IN THE MATTER OF the *Ontario Energy Board Act, 1998*, Schedule B to the *Energy Competition Act, 1998*, S.O. 1998, c.15;

AND IN THE MATTER OF an Application by Toronto Hydro-Electric System Limited for an Order or Orders approving or fixing just and reasonable distribution rates and other charges, effective May 1, 2015 to December 31, 2019.

The Applicant, Toronto Hydro-Electric System Limited (referred to in this application as the "Applicant, "Toronto Hydro", "THESL", the "Company" or the "Utility"), is a corporation incorporated under the *Business Corporations Act*, (Ontario), and is licensed by the Ontario Energy Board (the "OEB") under licence number ED-2002-0497 to distribute electricity in the City of Toronto.

Toronto Hydro hereby applies to the OEB pursuant to section 78 of the *Ontario Energy Board Act, 1998* (the "OEB Act") as amended, for approval of its proposed

1) electricity distribution rates and other charges effective May 1, 2015; and
2) custom Price Cap Index ("Custom PCI") framework to set distribution rates effective for the period January 1, 2016 to December 31, 2019, and the rates and charges resulting from it.

This application is prepared in accordance with the following OEB documents:

1) Filing Requirements for Electricity Distribution Rate Applications issued by the OEB on November 14, 2006 under file number EB-2006-0170, and updated on July 17, 2013 (the "Filing Requirements"); and

2) Report of the Board: Renewed Regulatory Framework for Electricity Distributors: A Performance - Based Approach, issued by the OEB on October 18, 2012 under file numbers EB-2010-0377, EB-2010-0378, EB-2010-0379, EB-2011-0043 and EB-2011-0004 (the "RRFE Report").

This application is supported by pre-filed written evidence, which may be amended from time to time, prior to the OEB's final decision on this application.

I. FORM OF HEARING REQUESTED

Toronto Hydro requests that this application be disposed of by way of an oral hearing.

II. PROPOSED EFFECTIVE DATE

The applicant requests that the OEB make its Rate Order effective May 1, 2015, notwithstanding that the OEB's Decision with Reasons approving or fixing these rates and other charges may not be delivered until after that date. In the alternative, the Applicant requests an interim Order making the Applicant's current distribution rates and charges effective on an interim basis as of May 1, 2015 and establishing an account to recover any differences between the interim rates and the actual rates effective May 1, 2015 based on the OEB's Decision and Order.

III. PROPOSED DISTRIBUTION RATES AND OTHER CHARGES

The Tariff of Rates and Charges proposed in this application is identified in Exhibit 8, Tab 3, Schedule 3. In addition to the evidence in support of those rates and charges for 2015 test year, Toronto Hydro also files with this application evidence in support of its Custom Incentive Rate-Setting ("Custom IR" or "CIR") framework and the rates resulting from it.

IV. PROPOSED DISTRIBUTION RATES ARE JUST AND REASONABLE

For all the reason set out in this application. Toronto Hydro submits that the proposed distribution rates and other charges are just and reasonable.

V. SPECIFIC RELIEF REQUESTED

With this application, Toronto Hydro requests:

1) Approval of 2015 base revenue requirement as proposed in Exhibit 6, Tab 1. For greater clarity, this includes:

a) cost of capital and debt to fund rate base, as set out in Exhibit 2A;
b) revenue offset forecasts, as set out in Exhibit 3, Tab 2; and
c) operations, maintenance and administration expenses, as set out in Exhibit 4A,
d) a depreciation expense, as set out in Exhibit 4B, Tab 1; and
e) payments in lieu of taxes, as set out in Exhibit 4B, Tab 2;

2) Approval of 2015 electricity distribution rates and charges as proposed in Exhibit 8, including a number of credits to customers. In particular:

a) base distribution rates as set out in Exhibit 8, Tab 1, Schedule 1;
b) rate riders as set out in Exhibit 9, Tab 3, Schedule 1; and
c) Specific Service Charges as set out in Exhibit 8, Tab 2, Schedule 1.

3) Approvals related to deferral and variance accounts as proposed in Exhibit 9. In particular:

a) to dispose of balances in existing deferral and variance accounts as at December 31, 2013 as detailed in Exhibit 9, Tab 1, Schedule 1;

b) approval of the continuation of existing deferral and variance accounts, as set out in Exhibit 9, Tab 1, Schedule 1;

c) relief from having to record amounts to Retailer Cost Variance Accounts as set out in Exhibit 9, Tab 1, Schedule 1; and

d) approval of four new deferral and variance accounts as proposed in Exhibit 9, Tab 1, Schedule 1: /C

   i) a variance account in respect of externally-initiated plant relocations and expansions;

   ii) a variance account in respect of derecognition losses;

   iii) a variance account to record the difference between the actual costs of approved eligible investments and the revenue received from the IESO relating to Provincial Rate Protection amounts; and

   iv) a deferral account in respect of costs and savings related to the mandatory transitioning of certain customers to monthly billing. /C

4) Approval of the rate-setting formula and related elements, as proposed in Exhibit 1B, Tab 2, Schedule 3.

5) Approval to implement rate year synchronization effective January 1, 2016, as proposed in Exhibit 8, Tab 1, Schedule 1.

6) Approval of annual reporting as proposed in Exhibit 1B, Tab 2, Schedule 6;

7) Deferral of the Incremental Capital Module true-up from EB-2012-0064, and approval to bring forward a separate application in 2015 as proposed in Exhibit 2A, Tab 9, Schedule 1.

8) Other items or amounts that may be requested by the Applicant in the course of the proceeding, and such other relief or entitlements as the OEB may grant.

DATED at Toronto, Ontario, this 13 day of February, 2015. **/C**

Applicant: **TORONTO HYDRO-ELECTRIC SYSTEM LIMITED** ("Toronto Hydro")

14 Carlton Street
Toronto, Ontario
M5B 1K5

Signed by:

Daliana Coban, Lead Regulatory Counsel **/C**

- Appendix to Legal Application -

Title of Proceeding:	An Application by TORONTO HYDRO-ELECTRIC SYSTEM LIMITED for an Order or Orders approving or fixing just and reasonable distribution rates and other charges, effective May 1, 2015 to December 31, 2019.
Applicant's Name:	Toronto Hydro-Electric System Limited ("THESL")
Application Address:	14 Carlton Street Toronto, Ontario M5B 1K5
Applicant's Counsels:	Charles Keizer, Torys LLP, LSUC# 34135D Crawford Smith, Torys LLP, LSUC# 42131S Daliana Coban, THESL, LSUC# 62139A
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2015 – 2019 CUSTOM IR FRAMEWORK INTRODUCTION

The purpose of this schedule is to provide a brief overview of the documents contained in the Exhibit 1B, Tab 2, which describe the key elements of Toronto Hydro's Custom Incentive Rate-Setting (Custom IR) application. The evidence sets out Toronto Hydro's proposal for and justification of the Custom IR framework underlying this application, and provides references to other supporting evidence throughout the Application.

Exhibit 1B, Tab 2 consists of eight schedules:

1) **Schedule 1, Introduction** (this document)
2) **Schedule 2, Alignment with OEB Guidance:** Describes how Toronto Hydro's Custom IR application aligns with the OEB's guidance in the Renewed Regulatory Framework for Electricity (RRFE) report and Chapters 2 and 5 of the Filing Requirements for Electricity Distribution Rate applications.
3) **Schedule 3, Rate Framework:** Details Toronto Hydro's proposed rate-setting framework , including the custom Price Cap Index approach to setting rates for the 2016-2019 period, following the establishment of 2015 base rates through a traditional test year approach.
4) **Schedule 4, Capital Investment (and Appendices):** Provides an overview of Toronto Hydro's Distribution System Plan (DSP), the utility's approach to capital planning, and Toronto Hydro's operating environment, which presents certain planning and work execution challenges. This schedule also includes a third-party review of Toronto Hydro's DSP, performed by Navigant Consulting Inc. (Navigant).
5) **Schedule 5, Efficiency, Productivity and Continuous Improvement (and Appendices):** Centralizes Toronto Hydro's evidence in support of the adequacy of its past and future productivity levels, describes Toronto Hydro's approaches to performance measurement and continuous improvements, and provides references

to other parts of the application where productivity and efficiency initiatives are described in more detail. This schedule also includes a third-party econometric benchmarking study of Toronto Hydro's total costs and reliability conducted by Power System Engineering Inc. (PSE).

6) **Schedule 6, Annual Reporting:** Provides information about the scope and manner of the annual reporting activities that Toronto Hydro proposes to undertake over the 2015-2019 Custom IR period.
7) **Schedule 7, Customer Engagement (and Appendices):** Details the utility's approach to customer engagement both in the ordinary course of its operations, as well as for this application, particularly relating to the DSP.
8) **Schedule 8, Stakeholder Consultation (and Appendices):** Describes Toronto Hydro's approach to, and results of, the stakeholdering activities undertaken in preparing this application.

ALIGNMENT WITH OEB GUIDANCE

1. OVERVIEW

The purpose of this schedule is to describe how Toronto Hydro's 2015-2019 Custom Incentive Rate-Setting ("Custom IR" or "CIR") application aligns with the Ontario Energy Board's ("OEB") guidance contained within the Renewed Regulatory Framework for Electricity Distributors, and the Filing Requirements (together, "OEB Guidance").

Specifically, in preparing this application, Toronto Hydro has considered the tenets of the Report of the Board "Renewed Regulatory Framework for Electricity Distributors: A Performance-Based Approach" issued October 18, 2012 (the "RRFE Report"), as well as Chapters 2 and 5 of the OEB's Filing Requirements for Electricity Distribution Rate applications issued July 17, 2013 (the "Filing Requirements").

Toronto Hydro has applied this approach understanding that aside from Chapter 5 of the Filing Requirements, there are no specific filing requirements for the CIR applicants. However, and as discussed in more detail below, Toronto Hydro's view is that the RRFE Report clearly conveys a number of key policy and mechanistic/administrative components of the OEB's expectations for CIR applications. These include the form of the rate-setting mechanism, areas of focus for the enquiry, and the scope and nature of evidence filed in support of the applications.

Toronto Hydro's view is that, in addition to substantive reasons to follow OEB Guidance, doing so also aids in the utility's application being accessible and digestible to the OEB, intervenors and the public. In particular, Toronto Hydro's Custom IR application aligns with OEB Guidance as follows:

1) The mechanism of the CIR Rate-Setting Framework;
2) The scope and nature of productivity evidence, including benchmarking;

3) Capital planning and implementation performance measures;
4) Evidence of customer engagement on the proposed capital investments;
5) A Distribution System Plan ("DSP") that conforms to Chapter 5 of Filing Requirements;
6) A program-based presentation of the Operations, Maintenance & Administration ("OM&A") expenditures; and
7) General adherence to Chapter 2 of the Filing Requirements.

Table 1 below provides a brief overview of these seven aspects.

Table 1: OEB Guidance Addressed in Toronto Hydro's 2015-2019 CIR Application

	OEB Guidance	Toronto Hydro's 2015-2019 CIR Application	Evidence Reference
1	A Custom Index rate-setting model, incorporating benefit-sharing through a Productivity Factor and a Stretch Factor, using the OEB's Inflation and Productivity analysis.[3]	OEB Guidance Addressed. The Application is based on a Custom Index rate-setting approach, incorporating the elements of the OEB's PCI framework, and the results of the OEB's inflation and productivity analysis.	Exhibit 1B, Tab 2, Schedule 3. Exhibit 1B, Tab 2, Schedule 5.
2	CIR productivity evidence should enable a sufficiently rigorous assessment of adequacy of the past and future productivity levels.[4] CIR applicants are expected to provide benchmarking evidence in support of reasonableness of their cost forecasts.[5]	OEB Guidance Addressed. The application includes a review of the utility's past productivity achievements, a Custom Total Cost and Reliability Econometric Benchmarking study, along with specific examples of current and anticipated productivity/efficiency initiatives and the utility's	Exhibit 1B, Tab 2, Schedule 5, and Appendices.

[3] RRFE Report at page 13.
[4] RRFE Report at page 70.
[5] RRFE Report at page 13, Table 1.

	OEB Guidance	Toronto Hydro's 2015-2019 CIR Application	Evidence Reference
		corporate culture of productivity.	
3	DSP filings must be supported by Performance Measures covering Customer-Oriented Performance, Cost Efficiency / Effectiveness of Planning and Implementation, and Asset / System Performance.[6]	OEB Guidance Addressed. Toronto Hydro's DSP includes 12 capital performance measures that the utility proposes to track and report on over the CIR timeframe. The measures address all three specific OEB-mandated categories.	Exhibit 2B, Section C.
4	Applications must showcase the applicants' efforts to engage their customers on their capital plans and planning processes.[7]	OEB Guidance Addressed. Toronto Hydro's application details the steps taken by the utility to engage its customers on the proposed DSP, along with the results of these engagements.	Exhibit 1B, Tab 2 Schedule 7
5	CIR applicants are required to file a DSP as specified in Chapter 5 of the OEB's Filing Requirements.[8]	OEB Guidance Addressed. Toronto Hydro's DSP has been prepared according to the Chapter 5 requirements.	Exhibit 2B and Appendices.
6	Applicants should showcase their year over year variance analyses based on their OM&A programs.[9]	OEB Guidance Addressed. Toronto Hydro Historical, Bridge and Test Year OM&A expenditures are presented on a	Exhibit 4A.

[6] Filing Requirements, Chapter 5 at page 11, section 5.2.3.
[7] Filing Requirements, Chapter 5 at page 15, section 5.4.2.
[8] Filing Requirements, Chapter 5 at page 7, section 5.1.3.
[9] Filing Requirements, Chapter 2 at page 27, section 2.7.

	OEB Guidance	Toronto Hydro's 2015-2019 CIR Application	Evidence Reference
		program basis.	
7	The Cost of Service Filing Requirements are relevant for Custom IR filers.[10]	OEB Guidance Addressed. Toronto Hydro's application for the 2015 Test Year is sufficiently compliant with the Chapter 2 Filing Requirements.	Exhibit 1A, Tab 3, Schedule 2 All Exhibits.

The remainder of this schedule discusses each of the above-noted elements of the RRFE guidance and the manner in which Toronto Hydro's 2015-2019 CIR application reflects this guidance in more detail. Toronto Hydro's evidence for the 2015-2019 CIR application addresses each of the above-noted OEB expectations.

2. CIR RATE-SETTING FRAMEWORK

2.1. OEB Expectations

In the RRFE Report, the OEB notes its expectation that the form of the CIR applications is to be that of a "Custom Index", covering Capital and OM&A expenditures, supplemented with a Productivity Factor, and a benefit-sharing mechanism in the form of a Stretch Factor or another construct determined on a case-by-case basis.[12]

The RRFE Report also notes that a distributor's rate trend will be set on the basis of a combination of:

- A distributor's cost, inflation and productivity forecasts;
- The OEB's productivity analysis; and
- Benchmarking to assess the reasonableness of a distributor's forecasts.

[10] RRFE Report at page 70.
[12] RRFE Report at page 13.

2.2. Toronto Hydro's Approach

As detailed in Exhibit 1B, Tab 2, Schedules 3 and 4, Toronto Hydro's proposed rate-setting model for the 2015-2019 CIR application addresses each of the above-noted OEB expectations. In particular, the utility's rate-setting model entails:

- (a) a forward test year rebasing approach to establish the 2015 Revenue Requirement and base rates; and
- (b) a Custom Index proposal for rate adjustments over the 2016-2019 period.

The Custom Index incorporates the OEB's long-standing Price Cap Index ("PCI") approach for the escalation of the OM&A portion of the 2015 Revenue Requirement over the out-years, augmented by a Custom Capital Factor ("CCF" or "C-factor") to account for the costs of forecasted capital additions over the 2016-2019 years.

The proposed Custom Index rate adjustment mechanism covers both OM&A and capital expenditures, and provides for sharing of benefits of efficiency and productivity improvements incented through the PCI framework with Toronto Hydro's customers. The values for the Inflation and Productivity Factor in the proposed Custom Index will be set on the basis of the OEB's analysis as contemplated under the 4th Generation IR rate adjustment framework. Toronto Hydro proposes a custom stretch factor that will apply the OEB's methodology, but will be set on the basis of benchmarking evidence that Toronto Hydro has filed at Exhibit 1B, Tab 2, Schedule 5 in support of the reasonableness of its cost forecasts.

Toronto Hydro submits that the proposed rate-setting framework meets the OEB's expectations as to the form, function and outcomes of the CIR rate-setting framework.

3. PRODUCTIVITY EVIDENCE AND BENCHMARKING

3.1. OEB Expectations

The RRFE Report indicates the OEB's expectation that Custom IR applications will enable "an assessment of the adequacy of past and future productivity levels."[13] Elsewhere in the RRFE Report, the OEB states that it expects to use benchmarking evidence "to assess the reasonableness of the distributor's forecasts."[14]

3.2. Toronto Hydro's Approach

As detailed in Exhibit 1B, Tab 2, Schedule 5 and the associated Appendices, Toronto Hydro's evidence for the 2015-2019 CIR application addresses each of the above-noted OEB expectations. In particular, Toronto Hydro's evidence contains detailed description of the utility's past and future productivity levels, as well as the reasonableness of the utility's 2015-2019 cost forecasts. The evidence also outlines the features of the proposed CIR rate-setting framework and its supporting elements, which in Toronto Hydro's submission, provide sufficient incentives for the utility to seek further productivity and efficiency improvements over the CIR timeframe, and to share the benefits of these improvements with its customers.

In support of the adequacy of Toronto Hydro's past and future productivity levels are: (i) a Review of Past Productivity Initiatives that recaps and quantifies, at a high level, the utility's productivity improvements since the time of Toronto Hydro's amalgamation; and (ii) a comprehensive Total Cost Econometric Benchmarking Study, evaluating the efficiency of Toronto Hydro's past and forecasted expenditures against a large sample of electric utilities in Ontario and the United States.

[13] RRFE Report at page 70.
[14] RRFE Report at page 13, Table 1.

In addition, Toronto Hydro's DSP (Exhibit 2B, Section C) contains a framework of capital performance metrics that the utility proposes to track over the CIR timeframe, consistent with section 5.1.3 in the Chapter 5 Filing Requirements. By monitoring its performance, Toronto Hydro expects to facilitate continuous improvement in the efficiency of execution in respect of capital additions and related costs.

Finally, Toronto Hydro's productivity and efficiency evidence provides specific examples of initiatives that utility is in the process of implementing, or expects to introduce over the CIR rate period.

4. PERFORMANCE MEASURES AND METRICS

4.1. OEB Expectations

Section 5.2.3 in Chapter 5 of the Filing Requirements notes the OEB's expectation for utilities to identify qualitative and quantitative measures and metrics to assess the performance of their capital planning and implementation practices as a part of their DSP filing. The Chapter 5 Filing Requirements specifically break down the measures that the utilities are expected to provide into three categories, namely:

- Customer-Oriented Performance;
- Cost Efficiency of Planning Quality and Implementation; and
- Asset / System Operation Performance.[15]

More generally, Performance Measurement and Continuous Improvement section of the RRFE Report, the OEB notes the expectation that,

> *Under the renewed regulatory framework a distributor will be expected to continuously improve its understanding of the needs and expectations of its*

[15] Filing Requirements, Chapter 5 at page 11, section 5.2.3.

customers and its delivery of services, which in turn can lead to reduced costs for customers.[16]

4.2. Toronto Hydro's Approach

Exhibit 1B, Tab 2, Schedule 5 addresses each of the above-noted OEB expectations. In Toronto Hydro's assessment, the objectives of understanding customer needs and improving service delivery processes are best supported by quantitative performance measurement tools and processes. In its evidence, Toronto Hydro accordingly showcases a number of activity-specific performance measures that the utility has put in place or plans to develop and refine over the 2015-2019 timeframe.

More specifically, in accordance with the section 5.2.3 in the Chapter 5 Filing Requirements, Section C of Toronto Hydro's DSP provides a framework of 12 performance measures related specifically to capital performance. Along with the Efficiency/Productivity measures discussed in the previous section, the proposed performance measurement framework includes measures of Customer-Oriented Performance and Asset and System Operation, thereby addressing all three measure categories outlined in the Chapter 5 Filing Requirements. The proposed measures include advanced reliability measures such as Momentary Average Interruption Frequency Index ("MAIFI"), and Feeders Experiencing Sustained Interruptions ("FESI").

[16] RRFE Report at page 55.

5. CUSTOMER ENGAGEMENT ON PROPOSED CAPITAL INVESTMENTS

5.1. OEB Expectations

Section 5.4.2 in the Chapter 5 Filing Requirements expresses the OEB's expectations that the applicants' DSP submissions be supported by information related to the distributors' efforts to engage their customers on various facets of their capital planning processes. In particular, the OEB states that distributors should provide details regarding the approach they use "to engage customers for the purpose of identifying their needs, priorities and preferences", and "the aspects of the DSP that have been particularly affected by consideration of that information."[17]

5.2. Toronto Hydro's Approach

Exhibit 1B, Tab 2 Schedule 7 of Toronto Hydro's evidence for the 2015-2019 CIR application addresses each of the above-noted OEB expectations. To facilitate customer dialogue and input, the utility developed a series of comprehensive workbooks containing customer-friendly explanations of the components of Toronto Hydro's distribution system, key issues facing its asset base, and its draft plans as to how to address these issues. The workbooks were tailored specifically towards different subsets of the utility's customers (e.g., residential and commercial), and contain a range of customer class-specific specific questions seeking feedback on the information presented in the workbook. Toronto Hydro posted its workbooks on its website and advertised them through a number of channels.

In addition to generating and seeking online feedback on its workbook, Toronto Hydro (with the assistance of its external consultant) undertook a series of focus group sessions with representatives of different customer classes, supplementing these activities with an

[17] Filing Requirements, Chapter 5 at page 15, section 5.4.2.

on-line questionnaire and a tele-survey. The evidence at Exhibit 1B, Tab 2, Schedule 7 discusses the results of these and other related customer engagement activities, and explains how the insights gained through this work relate to the utility's planned work program.

6. CAPITAL AND DISTRIBUTION SYSTEM PLAN

6.1. OEB Expectations

The RRFE Report clearly states that the OEB's expectations with respect to the nature and content of a distributor's DSP and applicable supporting materials are set out in Chapter 5 of the Filing Requirements.[19] Among other things, the Chapter 5 Filing Requirements oblige a distributor to outline: its capital planning objectives; the criteria used for planning; processes used to identify and implement alternatives; and tools and processes used to identify, select, prioritize and pace the proposed expenditures.

6.2. Toronto Hydro's Approach

Toronto Hydro's DSP, filed at Exhibit 2B of this application, addresses the above-noted OEB expectations. Each proposed capital program identified in the DSP is supported by a detailed Business Case justification that provides the following information:

- A description of the proposed capital program and its purpose;
- Primary and secondary drivers for the investments (consistent with the guidance in the Chapter 5 Filing Requirements);
- Asset lifecycle information and failure impacts (where applicable);
- Approach to the timing and pacing of investments;
- Description of program benefits, including customer value;
- Program execution approach and mitigation of associated risks; and
- Other pertinent information.

[19] RRFE Report at page 52.

For all of the applicable distribution plant programs, the DSP also includes a benefit calculation of undertaking the investments performed by the utility's Feeder Investment Model ("FIM"). The FIM received a positive review from the OEB in Toronto Hydro's Incremental Capital Module ("ICM") application:[20]

> *The Board finds that the FIM is a useful tool to compare the financial consequences of failure of aging assets to the benefits of delaying the work and to assess capital spending associated with replacement by extending service life as long as possible.*

A comprehensive discussion of Toronto Hydro's approach to asset management, capital planning and execution, that is responsive to specific requirements previously mentioned, supports the individual Business Cases in the DSP. Toronto Hydro submits that the scope and level of detail contained within the DSP provides the OEB valuable insight into the utility's capital planning and execution processes. Toronto Hydro's DSP also provides empirical support as to the need of proposed capital investments, along with information of the customer-oriented, utility-specific, and public policy outcomes underlying each proposed capital program.

7. OM&A EVIDENCE

7.1. OEB Expectations

As discussed in Chapter 2 of the Filing Requirements, the OEB is moving towards a program-focused review of the applicants' OM&A expenditures,[21] and expects applicants to present their OM&A variance analyses and other related information in a program-based format to facilitate this transition.

[20] EB-2012-0064, Partial Decision and Order (April 2, 2013) at page 21.
[21] Filing Requirements, Chapter 2 at page 27, section 2.7.

7.2. Toronto Hydro's Approach

Toronto Hydro's OM&A evidence at Exhibit 4A, Tab 2 addresses each of the above-noted OEB expectations. Specifically, the evidence provides a program-based view of the utility's historical and forecast OM&A expenditures, describes each program and its main objectives, justifies the Historical, Bridge, and Test Year expenditures, and discusses notable improvements in the areas of productivity, efficiency and service delivery. Toronto Hydro's general approach in preparing the OM&A evidence was to thoroughly explain the activities and functions comprising each program, and highlight their value to customers and the utility.

8. OEB FILING REQUIREMENTS

8.1. OEB Expectations

The RRFE Report conveys the OEB's expectation that "much of the material in Cost of Service Filing Requirements will be relevant for Custom IR filers."[22] Elsewhere in the RRFE Report, the OEB mentions that it sees merit in receiving the evidence of third-party experts while reviewing the applications under the RRFE, particularly in the area of distribution system planning.[23]

8.2. Toronto Hydro's Approach

In preparing this application, Toronto Hydro followed the Filing Requirements (where practicable and possible), in order to provide the OEB visibility into the utility's rate application in a familiar format that aids accessibility and provides the OEB a detailed view of the utility's operations and plans. Specifically, to support its evidence, Toronto Hydro has completed all the relevant Excel-based OEB appendices. Beyond the 2015 Test Year, Toronto Hydro's CIR application provides the OEB with insight into the

[22] RRFE Report at page 70.
[23] RRFE Report at page 37.

utility's proposed 2016-2019 capital expenditures to enable the determination of need and other relevant considerations, and to support the calculation of the Custom Capital Factor as proposed in the Exhibit 1B, Tab 2, Schedules 3 and 4.

Toronto Hydro's DSP is supported by a third-party review of the proposed investments and overall capital planning approaches and tools. This review was performed by Navigant and a copy of the report is filed as an Appendix to Exhibit 1B, Tab 2, Schedule 4. In addition to the Navigant Report, this application contains a number of other third-party assessments and evaluations of Toronto Hydro's operations and proposed plans.

RATE FRAMEWORK

This schedule describes the rate framework that Toronto Hydro proposes to apply for the 2015 to 2019 period.

Toronto Hydro submits that the proposed rate framework is:

- Concordant with OEB policy, and in particular with the objectives and guidance set out in the Report of the Board "Renewed Regulatory Framework for Electricity Distributors: A Performance-Based Approach" issued on October 8, 2012 (the "RRFE Report");
- Based on sound ratemaking principles; and,
- Expected to provide funding that:
  - Reconciles Toronto Hydro's significant, multi-year investment needs; and,
  - Constrains operational funding increases going forward at less than the rate of inflation.

1. SUMMARY

To better conform to the OEB's Guidance for CIR applicants, Toronto Hydro is proposing a rate framework that is a modification of the standard 4th Generation IR approach.

Year 1 is a traditional rebasing year, with costs allocated and rates set on the basis of a forecast Test Year.

Distribution rates in Years 2 through 5 are adjusted annually by a custom Price Cap Index ("PCI"):

$$\mathbf{PCI = I - X + C}$$

Where,

- "**I**" is the OEB's inflation factor, determined annually **/C**
- "**X**" is the sum of:
  - The Board's productivity factor.
  - Toronto Hydro's custom stretch factor.
- "**C**" provides funds incremental to "I – X" that are necessary to reconcile Toronto Hydro's capital need within a PCI framework.

Toronto Hydro submits that the proposed framework is concordant with OEB policy in the following respects:

- The proposed rate framework is comprehensive.
- The proposed rate framework is informed by Toronto Hydro's forecasts.
- The proposed rate framework is informed by the OEB's inflation and productivity analyses.
- The proposed rate framework is informed by benchmarking to assess the reasonableness of the Toronto Hydro's forecasts.
- The proposed rate framework includes a productivity and stretch factor.
- The proposed rate framework covers the entirety of the application's five year term.

In this way, Toronto Hydro is proposing a rate framework that differs from previous CIR filers.

2. YEAR 1: STANDARD REBASING

The first year of the proposed rate application is a standard rebasing year, consistent with the OEB's 4th Generation Incentive Rate-Setting ("4th Generation IR") approach.

Toronto Hydro developed and submitted in this application a forecast of its base revenue requirement for 2015. The utility developed forecasts of its costs based on its capital and operational plans for 2015. The Distribution System Plan ("DSP") and Operations, Maintenance & Administration ("OM&A") evidence contained in Exhibits 2B and 4A, respectively, provides the details supporting these projected costs. The calculated revenue requirement resulting from these projections is detailed in the Revenue Requirement evidence filed at Exhibit 6.

Similarly, Toronto Hydro employed the OEB's Cost Allocation model to allocate the revenue requirement to its eight rate classes and developed base distribution rates for each class. The standard rebasing approach maintains revenue-to-cost ratios for each class within the boundaries set out in the OEB's 2011 Review of Electricity Cost Allocation Policy.[1] For more information about Cost Allocation and Rate Design, please refer to Exhibits 7 and 8, respectively.

In addition to the base distribution rates, Toronto Hydro is applying to clear a number of Deferral and Variance accounts. Based on the values Toronto Hydro proposed for clearance, a number of new rate riders are proposed. These rate riders are proposed to be implemented beginning in 2015, and have various clearance time-frames. For more information about these rate riders, please refer to Exhibit 9, Tab 3.

3. YEARS 2 TO 5: CUSTOM PCI

Under 4th Generation IR, the years following a rebasing year constitute a period where distribution rates are subject to an incentive rate mechanism ("IRM"). The IRM is a formulaic approach to rate making under which distribution rates are adjusted annually using a two-component PCI:

[1] EB-2010-0219

PCI = I – X

The I-factor is intended to reflect changes to the input prices faced by the industry (i.e., inflation), while the X-factor is intended to capture changes in the productivity of the Ontario electricity distribution industry as a whole, and differences between utilities within it.

