the selected asset categories and maintenance programs/practices) is sufficient to draw inferences on Hydro Ottawa’s productivity in performing System Renewal capital activities, as well as preventative and predictive maintenance activities.
2. Industry maturity with respect to unit cost management is increasing as overall competence in asset management improves, but not to the point where standardized and easily retrievable data is available. Therefore, one must manage efforts to collect and analyze unit cost data closely, including the normalization of initial results to facilitate any meaningful comparisons (e.g. comparisons made through studies such as that performed by UMS Group).
3. The standard of “Directional Accuracy” is sufficient for identifying opportunities/areas where well-targeted intervention can result in improved performance, and provides a basis for conducting real-time performance trending and comparisons. However, one should exercise caution in extrapolating this information to statements implying precision. For example, in a situation where the unit cost for a specific asset category for utility “x” is twice that of the same asset category for utility “y,” this does not necessarily mean

that the productivity of utility “x” is half that of utility “y.” However, the disparity should drive utility “x” to search for differences in practices, organizational design, etc., and identify actionable initiatives to close the gap.

b) In addition to providing context for the report, UMS Group wanted to re-emphasize the point made in the Executive Summary of its report that, though unit costing is a simple concept to grasp, reporting these metrics for productivity management or benchmarking across electric utilities is complex. Rigid guidelines, carefully designed protocols, objective third-party oversight, and in many instances, more robust information management systems, will be required to make “apples-to-apples” comparisons.

INTERROGATORY RESPONSE - OEB-42

1-Staff-42

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment B/page 21 and page 8

SUBJECT AREA: UMS Unit Cost Benchmarking Study

Question(s):

a) OEB staff notes that Toronto Hydro was selected as one of the 15 peer utilities in the study, which indicates that UMS identifies Toronto Hydro as a compatible utility to Hydro Ottawa. However, a comparison of the Peer Group between UMS' studies filed in Toronto Hydro's proceeding[1] and this proceeding shows that only eight common utilities were contacted/selected in both groups. Please explain how the Peer Group Panel was selected and why approximately half of the utilities were different from the utilities contacted/selected for Toronto Hydro.

b) Please compare the six asset categories and seven OM&A programs selected in the study with those categories filed in Toronto Hydro's proceeding. Please provide explanations where certain categories were dropped, or added in the study for Hydro Ottawa.

c) OEB staff notes that the peer group unit cost median results vary significantly between the UMS study prepared for Toronto Hydro[2] and this study. For example, the peer group unit cost median for wood poles replacement is $7,372 in Toronto Hydro's study compared to $8,766 in this study; the peer group unit cost median for beakers replacement is $85,228 in Toronto Hydro's study compared to $106,580 in this study.

[1] EB-2018-0165, Exhibit 1B-2-1, Appendix B. UMS Unit Cost Benchmarking Study.
[2] EB-2018-0165, Exhibit 1B-2-1, Appendix B. UMS Unit Cost Benchmarking Study. Page 17, Table IV-1.

Please discuss how the OEB can rely on the results of the study when the selected peer group has a significant impact on the benchmarking results.

RESPONSE:

a) As with every benchmarking study, UMS Group established an initial list of targeted utilities based on a myriad of factors, including, but not limited to, the following:

- A blend of overhead ("OH") and underground ("UG") construction, and challenges with aging infrastructure;
- An equivalently-sized customer base with similar expectations regarding safe and reliable service;
- Ongoing initiatives to improve the efficiency and effectiveness of its workforce; and
- Existence of outside factors that can affect productivity (e.g. weather/climate, traffic congestion, city ordinances, vegetation, environmental mandates, etc.).

In helping to inform the selection of candidates for this study, UMS' goal was to provide comparisons that would be relevant to an electric utility of Hydro Ottawa's size and complexity. However, there are no instances where two electric distribution systems/ organizations are identical. This therefore requires the use of industry-accepted normalization processes when conducting actual benchmark comparisons.

With these points in mind, UMS Group reached out to 23 electric utilities to inquire as to their willingness to participate in this study. Fifteen agreed. Table A below summarizes the acceptances and rejections of those invited, and whether or not they were part of the aforementioned Toronto Hydro proceeding.

Table A – Hydro Ottawa Unit Cost Benchmarking Study Peer Group Candidates

Utility	Part of Hydro Ottawa Study Peer Group	Part of Toronto Hydro Study Peer Group
AES-Indianapolis Power and Light	X	X
AES-Dayton Power and Light	X	X
Alectra Utilities	X	
Austin Energy		
Duquesne Light Company	X	
ENMAX	X	X
EPCOR	X	
First Energy-Cleveland Electric Illuminating	X	X
First Energy-Toledo Edison	X	
Fortis BC		
Lansing Board of Water and Light	X	X
Louisville Gas and Electric-Kentucky Utilities		
London Hydro		
New Brunswick Power		
Northern Indiana Public Service Company		
Nova Scotia Power		
Portland General Electric	X	X
Puget Sound Energy	X	
Rochester Gas and Electric		
Sacramento Municipal Utility District	X	X
Seattle City Light	X	X
Toronto Hydro	X	X
Tucson Electric	X	

Of the 15 acceptances, nine utilities likewise participated in Toronto Hydro's unit cost study. The other six, as well as those that declined to participate, met the criteria for Hydro Ottawa's Peer Group Panel.

With respect to the eight electric utilities that participated in the Toronto Hydro study that were not included in Hydro Ottawa's study, all but SaskPower serve more than one million customers (and, of these, most serve significantly more customers than that threshold). In the Toronto Hydro study, UMS also strove to include participants that would allow the consultant to maintain a system-wide view in their analysis. UMS had to ask some of the larger participants or those with a disproportionate amount of customers in rural territory (e.g. Pacific Gas and Electric, Southern California Edison, SaskPower, and Xcel Energy) to segregate their costs and report costs/quantities on only a portion of their system. UMS wanted to avoid such complications in the engagement with Hydro Ottawa.

b) Table B below summarizes the similarities and differences in the scope (i.e. asset categories and OM&A programs/practices) of the respective studies prepared for Hydro Ottawa and Toronto Hydro.

Table B – Comparison of the Hydro Ottawa and Toronto Hydro Unit Cost Studies

Category / Program	Part of Hydro Ottawa Study	Part of Toronto Hydro Study
Asset Categories		
Wood Pole Replacement		
UG Cable (XLPE) Replacement		
OH Switches Replacement		
OH / Pole Top Transformer Replacement		
UG / Padmount Transformer Replacement		
Station Breaker Replacement		
Network Transformer / Protector		
Maintenance Programs		
Vegetation Management		
Pole Test and Inspection		
Overhead Line Patrol		
Station Breaker and Relay Test and Inspection		
Billing-Paper		
Billing-Online		
Meter Maintenance		
Vault Inspection		

The original Statement of Work received by UMS from Hydro Ottawa included UG Switchgear as an Asset Category. However, it was ultimately removed from the study, as there were not enough projects within Hydro Ottawa or across the Peer Group Panel to present a valid comparison.

In addition, the Billing-Paper, Billing-Online, and Meter Maintenance Programs were added to the scope of the study subsequent to the provision of the original Statement of Work. This was as a result of Hydro Ottawa's review of the OEB Staff Discussion Paper on Activity and Program Based Benchmarking for Electricity Distributors.[3] Having reviewed the paper upon its release, Hydro Ottawa signalled interest to UMS in

[3] Ontario Energy Board, *Staff Discussion Paper - Activity and Program Based Benchmarking For Electricity Distributors* (February 25, 2019).

incorporating several categories into the scope of the study that had been flagged by OEB Staff as worthwhile candidates for benchmarking in Ontario's distribution sector.

c) With the approximate 50% turnover of electric utilities in the Peer Group Panel, there are bound to be differences in the peer group unit cost medians across all categories. However, in this instance, the primary driver of the differences noted in the inquiry lay in the conversion rate between Canadian and US dollars. The two currencies were nearly on par during the timeframe governing the Toronto Hydro study, whereas the exchange rate for the Hydro Ottawa study was $0.76 US per $1.00 Canadian. Applying the previous conversion factor to the Hydro Ottawa study results in a computed unit cost median for wood pole replacement of $7,376 (as compared to the Toronto Hydro's proceeding value of $7,434). Therefore, it is the view of UMS that there is nothing fundamentally flawed in the formation of the Peer Group Panel used for Hydro Ottawa's study.

INTERROGATORY RESPONSE - OEB-43

1-Staff-43

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment B/pp. 16-17

SUBJECT AREA: Unit Cost Benchmarking

Preamble:

When assessing Hydro Ottawa's Unit Cost Methodology, UMS notes that it was impressed by the existence of well-documented querying rules that outlined the work breakdown structure used to collect costs and report quantities.

Question(s):

a) Please explain whether Hydro Ottawa has an existing framework, for unit cost analysis purpose, that tracks costs and quantities for asset categories and OM&A programs.

b) If yes to part a), please specify how many years of data are available.

c) Please explain what initiatives Hydro Ottawa has done, or plans to do, to incorporate unit cost information into its performance measurement framework.

d) Other than the six asset categories and seven OM&A programs studied in the UMS study, please clarify whether Hydro Ottawa is tracking costs and quantities information for any other asset categories and OM&A programs.

RESPONSE:

a) Hydro Ottawa does not have an existing framework for unit cost analysis purposes that tracks costs and quantities for asset categories and OM&A programs. The utility has, however, incorporated a number of the unit costing approaches developed in conjunction with the UMS benchmarking exercise into the Key Performance Indicator ("KPI") Dashboard and Continuous Improvement Plan of the Asset Management framework. These documents can be viewed in Attachment SEC-32(A): IAP0025 - AMS Continual Improvement Plan and Attachment SEC-32(B): KPI Dashboard.

b) Based on the response to part (a) above and the referenced attachments, unit cost analysis data is available from 2016-2019.

c) Hydro Ottawa had expanded discussion of findings, conclusions, and recommendations around the topic of unit costs with UMS and plans for next steps. Based on these discussions, Hydro Ottawa plans to leverage the level of rigour and traceability offered by its internal financial planning and analysis capacity to incorporate unit costing into its performance measurement framework. This will be achieved through the development of a consistent methodology for tracking changes in performance-related project/program execution and through the continued refinement in reporting, collecting, and synthesizing of cost and installation data. As described on pages 4-9 of Exhibit 1-1-11: Proposed Annual Reporting – 2021-2025, Hydro Ottawa has already incorporated some of the unit costing approaches used in this benchmarking study into its 2021-2025 Custom Performance Scorecard.

d) Hydro Ottawa collects cost and quantity information for all other asset categories and OM&A programs, but has not yet integrated them into a larger unit cost framework.

INTERROGATORY RESPONSE - OEB-44

1-Staff-44

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment B/Appendix F

Exhibit 1/Tab 1/Schedule 12/Attachment B/pp. 30-31 of 48

SUBJECT AREA: UMS Unit Cost Benchmarking Study

Question(s):

a) Please provide Hydro Ottawa's responses to the Peer Group Panel Survey illustrated in Appendix F.

b) Please provide Hydro Ottawa's actual data for 2019 and forecast information for each year over 2020-2025, in the same format as the Unit Costs Tab in Appendix F in Excel.

c) Please provide Table C-6: Full-Scale Normalization Factors and Table C-7: Full Scale Normalization in Excel. Please also include two additional tables summarizing outputs for Phase 1 and Phase 2 comparison results, across the six asset categories and seven OM&A programs, in the same format as Table C-7.

RESPONSE:

a) Please see Attachment OEB-44(A): Hydro Ottawa 2016-2018 Unit Costs.

b) Please see Attachment OEB-44(B): 2019 Unit Costs and 2020-2025 Forecast.

With respect to the information requested for the 2020-2025 period, Hydro Ottawa is only able to partially fulfill the request. The utility is able to provide forecast information for OM&A/maintenance programs, but only for five of the seven programs that were benchmarked as part of the UMS unit cost study. The two outliers are Vegetation Management and Meter Maintenance. The Vegetation Management program is based on predefined areas versus kilometres of lines, which makes it difficult to forecast per year units. Meter Maintenance is also very difficult to forecast as it is reactive in nature. In addition, there are a wide variety of meter types that fall under this category, including self-contained and transformer rated. The failure modes, and thus labour and material costs, can vary widely and often require differing levels of effort to resolve.

As for the asset/capital categories, there are several challenges which impede the derivation and provision of the requested forecast information. To begin, it must be acknowledged that obtaining the historical units and costs for capital programs involves an extensive analysis, breaking down each material unit involved with all historical projects individually and breaking down costs by component to obtain the proper unit measurements. While this exercise is inherently challenging when seeking to calculate unit costs on a retrospective basis, the challenges magnify when calculations are attempted on a prospective basis.

The reasons for this are several fold. First, while Hydro Ottawa plans its future capital expenditures at the program level, the asset categories that were selected for inclusion in the UMS study are all at the sub-program level. Moreover, as defined in the UMS study, the asset categories exclude “fully dressed” components that are often part of a mix of components of which a larger capital project might be comprised. For example, wood poles exclude components such as underground cable risers, underground transformers exclude associated civil structures, and so on. Any effort to pinpoint the exact number and cost of specific components for a capital project on a five-year forecast basis will thus be constrained by limitations in the data. Not all unit costs will be available because the design and scope refinement for many capital projects are performed closer to the year of execution. This renders any attempt to prospectively break down costs by component extremely challenging or altogether fruitless.

The information presented in Hydro Ottawa’s response to interrogatory EPRF-47 serves as a tangible example of what the foregoing discussion seeks to illustrate. As shown in Table A in the response to EPRF-47, within the Planned Pole Renewal program Hydro Ottawa has forecasted expenditures for the 2021-2025 Test Years. The proposed envelope for 2022-2025 shows a uniform level of spending across capital, labour, and overheads. What's more, there is a uniform projection for the number of pole replacements for each year in the five-year rate term.

However, as further explained in the corresponding section of Attachment 2-4-3(E): Material Investments and as corroborated by the pattern of historical expenditures, it is understood that there will be a certain degree of variance in Planned Pole Renewal project expenditures over the course of the five-year term. This is a result of projects being coordinated, scheduled, prioritized, and re-prioritized on an annual basis, based on numerous factors and conditions. And while Hydro Ottawa can plan and project with confidence that it will need to replace an average of 400 poles per year on a proactive basis during the 2021-2025 timeframe as part of its renewal program, it cannot specify with absolute certitude the precise number and scope of poles that will be replaced in a given year.

Hydro Ottawa trusts that the foregoing explanation casts sufficient light on the reasons which preclude the utility from providing the requested 2020-2025 forecast unit cost information for the benchmarked capital categories.[1]

c) Please see excel Attachment OEB-44(C): Full Scale Normalization Factors, as per the classifications below:

[1] As an aside, Hydro Ottawa observes that the inherent challenges in attempting to forecast unit costs in capital and OM&A categories has been implicitly acknowledged in the OEB's Activity and Program Based Benchmarking ("APB Benchmarking") initiative. Both the OEB Staff Discussion Paper (dated February 25, 2019) and the report from the Pacific Economics Group (dated December 18, 2018) which were released as part of the roll-out of the APB initiative focus exclusively on benchmarking utilities' unit costs on a historical/retrospective basis. There is minimal (if any) consideration or mention made with respect to either the value or the feasibility of forecasting unit costs on a prospective basis. Please see the materials available on the record in EB-2018-0278 for more details.

- Table C-6: Full Scale Normalization Factors (Difficulty Factors 2 TAB with linkages to Wage Adjusters and External Factors TABS)
- Table C-7: Full Scale Normalization (Unit Cost TAB, Rows 100-116)
- Phase 1 Outputs (Unit Cost TAB, Rows 24-40)
- Phase 2 Outputs (Unit Cost TAB, Rows 79-95)

INTERROGATORY RESPONSE - OEB-45

1-Staff-45

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment B/page 9

SUBJECT AREA: UMS Unit Cost Benchmarking Study

Preamble:

UMS notes that the six asset categories represent almost 72% of the system renewal capital budget over 2016-2018, and the seven OM&A programs/practices represent approximately 48% of all preventative and predictive maintenance costs.

Question(s):

a) Please provide the percentage that the six asset categories constitute relative to the total capital expenditures for 2016-2018.

b) Please provide the percentage that the seven OM&A programs/practices constitute relative to the total OM&A expenditures for 2016-2018.

RESPONSE:

a) The six asset categories constitute 11% of total capital expenditures for 2016-2018.

b) The seven OM&A programs/practices constitute 12% of total OM&A expenditures for 2016-2018.

INTERROGATORY RESPONSE - OEB-46

1-Staff-46

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/Attachment E

SUBJECT AREA: Benchmarking

Preamble:

Hydro Ottawa provides the results of the PEG Benchmarking model on pages 1-2 of this attachment. Beginning at the bottom of page 2 and going on to page 4, Hydro Ottawa provides comments on the PEG model forecasts, stating:

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 goes on to detail its points on the following pages, which OEB staff understands as the following:

1. The PEG benchmarking analysis relies solely on Ontario distributors, which has the practical impact of overlooking characteristics of Hydro Ottawa's operational circumstances. In particular, Hydro Ottawa is the only Ontario distributor half the size of the next largest Ontario utility and twice the size of the next smallest distributor.
2. While not disagreeing with the five business condition variables (number of customers, peak kW demand, kWh, average km. of line, and percentage of customers added within the last ten years) as drivers of costs, these driver do not account for distinct operating environmental characteristics of the service territories of distributors located around Ontario. Further, "[t]he 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."

3. The PEG model has not been updated, and is essentially unchanged from when the OEB adopted the currently distribution rate regulatory framework (4th Generation IRM) in 2013.[1]

Hydro Ottawa concludes by stating that:

> 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.

Question(s):

a) Please confirm that OEB staff's summarization of Hydro Ottawa's arguments in this section of the evidence is accurate.

b) In Exhibit 1/Tab 1/Schedule 12/Attachment C, Hydro Ottawa provides a benchmarking analysis of key performance statistics of operation, financial, service reliability and customer satisfaction. Hydro Ottawa has selected a peer group of eleven larger Ontario electricity distributors:

- Alectra Utilities Corporation
- Burlington Hydro Inc.
- EnWin Utilities Ltd.
- Hydro One Networks Inc.
- Kitchener-Wilmot Hydro Inc.

[1] EB-2010-0379.

- 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.

Since this peer group, selected by Hydro Ottawa itself, is solely composed of Ontario distributors, does Hydro Ottawa consider that this benchmarking analysis would also face the limitation that "[t]he practical effect of this peer group composition is that several distinguishing characteristics of Hydro Ottawa in the Ontario context are overlooked …"? If not, why not?

c) Hydro Ottawa has proposed to adopt the base productivity factor of 0%, which was also adopted by the OEB in 2013 for 4th Generation IRM for electricity distributors, as part of its OM&A adjustment formula. Please explain why Hydro Ottawa does not consider that there is a limitation in the base productivity factor of 0% since it is of a similar vintage to the PEG model?

RESPONSE:

a) Yes, Hydro Ottawa confirms that OEB staff has accurately summarized the utility's arguments with respect to the PEG model.

b) The benchmarking exhibit that is referenced (Attachment 1-1-12(C): Electricity Utility Scorecard) is a benchmarking analysis using the annual scorecard published by the OEB as the base data set. As a result, the local distribution companies ("LDCs") that can be selected for comparison are all Ontario-based. Selecting the 11 largest LDCs in the province ensures that the utilities which are the most comparable to Hydro Ottawa are included in the grouping, as size is one of the distinguishing factors in any benchmarking exercise.

In Hydro Ottawa's view, the benchmarking analysis performed in Attachment 1-1-12(C) does suffer from limitations that are similar to those underpinning the PEG model, insofar as the unique operating characteristics of Hydro Ottawa in the Ontario context are likewise overlooked. However, the utility's concerns with respect to the limitations on a voluntary, customized OEB scorecard-based benchmarking analysis are far less acute than its concerns vis-à-vis the PEG model. The implications for Hydro Ottawa of the analysis performed by PEG are orders of magnitude greater than any voluntary benchmarking exercise conducted by the utility using OEB scorecard data. PEG's analysis produces a scoring of Hydro Ottawa's overall cost efficiency and can have a significant impact on the utility's revenue through the OEB's rate-setting framework. It is therefore of much greater consequence and concern to Hydro Ottawa for the PEG model to be as free of undue limitations and deficiencies as possible.

In addition, Hydro Ottawa notes that the benchmarking analysis contained in Attachment 1-1-12(C) represents only one out of a total of six benchmarking analyses undertaken in support of this Application.

c) Hydro Ottawa's approach to Total Factor Productivity ("TFP") is informed by established OEB policy and practice. As noted in UPDATED Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework, the OEB has adopted a base productivity factor of 0% as formal OEB policy. What's more, the Renewed Regulatory Framework ("RRF") affirms that the TFP is intended to be applied across the Ontario distribution sector and all rate-setting methods.[2] This is in contrast to stretch factors, for which the OEB has consistently signalled openness to customization by individual distributors, assuming sufficient evidence is provided attesting to the basis for deviating from the PEG model's scoring.

[2] Ontario Energy Board, *Report of the Board - Renewed Regulatory Framework for Electricity Distributors: A Performance-Based Approach* (October 18, 2012), pages 13 and 17.

INTERROGATORY RESPONSE - OEB-47

1-Staff-47

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 13

SUBJECT AREA: Productivity

Preamble:

Hydro Ottawa identified productivity accomplishments from the 2016-2020 rate period, and identified initiatives planned for 2021-2025. OEB staff would like to understand how these initiatives are reflected in the proposed base revenue requirements for 2021-2025.

Question(s):

a) Please provide a table that summarizes (in millions) all actual productivity savings for the 2016-2020 rate period (2019 actual and 2020 forecast) and forecast productivity savings for the 2021-2025 rate period. Please provide a brief description for each initiative and provide actual and forecast savings by year. Please also classify initiatives by OM&A and capital.

b) For productivity initiatives identified for the 2021-2025 rate period, please explain how Hydro Ottawa forecasted savings for each initiative.

RESPONSE:

a) Please see Table A below. The amounts are estimated OM&A savings, with the exception of the Data Center - Intelligent migration which was a capital saving. With limited exceptions, descriptions for initiatives are available in Exhibit 1-1-13: Productivity and Continuous Improvement Initiatives.

Table A – Annualized Savings of 2016-2020 Productivity Initiatives

Productivity Initiative	Annualized Savings					Total
	2016 Historical Year	2017 Historical Year	2018 Historical Year	2019 Historical Year	2020 Bridge Year	
Online Billing Enhancements	$1.4M	$1.4M	$1.7M	$1.9M	$2.1M	$8.5M
Customer Contact Centre Enhancements		$0.4M	$0.3M	$0.3M	$0.3M	$1.3M
Service Desk Manager					$0.1M	$0.1M
Payment Options			$0.04M	$0.04M	$0.04M	$0.1M
Outbound Calling for 48-Hour Disconnection Warning					$0.4M	$0.4M
Customer Information System Enhancement					$1.0M	$1.0M
Mobile Workforce Management[1]		$0.3M	$0.3M	$0.3M	$0.3M	$1.2M
Outbound Calling for Planned Work and Vegetation Management Projects			$0.1M			$0.1M
Gatekeeper/Collection Meter Consolidation	$0.1M	$0.1M	$0.1M	$0.1M	$0.1M	$0.5M
Cable Chamber Inspections			$0.1M			$0.1M
Underground Locates (Extension of 30-Day Expiration to 60-Day)					$0.3M	$0.3M
Renegotiation of CC&B Maintenance Agreement				$0.1M	$0.1M	$0.2M
Data Center - Intelligent Migration				$0.2M		$0.2M
Points-based FR Clothing System			$0.1M	$0.1M	$0.1M	$0.3M
Physical Records Clean-up/Digitization				$0.1M	$0.1M	$0.2M
Negotiation of New Vegetation Management Service Contracts				$0.3M	$0.3M	$0.6M
Negotiation of Alternate Locate Agreement for UG Locates				$0.1M	$0.1M	$0.2M
Utilities Savings from Ground-Mounted Behind-the-Meter-Solar Systems					$0.4M	$0.4M
Reduction in Overtime Usage				$1.8M		$1.8M
TOTAL	**$1.5M**	**$2.2M**	**$2.7M**	**$5.3M**	**$5.7M**	**$17.5M[2]**

[1] These savings are associated with the termination of an external service contract, which was made possible as a result of the efficiency gains from the implementation of the Mobile Workforce Management solution.
[2] Totals may not sum due to rounding.

It is important to note that Table A above does not represent an exhaustive survey of each and every productivity initiative undertaken by Hydro Ottawa (along with its attendant level of savings) during the 2016-2020 rate period. As part of its commitment to continuous improvement and increased productivity, a host of other activities aimed at enhancing the efficiency of the utility's operations were undertaken and successfully implemented over the past five years. For additional information in this regard, please see the following evidence:

- 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.
- UPDATED Exhibit 4-1-3: Operations, Maintenance and Administration Program Costs – section 2.4 provides a summary of 2016-2019 historical OM&A expenditures and confirms reductions in OM&A spending that Hydro Ottawa was able to achieve, in part, as a result of productivity initiatives.
- UPDATED Exhibit 4-1-4: Operations, Maintenance and Administration Cost Drivers and Program Variance Analysis – this Exhibit provides year-over-year variance analysis for OM&A spending and, in so doing, helps to illustrate where successful execution of productivity initiatives and an enduring commitment to cost control translated into program savings and cost reductions.