In the RRFE Report, the OEB offers alternative forms of rate making "to accommodate differences in the operations of distributors, some of which have capital programs that are expected to be significant."[2] The OEB notes that the CIR option in particular "will be most appropriate for distributors with significant large multi-year… investment commitments that exceed historical levels," whereas 4th Generation IR is more suitable for utilities with "some" incremental needs. [3] The evidence at Exhibit 1B, Tab 2, Schedule 4 and the Distribution System Plan at Exhibit 2B discuss Toronto Hydro's capital investment needs and, by extension, the appropriateness of the CIR option in greater detail.

A challenge for CIR applicants like Toronto Hydro is to reconcile their significantly large, multi-year investment commitments within a framework that concords with RRFE guidance. To this end, Toronto Hydro proposes that these needs be reconciled within a custom PCI framework that entrenches the OEB's inflation and productivity factors within a formulaic approach to adjusting distribution rates.

The following subsections discuss the retention of the inflation and productivity factors and the inclusion of the customized elements of the proposed PCI formula.

[2] RRFE Report at page 9.
[3] RRFE Report at page 14.

3.1. Inflation and Productivity Factors

In 2013, the OEB updated its standard rate adjustment parameters following a consultation process that explicitly considered: [5]

1) The development of a more Ontario-specific inflation factor;
2) The estimation of long-run Ontario electricity distribution total factor productivity ("TFP"); and,
3) The development and implementation of total cost benchmarking.

The OEB decided on a new methodology for the I-factor. The I-factor is based on a 30/70 weighting of labour and non-labour sub-indices and is updated annually. The labour sub-index is determined by changes in the average weekly earnings of Ontario workers, and the non-labour sub-index is determined by changes in the Canada Gross Domestic Product Implicit Price Index for final domestic demand.

Toronto Hydro proposes to use the OEB's I-factor in its custom PCI. As the value for the I-factor is updated annually, Toronto Hydro will incorporate the value into its custom PCI to appropriately adjust base distribution rates for the following year.

The productivity factor, one of the two X-factor components, was also updated. The productivity factor is intended to estimate the overall trend in the productivity of the electricity distribution industry in Ontario by measuring changes in TFP, defined by Pacific Economics Group as a "comprehensive measure of the extent to which firms convert inputs into outputs."[7] TFP can change over time for a number of reasons, such as change in technology, achievement in economies of scale and overall improvements in efficiency.

[5] EB-2010-0379, Report of the Board, Rate Setting Parameters and Benchmarking under the Renewed Regulatory Framework for Ontario's Electricity Distributors (December 4, 2013) [the "OEB Rate Setting Parameters Report"].
[7] Pacific Economics Group (2013), Productivity and Benchmarking Research in Support of Incentive Rate Setting in Ontario, (corrected January 24, 2014) at page 12 [the "PEG Report"].

In its report, PEG used an indexing method to estimate TFP for the Ontario distribution sector based on data from the 2002 to 2012 period.[9] This sample excluded the experience of both Toronto Hydro and Hydro One because, as a result of their large size relative to the rest of the industry, PEG determined that they were exerting a disproportionate impact on industry TFP.[10] Toronto Hydro presumes that this principle would have held if one or both had outperformed the sector on TFP.

The result of PEG's analysis that excluded both utilities suggested that industry TFP over that period grew at an average annual rate of -0.33%. That is, TFP for sector actually declined over that period. As PEG noted, not only are negative productivity factors a "theoretical possibility", it cited multiple examples of negative productivity factors in other western democracies. The Australian experience in the early 2000s is of particular interest given that negative productivity factors occurred at a time when utilities "were undertaking extensive capital investment programs," which is the state that Toronto Hydro is currently operating in.

In alignment with PEG's recommendation, the OEB ultimately adopted a zero productivity factor as a matter of policy. In Toronto Hydro's view, any departure from the value produced by the methodology chosen to produce the productivity factor represents an implicit "stretch" to the sector. In this case, the sector is expected to achieve an additional 0.33 percentage points in productivity gains relative to the sector's overall trend in TFP. This is not an immaterial amount, particularly for a utility with the capital requirements of Toronto Hydro.

Nevertheless, Toronto Hydro notes that the OEB is very clear in its guidance to applicants that its productivity factor be part of a CIR rate framework. Accordingly,

[9] PEG suggests that a 10-year horizon is the minimum required for TFP Indexing.
[10] PEG Report, *supra* note 5 at page 4.

Toronto Hydro proposes to embed the OEB's productivity with its implicit incremental stretch factor unchanged within the proposed custom PCI. /C

3.2. Custom Stretch Factor

The second component of the X-factor is an explicit stretch factor. According to the OEB, "Stretch factors promote, recognize and reward distributors for efficiency improvements relative to the expected sector productivity trend."[8] Under the current methodology, which was updated most recently in 2013, utilities are assigned one of five stretch factors. This occurs on the basis of a comparison of the utility's total costs relative to their predicted total costs. The predicted total costs are determined using a total cost econometric model developed by PEG.[9]

As part of this application, Toronto Hydro is submitting alternative total cost benchmarking, the details of which can be found in the Power System Engineering's Econometric Benchmarking Report, at Exhibit 1B, Tab 2, Schedule 5 (the "PSE Report"). The alternative total cost benchmarking model prepared by PSE for Toronto Hydro is econometric in nature (similar to PEG's model) and includes an expanded data set. The results are statistically significant and relevant to the OEB's consideration of Toronto Hydro's performance.

Accordingly, Toronto Hydro submits that this is an appropriate basis for setting its stretch factor. As noted in the PSE Report, Toronto Hydro's forecasts of its total costs are within ten percent of its predicted total costs. Utilities within this demarcation point are assigned to Group III of the OEB's benchmarking cohorts, implying a stretch factor of 0.30%. Toronto Hydro therefore proposes that the stretch factor in the proposed custom PCI framework be set at 0.30%.

[8] OEB Rate Setting Parameters Report, *supra* note 3 at page 18.
[9] OEB Rate Setting Parameters Report, *supra* note 3 at page 19.

3.3. Custom Capital Factor

The premise of the inclusion of a custom capital factor ("CCF" or "C-factor") is to reconcile the OEB's guidance that the CIR framework is best suited for utilities with significant, multi-year capital investment requirements as it is clear that the standard 4th Generation IR framework is not.

The proposed C-factor is designed as a rate adjustment mechanism that is directly proportional to the degree of capital investment required by Toronto Hydro, as detailed in its DSP (Exhibit 2B). It is comprised of two sub-components that serve two primary functions:

- Reconcile Toronto Hydro's capital investment need in a price cap framework; and,
- Return to ratepayers the funding already provided for capital through the standard "I – X" increase.

The first sub-component, termed "C_n", is determined as the percent change in total revenue requirement that is attributable to changes in capital-related revenue requirement – that is, depreciation, return on equity, interest and PILs/taxes. Changes in capital-related revenue requirement are based on forecast changes in average annual rate base, associated depreciation and taxes. Tax rates and the cost of capital are maintained at their 2015 levels, consistent with the standard 4th Generation IR treatment.

For Toronto Hydro, C_n in 2016 would be determined on the following basis:

Table 1: Calculation of C_n ($ Millions)

Revenue Requirement Component	2015	2016
Interest	81.8	90.9
ROE	123.3	137.1
Depreciation	208.2	220.0
PILs/Taxes	24.4	14.9
Capital-related RR	**437.8**	**465.0**
OM&A	269.5	
Revenue Offsets	(46.1)	
Total RR	**661.2**	

/C

The change in forecast capital related revenue requirement from 2015 to 2016 is $27.2 million ($465.0 million minus $437.8 million). The total revenue requirement in 2015 is $661.2. C_n for 2016 is therefore:

/C

$$C_n = (465.0 – 437.8) / 661.2 = \mathbf{4.11\%}.$$

Calculating C_n for years beyond 2016 requires a forecast of total revenue requirement. Capital-related revenue requirement, as noted, is determined on a forecast basis. By contrast, OM&A and Revenue Offsets are assumed to increase by "I – X". A more detailed discussion of why this is the case can be found towards the end of this schedule.

Applying this method results in values for C_n that are summarized in Table 2 based on inputs summarized in Table 3. These values represent the amount by which base rates would need to be increased to fund Toronto Hydro's capital needs over the course of the rate term.

Table 2: Values of C_n for 2016 to 2019 (in percent)

	2016	2017	2018	2019
C_n	4.11	7.57	6.68	5.01

/C

Table 3: Inputs for the determination of C_n for 2016 to 2019

Revenue Requirement Component	2015	2016	2017	2018	2019
Interest	81.8	90.9	98.2	103.7	109.0
ROE	123.3	137.1	148.0	156.3	164.3
Depreciation	208.2	222.0	248.2	266.7	287.2
PILs/Taxes	24.4	14.9	22.8	40.5	46.7
Capital-related RR	**437.8**	**465.0**	**517.3**	**567.2**	**607.3**
OM&A	269.5	273.3	277.1	281.0	284.9
Revenue Offsets	(46.1)	(46.8)	(47.4)	(48.0)	(48.7)
Total RR	**661.2**	**691.5**	**747.0**	**800.1**	843.5

/C

With the inclusion of C_n in the custom PCI, Toronto Hydro would receive sufficient funding for its capital needs as presented in the DSP. However, the "I – X" increase retained in the custom PCI from the standard 4th Generation IR framework does provide some degree of incremental funding. Absent additional constraints, the custom PCI formula would risk over-funding relative to Toronto Hydro's capital need because a portion of the "I – X" increase could be committed to capital expenditures. Toronto Hydro proposes to remove this risk through an automatic distribution rate reduction captured in the C-factor to constrain the impact of C_n.

An efficient and principled approach is to reduce the C-factor by a capital-related proportion of "I – X". Toronto Hydro proposes that this "scaling" factor be determined

by the proportion of the total revenue requirement that is capital-related. Termed S_{cap}, this scaling factor is calculated in the following fashion:

$$S_{cap} = \text{(capital-related revenue requirement)} / \text{(total revenue requirement)}$$

Table 4 provides the information necessary for calculating S_{cap} for 2015.[10]

Table 4: Revenue Requirement Components for Determining S_{cap}

Revenue Requirement Component	2015
Interest	81.8
ROE	123.3
Depreciation	208.2
PILs/Taxes	24.4
Capital-related RR	**437.8**
OM&A	269.5
Revenue Offsets	(46.1)
Total RR	**661.2**

/C

In 2015, the capital-related revenue requirement is forecast to be $437.8 million and the total revenue requirement $661.2 million. S_{cap} for 2015 would therefore be:

/C

$$S_{cap} = 437.8 / 661.2 = 0.662 \ (66.2\%)$$

The same methodology for calculating S_{cap} is proposed for all years from 2016 to 2019.

[10] This particular example is for illustrative purposes only as the custom PCI, for which the term is required, does not apply until 2016. S_{cap} values for 2016 cannot be calculated at this time because S_{cap} is sensitive to changes in the inflation factor as determined annually by the OEB. Toronto Hydro proposes, for the purpose of determining its annual rates, to calculate S_{cap} using this methodology once the value of the inflation factor for the following year is determined by the OEB.

The above discussion sets out the variables that constitute Toronto Hydro's proposed custom PCI. The resulting PCI value for a given year would, in keeping with IRM principles, be applied to all distribution rates from the previous year to determine the following year's distribution rates.

To summarize, the custom PCI is determined in the following fashion:

$$\mathbf{PCI = I - X + C, \text{ or}}$$

$$\mathbf{PCI = I - X + C_n - S_{cap} * (I - X)}$$

Where,

- "**I**" is the OEB's inflation factor, determined annually
- "**X**" is the sum of:
  - The OEB's productivity factor of 0.0%
  - Toronto Hydro's custom stretch factor, applying the OEB's methodology to Toronto Hydro's alternative benchmarking model
- "**C**" is difference of:
  - $\mathbf{C_n}$, a reflection of Toronto Hydro's capital investment need
  - $\mathbf{S_{cap} * (I - X)}$, an offsetting adjustment required to ensure that the C-factor provides funding only in excess of what is already provided for capital through "I – X"

While the custom PCI cannot be calculated until the OEB determines its inflation factor for a given year, it is possible to develop scenarios using the methodology detailed in this schedule and an assumed value for the I-factor.

Table 5 shows the components of the custom PCI based on an assumed I-factor of 1.7%, its value at the time of writing, and the corresponding value of the custom PCI. This is

the same I-factor that is used to calculate bill impacts, which can be found in Exhibit 8, Tab 7, Schedule 1. Again, this is for illustrative purposes only.

Table 5: Custom PCI Values Assuming An Inflation Factor Of 1.7% For Each Year

CUSTOM PCI COMPONENT (%)	2016	2017	2018	2019
I	1.7	1.7	1.7	1.7
X - productivity	0.0	0.0	0.0	0.0
X - custom stretch	-0.3	-0.3	-0.3	-0.3
C_n	4.11	7.57	6.68	5.01
S_{cap}	67.2	69.3	70.9	72.0
Custom PCI	**4.57**	**8.00**	**7.09**	**5.41**

/C

4. CONCLUSION

4.1. Policy Concordance

The manner in which the rate framework submitted as part of this CIR application concords with the OEB's guidance in the RRFE Report is fundamental to Toronto Hydro's development of this application. Toronto Hydro has deliberately chosen a framework that includes a standard rebasing year followed by four years of a custom PCI framework as the mechanism by which to have its distribution rates set over the course of the term. It has done so because, in Toronto Hydro's view, this represents an approach that is appropriately concordant with RRFE guidance. Where this proposed rate framework does not explicitly conform to that guidance, it is Toronto Hydro's view that its approach is reasonable and appropriate. One such example is the explicit inclusion of the OEB's inflation and productivity factors into the custom PCI formula, which goes further than the OEB's guidance to be "informed" by those analyses.

In considering its custom approach, Toronto Hydro was particularly concerned with the contents of Table 1 in the RRFE Report.[14] This table provides some of the clearest indications of the OEB's expectations for prospective applicants.

The remainder of this sub-section outlines how Toronto Hydro's proposed rate framework concords with the guidance provided in that table.

The proposed rate framework is comprehensive. Toronto Hydro proposes that the rate framework commence with a standard rebasing year to determine base distribution rates, followed by four years where a custom PCI governs incremental changes to those base rates. Base rates are determined by a base revenue requirement that relates to both capital and operating costs.

The proposed rate framework is informed by Toronto Hydro's forecasts. The rebasing year offers the opportunity to test capital and operating expenditures. The C-factor in the custom PCI is calculated based on a forecast of Toronto Hydro's capital-related revenue requirement during the remainder of the term, which can also be tested. This incorporates expectations of inflation for its capital costs, as set out in Exhibit 2A, Tab 6, Schedule 1.

The proposed rate framework is informed by the OEB's inflation and productivity analyses. The proposed rate framework is not only informed by, but firmly entrenches the OEB's productivity analyses through the inclusion of its inflation and productivity factors within the custom PCI formula. While not a requirement, Toronto Hydro believes this is to be a distinctive element of its proposed rate framework.

[14] RRFE Report at page 13.

The proposed rate framework is informed by benchmarking to assess the reasonableness of the distributor's forecasts. The custom PCI incorporates a custom stretch factor that applies the OEB's methodology of assigning stretch factors but that uses Toronto Hydro's alternative total cost benchmarking model, as set out in Exhibit 1B, Tab 2, Schedule 5.

The proposed rate framework includes a productivity and stretch factor. In Toronto Hydro's view, the inclusion of the OEB's productivity factor and a custom stretch factor into the custom PCI meets the OEB's expectations for the sharing of (financial) benefits.

The proposed rate framework covers the entirety of the application's five year term.

4.2. Implications for OM&A and Revenue Offsets

An intended implication of this custom PCI framework is the amount of funding that is as a matter of consequence provided for OM&A and Revenue Offsets. Tested in the standard rebasing fashion in 2015, the custom PCI provides incremental funding for OM&A and Revenue Offsets in the amount of only "I – X". Consider the entire custom PCI formula, with the C-factor in its constituent parts: **/C**

$$CPI = I - X + C_n - S_{cap}*(I - X)$$

By design, C_n reconciles Toronto Hydro's capital investment need, leaving the remaining terms to fund increases in OM&A and Revenue Offset. In simplified terms, that amount is:

$$(1 - S_{cap}) * (I - X)$$

This can be restated in another fashion, using S_{OMA} and S_{RO} to respectively represent the ratio of OM&A and Revenue Offsets to the total revenue requirement (recall this is identical to how S_{cap} was determined). Given that capital costs, OM&A and Revenue Offsets are the only three components of total revenue requirement, the above formula can be restated as follows:

$$(1 - S_{cap}) * (I - X) =$$
$$(S_{OMA} + S_{RO}) * (I - X) =$$
$$S_{OMA} * (I - X) + S_{RO} * (I - X)$$

In other words, the custom PCI proposed by Toronto Hydro embeds the expectation that the components of rates attributable to OM&A and Revenue Offsets will continue to increase by only "I – X". If actual OM&A was to increase at a rate greater than this, or if Revenue Offsets were to stagnate, Toronto Hydro is at risk for under-recovery through the 2015 to 2019 period. Toronto Hydro is aware of this risk and, in response to the incentives created by its proposed custom PCI, expects to continue to seek efficiency and productivity improvements throughout the rate term.

5. OFF-RAMPS

Toronto Hydro proposes to apply the OEB's existing policy with respect to off-ramps. The RRFE Report indicates that each rate-setting method includes a trigger mechanism with an annual return on equity dead band of plus or minus 300 basis points, at which point a regulatory review may be initiated.

6. SPECIFIC Z-FACTOR

One of the incremental challenges inherent in a five-year rates plan is the need to contend with prudent, material unexpected costs. As part of this application, and as explained in further detail throughout this application,[15] Toronto Hydro has proposed restrained/constrained OM&A and capital funding requests. The funding that Toronto Hydro seeks in this application is expected to enable the utility to carry out the work that it has detailed in these programs. That funding, by definition, is not sufficient to address the prudent costs of material events that are outside the control of the utility and which have not been forecasted. Accordingly, Toronto Hydro proposes to incorporate within its rate framework the availability of Z-factor relief, which Toronto Hydro understands is available to CIR filers as part of the RRFE framework.

As detailed below, while Toronto Hydro expects that a request for relief would be exceptional, the utility has prepared a list of possible categories of specific events which it believes could occur, and where they occur, may necessitate additional funding during the term of the plan. The criteria that would apply to the consideration of any of these events would be the standard Z-factor criteria, most recently articulated by the OEB in its Decision on Enbridge Gas Distribution Inc.'s 2014 to 2018 Rate application.[16] To the extent the OEB has concerns with respect to the possible availability of Z-factor treatment in relation to any of the items set out below, Toronto Hydro asks the OEB to identify these concerns as part of this application.

6.1. Events with a one-time impact

One-time events that Toronto Hydro anticipates may give rise to a Z-factor application include:

- Extreme weather events such as storms;

[15] See for instance the Financial Planning Process (Exhibit 1C, Tab 3, Schedule 2), Overview of OM&A Expenditures (Exhibit 4A, Tab 1, Schedule 1) and Capital Expenditures Planning Process Overview (Exhibit 2B, Section E2).
[16] EB-2012-0459, Decision with Reasons (July 17, 2014) at pages 18-21.

- One-time investments made at the behest of government direction and outside of management's control, such as:
  - Smart Meter implementation;
  - Conservation and Demand Management;
  - Regional Planning; and,
- Any other one-time events that meet the Z-factor criteria.

6.2. Events with an ongoing impact

Material ongoing events that Toronto Hydro anticipates may give rise to a Z-factor application include:

- Changes to IESO market rules;
- Changes to OEB codes or policies, such as distributor rate design;
- Changes to income tax rates or laws;
- Changes to accounting frameworks or technical standards;
- Changes resulting from new or amended government legislation, regulation or policy, such as environmental laws;
- Ongoing investments made at the behest of government direction and outside of management's control; and,
- Any other ongoing events that meet the z-factor criteria.

In the interest of regulatory efficiency, Toronto Hydro proposes that any application for this treatment would compartmentalize the material impacts of the event, as opposed to undergoing a full regulatory review of the rate framework. For one-time events, Toronto Hydro would propose a targeted rate rider. For events with an ongoing impact, Toronto Hydro would propose an adjustment to the base revenue requirement if one was to occur in 2015, or else to the custom PCI.

CAPITAL INVESTMENT

1. INTRODUCTION

As described in Exhibit 1B, Tab 2, Schedule 3, Toronto Hydro has filed this rate-setting application under the Custom Incentive Rate-Setting ("Custom IR" or "CIR") framework primarily due to the significant multi-year investment needs of Toronto's electrical distribution system. Toronto Hydro's 2015-2019 Distribution System Plan ("DSP")[1] captures, in detail, the capital requirements of the system. These investment commitments exceed historical levels, as demonstrated in the DSP and as further indicated in the Navigant Report (Appendix B to this Schedule).

Toronto Hydro's DSP reflects the utility's need for a sustained period of capital investment to replace and expand the City's aging distribution infrastructure. Toronto Hydro's infrastructure investment plans over the five year forecast period (2015-2019) are aligned to the longer-term objective of reaching a "steady-state" of annual investment that is intended to (1) enhance value for money over the service life of all distribution assets and (2), through a restrained or paced approach to achieving "steady-state", provide greater predictability in customer bill impacts in the short and long-term. The steady-state concept is further explained in Section 2 of this schedule.

Toronto Hydro's proposed capital program:

I. represents a minimum level of appropriate investment given the distribution system's needs;
II. reflects customers' preferences;
III. will be delivered productively and efficiently; and
IV. ultimately delivers long-term value for ratepayers.

[1] Exhibit 2B

Each of these aspects of the evidence is summarized in Section 2 of this schedule, with reference to other, more detailed sections of the application where appropriate.

Section 3 of this schedule describes Toronto Hydro's presentation of its capital evidence in the form of the 2015-2019 DSP and the compliance of the DSP with the Chapter 5 Filing Requirements.[2]

2. 2015-2019 CAPITAL PLAN OVERVIEW

I. Responding to System Needs

Toronto Hydro's most recent rate setting application was the 2012-2014 Incremental Capital Module ("ICM") application (EB-2012-0064), which was approved the by Ontario Energy Board ("OEB") and covered the years immediately preceding the 2015-2019 Custom IR application. Toronto Hydro has identified its proposed capital programs in the DSP based on feedback from customers and by leveraging the same asset management tools and processes authorized by the OEB in EB-2012-0064.[3] Toronto Hydro's Asset Management Process – including its various components, decision tools and inputs and outputs – is discussed in detail in Section D3 of the DSP.

Continuity With Respect to the 2012-2014 IRM/ICM Application

With reference to the previous application, Toronto Hydro's proposed 2015-2019 DSP capital programs can be classified according to two general categories:

1) capital programs that are a direct continuation of activities described in one of the OEB-approved ICM segments, and
2) capital programs that are incremental to the ICM segments approved by the OEB.

[2] Filing Requirements for Electricity Distribution Rate applications (July 17, 2013) [the "Filing Requirements"].
[3] EB-2012-0064, Partial Decision and Order (April 2, 2013) at page 21.

The following tables summarize the proposed capital programs in the 2015-2019 DSP and their relationship to activities that were described in the 2012-2014 ICM application. The DSP programs listed in Table 1 are direct continuations of the activities featured in the ICM segments listed in the left column. The forecasted expenditures for the programs listed in Table 1 are comparable to those in the ICM period, with some programs tapering off or coming to an end within the 2015-2019 period, and other programs increasing marginally to address greater investment needs in the 2015-2019 period.

Table 1: DSP Capital Programs that are Continuations of OEB-Approved ICM Segments

Approved ICM Segment	DSP Program
B1 Underground Infrastructure	E6.1 Underground Circuit Renewal
B2 PILC Piece-outs and Leakers	E6.2 PILC Piece-outs and Leakers
B3 Handwell Replacement	E7.5 Handwell Upgrades
B4 Overhead Infrastructure	E6.4 Overhead Circuit Renewal
B5 Box Construction	E6.7 Box Construction Conversion
B6 Rear Lot	E6.6 Rear Lot Conversion
B7 Polymer SMD-20 Switches	E7.6 Polymer SMD-20 Switch Renewal
B8 SCADA-Mate R1 Switches	E6.8 SCADA-Mate R1 Switch Renewal
B9 Network Vaults and Roofs	E6.9 Network Vault Renewal
B10 Fibertop Network Units	E6.10 Network Unit Renewal[4]
B11 ATS and RPB	E6.11 Legacy Network Equipment Renewal
B12 Station Power Transformers	E6.14 Stations Power Transformer Renewal
B13-1 Municipal Substation Switchgear Replacement	E6.13 Stations Switchgear Renewal
B13-2 Transformer Station Switchgear Replacement	E6.13 Stations Switchgear Renewal

[4] E6.10 Network Unit Renewal includes fibertop units as well as an additional network unit type in need of renewal.

Approved ICM Segment		DSP Program
B14 Stations Circuit Breakers		E6.15 Circuit Breaker Renewal
B17 Copeland TS		E7.9 Stations Expansion[5]
B18 HONI Capital Contributions		E6.13 Stations Switchgear Renewal
		E7.9 Stations Expansion
B20 Metering		E5.1 Metering
B21 Externally Initiated Plant Relocations and Expansions		E5.3 Externally Initiated Plant Relocations and Expansions
C1 Operations Portfolio Capital	Customer Connections Capital	E5.2 Customer Connections
	Mitigating System Operating Constraints	E5.4 Load Demand
	Critical Stations Work	E6.17 Stations Ancillary Systems
		E6.18 Station Building Infrastructure
		E6.19 Stations DC Battery Renewal
	Reactive Capital	E6.20 Reactive Capital
	Worst Performing Feeder Capital	E6.21 Worst Performing Feeders
C2 Information Technology Capital		E8.4 IT Hardware Refresh
		E8.5 IT Software
C3 Fleet Capital		E8.1 Fleet and Equipment Services
C4 Buildings and Facilities Capital		E8.2 Facilities Management and Security

/C

The proposed capital programs in Table 2 are incremental to the approved OEB segments from the ICM application. Toronto Hydro added these programs to the 2015-2019 capital plan to accomplish one of three overarching objectives:

1) maintain responsiveness to public policy objectives and fulfil mandated service obligations (e.g., Generation Protection, Monitoring and Control);
2) address system and non-system renewal needs identified in the course of the utility's long-term planning review process (e.g., Underground Legacy

[5] Segment B17 was narrowly focused on the first phase of Copeland TS; E7.9 Stations Expansion includes carry-over expenditures from Copeland TS Phase 1, new Copeland TS Phase 2 investments and other capacity expansion investments at the station level over the five year forecast period. /C

Infrastructure; Distribution System Communications Infrastructure; Voice Radio System Upgrade; ERP Implementation); or

3) achieve targeted system and operational objectives in light of evolving system conditions (e.g., Local Demand Response; Design Enhancement; Program Support) and opportunities to enhance customer value (e.g., Feeder Automation, Operating Centers Consolidation)

Table 2: Proposed DSP Capital Programs that are Incremental to the OEB Approved ICM Segments

Proposed DSP Program
E5.5 Generation Protection, Monitoring and Control
E6.3 Underground Legacy Infrastructure
E6.12 Network Circuit Reconfiguration
E6.16 Stations Control & Monitoring
E6.22 Distribution System Communications Infrastructure
E7.1 Contingency Enhancement
E7.2 Design Enhancement
E7.3 Feeder Automation
E7.4 Overhead Momentary Reduction
E7.7 Downtown Contingency
E7.8 Customer Owned Station Protection
E7.10 Local Demand Response
E7.11 Energy Storage Systems
E8.3 Operating Centers Consolidation
E8.6 ERP Implementation
E8.7 Voice Radio System Upgrade
E8.8 Program Support

Proposed Level of Spending

Figure 1 shows (i) the historical level of capital spending from 2006 to 2011, (ii) the

average of actual and forecasted spending over the three-year ICM period (2012-2014), and (iii) the proposed level of capital spending for each of the five years in the planning horizon.

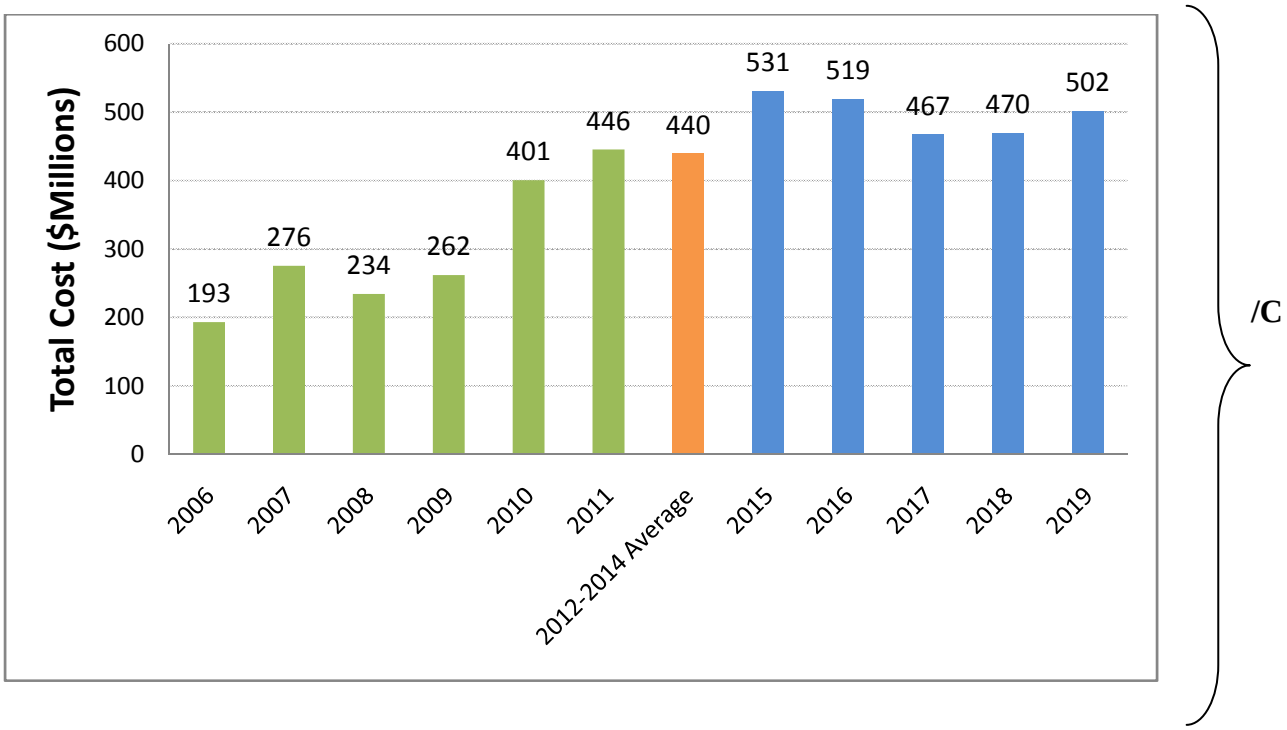

Figure 1: Historical and Forecast Capital Spending (2006 – 2019) ($Millions)

As shown above, the average annual level of investment for the proposed capital program is comparable to the level of spending during the utility's 2012-2014 IRM/ICM period. This level of investment is required primarily to address the large and growing backlog of end-of-life and obsolete assets, while also addressing critical system challenges and operational needs at a pace and in a manner that moderates rate increases and is consistent with customer preferences. As demonstrated in the DSP, and as validated in the Navigant Report (Appendix B of this Schedule), this level of spending is the minimum level of investment that is appropriate during the 2015-2019 period given the distribution system's needs. While the optimal level of capital investment exceeds the

work proposed in Toronto Hydro's DSP, the level of capital investment in this application balances the needs of the distribution system against a level of rate increases that customers accept.[6]

Distribution System Pressures

Toronto's distribution system faces a number of significant and evolving challenges that necessitate the proposed level of investment. These challenges include the following.