For information on forecast productivity savings for the 2021-2025 period, please see the response to part (b) below.

b) Hydro Ottawa's response to this interrogatory should be read in concert with its response to interrogatory CCC-29. Therein, the utility pinpoints the pieces of evidence in support of this Application in which information can be found pertaining to the underlying business cases and net savings associated with the productivity and continuous improvement initiatives identified for 2021-2025.

In addition, Hydro Ottawa wishes to emphasize that the application of a custom OM&A productivity escalator to its planned 2021 OM&A levels will translate into a reduction in OM&A spending of $13.1M over the term of the utility's five-year rate plan. (Please see UPDATED Exhibit 1-1-10: Alignment with the Renewed Regulatory Framework and UPDATED Exhibit 4-1-1: Operations, Maintenance and Administration Summary for details). Achievement of these OM&A savings will necessitate successful execution of the productivity and continuous improvement commitments for 2021-2025 set forth in Exhibit 1-1-13.

Moreover, it merits observation that many of the productivity initiatives identified in Table A above will have lasting effects and will translate into ongoing savings throughout the 2021-2025 rate term.

INTERROGATORY RESPONSE - OEB-48

1-Staff-48

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/pp. 13-17 of 21

Exhibit 1/Tab 1/Schedule 12/Attachment F

SUBJECT AREA: Benchmarking

Question(s):

a) Please specify the nine electricity utilities selected within the peer group.

b) Please clarify whether the selected nine utilities are all electricity distributors.

c) Please confirm revenue and operating expenses include cost of power.

d) Please provide Hydro Ottawa's IT budget included in the 2021-2025 plan:

- 2021 OM&A
- 2021-2025 Capital Expenditures

e) Please provide the allocation of the IT budget (2021 OM&A and 2021-2025 Capital Expenditures) by run, grow, and transform categories as defined in the Gartner study.

f) Please identify key OM&A and capital programs/projects under each of the categories (run, grow, and transform).

g) Please provide Hydro Ottawa's historical IT FTEs for the 2016-2020 rate period and forecast IT FTEs for the 2021-2025 period.

h) Is that possible to compare Hydro Ottawa's 2018 IT budget per customer with the peer group? If so, please provide the comparison results.

RESPONSE:

a) Gartner confirms that the Peer Group consisted of nine electric utility organizations as follows:

- Geography: 5 in U.S. cities, 2 in Australian cities, and 2 in Canadian cities
- Average Revenue: $1.372 billion CAD
- Average Operating Expense: $1.158 billion CAD
- Average Company Employees: 1,157

Due to contractual commitments regarding client confidentiality information, Gartner cannot share specific names of organizations within the Peer Group. Gartner has written agreements with its clients stating that it will only use a client's data in an aggregate and anonymous format when providing benchmarking services.

b) Gartner confirms that all organizations within the peer group are electricity distributors.

c) As per the statements on pages 7 and 17 of the IT Budget Assessment Benchmark, Gartner confirms that revenue and operating expenses include the cost of power. This is standard Gartner practice when conducting benchmarking studies with utility organizations.

d) Information on Hydro Ottawa's IT budget in the 2021-2025 rate plan is available as follows:

- For 2021 OM&A, please see UPDATED Exhibit 4-1-4: Operations, Maintenance and Administration Cost Drivers and Program Variance Analysis, Table 10.

- For 2021-2025 Capital Expenditures, please refer to Exhibit 2-4-3: Distribution System Plan, Table 8.32. The applicable Investment Categories/Capital Programs are Customer Service, ERP System, IT New Initiatives, IT Life Cycle & Ongoing Enhancement, and Operations Initiatives.

e) The objective of the IT Budget Assessment Benchmark was for Hydro Ottawa to gauge its IT spending relative to a peer group. Hydro Ottawa does not budget OM&A and capital expenditures based on the categories defined in Gartner's study (i.e. run, grow, and transform) and is therefore not able to provide a breakdown in the manner requested. These categories are part of a standard framework used by Gartner within the utility industry to perform peer group comparisons. Hydro Ottawa selected 2018 as the representative year and supplied Gartner with reasonable allocations of OM&A and capital expenditures in the respective categories required by the Gartner methodology for peer comparison. Hydro Ottawa is confident that the results of Gartner's study are a reasonable representation of the utility's IT allocation mix.

Table A indicates the 2018 allocation by run, grow, and transform, as defined in the Gartner study.

Table A – Allocation of 2018 IT Costs by Gartner-Defined Categories

	Run	Grow	Transform
Capital Expenditures	2%	5%	28%
OM&A	45%	3%	17%
TOTAL	**47%**	**8%**	**45%**

f) Please see the response to parts (d) and (e) above.

g) Table B below presents Hydro Ottawa's historical and forecast Full Time Equivalents ("FTEs") for IT. The number of IT FTEs is expected to remain flat for the 2022-2025 period.

Table B – Historical and Forecast IT FTEs

2016 Historical	2017 Historical	2018 Historical	2019 Historical	2020 Bridge Year (Forecast)	2021 Test Year (Forecast)
45.8	59.9	59.9	66.4	68.2	63.7

h) Gartner does not have IT Budget per Customer data in its peer database and is therefore unable to provide the requested information.

INTERROGATORY RESPONSE - OEB-49

1-Staff-49

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 12/pp. 17-19 of 21

Exhibit 1/Tab 1/Schedule 12/Attachment G

SUBJECT AREA: Benchmarking

Question(s):

a) Please explain the criteria of selecting the 15 positions (five management jobs and ten non-management jobs) as the sample in the Mercer benchmarking study.

b) Please clarify whether the ten non-management positions are all unionized.

c) Please explain why compensation and benefits for executive positions were not reviewed in the study.

d) Has Hydro Ottawa done any benchmarking analysis for its executive positions? If so, please provide the analysis/study.

e) Please clarify which year of data was used for Hydro Ottawa's management and non-management positions.

   i) If Hydro Ottawa's data are not 2019, please explain what inflation factors were applied to Hydro Ottawa's data to make it comparable to the 2019 Mercer benchmark database.

f) Please clarify whether overtime pay is included in the compensation benchmarking review.

g) Mercer's study defines the "competitiveness" of salaries and total cash compensation as falling within +/-10% of the median job rate for each market and industry comparator. Please discuss how Hydro Ottawa interpret the results of the study given that six of the total 15 positions are more than 10% above the P50 of the market's target total cash compensation.

RESPONSE:

a) The 15 positions selected for the benchmarking study are positions that are core to the utility's business, as well as technical, professional, and paraprofessional roles that support the business. These positions are commonly found in either or both the utility sector and general industry, are multi-incumbent, and are representative of the utility's current and projected workforce.

b) Yes, the 10 non-management positions are unionized.

c) The purpose of the 2019 Market Benchmarking study conducted by Mercer was in relation to multi-incumbent management and non-management positions.

d) Although Hydro Ottawa has not performed any benchmarking analysis for its executive positions as part of this Application, the utility's executive compensation is nevertheless regularly reviewed in comparison to both the industry and the general market.

A review of industry comparators through publicly available sources (examples of which are found in Table A below) show the reasonableness of Hydro Ottawa's executive compensation in comparison to Toronto Hydro, Alectra Utilities, and Hydro One Networks.

Table A – Executive Compensation - Industry Comparators

Principal Position	Hydro Ottawa	Toronto Hydro[1]	Alectra (2018)[2]	Hydro One[3]
President and Chief Executive Officer	446,318	1,269,208	941,394	677,264[4]
Chief Financial Officer	262,993	458,319	573,363	909,030
Chief Electricity Distribution Officer	201,244	684,996[5]	665,581[6]	-

In addition, to ensure competitiveness of executive compensation, a Competitive Compensation Review was conducted in September 2019 by Willis Towers Watson. A redacted copy of the review is appended to this response as Attachment OEB-49(A): Hydro Ottawa Competitive Compensation Review - Executive Management Team. The review provides the following findings and observations at page 5, regarding overall positioning of Hydro Ottawa's executive compensation:

> "*On average, Hydro Ottawa's salary and target total cash for the executive management team are positioned below the 25th percentile of the Combined Sample, Utilities Only Sample and Government Sample".* Note that combined sample means the utilities, government and transportation comparators combined. The detailed individual finding for the Chief Electricity Distribution Officer, who is the only executive in Hydro Ottawa Limited and whose compensation as an Officer is disclosed in the Hydro Ottawa Holding Inc. Annual Reports, can be found at page 22 of the review."

Lastly, Hydro Ottawa Holding Inc. discloses the compensation of its Officers in its Annual Reports, which can be found on the corporate website.[7]

e) 2019 data was used for Hydro Ottawa's management and non-management positions.

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[1] https://www.torontohydro.com/documents/20143/407273/Annual-Information-Form-2019.pdf.
[2] https://www.alectra.com/sites/default/files/assets/pdf/Alectra-Executive-Compensation-Disclosure-2018.pdf.
[3] https://www.hydroone.com/investorrelations/Reports/2019%20MIC.pdf.
[4] Compensation is not annualized.
[5] The job title for this analogous position is Executive Vice President and Chief Engineering and Construction Officer.
[6] The job title for this analogous position is President, Utilities Corporation.
[7] https://hydroottawa.com/about-us/our-company/our-reports.

f) Hydro Ottawa confirms that overtime is not included in the compensation benchmarking review.

g) As stated in UPDATED Attachment 4-1-5(A): Employee Compensation Strategy at page 2, Hydro Ottawa interprets the results of the benchmarking study as follows:

> *"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 within +/-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."*

Hydro Ottawa

Competitive Compensation Review

Executive Management Team

September 3, 2019

WillisTowersWatson

Introduction & Background

- Hydro Ottawa has asked Willis Towers Watson ("WTW") to complete a competitive review of compensation for the following seven executive management positions:
  - Chief Human Resources Officer (CHRO)
  - Chief Energy and Infrastructure Services Officer
  - Chief Electricity Generation Officer
  - Chief Financial Officer
  - Chief Information and Technology Officer
  - Chief Electricity Distribution Officer
  - Chief Customer Officer
- The last compensation market review of the executive management team was conducted in 2011
- Each Hydro Ottawa role has been matched to a benchmark in WTW's 2018 General Industry Executive Survey based on its key responsibilities. Matches were discussed with and approved by the CHRO prior to conducting the analysis
- Consistent with the previous compensation reviews, competitive compensation data reflect companies included in the following three comparator groups*
  1. Combine Utilities, Government and Transportation Comparators ("Combined Sample")
  2. Utilities and Related Industry Comparators ("Utilities Only Sample")
  3. Government and Not-For-Profit Comparators ("Government Only Sample")

*Refer to Appendix II – Methodology for comparator group listings

Introduction & Background

Interpreting the Data

- When reviewing the competitive findings and interpreting the results, it will be important to consider the following:
  - **Competitive positioning:** WTW defines competitiveness as a range and generally considers base salary to be competitive if within +/-10% of the preferred market position and target total cash to be competitive if within +/-15%
    - The primary value of survey data is to determine the range of competitive pay for positions rather than attempting to fix pay at a precise market level
  - **Comparator group composition:** While the overall criteria in determining the comparator groups have remained consistent between the 2011 and 2019 reviews, participation in WTW's surveys have changed and therefore the actual companies included in the market data differ. Overall the market has increased at median for most roles (approximately 9% for the Combined Sample)
  - **Relative size of Hydro Ottawa vs. comparators:** Hydro Ottawa's revenue is positioned between the 25th and 50th percentiles of the comparator groups and when reviewing unit size is generally around the 25th percentile. Therefore, it may be appropriate to reference the 25th percentile of the market data in assessing competitiveness of pay
  - **Individual skill, performance and potential:** Market compensation data are position-specific, based on each position's primary duties and responsibilities ("we benchmark positions, not individuals"). Individuals' compensation has been shown to vary with such factors as job content, tenure, time in position, business risk profile, individual and company performance, internal equity, and individual marketability/retention/recruitment requirements which are not part of this assessment

Introduction & Background

Regional Pay Differentials - Canada

- Most organizations use a national sample to assess the competitiveness of executive compensation as the talent pool for executives is often considered to be national
  - Organization size and industry are the factors that are most correlated with executive compensation
- To assess whether executive level pay is higher or lower in Ottawa than in other major centers, we tested three salary levels - $150,000, $200,000 and $250,000 – against the Economic Research Institute (ERI) Geographic Assessor
  - Pay in Ottawa is aligned with Edmonton, Toronto and Vancouver. A slight discount is observed in the Atlantic provinces and a slight premium is noted for Calgary
    - Differences of less than 5% would be considered statistically insignificant

Region / Metropolitan Area	Salary Range		
	$150,000	$200,000	$250,000
Newfoundland & Labrador - Province Average	92.1%	93.6%	94.5%
Nova Scotia - Province Average	89.3%	91.5%	92.8%
New Brunswick - Province Average	90.1%	92.1%	93.3%
Prince Edward Island - Province Average	89.7%	91.6%	92.8%
Montréal, Québec	96.5%	97.2%	97.7%
Toronto/GTA*	99.9%	100.1%	100.2%
Winnipeg, Manitoba	93.5%	94.8%	95.6%
Regina, Saskatchewan	96.5%	97.0%	97.4%
Calgary, Alberta	105.1%	104.0%	103.3%
Edmonton, Alberta	100.9%	100.7%	100.5%
Vancouver, British Columbia	100.6%	100.6%	100.5%
Ottawa, Ontario	***100.0%***	***100.0%***	***100.0%***

* Toronto / GTA includes Hamilton, Oakville, Milton, Mississauga, Brampton, Scarborough and Oshawa

Note: Data as at January 1, 2018 and sourced from the Economic Research Institute (ERI) Geographic Assessor

Findings & Observations

Overall Positioning

- On average, Hydro Ottawa's salary and target total cash for the executive management team are positioned below the 25th percentile of the Combined Sample, Utilities Only Sample and Government Sample
  - Note: Hydro Ottawa's revenue is positioned between the 25th and 50th percentiles of the three market references
  - Actual positioning varies by executive position
- The table below summarizes Hydro Ottawa's average competitive positioning relative to the three samples

Compensation Element	Summary of Hydro Ottawa's positioning against 2018 competitive data Hydro Ottawa as a % Above / Below Competitive Data								
	Combined Sample			Utilities Only Sample			Government Only Sample		
	25P	50P	75P	25P	50P	75P	25P	50P	75P
Salary	-16%	-33%	-46%	-17%	-36%	-47%	-14%	-31%	-43%
Target Total Cash (Salary + STIP)	-14%	-37%	-53%	-20%	-39%	-54%	-4%	-27%	-44%

WTW generally considers base salary to be competitive if within +/-10% of the preferred market position and target total cash to be competitive if within +/-15%

Findings & Observations: Summary by Compensation Element

Base Salary

- Executive management team base salaries are positioned below the 25th percentile of all three market references

[redacted]

Findings & Observations: Summary by Compensation Element

Short-term Incentive Plan (STIP)

- Hydro Ottawa's target STIP is generally positioned:
  - Around the 25th percentile of the Combined and Utilities Only samples
  - Between the 50th and 75th percentiles of the Government Only sample

[redacted]

Findings & Observations: Summary by Compensation Element

Target Total Cash (TTC = Salary + Target STIP)

- Consistent with base salary findings, target total cash is generally positioned below the 25^{th} percentile of all three market references

[redacted]

Findings & Observations

Long-term Incentive Plan Compensation

- While Hydro Ottawa does not provide its executives with a long-term incentive plan (LTIP) opportunity, LTIP is prevalent in the Utilities industry
  - This includes both investor-owned and government-owned utility organizations, particularly larger government-owned utilities
- The range of competitive target LTIP in the Combined Sample and Utilities Only Sample at median are as follows:
  - Combined Sample: between 45% and 95% (of salary)
  - Utilities Only Sample: between 35% and 95% (of salary)

Appendices

I. Executive Benchmarks

II. Methodology

III. Detailed Findings by Position

Appendix I – Executive Benchmarks

Executive Management Team

- Each executive management role has been matched to a *Willis Towers Watson* benchmark based on our understanding of Hydro Ottawa's organizational structure, the role and responsibilities

Executive Position	WTW Benchmark Match	Benchmark Description
Chief Electricity Distribution Officer	Division Head	Has primary responsibility for the profitability and growth of a division | Sets the overall strategic direction for the division that may include a range of activities (e.g., sales, marketing, operations, staff functions)
Chief Electricity Generation Officer	Division Head	Has primary responsibility for the profitability and growth of a division | Sets the overall strategic direction for the division that may include a range of activities (e.g., sales, marketing, operations, staff functions)
Chief Energy & Infrastructure Services Officer	Division Head	Has primary responsibility for the profitability and growth of a division | Sets the overall strategic direction for the division that may include a range of activities (e.g., sales, marketing, operations, staff functions)
Chief Financial Officer	CFO/Top Financial Officer	Establishes, implements, and maintains the financial plans and policies of the organization, including fiscal controls, preparation and interpretation of financial reports, and safeguarding of the organization's assets | Develops and maintains overall accounting policies and controls | Establishes and maintains good corporate relations with the investment and banking communities | Assists in long-range planning and advises management on financial affairs | May manage one or more significant staff functions, but primary focus is the management of the organization's finances
Chief Information & Technology Officer	Chief Information Officer	Establishes the strategic direction of the organization's information technology resources | Identifies changes in computer and systems technology and communicates these changes to senior management | Provides support to information users and determines information needs throughout the organization | Identifies systems software and hardware necessary for the successful integration of information systems | Coordinates through subordinate staff the operations of the technology functions on a day-to-day basis
Chief Human Resources Officer	Top Human Resources Executive	Has primary responsibility for designing, developing and implementing all human resource policies and programs, including labor relations, if applicable | For noncorporate positions, this position is typically responsible for the execution and administration of policies within a segment of the organization | In highly-decentralized organizations, responsibilities could also include policy design at the segment level
Chief Customer Officer	*Blend* of Top Customer Service Executive and Top Community Relations Executive	*Top Customer Service Executive:* Has primary responsibility for developing and implementing the customer relations programs of the organization in order to maintain high levels of customer service and satisfaction | Oversees and directs customer service operations to ensure that customer claims, inquires and complaints are handled fairly and effectively | Establishes customer service policies and procedures, in accordance with any relevant regulations *Top Community Relations Executive:* Has primary responsibility for developing and implementing policies and programs to enhance the organization's standing in the communities where plants, offices and other facilities are located

Appendix I – Executive Benchmarks

Organizational Structure

- For reference, we have included Hydro Ottawa's current organizational structure below:

Appendix II – Methodology

Competitive Data

- Raw data percentiles are presented and are calculated as follows:
  - 25th Percentile – the point at which 25% of the sample values are lower and 75% are greater
  - 50th Percentile (median) – the point at which 50% of the sample values are lower and 50% are greater
  - 75th Percentile – the point at which 75% of the sample values are lower and 25% are greater

- The 25th, 50th and 75th percentiles of the raw data distributions are presented for the following compensation elements:

Compensation Element	Hydro Ottawa Data	Competitive Data
Salary	Salary	Salary (April 1, 2018 effective date)
Target Short-term Incentive Plan (STIP)	Target STIP	Target STIP
Target Total Cash Compensation (TTC)	Salary + Target STIP	Salary + Target STIP
Target Long-term Incentive Plan (LTIP)	--	Target LTIP
Target Total Direct Compensation (TTDC)	TTC = TTDC	TTC + Target LTIP

Appendix II – Methodology

Peer Groups – Combined Sample

- The "Combined Sample" consists of Combined Utilities, Government and Transportation Comparators

Combined Sample Peer Group (n=45)			
Company	**Revenue (CAD)**	**Company**	**Revenue (CAD)**
Air Canada	$16,252,000,000	FortisAlberta	$599,950,000
Alberta Electric System Operator	$1,995,800,000	Hydro One	$5,990,000,000
Alberta Energy Regulator	$220,000,000	Hydro-Québec	$13,468,000,000
Alberta Health Services	$14,469,968,000	*Insurance Corporation of British Columbia*	$6,181,025,000
Amp Energy	$50,000,000	NAV Canada	$1,291,000,000
ATCO	$4,541,000,000	*Newfoundland Power*	$672,435,000
British Columbia Hydro and Power Authority	$5,874,000,000	Nova Scotia Power	$1,338,000,000
Bruce Power	$2,994,000,000	*Numeris*	$81,520,000
Canada Post	$8,226,000,000	Ontario Power Generation	$5,158,000,000
Canadian National Railway	$13,041,000,000	Purolator	$1,632,000,000
Canadian Pacific Railway	$6,554,000,000	*Saskatchewan Blue Cross*	$111,048,468
Capital Power	$1,046,000,000	Saskpower	$2,586,000,000
Corix	$400,200,000	*Schneider Electric Industry*	$681,998,000
DHL Supply Chain	$792,482,000	*SGI Canada*	$738,862,000
EDF Renewable Energy	$163,000,000	Toronto Hydro Electric Systems	$3,849,700,000
Emera	$6,226,000,000	TransAlta Corporation	$2,307,000,000
Energir	$2,526,645,000	*University of Calgary*	$1,360,896,000
ENGIE Energy North America	$19,929,000	*University of Saskatchewan*	$1,062,437,000
Enmax Corporation	$2,997,000,000	*Via Rail Canada*	$371,800,000
EPCOR Utilities	$2,035,000,000	Workers' Compensation Board of Alberta	$1,745,000,000
Export Development Canada	$2,260,000,000	*Workplace Safety and Insurance Board*	$7,693,000,000
Federal Express	$1,055,210,000	*York University*	$1,093,400,000
FirstGroup America	$685,720,000		

Reflects organizations not included in the 2011 comparator group

Percentiles

25th Percentile	685,720,000
50th Percentile	1,745,000,000
75th Percentile	5,158,000,000

Hydro Ottawa	**1,132,294,000**
Percentile Rank	40P

Appendix II – Methodology

Peer Groups – Utilities Only Sample

- The "Utilities Only Sample" consists of Utilities and Related Industry Comparators

Utilies Only Peer Group (n=23)	Revenue *(CAD)*
Alberta Electric System Operator	$1,995,800,000
Amp Energy	$50,000,000
ATCO	$4,541,000,000
British Columbia Hydro and Power Authority	$5,874,000,000
Bruce Power	$2,994,000,000
Capital Power	$1,046,000,000
Corix	$400,200,000
EDF Renewable Energy	$163,000,000
Emera	$6,226,000,000
Energir	$2,526,645,000
ENGIE Energy North America	$19,929,000
Enmax Corporation	$2,997,000,000
EPCOR Utilities	$2,035,000,000
FortisAlberta	$599,950,000
Hydro One	$5,990,000,000
Hydro-Québec	$13,468,000,000
Newfoundland Power	$672,435,000
Nova Scotia Power	$1,338,000,000
Ontario Power Generation	$5,158,000,000
Saskpower	$2,586,000,000
Schneider Electric Industry	$681,998,000
Toronto Hydro Electric Systems	$3,849,700,000
TransAlta Corporation	$2,307,000,000

Reflects organizations not included in the 2011 comparator group

Percentiles

25th Percentile	$677,216,500
50th Percentile	$2,307,000,000
75th Percentile	$4,195,350,000

Hydro Ottawa	**$1,132,294,000**
Percentile Rank	35P

Appendix II – Methodology

Peer Groups – Government Only Sample

- The "Government Only Sample" consists of Government and Not-For-Profit Comparators
  - *Note*: The "Government Only Sample" increased from 8 peers in the 2011 review to 13 peers below

Government Only Peer Group (n=13)	Revenue *(CAD)*
Alberta Energy Regulator	$220,000,000
Alberta Health Services	$14,469,968,000
Export Development Canada	$2,260,000,000
Insurance Corporation of British Columbia	$6,181,025,000
NAV Canada	$1,291,000,000
Numeris	$81,520,000
Saskatchewan Blue Cross	$111,048,468
SGI Canada	$738,862,000
University of Calgary	$1,360,896,000
University of Saskatchewan	$1,062,437,000
Workers' Compensation Board of Alberta	$1,745,000,000
Workplace Safety and Insurance Board	$7,693,000,000
York University	$1,093,400,000

Reflects organizations not included in the 2011 comparator group

Percentiles

25th Percentile	$738,862,000
50th Percentile	$1,291,000,000
75th Percentile	$2,260,000,000

Hydro Ottawa	**$1,132,294,000**
Percentile Rank	44P

Appendix III – Detailed Findings by Position

[redacted]

[redacted]

Appendix III – Detailed Findings by Position

[redacted]

[redacted]

Appendix III – Detailed Findings by Position

[redacted]

[redacted]

Appendix III – Detailed Findings by Position

[redacted]

[redacted]

Appendix III – Detailed Findings by Position

[redacted]

[redacted]

Appendix III – Detailed Findings by Position

Chief Electricity Distribution Officer

Compensation Element	Hydro Ottawa Current ($000s)	2018 Competitive Data ($000s) Hydro Ottawa *as a % above/below competitive data*								
		Combined Sample			Utilities Only Sample			Government Only Sample		
		25P	50P	75P	25P	50P	75P	25P	50P	75P
Salary	$165	$205 *-20%*	$260 *-37%*	$360 *-54%*	$210 *-21%*	$295 *-44%*	$385 *-57%*	*Insufficient Data*		
Short-term Incentive Plan (STIP) *(as a % of Salary)*	30%	35%	45%	55%	35%	50%	65%			
Target Total Cash (Salary + STIP)	$215	$270 *-21%*	$375 *-43%*	$565 *-62%*	$290 *-26%*	$420 *-49%*	$635 *-66%*			
Unit Size ($Millions)	$1,132	$635	$2,995	$6,555	$40	$985	$3,385	-	-	-

WTW Benchmark Match:	**Division Head**
WTW Benchmark Description:	Has primary responsibility for the profitability and growth of a division | Sets the overall strategic direction for the division that may include a range of activities (e.g., sales, marketing, operations, staff functions)

* Competitive data are independently arrayed

Note: Chief Electricity Distribution Officer hired June 1, 2019

Appendix III – Detailed Findings by Position

[redacted]

[redacted]

INTERROGATORY RESPONSE - OEB-50

1-Staff-50

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 13/pp. 49-50 of 64

SUBJECT AREA: Electric Vehicle Initiatives

Preamble:

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.

Question(s):

a) With respect to the residential EV charging pilot project launched in 2018, please explain:
   i) Hydro Ottawa's role/responsibilities in this pilot project
   ii) Who own the charging stations

b) Please specify the impacts of Hydro Ottawa's EV initiatives on the 2021-2025 Custom IR application, regarding:
   i) 2021-2025 load forecast
   ii) 2021-2025 capital expenditures

RESPONSE:

a) (i) Hydro Ottawa's role in the electric vehicle ("EV") charging pilot project is to market the pilot project, recruit residential customer participants, provide the pilot project participant with a charging station, coordinate installation of the charger (including collection of payment for purchase and installation), and provide onsite technical support during program sign-up. Hydro Ottawa is also responsible for data monitoring and analysis.

For further details on the pilot project, Hydro Ottawa's involvement, and the early lessons learned gleaned, please see the response to interrogatory DRC-2.

(ii) The pilot project participant owns the charging station once Hydro Ottawa has received full payment for the device and associated installation costs.

b) (i) The load forecast does not include the impact of EVs as a separate variable. Any existing connected demand would be in the historical data and contributing to the Load Forecast.

(ii) Hydro Ottawa has not included specific dollars/investments for EVs in the 2021-2025 capital expenditure plan.

INTERROGATORY RESPONSE - OEB-51

1-Staff-51

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 11/page 5 of 13

SUBJECT AREA: Custom Performance Scorecard

Question(s):

a) Please provide the historical data for each of the custom performance measures for the 2016-2020 rate period and specify the quantified target for the 2021-2025 rate period.

b) For all the measures with a target of "Monitor", please explain how Hydro Ottawa plans to evaluate its performance on these measures.

c) Please identify cost effectiveness measures on OM&A included in the Custom Performance Scorecard. Please also provide the percentage that these OM&A activities constitute relative to the total OM&A budget for 2021-2025.

d) Please identify cost effectiveness measures on capital expenditures included in the Custom Performance Scorecard. Please also provide the percentage that these capital activities constitute relative to the total capital expenditures budget for 2021-2025.

e) Please clarify whether the "Average Cost per Pole – Pole Test and Inspection" measure included in the Custom Performance Scorecard is defined in the same way as the "Pole Test and Inspection" measure included in the UMS unit cost benchmarking study.

RESPONSE:

a) Table A below provides historical data, where applicable, for the 2016-2020 period for each of the measures proposed for inclusion in the 2021-2025 Custom Performance Scorecard.

Please note that explanations for the symbols that have been inserted next to certain measures in the table are provided in the responses to part (c) and part (d) of this interrogatory below.

With respect to targets for each measure for the 2021-2025 period, as discussed in Exhibit 1-1-11: Proposed Annual Reporting – 2021-2025, "[i]t 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."

In addition, please see the response to interrogatory OEB-52 part (c) for further information on Hydro Ottawa's general practice for establishing target values for performance measures tracked by the utility.

Table A – Custom Performance Scorecard Measures - Historical Data & Targets

Hydro Ottawa Custom Measures	New/ Existing	Unit	2016 Historical	2017 Historical	2018 Historical	2019 Historical	2020 Target	2021 Target
Contact Centre Satisfaction – Transactional Feedback[1]	New	%	89%	87%	78%	87%	≥85%	Maintain
Number of MyAccount Customers	New	#	158,112	167,114	184,067	202,301	>210,000	Increase
Number of Online Billing Accounts	New	#	123,801	134,761	150,991	169,514	>175,000	Increase
All Injury/Illness Frequency Rate[2]	New	%	1.60	2.01	2.31	0.63	0.82	Reduce
Lost Workday Severity Rate	New	%	18.67	15.18	7.52	0.31	3.2	Reduce
Customer Average Interruption Duration Index *(excluding loss of supply)*	Existing	Hours	1.45	1.82	2.97	1.11	N/A	Monitor
Feeders Experiencing Multiple Sustained Interruptions	Existing	#	5	13	10	10	10	Maintain
Worst Feeder Analysis – Number of Feeders with Very Poor Performance	Existing	#	N/A	N/A	5	5	N/A	Reduce
Stations Exceeding Planning Capacity	Existing	%	10	9.1	16	8.8	≤5%	≤5%
Feeders Exceeding Planning Capacity	Existing	%	1.6	2	2.9	1.6	≤10%	≤10%
Stations Approaching Rated Capacity	Existing	%	1.1	0	0	0	0%	0%
Feeders Approaching Rated Capacity	Existing	%	0	0	0.1	0.1	0%	0%
Productive Time*	Existing	%	74	73	72	72	≥ 74	Maintain
Labour Allocation*	Modified	%	35	37	35	33	≤ 34	Maintain
3-Year Average Cost per Pole – Wood Pole Replacement#	New	$	N/A	N/A	8,524[3]	7,969	N/A	Monitor
3-Year Average Cost per Meter – Underground Cable#	New	$	N/A	N/A	80[4]	90	N/A	Monitor
Average Cost per Kilometer – Vegetation Management*	New	$	2,834	3,243	3,183	2,649	N/A	Monitor
Average Cost per Pole – Pole Test and Inspection*	New	$	51	53	24	16	N/A	Monitor
Technology Infrastructure Cost per Employee*	New	$'000s	24.4	22.8	26.5	26.8	≤ 25.8	Monitor
Annual Oil Spills & Costs of Remediation	Existing	Litres; $	825 L; 665K	1120 L; 873K	1475 L; 1.76M	1131 L; 948K[5]	N/A	Reduce
Non-Hazardous Waste Diversion Rate	New	%	92.3	91.6	91.6	86.1	>95	Maintain
Percentage of Green Suppliers	New	%	27	38	55	53	>45	Maintain

[1] 2016-2019 figures pertain exclusively to customers' interactions with Hydro Ottawa by phone. As of 2020, the scope of this metric has expanded to include email and chat interactions..

[2] Targets for injury/illness frequency and severity rates are established at the beginning of each year, based on the previous three years' performance.

[3] As defined in the unit cost benchmarking study prepared for Hydro Ottawa by UMS Group, these costs are for the installation of wood poles only. "Fully dressed" components such as risers and UG cable are excluded. Please see Attachment 1-1-12(B): Hydro Ottawa Unit Costs Benchmarking Study, page 7.

[4] As defined in the unit cost benchmarking study prepared for Hydro Ottawa by UMS Group, these costs exclude civil duct banks and associated secondary services. Please see Attachment 1-1-12(B): Hydro Ottawa Unit Costs Benchmarking Study, page 7.

[5] Please note that not all spills which occurred in 2019 have been closed out and invoiced.

Hydro Ottawa Custom Measures	New/ Existing	Unit	2016 Historical	2017 Historical	2018 Historical	2019 Historical	2020 Target	2021 Target
OM&A per Customer*	New	$	251.99	247.89	259.05	244.61	267.16	Monitor
Bad Debt as a Percentage of Total Electricity Revenue*	New	%	0.13	0.20	0.13	0.16	≤ 0.12	Monitor
Cumulative Capital Additions per Investment Category#	New	$	UPDATED Exhibit 2-4-1: Capital Expenditures Summary Table 4					Monitor
Annual Capital Spending per Investment Category#	New	$	UPDATED Exhibit 2-4-1: Capital Expenditures Summary Table 5					Monitor

b) Hydro Ottawa's approach to evaluating its performance will be consistent across the various measures set forth in the Custom Performance Scorecard. Applicable divisions and groups within the utility will be responsible for tracking and reporting against the specific metrics that correspond to their areas of business operations. Depending upon the patterns of performance that are observed, these groups will be responsible for recommending and implementing corrective courses of action to ensure performance is improved to, or maintained at, desired levels. In addition, these divisions and groups will be responsible for assisting with the preparation of information that will be submitted to the OEB as part of the utility's commitments for annual reporting over the five-year term of its Custom IR rate plan.

c) The cost effectiveness measures on OM&A in the Custom Performance Scorecard above are marked with an asterisk (*). These measures are as follows: Productive Time; Labour Allocation; Average Cost per Kilometer - Vegetation Management; Average Cost per Pole - Pole Test and Inspection; Technology Infrastructure Cost per Employee; OM&A per Customer; and Bad Debt as a Percentage of Total Electricity Revenue.

OM&A per Customer covers 100% of OM&A. Excluding this measure, the six other OM&A measures referenced above account for 37% of Gross OM&A.

d) The cost effectiveness measures on Capital Expenditures in the Custom Performance Scorecard above are marked with a number sign (#). These measures are as follows: 3-Year Average Cost per Pole - Wood Pole Replacement; 3-Year Average Cost per

Meter - Underground Cable; Cumulative Capital Additions per Investment Category; and Annual Capital Spending per Investment Category.

Cumulative Capital Additions per Investment Category and Annual Capital Spending per Investment Category cover 100% of capital expenditures. Excluding these measures, the other capital measures referenced above account for 17% of total capital expenditures.[6]

e) Hydro Ottawa confirms that the performance measure entitled “Average Cost per Pole – Pole Test and Inspection” is defined in the same way as the “Pole Test and Inspection” measure included in the unit cost benchmarking study prepared by UMS. (Please see Attachment 1-1-12(B): Hydro Ottawa Unit Costs Benchmarking Study).

[6] As noted in footnotes 3 and 4 above, the precise scope of the unit costing associated with the wood pole replacement and UG cable (XLPE) replacement asset categories is specified in the benchmarking study prepared for Hydro Ottawa by UMS Group. Please see Attachment 1-1-12(B): Hydro Ottawa Unit Costs Benchmarking Study for details. However, for purposes of part (d) of this interrogatory response, the 17% figure is the percentage of total capital expenditures represented by the larger capital asset programs under which wood pole replacement and UG cable (XLPE) replacement fall – namely, Planned Pole Renewal and Underground Cable Replacement. That is to say, this 17% figure represents “fully dressed” components and costs for pole replacement and underground cable replacement.

INTERROGATORY RESPONSE - OEB-52

1-Staff-52

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 13/Attachment A

EB-2015-0004/Exhibit D/Tab 1/Schedule 4/Attachment D-1(c)

SUBJECT AREA: Corporate Productivity Scorecard

Preamble:

By comparing the Corporate Productivity Scorecard filed in the 2016-2020 Custom IR application and this Application, OEB staff notes that the following measures are excluded in this Application:

- OM&A Measures
  - Cost per Underground Locate
  - Vegetation Management Cost Value Metric
  - Customer Service Cost Value Metric
- Asset Efficiency Measures
  - Sustainment Asset Reliability Cost Value Metric
  - Cost per metre Conductors extended
  - Normalized Derecognized Assets net of Proceeds
  - Generation Plant Availability
- Profitability Metrics
  - Cost per kWh Generated

Question(s):

a) Please explain why these identified measures are excluded in the Corporate Productivity Scorecard in this Application.

b) Please provide historical data for these identified measures by year for 2014-2019.

c) Please provide Hydro Ottawa's quantified target for each of the productivity measures for the 2021-2025 rate period.

d) Please confirm that Hydro Ottawa does not propose to report the Corporate Productivity Scorecard as part of the annual reporting.

RESPONSE:

a) The Corporate Productivity Scorecard measures and targets are re-evaluated each year to ensure they continue to be relevant and are not duplicated with other performance measures. Through this annual review process, some measures are removed while new measures are introduced.

In 2015, the Corporate Productivity Scorecard measures were reduced on account of certain measures being concurrently tracked through this scorecard as well as the Corporate Performance Scorecard. Eliminated measures included Vegetation Management Cost Value, Sustainment Asset Reliability, and Customer Service Cost Value. The objective was to streamline internal reporting, as the Corporate Performance Scorecard already had several measures on SAIFI, SAIDI, and customer satisfaction.

In addition, there were some underlying data quality issues with certain measures, such as Cost per Pole. The calculation was taking total costs incurred in the period and dividing it by the number of poles replaced in the same period. This caused misalignment, as some costs were often incurred during the periods before the poles were physically replaced as numerous projects overlapped reporting periods. Secondly, although the financial costs are captured on a timely basis, the unit data often experiences a delay from the field to the geographic information system ("GIS"). As a result, the calculations were not useful due to the mismatch of costs and poles.

b) Finally, it should be noted that in its 2016-2020 rate application,[1] Hydro Ottawa inadvertently included a copy of the Corporate Productivity Scorecard for the larger corporate enterprise. Hence the inclusion of certain metrics that exclusively measure the operations and performance of other entities within the corporate enterprise (e.g. Generation Plant Availability and Cost per kWh Generated, which are applicable to the utility's renewable energy generation affiliate). These non-applicable metrics have been excluded from the scorecard for purposes of this Application.

c) These measures were reported only up to 2014. There are therefore no 2015-2019 results to provide.

At this time, Hydro Ottawa is not able to provide the requested information. Target values for the measures in the Corporate Productivity Scorecard are updated on an annual basis and are approved by the Board of Directors in Q4 of the year preceding the year in which those targets are in effect. For example, targets for 2020 were approved by the Board of Directors in November 2019. This approach helps to ensure that the annual targets for productivity measures are informed to the maximum extent possible by the previous year's performance.

d) Hydro Ottawa confirms that it is not planning to include its Corporate Productivity Scorecard as part of the annual reporting on its performance during the 2021-2025 rate period. As noted in Exhibit 1-1-11: Proposed Annual Reporting – 2021-2025, the utility's proposals for annual performance reporting to the OEB are comprised of two elements: (i) a Custom Performance Scorecard and (ii) updates on the progress of capital spending in key categories.

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

INTERROGATORY RESPONSE - OEB-53

1-Staff-53

EXHIBIT REFERENCE:

Exhibit 1/Tab 2/Schedule 2/Attachment A/pp. 364-384 of 392

SUBJECT AREA: Customer Engagement

Preamble:

Hydro Ottawa retained Innovative Research Group Inc. (Innovative) to assist its customer engagement process for this 2021-2025 Custom IR application. The draft plan presented to customers include an estimated five-year operating expenses of $529 million, which was $35 million higher than the proposed OM&A of $494 million. The draft capital plan presented to customers in the Innovative survey was $517 million, which was $13 million higher than the proposed capital expenditures of $504 million. OEB staff notes the following changes by investment categories from the draft capital plan to the proposed plan (no change in System Renewal):

- $28 million increase in General Plant from the draft plan to the proposed plan
- $5 million decrease in System Access from the draft plan to the proposed plan
- $36 million decrease in System Service from the draft plan to the proposed plan

Question(s):

a) Please explain how the proposed plans on capital and OM&A reflect customers' feedback of the draft plans in the survey.

b) Please explain on what basis Hydro Ottawa/Innovative determined that the draft plan is a baseline approach that lies between the accelerated approach and the reduced approach.

c) Please explain why three options (accelerated approach, included in draft plan, and reduced approach) were designed for investments in the overhead distribution system while four options were designed for investments in the underground distribution system (accelerated approach, enhanced approach, included in draft plan, and reduced approach) and reliability investments (accelerated approach, included in draft plan, limited approach, and reduced approach).

d) Please clarify whether Hydro Ottawa/Innovative provided customers with the budgeted capital expenditures for 2021-2025 for the following investment drivers identified under System Service:
   i) Potential increases in severe weather
   ii) Serving a growing city
   iii) Innovation: investing for the future

e) In the Innovative survey, it was estimated that the distribution portion of the bill will increase an average of 2.5%/3.5% per year for the 2021-2025 period, for the typical residential/small business customer respectively. In Hydro Ottawa's application (Exhibit 8/Tab 12/Schedule 1/page 2 of 3), the proposed distribution portion of the bill will increase by an average of 4.44%/4.45% for the typical residential/general service <50 kW customer respectively for 2021-2025. Please explain why the distribution bill impacts based on the proposed plan are higher than the impacts based on the draft plan given that the proposed plan consists of lower budgets for both OM&A and capital.

RESPONSE:

a) Utilizing the input from Phase I of the customer consultation, Hydro Ottawa planners developed a draft plan that included an estimated baseline cost. They likewise identified a number of investment areas where spending could be increased, or in some cases decreased, in order to align with customer needs and expectations.

In total, more than 19,300 residential and small business customers completed the Phase II customer engagement workbook. The results indicated that a strong majority of Hydro Ottawa customers supported either what was then included in the utility's draft plans, or an approach that would accelerate the pace of investment.

No major adjustments to the proposed capital plan were made after the Phase II customer consultation. The results from Phase II confirmed the assumptions that were used in the preparation of the Distribution System Plan.

b) The options presented as "Included in Draft Plan" were based on what Hydro Ottawa planners and engineers felt achieved the right balance between customer feedback received (as of the then-current date in the process) to limit cost impacts, while prudently investing in the distribution system. These options were included in the current plan and were subject to customer feedback. The "Included in Draft Plan" option is not intended to lie between the accelerated approach and the reduced approach, but rather to represent the most prudent level of investment based on customer feedback and expert knowledge of the distribution system.

As Phase I and Phase II customer engagement feedback indicated, system reliability and reasonable rates were high priorities for a majority of customers. As both objectives are interdependent, the proposed draft plan aimed to strike a balance between expenditures and rate impacts.

For further details on customer needs and preferences, please refer to section 2.3 - Key Takeaways of Exhibit 1-2-2: Customer Engagement on the 2021-2025 Application, and Appendices 2.0 and 3.0 of Attachment 1-2-2(A): Innovative Research Group - Customer Engagement Report on Hydro Ottawa's 2021-2025 Rate Application.

c) On June 11, 2019, Hydro Ottawa and Innovative held a stakeholder workshop with OEB Staff and intervenors. The purpose of this workshop was to present Hydro Ottawa's proposed customer engagement process, share the draft workbook, solicit stakeholder feedback, and answer any outstanding questions related to the engagement process.

Based on feedback from OEB Staff and intervenors, Hydro Ottawa did make changes to the draft customer engagement workbook. This included increasing the number of question options. It was suggested that, where possible, Hydro Ottawa provide more than three options for investment scenario questions. In response to this feedback, Hydro Ottawa increased the number of investment options from three to four for two key sections of the customer engagement workbook: *"Pacing investments in the underground distribution system*" and "*Reliability investments."*

d) In Phase II of the customer engagement process, Hydro Ottawa communicated to customers that it had developed a plan that addressed key pressures to the system, including an expanding customer base and continued population growth, the effects of severe weather events, and prudent investments in emerging technologies to enhance service offerings and/or reduce operating costs.

With regards to "serving a growing city", key initiatives proposed between 2021 and 2025 included the following: *"An average of $14 million, per year, in distribution system upgrades to increase electricity supply in growing communities."*[1]

Because of the nature of the timing of the customer engagement, customers were not provided budgeted capital expenditures for 2021-2025 for the areas of "potential increases in severe weather" or "innovation: investing for the future."

e) In order to incorporate customer feedback in the development and finalization of the 2021-2025 Business Plan, Hydro Ottawa prepared the customer engagement workbook content in early to mid-2019 (Q1/Q2). Once drafted, the workbook needed to be tested

[1] Attachment 1-2-2(A): Innovative Research Group - Customer Engagement Report on Hydro Ottawa's 2021-2025 Rate Application, page 371.

by customer focus groups and finalized in order to present it to customers in a timely manner.

At the time Hydro Ottawa needed to prepare and conduct these surveys, finalized numbers were not available in which to calculate detailed bill impacts. The rate impacts presented to customers were clearly identified as “estimates.” The 2.5% (for residential) and 3.5% to 4.5% (for commercial) were deemed to be reasonable approximations, based upon historical trends and preliminary business plan information.

INTERROGATORY RESPONSE - OEB-54

1-Staff-54

EXHIBIT REFERENCE:

Exhibit 1/Tab 1/Schedule 4/page 8

SUBJECT AREA: Past OEB Decisions

Preamble:

In Hydro Ottawa's 2019 Decision and Rate Order[1], 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.

In Hydro Ottawa's 2020 Decision and Rate Order[2], OEB approved the disposition of Group 1 accounts as of December 31 2018 on a final basis. OEB stated its expectation that Hydro Ottawa will submit details of any resolution to the ICI enrollment matter and propose an appropriate adjustment, if necessary, for the one-time adjustments for its 2017 Class A/B transition customers, the balance and rate rider associated with its Class B GA Variance Account, and any other matters that may need to be addressed.

In the current application, Hydro Ottawa stated that it is not requesting any adjustments at this time.

Question(s):

a) What is the current status of the resolution of this issue?

b) What Hydro Ottawa plans to do to address the ICI enrollment matter?

[1] EB-2018-0044
[2] EB-2019-0046

RESPONSE:

a) This file remains open. On March 3, 2020, Hydro Ottawa submitted detailed bill impact information and supporting documentation at the request of the OEB Consumer Protection and Industry Performance division.

b) Hydro Ottawa does not plan to take any further action until the OEB confirms the outcome of their review.

INTERROGATORY RESPONSE - OEB-55

1-Staff-55

EXHIBIT REFERENCE:

Exhibit 1/Tab 3/Schedule 10/page 2

SUBJECT AREA: IFRS 16

Preamble:

Hydro Ottawa adopted IFRS 16 Leases on January 1, 2019. The adoption of IFRS 16 did not result in any right-of-use assets being recognized as at January 1, 2019. However, Hydro Ottawa proposes to include the cost of any future right-of-use assets related to leases as part of rate base.

Question(s):

a) Please explain what new lease agreements Hydro Ottawa expects to enter during the period of 2021 to 2025 and identify the right-of-use assets and the balances that have been included in the rate base.

RESPONSE:

a) Hydro Ottawa did not include any right-of-use assets in rate base during the period of 2021-2025. Hydro Ottawa does not expect to enter into any right-of-use assets during the 2021-2025 period. However, should it become more advantageous for Hydro Ottawa to lease an asset, the utility may deviate from this plan during the term and would therefore propose that any future right-of-use-assets related to leases be included in rate base.

INTERROGATORY RESPONSE - OEB-56

2-Staff-1

EXHIBIT REFERENCE:

Exhibit 2/Tab 4/Schedule 1/pp. 8-13 of 13

Exhibit 2/Tab 4/Schedule 3/pp. 308-312 of 374

Exhibit 2/Tab 4/Schedule 3/pp. 329-331 of 374

SUBJECT AREA: Historical Capital Expenditures

Preamble:

For the 2016-2020 period, Hydro Ottawa is projecting capital additions to exceed the OEB-approved overall envelope by $70.4 million. Capital expenditures are set to exceed the OEB-approved budget by $89.6 million.

Question(s):

a) There is a consistent overspending in the Corrective Renewal Program during 2016-2020. Please explain what actions Hydro Ottawa has taken to ensure the actual spending is as close to the forecasted costs as possible.

b) There is a consistent overspending in the System Expansion program during 2016-2020. Please explain what actions Hydro Ottawa has taken to ensure the actual spending is as close to the forecasted costs as possible.

c) In 2018, spending in the Corrective Renewal Program was 386% above the approved budget. Hydro Ottawa noted that there were three major weather events that affected the spending in emergency replacement of overhead assets. Please provide the actual capital expenditures spent in 2018 that were caused by the three major weather events.

d) Actual spending on Buildings-Facilities is 620% higher than the OEB approved amount in 2018, and 156% higher than the actual 2017 spending on this program. Hydro Ottawa noted that the variance was due to a renovation project at the Bank Street location. The renovations were completed in 2019. Please specify the renovation cost spent on the Bank Street facility in 2018 and 2019.

e) Please explain what practices are in place, or Hydro Ottawa plans to do, for the 2021-2025 rate period, to ensure the actual capital expenditures are in line with the forecasted costs.

RESPONSE:

a) Hydro Ottawa has taken the following steps to ensure that the actual spending in the Corrective Renewal Program is as close to the forecasted costs as possible:

- Re-structured the program into two separate programs: Critical Renewal and Emergency Renewal, in order to differentiate between replacements of assets that had functionally failed and required urgent intervention, and those that had fully failed requiring emergency replacement;
- Adjusted budget for 2021-2025 to align with historical spending under this program;
- Conducted regular reviews of budget to actuals by management; and
- Engaged a consultant to develop a Climate Vulnerability and Risk Assessment, as well as a Climate Adaptation Plan, since extreme weather events have a significant impact on spending under this program. The study identified a number of risks which will be considered in the management of Hydro Ottawa's assets moving forward. For details, please see Attachment 2-4-3(I): Hydro Ottawa Climate Change Adaptation Plan.

b) Hydro Ottawa worked with stakeholders to review anticipated projects which required System Expansion over the 2016-2020 period. An example of this is the City of Ottawa's

Light Rail Transit Phase 2 project (see Exhibit 2-4-3: Distribution System Plan for details).

Additionally, Hydro Ottawa reviews historical spending which is used to forecast projects not yet known, but which are normal ongoing expenditure requirements.

c) The actual capital expenditures spent in 2018 that were triggered by the three major weather events are shown in Table A.