- **Aging and Obsolete Assets:** The foremost pressure driving distribution system investment commitments is the large and growing backlog of in-service assets that are operating beyond their expected useful lives. An estimated 26% of Toronto Hydro's existing distribution system asset base will be operating beyond end-of-life as of 2015. Assuming a run-to-failure approach (i.e., executing a capital expenditure plan with minimal proactive asset replacement), Toronto Hydro expects an additional 7% of the existing asset base to reach end-of-life by 2020. Without a sufficient proactive renewal program, the utility anticipates that reliability will deteriorate over the five-year CIR period, and the growing backlog of end-of-life assets will become more difficult to manage beyond 2019 without potentially unacceptable rate increases and execution challenges due limited resource availability.

  With respect to system renewal, Toronto Hydro's long-term asset management policy objective is to eventually arrive at an optimal percentage of assets operating beyond end-of-life in order to minimize the overall lifecycle costs of operating the system over time. This concept is discussed in Section IV of this schedule.

[6] For further discussion of Toronto Hydro's customer engagement program, please refer to the evidence at Exhibit 1B, Tab 2, Schedule 7 and the 2015-2019 DSP (Exhibit 2B).

The forecasted improvement in reliability associated with Toronto Hydro's proposed capital plan[7] is due in part to the ongoing renewal of aging and defective assets, but is also an expected outcome of a small number of targeted, high-value programs such as Feeder Automation[8] and Design Enhancement[9], which are incremental to the OEB-approved ICM segments and are expected to deliver significant improvements in system performance and operational efficiency for a level of annual investment that is relatively small compared to the typical renewal program. These cost-effective interventions allow Toronto Hydro to enhance customer value through system reliability and efficiency improvements while executing core renewal programs at a moderate pace.

- **Economic Growth and Capacity Constraints:** Toronto's distribution system continues to face utilization pressures related to economic growth and evolving system use. These pressures include existing and emerging capacity constraints in several areas throughout the system due to load and customer growth; an anticipated increase in large externally initiated plant relocation projects (e.g., Metrolinx light rail transit projects); and the expectation that connected distributed generation ("DG") capacity will more than triple over current levels during the five-year CIR period.

As explained in Exhibit 9, Tab 1, Toronto Hydro is requesting a minimal, below-forecast baseline amount of rates funding for externally initiated plant relocations work as part of the DSP, representing less than the utility's forecast annual spending on externally initiated projects. This below-forecast amount is accompanied by a variance account to capture annual differences from this base amount. The utility's expectation is that this approach will allow it to fund

[7] Exhibit 2B, Section E2.
[8] Exhibit 2B, Section E7.3.
[9] Exhibit 2B, Section E7.2.

Table 1: Calculation of C_n ($ Millions)

Revenue Requirement Component	2015	2016
Interest	80.2	89.5
ROE	120.9	135.0
Depreciation	206.5	221.6
PILs/Taxes	24.0	14.7
Capital-related RR	**431.6**	**460.9**
OM&A	269.5	
Revenue Offsets	(46.1)	
Total RR	**655.0**	

/C

The change in forecast capital related revenue requirement from 2015 to 2016 is $29.3 million ($460.9 million minus $431.6 million). The total revenue requirement in 2015 is $655.0. C_n for 2016 is therefore:

/C

$$C_n = (460.9 – 431.6) / 655.0 = \mathbf{4.47\%}.$$

Calculating C_n for years beyond 2016 requires a forecast of total revenue requirement. Capital-related revenue requirement, as noted, is determined on a forecast basis. By contrast, OM&A and Revenue Offsets are assumed to increase by "I – X". A more detailed discussion of why this is the case can be found towards the end of this schedule.

Applying this method results in values for C_n that are summarized in Table 2 based on inputs summarized in Table 3. These values represent the amount by which base rates would need to be increased to fund Toronto Hydro's capital needs over the course of the rate term.

Table 2: Values of C_n for 2016 to 2019 (in percent)

	2016	2017	2018	2019
C_n	4.47	8.25	6.68	5.01

/C

Table 3: Inputs for the determination of C_n for 2016 to 2019

Revenue Requirement Component	2015	2016	2017	2018	2019
Interest	80.2	89.5	98.4	103.9	109.2
ROE	120.9	135.0	148.3	156.6	164.6
Depreciation	206.5	221.6	248.3	266.8	287.4
PILs/Taxes	24.0	14.7	22.6	40.3	46.5
Capital-related RR	**431.6**	**460.9**	**517.6**	**567.5**	**607.6**
OM&A	269.5	273.3	277.1	281.0	284.9
Revenue Offsets	(46.1)	(46.8)	(47.4)	(48.0)	(48.7)
Total RR	**665.0**	**687.5**	**747.4**	**800.5**	843.8

/C

With the inclusion of C_n in the custom PCI, Toronto Hydro would receive sufficient funding for its capital needs as presented in the DSP. However, the "I – X" increase retained in the custom PCI from the standard 4th Generation IR framework does provide some degree of incremental funding. Absent additional constraints, the custom PCI formula would risk over-funding relative to Toronto Hydro's capital need because a portion of the "I – X" increase could be committed to capital expenditures. Toronto Hydro proposes to remove this risk through an automatic distribution rate reduction captured in the C-factor to constrain the impact of C_n.

An efficient and principled approach is to reduce the C-factor by a capital-related proportion of "I – X". Toronto Hydro proposes that this "scaling" factor be determined

by the proportion of the total revenue requirement that is capital-related. Termed S_{cap}, this scaling factor is calculated in the following fashion:

$$S_{cap} = \text{(capital-related revenue requirement)} / \text{(total revenue requirement)}$$

Table 4 provides the information necessary for calculating S_{cap} for 2015.[10]

Table 4: Revenue Requirement Components for Determining S_{cap}

Revenue Requirement Component	2015
Interest	80.2
ROE	120.9
Depreciation	206.5
PILs/Taxes	24.0
Capital-related RR	**431.6**
OM&A	269.5
Revenue Offsets	(46.1)
Total RR	**655.0**

/C

In 2015, the capital-related revenue requirement is forecast to be $431.6 million and the total revenue requirement $655.0 million. S_{cap} for 2015 would therefore be:

/C

$$S_{cap} = 431.6 / 655.0 = 0.659 \ (65.9\%)$$

The same methodology for calculating S_{cap} is proposed for all years from 2016 to 2019.

[10] This particular example is for illustrative purposes only as the custom PCI, for which the term is required, does not apply until 2016. S_{cap} values for 2016 cannot be calculated at this time because S_{cap} is sensitive to changes in the inflation factor as determined annually by the OEB. Toronto Hydro proposes, for the purpose of determining its annual rates, to calculate S_{cap} using this methodology once the value of the inflation factor for the following year is determined by the OEB.

Toronto Hydro has a long-standing productivity culture which has evolved over time in line with emerging operating challenges, changes in government policy and expectations underlying the regulatory regimes that govern the utility's operations. Toronto Hydro's framework of current and planned productivity processes and initiatives emphasize increasingly sophisticated performance measurement tools, a bottom-up approach to identifying new efficiency opportunities, and streamlining labour-intensive processes through technological improvements and rationalization of supporting infrastructure. For a comprehensive overview of the evidence that Toronto Hydro has filed this application to enable the OEB to evaluate the utility's ongoing efforts regarding efficiency and productivity improvements, please refer to Exhibit 1B, Tab 2, Schedule 5.

Performance Measurement in the DSP

With specific reference to the OEB's Chapter 5 Filing Requirements, Toronto Hydro has proposed a series of measures for monitoring and encouraging continuous improvement with respect to the execution of 2015-2019 capital expenditure plan in the DSP. These metrics are listed in Table 3 below.

The measures cover several dimensions of the utility's capital planning and implementation processes or pertain directly to the outcomes of such processes, motivated by customer needs, regulatory compliance obligations, or corporate efficiency objectives. Several of these measures are already in a mature state and will be tracked during the five-year planning horizon; others are in a relatively nascent state, to be developed and refined over the course of the CIR term as part of Toronto Hydro's commitment to productivity and continuous improvement.

the same I-factor that is used to calculate bill impacts, which can be found in Exhibit 8, Tab 7, Schedule 1. Again, this is for illustrative purposes only.

Table 5: Custom PCI Values Assuming An Inflation Factor Of 1.7% For Each Year

CUSTOM PCI COMPONENT (%)	2016	2017	2018	2019
I	1.7	1.7	1.7	1.7
X - productivity	0.0	0.0	0.0	0.0
X - custom stretch	-0.3	-0.3	-0.3	-0.3
C_n	4.47	8.25	6.68	5.01
S_{cap}	67.1	69.3	70.9	72.0
Custom PCI	**4.94**	**8.68**	**7.09**	**5.41**

/C

4. CONCLUSION

4.1. Policy Concordance

The manner in which the rate framework submitted as part of this CIR application concords with the OEB's guidance in the RRFE Report is fundamental to Toronto Hydro's development of this application. Toronto Hydro has deliberately chosen a framework that includes a standard rebasing year followed by four years of a custom PCI framework as the mechanism by which to have its distribution rates set over the course of the term. It has done so because, in Toronto Hydro's view, this represents an approach that is appropriately concordant with RRFE guidance. Where this proposed rate framework does not explicitly conform to that guidance, it is Toronto Hydro's view that its approach is reasonable and appropriate. One such example is the explicit inclusion of the OEB's inflation and productivity factors into the custom PCI formula, which goes further than the OEB's guidance to be "informed" by those analyses.

possible.

Due to a number of factors, executing capital work in Toronto is necessarily a complex and dynamic process. While executing a planned work program, external factors, such as work permit timing, weather, re-prioritization of jobs due to system needs, etc., will inevitably arise. In many of these situations, good utility practice and prudent work planning is best served by: (a) specific projects within a capital program being substituted, on a like-for-like basis, with other projects; and (b) specific projects being added to, or deferred from a given program. These numerous externalities mean that Toronto Hydro cannot plan with certainty of execution timing or costs in advance, and attempting to do so would actually be an imprudent use of time and ratepayer funds. Toronto Hydro has prepared a detailed overview of the practical execution challenges that the utility often faces during development and execution of its capital program. This overview can be found in Appendix A to this schedule ("Execution Challenges").

Despite its best efforts to anticipate and plan around these challenges, Toronto Hydro must be prepared to respond to circumstances "on the ground" in order to make the most efficient use of resources and ultimately deliver the best value for its customers. From a planning perspective, this means that the utility must be able to substitute, defer and add projects in the annual work program in any given year, to accommodate the operational realities that it encounters in the course of executing its work program.

Toronto Hydro's planning process attempts to mitigate these issues in various ways, but ultimately the execution of any given project can be changed by various external forces that cannot be predicted with certainty. Over time, these issues can generally be mitigated – some work can be advanced if other work must be delayed – but the forecast work for any given year may change depending on circumstances, and as a result the aggregate work in service in a given year may change.

While specific projects may change in scope, cost and timing during the CIR period, the utility has confidence that, over the course of the five-year planning horizon, the overall work program presented in the DSP can be executed as described. Prudence dictates that Toronto Hydro must retain the flexibility to execute an optimal mix of work in each given year. It is not possible to predict the specific work that will comprise Toronto Hydro's execution work program in 2019, but the utility can be certain that, over the five years of the application, this level of work, as set out in the DSP programs, is required.

IV. The proposed capital program ultimately delivers long-term value for customers

As discussed in part I of this section, the pace of investment during the 2015-2019 period is driven by system needs. The underlying need and establishment of pacing is described in detail in Toronto Hydro's asset management policy and processes[13] and in the capital expenditure plan.[14] At a high level, the long-term objective of Toronto Hydro's asset management policy is to achieve an optimal "steady-state", in which the number of assets that are past their economic end-of-life (explained below) is minimized. When the system is in that theoretical steady state, the total operating (or lifecycle) costs associated with the broader in-service asset population are minimized, meaning that customer value is maximized.

The concept of a steady state is based on Toronto Hydro's risk-based optimization approach to investment planning, which relies largely on use of the utility's Feeder Investment Model ("FIM") and other age and condition based information. Using these tools, Toronto Hydro determines the optimal asset renewal timing based on the economic end-of-life criteria for each asset. An asset reaches its economic end-of-life when the risk cost of continuing to operate the asset, which increases over time, becomes equal to or

[13] Exhibit 2B, Section D.
[14] Exhibit 2B, Section E.

greater than the cost of replacing the asset, which decreases over time. An asset management policy that strives to replace the broader population of assets at this "optimal intervention time" ensures that, on average, Toronto Hydro is minimizing the total costs of operating the system, thereby maximizing customer and utility value derived from the assets.

Theoretically, Toronto Hydro's risk based model defines the ideal "steady state" as the scenario where, on a system level, no assets are allowed to operate beyond their optimal intervention time, and all assets are replaced at exactly the optimal intervention time and no earlier (except those that inevitably fail prematurely). (Practically speaking, Toronto Hydro must group asset replacements into efficiently executable projects; therefore, the actual "steady state" will necessarily involve replacing a small percentage of assets before end-of-life and allowing a small percentage of assets to operate beyond end-of-life.)

As discussed in part I of this section, Toronto's distribution system currently features a high percentage of assets operating beyond end-of-life. Clearing this backlog and achieving "steady state" as quickly as possible is ideal for the utility and customers to the extent that it will minimize the duration that the distribution system is operating in an unbalanced state with higher than necessary aggregate lifecycle costs. However, in reality, clearing this backlog in one year (i.e., the economically ideal approach), or even over the duration of the five-year CIR period, would not be feasible as it would feature levels of investment that do not immediately align to Toronto Hydro's current resources and system constraints. For these reasons, Toronto Hydro's DSP is based on a paced execution strategy, which represents the minimum level of investment appropriate given system needs during the 2015-2019 period.

If Toronto Hydro were to continue at the proposed annual average pace of investment beyond 2019, the system is forecasted to reach steady state by approximately 2037. This paced approach has the advantage of more predictable and tolerable bill increases during the 2015-2019 period and alignment with Toronto Hydro's immediate execution capacity. The paced strategy also helps to ensure more predictable bill impacts and system performance beyond the achievement of steady-state, due to the more gradual or dispersed approach to clearing the backlog of end-of-life assets.

3. STRUCTURE AND COMPLIANCE OF TORONTO HYDRO'S DSP

Toronto Hydro has organized its 2015-2019 Distribution System Plan ("DSP")[15] in a manner consistent with Chapter 5 of the Filing Requirements. Toronto Hydro has worked to provide DSP content that aligns with the spirit of the RRFE Report, as expressed through the Chapter 5 Filing Requirements, and that allows the OEB to evaluate all aspects of the utility's detailed and integrated five-year capital plan within the context of this Customer IR application. Key features of the DSP include the following.

- The five major sections of Toronto Hydro's DSP adhere to the organizational structure outlined in sections 5.2 and 5.3 of Chapter 5. This includes:
  - **Section A**: DSP Overview
  - **Section B**: Coordinated Planning with Third Parties
  - **Section C**: Performance Measurement for Continuous Improvement
  - **Section D**: Asset Management (AM) Process
  - **Section E**: Capital Expenditure Plan

[15] Exhibit 2B.

- The contents of these chapters are in substantial compliance with the various filing requirements listed throughout the applicable sections of Chapter 5.

- Toronto Hydro has organized its capital investments in accordance with the OEB's prescribed investment categories (System Access, System Service, System Renewal and General Plant) and has provided figures and analysis for historical and forecasted expenditures in these categories as well as for System Operating & Maintenance ("System O&M") expenditures.

- To address the OEB's incremental filing requirements for "Material Investments"[16], Toronto Hydro has further grouped investment activities within the investment categories into 46 *capital programs*, which are analogous, and in many cases identical, to the "segments" filed in the utility's 2012-2014 ICM application. Programs consist of investment activities or groups of discrete projects that are similar in nature and purpose and that share similar justifications and business case elements.

- Each capital program is further defined by a single 'trigger' driver and a number of secondary drivers. These drivers generally align to the example drivers provided by the OEB in Chapter 5.17 The trigger driver indicates the primary reason that a particular program must be carried out. However, in some cases, secondary drivers may be as or more consequential than the trigger driver (e.g., safety as a secondary driver).

- Each capital program contains detailed information that can be used to assess Toronto Hydro's investment plans in light of the OEB's specific evaluation criteria (i.e., Customer Value, Reliability, Efficiency, Safety, etc.). To aide in this

[16] Filing Requirements, Chapter 5 at section 5.4.5.2.
[17] Filing Requirements, Chapter 5 at section 5.1.1, Table 1.

evaluation, Toronto Hydro has provided summary tables of anticipated program benefits in the description of each program.

- Toronto Hydro has complied with specific requirements in Chapter 5 that are meant to promote integrated planning, including, for example:
    - a complete analysis of regional planning considerations and their effect on the DSP;
    - a system capability assessment for renewable energy generation;
    - details on System O&M expenditures and their relationship to capital investments;
    - forecasted smart grid development; and
    - identified sources of cost savings during the forecast period.

APPENDIX A: EXECUTION CHALLENGES

When executing its capital program Toronto Hydro must be prepared to respond to circumstances "on the ground" in order to make the most efficient use of resources and ultimately deliver the best value for its customers. From a planning point of view, this means that the utility must be able to substitute, defer and add projects in the annual work program in any given year to accommodate the operational realities that it experiences in the course of its work program.

This appendix describes aspects of Toronto Hydro's service territory that add complexity to the execution of large capital projects.

1. WEATHER AND THE NATURAL ENVIRONMENT

A number of unpredictable work execution challenges arise due to severe weather and conditions that exist in the natural environment. These challenges are difficult to assess in advance of undertaking projects and planned work.

1.1. Weather

Unpredictable weather events have the potential to impact work execution in two ways. One is that extreme weather (e.g., very cold or very hot temperatures) over a prolonged period can cause projects to be delayed. Second, severe weather such as extreme wind, ice, and rain events can cause wide-spread damage to Toronto Hydro's distribution system and necessitate the redirection of crews from planned work to emergency storm restoration activities.

An example of a prolonged weather pattern that impacted Toronto Hydro's ability to execute planned work was the cold experienced during the 2013-2014 winter. Due to

frost, snow, and ice, utilities are generally challenged to conduct civil and pole installation work during winter months. To manage this reality, Toronto Hydro conducts significant amounts of civil work in the lead up to winter and then does not schedule much civil work until winter conditions subside. Given that the 2013-2014 winter was particularly long and cold, resulting in frost settling deep into the ground, civil work was substantially delayed in 2014. The long winter not only impacted capital projects but also maintenance programs such as insulator washing that cannot be conducted in cold temperatures.

Examples of severe weather events causing damage to Toronto Hydro's distribution system occurred on October 29, 2013 (i.e., Hurricane Sandy) and December 21, 2014 (i.e., the 2013 Ice Storm). In response to the damage caused by these severe weather events, Toronto Hydro redirected all available crews, including crews working on planned projects and programs, to emergency storm restoration activities. In any given year, the amount of time and delay caused by severe weather can vary but can equate to weeks of construction time across all projects as evidenced in 2013, where planned work was delayed due to flooding in July, strong winds in August and October, and the ice storm in December. Some of the delays were overcome by working overtime at an increased cost to individual projects.

1.2. The Natural Environment

The natural environment can create challenges due to issues that may involve soil conditions, ground water, and vegetation. Prior to work execution, Toronto Hydro attempts to plan for the natural environment and mitigate associated risks. However, it is not uncommon for even the most prudently planned projects to be delayed due to challenges associated with the natural environment.

One set of challenges that are encountered are related to the soil conditions found on sites

where planned projects are being conducted. For example, it is not uncommon for Toronto Hydro to encounter shale while installing poles. When identified, shale must be removed using a jackhammer causing delays and increased costs. Toronto Hydro tries to mitigate the risk of unexpected shale using test pits prior to commencing work. These test pits require additional site visits and are costly. As a result, it is prudent for Toronto Hydro to only undertake such costs if there is a reason to believe that soil conditions are abnormal.

Another risk related to soil conditions is soil contamination. The removal and disposal of contaminated soil can be particularly costly and can delay projects if identified during work execution. An example of a where this did occur is the Strachan TS Civil Egress project. This project was required to construct cable chambers and underground conduits from Hydro One's Strachan TS to Manitoba Drive. When construction commenced, contaminated soil was discovered and the additional cost for soil testing, removal, and disposal was approximately $400,000.

A second set of challenges associated with the natural environment is excessive ground water. Although de-watering needs are anticipated for many projects including those that are undertaken close to Lake Ontario, these needs can significantly exceed estimates and contingencies. In some cases, de-watering specialists need to be called in during work execution as excessive and unanticipated water levels delay the project and increase costs. Further complications can arise if soil is contaminated and de-watering is required. Finally, Toronto Hydro may need to obtain a permit from the City of Toronto to pump water out and to release it in the City's sewer system. An example of excessive de-watering needs occurred during the civil construction work associated with the Copeland TS project. Some of the conduits and cable chambers being built as part of this project resulted in approximately $375,000 in additional costs for excessive de-watering.

Beyond the de-watering challenges described above, complications can also arise with de-watering that is required following heavy rains. For example, the heavy rain on July 9, 2013 and the flooding that ensued caused work at a number of Toronto Hydro's construction sites across the City to stop until de-watering could be completed. Project schedules as a result were generally delayed for approximately four days each.

A third set of challenges associated with the natural environment is related to vegetation, specifically trees. Many of Toronto Hydro's overhead and underground construction projects have the potential to negatively impact trees and as part of the design and estimating process, Toronto Hydro takes into consideration precautions to protect trees. These precautions are often conditions of obtaining permits and approvals from the City of Toronto. These conditions are enforced by City inspectors that may visit sites during construction. In many cases, precautions must be expanded upon or altered during work execution based on conditions that are identified at the time. For example, Toronto Hydro may need to dig deeper, alter trench routes, or construct unplanned tree tunnels during work execution to avoid damaging a tree. These requirements can and do result in delays and additional costs.

2. EXTERNAL STAKEHOLDERS

Work execution challenges often arise as a result of external stakeholder needs, preferences, requests, and actions. External stakeholders include the City of Toronto, Toronto Hydro's customers, Hydro One, and a wide variety of other organizations and individuals that have an interest in the work that Toronto Hydro undertakes. Challenges that are related to external stakeholders can greatly impact project and program schedules and costs as illustrated by the examples that follow.

2.1. The City of Toronto

A significant stakeholder in all work that Toronto Hydro undertakes is the City of Toronto. The vast majority of Toronto Hydro's assets are located on City road allowances and co-exist with City (e.g., water and sewer systems, roads, sidewalks) and other utility (e.g., telecommunications, gas lines) and non-utility (e.g., transit) infrastructure. To enable the efficient management of road allowances, the City has implemented a number of co-ordination, permitting, and approval processes that have the potential to influence work execution, schedules, and budgets.

An example of how the City's processes can impact work execution is road moratoria that are implemented following City road improvement projects.[1] Depending on the type of road (e.g., road, curb, sidewalk) improvement that the City undertakes, utilities such as Toronto Hydro will not be granted permits to conduct subsequent construction work for a period of three to ten years.

In situations where the City advances or provides short notice for road improvements, Toronto Hydro must re-prioritize work to ensure that projects that are planned in the short and medium terms are completed before a moratorium goes into place. A specific example of this is work that Toronto Hydro planned in the Hogg's Hollow area of Toronto. Plans were to initially execute the work in five sequential phases. When the City announced that it was moving forward with road improvement work, Toronto Hydro brought forward the execution of the fifth phase to avoid a road moratorium after 2013. Re-prioritizing projects in this manner can force the deferral of another project and has the potential to increase costs depending on whether the project must be undertaken by a different contractor or resource group.

[1] Moratoria are implemented by the City's Municipal Consent Requirements for the Installation of Plant Within City of Toronto Streets, pursuant to the City's authority over highways (public roads) under sections 32 and 33 of the *City of Toronto Act, 2006,* S.O. 2006, C. 11, Sched. A.

Another example is work that Toronto Hydro had to conduct as a result of a series of City projects (e.g., granite sidewalk retrofit; water main replacement) in the vicinity of Bay and Bloor Streets. During one project, Toronto Hydro was given only three months to complete its work and during another project, Toronto Hydro had to rebuild an overhead pole line during the Christmas season. Typically, work in this area is constrained as restrictions to only work certain hours of the day, to only occupy a certain length of street at a time, to minimize disruption to local business, and to eliminate work during rush hour are in place. Given the tight timelines imposed, Toronto Hydro had to obtain noise exemptions from City and crews had to work overtime resulting in costs that would not otherwise have been required. Another project on Asquith Avenue in the same vicinity needed to be delayed entirely and was only completed in 2014 as a result of City work in the area.

On many occasions, challenges that arise as a result of City requests do not result in delays or additional costs, but instead result in a need to advance costs from one year to the preceding year. One example is a voltage conversion project south of Bloor Street. Initially, Toronto Hydro had planned to finish the project by May 1, 2014 when the City asked for the project to be completed by March 31, 2014 due to a planned water main and sewer replacement project. To accommodate the City's request, Toronto Hydro started construction in the last quarter of 2013 and advanced more than $200,000 of expenditures into 2013. Another example is a project to replace direct buried cable on Starview Lane and Rockbank Crescent in the Weston Road and Sheppard Avenue area. To avoid a scheduling conflict with other City's water main and sewer work, Toronto Hydro advanced an additional $250,000 into 2013.

2.2. Customers

A second set of stakeholders that can introduce unexpected challenges during work execution are customers and members of the public. Although Toronto Hydro undertakes

significant customer engagement activities (e.g., informational letters, town hall meetings, responses to requests for accommodation) before and during planned work, and although the vast majority of Toronto Hydro's customers are supportive and very reasonable when work is being undertaken in proximity to their homes and businesses, incidents and challenges do arise.

One example is the aforementioned set of projects at Bay and Bloor Streets in downtown Toronto. During one project, pedestrian control in the area became so challenging that Toronto Hydro had to increase the budgeted number of paid duty police officers from one to two. In addition, one of the buildings along the project route started renovations at the same time that Toronto Hydro's project was to be executed. The building's contractors installed scaffolds outside the building for two months and this prevented Toronto Hydro from commencing its project during this time.

2.3. Hydro One Networks

Toronto Hydro is supplied by Hydro One Networks Inc. ("HONI") and owns equipment at 34 transformer station sites that are owned by HONI. The equipment at station sites is tightly integrated and the two companies must closely coordinate planned work. At times, even the best efforts and plans cannot fully mitigate the risk that challenges will arise and delays will occur.

3. OPERATING ENVIRONMENT

Work execution challenges that are brought on by the Operating Environment relate to issues that arise as a result of working within congested underground utility corridors that are shared with other service providers such as the City of Toronto's Water Division, natural gas and telecom companies. This includes past tenants or users of the space that now makes up the corridors. These challenges, as illustrated below, can greatly influence

Toronto Hydro's ability to execute work on schedule and on budget.

3.1. Aging Infrastructure

Challenges often arise due to the need to work around aging infrastructure that is often owned by third parties (or Toronto Hydro). One example of this is water and sewage lines. Around these lines, Toronto Hydro utilizes specialized excavation techniques such as vac-truck digging to mitigate the risk of damage. However, aging lines have at times broken open despite the use of these techniques and have caused water or sewage spills that delay projects and increase costs.

A particular example of the unexpected failure of water and sewage lines during the execution of a Toronto Hydro project occurred on Laird Drive in East York. As illustrated in Figure 1, a sewer line was uncovered and during the project, the line began to leak as a result of a defective fitting. The fitting needed to be replaced and the line needed to be supported during the construction of the duct bank.

Figure 1: Sewage Line Uncovered During Duct Bank Construction

As part of the same project, a water line was also uncovered while constructing a new cable chamber. This water line began to leak and water migrated into the chamber as shown in Figure 2. These two issues caused weeks of delays in the construction schedule of the Laird Drive project.

Figure 2: Water Line Leak Flooding Cable Chamber During Construction

Another particular example occurred where Toronto Hydro needed to construct a duct structure well below an old existing water main. This main can be seen at the bottom of the trench in Figure 3. During excavation, the water main broke. (Water can be seen running in the trench in Figure 3.) The main had to be repaired and supported by chains, which caused delays and additional costs in the project.

Figure 3: Water Main Leak at the Bottom of a Trench

Beyond aging water and sewer infrastructure, challenges also arise during work execution in the vicinity of telecommunication infrastructure and even Toronto Hydro's own infrastructure. For example, older telecom cables were buried directly into the ground without concrete encasings as found during a recent project on Toresdale Avenue in North York. Precautions to mitigate the risk of damage to in-service cables during the Toresdale Avenue project added to costs and if damage had occurred, would have resulted in delays. Precautions must also be taken with Toronto Hydro's own infrastructure, which often must be supported and maintained in functional condition throughout a project. The following figures illustrate live cables being supported during construction projects.

Figure 4: In-Service cable being supported as a large cable chamber was re-constructed in the aforementioned Laird Drive project.

Figure 5: In-Service cables being supported during a vault re-build at Wellington and Emily Streets in downtown Toronto.

Figure 6: In-Service cables being supported during a vault re-build at 390 Bay Street in downtown Toronto.

The complexity of some of these work sites and the necessity to support at times aging and deteriorated assets can lead to issues arising, delays in work schedules, and increased costs.