Table A – Capital Expenditures Caused by Major Weather Events in 2018 ($'000s)

2018 Events	Capital Expenditures
April Storm (Freezing Rain & Wind)	$943
May Storm (Heavy Wind)	$805
September Tornados	$2,336
Total	**$4,084**

d) The renovation cost spent on the Bank Street facility was $3,262,728 in 2018 and $2,085,850 in 2019.

e) Management has recently implemented a rigorous change management and capital expenditure review process. For details of this process, please see Attachment OEB-56(A): System Renewal and System Service Expenditure - Change Request Procedure.

HydroOttawa		TITLE: Procedure	
RECOMMENDED:	M. Flores	NO: GDG0017	REV: 0
APPROVED:	B. Hazlett		
REV. DATE:	2020-02-19		

System Renewal and System Service Expenditure

Change Request Procedure

REVISION SHEET

Revision	Description of Change	Date	Initial
0	Original Document		mf/bdh

TABLE OF CONTENTS

PAGE

1. Introduction

The purpose of this procedure is to describe the method used at Hydro Ottawa for assessing and managing Change Requests associated with System Renewal and System Service projects included in the Expenditure Plan.

2. References

Hydro Ottawa – POL-ED-IAS0001-01 – Asset Management Policy
Hydro Ottawa – IAP0022 – Asset Management System Risk Procedure
Hydro Ottawa – IAS0003 – Strategic Asset Management Plan
Hydro Ottawa – Risk Register – IAP0022 Schedule 1 – Asset Management System Risk Procedure

3. Scope

This document describes the procedure used for Change Requests reviews and on-going monitoring of Projects in current year. Only projects under System Renewal and System Service Investment Categories follow this procedure.

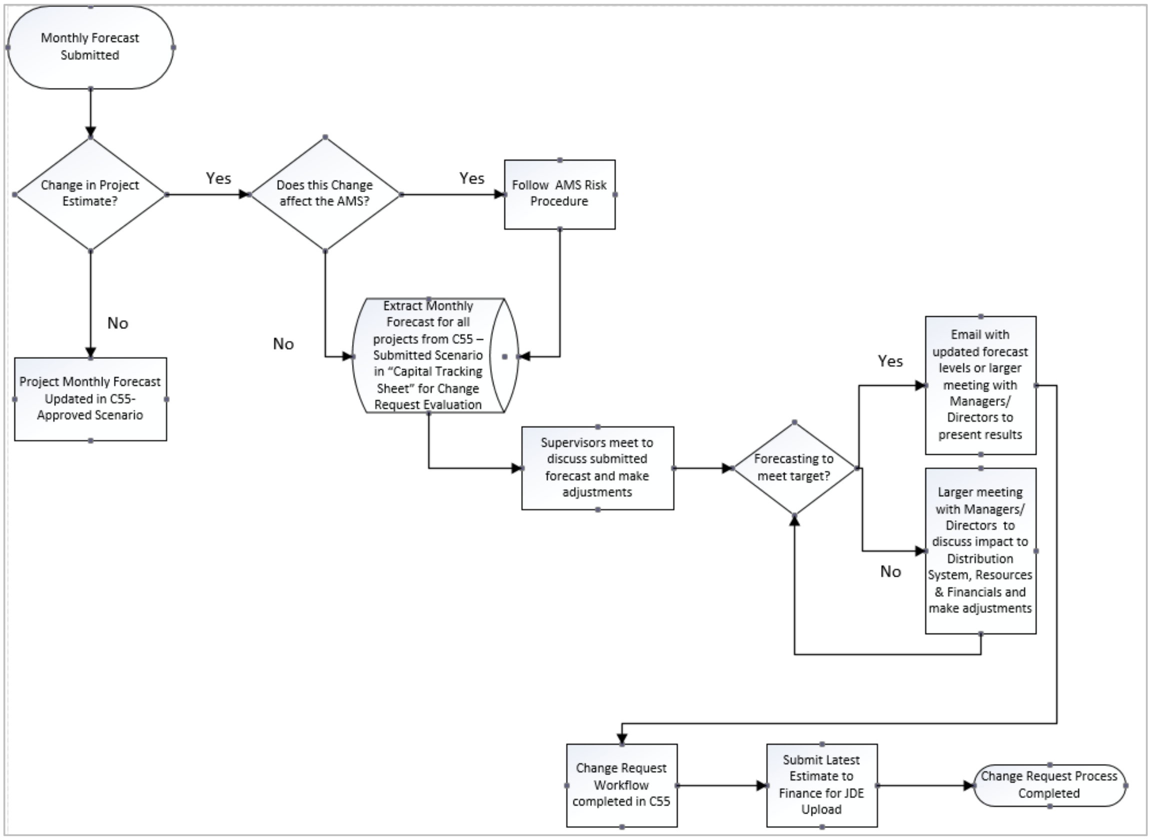
4. Definitions, Abbreviations, and Acronyms

AMS – Asset Management System
C55 – Copperleaf Asset Management Software

5. Procedure Description

The Change Request Process is shown in Figure 1 and the detailed information pertaining to the description of each step is defined in the subsequent sections.

Figure 1: Change Request Process



6. Monthly Forecast Submission

Monthly Forecast for all projects under System Renewal and System Service are submitted every third Wednesday of the month. Project Managers update monthly actuals and forecast spending for the reminder of the months. Actuals can only be updated once Finance provides the file from JDE.

Step by step instructions on updating Monthly Forecasts can be found in **Appendix A**.

Design, Major Projects, Metering and Reliability & Maintenance Supervisors review and confirm that forecast have been submitted properly in C55 by sending an email to the Supervisor of Asset Planning.

6.1. No Change in Project Estimate

Monthly forecast gets automatically added to the Approved Scenario in C55.

6.2. Change in Project Estimate

6.2.1. Change Affects AMS

Follow IAP0022 - AMS Risk Procedure.

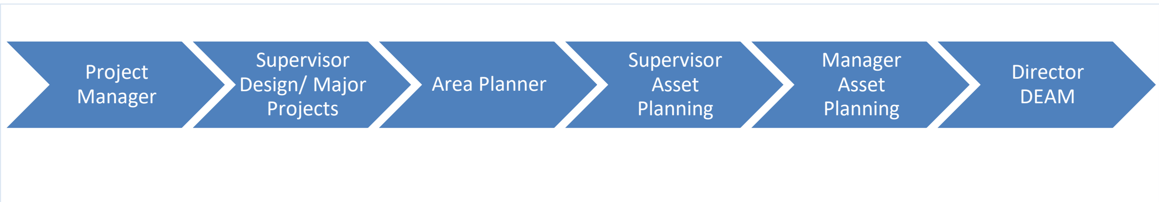
6.2.2. Change Request Thresholds for Approval

Change goes through C55 Change Request workflow. See Table 1 for Change Request approval thresholds and Figure 2 for approval workflow.

Table 1- Change Request Approval Thresholds

Change Request Amount	Approval Level
Less than $20k	Automatic Approval in C55
$20k or larger	Manager, Asset Planning
Larger than $500k	Director, DEAM

Figure 2- Change Request Approval Workflow



7. Capital Tracking Sheet Review

Once all forecasts have been submitted in C55 and reviewed by Supervisors, the Supervisor of Asset Planning updates the Capital Tracking sheet for the current year for review during the Supervisors meeting. Before meeting, all change requests should have been approved by Supervisor Distribution Design/ Major Projects and area planners.

The Capital Tracking sheet can be found at the following location:
http://hydrobuzz/content/33692

7.1. Supervisors Review Meeting

The Supervisor of Asset Planning sets up a meeting within the next two days to review the overall budget enveloped with all submitted change requests. The following people are invited to this meeting:

- Supervisor, Asset Planning
- Supervisor, Reliability and Maintenance
- Supervisor, Major Projects
- Supervisor, Distribution Design
- Supervisor, Work Scheduling
- Manager, Distribution Design
- Manager, Asset Planning
- Manager, Program and Contractor Manager

The Capital Tracking sheet with submitted change requests is reviewed and adjustments are proposed to bring the overall estimate to the target amount. Before adjustments are applied, a lead person is assigned to each proposed change to review impact of change with project manager and area planner.

7.2. Managers/Directors Review Meeting

A meeting is set up by the Supervisor of Asset Planning to inform a larger group of changes to the project list or discuss additional proposed changes and impact to further decrease the spending forecast for the current year. The following people are invited to this meeting:

- Supervisor, Asset Planning
- Supervisor, Reliability and Maintenance
- Supervisor, Major Projects
- Supervisor, Distribution Design
- Supervisor, Work Scheduling
- Manager, Distribution Design
- Manager, Asset Planning
- Manager, Program and Contractor Manager
- Manager, Stations
- Manager, Distribution Operations (South, East, Central, West & Underground)
- Director, Distribution Engineering and Asset Management
- Director, System Operations and Grid Automation
- Director, Distribution Construction and Maintenance

Once desired target has been achieved, the next step is to complete the Change Request Workflow in C55.

8. Change Request Workflow Completion

8.1. Supervisor/Manager/Director Change Request Workflow Completion in C55

Adjustments are applied by completing the change request workflow in C55 with approvals from Supervisor of Asset Planning, Manager of Asset Planning and Director of DEAM (if required).

Once this is done, the Capital Tracking Sheet is updated and information provided to Finance for JDE Upload.

8.2. Latest Estimate Submission to Finance

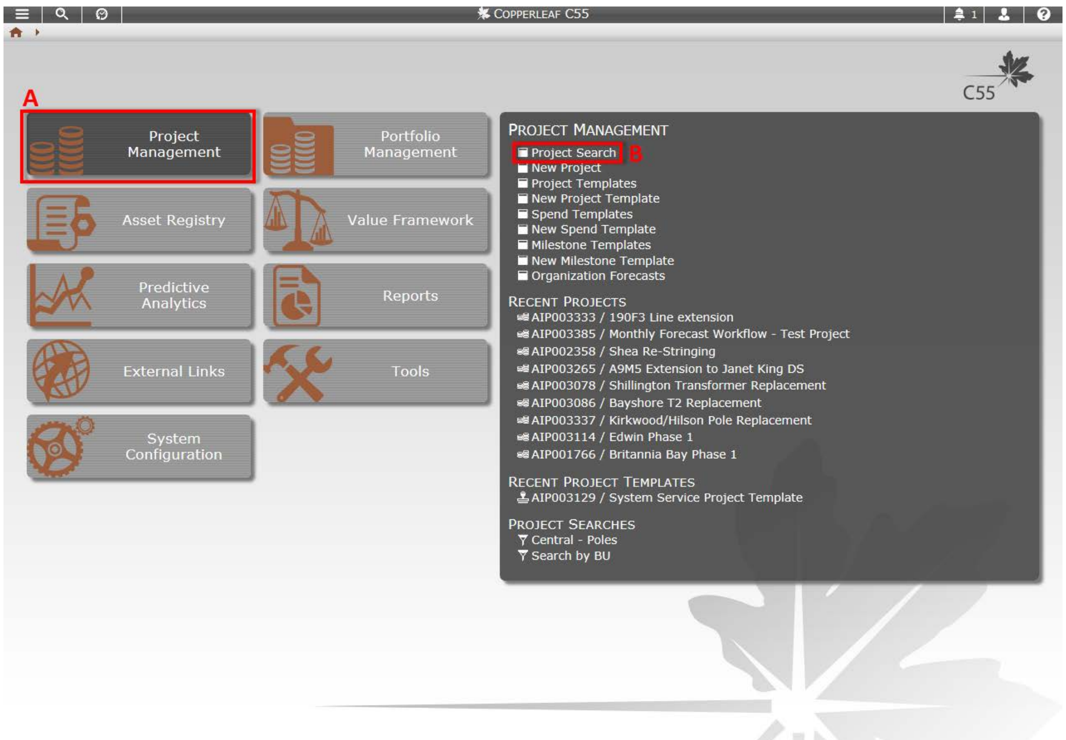
Once the Capital Tracking Sheet is updated, information is provided to Finance for JDE upload via email by the Supervisor of Asset Planning.

Appendix A – How to Submit Change Requests in C55

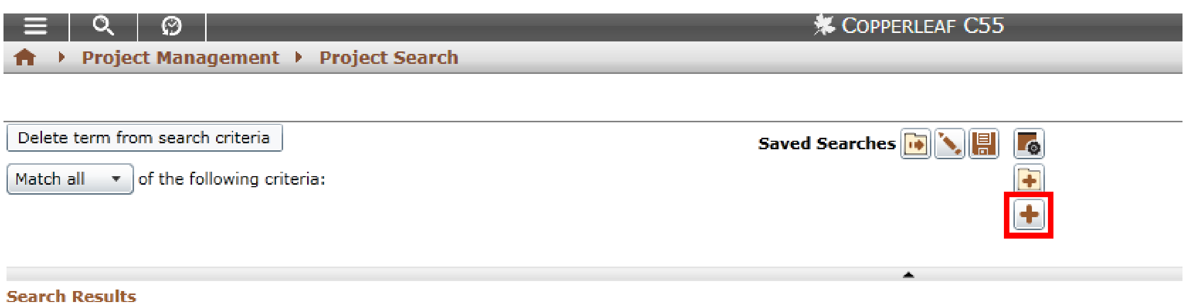
1.1 Monthly Forecasting

1.1.1 Navigating to and Formatting the Project Forecast Page

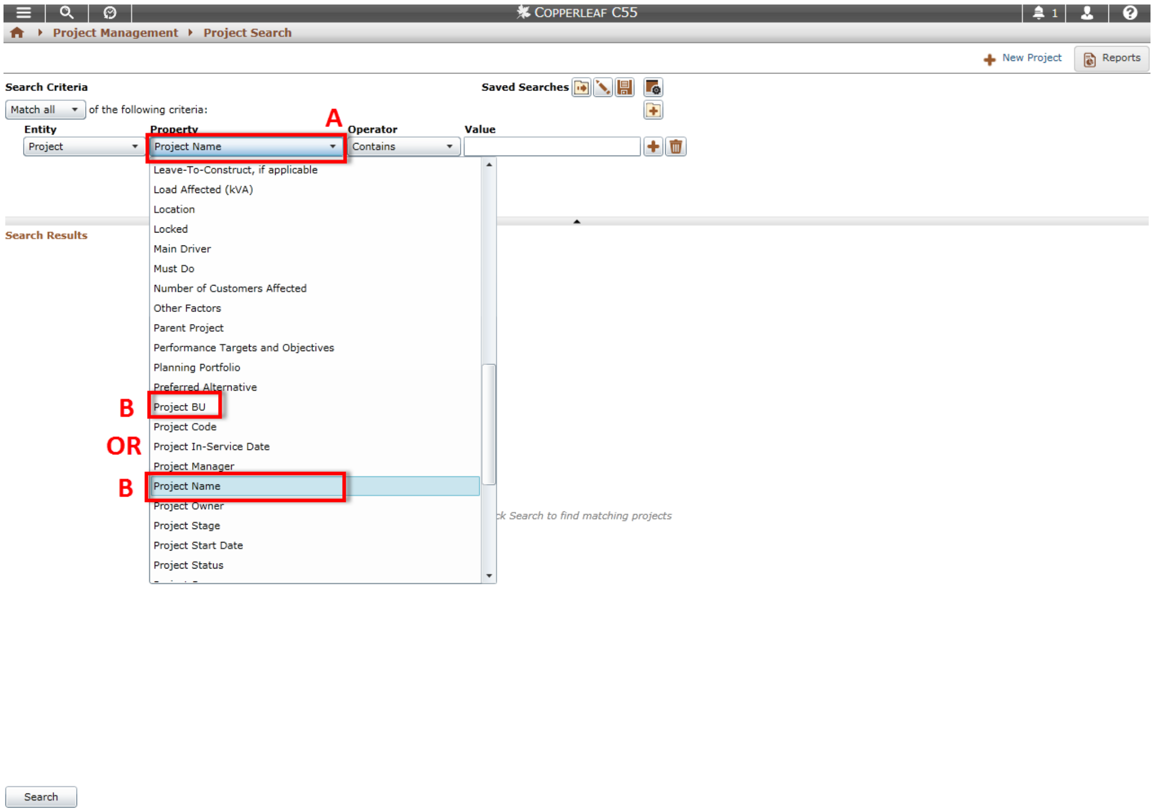
1) From the Home page, click '**Project Management**'(A), then '**Project Search**' (B).



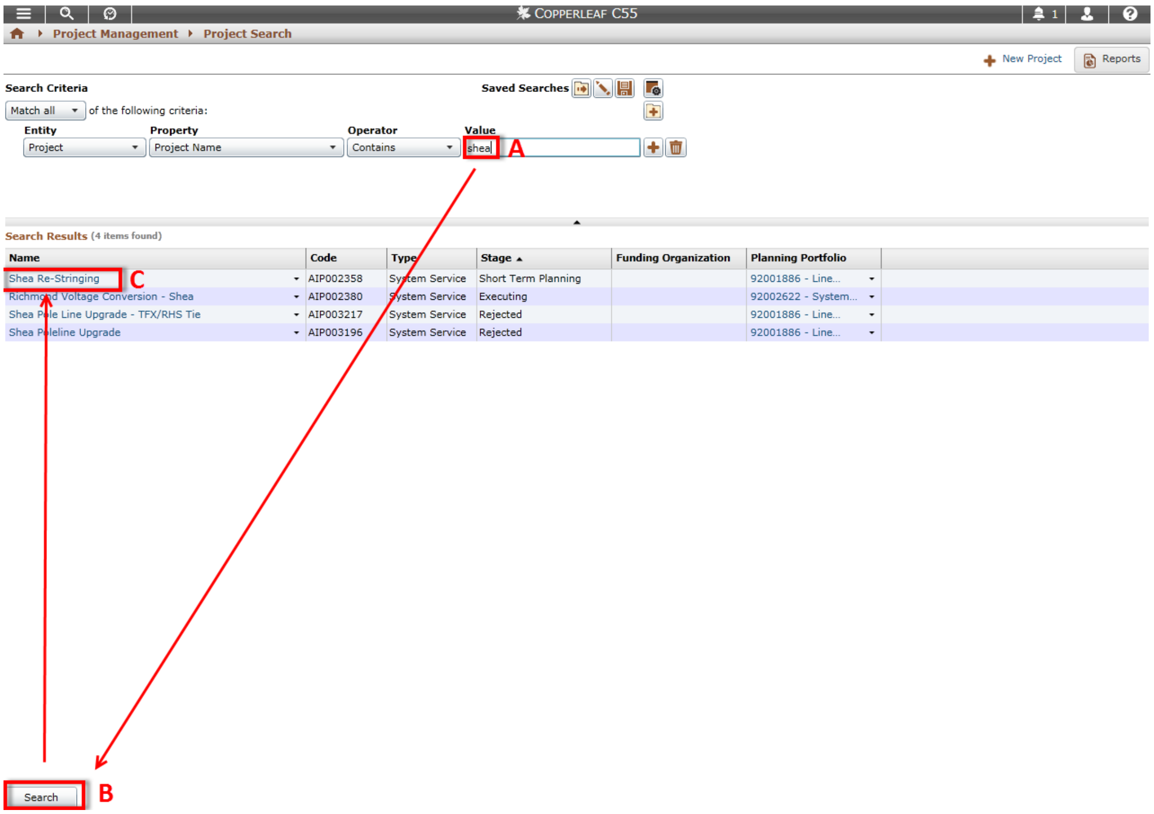
2) From the 'Project Search' query, click the '**+**' symbol to add criteria.



3) Select the preferred search **Property** (e.g. Project Name or Project BU) by clicking the 'Property' tab (A) and clicking a property in the list (B).

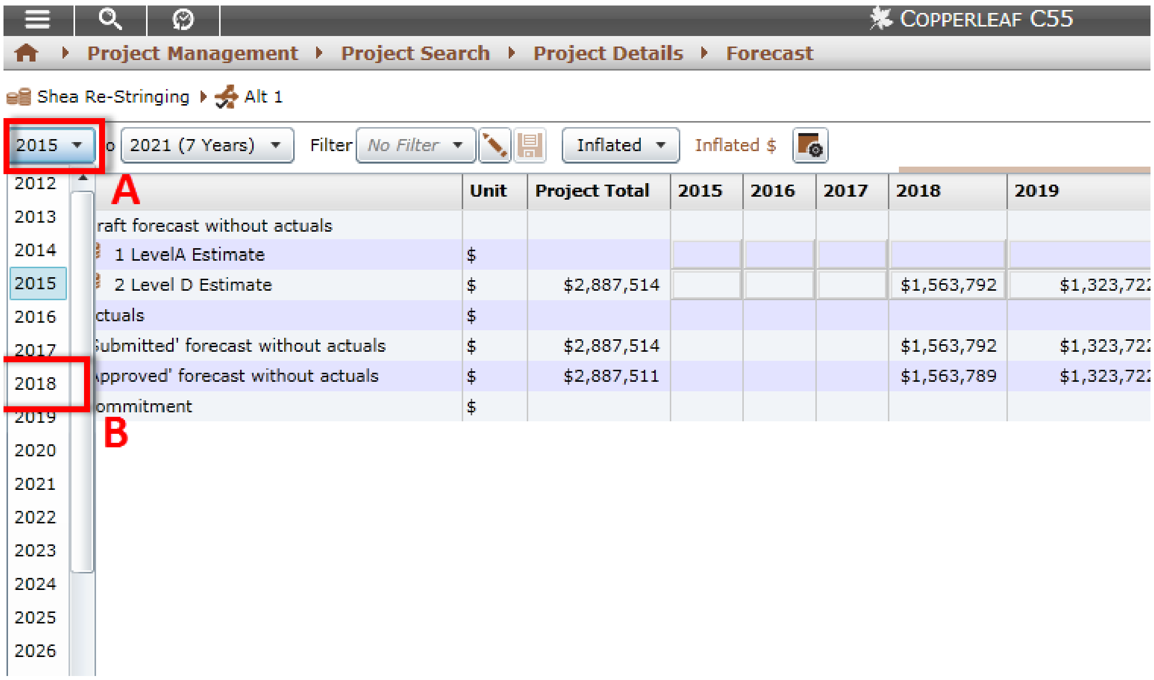


4) Enter the project name (full or partial) or BU in the **Value** section (A) and click '**Search**' (B). You may now click the applicable project (C) to arrive at the '**Project Summary**' page.

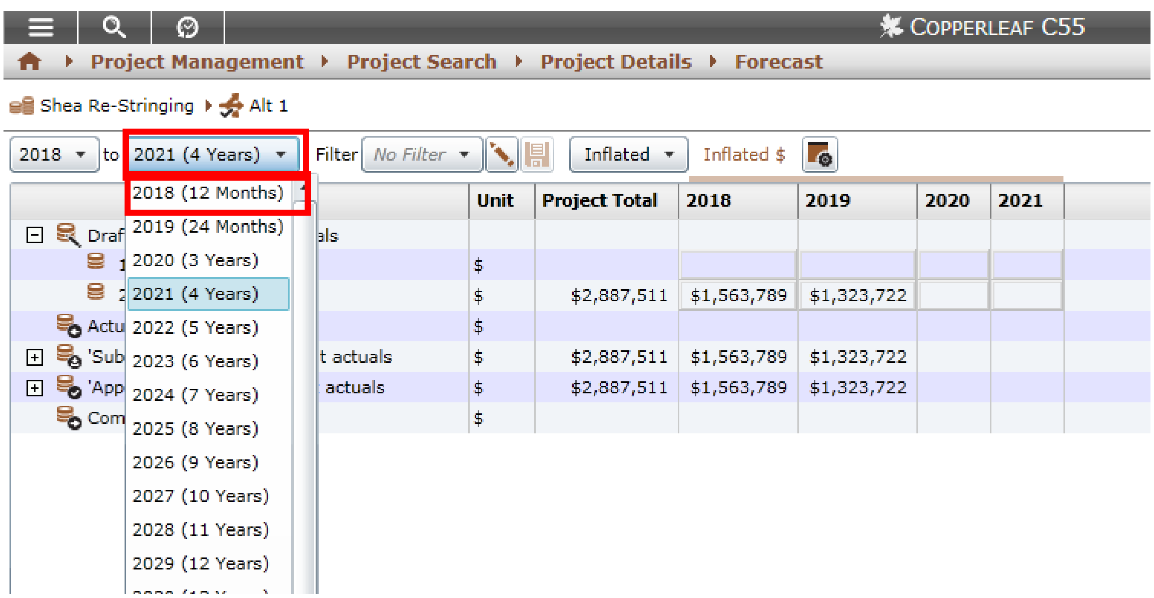


5) From the ‘Project Summary’ page, click the **arrow** (A) to the right of ‘**Project Summary’** in the menu bar, and select ‘**Forecast**’ (B).

6) You will need to adjust the date range on the 'Forecast' page to see monthly values. Click on the left-hand year value (A) and change it to the year of interest (B) (e.g. 2018).



7) Now change the right-hand value to provide a 12-month view for the year of interest, as indicated.



8) You should now see a **column for each month**. C55, by-default, divides the annual estimate by 12 to give **equal monthly estimates**. These can be changed manually by double-clicking the cells.