3.2. Undocumented Sites and Infrastructure

During work execution, it is not uncommon for Toronto Hydro to encounter sites and infrastructure that are not documented or difficult to anticipate. Some of these discoveries can be accommodated within the scope of a project. However, some are particularly unique and result in unavoidable delays and costs. Discoveries often cause

projects to be placed on hold as they necessitate investigations, project redesigns, and new permits.

One example of a unique discovery during work execution is an unregistered archaeological site that was found on Scenic Hill Court in Scarborough. The discovery was made during an underground civil construction project and resulted in a four-month delay in the project.

A second example of a unique discovery is an old undocumented gas pipe that was found during a system expansion project to supply new customer load. The project was replacing an overhead single circuit steel pole line with a new double circuit wood pole line. When an old cast iron pipe was discovered, pole installation was halted and a subsequent investigation revealed that the pipe was an abandoned gas main (see Figures 6 and 7 below). Enbridge was contacted and approval to break out the abandoned gas main at the proposed new wood pole locations was obtained. The impact of the abandoned pipe, which included breaking out the pipe at 28 pole locations, resulted in approximately $120,000 of additional expenditures and a three-week delay.

Figure 7: Abandoned Gas Main Found During Pole Placement

Figure 8: Pole Placed in Vicinity of Abandoned Gas Main

INDEPENDENT ASSESSMENT OF TORONTO HYDRO'S DISTRIBUTION SYSTEM PLAN AND BUSINESS CASES

Review of Proposed Projects and Programs to be Filed before the Ontario Energy Board for the 2015 through 2019 Rate Period

The star design is a trade-mark of Toronto Hydro Corporation used under licence.
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NAVIGANT

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EXECUTIVE SUMMARY

Navigant Consulting Ltd. (Navigant) was retained by Toronto Hydro-Electric System Limited (THESL) to conduct an independent review of THESL's Distribution System Plan (DSP), prepared to support distribution projects and programs that THESL plans to submit for approval under the OEB's Chapter 5 requirements for electricity transmission and distribution applications. The specific investment categories and business case segments that Navigant reviewed are listed in Table 1.

Table 1: DSP Capital Investments Reviewed by Navigant

System Access	▪ Modifications that we are obligated to perform or that are otherwise necessary to provide customers with access to electricity services, driven by statutory, regulatory or other obligations.
System Renewal	▪ The replacement and/or refurbishing of assets at, or approaching, end-of-life to extend the service life of the assets, and/or replacement of those assets that no longer align to current operating practices such that accessibility and serviceability conflicts are produced.
System Service	▪ Modifications to the system to ensure that operational objectives are met while addressing system-wide critical issues and future electricity service requirements.
General Plant:	▪ Modification, replacements or additions to assets that are not part of the distribution system, but represent the "backbone" of Toronto Hydro's 24/7 operations, including capital and maintenance supporting activities.

Based on our review of THESL's DSP and the business cases it prepared to support its five-year spending plan (for simplicity, "the proposed investments"), Navigant has concluded the following:

1. **THESL's DSP supports the OEB's four performance outcomes; customer focus, operational effectiveness, public policy responsiveness and financial performance as outlined in Chapter 5 of the OEB's Filing Requirements for Electricity Distribution Rate Applications (Chapter 5). Further, THESL's DSP addresses specific provisions set forth in applicable subsections of Chapter 5.**

   - Where applicable, the proposed project plans provide information on customer engagement to identify customer preferences. THESL has taken steps to ensure that customer inputs were taken into consideration, and to ultimately provide economic efficiency, superior performance and cost effectiveness for its customers.
   - THESL has provided descriptions of how its proposed assessment management strategy and capital expenditure plans best maximize the opportunities for operational effectiveness and continual improvements for productivity and cost performance.

- Proposed projects are explained and rationalized as to how the capital expenditure plan is integrated with public policies (government mandates) where applicable.
- Each of the projects proposed offer justification for prudent capital expenditure and show they can be executed with financial viability and operational effectiveness. Furthermore, the project plans provide details of how these efficiencies can be sustained over the long term.

2. **The proposed projects in each investment category of THESL's DSP are required and justified based on methods and criterion that reflect Chapter 5 objectives.**
   - The DSP provides a clear and concise approach to asset management and planning, including the data bases and decision tools it used to prioritize and select capital projects that appear in its five-year investment plan.
   - Business cases consistently apply methods outlined in DSP asset management processes, and the results of THESL's evaluation confirm that the solutions it proposes are the preferred alternative based on performance and economic criteria.
   - The proposed investments are consistent with solutions other similar utilities have or propose to implement; for example, utilities throughout North America are replacing obsolete air blast magnetic breakers, transformers and communications and control systems.
   - Several of the proposed projects reflect the intent of relevant sections of OEB Chapter 5, the Ontario Distribution System Code and Electrical Safety Authority (ESA) rules and regulations with respect to power system safety and reliability.

3. **THESL's DSP and proposed projects prudently address key drivers such as condition, safety and growth in a responsible and efficient manner, and are consistent with other utility practices.**
   - Each of the projects proposed in the four investment categories addresses important reliability, safety, and performance issues. Deferring these projects will degrade service reliability and quality of service to THESL customers.
   - Several of the safety-related upgrades, including breaker and switchgear replacements, are issues that many other utilities have encountered and have proactively addressed or are addressing.
   - Many of the deficiencies THESL has identified and proposes to address were identified in Asset Condition Assessment (ACA) procedures and DSC mandated inspections, and should be addressed without unreasonable delay.

4. **THESL's decision tools, planning criteria and design practices underpinning the business cases in the DSP are consistent with industry best practices.**
   - THESL planning criteria with respect to equipment loading and distribution feeder design are consistent with other utilities, except in the downtown Toronto core, where feeder back-up is provided by intra-station ties instead of inter-station feeder ties.
   - Where differences in standards exist, they typically are due to constraints associated with operating energy delivery facilities in a major urban center, or because of unique equipment requirements due to higher operating voltages or subject to higher fault current levels.
   - The decision tools and processes cited above have been consistently applied in THESL's business cases, where projects are selected based a thorough evaluation of reliability, safety, economic, environmental and other factors applicable to each investment category.

5. **The methods and tools employed by THESL to evaluate and select the proposed projects are appropriate, and meet or exceed those employed by electric utilities in Ontario and other provinces. The business cases provide ample evidence that the projects are not only required, but have been thoroughly evaluated.**
   - THESL has conducted extensive technical evaluation of the condition of the assets it proposes to upgrade or replace. The underlying reasons as to why the equipment or facilities proposed for renewal are deficient are clearly evident from the analyses THESL engineers and support staff have performed and documented in the business cases.
   - Proposed upgrades are based on rigorous and thorough condition assessment methods, using modern tools and methods. For example, power transformer and breaker replacements were selected, in large part, based on physical data from ACA records that confirms declining performance or potential for failure.
   - Project need and the evaluation of alternatives are based on similar asset management best practices and principles that leading utilities now employ, including optimizing the timing of renewal investments based on trade-off of cost and risk.

6. **THESL's proposed projects are coordinated to ensure they will result in the maximum utilization and efficient use of equipment.**
   - Project selection is based on sound asset management practices and principles that are consistent with those we have seen at other utilities that have adopted best practices and solutions. These include use of asset condition data and decision tools that ensure renewal investments optimize the timing of replacements or upgrades.
   - Several projects are complementary; that is, investments often are needed to ensure maximum efficiency and utilization of equipment, particularly those designed in consideration of area planning.

- Some assets are nearing maximum utilization and new facilities are needed to serve growing load and to ensure reliability is maintained. Downtown Toronto is one of the areas experiencing capacity constraints and increased risk of exposure to high impact events. For example, downtown station's capacity constraints will be addressed by a combination of new feeder ties, expanded station capacity and targeted CDM in the form of localized demand response.
- Some investments are needed to support City of Toronto initiatives, including major in-City roadway projects that will require major relocation of underground facilities and cables.

7. **THESL's proposed aggregate capital spending of approximately $490 million annually over the five year period is reasonable and justified based on the information and analyses provided in THESL's DSP. There are potential undesirable consequences to system reliability, safety and performance if THESL does not proceed with the proposed projects.**
   - THESL's proposed spending is the minimum needed to complete the continuation of ICM programs in 2015 and to maintain a reasonable balance between risks and costs over the five-year rate period. The level of spending is higher than the prior five years, but is the minimum required to reduce the backlog of end-of-life asset replacement by 2037 and meet OEB Chapter 5 requirements.
   - The technical and economic analyses THESL has developed to support capital is rigorous and consistent with Chapter 5 guidelines for each of the four major spending categories.
   - Data and analyses presented in the business cases demonstrate that key distribution equipment and facilities are increasingly at risk of failure or are inadequate to reliably serve current and future load. System reliability and customer satisfaction are expected to decline in the absence of proposed investments as these risk factors increase and equipment performance declines.
   - THESL is proposing to responsibly address known safety and performance deficiencies that company personnel have identified, including structures, devices and facilities that place public and crew safety at risk. Similarly, the known deficiencies associated with primary distribution equipment should be addressed to reduce safety risk to THESL crews and minimize the potential for interruptions or longer restoration times for customers.
   - Without the proposed investments, THESL customers would likely see higher costs in the form of increased O&M, longer restoration time, and greater likelihood of collateral damage due to catastrophic equipment failures.
   - Timely completion of key major projects is needed to complement Hydro One renewal programs, and vice-versa, with sub-optimal performance and higher costs if these are not installed as THESL and Hydro One have proposed.

In summary, each of the proposed investment categories and business cases in THESL's DSP that Navigant reviewed is consistent with those currently or previously undertaken by many other urban utilities in Canada and the United States that Navigant has evaluated. Notably, we did not identify any projects or measures that are inconsistent in scope or need with programs implemented elsewhere. In Navigant's view, because of these reasons and the review and analysis presented in subsequent sections of our report, the proposed projects in THESL's DSP are reasonable and justified.

INTRODUCTION AND BACKGROUND

Background

Chapter 5 of the OEB's *Filing Requirements for Electricity Transmission and Distribution Applications* sets forth guidelines and objectives applicants must follow to support proposed capital investments.

THESL has prepared a Distribution System Plan (DSP) to support proposed investments for the years 2015 through 2019 based on requirements in Chapter 5. The DSP includes detailed business cases for each major project or program under which THESL seeks OEB approval.

Navigant's Scope of Work

Navigant was retained by THESL to conduct an independent review of its Distribution System Plan (DSP) and business cases that it prepared to support proposed capital investments from 2015 through 2019, inclusive.

Specifically, Navigant was asked to answer the following questions in its review:

1. Is THESL's Distribution System Plan (DSP) consistent with the guidelines, objectives and criteria set forth in Chapter 5 of the OEB's Filing Requirements for Electricity Distribution Rate Applications (Chapter 5)?
2. Does THESL's DSP and proposed investment plan satisfy the objectives set forth in Chapter 5?
3. Are the business cases that THESL presents in its DSP consistent with the requirements of Chapter 5?
4. Does each of THESL's business cases apply the methods, tools and criterion outlined in its DSP, and has THESL provided sufficient evidence to justify the proposed investments?
5. Are THESL's design and planning practices consistent with utility best practices?
6. Are the methods and tools employed by THESL to select proposed projects appropriate and sufficient to justify the investment?

Navigant conducted its independent review and assessment based solely on information and findings obtained from documents THESL prepared under five DSP document categories listed below. Navigant did not request nor did THESL advise as to content or suggest modifications to any of the findings or conclusions contained in this report.

1. **Section A**: Distribution System Plan Overview

2. **Section B**: Coordinated Planning with Third Parties

3. **Section C**: Performance Measures for Continuous Improvement

4. **Section D**: Asset Management Process

5. **Section E**: Capital Expenditure Plan (including Business Cases)

Section E includes detailed business plans based on the methods, criteria, and evaluation framework set forth in Sections A through D. These business cases are grouped according to four categories outlined in Chapter 5. Navigant's review includes a detailed assessment and evaluation of over 30 specific business cases, grouped according to the four OEB investment categories listed in Table 2.

Table 2: THESL Capital Investments Reviewed by Navigant

System Access	▪ Modifications that we are obligated to perform or that are otherwise necessary to provide customers with access to electricity services, driven by statutory, regulatory or other obligations.
System Renewal	▪ The replacement and/or refurbishing of assets at, or approaching, end-of-life to extend the service life of the assets, and/or replacement of those assets that no longer align to current operating practices such that accessibility and serviceability conflicts are produced.
System Service	▪ Modifications to the system to ensure that operational objectives are met while addressing system-wide critical issues and future electricity service requirements.
General Plant:	▪ Modification, replacements or additions to assets that are not part of the distribution system, but represent the "backbone" of Toronto Hydro's 24/7 operations, including capital and maintenance supporting activities.

Navigant's Approach

For each investment category, Navigant reviewed the overall robustness of the business cases in terms of establishing that the projects are required and sufficiently justified to support each of the proposed investments. The criteria considered by Navigant in its review included, among other factors, the following:

1. Comprehensiveness of impact analysis including underlying logic, quantification of benefits wherever possible, and linkage back to a robust, systematic capital planning approach used by THESL.
2. Prioritization within the cases, as appropriate (e.g., why do the recommended units need to be replaced or upgraded?) and rationale for such prioritization.
3. Clarity regarding impact of the proposed investment relative to other capital investments or expenses (e.g., maintenance, do nothing, capitalized maintenance).

4. Robustness of analytical methods and technical support for establishing need and the impact on reliability and performance if the projects are not funded and implemented by THESL.
5. Identification of options considered and robust analysis of these options clearly showing the advantage of the preferred options.
6. Comparison with industry practices and standards as appropriate (e.g., asset economic end-of-life schedules).

Navigant also reviewed THESL's Feeder Investment Model (FIM) methodology and how it was applied to support each of the business cases in terms of consistency with industry practice and sound logical underpinning.

In the sections that follow, Navigant answers the six questions set out at the beginning of this section.

DISTRIBUTION SYSTEM PLAN OVERVIEW

In this section, Navigant addresses THESL's Distribution System Plan ("DSP" or "the Plan") with respect to consistency and compliance with the guidelines and objectives set out by the OEB. Specifically, our review of the DSP is intended to address the following question:

Is THESL's Distribution System Plan (DSP) consistent with the guidelines, objectives and criteria set forth in Chapter 5 of the OEB's Filing Requirements for Electricity Distribution Rate Applications (Chapter 5)?

Distribution System Plan Framework

Our review of THESL's DSP, including relevant chapters and sections contained in Sections A through E, confirms that the Plan meets each of the requirements set forth in Chapter 5. Navigant reviewed in detail THESL's DSP framework presented in Section A through D, and specific business cases in Section E, and has determined that THESL has developed a DSP with sufficient rigour and supporting analysis to justify the proposed levels of spending throughout the rate period. Additionally, Navigant has determined that the methods, tools, and system that THESL used to evaluate and justify proposed capital spending in its DSP meets or exceeds current utility practices. Our determination is based on comparable reviews Navigant has conducted in Ontario, the United Kingdom, the United States, and other provinces in Canada.

The basis for our conclusions and opinions regarding THESL's DSP is supported by the detailed review and assessment in sections that follow.

Overview

The following presents Navigant's general findings and opinions on the processes, tools and methods THESL developed and applied to support proposed capital spending throughout the five-year rate period. Navigant's findings with respect to the above are based largely on the DSP overview and framework presented in Sections A through D, and application thereof to individual business cases in Section E. Our independent assessment seeks to make a determination as to the whether THESL's DSP is consistent with Chapter 5 guidelines and objectives, and to identify potential opportunities where new data or information could be incorporated into THESL's planning for greater optimization of proposed investments during the five-year rate period.

Asset Management Plan

Section D of THESL's Application provides a concise overview of the processes, systems and methods it uses to manage its capital assets, and to meet an overarching objective of optimizing spending over the rate period to meet customer and performance objectives at acceptable cost and rates. THESL's AM objectives are set forth in the following excerpt, which

appears in Sections A.1.2 and D.1.1 of its filing documents. Navigant believes these objectives are consistent with the OEB's general requirements set forth in Chapter 5.

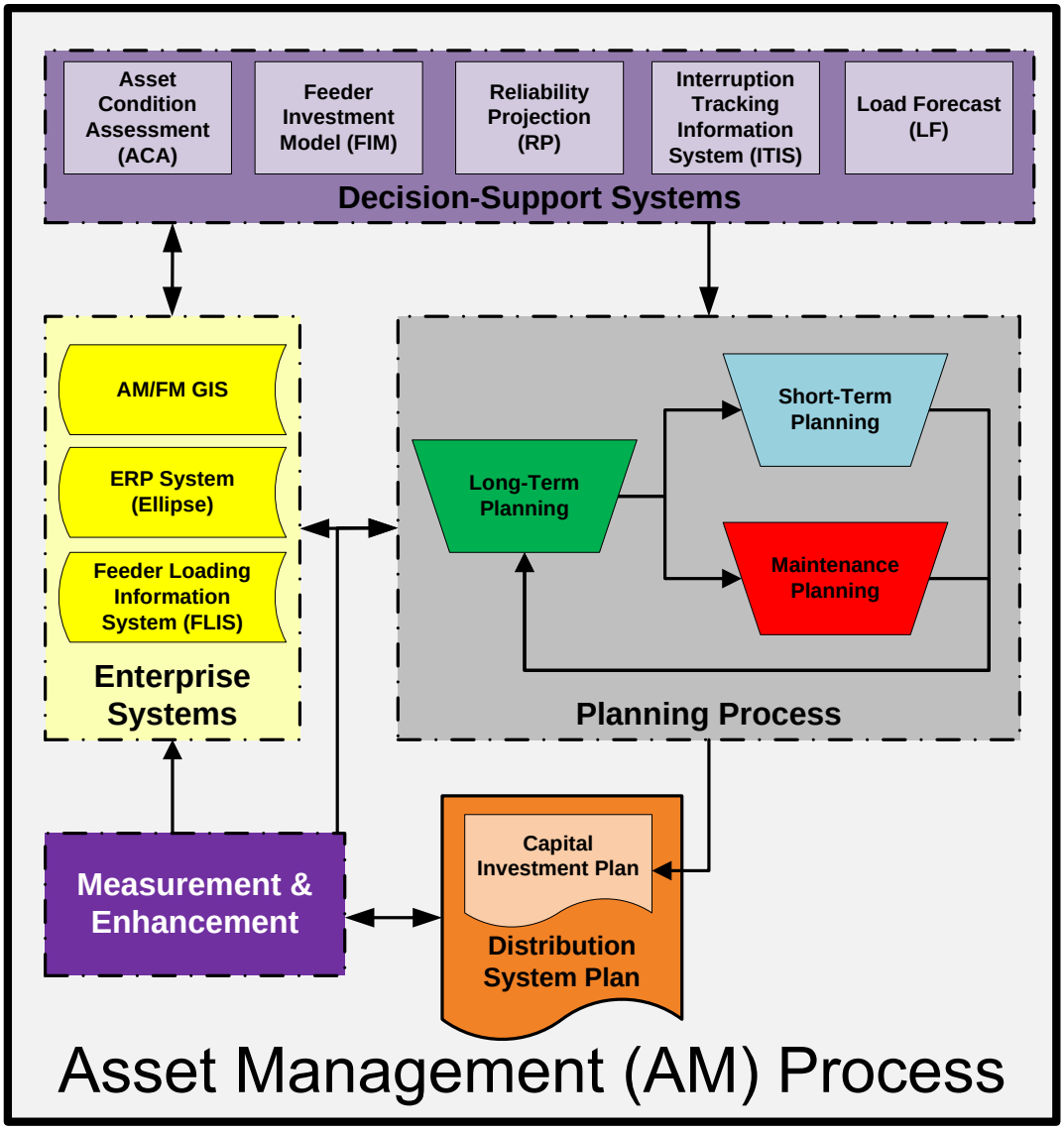
> *Toronto Hydro's asset management objectives proactively identify, manage, and mitigate deficiencies and risks to the electrical distribution system in order to (i) maximize value to the utility's customers, (ii) minimize or eliminate safety risks, and (iii) strike an optimal balance between required capital investment and risk costs associated with asset failure (Toronto Hydro refers to this balance as "steady state").*

To maintain a desired balance in spending – THESL seeks to achieve spending equilibrium (i.e. "steady state" as described above) in a "paced" manner such that funds are spent at relatively consistent levels – the AM Plan outlines the approach THESL used to evaluate asset needs over the short-, mid- and long-term to derive a level of spending that balances risk versus cost, consistent with Chapter 5 guidelines prescribed in Section 5.3. Figure 1 is a high-level process diagram THESL prepared to illustrate foundational elements of its AM plan, each of which Navigant has reviewed and analysed in forming its opinion on THESL's AM strategy, approach, and proposed spending plan.

Based on our prior review of THESL's previous ICM application and the current DSP, Navigant is able to confirm that THESL has developed a comprehensive Asset Management (AM) strategy that is based on key principles outlined in Chapter 5, and consistent with leading industry practices such as those outlined in British Publicly Available Standard (PAS) 55[1]. The strategies THESL's DSP has adopted are designed to identify renewal program requirements based on quantifiable data that accurately describe asset condition and risk. Our review indicates the information contained in the business cases include significant condition data based on measurements and root cause analysis, such as those performed for station transformers and overhead switches. THESL's DSP also highlights the associated risks if the investments are not undertaken. The FIM is one of the primary AM tools used to incorporate project economic value based on asset condition, risk factors and customer impacts.

[1] PAS 55 recently migrated to ISO 55000 1 & 2, which expands upon and incorporates most elements of PAS 55, but includes greater standardization requirements for auditing and certification; and separate segments on requirements and guidelines for application of asset management systems. The new standard has been adopted in the U.S., UK and Canada, among other nations.

Figure 1. THESL Asset Management Planning Process



Source: THESL Application- Section D: Figure D1.2-2 Asset Management Planning Process Overview

Decision Support Systems

Figure 1 includes five decision support systems or tools THESL relies on to evaluate project need and investment alternatives. Each of these systems links to AM databases to support the planning processes for selection of investments and formulation of the DSP. Our assessment of each of these systems and related processes follows.

Asset Condition Assessment (ACA)

The ACA is a critical element of THESL's AM processes for evaluating capital investment options, as it relies heavily on ACA data to support spending for asset renewal. The renewal

of assets that have deteriorated or are otherwise obsolete is based largely on application of ACA metrics for virtually all major equipment categories. THESL's use of ACA to determine the condition of distribution asset extends to the past decade, when it created asset records and a methodology to categorize the condition of its assets based on consistently applied testing, measurement and evaluation techniques. The results of a recent ACA audit indicate that many assets have deteriorated to a state where replacement, recondition or upgrade is warranted. To maintain spending at desired levels, THESL prioritized renewal projects by applying economic methods that incorporate risk and criticality; thereby enabling the selection of assets that demonstrate the highest level of need and justification.

In June 2014, THESL updated an ACA audit originally completed in 2007 and revised in 2012 by its independent consultant, Kinectrics, to include one new asset category (Network Protectors), and a series of other enhancements. The ACA processes and health indices now incorporate updated asset condition and failure data, enhanced equipment testing and inspection, and larger sample sizes.[2] The 2014 audit report presents asset condition data for 21 asset categories ranked by health indices on a scale of 1 through 5. The report also provides reasoning on how ACA data can be used for asset prioritization and ranking. It lists seven recommendations to further improve ACA processes, many of which THESL applied in this application, including data entered into Ellipse and used in BI (Business Intelligence) tool calculations[3]. THESL has provided information in its DSP that confirms it has or proposes to implement these recommendations.

The Kinectrics report confirmed a series of enhancements THESL has implemented since the prior audit, including changes in asset sample size and condition for each of the 21 categories included in the ACA. Results indicate relatively minor changes in asset condition for some of the 21 categories, but increased deterioration in others, such as station transformers and switchgear; Navigant views each of these as critical assets in terms of reliability, safety and customer satisfaction.

Navigant views the level of rigor and use of ACA data that THESL applies in its asset renewal selection process as consistent with industry best practices, supported by condition data and assessment methods that have evolved and continuously refined over time. In support of its DSP, THESL's ACA audit highlights those assets whose condition has remained relatively stable versus those that are experiencing accelerated deterioration. This information provides key input into decision tools, that THESL's distribution planners use to prioritize proposed renewal spending to assets that demonstrate greatest justification and need. It also indicates where asset upgrades or capitalized maintenance may be a more cost effective choice. In addition, THESL's incorporation of continuous improvement and monitoring of equipment performance, ACA data, and evaluation methods indicates it intends to update or revise

[2] Toronto Hydro-Electric System Limited, *2014 Asset Condition Assessment Audit*, Kinectrics Inc. Report No: K-418649-RA-R00, June 20, 2014.

[3] Specific recommendations appear in the Kinectrics report.

specific business case investments during the 2015 through 2019 rate period using the most current information available at the time of implementation of the investment. Navigant views THESL's approach as reasonable, as it will produce the greatest value to its customers for a given level of investment over the life of the asset.

Feeder Investment Model (FIM)

THESL uses a Feeder Investment Model (FIM) to evaluate the economic value of asset renewal capital investments options. FIM is a series of distribution simulation and analytical tools designed to predict asset performance and equipment loading under a range of operating conditions. The FIM incorporates key risk factors and life-cycle economics to evaluate and justify project need and value, summarized in the following excerpts from Section D.3 – *Asset Lifecycle Optimization Policies & Practices*, which states that FIM is

> *". . . used as part of the Long-Term System Review Process to determine the asset renewal investment timing based upon the economic end-of-life criteria for each asset. It is through this approach that Toronto Hydro plans to eventually achieve a "steady state" at the system-level through the execution of its capital investment plan."*

Where,

> *". . . steady state represents an optimal balance between required capital investment and aggregate risk costs associated with the existing asset base, such that the total lifecycle cost of the broader asset population is minimized."*

From the above statements and DSP process descriptions, THESL demonstrates that it has incorporated least-cost planning criteria and methods to support its investment strategy and proposed spending levels, which Navigant finds is consistent with OEB Chapter 5, Navigant also finds that FIM includes the capability to identify optimal investments for an appropriate range of performance, safety, operating efficiency and cost and performance factors.

One of the key inputs is Value of Service (VOS), applied to net reliability gains achieved over the life of an asset or investment strategy to quantify a primary value driver for the investment. The use of VOS is consistent with Chapter 5 guidelines and practices that utilities in North America, the UK and elsewhere have applied. The assumptions for VOS components also are consistent with values applied by comparable utilities. THESL's predictive reliability impact analysis data, described below, is a key input for renewal and other project categories where VOS is a driver. The FIM model is applied to most renewal investments, in addition to other projects with a range of performance and cost trade-offs. The FIM model is used to determine the optimal timing of investments based on criteria that establish when an asset has reached end-of-life (in economic terms).[4]

[4] Assets not evaluated using FIM are targeted for replacement based on estimates of useful remaining life.

THESL has consistently applied FIM to proposed renewal investments, which should result in least cost investment choices based on end-of-life economic evaluation criteria. The FIM results, coupled with other critical replacements THESL has identified, indicates up to a $2.5 billion backlog of assets exists for 2015 with another $1.55 billion for the remaining four years for a total of about $4 billion that is justified based on DSP economic end-of-life criterion. However, proposed spending for asset replacement over the five-year rate period is much less, reflecting a desire to balance risk and cost via paced spending.[5] The validity of the levelized approach is supported by THESL's reliability metric projections, which indicate proposed spending will maintain or improve system performance up to 2019.

Reliability Projections (RP)

The RP is an important process and set of analyses THESL uses to predict the reliability benefits associated with proposed upgrades and renewal replacements, including the impact on reliability for reinforcement and replacement options.[6] This capability is important, as the accuracy of the RP is contingent upon ACA data and predictive methods that quantify reliability impacts over time, including accelerated degradation for "do nothing" or "run to failure" strategies.

Databases

THESL relies on several data bases, collectively referred to as its Enterprise system, for use in its planning process and decision support tools described above. It includes asset records and condition data contained in THESL's Ellipse data base, a system commonly used by utilities for tracking and recording of maintenance and performance data. Similarly, the AM/FM GIS contains diagrams and feeder attribute data needed for planning, design and construction of the distribution system. It also provides requisite links or inputs to GEAR, and plant record keeping systems. The reliability data base provides failure history and cause code information needed to assess risk factors and the extent to which candidate solutions will impact reliability, safety and performance. As noted in our ACA review, THESL reports that the accuracy and quantity of data stored has risen over the past several years, commensurate with increases in sample size and quantity of information collected.

Feeder loadings are continually read and downloaded from the SCADA system and captured in a Feeder Loading Information System (FLIS) to provide information distribution planners use to conduct short- and long-term capacity studies. The data also ensure distribution simulation studies of feeder performance and operation are based on accurate loading data. This process is similar to those applied by most utilities to evaluate capacity alternatives and proposed spending.

[5] Replacement spending of up to $4 billion over five years also would create disproportionate and unacceptable rate increases.

[6] In the absence of proposed spending programs, reliability would degrade to a SAIFI of 1.99 and SAIDI of 1.50.

THESL's reliance on and accuracy of systems such as Ellipse, AM/FM/GIS, FLIS and reliability history is consistent with leading industry practices, as each provides critical input to decision and planning tools that the company relies on to determine assets that present the greatest risk and economic impact. The data also is used to prioritize and select investments among candidate options. The data also support processes such as current state analysis (CSA) for determination of such conditions as distribution reliability, performance history and remaining life of key equipment. Importantly, THESL has established processes to ensure data quality is maintained and used properly in its suites of tools and systems. Navigant views THESL suite of Enterprise data bases, type of data collected, and quality assurance processes to be consistent with current industry practices.[7]

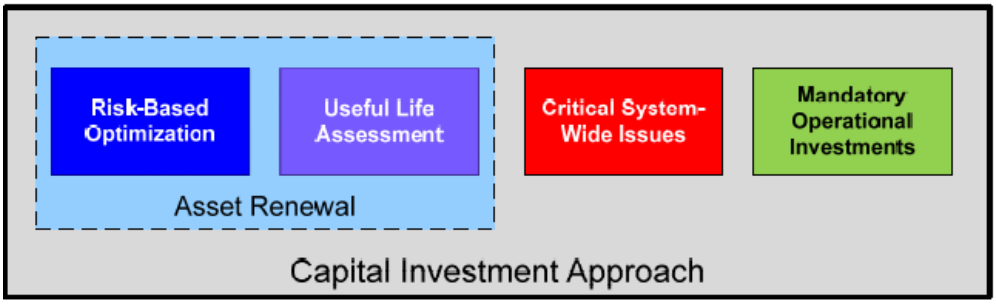
Other Key Asset Management Metrics

Navigant also finds that THESL has appropriately used other key AM metrics to justify and support investments included in its AM plan and business cases. These additional AM metrics include distribution system attributes such as urban versus rural, underground versus overhead, temperate versus extreme weather and fast versus slow economic growth areas.

Capital Planning Process

THESL's capital planning process is designed to consider investments across three broadly defined investment categories, each reflecting a range of business drivers and planning horizons. Figure 2 presents these three categories, which includes two sub-categories for AM investments based on risk-based versus useful life economic justification methods. Each investment category includes evaluation processes that determine when intervention is required to achieve an optimal balance of spending versus risk.

Figure 2.



Section E.2.1: Capex Planning Approach

[7] Navigant's review focused on the systems, procedures and application of Enterprise system data. However, Navigant did not conduct a review of data accuracy.

THESL's planning process includes recognition of DG interconnection and integration requirements. Specific upgrades and mitigation strategies are proposed to relieve constraints that currently limit the amount of DG that can be installed in various sections of Toronto.

Key Business Drivers

Table 3 presents the key value drivers THESL prepared and presented in Section A.2.1. Navigant reviewed these drivers and the analyses THESL presents in specific business cases and supporting sections and has determined that these drivers are consistent with Chapter 5 requirements and guidelines. THESL's asset management based approach to developing its DSP and proposed investment incorporates inputs and data for each relevant driver. The business cases prepared by THESL and reviewed by Navigant demonstrate that drivers listed in Table 3 also are consistently and appropriately evaluated to support proposed investments.

Table 3. Key Business Drivers by Asset Category

	Driver	Description
System Access	**Customer Service Requests**	▪ The fulfilment of Toronto Hydro's obligation to connect a customer to its service. This includes both traditional demand customers and distributed generation (DG) customers. The obligation to connect holds as long as there are no safety concerns for the public or employees and there is no adverse affect on the reliability of the distribution system. ▪ Expansion or enhancements to the system when a connection cannot be made with existing infrastructure.
	Mandated Service Obligation	▪ Compliance with all legal and regulatory requirements and government directives. ▪ Compliance with Measurement Canada (*Gas and Electricity Inspection Act*), the Ontario Energy Board (*Standard Supply Service Code*) and the Independent Electricity System Operator (*Wholesale Revenue Metering Standard*) and other regulations is mandatory
	Third Party Request	▪ Mandated system modifications for property or infrastructure development by government agencies and other entities.
System Renewal	**Functional Obsolescence**	▪ Assets/asset installations that no longer align to Toronto Hydro's current operating processes and practices including those assets with accessibility (ravines, rear lots, highway crossings) or serviceability (eg. Lack of spare parts, lack of ability perform maintenance, operational constraints) conflicts, which can result in increased reliability and/or safety-related risks.
	Failure	▪ Failures have already taken place that Toronto Hydro must reactively respond to as part of capital investment activities.
	Failure Risk	▪ There is the imminent risk of failure due to age or condition deterioration ▪ The potential failures will result in severe reliability impacts to customers as well as potential safety risks to crew workers or to the public.
System Service	**Safety**	▪ Assets are exposing known safety-related hazards/risks to crew workers or the general public, or assets are an integral part of maintaining safe work practices, and the failure of those assets would result in safety-related hazard/risk exposure
	Reliability	▪ Maintain or improve reliability at a local, feeder-wide or system-wide level
	System Efficiency	▪ The need to improve restoration capability, ultimately resulting in substantial reliability and customer experience improvements. ▪ The need to reduce losses in distribution lines

A key outcome of THESL's capital investment program is improved distribution system reliability performance (as measured by system reliability metrics). By 2019, THESL expects reliability as measured by outage (interruption) frequency and duration will improve:

- SAIFI (system average interruption frequency index): Reduce from 1.53 to 1.13
- SAIDI (system average interruption duration index): Reduce from 1.21 to 0.97

The above reductions represent a significant improvement in reliability. Although THESL seeks to balance investments over the five-year rate period to balance costs versus risks, it also has instituted a reliability improvement program designed to lower (i.e. improve) these two metrics at low cost. In addition to targeted renewal programs that optimize spending based on reliability performance, THESL's reliability improvement program also includes low-cost, smart grid investments such as feeder automation and equipment monitoring to achieve these gains. This strategy is consistent with leading practices utilities have implemented elsewhere in Canada, the UK and North America.

Load Forecast

THESL projects increases in peak demand at each of the 35 station busses serving 13kV and 27kV load. The forecast is based on known changes in building construction and population forecasts, which are continuously monitored for changes, including proposed load transfers that make best use of available station bus or transformation capacity among adjacent stations; particularly important at downtown stations where capacity upgrades are most costly. The forecast also incorporates CDM measures in the forecast, including targeted demand response to reduce peak demand in the relatively few peak load hours. These practices are consistent with or exceed industry practices, particularly with respect to incorporation of CDM in localized forecasts.

CDM and Distributed Generation

THESL's planning methodology includes "non-wires" options as candidate solutions to meet capacity shortages caused by growing demand. Key among these is targeted CDM, designed to defer capacity additions on a cost-effective basis. Programs THESL proposes are comparable to other programs Navigant has encountered or supported, such as Consolidated Edison Company of New York's Targeted T&D DSM program. Non-wires solutions also are included in the Central Toronto Integrated Regional Resource Plan (IRRP), currently underway.

These measures include a comprehensive Demand Response program designed to reduce distribution peak demand in Section E.7.10 (Local Demand Response). The DR program THESL proposes is consistent with Chapter 5 guidelines that recommend applicants consider load control and efficiency as a means to defer distribution capacity investments at the station level, where the value of capacity upgrade deferrals often is high due to the complexity of design and high cost of major equipment components. Because of long lead-times for planning and design of both station and local DR programs, THESL's targeted program is suitable for deferring station capacity over the mid- to long-term. For this application, the downtown Cecil station is targeted for deferral, as the cost of upgrades and criticality of the station makes it an ideal candidate for localized DR. THESL and its consultant, IDF, conducted a series of economic studies of both capacity and DR options under a range of tests using an external model (e.g., total resource costs, ratepayer, as opposed to Avoided Risk Cost

(ARC) or Cost of Ownership (COO) under its Business Case Evaluation (BCE), and the DR program produces favorable results in terms of cost effectiveness. The use of a set of tests other than BCE is appropriate given the nature and timing of DR programs, which are comparable to energy efficiency programs where use of such tests are common. Accordingly, Navigant finds that THESL's DR program meets this objective on a cost-effective basis, as it will defer up to 9 MW of capacity by 2019.

Although limited to Cecil for this application, almost half of THESL's 35 major stations will require capacity upgrades by 2025. Navigant concludes that Localized DR programs ultimately will result in cost effective deferral of future capacity upgrades. Although not cited as a primary objective, Navigant notes that the Local DR program also relies on smart technology and communications, consistent with Chapter 5 smart grid objectives.

THESL's current projection of DG capacity additions by 2019 is 626 MW, about 200 of which is renewable energy sources. Table 1 summarizes these additions by type and year.

Table 4. DG Capacity Additions

Program	Existing (Includes 2014 Planned)	2015	2016	2017	2018	2019	Total (MW)
FIT 1.0 - 2.0	53.9	31.2	0.0	0.0	0.0	0.0	85.0
FIT 3.0 - 7.0	0.0	10.7	23.9	25.8	27.7	29.7	117.8
Combined Heat and Power (CHP)	59.6	35.5	28.2	27.3	24.0	104.0	278.6
Other DG	62.7	32.9	18.0	8.0	15.0	8.0	144.6
Total	176.2	110.3	70.1	61.1	66.7	141.7	626.0

Past and current studies reveal DG capacity is constrained at the transmission and distribution level. A major limiting factor is station equipment, typically breakers, that is not rated to accept the additional fault current contribution from DG. Reverse power flow on DESN power transformers is an additional constraint.

Because these constraints are evident at both the transmission and distribution level, HONI and THESL each have proposed several mitigation options to relieve these constraints. HONI expects to complete major equipment upgrades at Manby and Leaside (also referenced in THESL's 2012 ICM filing) in 2015 while THESL will implement upgrades coincident with DG capacity projections in Table 4.

Other THESL upgrades designed to relieve constraints include enhanced protection, real-time monitoring and control, and bus tie arrangements. The use of advanced monitoring and controls is needed to safely and reliably integrate large quantities of DG. These real-time systems rely on smart technology and communications, consistent with Chapter 5 objectives. These strategies are reviewed in greater detail in several of the business cases we reviewed.

Performance Reporting

THESL proposes to enhance performance measurement processes and monitoring to ensure continuous improvement of processes, data and methods used to support investments, and assure accountability of results. The concepts THESL has outlined are consistent with Chapter 5 guidelines and approaches implemented by other utilities.

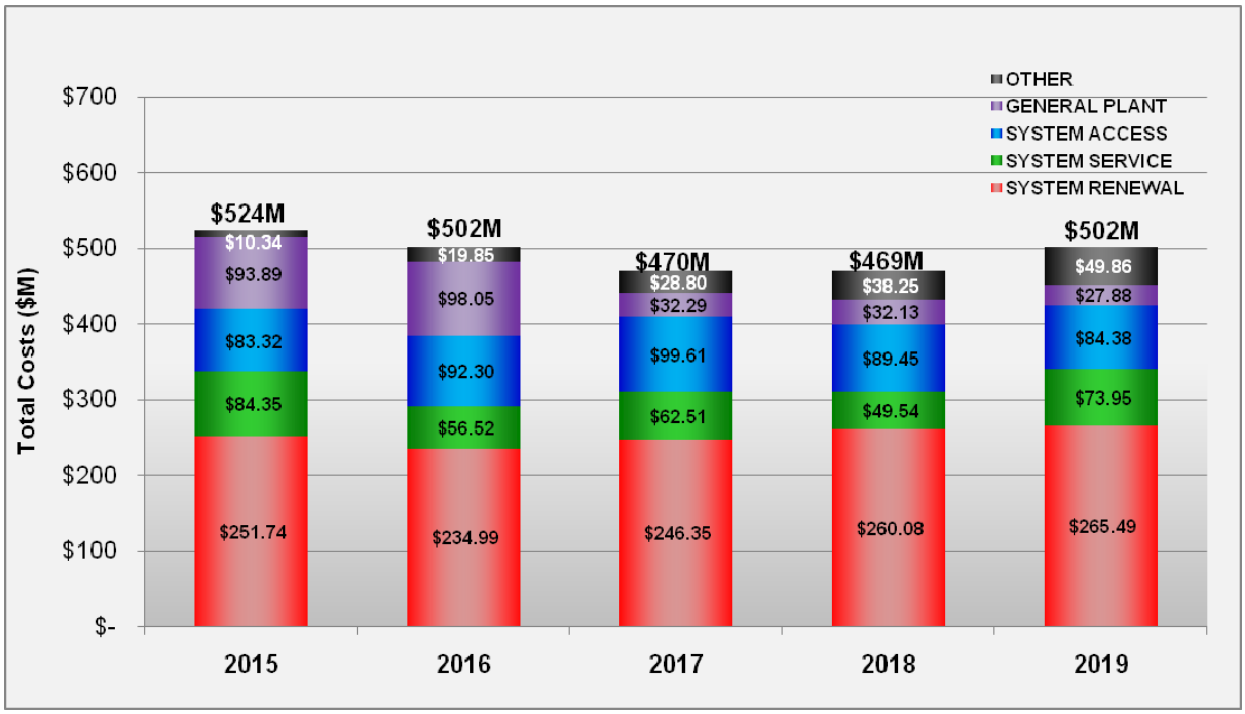
THESL's Investment Plan

THESL proposes to spend approximately $490 million annually over the five-year rate period. Figure 3 presents total annual spending for each of THESL's DSP investment categories. Notably, about one-half of proposed spending is for asset renewal, reflecting a level of spending designed to gradually reduce the backlog of assets that have reached economic end-of-life without compromising reliability, safety or performance. The investment strategy appears warranted, as an accelerated approach to decrease the backlog would increase annual capital spend by about 60 percent, with attendant undesirable rate impacts. It also reflects a minimum level of investment needed to maintain distribution system performance, reliability, safety and performance at a level consistent with customer expectations and OEB Chapter 5 requirements.

Based on our review of THESL's AM-based planning processes and individual business cases, Navigant finds that the proposed five-year investment plan is justified and consistent with OEB Chapter 5 requirements. Further, performance monitoring and measurement procedures will help ensure that appropriate adjustments and refinements to specific investment plans can be made based on new information received during the five-year rate period.

Additional details and rationale supporting this finding is providing in subsequent sections and business case reviews.

Figure 3. Proposed 5-Year Investment Plan



BUSINESS CASE REVIEW

In the following, Navigant opines on the benefits of the proposed investments, with emphasis on the likely outcomes and benefits that will accrue to THESL customers from DSP investments. Our review seeks to answer the following questions regarding consistency with THESL's DSP framework and Chapter 5 requirements.

Does each of THESL's business cases apply the methods, tools and criterion outlined in its DSP, and has THESL provided sufficient evidence to justify the proposed investments?

Concurrent with its review of Sections A through D, Navigant conducted an independent review and assessment of business cases THESL prepared in Section E of the DSP. Navigant's assessment of THESL business cases, summarized in Appendix A, includes two key objectives:

1. Develop a thorough understanding of the specific business cases THESL prepared for each the four OEB investment categories outlined in its Chapter 5 filing requirements.

2. Determine the extent to which THESL adopted the principles and methods set forth in Sections A through D to specific business cases and Chapter 5 requirements and guidelines for the four investment categories.

Given these objectives, our review of THESL's business cases seeks to answer the following question:

Are the business cases that THESL presents in its DSP consistent with the requirements of Chapter 5?

THESL has prepared detailed business cases that thoroughly address why the investment is needed and includes several alternatives and solutions, including "do nothing" and "run-to-failure" options. It has consistently applied the methods and principles outlined in its DSP, consistent with OEB Chapter 5, to support the level of investment for each business case. THESL also demonstrates that it has evaluated and selected alternatives within each business case based on life-cycle economic criterion. THESL's business case analyses also confirm the investments will provide value to its customers over the five-year rate period and beyond. For these reasons, Navigant concludes that the investments THESL proposes are supported and justified by the business cases it has prepared.

Navigant review of THESL's business cases is presented in Appendix A for each of the four OEB investment categories.

CONSISTENCY WITH UTILITY PRACTICES AND STANDARDS

In this section, Navigant addresses the degree to which THESL's practices and proposed projects are consistent with those used and implemented by comparable utilities. It includes an assessment as to whether THESL's practices meet or exceed those of other utilities, and reasons why differences exist in some segments of the distribution system. Specifically, this section sets out Navigant's response to the following question:

Are THESL's design and planning practices consistent with utility best practices?

To support its review, Navigant compared THESL's planning criterion, and design and construction practices to other comparable utilities in Ontario and other provinces. We also reviewed a June 2014 report prepared by Power System Engineering (PSE) that evaluated design standards and practices covering four areas.[8]

Design Practices

The PSE report confirms the adequacy of THESL's design standards, succinctly summarized in the following excerpts from the study.

> *The SDP[9] document was found by PSE and LHB to be thorough, well documented, and consistent with what is seen in the industry throughout North America as best practices.*
>
> *Overall, the standards and specifications contained in the SDP would not be perceived as insufficient or excessive.*

Navigant agrees with PSE's overall assessment. Navigant's concurrence with these statements is based on our review of the PSE report and a prior independent review of THESL's design standards and practices that Navigant completed for its 2012 IRM filing. For the 2012 IRM, Navigant conducted a survey to support its findings relating to design standards and practices covering the following. Navigant considered these criteria, where applicable, in developing findings and conclusions herein.

- Distribution design and planning criteria
- Equipment selection criteria
- Station and distribution line loading criteria and practices
- Line relocation policies and practices

[8] *Standards Review Study*, Power System Engineering, Inc. LHB, Inc., January 14, 2014.

[9] The SDP refers to THESL's Standard Design Practices (SDP) document, which documents Company Standards as applied to the design of the electric distribution system.

- Equipment replacement (renewal) criteria
- Overhead and underground distribution design and protection
- Physical infrastructure and renewal programs
- Safety-related upgrades and replacements

Planning Criteria and Methodology

THESL's approach to planning recognizes differences in methods applied to assets where criticality requires short-term action versus assets where long-term planning methods are appropriate. The type of economic evaluation also differs for business case evaluation, where Avoided Risk Cost is applied to replacement of assets and Cost of Ownership for new or non-in kind interventions.

Long-Term Planning

Over the longer term, THESL's planning criteria and methods, outlined in various sections of its DSP, considers a range of options, including "non-wires" strategies such as CDM and localized Demand Response as alternatives to new lines and stations. THESL's long-term capacity planning also recognizes integration requirements associated with renewable energy generation (REG) and other forms of distributed generation (DG) such as CHP. THESL's planning processes thus must consider factors such as increased fault current contribution and two-way power flows on distribution assets. Operational considerations such as intertie transfer constraints, enhanced protection and the need to monitor third-party generation become more apparent and critical as REG and other DG capacity increases.

THESL also must consider differences in the fundamental design of the distribution system. The mostly overhead 27kV system serving areas outside the downtown core has greater flexibility due to multiple feeder ties between stations; whereas the mostly underground 13kV system serving Toronto's downtown core has few feeder ties and limited station back-up at the transmission level. THESL has taken steps to proactively address these issues, including joint planning with HONI on development of east-west 115kV transmission tie lines and the construction of the Bremner station (renamed Copeland), each of which will provide greater flexibility and capacity serving critical downtown core load. In the DSP, THESL expands on this design philosophy via enhanced contingency plans for the downtown core, with increased feeder ties needed for load growth and reliability. It also is applying non-wires solutions in the form of localized DR for the Cecil station as a cost-effective alternative to new station capacity.

Short-Term Planning

THESL short-term planning focuses on assets where degradation, safety, municipal projects and relocations, and customer requests require near-term action. For assets that are rapidly degrading or where safety concerns are evident, THESL has taken steps to remedy deficiencies, which includes replacements from the 2012 IRM that will be completed in 2015

(also see Continuation of IRM projects in Business Case Review section). Strategies include enhanced maintenance, both corrective and preventative, as an alternative to replacement or upgrade. Key among these programs is THESL pole inspection and mitigation, where ACA data is used to identify poles in need of remediation or replacements. ACA data and current state assessment (CSA) results also provides information from which THESL can make cost-effective choices to address performance issues or known deficiencies. Each of these practices is consistent with practices Navigant has encountered at other comparable utilities that have adopted best practices for short term investment planning.

Based on the above and our review of documents that outline THESL's approach to planning its assets, supported by business case reviews, Navigant confirms that THESL has appropriately considered a diverse range of options and strategies, consistent with OEB Chapter 5. Further, the economic criteria and methods used to evaluate and rank options is consistent with leading utility practices.

Consistency with Industry Best Practices

As noted in prior sections, THESL's proposed projects are consistent with measures undertaken at other utilities with comparable service areas and electric system configurations. The methods that THESL has employed to determine need and sequencing of renewal upgrades also is consistent with current utility practices. This is particularly evident for high cost replacements such as power transformers and station switchgear, where THESL has undertaken a high level of rigour and significant analysis to determine where the need for renewal is greatest.

The replacement of obsolete equipment and facilities that are deteriorated and pose reliability or safety risks, such as non-arc resistant switchgear, is common among utilities, as are some of the more salient, and equally compelling needs to replace defective porcelain and change out of gang-operated overhead switches – each of these programs are underway at many other utilities in Canada and the U.S.

The upgrade of communications and SCADA is also consistent with common utility practice, as sound and reliable communications provided via redundancy is now an essential component of utility monitoring and control systems. The increased sophistication of these systems and introduction of Generation Protection Monitoring and Control program is needed to enable increased penetration of distributed generation.

In summary, Navigant views THESL practices and proposed investment programs to be in line with those undertaken by other utilities that have adopted best practices for renewal programs. Such actions assure that THESL's energy delivery system will continue to operate safely and reliably. Further, the proposed investment schedule will assure that renewal programs are implemented in a scheduled and orderly manner, both during the 2015 – 2019 and thereafter, until the renewal backlog is fully addressed by 2037.

Overall Findings

From our in-depth review of THESL's DSP, policies and practices, specific business cases, and planning methods and criteria, and prior experience evaluating similar utilities, Navigant finds that THESL's planning practices are consistent with those employed by other utilities and the requirements set forth in relevant sections of OEB Chapter 5. Significantly, business plans in THESL's DSP consider a diverse set of options and selects the least-cost options based on life-cycle economic criteria.

Based on our review of THESL documents and extensive work with other electric utilities in Ontario and other provinces, Navigant finds that THESL's design practices also are consistent with Chapter 5 guidelines and prudent utility planning practices. Where differences exist, such as limited downtown feeder ties, higher fault current rating of some station equipment, these are due to the unique challenges and requirements associated with a major urban system; many of which are discussed in THESL's DSP and business cases and that will be addressed through THESL's proposed projects.

CONFORMANCE WITH OEB DISTRIBUTION SYSTEM PLAN REQUIREMENTS

In this section, Navigant opines on the degree to which THESL's DSP conforms and complies with the major objectives and guidelines outlined in Chapter 5. Specifically, this section sets out Navigant's response to the following question:

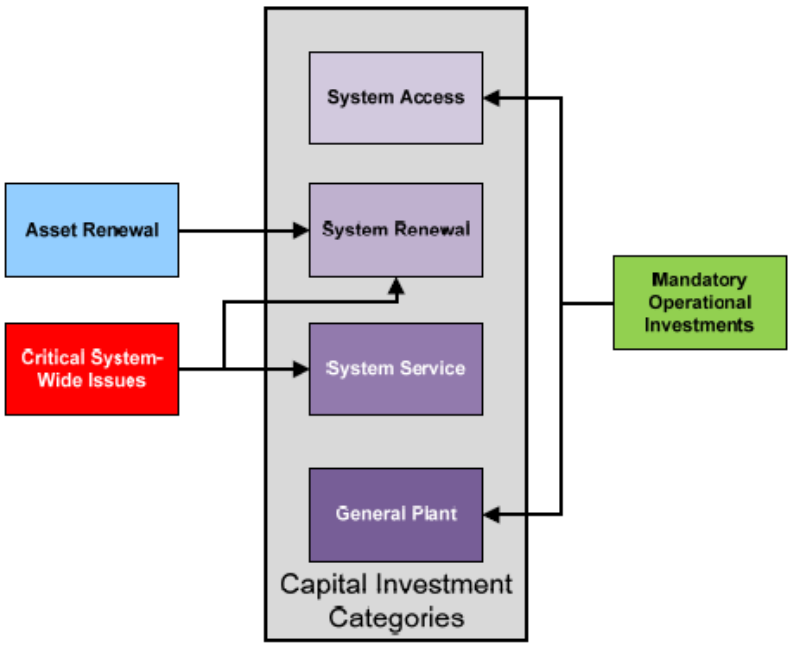
Does THESL's DSP and proposed investment plan satisfy the objectives set forth in Chapter 5?

Following a careful review of Chapter 5, Navigant has concluded that THESL's DSP meets the general and specific requirements set forth therein. Our findings are based on the degree to which THESL processes outlined in the DSP comply with Chapter 5, and the consistency of THESL's business plans with OEB guidelines. Our conclusions are supported by findings contained in the sections that follow.

OEB Investment Categories

THESL's CAPEX plan has been developed in a manner generally consistent with OEB asset capital investment categories; however, certain asset classes and investments span more than one category. THESL prepared the diagram that is replicated in Figure 4 to facilitate external review of its application, and is referenced herein as an aid in our assessment. It highlights the asset categories that are designated as material investments outlined in Section 5.4.5.2 of Chapter 5.

Figure 4. Mapping of THESL Investments to OEB Categories



Integrated Planning

Planning for the safe and reliable operation of an electricity distribution system requires the integration of a range of primary and secondary drivers to ensure needs are met in a cost effective manner. Inherent in this process is the recognition of drivers outside of the utility's direct control, such as transportation infrastructure improvements. It also recognizes the drivers jointly affecting other utilities; most relevant to THESL is joint planning with HONI where investments are made as a result of the respective needs of each utility.

Navigant has found that, through the policies and practices outlined in Sections A through D, and the detailed business cases in Section E, integrated planning has been consistently undertaken by THESL and it has been incorporated in virtually all aspects of its system. Several examples of comprehensive and proactive integrated planning are presented in our review, with key examples highlighted below.

- Load forecasts that recognize CDM and localized demand response for capacity planning
- System upgrades designed to enable safe and reliable integration of DG, consistent with provincial policy and Green Energy and Economy Act mandates
- Contingency planning of critical downtown load recognizing HONI transmission design and constraints
- Recognition of major transportation infrastructure and city expansion to guide the development of new or upgraded facilities to meet these needs
- Safety and reliability improvements designed to meet customer expectations and needs
- Balancing of risk versus of cost in developing a five-year investment plan

These factors support Navigant's conclusion that THESL's DSP recognizes and consistently applies integrated planning principles and practices to support formation of its proposed investment plan. It incorporates principles and requirements in Section 5.0.3.1 (Integrated Planning) specifically and Section 5.2 (Distribution System Plan) generally, thereby ensuring compliance with OEB DSP objectives. Our review of individual business cases supports this finding, as many projects and programs include elements of several of the above drivers.

Long-Term Planning

THESL clearly has taken a long-term approach for each of the investment categories outlined in Chapter 5 and addressed herein. The use of ACA and FIM determines the optimal timing of renewal replacement based on economic end-of-life criteria; which for many assets has been partially deferred to ensure an appropriate balance of risk and cost. THESL's paced investment plan for reducing the backlog of economically justified renewal and replacement goes well beyond 2019, with the backlog fully addressed by 2037.

System Service investments, especially more costly station upgrades, are made with consideration given to "non-wires" alternatives and rebalancing and transfer of distribution loads to ensure station and line capacity is used in the most efficient manner, consistent with OEB Section 5.4.2 (b) and other relevant sections in Section 5.2. These initiatives are projected to result in the deferral of costly upgrades at critical downtown stations such as Cecil. Navigant views the multitude of options THESL considered in its planning process and strategy to maintain a paced spending profile for renewal projects as entirely consistent with Chapter 5 objectives specifically, and common industry practices in general.

Regional Considerations and Third Party Planning

THESL, as an embedded LDC, does not interconnect to or provide distribution supply to other LDCs – all points of supply are from HONI networks via direct connection to the transmission system or HONI stations. Hence, most regional planning considerations focus on HONI and the OPA. Navigant's review of THESL's DSP and knowledge of regional planning for the Greater Toronto Area (GTA) confirms regional issues have been incorporated into the DSP.[10] Foremost among these is the extensive joint planning efforts to address reliability of supply for downtown Toronto.[11] The development and expansion of HONI's 115kV transmission to create a new east-west tie was the result of extensive joint planning, including supply to the Copeland station in the 2012 IRM and the Downtown Contingency Plan in the DSP. Additionally, THESL has coordinated its plans to mitigate constraints limiting DG and renewable sources with HONI, as conditions such as fault current limitations exist on both systems (e.g. Leaside and Manby on HONI's system).

THSEL also is actively supporting the Central Toronto Integrated Regional Resource Plan (IRRP) to address alternatives for ensuring reliable, low-cost supply to Toronto, including non-wires alternatives. For these reasons and evidence of joint planning for City infrastructure projects and downtown development, Navigant concludes that THESL has demonstrated that it has proactively addressed regional issues in its DSP, consistent with Chapter 5 requirements. Our conclusion is supported by the cost-effective alternatives THESL evaluated and proposed in business cases from Section E of the DSP that Navigant reviewed in preparing this report.

[10] Navigant's involvement in prior GTA regional issues include business case review of the Copeland station for the 2012 ICM; review and assessment of THESL's GEA Plan; market potential assessment of DG with the OPA, and an assessment for enabling greater amounts of DG in Toronto in concert with HONI proposed upgrades, among other engagements addressing supply.

[11] For example, THESL demonstrates that it has coordinated station expansion and upgrades with third parties, including HONI and the Ontario Power Authority for upgrades considered in the ongoing OPA led IRRP planning process.

Smart Grid Development and Implementation

Although THESL does not include a spend category labeled Smart Grid, our review of its planning processes and specific business cases indicates the five-year spending plan include many smart grid components and systems. Many smart grid initiatives are effectively embedded within projects and programs, such as enhanced monitoring of distributed generation to enable higher levels to be installed. Other smart grid investments such as automated switching and transfer schemes are categorized as reliability improvements. The use of smart technologies is proving to be particularly effective as a low-cost method to improve reliability, a foundational aspect of SmartGrid deployed throughout North America and worldwide. Further, the build-out of communications system provides requisite infrastructure to support a range of smart grid investments, including those that will enable higher penetration of DG throughout the distribution system. Each address specific OEB guidelines set forth in Section 5.0.3.4, including the use of smart technologies to "facilitate the integration of distributed generation and complex loads."

Integration of Renewable Energy Generation to THESL's Network

THESL fully complies with Chapter 5 requirements set forth in Section 5.4.3 (a) through (e), (System Capability Assessment of Renewable Generation), which directs applicants to provide information on the capability of the distribution system to accommodate REG capacity and integration constraints. Section E.3 of THESL's DSP includes a projection of renewable and other DG technology capacity to 2019 (626 MW total), and specific solutions and mitigation strategies to address constraints it has identified on its and HONI's system. These upgrades are consistent with those outlined in THESL's 2012 Green Energy Act plan and related studies it prepared over the past several years that addressed DG market potential, DG capacity limits and solutions to address integration constraints. THESL is also proposing implementation of monitoring and controls via its Generation Protection Monitoring and Control program. Navigant believes this is a vital and necessary project that reduces the likelihood of DG disrupting distribution performance or operations, thereby increasing THESL's DG integration capability. In addition, as discussed previously, THESL is undertaking joint planning and coordination with HONI to identify solutions to facilitate integration of REG that are best addressed at the transmission level.

Reliability and Performance

Almost 50 percent of THESL's proposed spending over the five-year rate period is for renewal programs. Because of the backlog in economically justified renewal replacements and other critical infrastructure projects, THESL has relied on a risk-based process and economic model (FIM) to identify the most critical upgrades to ensure reliability and performance does not degrade. The processes and methods THESL used to select up to $250 million of renewal investments annually are consistent with Section 5.4.5 (Justifying Capital Expenditures) of Chapter 5. The validity of the levelized approach is underscored by THESL's reliability

projections, as the proposed spending program will maintain or improve system performance metrics by 2019.