COPPERLEAF C55

Project Management ▸ Project Search ▸ Project Details ▸ Forecast

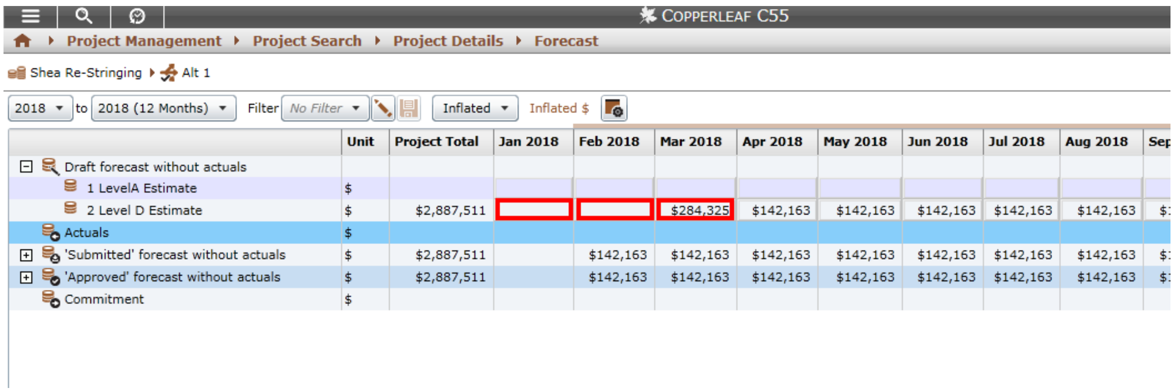
Shea Re-Stringing ▸ Alt 1

2018 to 2018 (12 Months) Filter No Filter Inflated Inflated $

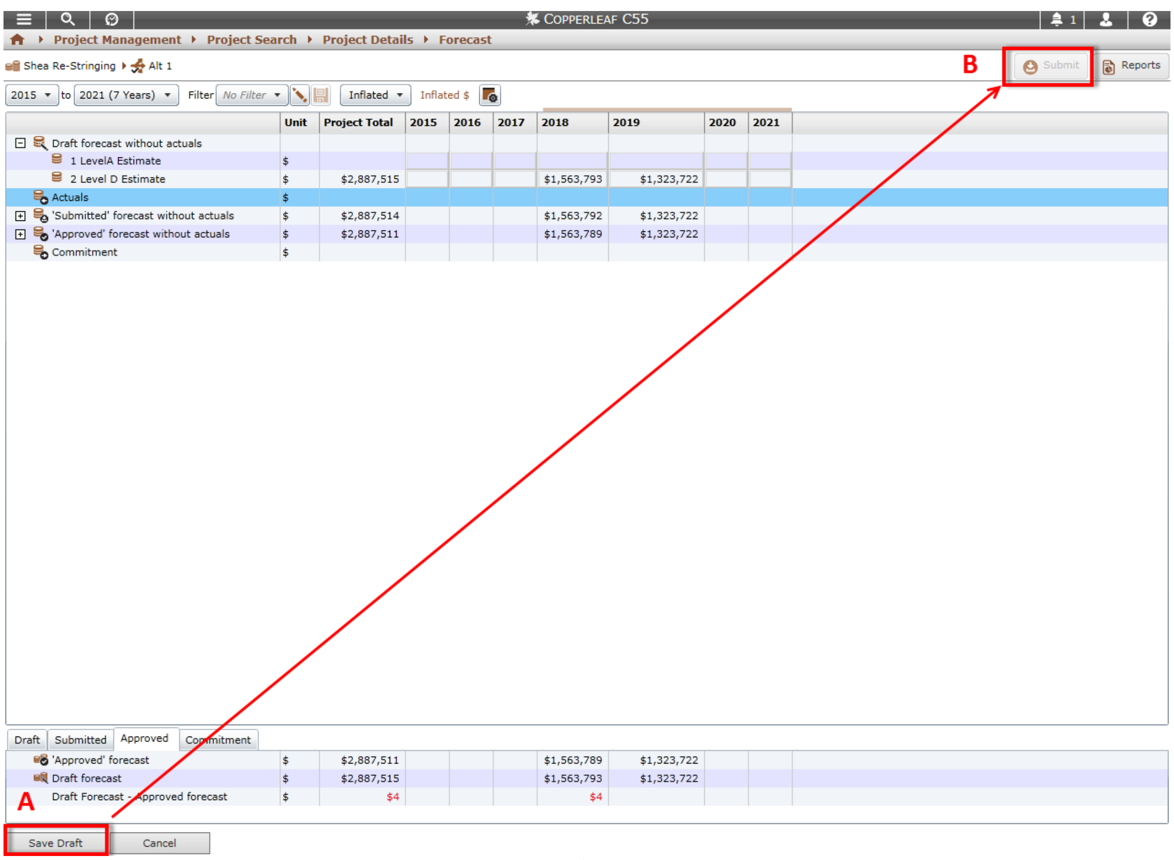
	Unit	Project Total	18	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018	Oct 2(
Draft forecast without actuals												
1 LevelA Estimate	$											
2 Level D Estimate	$	$2,887,511		$142,163	$142,163	$142,163	$142,163	$142,163	$142,163	$142,163	$142,163	$142
Actuals	$											
'Submitted' forecast without actuals	$	$2,887,511		$142,163	$142,163	$142,163	$142,163	$142,163	$142,163	$142,163	$142,163	$142
'Approved' forecast without actuals	$	$2,887,511		$142,163	$142,163	$142,163	$142,163	$142,163	$142,163	$142,163	$142,163	$142
Commitment	$											

1.1.2 Entering Initial Monthly Forecasts (One-time Event)

1) Late in the preceding year, based on preliminary dates from scheduling and material procurement milestones, you will enter the initial monthly forecasts, adding up to the overall project estimate for that year. In the example below, there is no forecast spend in January or February, with larger expenditures scheduled in March.



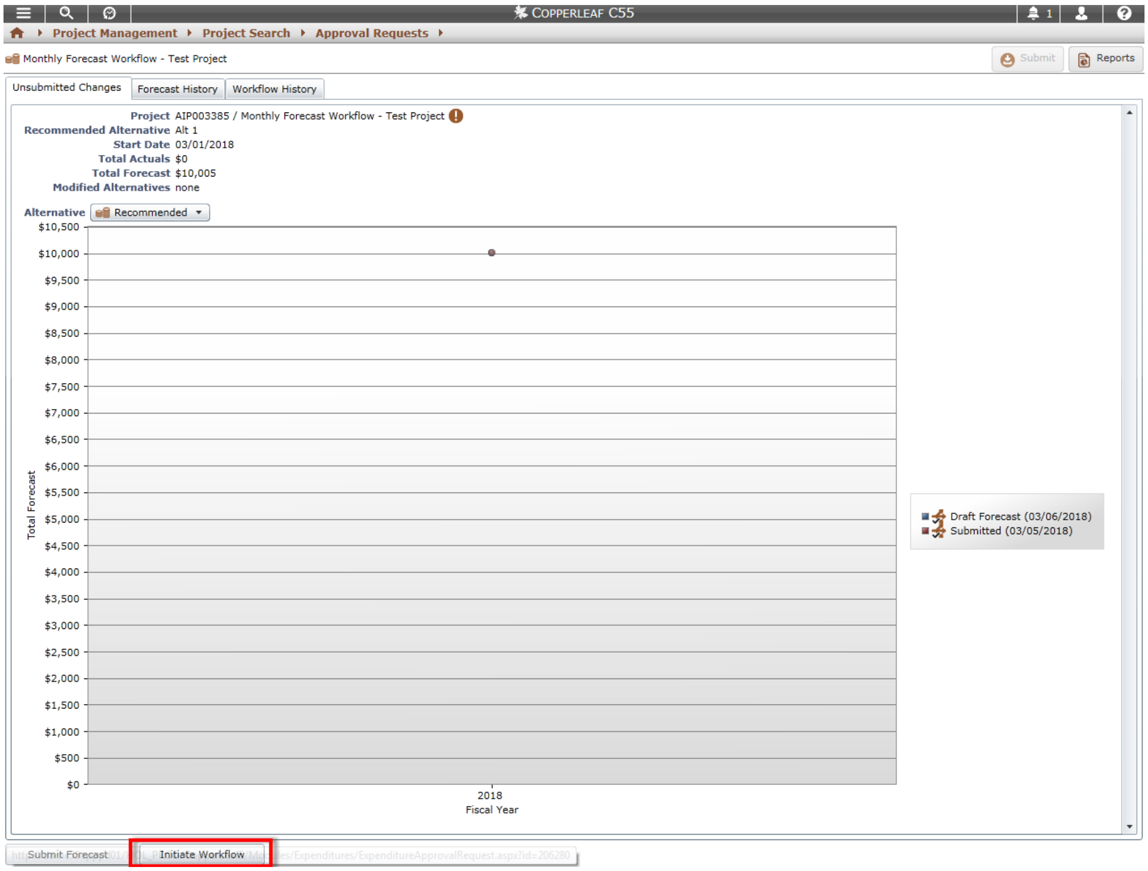
2) When you have completed the forecast estimate for each month, click 'Save Draft' (A) and 'Submit' (B) to save the monthly forecasts.



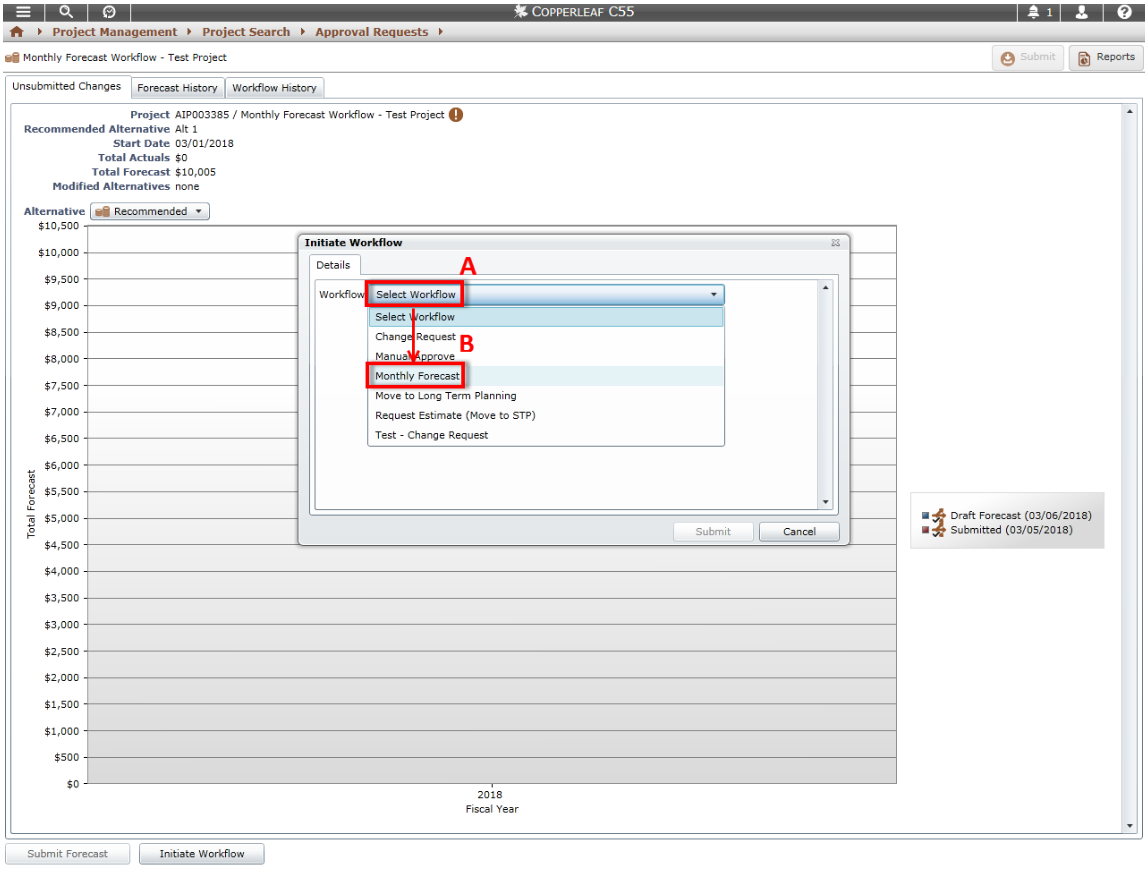
3) If the project forecast has changed by **less than $10,000**, please use the new Monthly Forecast Workflow as shown below in section 1.1.3. If the forecast has changed by more than $10,000, please use the Change Request Workflow as shown in section 1.2.

1.1.3 Monthly Forecasting Workflow

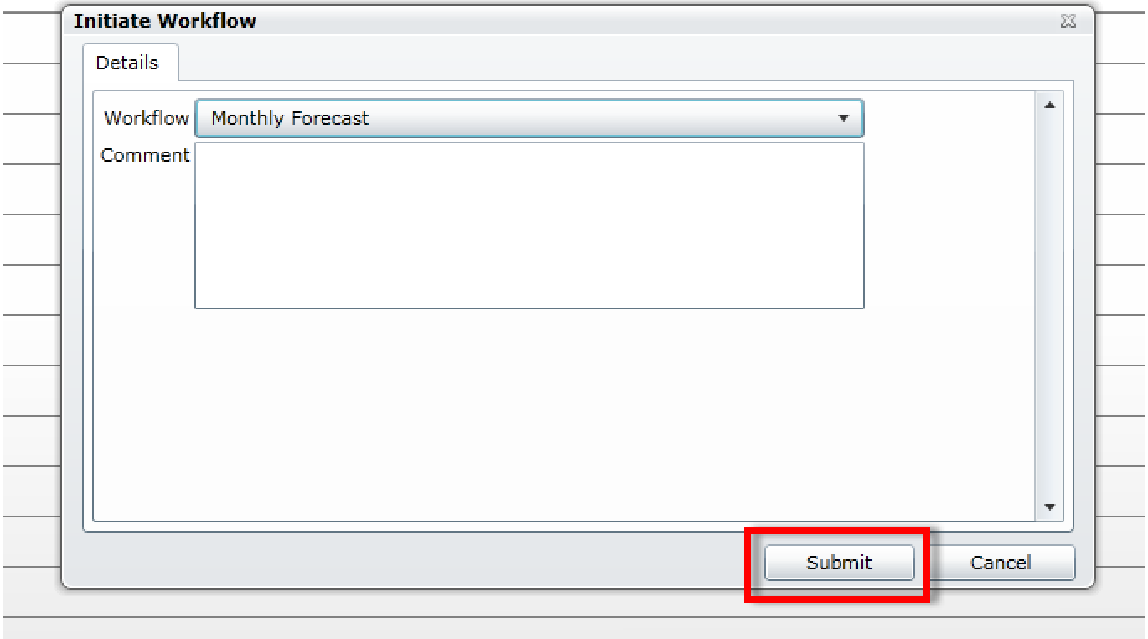
1) After submitting the updated forecast, from the '**Approval Requests**' page, click '**Initiate Workflow**'.



2) Now click on the drop-down list ‘**Select Workflow**’ (A) and click on ‘**Monthly Forecast**’ (B).



3) You should now see a comment box and a 'Submit' button. You do not need to select a supervisor. If there have been any large changes in the forecast, such as delays or moving funds to the end of the year, that you believe could impact the budget, please provide a brief description in the comment box. Otherwise, no comment is required and you can proceed by clicking 'Submit'.



4) You should immediately receive an email notification once you have submitted the workflow. Please review the notification to ensure the workflow was accepted. If the notification indicates a 'Failure' (see the example below) the project forecast has changed by more than $20,000, and a Change Request Workflow needs to be completed.

Workflow Task:	Notify Initiator - Workflow Rejected
Workflow Task Description:	Notify Initiator - Workflow Rejected
Project/Portfolio:	Project: AIP003385 / Monthly Forecast Workflow - Test Project
Workflow Name:	Monthly Forecast
Workflow Description:	Redistribution of estimate, budget change <$10K
Workflow Initiator:	Ritchie, Scott (scottr)

Workflow Details:

03/05/2018 04:13:37 PM		Failure	Forecast Within Tolerance of Funds Release: The 'Submitted' scenario forecast total of $10,005 differs from previous approved fund release of $0 by more than the specified tolerance of $10,000.

INTERROGATORY RESPONSE - OEB-57

2-Staff-2

EXHIBIT REFERENCE:

Exhibit 2/Tab 4/Schedule 3/Attachment G

SUBJECT AREA: Historical Capital Expenditures

Preamble:

Hydro Ottawa provided its Strategic Asset Management Plan (SAMP).

Question(s):

a) With respect to the Asset Condition Assessments and the health index scores, please explain the basis of using a 2% probability of failure to determine the expected operating life of overhead and underground distribution assets and a 1.5% probability of failure for station assets.

b) It was noted that three documents were work in progress when the SAMP was prepared: Feeder Performance Analysis, Project Evaluation Procedure, and Project Prioritization Procedure. For each of these three documents:
   i) Please explain the scope/purpose of each document.
   ii) Please provide the timeline of developing each document.

RESPONSE:

a) The basis of using a 1.5% probability of failure to determine the expected operating life of station assets versus a 2% probability of failure for overhead and underground distribution assets is to illustrate the increased risk due to potential failures of an aging demographic. Hydro Ottawa does not use expected operating life for investment planning; rather, probability of failure curves are used to forecast failure rates and to plan investment scenarios in order to minimize the risk caused by failures. Asset condition assessment and the health index scores are used to prioritize projects within those investment scenarios.

b) The Feeder Performance Analysis, GRG0002 R0, document was approved January 2, 2020. The document provides a guideline for Hydro Ottawa to evaluate the condition and prioritization of feeder performance in order to determine investment needs.

The Project Evaluation Procedure, GDG0016 R0, document was approved February 20, 2020. The purpose of the document is to record the process of how Hydro Ottawa evaluates projects and alternatives to ensure delivery of the utility's Asset Management Objectives. The document outlines the following Hydro Ottawa Capital Expenditure process phases: Project Concept Definition, Evaluation, and Review.

The Project Prioritization Procedure, GDG0015 R0, was approved February 20, 2020. The purpose of the document is to record the process of how Hydro Ottawa prioritizes projects included in the Capital Expenditure Process, as described in section 5 of Exhibit 2-4-3: Distribution System Plan, to ensure delivery of Asset Management Objectives.

INTERROGATORY RESPONSE - OEB-58

2-Staff-3

EXHIBIT REFERENCE:

Exhibit 2/Tab 4/Schedule 3/Attachment J

SUBJECT AREA: Historical Capital Expenditures

Preamble:

EA Technology provided Hydro Ottawa with a gap analysis assessment for its Asset Management System (AMS) against the requirements of ISO 55000.

Question(s):

a) Please confirm Hydro Ottawa intends to obtain ISO 55000 certification.

b) Please explain the minimum requirements (i.e. what is the minimum maturity score required for each clause?) of obtaining ISO 55000 certification.

c) Please specify when the first gap analysis assessment was done and who conducted the first assessment.

d) Please provide the maturity scores for the 27 clauses concluded in the first assessment.

e) Please confirm Hydro Ottawa has an internal audit group to conduct audits of its AMS.

f) If yes to part e), please clarify whether Hydro Ottawa has conducted internal audit(s) of its AMS.
    i) If yes, please provide the audit report(s).

ii) If no, please explain when Hydro Ottawa plans to conduct its first internal audit and how often it plans to do that.

g) For each of the recommendations identified in section 6 of the report, please specify:

i) Whether Hydro Ottawa plans to implement the recommendation.

ii) If yes to part i), please specify the action plan of implementing each recommendation.

iii) If yes to part i), please specify when Hydro Ottawa plans to start and complete the implementation of each recommendation.

RESPONSE:

a) Hydro Ottawa intends to obtain ISO 55000 certification and has begun the audit process.

b) Hydro Ottawa is required to undergo a formal assessment by an accredited certification body. The assessment occurs in two stages. The first stage is to determine if all required processes and documents required by the standard are in place and are familiar to all relevant parties within Hydro Ottawa. The second stage is to determine if policies, objectives, programmes, and procedures demonstrated in the first stage are effectively put into practice. Overall, Hydro Ottawa is required to demonstrate compliance with all causes, with some minor non-compliances being allowed, ensuring that Hydro Ottawa demonstrates plans to the assessors that they will achieve compliance within reasonable timeframes.

c) The first gap analysis assessment was conducted by The Woodhouse Partnership Limited (“TWPL”) and carried out between September and November 2016.

d) The following table shows the maturity scores provided by TWPL in its final report. All scores are based out of a value of 4, with 4 being the highest. Hydro Ottawa’s overall average score was 1.6 at the time of the audit.

Table A – Maturity Scores Provided in the TWPL Report

No	Clause	TWPL Score
4.1	Understanding the organization and its context	2.33
4.2	Understanding the needs and expectations of stakeholders	1.89
4.3	Determining the scope of the Asset Management system	1.33
4.4	Asset Management system	1.83
5.1	Leadership and commitment	1.33
5.2	Policy	0.67
5.3	Organizational roles, responsibilities and authorities	1.33
6.1	Actions to address risks and opportunities for the Asset Management system	1.67
6.2.1.	Asset Management objectives	2.00
6.2.2.	Planning to achieve Asset Management objectives	1.33
7.1	Resources	1.67
7.2	Competence	1.67
7.3	Awareness	1.33
7.4	Communication	1.33
7.5	Information requirements	1.67
7.6.1	Documented information general	1.67
7.6.2	Creating and updating documented information	2.33
7.6.3	Control of documented information	1.67
8.1	Operational planning and control	1.67
8.2	Management of change	1.33
8.3	Outsourcing	2.00
9.1	Monitoring, measurement, analysis and evaluation	1.83
9.2	Internal audit	1.33
9.3	Management review	1.00
10.1	Nonconformity and corrective action	1.44
10.2	Preventive action	2.33
10.3	Continual improvement	1.67

e) Hydro Ottawa has an internal audit group; however, this group does not have the required qualifications or experience to conduct an ISO 55001 audit. As per Hydro Ottawa's Audit Plan IAP0024, the Lead Auditor is required to be ISO 55001 certified or have suitable experience and qualifications deemed acceptable by the Asset Management Council. PwC was employed to conduct the 2019 audit.

f) Hydro Ottawa conducted an internal audit of the AMS in August and October 2019. The final audit report is attached as Attachment OEB-58(A): Hydro Ottawa ISO 55001 Internal Audit Report. Hydro Ottawa will conduct internal audits on a yearly basis.

g) All recommendations were adopted and implemented by Hydro Ottawa with a completion date of February 2020. Table B below shows the specific action plan implemented by Hydro Ottawa.

Table B – Hydro Ottawa Action Plan

No.	Recommendation
R4.3a	It is recommended that HOL should document in the SAMP document which Assets are explicitly excluded from the AMS.
	Hydro Ottawa updated the SAMP document IAS0003 Section 4.2 to explicitly state which assets are excluded from the AMS.
	Implemented: January 14th, 2020
R4.3b	It is recommended that HOL should make reference to HOL's current management systems (ISO9001, ISO14001) in the AMS Manual.
	Hydro Ottawa updated the AMS Manual IAS0002 Sections 2 and 3 to reference HOL's current management systems.
	Implemented: December 13th, 2020
R5.2	It is recommended that the Asset Management Policy is included in the contractor on-boarding process and maybe the Contractor intranet.
	Hydro Ottawa now includes the Asset Management Policy in the contractor on-boarding process.
	Implemented: October 15th, 2019
R5.3	It is recommended that HOL ensure that the responsibilities documented in the SAMP and AMS Manual documents are reflected in personal job descriptions.
	Hydro Ottawa has added the responsibilities documented in the SAMP and Manual in personal job descriptions of relevant personnel.
	Implemented: November 2019
R7.3	It is recommended that Hydro Ottawa continue to make their staff as aware as possible regarding the AMS, as the awareness process conducted during the audit was minimal compared to a certification audit.

No.	Recommendation
	Hydro Ottawa has undergone an awareness campaign with all relevant stakeholders within the organization and is continuing to hold small engagements to reinforce the Asset Management System. Formal training for the Asset Management System in development.
	Implemented: Ongoing – Start Date November 18th, 2020
R7.4	It is recommended that HOL document major known communication tasks in the AMS or SAMP document.
	Hydro Ottawa has included references to its Asset Management System Communication Plan IAP0021 within the SAMP.
	Implemented: January 14th, 2020
R7.5	It is recommended that HOL create a KPI(s) that provides a level of confidence in their asset information.
	Hydro Ottawa has created KPIs documented in IAP0022 Asset Management System Continual Improvement Plan to provide a level of confidence in its asset information. These are discussed on a quarterly and annual basis.
	Implemented: January 14th, 2019
R8.1	It is recommended that HOL should link their operational planning and control processes to HOL's risk register.
	Hydro Ottawa has created three documents GDG0015 Project Prioritization Procedure, GDG0016 Project Evaluation Procedure, and GDG0017 System Renewal and System Service Expenditure to link operational planning and control processes to the risk register.
	Implemented: February 20th, 2020
R8.2a	It is recommended that HOL should document how it will consider and manage changes to its AMS.
	Hydro Ottawa has created a Corrective Action Request to manage changes to its AMS that requires sign off from the Asset Owner.
	Implemented: January 7th, 2020
R8.2b	It is recommended that HOL should consider how Management of Change requests are monitored and recorded.
	Hydro Ottawa has various Management of Change request processes, including GDG0010 Schedule C10 that captures changes regarding Project Variance, Technical Deviation, Standard Terms & Conditions, and Model agreements, amendments or early termination. These existing processes are referenced in IAP0022.
	Implemented: January 28th, 2020
R8.2c	It is recommended that HOL should link any significant risks identified from a management of change process to HOL's risk register
	Hydro Ottawa has added wording in the AMS Risk procedure IAP0022 to link risk identified from non AMS management of change processes to HOL's risk register.
	Implemented: January 28th, 2020
R8.2d	It is recommended that HOL create a process that identifies the requisite parts of a management of change request (see diagram above).
	Hydro Ottawa has added wording in the AMS Risk procedure IAP0022 to link risk identified from non AMS management of change processes to HOL's risk register.