Performance Monitoring

THESL presents a performance monitoring and continuous plan designed to ensure the investments it proposes over its five-year rate period produces efficiency, performance and customers satisfaction gains outlined in its DSP and business plans. It includes 12 measures over three categories that THESL proposes to monitor throughout the rate period (Figure 5). Foremost among these is Customer-Oriented Performance that THESL will track and measure using IEEE reliability and performance metrics.

Figure 5. THESL Performance Measures

Customer-Oriented Performance	Cost Efficiency/ Effectiveness of Planning and Implementation	Asset/System Operation Performance
1. System Average Interruption Duration Index (SAIDI). 2. System Average Interruption Frequency Index (SAIFI). 3. Customer Average Interruption Duration Index (CAIDI). 4. Feeders Experiencing Sustained Interruptions (FESI). 5. Momentary Average Interruption Frequency Index (MAIFI).	1. Distribution System Plan Implementation Progress. 2. Planning Efficiency: Engineering, Design and Support Costs. 3. Supply Chain Efficiency: Materials Handling On-Cost. 4. Construction Efficiency: Internal vs. Contractor Cost Benchmarking. 5. Construction Efficiency: Standard Asset Assembly Labour Input.	1. Outages caused by defective equipment. 2. Stations capacity availability.

THESL also proposes to track DSP progress via internal and external benchmarking for key supply, construction and design performance metrics. THESL will track operational performance via two metrics, outage from defective equipment and station capacity; charts in the DSP confirm increased utilization of station capacity. THESL also proposes to continue to track customer satisfaction through periodic surveys to gauge customer views on a series of performance and cost issues. These surveys also are used to provide guidance to THESL to ensure program spending, to the extent practicable, is directed to areas of greatest concern of interest to its customers. Based on THESL's proposed monitoring and tracking of key metrics, Navigant concludes the plan, consistently tracked, should yield continuous improvements in each performance category listed in Figure 5.

Customer Value

Customer value is repeatedly underscored throughout THESL's DSP by the significant emphasis on ensuring and improving reliability performance, taking numerous proactive steps to improve system safety, and realizing operational and investment efficiency synergies whenever possible. Utilizing ACA data and the FIM as tools for informing sensible and cost efficient system investments maximize customer value and represent best practice in investment planning. The implementation of tracking continuous improvement measures for reliability should enhance customer value throughout the rate period, which THESL will verify by periodic surveys. Consistent with Chapter 5 requirements, consideration of both current and future customer value is present in THESL's planned investments that in many cases may enable future modernization projects not yet directly contemplated in this plan (e.g. development and modernization of distribution communication infrastructure will support future smart grid opportunities).

SUMMARY ASSESSMENT

The section addresses the methods and tools THESL employed to evaluate projects, and the level of rigour applied to justify project need. Specifically, with respect to THESL's proposed projects, Navigant critically reviewed the approach THESL undertook to justify each project, summarized in the following question:

Are the methods and tools employed by THESL to select proposed projects appropriate and sufficient to justify the investment?

Technical Need

For all business cases Navigant reviewed, THESL provided factual or empirical evidence that amply demonstrate why the proposed projects are needed, consistent with guidelines set forth in Chapter 5. The methodology, engineering principles, assumptions, and level of rigour used by THESL are broadly consistent with those used by leading utilities. Foremost among these is the use of sophisticated tools and tests to determine the condition of equipment, and to predict the areas of the system at greatest risk. For example, the condition and need for replacement of station transformers is based on dissolved gas analysis (DGA) performed by reputable firms, coupled with the exposure to customers if such devices were to fail. Similarly, the replacement of station class breakers, switchgear and overhead, gang-operated switches is based on thorough research and tests performed by THESL personnel that confirm that some of the devices installed on THESL's system are defective, with attendant reliability and safety exposure.

THESL uses a comprehensive series of distribution simulation and analytical tools to accurately predict asset performance and equipment loading under a range of operating conditions. These include the FIM for renewal spending, which incorporates risk factors and life-cycle economics to evaluate project need and value. The upgrade of remote terminal units (RTU) also is critical as several devices are no longer capable of reliably providing continuous status data to system operators. Navigant has witnessed the degradation of RTU functionality at many other utilities, which have adopted similar replacement strategies.

Economic Value

Navigant has determined that the economic value of the five-year investment plan to THESL customers is consistent with OEB Chapter 5 requirements and leading industry practices. This finding is supported by the rigour and application of economic methods THESL used to develop its capital spending plan. Navigant views THESL's proposed level of spending over the five-year rate period as the minimum needed to ensure distribution reliability, safety and customer satisfaction. THESL has developed and implemented economic models designed to optimize investments based on risk versus cost trade-offs. Although THESL does not propose spending levels that are supported by economic end-of-life criterion – this would result in capital spending at 60 percent above proposed levels - it has developed a spending strategy to

meet Chapter 5 requirements at an acceptable level of risk. Navigant's review of THESL's methodology presented in its DSP, and its application of these methods to business cases we reviewed, confirm the projects and programs THESL proposed are justified based on life-cycle economic value.

Smart Grid and Renewable Generation

THESL proposes a series of investments designed to reliably integrate up to 626 MW of DG capacity that it expects to be added to its distribution system through 2019, including over 200 MW of renewable generation. THESL prepared a DG capacity forecast, and includes in its DSP a series of investments to proactively address constraints and violations caused by the addition of DG resources. These include upgrades such as communications, monitoring and controls that Navigant believes are essential to reliably integrate large amounts of DG. THESL has also coordinated its investigation of impacts and mitigation options with HONI. Accordingly, we conclude that THESL's DSP meets or exceeds the requirements set forth in OEB Chapter 5 and are consistent with leading industry practices.

Environmental Factors

THESL proposes programs that address environments factors at the system and distribution level. At the system level, THESL has proposed upgrades and system that will enable greater amounts of DG capacity, including environmentally favourable renewable generation. At the distribution level, THESL proposes replacement of critical infrastructure and equipment that pose local environmental hazards. Our review of the DSP and individual business plans indicates that the upgrades and replacements THESL proposes also will produce the value in terms of reasonable efforts to mitigate or reduce environmental impacts. Further, by focusing on assets with the highest risk, THESL has taken a responsible approach to addressing infrastructure and equipment with potential environmental impacts.

Overall Assessment of the THESL's DSP and Five-Year Capital Investment Plan

Our review and assessment of THESL's DSP indicates the methods it has applied to develop its capital investment program are consistent with other urban utilities in Canada and the United States where Navigant has conducted a similar evaluation. Notably, we did not identify any projects or measures that are inconsistent in scope or need prescribed in OEB Chapter 5. In Navigant's view, because of these reasons and the analysis presented in prior sections of our report, THESL's DSP, and the business cases and proposed projects therein, are reasonable and justified.

Further, THESL's proposed five-year capital spending plan of approximately $490 million annually is justified based on Navigant's review of the evidence and facts THESL presents in its DSP that we relied upon to conduct our independent review and evaluation.

Our conclusion is based on the following key findings:

- THESL's proposed spending is the minimum needed to complete the continuation of IRM programs in 2015 and to maintain a reasonable balance between risks and costs over the five-year rate period. The level of spending is higher than the prior five years, but is the minimum required to reduce the backlog of end-of-life asset replacement by 2037 and meet OEB Chapter 5 requirements.
- The technical and economic analyses THESL has undertaken to support the capital investment plan is rigorous and consistent with Chapter 5 guidelines for each of the four major spending categories.
- THESL's has consistently applied technical and economic evaluation methods to support individual business cases; and proposed spending for each business case is justified by the facts, evidence and analysis Navigant evaluated for its review.

APPENDIX A: BUSINESS CASE REVIEWS

Concurrent with its review of Sections A through D, Navigant conducted an independent review and assessment of business cases THESL prepared in Section E of the DSP. Navigant's review of these business cases is presented below.

System Access

2014 ICM Continuation Programs

Metering

THESL's investment in its metering program is designed to achieve mandatory service obligations as outlined by the IESO (for wholesale metering) and the Gas & Electricity Inspection Act (for revenue metering). THESL's DSP outlines the work involved in the program, including meter removal for verification testing; there is a further breakdown of assets proposed for replacement by customer class. THESL quotes the relevant OEB amendment to the Distribution System code (DSC) which impacts a portion of its metering upgrade program. For the suite metering segment of its business case, THESL cites the Energy Consumer Protection Act (ECPA) as a standard mandating these installations. The total capital required for the program is $77.3 million. Annual capital expenditures and unit replacement schedules are presented, with annual costs averaging $17 million with most spending concentrated at the beginning of the program.

Compliance with statutory provisions and regulatory requirements are the primary drivers for THESL's metering program. Asset management is governed by identified standards (specifically Sections 9, 11, and 12 of the Electricity and Gas Inspection Act) which are expanded upon extensively and summarized in Table 19.

The benefits of the metering program are highlighted in THESL's business case, primarily improvements to customer service. For example, large building operators' dependence on metering data to manage electrical plants is cited, as well as the number of customers (9,500) that will benefit from the replacements. THESL also states that interval metering upgrades will allow for more efficient outage verification and a reduction in SAIDI, consistent with customer benefits cited by other utilities.

The business case lists timelines for the program and the start dates of the sub-programs. It also list factors contributing to year-to-year variances in spending, including data processing deferment and dependence on HONI for scheduling wholesale revenue metering changes. THESL also summarizes program risks~~,~~ such as delays in HONI work and methods for mitigation (i.e. scheduling work closely with HONI for proper allocation of resources). THESL highlights the consequences of changing its current approach for meter reads; for example, manual reading of meters would require "immense resources" compared to upgrading

metering to smart synch meters. THESL's program is unique in that due to regulatory mandates, there are no alternatives for the majority of THESL's proposed work plan. Accordingly, this requirement obviates the need to perform economic feasibility analyses. THESL provides further justification in its business case by separately listing all of the individual standards and regulations that the program work must comply with in Table 19.

Customer Connections

THESL's customer connections program is driven by its obligation to connect to new buildings on its distribution lines or for an occupant that requests connection. The work includes installation of overhead or underground supply lines, service poles, cable chambers, transformers, commercial meters and other connection tasks. Expansion work is sometimes necessary, and may include upgrades such as new circuits or civil infrastructure enhancements. THESL's forecasted total cost forecast from 2015 to 2019 is $260 million, with $70 million offset by customer contributions.

THESL's business case indicates the primary justification and program benefit is customer value. THESL states that the investment will provide, and continue to maintain, distribution service to customers, particularly during a period of time of when it expects increasing numbers of high rise developments, consistent with growth projections in the City's GDP. THESL compares the rate of development of high rise buildings in Toronto to other large cities to support a view that connection work in Toronto is likely to be comparable to or exceed that of other large cities.

Regarding the pacing of its program, THESL cites the timelines of individual connection work mandated by the Electricity Act and CoS. THESL forecast connection requests through development of a historical baseline, and then incorporated economic growth factors, development factors, and large construction projects to augment the baseline. This method is typically used in developing load forecasts and is consistent with what has been provided by similar utilities. THESL describes cross-program efficiency initiatives in prior connection projects, citing cases where expansion for future load was integrated into task work. Risks in program execution are highlighted, including variations in the forecasted demand impacting timelines.

Externally-Initiated Plant Relocation & Expansion

Investment in this program is for government mandates that require Toronto Hydro to work in conjunction with public entities to facilitate public development projects. This includes like-for-like replacement of some assets during relocations or upgrade of service to provide safe and reliable service. Some requests are mandated by Public Service Works on Highways. THESL estimates it will be able to recover 30 percent of construction costs from projects associated with the road authority, while all other agencies cover 100 percent of THESL's relocation cost. An example of the latter is the ELRT, with program costs of about $220 million from 2015-2019, averaging about $40 million annually.

THESL's report thoroughly supports paced program spending, citing major projects between 2015-2019, such as the MTO Bridge Rehabilitation, GO Transit Electrification, Eglinton Light Rail Transit, and other Metrolinx LRT projects. THESL notes that since investments are highly dependent on external agencies, high variability in required funds is likely and largely beyond THESL's control. For this reason, Toronto Hydro requests OEB authorize funding for a base rate sufficient to fund the sub-forecasted base amount; a variance account is also requested to cover additional costs that are difficult to predict.

The report also identifies opportunities to upgrade system assets instead of like-for-like replacement for externally initiated relocations. THESL's DSP provides a description and review of how potential efficiencies in the upgrade process are evaluated. This review provides evidence that Toronto Hydro selects work plans to consider associated work "when carrying out non-discretionary capital projects" (i.e. to directly address EB-2012-0064, as discussed in the report).

Load Demand

THESL investment in the Load Demand program funds three activities on its 13.8kV and 27.6kV distribution system: load transfers, feeder upgrades and equipment upgrades. These upgrades and modifications will alleviate operational constraints associated with available connection capacity. THESL evaluated stations forecasted to be overloaded in the 2015 through 2019 rate period, and proposes to proactively transfer load off of these station buses to reduce reactive work and resultant less efficient system configurations. THESL's program includes upgrades to 18 stations at a cost of $63.14 million. Average annual expenditures are approximately $15 million, with program costs increasing throughout the five-year investment period.

Program benefits include enhanced customer value, expressed as the difference in cost of ownership between existing and renewed assets for the first year of the program ($24.2 million), a common metric used as evidence to support the investment. This value, along with a positive first-year NPV ($12.3 million), indicates that the program is prudent investment. Additional qualitative benefits include enhanced reliability, safety, and efficiency (i.e. reduction in restoration time, reduction in asset failure risk, and increased operational freedom). The primary driver is customer service requests. THESL's interpretation of DSC 3.3.1, in which the distributor is obligated to plan and build the system for reasonable forecast load growth, and improve the system "for relieving system capacity constraints" provides additional rationale to support proposed investments. Other drivers, such as reliability, also reference DSC operational mandates with regards to the planned program work.

The business case conveys sound underlying support for pacing program investments. For example, the number of proposed developments in the process of obtaining permits is a significant factor driving the need for increased investment in load transfers and station upgrades. THESL demonstrates that based on historical timelines, substantial connection work will be needed between 2015 and 2019. As evidence, THESL provides service territory maps

overlaid with proposed connected load to illustrate concentrated load requests necessitating specific station upgrades. The lower amount of spending in 2015 is due to the City's construction moratorium for the Pan-Am games. Other program expenditures are based on individual project ranking criteria, including area capacity to connect new customers, the ability to continue operations under single contingency conditions, and area reliability; each are consistent with utility prioritization approaches for asset replacement or upgrade. Finally, THESL includes funding for temporary upgrades to ensuring system operability is maintained until future upgrades have been evaluated and completed.

The business case evaluates investment alternatives, including upgrading station capacity through expansion or the construction of new stations. These options were eliminated in favour of equipment upgrades due to long lead times, potentially exposing the system to degraded reliability until work is completed. THESL includes asset replacement for each sub-project.

Generation Protection, Monitoring and Control

THESL's Generation Protections, Monitoring and Control (GPMC) program aims to enhance and enable protection schemes, and increase visibility via the monitoring and control of distributed generation (DG). This program includes high speed protective relays at station buses with short circuit constraints, bus-tie reactors that minimize the short circuit at station busses, and monitoring and control equipment to provide greater visibility and provide distribution operators with proactive controls to prevent risky conditions such as islanding. The program is expected to cost approximately $15.5 million over the next 5 years. The program also supports HONI's ongoing efforts to alleviate constraints at the transmission level, as protection systems will be installed at Leslie, Basin and Wiltshire TS with a bus tie reactor at Richview TS. Related program benefits associated with enabling greater DG capacity include greater customer value, reliability, safety, efficiency, and meeting public policy and environmental goals.

Given significant projected increases in DG capacity in its service territory, THESL's business case amply justifies the investment by citing field crew safety, reliability impacts and potential deterioration of distribution assets due to high fault currents. THESL forecasts that 626 MW of new DG capacity is likely to come on line over the next 5 years for FIT, CHP and other DG. Its staggered plan to install the advanced protection, monitoring and control devices is in line with expected DG capacity additions between 2015 and 2019. The program includes anti-islanding to reduce risk for field crews during restoration. Enhanced protection and monitoring capability also enables distribution operators to better manage thermal loads via load transfers. The NPV cost for the GPMC program is about $18 million

THESL evaluated alternatives such as major system upgrades and deemed these too expensive and largely dependent on HONI to perform the work with scheduled timeframes outside the five-year window. Navigant views THESL's GPMC program as less costly and providing tangible benefits within a desired timeframe. Tables and graphs THESL used to evaluate

program need and benefits support the business case, although details on the process THESL used to select technologies is limited – additional details on cost for selected technologies would further strengthen the business case.

System Renewal

2014 ICM Continuation Programs

THESL provided significant evidence in its 2012 ICM filing to justify and support proposed renewal expenditures for programs continuing into 2015. Navigant reviewed much of this evidence for its independent evaluation of the ICM filing. Navigant also reviewed the updated business cases THESL prepared for the DSP and the technical and economic methods used to justify these projects. Based on its review, Navigant finds that each of the renewal program investments continue to be justified based on need and life-cycle economics. We did not see any major changes in assumptions, costs or economic results that would justify deferring or eliminating completion of these programs as part of the ICM filing.

Reactive Capital

Reactive capital is necessary to ensure THESL retains the ability to reliably serve its customers and quickly respond to service interruptions or hazardous system conditions. Exact budget requirements for a reactive capital program are difficult to predict. THESL justifies its business case based on past experience, inventory of asset condition (via a Defective Equipment Tracking System), and tracking corrective work request needs. THESL estimates reactive capital spending over the 2015 to 2019 rate period at $165.5 million, a figure inclusive of the offset expected from planned non-reactive asset replacements.

The business case justifies the renewal program budget in light of THESL's to ongoing obligation to maintain system reliability, quickly correct hazardous system conditions, address imminent or likely asset failures, and restore service resulting from defective, failing assets and unplanned contingencies including natural disasters and foreign interference. Reactive capital also is required to facilitate planned modernization and system growth by ensuing resources needed to support planned operational investments are available for those activities. THESL expects reactive capital requirements to increase based on a growing trend of equipment reaching or exceeding EUL, with 26 percent of distribution system expected to be beyond their EUL by 2015. While the overall reactive budget is reasonable in light of expected increases in asset failure due to larger shares of system equipment exceeding EUL, among other factors, asset condition may be a more useful and clear metric than asset EUL and is described but not as clearly and quantitatively summarized as asset age in this business case.

Creating a reactive capital budget based on expected future asset failure and historical failure data is consistent with standard utility practice. The program is required to ensure the continued safe operation of the distribution system, maintaining crew and public safety, mitigation of environmental hazards, and proactive response to actual or potential

contingency events. Though financial analysis is not performed for alternative scenarios, including "do nothing" options, Navigant recognizes both the need and level of investment THESL presents in its business case.

Underground Legacy Infrastructure

THESL's Underground Legacy Infrastructure (UGL) renewal program is designed to upgrade system components that present challenges on multiple fronts including system maintenance, operational efficiency, crew and public safety, and delivery of customer value through reliable and efficient service. In its business case, THESL supports the replacement of several assets between 2015 and 2019 including:

1. Sachsenwerk switch and fuse units
2. Specific equipment in the Thorncliffe Park distribution area
3. Transclosures
4. Powerlite switches
5. Vault step transformers
6. Cable chamber covers (i.e. 'manhole' covers)

The program is expected to cost $27.39 million over the five-year rate period, and includes replacement of the above listed assets at various locations across THESL's service territory.

THESL's business case for replacement of these UGL assets covers a range of factors unique to individual assets, though primary drivers across all categories include obsolescence of equipment design and/or configuration, increased failure probability in light of equipment condition and age, and safety concerns for both the public and THESL crews resulting from failing and outdated equipment or equipment in poor condition. Navigant agrees that continued operation of aging and non-standard assets experiencing intermittent failures, particularly with regard to the Sachsenwerk switch and fuse units, Powerlite switches, and certain transclosures, presents operational challenges, safety hazards, and inefficiencies as reactive replacement or repair may require custom-engineered solutions and workarounds that lead to longer customer outage times. Further, certain UGL assets (e.g. Powerlite switches) are no longer manufactured, making continued operation impractical without OEM support or an adequate supply of replacement parts. Others, such as in the case of Sachsenwerk switches, are of an outdated design prone to flash-over hazards.

Potential safety hazards exist for other UGL assets as well. Traditional unsecured chamber covers present a danger to the public/THESL crews in the event of an underground explosion (24 incidents of dislodged covers have occurred in the past 7 years), and corroded transclosures beyond their EUL (representing the majority of the system) present hazards to THESL crews as transformers are degraded by the elements. Reliability of transclosure units following replacement also is enhanced, as THESL seeks to convert radially fed units to a

looped system with open ties. THESL also proposes to replace or decommission vault step transformers installed between the late 1950s through the early 1980s in a wide array of sizes (both in kVa and voltage). The programs is justified, as THESL no longer provides multiple service voltages, and it no longer stocks replacement transformers due to the small number of installed units. Decommissioning will improve reliability by reducing the potential for equipment failure and by removing non-standard equipment no longer in stock and that is challenging to replace.

Navigant notes that THESL's plan to upgrade UG infrastructure in the Thorncliffe Park distribution area includes replacement of newer vintage assets (compared to other UGL assets); it includes the replacement of five and six-way SF6 switches installed by the former East York Hydro. These switches, permanently sealed after manufacture, have a rated EUL of only 20 years, and are deemed "effectively failed" after leaking sufficient levels of SF6 insulating gas. THESL does not stock replacements as these switches are no longer manufactured and are used in a small segment of its service territory. Replacement solves a series of challenges and brings greater uniformity to system design, avoids possible near-term failures (as experienced by other similar vintage SF6 switches), and reduces equipment exposure to flooding and corrosion by reconfiguring equipment to be pad mounted. Notably, the Thorncliffe Park area has experienced flooded vaults resulting in damaged UG equipment despite THESL's use of sump pumps. This reduced automatic transfer switching (ATS) capability of SF6 switches, which have higher failure rates due to flooding and that require frequent maintenance.

Based on the quantification of these risks and constraints, THESL estimates the cost of ownership of existing legacy infrastructure (COE) is greater than the cost of ownership of new assets of a standard design (CON). Total CON, inclusive of additional quantifiable benefits, risks and program cost, is expected to yield a positive NPV of $1.46 million in the first year.

THESL's business case for replacing UGL assets is justified by a host of safety, reliability, and customer value concerns: Improving system architecture and uniformity offers THESL greater flexibility for optimal network management, both by crews (via safe/efficient use of engineering resources) and remotely (i.e. smart grid); and replacement CRD/CLD and pad-mounted switches can be retrofitted to enable remote operability. THESL's ranking and prioritization of equipment replacements is clearly outlined, both in methodology and expected installation sequence. THESL's analysis evaluates asset condition, load served, upstream effects, and coordination with other program work balanced to ensure equipment replacements enhances customer value by delivering service reliably and efficiently.

Network Unit Renewal

Network units (NUs) are a critical element of THESL's downtown secondary distribution network. These devices contain several components including a network protector, a primary disconnect and grounding switch, and a network transformer. These units are essential, as they isolate faults from separate feeders within the network, which protects network

equipment, and provide uninterrupted service to downtown load. Many of THESL's NUs are beyond or approaching EUL, and, particularly for "fibertop" units, an outdated design that risk service disruption and increased risk of vault fires. All NUs scheduled for replacement are susceptible to damage and corrosion from flooding, and replacement with submersible units will mitigate these impacts. THESL estimates total program costs over the 2015 through 2019 rate period at $34.38 million. First year program cost versus avoided risk cost is $7.11 million NPV.

THESL's business case justifies the NU renewal program based on safety, reliability, and customer value. Further value is realized via the replacement of submersible equipment that will be less susceptible to corrosion and flood damage, and improved visibility of vault conditions through remote load monitoring (i.e. via use of smart grid technology). Existing network unit equipment includes 'fibertop' and 'semi-dust-type' units that are not water tight and in many cases experience significant corrosion and rust following years of exposure to flooding. Fibertop units have an outdated design that increases the risk of phase tracking, which can instigate costly and dangerous vault fires with attendant risk to the public and THESL crews. Some units also are connected to the secondary grid using asbestos-insulated, lead cables that also pose significant hazards in the event of a vault fire. THESL's proposed replacement of fibertops with submersible units virtually eliminates tracking risk, as use of a raised secondary busbar reduces accumulation of salts and debris. Some older units also may leak oil, which poses an environmental hazard and higher risk of failure.

THESL's proactive replacement of network units that are both of inadequate design, susceptible to flooding damage, and pose increasing risk of failure is consistent with industry practices. THESL has prioritized replacements by focusing on fibertop units most prone to failure, followed by replacement of units in the poor condition and those most likely to encounter flooding. Though not fully detailed in the business case, a feeder investment model (FIM) is used to balance asset condition and customer impact to determine optimal intervention time and replacement prioritization. Annual forecasted capital expenditures are provided with approximately 50 units replaced annually.

Distribution System Communication Infrastructure

THESL's existing communications infrastructure is becoming increasingly difficult to maintain and expand, with reliability bottlenecks that are inconsistent with current design practices. THESL's renewal program addresses key communication infrastructure constraints and deficiencies, several with synergies to other renewal programs. THESL's supervisory control and data acquisition (SCADA) system is critical for optimal distribution system (DS) management, as it enables controllers to respond quickly to changing system conditions and manage contingency events. Proposed communications and control infrastructure will significantly reduce outage times - THESL estimates outage time increases from 30 minutes to three hours without proper SCADA functionality. THESL estimates program costs of $16 million over the 2015 to 2019 rate period, with all work scheduled to be completed by the end of 2017. Pacing and prioritization of the work is based on the dependency of individual

communication components as well as the dependency of other programs on the communication infrastructure.

Consistent with other renewal programs, THESL's business case justifies the investment based on improved reliability, operational efficiency, and enhanced customer value, achieved by limiting outage duration via optimized system control. The program includes three primary investments: 1) DS communication technology upgrade; 2) DS fiber-optic plant replacement/expansion; and 3) SCADA wireless infrastructure. For its current DS communication technology, THESL relies on an outmoded 1980's vintage synchronous optical network (SONET) system that has produced 90 communication outages over the last five years. The system is no longer supported by the manufacturer, is compatible with only one remote terminal unit (RTU) system, and limits benefits achieved by other programs such as station control and monitoring, and station switchgear renewal. Navigant agrees that it is neither cost effective nor prudent to continue to investing in and utilizing the outdated SONET system, as this system is non-standard and incompatible with future expansion.

Fiber optic plant replacement and expansion, the second major investment category, creates reliability exposure and an expansion bottlenecks, both in design and ownership structure. Currently, 75 percent of all fiber-optic cable is jointly owned by THESL and Cogeco Data Services (CDS). This arrangement limits THESL's ability to optimally route cables and eliminate single points of failure, resulting in potential SCADA outages. Targeting areas prone to failure, THESL plans to reduce dependency on CDS through gradual migration to a fully-diverse THESL owned fiber-optic plant, while also expanding its reach.

Wireless SCADA infrastructure, the third primary investment area, is currently dependent on five separate wireless technologies, three of which are now functionally obsolete. Over 1,100 vault or overhead RTUs now rely on communications from this equipment, and system operations are further complicated by a lack of manufacturer support for outdated models. Also, THESL cites a potential cyber security risk by operating an outdated and unencrypted wireless communications system, one that will be minimized thorough investment in new equipment.

THESL's justification for proposed investment for the upgrade of this critical communications infrastructure is consistent with practices Navigant has encountered with other utilities. We also acknowledge that it is necessary to further enable smart grid management, and to fully realize benefits and opportunities presented by other planned system investments. In summary, THESL proposed investments will significantly modernize and improve the security of THESL's distribution communications network.

Station Building Infrastructure

THESL's proposed investment in its Station Building Infrastructure program is driven by the failing building components identified through a civil assessment on Toronto Hydro station buildings. The assessment included observations of water infiltration, moisture ingress,

structural integrity, rodent infestation, building security, and other hazards, each of which are targeted for upgrade. Failure to address structural degradation could negatively impact safety and reliability. For some buildings, maintenance is recommended instead of replacement to save cost and reduce lead time. Total proposed program cost from 2015 to 2019 is $11.25 million for 11 stations; on average, about $2.5 million annually.

The value of THESL's program is presented in terms of avoided estimated risk cost (ARC), estimated at $0.65 million. In maintenance based programs where assets are primarily repaired versus replaced, demonstrating positive ARC is typically sufficient evidence to demonstrate the investment is prudent, and in lieu of financial metrics such as difference in Cost of Ownership. The proactive nature of the maintenance work is justified through planning and labour management efficiencies that will be recognized through advanced notice. In addition, although standard maintenance is carried out, the level of investment that is recommended is such that standard maintenance can be performed without failure risk.

The civil assessment details several criteria required for station buildings to be deemed at risk including age, foundation deterioration, flood risk, and potential for high risk to customers under failure. These criteria imply a careful assessment of asset operability, beyond asset age, which provides convincing evidence for the proposed investment. Furthermore, THESL provides both the number of customers and the amount of load served by targeted stations serve to illustrate the impact of failures on continuity of service.

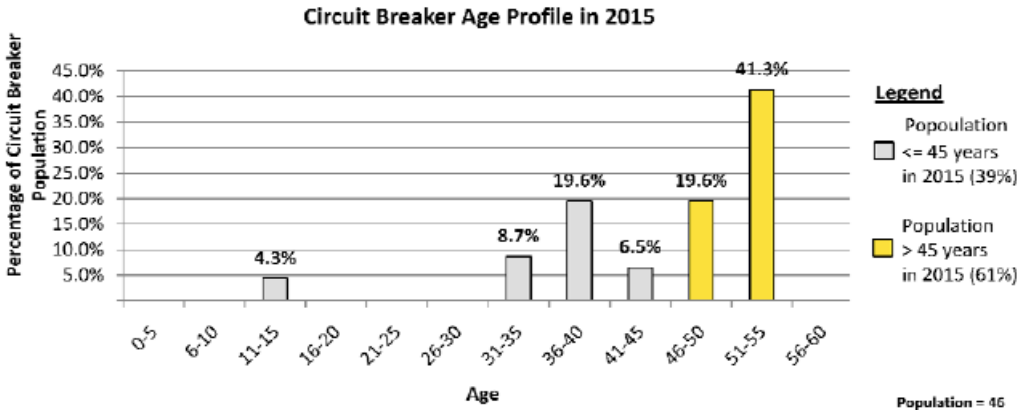
Navigant views THESL's approach to prioritize program work as sound. This finding is supported by our review of engineering notes and cost estimates from the civil assessment, the complexity of the proposed work, and sequence of stations proposed for upgrade. THESL also cites potential risks and challenges in scheduling the work, including Hydro One restrictions to THESL station work, extensive coordination for de-energization and load transfer, and potential permitting delays from the City of Toronto; each of which are factored into the program schedule.