No.	Recommendation
	Implemented: January 28th, 2020
R8.3a	It is recommended that HOL ensure that all outsourced contractors are aware of HOL's Asset Management Policy.
	Hydro Ottawa includes the Asset Management Policy and an introduction to the Asset Management System slideshow when onboarding.
	Implemented: October 15th, 2019
R8.3b	It is recommended that HOL provide all outsourced contractors with Asset Management Awareness training, possibly through the on-boarding process
	Hydro Ottawa includes the Asset Management Policy and an introduction to the Asset Management System slideshow when onboarding.
	Implemented: October 15th, 2019
R9.2	It is recommended that HOL's internal audit team carry out an internal audit upon HOL's AMS.
	Hydro Ottawa's Asset Management System underwent an internal audit in August and October of 2019.
	Implemented: August 29th, 2020 & October 1-3rd 2020.
R9.3a	It is recommended that HOL carry out a management review of the AMS separately to the AMC quarterly meetings.
	Hydro Ottawa carried out an Management Review meeting August 12th, 2019.
	Implemented: August 12th, 2019
R9.3b	It is recommended that HOL determine and document the minimum content of the management review process.
	Hydro Ottawa documents the minimum content of the management review process in the AMS Manual IAS0002.
	Implemented: December 10th, 2018

ISO 55001:2014 Asset Management System

Internal Audit Report

October 2019

HydroOttawa

Contents

HydroOttawa

Audit Objectives & Scope

Audit Objectives

The objectives of the work scope are as follows:

Internal Audit of the Asset Management System in accordance with the Hydro Ottawa Asset Management System Audit Plan (IAP0024) document and with ISO 19011:2018 Guidelines for auditing management systems to provide analysis of:

- Asset Management System conformance to planned arrangements, as stated in Hydro Ottawa policies and procedural documents;
- Asset Management System conformance to the requirements of ISO 55001:2014; and,
- Steps remaining for full implementation of the Asset Management System to ISO 55001:2014 self-declaration.

Internal Audit Team & Key Findings

Internal Audit Team

Lead Auditor - Lucien Cattrysse

Auditor - AJ van Lieshout

Duration

August 29, 2019 - Document Review

October 1 - 3, 2019 - On-site Audit

Key Findings

Results of the internal audit identified four (4) non conformances and two (2) opportunities for improvement, as well as examples of good management practices.

It was found that Hydro Ottawa's AMS is nearing full implementation, but requires more run-time on new support processes, including fulfillment of the full corrective action cycle on identified nonconformities.

Initial system strengths found include the use of current processes demonstrating that the AMS is embedded within the business, the intrinsic recognition of the value of an ISO-based Asset Management System to demonstrate proactive stewardship over assets in balance with other operational risk areas (Cybersecurity, EH&S, Business Continuity), as well as demonstrated management commitment for implementation.

Asset Management System Findings Summary

AMS Elements	Conformance	NC#	OFI#
4.1 Understanding of the organization and its context	✓		
4.2 Understanding the Needs and Expectations of Interested Parties	✓		
4.3 Determining the Scope of the Asset Management System	✓		
4.4. Asset Management System	✓		
5.1 Leadership and Commitment	✓		
5.2 Policy	✓		OFI-01
5.3 Organizational Roles, Responsibilities, and Authorities	✓		

Asset Management System Findings Summary

AMS Elements	Conformance	NC#	OFI#
6.1 Actions to Address Risks and Opportunities for the Asset Management System	✓		
6.2 Asset Management Objectives and Plans to Achieve Them	✓		
7.1 Resources	✓		
7.2 Competence	✓		
7.3 Awareness		NC-01	OFI-01
7.4 Communication	✓		
7.5 Information Requirements	✓		
7.6 Documented Information		NC-02	

Asset Management System Findings Summary

AMS Elements	Conformance	NC#	OFI#
8.1 Operational Planning and Control	✓		
8.2 Management of Change	✓		OFI-02
8.3 Outsourcing	✓		
9.1 Monitoring, Measurement, Analysis, and Evaluation	✓		
9.2 Internal Audit		NC-03	
9.3 Management Review	✓		
10.1 Nonconformity and Corrective Action		NC-04	
10.2 Preventative Action	✓		
10.3 Continual Improvement	✓		

Detailed Findings

4.0 Context of the Organization

Process	ISO 55001:2014 Element	Evidence Reviewed
Understanding of the Organization and its Context	4.1	Strategic Asset Management Plan (SAMP) 2013 Corporate Social Responsibility Report Strategic Direction 2016-2020 11-Sep-19 Stantec Distribution System Climate Risk and Vulnerability Assessment 2016 Distribution System Plan Asset Management System Risk Procedure & corresponding Risk Register
Understanding the Needs and Expectations of Interested Parties	4.2	
Determining the Scope of the Asset Management System	4.3	
Asset Management System	4.4	
Organizational context documentation was reviewed on August 29, 2019.		

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5.0 Leadership

Process	ISO 55001:2014 Element	Evidence Reviewed
Leadership and Commitment	5.1	Strategic Asset Management Plan Action Items Registry
Policy	5.2	Asset Management Policy Asset Management System Manual
Organizational Roles, Responsibilities, and Authorities	5.3	Organization Chart Strategic Asset Management Plan
Leadership policies and procedures were reviewed on August 29, 2019.		

6.0 Planning

<table>
<tr><th>Process</th><th>ISO 55001:2014 Element</th><th>Evidence Reviewed</th></tr>
<tr><td>Actions to Address Risks and Opportunities for the Asset Management System</td><td>6.1</td><td rowspan="2">Asset Management System Risk Procedure
Risk Register
Action Items Registry
Asset Management System Continual Improvement Plan
KPI Dashboard
Capital Program Tracking Sheet</td></tr>
<tr><td>Asset Management Objectives and Plans to Achieve Them</td><td>6.2</td></tr>
<tr><td colspan="3">Planning activities and documentation were reviewed on October 1, 2019.</td></tr>
</table>

7.0 Support

Process	ISO 55001:2014 Element	Evidence Reviewed
Resources	7.1	Strategic Direction 2016-2020 Strategic Asset Management Plan Asset Management System Manual
Competence	7.2	KPI Dashboard
Awareness	7.3	Site visit Posters Employee Email Example Asset Management System Communication Plan
Communication	7.4	
Information Requirements	7.5	Control and Retention of Technical Based Documents and Standard Work Methods
Documented Information	7.6	Technical “Text Based” Document Format Standard
Support procedures were reviewed on August 29, 2019 and October 2, 2019.		

8.0 Operation

Process	ISO 55001:2014 Element	Evidence Reviewed
Operational Planning and Control	8.1	Asset Management Council Management Review Session *(presentation)* Asset Management Council Meeting Minutes *(sample from July 2019)* Management Review Summary Report *(from August 2019 meeting)*
Management of Change	8.2	Change Management Example
Outsourcing	8.3	Hydro Ottawa - Asset Management and Alignment to ISO 55000 *(presentation)* Procurement Policy Technical Specification Example *(GMS0054)* Vendor Statement for RFx Megger Sole Source Example
Planning was reviewed through documentation review on August 29, 2019. Change control and outsourcing aspects of the system were reviewed on October 2, 2019.		

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9.0 Performance Evaluation

Process	ISO 55001:2014 Element	Evidence Reviewed
Monitoring, Measurement, Analysis, and Evaluation	9.1	Asset Management System Continual Improvement Plan SAMP
Internal Audit	9.2	Asset Management System Audit Plan
Management Review	9.3	Asset Management Council Documentation Risk Register
AMS performance evaluation was reviewed throughout the audit, as it is embedded in other processes, but in- and out-of-scope for the system.		

10.0 Improvement

Process	ISO 55001:2014 Element	Evidence Reviewed
Nonconformity and Corrective Action	10.1	Corrective Action Request Template Asset Management Plan Example
Preventive Action	10.2	
Continual Improvement	10.3	
Corrective and preventive actions, and continual improvement were reviewed throughout the audit, as these activities are embedded in other AMS processes.		

Nonconformities

NC-01

ISO 55001:2014 @ 7.3 Awareness

Related ISO Clause

7.3 Awareness

Persons doing work under the organization's control, who can have an impact on the achievement of the asset management objectives are aware of:

- the asset management policy;
- their contribution to the effectiveness of the asset management system, including the benefits of improved asset management performance;
- their work activities, the associated risks and opportunities, and how they relate to each other; and
- the implication of not conforming to the asset management system requirements.

Description

At the time of the audit, field staff were not aware of the asset management policy, nor of the system in general.

NC-02

ISO 55001:2014 @ 7.6.1 Documented Information: General

Related ISO Clause

7.6 Documented Information

7.6.1 General

The organization's asset management system shall include:

- documented information as required by this International Standard;
- documented information for applicable legal and regulatory requirements; and
- documented information determined by the organization as being necessary for the effectiveness of the asset management system, as specified in 7.5.

Description

At the time of the audit, there was insufficient documented information for applicable legal and regulatory requirements related to asset management.

NC-03

ISO 55001:2014 @ 9.2 Internal Audit

Related ISO Clause

9.2 Internal Audit

9.2.2 The organization shall:

a) plan, establish, implement and maintain and audit programme(s), including the frequency, methods, responsibilities, planning requirements and reporting. The audit programme(s) shall take into consideration the importance of the processes concerned and the results of previous audits;

…

Description

At the time of the audit, the governance document IAP0024:

- contained technical errors in the description of planning requirements between the internal audit and 3rd party certification audit requirements, e.g., Appendix B reference to joint internal and surveillance audits.
- refers to findings being captured in the AMS risk register vs. the Action Item Registry

NC-04

ISO 55001:2014 @ 10.1 Nonconformity and Corrective Action

Related ISO Clause

10.1 Nonconformity

When a nonconformity or incident occurs in its assets, asset management, or asset management system, the organization shall:

a) react to the nonconformity or incident, and, as applicable:
   - take action to control and correct it;
   - deal with the consequences;

b) evaluate the need for action to eliminate the causes of the nonconformity or incident, in order that it does not occur or recur elsewhere, by:
   - reviewing the nonconformity or incident;
   - determining the causes of nonconformity or incident;
   - determining if similar nonconformities exist, or could potentially occur;

c) implement any action needed;

d) review the effectiveness of any corrective action taken; and

e) make changes (see 8.2) to the asset management system, if necessary.

Description

At the time of the audit, there was insufficient evidence that non-conformances identified to date have completed the full corrective action process cycle to closure based on review of effectiveness.

Opportunities for Improvement

OFI-01

ISO 55001:2014 @ 5.2 Policy & 7.3 Awareness

Description

To raise awareness of the Asset Management System, there is an opportunity for Hydro Ottawa to re-address internal communications on:

- the key takeaways from the policy
- Asset Management related Strategic Objectives

OFI-02

ISO 55001:2014 @ 8.2 Management of Change

Description

There is an opportunity to formalize training requirements for onboarding of new staff, and for Hydro Ottawa staff transferring into T&D from outside the current Asset Management System scope on the Asset Management System.

Good Management Practices

Good Management Practices

- Use of many current processes to embed the AMS within the business
- Intrinsic recognition of the value of an ISO-based Asset Management System to demonstrate proactive stewardship over assets in balance with other operational risk areas (Cybersecurity, EH&S, Business Continuity)
- Management Commitment for implementation

Appendix A

Internal Audit Participants

Interview List

Department	Interviewee
Senior Management	Guillaume Paradis Brent Fletcher Joseph Muglia Laurie Heuff
Policies and Standards	Ben Hazlett Tony Stinziano Kyle Smith Christopher Murphy
Distribution Operations	Margaret Flores Mark Wojdan Steve Hawthorne Aleks Diotte Brian Kuhn Greg Bell Ed Donkersteeg
Site Visit (155 Longpre)	Cory Nixon Matt Stuyt Ben Patterson

Appendix B

Reviewed Documentation

Documents Examined

- *2019 MR KPIs R2.pdf (seen in 02-Oct-19 interview)*
- 4245_ISO_55001_Strategic_Asset_Management_Plan_R0_LJ.pdf
- Asset Management Council Management Review Session 2019 R1.pptx
- Asset Management Council Meeting Minutes - 02-07-2019_R0.pdf
- *Capital Program Tracking Sheet.xls (seen in 02-Oct-19 interview)*
- Change Management Example - Approval for Greater Than 50% Increase in PO….pdf
- CSR_report_en.pdf
- CVRA Report (Stantec Climate Risk and Vulnerability Assessment)
- *DFS001.pdf (seen in 01-Oct-19 interview) - Control and Retention of Technical Based Documents and Standard Work Methods*
- *DFS007.pdf (seen in 01-Oct-19 interview) - Technical "Text Based" Document Format Standard*
- *DSP Final.pdf (seen in 01-Oct-19 interview)*
- DSP Updated HOL Submission - June 29, 2015.pdf
- *Example Employee Communication.docx (seen in 01-Oct-19 interview)*
- GMS0054 R3 High Voltage Station Class Outdoor Circuit Breaker.pdf
- HOL IA 2019 NC-01.doc
- IAP0006 - Asset Management Plan Distribution Overhead Switch R0.pdf
- IAP0021 - Asset Management System Communication Plan - R0.pdf
- IAP0022 Asset Management System Risk Procedure - R0.pdf
- IAP0022 Schedule 1 Risk Register R0-6.xlsx
- IAP0024 - Asset Management System Audit Plan - R0.pdf
- IAP0025 - Asset Management System Continual Improvement Plan - R0.pdf
- IAP0025 - Schedule 1 KPI Dashboard R0.pdf
- IAS0002 - Asset Management System Manual - R0.pdf
- IAS0002 - Asset Management System Manual - R1-1.docx
- ISO 55000 - ISN - R1_bdh_sh.pptx *(Asset Management System and ISO 55001 presentation for contractors)*
- ISO 55000 Management Review - Action Items Registry.xlsx
- ISO 55000 Management Review - Summary Report - R0.pdf
- ISO 55001 Asset Management Policy.pdf
- ISO 55001 Vendor Statement for RFx Statement of Work-Specifications.docx
- Megger Sole Source Procurement Example
  - Megger Quote.eml
  - RE: Megger Quote.eml
  - 2018-051 Directed Source - Megger Fault Finding Equipment.pdf
  - FW: 2018-051 Directed Source - Megger Fault Finding Equipment.pdf.eml
  - DIGIPHONEPLUSNT_EN_V02.pdf
  - 18021 CableQ SPG and T3090.docx
  - 18022 CableQ Cable accessories.docx
  - 18023 CableQ Digiphone options.docx
- Org Chart - August, 2019.xls
- POL-Fi-003.01 Procurement Policy - Highlighting Change Mgt Control for P….pdf
- Strategic-Direction-2016-2020-EN.pdf

- Altec Industries Limited Daily Vehicle and Equipment Inspection
- Various posters that said ISO 55001 on them
- http://hydrobuzz/content/10899 → Engineering Operations Information → Internal Standards *(Intranet Page)*

INTERROGATORY RESPONSE - OEB-59

2-Staff-4

EXHIBIT REFERENCE:

Exhibit 2/Tab 4/Schedule 3/Attachment K

Exhibit 2/Tab 4/Schedule 3/page 8

Exhibit 2/Tab 4/Schedule 3/pp. 273-274

SUBJECT AREA: Historical Capital Expenditures

Preamble:

Hydro Ottawa provided a Local Achievable Potential (LAP) study for the Kanata North Area.

Question(s):

a) Hydro Ottawa notes that through 2021-2025 period, it will be deploying a portfolio of measures in the Kanata North area to enable deferral of an additional transmission-connected station. Please specify the portfolio of measures will be deployed through 2021-2025. Please also identify if any non-wire alternatives included in the portfolio.

b) Please explain Hydro Ottawa's long-term plan of addressing the load growth in the Kanata North area (i.e. Will Hydro Ottawa implement the utility-scale energy storage as recommended in the LAP study?).

RESPONSE:

a) Please refer to pages 287-288 of Attachment 2-4-3(E): Material Investments for the distribution capacity upgrades plan for Kanata North. To enable deferral of an additional transmission-connected station for the short-term, Hydro Ottawa plans to deploy the following portfolio of measures:

- Feeder extensions and reconfiguration from adjacent stations with available capacity; and
- Kanata MTS and Marchwood MTS Egress Upgrade (to increase design capacity under normal conditions as well as the station backup capacity).

Non-wire alternatives included in the portfolio that Hydro Ottawa plans to deploy include the following:

- Kanata North Retrofit + Program: Offers top-up incentives at 100% or double the incentive amounts with a targeted outreach strategy. The potential demand impact from the Retrofit Top-up is expected to be 1.8 MW.
- Kanata North Smart Thermostat Program: the Thermostat Program leverages Enbridge Gas Distribution's existing smart thermostat rebate program and offers more beneficial incentives to Hydro Ottawa customers in the Kanata North region. Potential demand reduction from the Smart Thermostat program is 0.76 MW.

b) Hydro Ottawa's long-term plan to address load growth in the Kanata North area will be confirmed after the bulk transmission plan for the area is completed by the IESO, which is expected later in 2020. In addition to considering new station connection options that arise from the bulk transmission supply plan, the IESO will consider the latest information on potential and cost for non-wires alternatives.

INTERROGATORY RESPONSE - OEB-60

2-Staff-5

EXHIBIT REFERENCE:

Exhibit 2/Tab 4/Schedule 3/page 313 of 374

SUBJECT AREA: Historical Capital Expenditures

Preamble:

Metering Renewal is a new program introduced under System Renewal over the 2021-2025 rate period.

Question(s):

a) Please provide examples of services Hydro Ottawa will provide under this program.

b) Please clarify whether services under this new program are available during the 2016-2020 rate period.

RESPONSE:

a) Please refer to section 1.5 on pages 169-217 (Metering Renewal) of Attachment 2-4-3(E): Material Investments for detailed information regarding the program services.

b) None of the proposed programs/services are being completed in the 2016-2020 rate period as there is no budget to perform the work.

INTERROGATORY RESPONSE - OEB-61

2-Staff-6

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 1 / page 10 of 13

SUBJECT AREA: Historical Capital Expenditures

Preamble:

Regarding its historical System Expansion and Infill spending, Hydro Ottawa stated:

> System Expansion and Infill, which in general have lower contributions, exceeded the budget expectation. This explains the capital contributions which were lower than budgeted. All of these projects were third-party driven and were therefore ones which Hydro Ottawa had an obligation to complete.

Question(s):

a) Please quantitatively differentiate the historical spending above OEB approved levels caused by one-time non-repeating drivers, cyclical/repeating drivers and normal ongoing expenditure requirements.

b) Has the historical spending caused by any of the non-repeating drivers been trended or factored into the 2021-2025 expenditure forecast? If yes, what proportion of the 2021-2025 expenditures does this extra trend comprise?

RESPONSE:

a) Historical spending and variance from OEB-approved levels is summarized in Table 8.13 (see UPDATED Attachment 2-4-3(A): OEB Appendix 2-AA - Capital Programs Table).

Historical spending within the Infill and Upgrade program is driven by normal ongoing expenditures due to customer requests. Historical spending within the System Expansion program is a combination of one-time non-repeat drivers, cyclical/repeating, and normal ongoing expenditure requirements. A quantitative differentiation of the historical spending levels broken down by key drivers is detailed in Table A.

Table A – System Expansion Program Gross Spending ($'000s)

	2016	2017	2018	2019	2020*
OEB-Approved Budget	**$3,457**	**$10,851**	**$12,999**	**$12,284**	**$14,984**
Normal Ongoing Actuals	$4,332	$1,834	$4,528	$994	$3,902
Cyclical/Repeating Actuals	$1,094	$971	$665	$1,682	$15,226
One-Time Non Repeat Actuals	$3,300	$1,029	$792	$9,032	$0

*2020 spending is based on forecasted values

b) Forecasted spending for 2021-2025 is summarized in Table 8.15 (see UPDATED Attachment 2-4-3(A): OEB Appendix 2-AA - Capital Programs Table). There are no known non-repeating project expenditures forecasted for 2021-2025. Large repeating/cyclical projects, such as the large spends in 2020 and 2021 for Ottawa's Light Rail Transit, are forecasted with project expenditures in specific years and are derived through stakeholder engagement.

INTERROGATORY RESPONSE - OEB-62

2-Staff-7

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 1 / page 10 of 13

SUBJECT AREA: Historical Capital Expenditures

Preamble:

Regarding its critical renewal spending, Hydro Ottawa states:

> With respect to critical renewals, over the past few years Hydro Ottawa has increased asset inspections as part of its reliability improvement program. Increased inspections have led to more assets being identified as being in a "critical state." "Critical state" means that the assets have been identified as having "functionally" failed, but have not yet caused an outage (e.g. poles that have been deemed to have deteriorated to a point where they no longer meet their designed strength requirements).

Question(s):

a) Does this indicate that the condition parameters used to determine a Critical State assessment for certain assets may need to be better calibrated?
   i) If not, has Hydro Ottawa identified a step change deterioration in asset performance that parallels the step change in assessed asset condition?

b) Please confirm that the change in the assessed condition of the assets was not influenced by the increased level of inspections.

c) Please confirm if historical performance trends based upon the period prior to the "increased asset inspections" is different than the historical performance trends after the "increased asset inspections".

d) When assets fail, does Hydro Ottawa record if those assets had been previously identified as being in Critical State?
   i) If yes, please identify what percentage of the assets identified as being in Critical State fail each year.
   ii) What is the equivalent Health Index rating of an asset that has been identified as being in Critical State?

RESPONSE:

The preamble referenced in this question relates to Hydro Ottawa's increased number of inspections leading to the discovery of an increased number of assets in a "Critical State." The paragraph does not provide details with respect to whether Hydro Ottawa has made modifications to the assessment criteria nor whether the utility has increased the number of assets replaced annually by asset type.

a) The preamble referenced in this question does not relate to the condition parameters used to determine a Critical State assessment. Hydro Ottawa is therefore not able to respond to whether the parameters for certain assets may need to be better calibrated.
   i) Again, Hydro Ottawa is not able to relate the preamble to the question posed and is therefore not able to provide a response.

b) Hydro Ottawa did not state that the assessed condition of the assets has changed.

c) The performance trends have not been analyzed before or after the increased inspection frequency, as Hydro Ottawa does not consider asset performance to be correlated to the discovery of assets in a Critical State. Hydro Ottawa considers the rate of replacement of the assets deemed to be in a Critical State to be a factor related to performance trends.

d) When assets fail, Hydro Ottawa does not record if those assets had been previously identified as being in Critical State.

   i) Not applicable.

   ii) Not all assets have an associated Health Index rating to be identified as being in Critical State. Most assets are considered to be in Critical State when they are in very poor condition (<=30%).

INTERROGATORY RESPONSE - OEB-63

2-Staff-8

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / pp. 1-2 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding its forecast spending relative to historical levels, Hydro Ottawa stated:

> This plan is 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 renewal of the aged and aging infrastructure at risk of failure. … These and other initiatives have translated into improved system reliability and performance, with the utility having consistently met or exceeded its reliability targets over the 2016-2018 timeframe. …
>
> Notwithstanding this progress, however, renewing Hydro Ottawa’s aged and aging infrastructure in deteriorating condition (i.e. stations, and underground and overhead systems) at an appropriate pace remains a priority for both near-term performance and long-term sustainability of the distribution system.

Question(s):

a) Is Hydro Ottawa's renewal spending primarily driven by reliability performance, or by factors that predict performance, or some other reason?
   i. If driven by some other reason, please elaborate.

b) How does Hydro Ottawa define an "appropriate pace" of renewing its aged and aging infrastructure? Will that pace of spending improve performance, hold performance steady or allow performance to slightly deteriorate?

c) Which specific asset classes require increasing levels of renewal spending to enable Hydro Ottawa to maintain its historical positive reliability performance trends?

d) Has Hydro Ottawa calculated the expected change in its system reliability performance attributable to asset failures in the identified asset classes with and without the proposed incremental level of investment?
   i. If yes, please provide documentation showing the results of this analysis.
   ii. If no, is Hydro Ottawa able to demonstrate quantitatively how the proposed increased renewal spending on those asset classes will impact its reliability performance?

e) Has Hydro Ottawa assigned a cash value to outages or decreases in reliability?

f) If Hydro Ottawa holds the line on the level of renewal spending for all asset classes, what level of overall reliability performance should be expected, and would that performance be considered acceptable by customers?

RESPONSE:

a) Hydro Ottawa's System Renewal program level spending is primarily driven by factors that predict performance, specifically the number of failures per year given the existing demographics.

b) Hydro Ottawa defines an "appropriate pace" of renewing its aged and aging infrastructure as the ability to balance cost versus performance by being proactive in renewing infrastructure to prevent future impacts to safety, reliability, and financial performance and while holding overall existing performance steady.

c) Page 312 of Exhibit 2-4-3: Distribution System Plan describes the planned increases in forecasted System Renewal expenditures by asset class.

d) No, Hydro Ottawa has not calculated the expected change in its system reliability performance attributable to asset failures in the identified asset classes with and without the proposed incremental level of investment. Hydro Ottawa has projected the expected number of faults under various replacement scenarios. For the proposed increased spending in cable renewal, the expected number of faults can be found on pages 133-134 of Exhibit 2-4-3: Distribution System Plan.

e) Yes, Hydro Ottawa assigned a cost per interruption, as outlined in Table 5.5 on page 121 of Exhibit 2-4-3: Distribution System Plan.

f) Hydro Ottawa is currently holding the line with only a slight increase in System Renewal average spending from $40.6M in 2016-2020 to $41.5M proposed over 2021-2025. The overall reliability is expected to be maintained as Hydro Ottawa renews its infrastructure while leveraging maintenance programs and increasing system operability to manage performance. Customers consider the current level of reliability performance acceptable, as was indicated in the customer engagement conducted by Innovative Research Group Inc. (“Innovative”) on behalf of Hydro Ottawa in 2019. A summary of customer feedback as it relates to reliability is provided in Innovative’s report and can be found on pages 3-5 of Attachment 1-2-2(A): Innovative Research Group - Customer Engagement Report on Hydro Ottawa's 2021-2025 Rate Application.

INTERROGATORY RESPONSE - OEB-64

2-Staff-9

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 7 of 374

SUBJECT AREA: Customer Engagement

Preamble:

Regarding its customers' preferences, Hydro Ottawa stated:

> Based on results from a variety of customer engagement activities, Hydro Ottawa customers indicate that reliability should be maintained or improved, at minimal or no increased cost.

Question(s):

a) Did Hydro Ottawa's customer engagement activities provide data sufficient for Hydro Ottawa to differentiate between customers that indicated that "reliability should be maintained", customers that indicated that "reliability should be improved", and customers that indicated "reliability could be reduced" (or the equivalent statement)?
   i) If yes, please provide data quantifying the different customer responses.
   ii) If not, why not?

b) Did Hydro Ottawa's customer engagement activities provide data sufficient for Hydro Ottawa to differentiate between customers that indicated that "reliability should be maintained or improved, at minimal increased cost" and customers that indicated that "reliability should be maintained or improved, at no increased cost", and customers that indicated that "reliability could be reduced if no increased cost" (or equivalent), and customers that indicated "reliability should be maintained at reduced cost" (or equivalent statement)?

i) If yes, please provide data quantifying the different customer responses.

ii) If not, why not?

RESPONSE:

a) Yes, Hydro Ottawa's customer engagement activities did provide sufficient data to differentiate between customer views on improving, maintaining, or potentially reducing system reliability and service more broadly.

First, in Phase II of the customer engagement, 94% of residential and 90% of commercial customers indicated that they agreed with Hydro Ottawa's planning principles, which explicitly included "maintaining reliability and service quality." For details, please refer to pages 128-130 and 190-192 of Attachment 1-2-2(A): Innovative Research Group - Customer Engagement Report on Hydro Ottawa's 2021-2025 Rate Application. Therefore, prior to Hydro Ottawa exploring specific investment trade-offs where spending could be accelerated or reduced relative to the draft plan, customers agreed with the general principle of a plan that maintains current levels of reliability.

Second, again in Phase II, all customers who participated in the online workbook were asked about their overall impression and view of Hydro Ottawa's draft plan. Customers were provided with the following five options:

- Hydro Ottawa should improve service, as discussed on the previous pages, even if that means an annual increase that exceeds 2.5%;
- Hydro Ottawa should maintain a 2.5% annual increase to deliver a program that focuses on the priorities above;
- Hydro Ottawa should keep increases below 2.5% annually, even if that could mean reductions in service;

- Other (Please Specify); or
- Don't know.

For further details, please refer to pages 167-171 and 229-231 of Attachment 1-2-2(A).

Based on individual responses to this question, Hydro Ottawa can conclude that those who support maintaining the proposed increase also support maintaining current reliability. Those who believe the increase should be reduced acknowledge that it could result in a reduction in service. Finally, it can be concluded that those who believe Hydro Ottawa should improve service would support some level of investment in improving reliability, whether in the form of reduced frequency and/or duration of outages.

b) No, Hydro Ottawa's customer engagement activities do not provide data sufficient for Hydro Ottawa to differentiate between customers that indicated the following two reliability/cost scenarios:

- Reliability should be maintained or improved, at no increased cost; or
- Reliability should be maintained at reduced cost (or equivalent statement).

A core principle of this engagement was to provide customers the opportunity to provide feedback on "real" trade-offs, often focusing on price versus reliability and other outcomes. Hydro Ottawa is of the opinion that maintaining or improving reliability at reduced costs is not a realistic option and was therefore not presented to customers as part of this engagement.

With regards to the remaining two reliability/cost scenarios outlined in the question, customers were explicitly asked to provide their feedback on the trade-off between any potential cost increase and investments in system reliability, both in Phase I and Phase II.

- Reliability should be maintained or improved, at minimal increased cost; or

- Reliability could be reduced if no increased cost (or equivalent).

In Phase I of the customer engagement, 72% of residential and 63% of commercial customers indicated that they agreed that "Hydro Ottawa should invest what it takes to replace the system's aging infrastructure to maintain system reliability; even if that increases my monthly electricity bill by a few dollars over the next few years." Alternatively, 21% of residential and 23% of commercial customers indicated that "Hydro Ottawa should defer its investments in replacing aging infrastructure to lessen the impact of any bill increase; even if this could eventually lead to more or longer power outages." For more details, please refer to page 66 of Attachment 1-2-2(A).

Additionally, as per part (a) of this response, 94% of residential and 90% of commercial customers indicated that they agreed with Hydro Ottawa's planning principles, which explicitly included both "minimize rate increases" and "maintaining reliability and service quality." For more details, please refer to pages 128-130 and 190-192 of Attachment 1-2-2(A).

INTERROGATORY RESPONSE - OEB-65

2-Staff-10

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / pp. 8-9 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding its enhanced work coordination, Hydro Ottawa stated:

> Over the course of 2015-2016, Hydro Ottawa introduced Mobile Workforce Management ("MWM"). This tool has been deployed across multiple groups in Operations (Collections, Metering, Forestry, Service trucks, Civil Inspection, etc.). The main strengths of the MWM system reside in its core capabilities to schedule and dispatch field work, including re-shuffling assignments to manage changes introduced during the day (e.g. cancellations and new high-priority work), and to enable communications through a mobile application to exchange information about work assignments, basic routing, work progress, and crew location. These strengths have resulted in improved work processes and productivity.
> As the current tool has reached end-of-life and is no longer supported by the vendor, Hydro Ottawa will be replacing it with the new system in service by 2021. … Hydro Ottawa will be aiming to drive productivity by sourcing a tool with … the ability to forecast more realistic completion times…

Question(s):

a) Has Hydro Ottawa quantified the improvements in work process and productivity since the implementation of MWM?
    i. If yes, please provide examples.

b) Does the current tool not forecast realistic completion times?
    i. If not, why not?

RESPONSE:

a) Yes, Hydro Ottawa has quantified some of the improvements in work process and productivity since the implementation of Mobile Workforce Management ("MWM"). Examples can be found in the following sections of the evidence filed in support of this Application:

- Attachment 1-1-10(A): 2016 Annual Summary - Achieving Ontario Energy Board Renewed Regulatory Framework Performance Outcomes, Section 2 (ii) Mobile Workforce Management;
- Attachment 1-1-10(B): 2017 Annual Summary - Achieving Ontario Energy Board Renewed Regulatory Framework Performance Outcomes, Section 2 (ii) Mobile Workforce Management;
- Exhibit 1-1-13: Productivity and Continuous Improvement Initiatives, Section 2.2.1, Mobile Workforce Management; and
- The response to interrogatory OEB-47.

b) Yes, the current tool does forecast realistic completion times. Newer systems have enhanced functionality including artificial intelligence engines that will permit system learning to adjust the duration of field activities to be automatically updated based on actual results on an ongoing basis, providing even more accurate completion times.

INTERROGATORY RESPONSE - OEB-66

2-Staff-11

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / pp. 12-13 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Hydro Ottawa stated that one of the goals and benefits of implementing its new GIS system is "increasing availability of asset condition data for risk based asset condition modelling".

Question(s):

a) Have the new risk analysis outputs been validated or calibrated against actual results? In other words, has using more asset condition data in the risk-based asset condition analysis created risk forecasts that align better with measured historical trends in performance or other risk measures?
   i. If yes, please provide examples.

RESPONSE:

a) No, the new risk analysis outputs have not been validated or calibrated against actual results. Hydro Ottawa uses METSCO's asset failure probability curves and Asset Condition Assessment methodology to assess the likelihood of asset failure, which is in turn used as an input to estimate risk and prioritize projects. The increased availability of asset condition data in the utility's geographic information system ("GIS") enables the asset risk assessment to be as accurate as possible.

INTERROGATORY RESPONSE - OEB-67

2-Staff-12

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 13 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Hydro Ottawa proposed to restructure some of its capital program in this application. For example, Hydro Ottawa stated that "the Metering Program was moved to System Service, since the main driver of gaining the ability to remotely disconnect and reconnect the meter better aligns with the System Efficiency driver under System Service Investment category."

Question(s):

a) Please map Hydro Ottawa's recategorized spending to enable continuity evaluation between historical and forecast spending by capital program (i.e. as set out in Exhibit 2 / Tab 4 / Schedule 3 / page 349 of 374, Appendix C)?

b) Is Hydro Ottawa able to demonstrate that there are no unexplained step changes in capital spending on specific asset categories through this category transition?

c) Which capital program category was the Metering Program under for 2016-2020 in App 2-AA: Capital Programs Table?

d) Is Hydro Ottawa aware if other LDCs are similarly recategorizing these investments or is this recategorization unique to Hydro Ottawa?

RESPONSE:

a) Please see Attachment OEB-67(A): 2016 DSP Budget Structure Comparison.

b) As shown in Attachment OEB-67(A): 2016 DSP Budget Structure Comparison, all program budgets were re-allocated to the new budget structure starting from 2016 to ensure continuity in evaluation against historical and forecast values. There was only one discrepancy found in 2016, which was due to one project budget being moved to System Access.

c) The Metering Capital Program was under the System Service Investment Category for 2016-2020 in Attachment 2-4-3(A): OEB Appendix 2-AA Capital Programs.

d) Hydro Ottawa is not aware if other distributors are recategorizing these investments. Hydro Ottawa has restructured its capital budget to better align with the definitions set out in the OEB's Filing Requirements and to facilitate reporting on expenditures.

INTERROGATORY RESPONSE - OEB-68

2-Staff-13

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / pp. 21-22 of 374

Exhibit 2 / Tab 4 / Schedule 3 / page 24 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding the City of Ottawa's Energy Evolution program, Hydro Ottawa stated:

> Hydro Ottawa has been actively engaged in the Energy Evolution initiative since its inception and has taken the strategy's goals into consideration in the development of the DSP. Where appropriate, the DSP highlights planned actions and expenditures that are complementary to Energy Evolution's objectives. For example, the expansion of station capacity can support increased accommodation of renewable energy projects through such measures as the installation of transformers which are designed to enable reverse-flow capabilities.

Regarding Ottawa Light Rail Transit, Hydro Ottawa stated:

> The impacts and planning considerations of LRT construction have been incorporated into the development of the DSP, where appropriate. For example, the station capacity required to support the constructed and forecasted LRT loads have been included in the utility's system capacity planning.

Question(s):

a) Are any of the forecast capital investments solely or primarily driven by Energy Evolution objectives?
    i. If yes, please identify those investments and quantify the investment amounts.

b) What are the gross and net (of customer contributions) levels of electric system spending related to transit facility developments during the 2016-2020 period?

c) During the test period, is the level of transit facilities-related electric system spending forecast to increase, hold or decline from the historical levels?

d) Please identify and quantify any LRT-driven expenditures expected to be required through the test period.

RESPONSE:

a) There are no capital investments solely or primarily driven by Energy Evolution objectives in Hydro Ottawa's 2021-2025 capital expenditure plan.

   It should be noted that the full scope and plan of action for Energy Evolution remains under development by the City of Ottawa. In Exhibit 2-4-3: Distribution System Plan, Hydro Ottawa indicated that a final strategy and action plan for Phase 2 of Energy Evolution was scheduled to be presented to City Council for approval in early 2020. The latest publicly available information from the City indicated that Q2 2020 was the targeted deadline for City staff to submit the final report on the planned development and implementation of the Energy Evolution initiative.[1]

[1] https://ottawa.ca/en/living-ottawa/environment/climate-change-and-energy/energy-evolution.

b) Table A outlines gross and net levels of spending related to transit facility developments during the 2016-2020 period.

Table A – 2016-2020 Gross and Net Spending Related to Transit Facilities ($'000s)

	2016	2017	2018	2019	2020[2]
Gross Spending	$2,900	$2,348	$1,480	$2,078	$16,158
Net Spending	$833	$560	$590	$718	$5,643

c) During the test period, the level of transit facilities-related electric system spending is forecasted to be lower than 2016-2020 spending.

d) Table B identifies expected LRT-driven expenditures during the test period.

Table B – 2021-2025 Forecasted Spending Related to Transit Facilities ($'000s)

	2021	2022	2023	2024	2025
Gross Spending	$12,793	$3,050	$0	$0	$0
Net Spending	$2,700	$890	$0	$0	$0

[2] Spending in 2020 is based on forecasted values.

INTERROGATORY RESPONSE - OEB-69

2-Staff-14

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / pp. 28-29 of 374

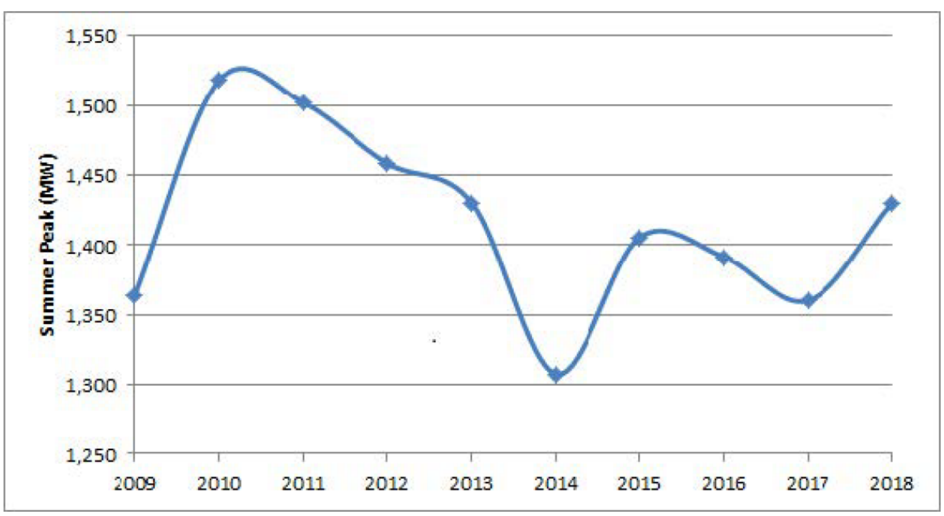
SUBJECT AREA: Distribution System Plan

Preamble:

Regarding its distribution service area, Hydro Ottawa stated:

> The Hydro Ottawa system peaks in the summer at a level that has remained relatively constant (maximum of 1,518 MW in 2010 and minimum of 1,308 MW in 2014) over the past decade. … Figure 2.2 depicts the net system summer peak (i.e. including embedded generation) over the last 10-year period.

Figure 2.2 – Net System Summer Peak (2009-2018)



Question(s):

a) Given the relatively flat or downward-trending net system summer peak load profile over the past decade, are the proposed capacity investments attributable solely to localized constraints driven by localized/suburb load additions?

b) Are operating margins increasing elsewhere in the system where loads are not growing or are shrinking?

c) What happened in 2014 to cause the abnormally low summer peak?

d) What was the 2019 summer peak?

RESPONSE:

a) Yes, the proposed capacity-driven investments over 2021-2025 are attributed solely to localized constraints across Hydro Ottawa's service territory.

b) For forecasted growth trends by planning region, please see the following Figures in Exhibit 2-4-3: Distribution System Plan: Figures 7.9, 7.11, 7.13, 7.14, 7.17, 7.19, 7.21, 7.23, 7.25, 7.27, 7.29, 7.31, 7.33, 7.34, and 7.35.

   These regional forecasts show several areas with flat or declining demand, specifically the 4kV, West 8kV, West 12kV and West Nepean 8kV regions. In these areas, operating margins are increasing or remain constant.

c) The low 2014 summer peak was caused by mild temperatures on the peak day. Hydro Ottawa applies weather normalization factors for planning purposes. In 2014, the factor for the summer peak was 1.107. This means the system peak was ~90% of what would be expected at typical seasonal temperatures. For historical weather-normalized system peaks, see Figure 7.5 in Exhibit 2-4-3: Distribution System Plan.

d) The 2019 summer peak was 1,306 MW.

INTERROGATORY RESPONSE - OEB-70

2-Staff-15

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 30 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding the age of its system, Hydro Ottawa stated (emphasis added):

> Large segments of the system were constructed in the 1960s, 1970s, and 1980s, with a typical expected service life for these assets on the order of 50 years. Consequently, a considerable proportion of the system has exceeded or is approaching its anticipated end of life. **These aging assets pose an increasing failure potential, and without corrective actions, will impact the utility's ability to maintain system reliability and minimize unplanned renewal cost in the future.**

Question(s):

a) Does Hydro Ottawa historic data show evidence that assets assessed to be in Very Good, Good or Fair condition regularly fail unexpectedly or deteriorate precipitously?
   i. If yes, what percentage for each category fails unexpectedly?
   ii. If no, given the Good and Very Good asset condition assessment results for the bulk of assets in most asset classes (with the possible exception of poles), is the emphasized statement above actually valid?

RESPONSE:

a) Hydro Ottawa does not have available evidence to validate that assets assessed to be in Fair, Good, or Very Good condition regularly fail unexpectedly or precipitously. Hydro Ottawa does believe that the emphasized statement is still valid as it was not derived based solely on asset condition, but also based on the consideration of industry derived age-based failure probability curves.

INTERROGATORY RESPONSE - OEB-71

2-Staff-16

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 37 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding ice accumulation and snow loading, Hydro Ottawa stated:

> Another impact of the harsh winters is an increased use of road salt which can lead to premature rusting of equipment located along the road right of way. The salt spray from roadways increases the need to repaint and repair rusted underground and overhead equipment. Salt contamination on porcelain insulators can lead to pole fires and flashovers. Insulator washing is necessary to mitigate the risk of these failure modes.

Question(s):

a) Does Hydro Ottawa use or has Hydro Ottawa evaluated the use of silicone insulators near busy roadways to minimize the need for insulator washing?

b) Does Hydro Ottawa still use porcelain insulators next to busy roads?
    a. If not, in which year did Hydro Ottawa change its past practice?

RESPONSE:

a) Yes, Hydro Ottawa has evaluated the use of silicone insulators near busy roadways to minimize the need for insulator washing. Hydro Ottawa's current practice is to install oversized polymer insulators next to busy roads to deal with high levels of contamination.

b) No, Hydro Ottawa no longer uses porcelain insulators next to busy roads. The use of non-porcelain insulators started in the mid-1990s where a large portion of the distribution system was already built using porcelain insulators. Hydro Ottawa has been replacing these insulators as failures occur or lines are scheduled to be rebuilt/renewed.

INTERROGATORY RESPONSE - OEB-72

2-Staff-17

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page pp. 38-39 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding the effect of climate change on freeze-thaw cycles, Hydro Ottawa stated:

> The annual number of freeze-thaw cycles is projected to decrease under climate change, from a baseline (1981-2010) mean of ~76 cycles per year to 59-60 cycles per year by the 2050's. While the number of freeze-thaw cycles is projected to decrease in many months under climate change, increases are projected for the months of December, January, and February, during which freeze-thaw cycles can be particularly damaging.

Question(s):

a) Why is a freeze-thaw cycle particularly damaging in December-January-February as compared to a freeze-thaw cycle in October, November, March, or April?

RESPONSE:

a) Freeze-thaw cycles are particularly damaging in December-January-February as compared to a freeze-thaw cycle in October, November, March, or April because there is expected to be a greater frequency of "hard" freeze-thaw cycles. "Hard" freeze-thaw cycles occur when the temperature fluctuates from greater than or equal to 4 degrees Celsius to less than or equal to -4 degrees Celsius. Greater variation in temperature during the freeze-thaw cycle can further promote the presence of moisture, which causes damage to exposed infrastructure.

INTERROGATORY RESPONSE - OEB-73

2-Staff-18

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 52 of 374

SUBJECT AREA: Customer Satisfaction

Preamble:

Regarding its Touch Logic customer survey, Hydro Ottawa provided the following table:

Table 4.2 – Touch Logic Survey Results

KPI	Target	2014	2015	2016	2017	2018
Customer Satisfaction	**90%**	88%	90%	89%	87%	78%
Staff Knowledge	**90%**	92%	92%	93%	90%	90%
Staff Courtesy	**90%**	93%	93%	94%	92%	91%
First Call Resolution	**85%**	84%	85%	85%	84%	86%

Question(s):

a) What caused the drop in customer satisfaction in 2018?

b) What are the 2019 results?

RESPONSE:

a) The decrease in customer satisfaction occurred primarily in Q2 2018 and can be attributed to the following factors:

- Severe weather events causing power outages and property damage (for example, the Ice Storm that occurred on April 16, 2018);
- An increase in the number of high bill inquiries, due to increased electricity consumption during the winter (Ottawa experienced a very high number of cold temperature days in 2018);
- A larger number of customers fell into arrears and into the severance process at the end of the Disconnection Moratorium period, which was three months longer than the previous year; and
- An increase in the number of service disconnections, due to customer ineligibility for an Arrears Payment Arrangement ("APA").

b) Table A provides the 2019 Touch Logic Survey results.

Table A – 2019 Touch Logic Survey Results

KPI	2019
Customer Satisfaction	87%
Staff Knowledge	88%
Staff Courtesy	87%
First Call Resolution	89%

INTERROGATORY RESPONSE - OEB-74

2-Staff-19

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 53 of 374

SUBJECT AREA: Customer Satisfaction

Preamble:

Regarding its SIMUL customer survey, Hydro Ottawa provided the following table:

Table 4.3 – SIMUL Survey Results

KPI		2014	2015	2016	2017	2018
Pre-Survey Residential & Small Commercial (Target >90%)	Results	83%	87%	81%	90%	94%
	Ontario Results	83%	86%	81%	85%	91%
Pre-Survey Commercial (Target >90%)	Results	-	-	-	90%	94%
	Ontario Results	-	-	-	90%	93%
Staff Helpfulness (Target >80%)	Results	73%	75%	81%	74%	65%
	Ontario Results	65%	67%	69%	66%	64%
Value for Money (Target = 2% better than Ontario)	Results	61%	63%	57%	66%	75%
	Ontario Results	63%	62%	58%	57%	71%
Customer Loyalty - Satisfied (Target = 35%)	Results	24%	23%	25%	33%	47%
	Ontario Results	27%	28%	30%	32%	36%

Question(s):

a) Please provide descriptions for each KPI, including:
   i) Definition of the KPI
   ii) How each KPI is measured
   iii) Source of Ontario data
   iv) Source of target level

b) Please explain why the following measures consistently fail to achieve the target:

i) Staff Helpfulness

ii) Customer Loyalty

RESPONSE:

a) Simul/UtilityPULSE is the source of all of the Key Performance Indicator ("KPI") survey data for Ontario distributors. Simul/UtilityPULSE conducts surveys across Ontario, securing participants through random digit dialing. Survey results are balanced by population density and stratified to reflect low volume, medium volume, and larger volume electricity users.

Hydro Ottawa reviews the Simul/UtilityPULSE results and compares its own performance against that of other distributors in the province. When results are significantly higher or lower than those of the provincial benchmark, Hydro Ottawa's previous scores are also used as a means of benchmarking year-over-year progress.

For a definition of each KPI, an explanation as to how it is measured, and the source of each target level, please see Attachment OEB-74(A): Customer Survey KPI Definition and Measurement. Additionally, further details can be found in Attachment CCC-14(E): Hydro Ottawa Residential and Small Commercial 2018 UtilityPULSE Report.

b)

i) Staff Helpfulness

The target for this KPI from 2014-2016 was set at 75%, which was achieved by Hydro Ottawa in 2015 and surpassed in 2016. As a result, Hydro Ottawa's target was raised to 80% in 2017 to strive for greater results. The targets were not met in 2017 and 2018. Although Hydro Ottawa continued to exceed the Ontario benchmark, it was decided not to lower the internal targets.

A significant driver for contacting any local distribution company is outages, including those caused by Major Event Days ("MEDs"), of which there were several in Hydro Ottawa's service territory in 2017 and 2018. (Please see page 6 of Exhibit 2-4-6: Service Quality and Reliability Performance for more information). During these events, staff helpfulness, as it relates to the ability to obtain timely updates on the status of outages, may be compromised, thereby negatively impacting customer satisfaction.

ii) Customer Loyalty

Customer Loyalty combines the responses of customer satisfaction, commitment, and advocacy.

The Ontario target for this KPI from 2014-2017 was set at 39%. In 2018, the target was reset to 35%, and it was surpassed by Hydro Ottawa.

In 2014, customer satisfaction, commitment, and advocacy was lower than previous years. Survey results indicated that this was due to the cost of electricity, which can directly affect levels of satisfaction with the utility.