Circuit Breaker Renewal

THESL's Circuit Breaker Renewal program is designed to replace aging oil circuit breakers that are nearing the end of or are currently beyond their useful service life, and that pose unnecessarily significant safety, reliability, and environmental risks in the event of failure. THESL intends to replace breakers in tandem with the replacement of similar vintage electromechanical (EM) feeder protection relays with modern microprocessor units to enable future feeder automation and other smart grid functionality. THESL's decision to simultaneously replace EM relays comes as a lesson-learned after two outage events of previously replaced circuit breakers revealed end-of-life relays were defective that had to be replaced reactively at higher cost. This approach will reduce reliability risk, improve operational efficiencies, and result in lower cost compared to reactive replacement. Figure 6 presents the age profile of THESL's circuit breakers.

THESL's program is expected to cost $9.13 million over the 2015 to 2019 rate period. It includes the replacement of 35 oil circuit breakers with vacuum units equipped with microprocessor relays. In 2015, THESL expects 46 stand-alone oil circuit breakers to remain in service, with 42 located at 27.6kV outdoor transformer stations across North York, and four in 13.8 kV municipal substations in the Scarborough area.

Figure 6. Circuit Breaker Age Profile in 2015 (EUL = 45 Years)



The business case for the circuit breaker renewal program is well justified. Oil circuit breakers present both operational challenge and risk that can be mitigated at a very low cost relative to the total renewal budget and estimated risks. Operational challenges include the difficulty of finding suitable replacement parts and increased maintenance costs versus vacuum breakers. Further, safety and environmental concerns in the event of catastrophic failure are daunting. In the event of such a failure these units have the potential to cause significant/explosive fire, while emitting flying debris, and, in some cases, the release of PCBs at a concentration in excess of 50ppm. In contrast, vacuum units have fewer moving parts, require less maintenance, and do not contain oil that imposes additional risk. THESL proposes to systematically replace these circuit breakers over five years, and has prioritized renewal replacement schedules first by asset condition and age, and second by load and customers served.

Navigant views THESL's proposed replacement of oil-based circuit breakers (OCBs) is an important investment in reliability, customer value, safety, and environmental protection. Navigant is aware that numerous other electric utilities also are replacing OCBs, and THESL has presented a logical sequence for upgrading these assets based on their likelihood to fail (age and condition), and the severity of impacts from a failure (customers affected and load served). THESL's business case includes a table and graphic that indicates the quantity of circuit breakers to be replaced annually and transformer stations where these replacements are scheduled.

OH Circuit Renewal

THESL's Overhead Circuit Renewal program is designed to replace assets that are or nearing the end of their useful services lives or which have degraded to a stage where replacement is justified. Specific asset classes in the program include wood and concrete poles, single and gang-operated overhead switches, CSP transformers, animal guards and porcelain insulators. The program will cost approximately $39 million over 5 years, which includes about $10 million in 2015 for SCADA-Mate switch replacements that THESL included in its 2012 Incremental Capital Model (ICM) rate filing. Annual spending averages between $25 and $30 million. Most of these assets are located on THESL's 27kV overhead distribution lines outside the downtown core, but include lower voltage 4kV and 13kV connected to 27kV lines or unit substations.

THESL's business case justifies the renewal program based on a combination of factors, including obsolescence for certain manual overhead switches, crew safety for devices such as SCADA-Mates switches, public safety for pole replacements, and reliability associated with each of the individual asset replacement categories. Tables that present historical reliability trends for each equipment type are included to support expected reliability benefits. The program also includes the conversion of 4kV and 13kV lines and equipment to operate at 13kV or 27kV, both to increase line capacity and to replace deteriorated equipment. Each of these programs and the justification used to support these investments is common for utilities in Ontario and throughout North America. An NPV analysis is performed for specific projects over 5 years and the first year avoided risk for the combined programs is about $39 million.

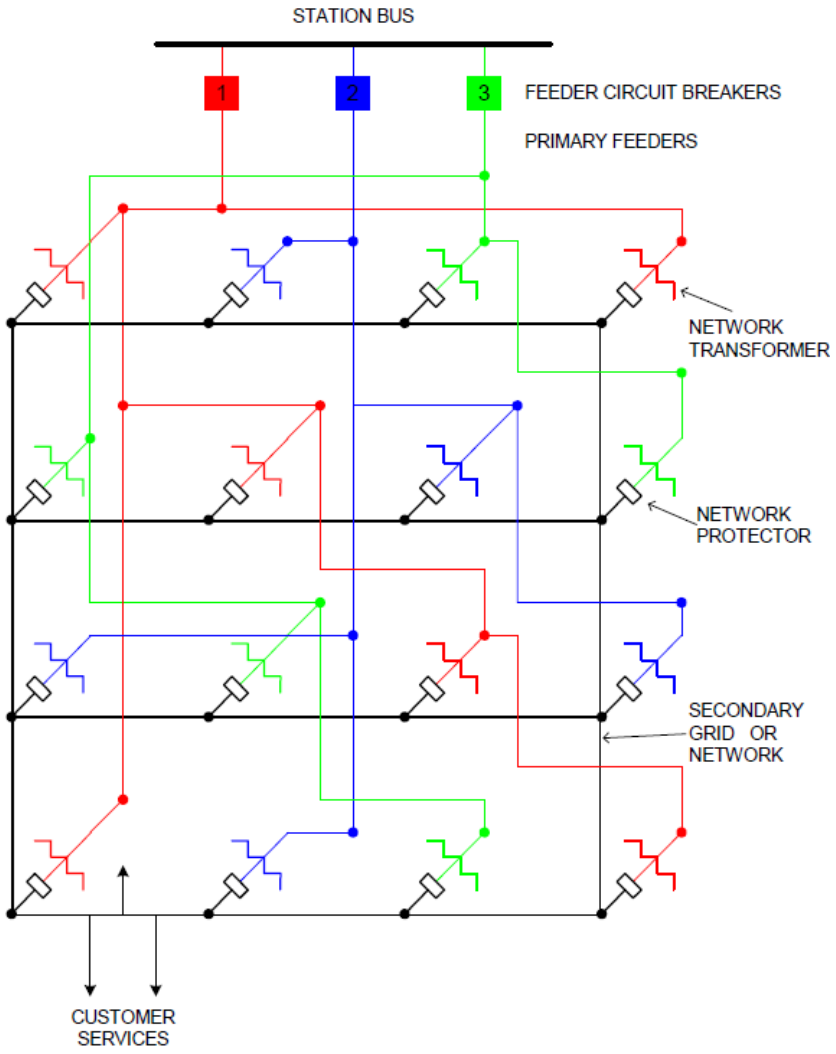
Each of the programs and the methods THESL used to justify the proposed investments is consistent with practices Navigant has applied and encountered with other electric utilities. The detailed list of individual project business cases, such as those presented for individual feeders, is beyond what some utilities use to support replacement programs covering a wide range of investments. The business case also describes the ranking and selection criteria for each equipment category. The replacement of critical assets such as wood poles whose condition has deteriorated beyond acceptable limits is an important component of renewal programs that regulatory bodies now require from electric utility distribution systems. We note that the business case does not include tables that summarize the quantity of equipment THESL proposes to replace versus the total population of each asset class. For example, utilities often will present pole replacements based on scheduled inspections, with test results, and condition. These additional summary tables would provide further support and justification.

Network Circuit Reconfiguration

THESL's Network Circuit Reconfiguration program is comprised of two initiatives: (1) enhance secondary network grid flexibility, and (2) expansion and upgrades of its 600V network distribution, which includes conversion of grid to spot networks. The first proposes increased power transfers from new high voltage station feeders and connecting transformers

(Figure 7 illustrates THESL's secondary network design). This portion of the work is also identified as a necessary prerequisite to the Downtown Contingency work described in the System Service section.

Figure 7. THESL Network Configuration



The second initiative is to introduce a 600Y/347V network to supplement existing lower voltage 433Y/250V and 216Y/125V network equipment. The higher voltage system will prevent functional obsolescence of the secondary distribution network, as 433Y/250V equipment is obsolete and difficult to acquire, while the 216Y/125V grid, while suitable for smaller buildings, is not preferable for use in tall buildings due to internal voltage drop. Finally, some existing 600Y/347V network equipment has been identified as hazardous, and is also up for replacement.

The objective of THESL's program is to minimize customer interruption, improve planning and operational flexibility, enhance the ability of the network to operate under extreme events,

and prevent the secondary network distribution system from becoming functionally obsolete. To meet this objective, THESL proposes to replace four transformer and eight switchgear line-ups, and add eight network underground transformers. The total cost of the program between 2015 and 2019 is estimated at $9.14 million – THESL expects the program to continue beyond 2019. The average cost of the program is about $2.3 million, which begins in 2016.

THESL indicates customer value is confirmed by an analysis that produces a positive first-year NPV of $0.77 million, with a cost of ownership of $3.08 million. THESL also cites reliability, safety and efficiency benefits to further support the program. THESL's analysis includes a 66 percent reduction in load interruption during second contingency events, the elimination of hazardous Sachsenwerk switch/fuse units, and the elimination of special operation procedures associated with the new configuration. THESL states the primary program driver is functional obsolescence, supplemented by the necessity to expand or convert the secondary network to a mixed network configuration, with expansion of 600V connections for new large buildings and customers. THESL supports safety concerns with Sachsenwerk switches by describing failure events that have occurred. The replacement of these switches is further detailed in the UG Legacy Infrastructure business case.

THESL's pacing of the program is reasonably justified and in line with common utility practice. THESL plans to stagger rollout to ensure staff training and safe work procedures are developed. Furthermore, individual sites are planned based on operational restrictions that allow distribution operators to take feeders out of service in certain areas. THESL identifies the portions of the program that will be completed in the short- versus long-term. The risks associated with downtown underground work are listed along with mitigating options, such as scheduling construction work outside of the switching restrictions periods in the summer. The cost of ownership of the status quo system configuration is assessed and quantified in terms of the number of outage hours and associated avoided costs ($1.8 million) resulting from the proposed reconfiguration, for a net difference is shown to be $0.77 million.

Stations DC Battery Renewal

This program is designed to proactively replace station DC battery systems that control and operate station circuit breakers. THESL's proposed battery system replacements vary in capacity from 50Ah to 400 Ah that will be installed between 2015 and 2019. The variation in battery sizes are due to the diverse requirements of the stations such as load requirement, different alarm systems, emergency lights, SCADA protection systems, and RTUs. THESL estimates total program cost at approximately $3.1 million, with annual spending of approximately $700K per year beginning in 2016. The proposed program aims to replace 67 battery systems at an average rate of 14 per year.

The useful life of existing DC battery systems is about ten years, and 27 percent of THESL's 194 battery systems are expected to be beyond their useful life by 2015, with an additional 33 percent expected to reach end-of-life by 2020. THESL's business case justifies the renewal program citing operational issues such as the increased potential for failed batteries to cause

lengthy outage and safety of workers when performing manual switching activities, and potential risk of exposure to acid and fumes from old batteries, and operational efficiency. In addition, the proposed program is consistent with Transmission System Code requirements.

Navigant views methods THESL used to justify the proposed investment to be consistent with industry practices. THESL conducted an extensive analysis of battery performance and presented graphs and tables summarizing the age of batteries that failed over 2011-2013 and the percentage of the battery population approaching end-of-life. It also includes a detailed assessment of the 67 battery systems that THESL identified for replacement. THESL is also considering the replacement of vented lead-acid (VLA) batteries with Valve-regulated lead-acid (VRLA) batteries that do not release chemical fumes to further reducing safety risk. THESL also evaluated run-to-failure versus planned replacement, with the latter yielding an avoided risk cost of $5.10 million for the year of 2015.

Station Ancillary Systems

Station ancillary systems ensure that THESL's stations function normally with minimal disruption to operations. THESL's program is designed to maintain the integrity of systems such as air compressors, fire alarms, heating and lighting, batteries and chargers, station service power supply, sump pumps, and fire barriers or fire suppression systems. The estimated investment for this program is approximately $2.29 million between 2015 and 2019. The assets that will be replaced under this program are listed in Table 5.

Table 5. Assets to be Replaced by Asset Class

Assets(units)	2015	2016	2017	2018	2019	Total
Air Compressors	4			2		6
Station Service Power Supply		1				1
Fire Alarm System			2	1	2	5
Fire Barrier/Suppression System	1	2				3

Assets targeted for upgrade are rated from 4.16kV and 13.8kV for air compressors to 230kV for fire barrier/suppression around transmission transformers.

THESL's business case is justified based on the criticality of the ancillary systems required for reliable distribution operations. THESL estimates over 100,000 customers are at risk of extended outages if the proposed station ancillary system program investment is not undertaken. Tables and graphs presented in the business case clearly illustrate the escalating number of repair is proportional to the increasing age profile of these assets. The primary driver for this program is the risk of failure resulting in extended customer outages and failure of station assets. The secondary drivers for this program are functional obsolescence and safety of crews and customers at or near the station. An NPV analysis performed for this program produces a net benefit of about $1.53 million.

The methods THESL used to justify the business case provide an objective view of each asset in THESL's ancillary systems. It includes an analysis of the current situation, and the prioritization and ranking of required upgrades by asset type. The business case provides analysis of alternative options with associated costs. The alternative option to replacing the ancillary services is the status quo option. Given the risk to customer outages and safety risks, THESL has decided the replacement of ancillary systems is the preferred option. The business case covers the overall program cost; additional details about individual asset replacement cost would provide further support and justification.

Worst Performing Feeder

THESL's worst performing feeder (WPF) renewal program is designed to improve the performance of feeders that, on average, experience the highest number of customer interruptions as measured by THESL reliability metrics. Asset replacements executed under the WPF program typically include replacement of legacy or worn components or outdated designs that pose a higher risk of service disruption or, in some cases, safety hazards. THESL uses a metric of seven interruptions per 12 month period (FESI-7[12] status) to classify and identify worst performing feeders, with plans to address feeders exceeding or trending toward FESI-7 status. Most feeders classified as worst performers are 27kV overhead lines outside the downtown core. Proposed spending is projected at $8.5 million between 2015 and 2019.

THESL's targeted investment for worst performing feeders is justified as it is expected to improve system reliability at low cost. Economic value and improved customer service is achieved by targeting equipment or conditions known to produce the highest level of interruptions. Many, if not most major utilities have implemented similar programs as they often produce very favourable NPV as measured by value of service (VOS) metrics. Typical components THESL proposes to replace or upgrade include uninsulated secondaries and services (replaced with insulated conductors to mitigate the impact of temporary faults), metal switch brackets (replaced with non-conductive brackets), defective glass/porcelain insulator (replaced with polymer insulators to reduce tracking or flashover risk), and certain underground assets such as transformers and cable segments with repeat failure histories. Proactive measures include insulator shielding to prevent animal contact, such as the installation of animal guards on transformer bushings and conductor leads, a common utility practice.

Targeting worst performing feeders is a standard practice that Navigant has recommended or encountered with numerous electric utilities. THESL's prioritization of feeders selected for mitigation is based on identifying those experiencing the highest number of sustained interruptions over a 12-month period, and that can be addressed at reasonable cost. Notably,

[12] THESL utilizes the acronym FESI-7 to refer to feeders experiencing sustained interruption seven or more times in a 12-month period.

THESL recalibrated its WPF program in 2012 to focus on short-term mitigation options that yield immediate reliability benefits, with demonstrable success over the past few years.

System Service

Station Expansion

THESL proposes to upgrade several major stations during the five-year period, many in the downtown area where building activity and growth are driving the need for increases in station capacity and connections capability. The other major driver is fault current constraints on station equipment that both THESL and HONI propose to address via breaker, switchgear and associated equipment replacement and upgrades. The relief of fault current constraints is a key requirement to enable greater DG capacity in the City of Toronto. THESL's station plan includes approximately $50 million in 2015 to complete the first phase of the Copeland station that is currently under construction and previously approved in THESL's 2012 IRM. Work at Copeland has been delayed to a combination of harsh winter weather and challenging site conditions associated with a high complex underground station. The need for Copeland was fully supported in THESL's 2013 IRM, in which Navigant provided evidence to justify need and proposed capital spending. Total program cost for stations over the five-year rate period is $182 million, with annual costs ranging from a low of $22 million in 2018 to a high of $51 million in 2015; the latter mostly to complete work at Copeland.

The methods THESL used to justify the proposed station project is consistent with leading practices Navigant has applied and encountered with other electric utilities. THESL's business cases emphasize use of CDM measures to permanently reduce peak demand enabling it to defer capacity upgrades, where possible. As noted in other business cases Navigant reviewed, CDM in the form of local demand response is proposed to defer capacity upgrades at Cecil. The business case also demonstrates station capacity is utilized to the extent practicable, accomplished via increased use of load transfer and greater use of feeder ties. Station upgrades in the downtown core are planned based on composite loadings and projected growth at several stations, recognizing the need to balance loadings to maximize the capability of each station to the extent possible.

THESL's business case clearly describes factors and assumptions supporting the ranking and selection process for each station project, including potential outcomes if proposed projects are not completed. These include new feeder positions such as the two needed at Bathurst to accommodate a large customer request. THESL also demonstrates that it has coordinated station expansion and upgrades with third parties, including HONI and the Ontario Power Authority for upgrades considered in the ongoing OPA led IRRP planning process. THESL is active in the IRRP working group committees, which issued a recommendation to increase transformation capacity and the Manby area. For the reasons cited above, Navigant finds that THESL's proposed station expansion plan is justified, as it has comprehensively considered

both expansion and non-expansion options and demonstrates that it has sought to maximize the utilization and capability of existing assets.

Station Control and Monitoring

Remote Terminal Units (RTUs), SCADA systems and pilot-wire configurations are systems that THESL relies on to clear and manage faults. Due to aging hardware and lack of new communication capabilities, station relays many not be able to clear *all* faults and could be susceptible to cyber-attacks. The Station Control and Monitoring program is designed to upgrade or replace station RTUs and pilot wire protection systems that have reached their end of useful life. The program is also designed to install SCADA at stations where none exists and that can utilize remote monitoring capabilities of RTU and pilot-wire systems. The program is expected to cost approximately 5.05 million between 2015 and 2019. Average spending is $1 to $1.5 million per year starting in 2016 with very little upgrade planned for 2015. When the difference in cost of ownership is compared to the associated program costs, the Station Control & Monitoring program produces an NPV of $0.02 million.

THESL's business case justifies need by identifying RTU and pilot wire systems that are at the end of their useful lives. Given the capabilities of newer RTUs, communication systems and pilot-wire systems, additional efficiencies and benefits are anticipated, particularly installing SCADA systems in stations where none exist. Supporting plots and tables indicate that customer hours interrupted (CHI) is nearly double for stations without SCADA capability. The primary driver for this program is functional obsolescence, with additional benefits focusing on labour and maintenance cost efficiency and a power distribution system with greater resilience from cyber-attacks.

Each of THESL's program initiatives and methods used to justify spending are consistent with Navigant's experience with other utilities. THESL provides examples of prior outages caused by the failure of RTUs or pilot wire system to further justify the need and value. The business case also describes the ranking and prioritization criteria, which considers other system renewal programs in its evaluation. Since this program requires station outages for the work to be performed, THESL also considered program risks and appropriate mitigation measures to limit outage exposure. Like other business cases, THESL's evaluation of alternatives includes status quo (do nothing) versus the RTU, communication system and pilot-wire upgrades it has proposed.

Feeder Automation

THESL's Feeder Automation (FA) program includes installation and refurbishment of SCADA switches with software upgrades to enable autonomous tie transfer for unaffected feeder segments during interruptions. THESL's directive for its Feeder Automation program is to reduce outage times through decreasing the resources and effort necessary to restore service following an interruption. The upgraded system will detect and automatically isolate faults, thereby reducing isolation times from between 30 minutes and 3 hours depending on the

existing setup. THESL is proposing feeder upgrades in both the Downtown and Horseshoe areas of its distribution system, where it will automate 640 switches on 130 feeders. The total cost of the program is projected to be $54.1 million from 2015-2019, with average annual cost of about $10 million.

THESL provides compelling evidence in terms of increased reliability to justify the FA program, citing improvements in outage metrics such as number of customer interruptions (CI), customer hours interrupted (CHI), and SAIDI/SAIFI. THESL compared current reliability metrics to the projected system state following automation, and determined that it can achieve an approximate 50 percent improvement in these metrics. Based on THESL's method of analyzing the number of feeder trunk lines that will benefit by automation, improved fault location and isolation times, and reductions in CI and CHI achieved by prior automation projects, THESL's DSP goals appear reasonable. The project produces a positive difference in the cost of ownership of $102.74M and NPV of $91.6M for the first year of the project.

THESL relies on past experience with feeder automation in the Horseshoe area and standardized utility practice to extend feeder automation to the Downtown system (first of its kind deployment in downtown area). The process THESL used to sub-prioritize work appears justified, as it includes trunk outage data, and consultation with operations staff and systems planning approaches to identify the best opportunities given the loadings and geography of downtown lines. THESL also evaluated project risk, including potential for rapid load increases, integrity of the communication infrastructure, and premature asset failure. The report provides mitigating planning techniques which are reasonable, including monitoring load forecasts and connection requests, review of radio design, and reactive replacement of failed switching devices to enable the FA program.

THESL present program alternatives, including a status quo option, remote-manual switching control, along with the proposed option. The COO and NPV for these options are derived, and the proposed option offers significant benefit over other alternatives.

Contingency Enhancement

The Contingency Enhancement program includes several investments to improve response time during outages, achieved by re-routing power via feeder ties to restore affected customers. The program will improve customer service by reducing customer outage hours. Total program cost is $66.1 million from 2015 to 2019, excluding capital expenditures from previous years, as projects were undertaken as part of asset renewal or plant upgrades prior to 2015. Assets scheduled for replacement include primary cable, underground transformers, poles, overhead transformers, and overhead switches. Average annual spending is approximately $10 million, with the greatest spending occurring in the last year of the program.

THESL justifies the Contingency Enhancement by highlighting reliability, system efficiency, and safety improvements. THESL notes in its business case that fewer crews will be deployed

in outage scenarios to operate tie switches; as more tie transfer switches are installed, potentially dangerous manual switching also will be reduced. THESL determined that in the first year the program will produce a positive NPV of $49.82 million, with a difference in cost of ownership between existing and renewed assets of $59.19 million. The capacity of some conductors will be upgraded, as maximum peak loading during transfers on could exceed maximum ratings. THESL has structured the program pace to coincide with system renewal projects, so that replacement efficiencies are realized.

THESL's business case includes a description of each feeder tie project, along with costs, justification, and assets to be replaced in the sub projects. The Cost of Ownership in terms of asset risk and non-asset risk is significant higher than program costs, and the NPV for the first year activities is much larger than the proposed net spend. Given these data, Navigant finds THESL's proposed contingency enhancements to be a cost-effective approach to improving reliability and increasing operating flexibility.

Overhead Momentary Reduction

THESL's proposed overhead momentary reduction program is designed to reduce the number of customers impacted by momentary interruptions caused by temporary or permanent line faults. On longer feeders, the number of customers interrupted by permanent faults can be high, and these can be reduced via installation of line reclosers. Use of line reclosers is relatively new for THESL, and the primary focus of the program is to improve distribution performance and enhance customer satisfaction by reducing the quantity of customers impacted by momentary interruptions. THESL proposes to focus spending during the first two years to evaluate options and identify the best locations for installing line reclosers on its 13.8kV and 27.6kV distribution system. Thereafter, THESL proposes to install eight per year starting in 2017. The total cost of the program over five years is estimated at $1.92 million.

Customer service disruptions, even momentary, can be a major inconvenience to customers, and some result in material economic losses. Navigant's experience confirms that customers are increasingly impacted by momentary disruptions due to use of digital electronics susceptible to drop-out. Momentary disruptions[13] account for 54 percent of interruptions on THESL's distribution system, and are of particular concern to customers that require uninterrupted supply for sensitive equipment. Installation of reclosers on main line sections can reduce the number of customers affected by momentary *and* sustained disruptions by eliminating station breaker operation that otherwise would occur absent the recloser. In addition to enhanced customer satisfaction, use of reclosers also improves THESL crew and general public safety. By isolating faults automatically quickly (through improved protection coordination), hazards can be isolated faster (e.g. high impedance faults such as overhead lines on roadway pavement). Manual switching by crews also is reduced as reclosers can be operated remotely by distribution operators via SCADA communications links. Operational

[13] Defined as an interruption with a duration of less than one minute.

efficiencies are also achieved by reducing the time required by field crews to patrol and isolate faults.

Navigant finds that THESL's proposed use of reclosers to reduce the number of customers impacted by momentary interruptions is justified, as use of these devices is a cost-effective approach to improve distribution reliability and performance, and it is common among utilities throughout North America. THESL's NPV estimate of $5.76 million demonstrates the program produces significant value for a relatively small investment, and that will enhance customer value by providing more reliable and efficient service.

Design Enhancement

THESL's design enhancement program focuses on two primary areas of improvement: (1) improved fuse protection and coordination and (2) installation of tree wire on 27.6kV overhead lines. These investments are proposed to improve distribution reliability via low cost enhancements. The total cost of the program is $7.3 million over the five-year rate period. THESL selected feeders for improved fusing based on known fusing deficiencies and where installation of fuses currently is limited by high fault current (i.e., exceeds 140k maximum rating). In addition, THESL will install fuses where none currently exist, mostly on three-phase laterals integral to trunk lines.

THESL proposes to install tree wire or insulated overhead conductor in areas most susceptible to tree-related outages. Tree wire (insulated conductor) is most effective in areas where trees cause temporary interruptions; insulated wire will prevent line trips for self-clearing faults, and some permanent faults such as small branches lying on the line that are later removed by field crews. THESL will select distribution lines for fusing (install correct fuse sizes or improved coordination) or insulated conductor based on studies that are most susceptible to interruption due to fuse deficiencies or a high number of tree-related interruptions.

The primary benefits of these two initiatives is improved reliability, achieved by reducing the number of customer interrupted due to absence of fuses, undersized fuses or miscoordination; or by reducing the number of sustained faults via replacement of bare conductor with insulated conductor. The program NPV of $5.2 million is very favourable compared to the level of investment. Navigant finds THESL's proposed design enhancements to be prudent, as these are common reliability improvements it has seen elsewhere and demonstrate positive economic value.

Energy Storage Systems

The goal of THESL's Energy Storage Systems (ESS) program is to install 24 ESS' for a total installed capacity of 4.4MW and energy output of 10MWh. The program is designed to improve system efficiency, reliability, power quality, distributed generation enablement and electric vehicle enablement. The function of the ESS' is to provide load relief and shave peak load to reduce strain on system assets. THESL has divided the proposed investments into

centralized forms (Compressed Air Energy storage and Lithium ion batteries) and decentralized forms (solely lithium ion batteries) of ESS. The centralized devices can deliver 400 kW over 3 hours to municipal substations, whereas the decentralized devices can deliver 100-200kW of grid support/local support for 1-2.5 hours at strategic locations within the system. It is expected that the ESS program will cost $10.82 million from 2015-2019 with an average annual cost of about $2.0 million.

THESL scopes program benefits in terms of OEB goals, such as the enablement of DG and renewable generation. Expected reliability improvements are comparable to goals established by other utilities, such as increased voltage support, decreased harmonics, and uninterrupted service. The primary driver for the program is efficiency, as ESS is argued to increase the utility and lifespan of existing distribution assets while managing the variability of distribution system load, thus improving service and distribution capacity. The secondary drivers of improving reliability and power quality also contribute to the narrative of THESL targeting proactive improvement of its system assets.

The timing and pacing of the program is methodical, with planning work occurring in the first year, and a steady ramping of annual installations occurring for the remainder of the program. THESL's historical experience from ESS pilots that occurred in 2014 ensures that preferred sites (i.e. overloaded stations, feeders with reliability issues, areas with historical power quality complaints, areas with high DG penetration, etc.) are chosen for installation. The process outlined in THESL's execution plan is similar to utility practices for handling DG connection; with system evaluation, technology selection, site selection, design, procurement and commissioning playing large roles.

THESL addresses program risks, including limited technical expertise, load transfer constraints, and labour availability. Mitigation techniques appear reasonable, as THESL commits to advanced planning, training, and coordination between lines of business. THESL cites a third party study performed by Sandia National Laboratories to determine the cost of ownership for recommended ESS technologies. THESL's methodology for converting Sandia's findings to a quantitative first year benefit appears sound. THESL's justification of GSES work in 2015 is well outlined and complies with the OEB mandate of accommodating connection of DG to distribution systems.

Local Demand Response

The goal of THESL's Local Demand Response (local DR) program is to encourage a shift in electricity consumption from peak to off-peak periods, to delay system expansion until a permanent means to address load growth becomes financially prudent. THESL's program is designed to operate in conjunction with its Stations Expansion program, targeting load served by Cecil TS. Cecil TS is geographically confined so as to restrict physical expansion, and the load profile for the station transformers exhibits short-duration peaks, which suggests DR as an alternative to capacity upgrades. THESL's program will cost $4.02M from 2015 to 2019, with an average cost of just under $1 million annually.

The primary driver for this program is relief of capacity constraints at Cecil TS, which THESL expects to be overloaded by 2020. Navigant views load growth projections as reasonable for this area of the city, and supported by the increasing trend in customer connections to Cecil TS. The business plan describes THESL's decision making process for mitigating capacity constraints; first, load transfer to adjacent buses is considered, and failing this, load transfer to surrounding stations. It is argued that load transfer may not feasible due to lack of station interties and existing station capacity limits. Physical expansion of Cecil TS is also considered. THESL's justification of switchgear additions as the only feasible expansion option to relieve capacity constraints is supported by evidence it presents. Even for switchgear replacement, extensive coordination with Hydro One would result in long lead times and lower short-term reliability in the short term.

THESL cites the positive results from the economic analysis performed for the project, operational issues associated with options for relieving capacity constraints at Cecil TS, and the ability to use proposed local DR for future work to justify the investment. THESL's selection of Cecil TS amongst other candidate stations is justified by a combination of factors, including year of required load relief, implementation time, physical restrictions, asset condition, cost of investment, and DR potential. THESL's business case provides an analysis of risks and alternatives, while an external consultant, ICF International, developed a financial model that incorporates cost-effectiveness tests to evaluate the potential financial impacts.