CUSTOMER SURVEY KPI DEFINITION AND MEASUREMENT

KPI	Definition of the KPI	How each KPI is Measured	Source of Target Level
Pre-Survey Residential & Small Commercial	Measures overall customer satisfaction at the start of the survey	Survey participants are asked the following question: ***Thinking about the many services Hydro Ottawa provides, how satisfied are you overall with those services? Would you say…*** - ***Very satisfied*** - ***Fairly satisfied*** - ***Fairly dissatisfied OR*** - ***Very dissatisfied*** This KPI allows the measurement of customers' overall impressions of the utility before prompting them to think of specific aspects of the relationship.	The target level was set at 2% above the Ontario Benchmark, until 2013 when a result of 90% was reached. From 2014 onward the target level of 90% has been maintained.
Pre-Survey Commercial	Measures overall customer satisfaction at the start of the survey	Please see the response to Pre-Survey Residential & Small Commercial above. This question is also asked in the Large Commercial Survey.	SInce the first Commercial survey in 2017, the same target level was set as the Residential and Small Commercial Satisfaction KPI.
Staff Helpfulness	Describes whether a customers' concern was addressed in a manner that was useful, providing a solution to the customers' problem	Survey Participants were asked about the service delivery aspect of their most recent experience with a representative of Hydro Ottawa. Specifically, the following question was asked: ***Thinking of your most recent contact with someone from Hydro Ottawa were you very satisfied, fairly satisfied, fairly dissatisfied or very dissatisfied with the helpfulness of the staff who dealt with you***	Originally the target level was set at 2% above the Ontario Benchmark. In 2012, the target was adjusted upwards to 75% until 2016 when a result of 81% was reached. From 2017 onwards, the target was reset to 80% where it has been maintained.

KPI	Definition of the KPI	How each KPI is Measured	Source of Target Level
Value for Money	Measures perceptions about service quality and value, and is linked to the utility's overall image	Survey participants were asked: ***Would you tell me if you agree or disagree that Hydro OttawaProvides good value for your money. Is that agree/disagree strongly or somewhat?***	At this time the target is 2% above Ontario Benchmark.
Customer Loyalty	Measures the degree to which customers are satisfied, would continue to do business with Hydro Ottawa if given a choice, and would recommend Hydro Ottawa to others. Further details on this metric can be found on pages 56-57 of Attachment CCC-14(E): Hydro Ottawa Residential and Small Comm 2018 UtilityPULSE Report.	The Customer Loyalty KPI is a combination of the following three questions: ***Thinking about the many services Hydro Ottawa provides, how satisfied are you overall with those services? Would you say…*** - ***Very satisfied*** - ***Fairly satisfied*** - ***Fairly dissatisfied OR*** - ***Very dissatisfied*** ***I am going to read a list of items about customer service, would you tell me if you agree or disagree with each statement describing Hydro Ottawa.*** ***1) Is a company that you would like to continue to do business with*** ***2) Is a company that you would recommend to a friend or colleague*** ***Is that agree/disagree strongly or somewhat?*** - ***Agree strongly*** - ***Agree somewhat*** - ***Disagree somewhat*** - ***Disagree strongly*** - ***Neither*** - ***Don't know***	Originally the target level was set at 2% above Ontario Benchmark. In 2014, the target was adjusted upwards to a static 39%. In 2018 the target was reset to 35%.

INTERROGATORY RESPONSE - OEB-75

2-Staff-20

EXHIBIT REFERENCE:

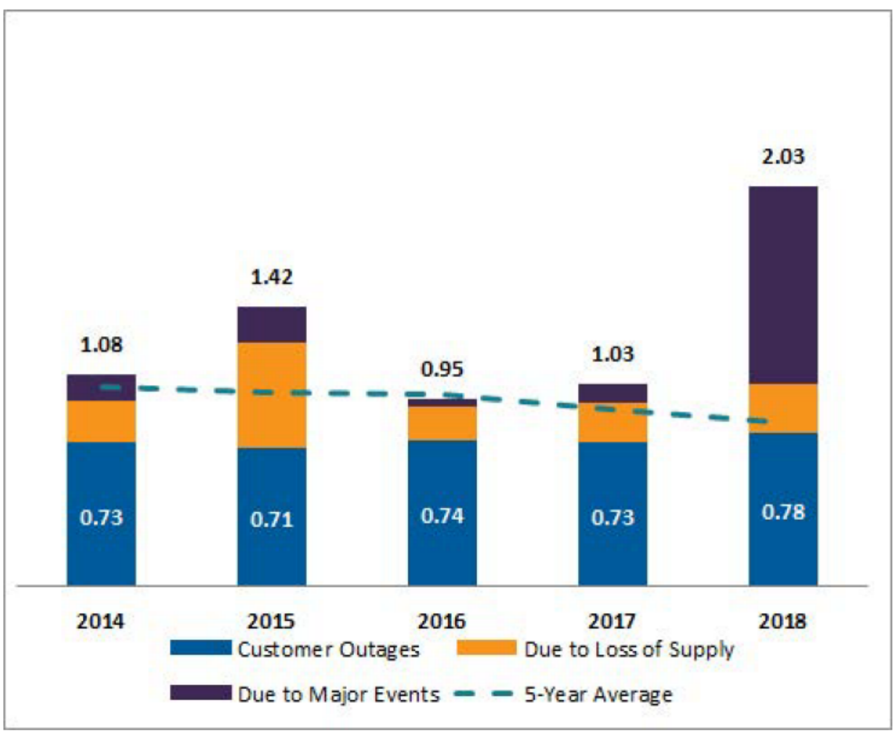
Exhibit 2 / Tab 4 / Schedule 3 / page 55 of 374

SUBJECT AREA: Reliability

Preamble:

Regarding its system average interruption frequency, Hydro Ottawa provided the following graph:

Figure 4.1 – SAIFI Reliability Performance



Question(s):

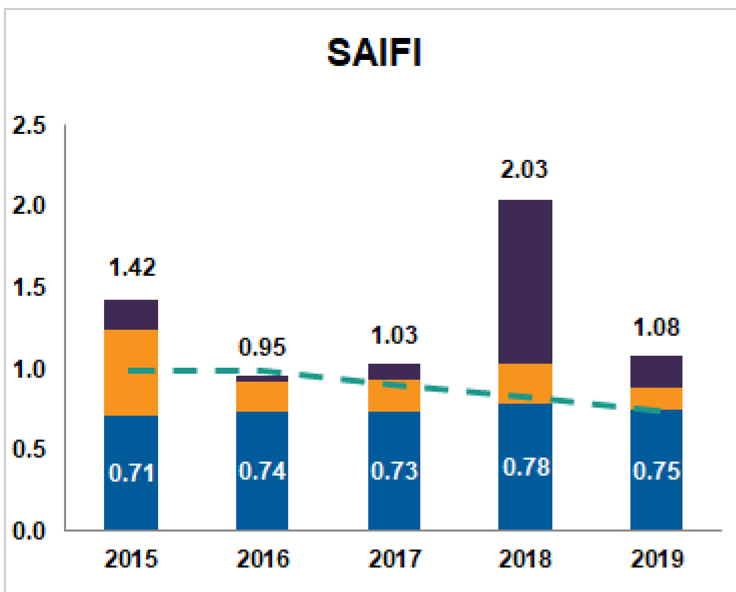
a) Are 2019 results available?

   i) If yes, please provide an updated figure that includes the 2019 results.

RESPONSE:

a) Yes, 2019 results are available and are included in Figure A.

Figure A – SAIFI Reliability Performance



INTERROGATORY RESPONSE - OEB-76

2-Staff-21

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / pp. 62-63 of 374v

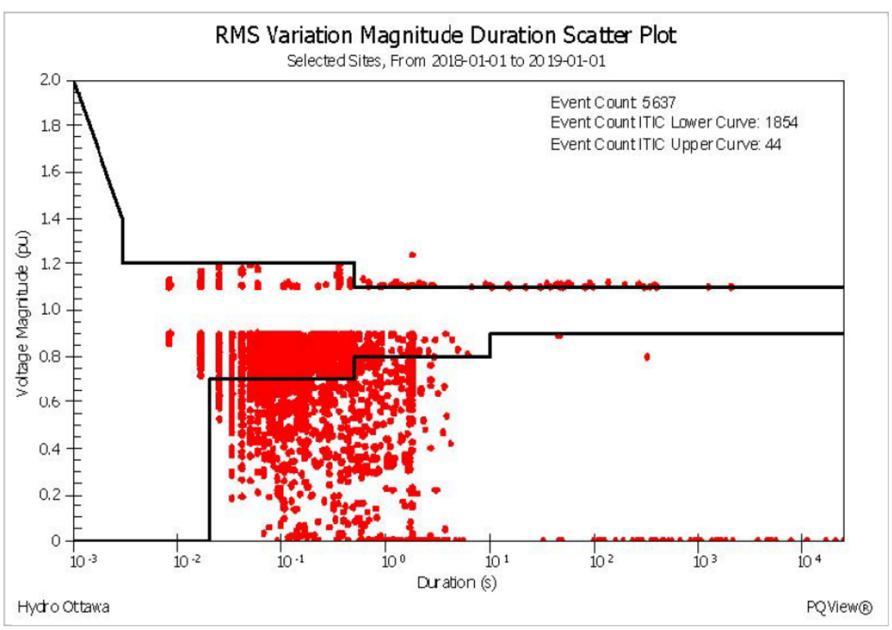
SUBJECT AREA: Reliability

Preamble:

Regarding its System Average Root Mean Square (RMS) Variation Frequency Index results, Hydro Ottawa stated:

> As indicated in Figure 4.7, there were 5,637 [variation] events recorded in 2018. Of these, 44 fell within the prohibited region. Of the 44 prohibited events, five were due to events on Hydro Ottawa's system. There were no known customer impacts from these short duration RMS events. Hydro Ottawa continues to track and monitor SARFI events.

Figure 4.7 – 2018 Power Quality Events ITIC Curve



Question(s):

a) Is Hydro Ottawa planning to take any steps to address the causes of the 5 prohibited events recorded in 2018 caused by factors in its system?

b) Are there any steps Hydro Ottawa can take to mitigate events similar to those caused by factors outside of Hydro Ottawa's system?

c) Has Hydro Ottawa assigned an economic value to the power quality issues?
   i) If yes, please provide details.

d) In Figure 4.7, how many sites are measured and how were the selected sites chosen?

RESPONSE:

a) Yes, Hydro Ottawa undertook a root cause investigation into each of the five prohibited events recorded in 2018 which originated from distribution system faults. The utility implemented corrective actions resulting from the investigations.

b) No, Hydro Ottawa already continuously monitors power quality events originating from both the distribution system and the transmission system. Hydro Ottawa regularly addresses issues and collaborates to find solutions to mitigate future events with customer connections on the distribution system and with Hydro One Networks on the transmission system.

c) No, Hydro Ottawa has not assigned any economic value to power quality issues.

d) Figure 4.7 of Exhibit 2-4-3: Distribution System Plan includes data for 120 power quality meters. Sites are selected based on locations at stations with wholesale meters.

INTERROGATORY RESPONSE - OEB-77

2-Staff-22

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 64 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding its cost efficiency indicator, Hydro Ottawa stated:

> The target of the cost efficiency indicator is to achieve 100% completion of the annual planned work within the approved budget.
>
> The yearly Cost Efficiency is shown in Table 4.8.

Table 4.8 – Cost Efficiency

KPI	Target	2014	2015	2016	2017	2018
Cost Efficiency	100%	94%	94%	94%	95%	113%

Question(s):

a) Please explain when and how the "approved budget" input used in this calculation is established.

b) Are there circumstances in which the approved budget is later changed? If yes, please explain.

c) For the cost efficiency metric, please confirm if a figure below 100% indicates that total costs are less than all costs associated with completion of all projects identified in the "approved budget".
   i) If no, please describe how the Cost Efficiency metric is calculated.

d) Please discuss whether Hydro Ottawa would consider including this Cost Efficiency metric in its proposed Custom Performance Scorecard.

RESPONSE:

a) The approved budget is established by review and approval by Hydro Ottawa's Executive Management Team and Board of Directors in the fourth quarter of the prior fiscal year.

b) No, the Board of Directors-approved budget used in the calculation of data included in Table 4.8 does not change once it has been established.

c) No, a figure below 100% does not necessarily indicate that the total costs are less than all costs associated with completion of all projects identified.
   i) The Cost Efficiency metric is calculated using the formula identified on page 64 of Exhibit 2-4-3: Distribution System Plan. The Budget System Service/System Renewal Expenditures portion of the calculation is derived from the process detailed in part (a) of the response above and does not vary in year. The Actual System Service/System Renewal Expenditures portion of the calculation is derived from all projects completed in-year. The mix of actual projects completed can vary from the budget project assumptions in response to factors such as resource availability, project reprioritization, variation in costs versus initial estimates, and project scope adjustments.

d) This metric is already included in Hydro Ottawa's performance reporting as part of the utility's annual Electricity Utility Scorecard for the OEB. However, it is reported under a performance measure of a different name – "Distribution System Plan Implementation Progress." Hydro Ottawa first began reporting against this measure on its Electricity Utility Scorecard in 2013.

INTERROGATORY RESPONSE - OEB-78

2-Staff-23

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 66 of 374

SUBJECT AREA: Labour Allocation

Preamble:

Regarding its labour allocation, Hydro Ottawa provided the following table and comment:

Table 4.10 – Labour Allocation

KPI	Target	2014	2015	2016	2017	2018
Labour Allocation	61%	60%	61%	62%	60%	58%

> The reduction observed in 2018, over 2017, results primarily from an increase in mutual aid responses undertaken in that year.

Question(s):

a) When was the target rate (of 61%) set?

b) Why is 61% considered the optimal allocation of labour costs?

c) Does Hydro Ottawa revisit the target rate periodically? Please explain.

RESPONSE:

a) The target rate is set annually as part of the budgeting and performance evaluation process. The target of 61% referenced in Table 4.10 in Exhibit 2-4-3: Distribution System Plan is for 2018 only. The annual targets for 2014-2018 are included in the table below.

Table A – Labour Allocation

KPI	2014 Target	2015 Target	2016 Target	2017 Target	2018 Target
Labour Allocation	59%	59%	58%	60%	61%

b) The labour allocation is built using the budgeted headcount mix in combination with known planned work and historical trending for unplanned work. In 2018, these factors yielded a target allocation of 61% to capital. This represents the target resources that will be working on capital activity once the plan is approved. This metric is measured to guide resource allocations and to quickly identify when actual headcount mix or mix of the type of work deviates from the plan.

c) Yes, Hydro Ottawa revisits the target rate annually.

INTERROGATORY RESPONSE - OEB-79

2-Staff-24

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 67 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding its asset performance, Hydro Ottawa provided the following table:

Table 4.11 – Defective Equipment SAIFI per 100 Customers

Asset – SAIFI x 100	Target	2014	2015	2016	2017	2018
Overhead System Assets	10.13	12.73	7.89	6.70	13.69	9.58
Station System Assets	1.77	0.33	2.28	1.88	0.20	3.65
Underground System Assets	11.17	13.28	14.89	9.26	5.09	13.26

Question(s):

a) What are the primary drivers of the inter-annual variability in these results, given that these outages are notionally caused by defective equipment?

b) Do weather events or any other external factors contribute to increased impact of defective equipment in certain years?
   i. If yes, please explain why these are classified as defective equipment events rather than storm/weather events.

c) Do the SAIFI results incorporate interruption events driven by factors outside the control of Hydro Ottawa?

i. If yes, why does Hydro Ottawa measure itself using a metric that includes events that are outside of Hydro Ottawa's control?

RESPONSE:

a) Primary drivers of the inter-annual variability in these results, given that these outages are notionally caused by defective equipment, include system configuration, fault location, and protection schema. Based on these drivers, the contribution to SAIFI can have a large variability due to the number of customers that may be affected by a fault.

b) No, weather events or any other external factors do not contribute to increased impact of defective equipment.

c) No, the SAIFI results in the referenced table do not incorporate interruption events driven by factors outside the control of Hydro Ottawa.

INTERROGATORY RESPONSE - OEB-80

2-Staff-25

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 68 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding public safety concerns, Hydro Ottawa provided the following table:

Table 4.12 – Public Safety Concerns

KPI	Target	2014	2015	2016	2017	2018
Public Safety Concerns	0	8	2	1	1	2

Question(s):

a) What constitutes a "Public Safety Concern"?

b) How are they reported and by whom?

c) How are they assessed and validated by Hydro Ottawa?

RESPONSE:

a) A Public Safety Concern is documented whenever any member of the public contacts the Electrical Safety Authority ("ESA") to report a concern they have with regards to the safety of Hydro Ottawa's distribution system. When Hydro Ottawa receives a Public Safety Concern from the ESA, it is expected to respond within a specific timeframe with a resolution.

b) Please see the response to part (a) above.

c) Public Safety Concerns are assessed by Hydro Ottawa's field crews. If the concern is found to be valid, the deficiency is corrected as soon as possible. Once the corrective action and resolution has been sent to the ESA, the matter is closed.

INTERROGATORY RESPONSE - OEB-81

2-Staff-26

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 69 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding oil spills, Hydro Ottawa provided the following table:

Table 4.13 – Annual Oil Spills

KPI	Target	2014	2015	2016	2017	2018
Oil Spilled (litres)	0	958	1,133	824	1,119	1,475
Oil Remediation ($'000s)	0	695	609	799	733	1,083

Question(s):

a) What are the primary causes of Hydro Ottawa's oil spills?

b) Are oil spills from transformers only counted if the spill escapes the oil containment structure?

c) Do all Hydro Ottawa transformers have oil containment structures?

d) How many events of oil spills occurred in each year between 2014 and 2018?

e) Does Hydro Ottawa have data available to compare its annual oil spills, in terms of litres spilled and number of oil spill events, with its LDC peers?

RESPONSE:

a) The majority of Hydro Ottawa's oil spills result from leaking padmounted electrical transformers. The primary causes of these leaks are weather effects and rusting, followed to a smaller degree by damage caused by third parties.

b) All identified oil spills from transformers are counted, even if the spill is contained.

c) No, not every Hydro Ottawa transformer has an oil containment structure.

d) The number of oil spill events that occurred in each year between 2014 and 2018 are provided in Table A.

Table A – Oil Spill Events by Year

2014	2015	2016	2017	2018
71	96	103	114	131

e) No, Hydro Ottawa does not have data available to compare its annual oil spills, in terms of litres spilled and number of oil spill events, with its electricity distributor peers.

INTERROGATORY RESPONSE - OEB-82

2-Staff-27

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 70 of 374

Exhibit 2 / Tab 4 / Schedule 3 / page 72 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding stations capacity, Hydro Ottawa stated:

> To improve System Accessibility, Stations Capacity KPIs are tracked to provide insight for larger medium- and long-term capacity needs, as well as smaller capacity deficits that may be solved through load transfers.

Regarding its stations exceeding their planned capacity, Hydro Ottawa provided the following table:

Table 4.14 – Stations Exceeding Planning Capacity

KPI	Target	2014	2015	2016	2017	2018
SEPC %	≤5%	14%	13%	10%	9%	16%
Count		13	11	9	8	15

Question(s):

a) Does Hydro Ottawa have a target station capacity factor (average load / rated capacity)?

b) Does a low capacity factor indicate that assets are underutilized?

c) In Table 4.14, what caused the spike in 2018?

d) Is the 2019 SEPC% available for Table 4.14?

RESPONSE:

a) Hydro Ottawa's target station capacity factor is 50%, assuming the station has N-1 contingency available and that redundant station equipment has equivalent nameplate capacity.

b) A low capacity factor may indicate underutilization; however, the historical and forecasted demand trends for a station's supply region must be taken into account.

For example, new stations in high-growth regions typically have lower capacity factors during the initial years post-energization, as the newly-installed capacity is intended to service long-term projected growth. Terry Fox MTS, which was energized in 2014, had a capacity factor of approximately 19% one year post-energization, 27% in 2018, and is forecasted to reach 45% by 2028.

Legacy Hydro Ottawa stations that have low capacity factors are typically found in the 4kV supply region, where demand has decreased over time as intensification and new developments are transferred to the 13kV system.

c) The 2018 summer peak was influenced by summer temperatures exceeding historical norms. For further details, please refer to part (c) of the response to interrogatory OEB-69.

Regarding Table 7.1 of Exhibit 2-4-3: Distribution System Plan, five stations included in the 2018 Stations Exceeding Planning Capacity ("SEPC") metric experienced minor overloads, and were not present under SEPC in previous years. With a cooler summer in 2019, SEPC returned to normal levels. Hydro Ottawa calculates SEPC using actual demand, rather than weather-normalized.

d) Table A provides the SEPC percentage for 2019.

Table A – Stations Exceeding Planning Capacity

KPI	Target	2014	2015	2016	2017	2018	2019
SEPC %	≤5%	14%	13%	10%	9%	16%	**9%**
Count		13	11	9	8	15	**8**

INTERROGATORY RESPONSE - OEB-83

2-Staff-28

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / pp. 75-76 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding its feeder capacities, Hydro Ottawa provided the following Table:

Table 4.18 – Cable Planning Ratings

Voltage (kV)	Typical Egress Cable	8-hour Loading Limit (A)	Cold Load Limit (A)	Planning Limit (A)*	Limiting Factor
4.16	5kV, 4/0 Cu PILC	330	300	300	Coordination between Lo-set instantaneous protection and cold/hot load pick-up
8.32	15kV, 500 MCM Cu XLPE	870	300	300	Coordination between Lo-set instantaneous protection and cold/hot load pick-up
12.47	15kV, 500 MCM Cu XLPE	870	350	350	Coordination between Lo-set instantaneous protection and cold/hot load pick-up
13.2	15kV 500 MCM Cu PILC	510	400	255	Ability to provide adequate back-up capability for neighbouring circuits
27.6	29kV, 750 MCM Al XLPE	620	400	310	Ability to provide adequate back-up capability for neighbouring circuits
27.6	29kV, 1000 MCM Al XLPE,	685	400	340	Ability to provide adequate back-up capability for neighbouring circuits

*Planning Limits may change from above based on specific feeder configurations.

The rated capacity is defined as the egress cable 8-hour loading limit. If the circuits are loaded above this limit for longer than eight hours it will cause overheating and accelerated loss of life.

Question(s):

a) Why is the planning limit set by the ability to provide adequate back-up capability for neighbouring circuits for 13.2 kV and 27.6 kV feeders and not feeders operating at other voltages?

b) If egress cables are often the limiting factor for this KPI, does this indicate that Hydro Ottawa's standard egress cable sizes are too small to adequately support the connected feeders?

c) How is egress cable size selected?

RESPONSE:

a) The planning limit is set by the ability to provide adequate back-up capability for neighbouring circuits for 13.2kV and 27.6kV because they have larger amounts of connected load and customers. Hence, they rely on available backups to minimize reliability impacts in an N-1 contingency at the feeder level. Feeders operating at 8.32kV and 12.47kV also have the ability to back up neighbouring circuits, but are limited by cold/hot load pickup and coordination. Feeders operating at 4kV depend on up to two dedicated backup circuits, and have less of a reliability impact since they supply few customers.

b) Egress cables being the limiting factor is not synonymous with being undersized. Hydro Ottawa sizes egress cables to adequately supply all connected feeders.

c) Egress cable sizes are standardized by system voltage taking into consideration protection coordination limitations, back-up capability, breaker ratings, and duct size. 500MCM copper conductor is used on systems where the existing duct sizes can only accommodate up to this size and can be paired with a parallel run of cable if the required ampacity needs to be increased. 1000MCM aluminum conductor is used where duct size is not limited and provides comparable capacity to the 556MCM overhead trunk conductor (685A vs 700A). Once normal or contingency loading levels exceed the egress limitations, a new feeder or reconfiguration of the existing feeders is required to support loading.

INTERROGATORY RESPONSE - OEB-84

2-Staff-29

EXHIBIT REFERENCE:

Exhibit 2 / Tab 4 / Schedule 3 / page 77 of 374

SUBJECT AREA: Distribution System Plan

Preamble:

Regarding unit cost metrics, Hydro Ottawa provided the following table:

Table 4.22 – Unit Cost Metrics (as per Appendix 5-A)

Metric Category	Metric	1-Year Cost (2018)	5-Year Average (2014-2018)
Cost	Total Cost per Customer	$803	$664
	Total Cost per km of Line	$46,678	$38,634
	Total Cost per MW	$186,762	$158,146
CAPEX	Total CAPEX per Customer	$544	$412
	Total CAPEX per km of line	$31,616	$23,970
O&M	Total O&M per Customer	$259	$252
	Total O&M per km of line	$15,062	$14,663

Question(s):

a) What is causing the unfavourable unit cost trends?

b) Does Hydro Ottawa anticipate these unfavourable trends to continue over the forecast period?

RESPONSE:

a) The unfavourable unit cost trends are largely caused by increased capital expenditure in 2018, as summarized on page 265 of Exhibit 2-4-3: Distribution System Plan. This includes the following:
   - Underspending in the Facilities Renewal Program ("FRP") over the first three years, with the majority of spend happening in 2018;
   - Delays in some station projects (i.e. Merivale Station, Richmond South Station, and South Nepean MTS) over the first three years, with increased spending in 2018; and
   - Increased spending in the Corrective Renewal Program from 2015-2020 due to the following:
     - An increase in the required interventions identified through the distribution inspection programs; and
     - Severe weather events which occurred in 2018.

b) Hydro Ottawa does not anticipate these unfavourable trends to continue and expects the trending to improve in the 2023-2025 forecast period, as suggested by the declining future capital expenditures shown in Figure 8.1 on page 268 of Exhibit 2-4-3: Distribution System Plan.