Customer Owned Station Protection

Customer-Owned substations are used by commercial and industrial customers of THESL that have significant power usage. These substations contain overhead steel structures and electrical assets like transformers that connect to THESL's larger distribution network. The Customer-Owned Substation Protection (COSP) program is designed to improve the protection mechanism at customer-owned substation and utility-owned protection mechanism installed upstream from the customer-owned substation. The program investment is estimated at $4.04 million over the 5 year period from 2015 to 2019. THESL estimates about 630 devices to be installed at 210 customer-owned substations on the overhead 13kV and 27kV in the Horseshoe and Downtown networks. The program cost and estimated devices are subject to change based on the outcome of the audit phase proposed in this program.

The business case for this program is justified given the primary driver is reliability and the failure of customer-owned equipment has caused nearly 17 interruptions per year. The failure of customer-owned substation is due to equipment not meeting the required standards or THESL-owned protection devices are absent altogether. The secondary drivers are safety of field crew that may have to perform work on rusted metal structures and poorly maintained transformers. The supporting details such as pictures, graphs and outage analysis in the business case exhibits a clear picture of the aged and under maintained infrastructure that has caused service interruptions. The proposed protection mechanism is in line with the industry standards and good utility practice.

THESL has conducted an assessment of 10% of the total population (about 214 customer-owned substations) and has found 21 of 185 visited customer-owned substations in the Horseshoe area with equipment beyond its useful life and numerous substations with missing upstream protection devices. This type of analysis is consistent with utility operations that Navigant has seen. As required by such a program, THESL has proposed a two phase approach to executing this program. According to the business case THESL will conduct an audit phase followed by an implementation phase. Table 6 illustrates the outcome of the audit phase that is ongoing. Prioritization of the required work has been done based on priority for overhead lines susceptible to faults caused by trees and animals, number of interruptions, condition of equipment and protection coordination. THESL has considered the status quo option to perform system repairs and upgrades reactively which would result in considerable reliability concerns and has hence decided to adopt the proposed plan which is well justified.

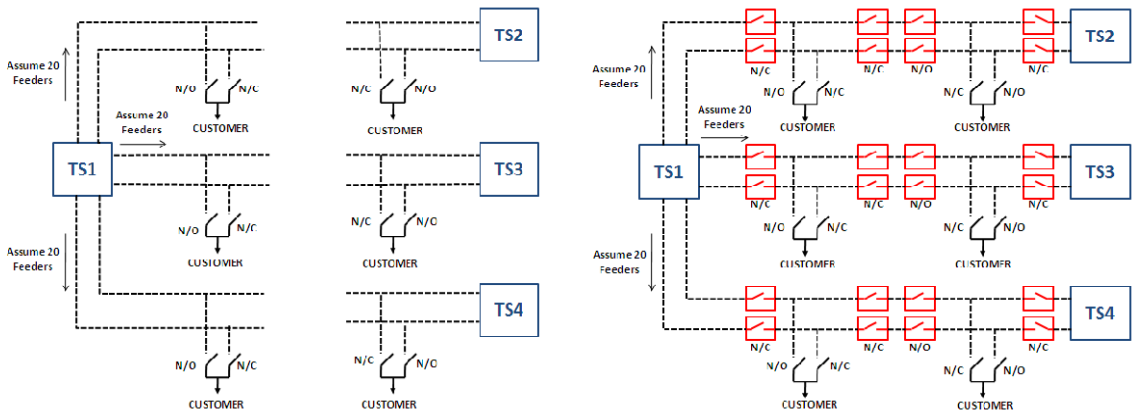
Table 6. Customer-Owned Stations

	Number of Customer-owned Substations	Number of Sample Substations	Number of Inspected Substations	Number of Substations without utility-owned protection devices	Number of Substations that identified as aged or poorly maintained
Horseshoe	1,417	144	185	64	40
Downtown	693	70	71	71	3
Total	2,110	214	256	135	43

Downtown Contingency

The Downtown Contingency program will install inter-station feeder ties in the downtown 13.8 kV network in order to change the network configuration from a dual radial distribution design to an open loop design. (Figure 8)

Figure 8. Dual Radial Dx Design (current) & Inter-station Feeder-Ties Design (Proposed)



THESL is planning for 6 separate projects which will cost a total of $3.36 million from 2015-2019. The business case quantifies the number of assets scheduled for replacement by this

work, which include underground switches, overhead switches, underground cable, and overhead conductor.

Customer Value is justified by THESL through quantifying the expected service restoration time during contingency events (8.2 hours currently, versus 1 hour after upgrades, on average). Reliability improvements are further quantified in Figure E7.7-8 which details downtown contingency outages from August 2003 to July 2013 (a 10 year window which covers the previous 5 years of system activity). This chart also summarizes CMO, CHI, CI, and outage duration, and forecasts the improvements in these metrics after system upgrades (consistent with other utilities' practices in quantifying outage data). Furthermore, the first year of activities of the program will represent a difference in cost of ownership of $3.07 million and an NPV of $2.33 million, which is in line with overall spending. THESL's pacing of the discussed project work is justified in the context of 3rd party utility constraints (HONI) and construction moratoriums (Pan Am Games), which demonstrates coordination with regional planning. Advanced planning with HONI is specified in the Program Risks section as a mitigating technique. Project prioritization is ranked first with respect to Historical Outage data, and second with respect to execution complexity, which is consistent with reviewed utility practice.

There is a thorough analysis of the alternatives to this program. The financial feasibility of the status quo alternative is compared against the proposed program, wherein the NPV of the proposal is found to be more financially prudent. However, although a third program alternative is provided, a financial analysis was not performed as a part of its assessment. When considering multiple alternatives, utilities generally attempt to discount the financial feasibility of each to strengthen the investment proposition.

General Plant

Information Technology

THESL's IT refresh programs are designed to replace and maintain assets relating to the software and hardware components to support ongoing operations. These components are required in order for THESL to efficiently execute required tasks such as preparing customer bills and dispatching crews to respond to outages. The IT Hardware Refresh program addresses the renewal and maintenance specifically for hardware assets. Software assets are specifically addressed in a separate business case (IT Software Upgrades, Enhancements and Analytics Program). Specific asset classes in this program include endpoint assets (such as desktops, laptops, tablets, printers and plotters) and core backend infrastructure assets (such as servers, disk arrays, network and telephony assets, and ancillary items). The IT Hardware Refresh program will cost approximately $37 million over 5 years, which includes $28 million of core backend infrastructure assets and $9 million of endpoint assets. Annual spending averages are expected to be approximately $7.4 million per year, with 2018 as the year with the highest spend at $10 million. This is primarily driven by the maintenance and capital investment required for disk and flash storage assets.

The primary driver for the program is system maintenance, which is justified by the necessity to periodically refresh IT infrastructure to mitigate risk associated with aging assets. If investment is not granted, the risks as outlined in the report may be:

1. Business continuity – obsolete hardware can result in core process interruption
2. Cyber security – security updates and patches could be impaired
3. Inability to pursue operational efficiency - obsolete hardware might act as a bottleneck for new program development
4. Lost opportunity cost – inability to plan for a uniform update can lead to system operation inefficiencies

Toronto Hydro also significantly details the stages of its IT asset lifecycle, and provides reasonable evidence for the benefits of constant failure rate operation. Navigant notes that supporting evidence in the form of industry standards for IT hardware replacement scheduling would be useful to further justify timelines. The report provides a breakdown of the types of assets up for replacement, and justifies the increased spending rates in 2018 as necessary in order to avoid deferral of storage asset replacement beyond their planned lifecycle. The priority of the replacements is such that the largest impact due to asset failure is mitigated first.

The regulations and standards cited ensure that THESL is replacing its current fleet with IT hardware that is industry accepted, and forwards OEB goals such as cyber-security and Smart Grid development. Adherence to internal policy also ensures the program in line with Toronto Hydro's historical strategy towards IT hardware. The report assesses the alternatives to the approach the program is proposing, such as the run-to-failure option, and outsourcing device management. Due to risks involved with reactive replacement of assets, such as lack of planning causing poor integration of devices and high operational expenditure, run-to-failure is generally discounted, which demonstrates THESL's commitment to proactive asset management in this rate filing. Furthermore, Toronto Hydro justifies internal replacement of its assets through decreased cyber security risks, mitigation of system lag/latency, and the flexibility to modify hardware asset maintenance without needing to communicate with external vendors.

Facilities Management & Security

THESL's facilities management and security plan is designed to make infrastructure improvements to specialized facilities that perform unique functions. These improvements include changes and enhancements to building security, mechanical, electrical, civil and architectural areas at 500 Commissioners, 14 Carlton, 60 Eglinton and several THESL stations. It is important to note that the security aspect of station facilities covered under this program will be coordinated with other improvements covered by Stations Building Infrastructure Renewal program. Total program cost is estimated to be $28.8 million between 2015 and 2019.

Most of the investment ($22.9million) is proposed in the 2015 through 2016 time frame. High level items covered by this program include:

- Security – Locking hardware, card readers, fencing/gates, lighting, and intercom systems
- Mechanical - Plumbing, heating, air conditioning, and elevators
- Electrical - power distribution system, building automation system (BAS) and the fire and security monitoring systems
- Civil - Interior and exterior coverings, surfaces of the buildings, access ways, walk ways and windows
- Architectural - foundation and building envelope, roof and building masonry

THESL's business case justifies the upgrade based on security related incidents like theft, forced entry, vandalism, trespass, injury and safety. Pictures and associated details provide reasonable evidence to the deteriorating conditions in mechanical, electrical and architectural areas. The primary objective of this program is to maintain critical facilities that support efficient operations, replace assets that are at end of life, and to move toward alignment with NERC security standards. Secondary drivers include health and safety of employees and a reduction of failure risk that could affect reliability.

Methods THESL used to justify this program are in line with the processes applied and encountered at other utilities. THESL clearly articulates the facilities included in the program, the current state analysis of each facility, expected improvements, and the cost of each improvement. THESL's evaluation of alternatives clearly suggests the activities planned for this program are superior compared to the status quo option or repairing facilities reactively. Detailed cost analysis of the first year of investment provides additional justification.

Voice Radio System

THESL's Voice Radio System Upgrade Program is designed to replace voice communications equipment that field crews and external contractors use to communicate with control room personnel. THESL has accelerated the program to be completed between 2015 and 2016 due to the aging communication equipment and lack of vendor support. THESL expects the program to cost about $20 million over two years. The assets to be replaced in this program include the Data network, associated facilities; and backend equipment such as antennas, gateways, base stations; and front end equipment such as dispatch consoles. Spending is front loaded with $15 million of the investment proposed for 2015 and $5 million in 2016.

THESL justifies the program by citing two key facts: First, most communication hardware has been in service past the expected lifespan and second, vendor support contract expiring in 2016 with no future plans to support the existing communication hardware, the business is

justifies the renewal program. The voice communication infrastructure is critical to THESL's core distribution operations as it enables field crews to report injuries, emergencies and operations feedback. The tables and graphs clearly show an increase in component failure and proportional increases in repair costs. The limitations with the current system and dead zones within Toronto are preventing some communications, which affects THESL's core distribution functions.

In its business case, THESL evaluated other options such as,

1. Maintaining the existing system beyond 2016 on a "best effort" basis
2. Migrate to a contracted radio service
3. Replace the existing analog system with new digital radio system TETRA
4. Upgrade the existing analog system to digital radio system P25

THESL cites Option 4 as the preferred alternative, as it requires minimum investments and lower risk in safety, vendor and operational categories. THESL's evaluation and justification is in line with practices seen by Navigant at other utilities and with other programs within THESL.

Fleet and Equipment

The Fleet and Equipment services program is intended to replace THESL's aging fleet of vehicles in a timely manner to avoid expensive repairs and benefit from related efficiencies. There are a total of 660 units from various classes of vehicles and trailers that include cars, backhoes, minivans, among other equipment. The program is expected to cost about $18 million between 2015 and 2019. Annual spending averages about $3.5million, which includes vehicle replacements and equipment such as GPS trackers and associated services. The fleet replacement lead times vary from 3 to 12 months depending on the type and required vehicle equipment.

THESL's fleet replacement program is driven primarily by system maintenance and capital investment support with safety, reliability and business operations efficiency as secondary drivers. Analysis of vehicle life cycle costs, maintenance cost and reliability with age and odometer over 2008 to 2012 clearly presents rising maintenance costs with decreased reliability as the average age of the fleet exceeds 16 years and approximately 150K kilometers. THESL is considering the replacement of GPS/Telemetry systems as a part of this program. Year 2015 is the final year of the support contract for these systems, and replacement is justified because newer systems with enhanced features are available at lower cost due to technological advancements.

The methods THESL uses to justify the program are consistent with practices at other utilities. Various vehicle classes and related replacement criteria has been considered, and options such as "run to failure", "status quo" and "managed fleet replacement" were explored. The benefits of managed fleet replacement outweigh the risk and demerits of the other two options.

Program Support

Program Support investments include a study of customer interruption cost (CIC) and a climate adaptation study. Through surveys of various customer classes, the CIC study will provide THESL with better information on localized outage costs for customers. The primary benefit of the CIC study is the incorporation of the resulting data into the Feeder Investment Model (FIM). The climate adaptation study will improve system resiliency with regards to weather-related risk, thus reducing the frequency and duration of outages caused by these events. Program Support will cost $1.7 million between 2015 and 2019 with all of the spending occurring in 2015 and 2016. The climate adaptation studies will cost $0.5million annually, while the CIC study will be executed in 2015 and cost $0.7 million.

The most significant driver for the program is the need to support system maintenance programs through a robust knowledge of climatic impact on assets and cost of localized outages caused by asset failure. This program is framed by THESL in terms of a mechanism to improve its numerous capital investments in asset renewal for this rebasing. The report makes use of recent singular events, and historical impacts that Major Event Days have had on SAIDI and SAIFI metrics, and to quantify the necessity for climatic asset resiliency. In addition, the report summarizes the findings of studies conducted by other electrical utilities.

The report provides sound justification for the pacing of the program. The desire to incorporate the results of this program to enhance business cases for other investments is restated and is reasonable justification towards completing the CIC survey and climate adaptation studies early in the 2015-2019 rate period. THESL proposes to minimize cost by opening the studies to competitive vendor bidding. To reduce risk, THESL proposes to restrict the pool of vendors to those that have previously completed similar studies in conjunction with other electrical utilities.

/C

September 16, 2014
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RIDER to Navigant Consulting Ltd. Report Titled:

INDEPENDENT ASSESSMENT OF TORONTO HYDRO BUSINESS CASES

Ontario Energy Board EB-2014-0116.

The following summarizes Navigant's review and assessment of updates for certain projects included in Toronto Hydro-Electric System Limited's (THESL) July 31, 2014 Custom Incentive Rate-setting (Custom IR) application for 2015 – 2019 Electric Distribution Rates and Charges before the Ontario Energy Board (OEB) under EB-2014-0116. The findings and conclusions presented in our report are based on our independent assessment of THESL's *Distribution System Plan* (DSP), the Schedule of Exhibits accompanying the DSP and all updated business cases for programs that THESL now seeks authorization from the OEB, and which Navigant originally evaluated in its July 29, 2014 report titled "Independent Assessment of Toronto Hydro's Distribution System Plan and Business Cases" (Exhibit 1B, Tab 02, Schedule 4, Appendix B submitted in EB-2014-0116).

The 2014 Evidence Update includes a supplemental exhibit (E.8.3) titled "*Operating Centres Consolidation Program*", which requests additional capital funds of $52.2 million over 2015 - 2019. Navigant completed a post-filing and independent review and assessment of THESL's business case presented in E.8.3, which is attached to this rider as Attachment A. Thus, the findings and conclusions presented below are intended to amend and supplement those contained in our July 29, 2014 report with respect to the business cases and exhibits reviewed by Navigant in the 2014 Evidence Update, in addition to new evidence provided in E.8.3 justifying the consolidation of THESL operating centres.

Navigant's independent review of the Custom IR project revisions contained in THESL's September 2014 Evidence Update resulted in a determination that the conclusions we reached in our July 29, 2014 assessment have not changed. Among other findings, the total capital funds THESL now requests for 2015 – 2019 are virtually the same as the amounts that appear in our July 29, 2014 report, i.e. slightly less than $500 million annually.

Most important, THESL's justification for each project, including costs versus expected benefits, has not materially changed. Notably, findings in our July 29, 2014 report were not premised on specific dates or times when specific projects and jobs should be completed. Rather, our report highlights on page 9 that: "*Navigant reviewed in detail*

THESL's DSP framework presented in Section A through D, and specific business cases in Section E, and has determined that THESL has developed a DSP with sufficient rigour and supporting analysis to justify the proposed levels of spending <u>throughout</u> the rate period [emphasis added]." The adjustments that THESL proposes are entirely consistent with this statement.

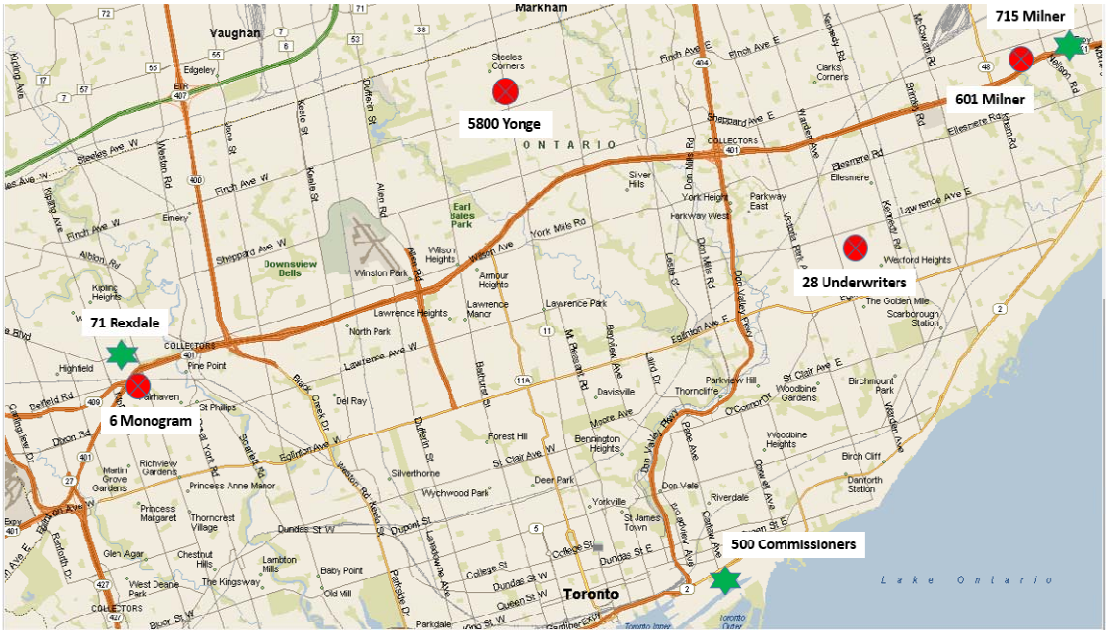
Given these facts, Navigant has no reason to change any of the key findings, conclusions or any of the findings presented in its July 29, 2014 report with respect to the business cases and exhibits reviewed by Navigant in THESL's September 2014 Evidence Update. With respect to the Operating Centres Consolidation Program, Navigant finds the proposed investments and activities associated with the reduction or relocation of THESL operating centres is warranted and will produce net economic, reliability and customer service benefits to its ratepayers.

Attachment A

Operating Centres Consolidation Program

THESL proposes to continue to invest in its Operating Centres Consolidation Program (OCCP) that it initiated prior to the Custom IR filing. The OCCP for 2015 through 2019 includes $52.2 million of investments to fund the reduction and relocation of four operating centres at several locations. This is in addition to amounts that have been or will be spent in 2014 and prior years. Two of the operating centres ("OC") are owned by THESL and will be sold. The other two operating centres are leased facilities that are set to expire within the 2015 through 2019 rate period. Staff, equipment and work activities from these four centres will be transferred to three existing THESL operating centres or vacant properties owned by THESL. All funds will be used for upgrading or purchasing of equipment for use in closing of the operating centres, termination of leases, transfer of staff and equipment, and the purchase of new equipment. None of the funds will be used for facilities or equipment for the delivery of electricity to THESL customers.

The following illustration highlights the location of operating centres that will be closed and the locations of existing THESL operating centres or properties that will be expanded or built to accommodate the relocations.



THESL proposes to implement the OCCP over 4 phases, the first involving the closure and sale of 5800 Yonge, with most staff, equipment and related operating functions transferred to 500 Commissioners Street. (THESL has a 99-year lease for 500 Commissions.) Yonge Street currently houses THESL's Data Centre, the Call Centre and Control Centre. The Commissioners Street facility has sufficient space to accommodate the additional staff and activities, and will include enhancements to communications, infrastructure and security features needed for each of the three above operating functions. It includes use of highly reliable fiber optics communication systems and uninterruptible power supply at Commissioners Street for critical Control and Call Centre functions. Approximately 300 employees will transfer from 5800 Yonge to 500 Commissioners.

The second and third phases involve constructing new OC's at 715 Milner (currently a vacant building) and 74 Rexdale due to termination of leases at nearby OC's at 601 Milner and 6 Monogram. The existing OC's are used primarily as crew work centres for maintenance and construction, and are needed to serve northeastern and northwestern sections of THESL's service territory, respectively. The new OC's will provide assurance of property tenure and provide greater efficiency in building utilization and work activities. The new OC's will include more efficient space utilization and modern office facilities and equipment.

The fourth and final phase involves the permanent closure and relocation of THESL personnel, mostly restoration crews ("System Response"), from 28 Underwriters to other OC's, including the new OC's at Rexdale and Milner. The property will be completely vacated and sold. THESL expects that the de-centralization of System Response functions will reduce travel times for crews to response to emergencies or service interruptions.

The OCCP is expected to provide benefits to THESL customers in terms of reduced cost, better reliability and improved customer service. Among these benefits is improved efficiency and asset utilization. The consolidation is expected to reduce total THESL OC square footage from 4.2 to 2.6 million, or 43%, thereby improving utilization of existing and new facilities. The sale of the 8.1 acre Yonge Street property is expected to provide direct economic benefits to ratepayers via reduced taxes, lower maintenance and proceeds from the sale of property located in a desirable, high growth area. The transfer of restoration personnel from 28 Underwriters to other OC's is expected to improve reliability as crews will require shorter travel time from the dispersed work locations to restore service. Downside risk is low as THESL owns or occupies each of the three properties where staff and operating activities will be relocated.

Navigant's experience and review of THESL's OCCP confirms the proposed consolidation is consistent with utility practices throughout North America. The reasons and analysis THESL performed to support the OCCP demonstrates that it is a better choice when compared to continuation of existing leases and facilities ("Base Case") or "Do Nothing" options. Specifically, the OCCP will provide net economic, reliability and customer service benefits to THESL's customers, and reduces the risk of higher long-term costs associated with currently leased properties when compared to other options. As a result of these findings, Navigant has determined that THESL's funding request for the OCCP is justified and warranted.

EFFICIENCY, PRODUCTIVITY AND CONTINUOUS IMPROVEMENT

1. INTRODUCTION

The purpose of this schedule is to provide an overview of the evidence that that Toronto Hydro has filed this application to enable the Ontario Energy Board ("OEB") to evaluate the utility's ongoing efforts to achieve sustained improvements in efficiency and productivity.

In response to the OEB's Guidance in the RRFE Report,[1] Toronto Hydro has filed evidence detailing the utility's past, present and future productivity accomplishments, including continuous improvement as part of the utility's proposed custom rate-setting index. This evidence presents an evaluation of the utility's productivity levels, confirms the reasonableness of the utility's application through empirical benchmarking analysis, and explains how Toronto Hydro is appropriately incented to continue seeking further efficiency and productivity gains during the 2015 – 2019 rate period.

Toronto Hydro has a long-standing productivity culture which has evolved over time in line with emerging operating challenges, changes in government policy and expectations underlying the regulatory regimes that govern the utility's operations. Toronto Hydro's framework of current and planned productivity processes and initiatives are in alignment with the spirit of the RRFE Report. These processes and initiatives emphasize increasingly sophisticated performance measurement tools, bottom-up approach to identifying new efficiency opportunities, as well as streamlining labour-intensive processes through technological improvements and rationalization of supporting infrastructure.

[1] Report of the Board "Renewed Regulatory Framework for Electricity Distributors: A Performance-Based Approach" (October 18, 2012) [the "RRFE Report"].

Consistent with the OEB's guidance in the RRFE Report (as briefly summarized below and discussed in more detail in Exhibit 1B, Tab 2, Schedule 2) the remainder of this schedule addresses the utility's productivity and efficiency levels and the culture of continuous improvement. The evidence is presented in two sections:

(i) the **Past and Present**, detailing the utility's accomplishments up to and including its 2015 Test Year; and

(ii) the **Future**, discussing the utility's plans for continued improvement of productivity and efficiency, together with the tools and processes needed for the utility to deliver the desired outcomes.

2. OEB GUIDANCE ON PRODUCTIVITY, EFFICIENCY AND CONTINUOUS IMPROVEMENT FOR THE DISTRIBUTORS FILING CUSTOM IR APPLICATIONS

The OEB's RRFE Report indicates the OEB's expectation that Custom Incentive Rate-Setting ("Custom IR" or "CIR") applications will enable "an assessment of the adequacy of past and future productivity levels."[2] Elsewhere in the RRFE Report, the OEB states that it expects to use benchmarking evidence "to assess the reasonableness of the distributor's forecasts."[3]

Toronto Hydro has endeavoured to address, and submits that it has effectively addressed, the OEB's guidance in the RRFE Report through information contained in, and appended to, this schedule. In particular, the utility's productivity evidence showcases,

(i) the long-standing nature of Toronto Hydro's culture of productivity;

(ii) the reasonableness of the utility's current and forecasted costs in light of its atypical operating conditions; and

[2] RRFE Report, *supra* note 1 at page 70.
[3] RRFE Report, *supra* note 1 at page 13.

(iii) the sufficiency of productivity and efficiency incentives embedded within the Toronto Hydro's proposed CIR rate framework and capital efficiency performance measures underlying the utility's Distribution System Plan ("DSP).

2.1. Past and Present Productivity Initiatives

The adequacy, scale, scope of Toronto Hydro's productivity levels, together with its past and present productivity culture is subdivided into three general components:

1) Past Accomplishments – Case Studies and Cultural Evolution;
2) Empirical Evaluation – Econometric Benchmarking Study;
3) Ratemaking Incentives –The Effect of the IRM Framework

2.1.1. Past Accomplishments – Case Studies and Cultural Evolution

To showcase the range, nature and value proposition of Toronto Hydro's past productivity accomplishments the utility has filed, at Appendix A to this schedule, a review of past productivity initiatives implemented by the utility between 1998 and 2011, inclusively. The review uses a narrative structure (with high-level quantification) to showcase the evolution of Toronto Hydro productivity culture since the utility's amalgamation.

As further discussed in Appendix A, Toronto Hydro's productivity was in large part shaped by the amalgamation of six neighbouring municipal electric utilities with distinct operating practices, unique asset bases and long-standing management philosophies. Following amalgamation, Toronto Hydro was dedicated to streamlining and rationalizing the legacy tools, processes, assets and the workforce, while working towards creating a unified operating model supported by a common corporate philosophy.

As the utility matured and the operating practices became progressively harmonized, the focus shifted to enhancing its capabilities to plan for and implement comprehensive and

sustainable longer-term staffing and asset management strategies, along with expanding its ability to operate the distribution system in a reliable and coordinated manner. Critically, the systems and processes put in place during the 2004-2006 timeframe facilitated Toronto Hydro's ability to accommodate the increase in the volume of the utility's capital program starting in 2007. Among the key initiatives that drove productivity and efficiency improvements were the implementation of the Outage Management and Distribution Management Systems ("OMS" and "DMS", respectively), the adoption of the reliability-centered maintenance framework, and job description harmonization.

More recently, Toronto Hydro's productivity-enabling activities were primarily focused on supporting the utility's growing capital investment program and facilitating improvements to its customer service offerings. The specific initiatives included the adoption of new asset management tools and procedures, implementation of comprehensive health and safety management practices, outsourcing of capital work execution, and the introduction of a new Customer Care and Billing ("CC&B") system. Throughout this period, the utility also focused on maximizing the value of output from its internal labour force through such programs as performance and attendance management, the employee health and safety management system ("EHSMS"), and enhanced field supervision practices.

2.1.1.1. Asset Management Productivity Evolution

Among other examples of continuous improvement showcased within the Past Productivity Review is the evolution of Toronto Hydro's asset management practices and tools. Having inherited six distinct distribution systems with varying asset types, vintages and configurations, Toronto Hydro made significant progress in standardizing its asset base and implementing progressively more sophisticated asset management tools and processes.

The utility's initial challenge, at the outset of its amalgamated existence, was to develop and implement a consistent framework of asset nomenclature across all six legacy distribution territories. This was a complex and labour-intensive process, the outcome of which was to simplify and streamline the execution of field work. Toronto Hydro also consolidated and systematized all of its asset records into a comprehensive Geospatially Enabled Asset Registry ("GEAR") application, which remains a fundamental asset management and design application used by Toronto Hydro's engineers and technicians. Using Geographical Information System ("GIS") technology, GEAR has streamlined the utility's asset management and planning procedures, allowing Toronto Hydro to support the growing capital program.

The standardization of asset nomenclature and records also enabled Toronto Hydro to adopt the Reliability-Centered Maintenance ("RCM") approach for its distribution plant maintenance activities. This approach, first adopted in the airline industry, has allowed Toronto Hydro to schedule and prioritize its maintenance activities on the basis of highest probability and the impact of failure, contrary to past approaches that were largely reactive, or planned maintenance activities on the basis of equipment manufacturer specifications. In a similar manner, the implementation of the Worst Performing Feeder ("WPF") program and tracking of the supporting Feeders Experiencing Sustained Interruptions ("FESI") measure enabled the utility to effectively and efficiently target the most vulnerable parts of its system, driving performance improvements through targeted reliability-driven investments.[4]

The utility further improved its asset analytics capabilities by implementing the Feeder Investment Model ("FIM"). The FIM application allows the utility to determine the optimal intervention times for the replacement or refurbishment of its distribution plant

[4] For more information about the WPF program and the FESI measure, refer to the utility's Distribution System Plan at Exhibit 2B, Sections C.2.2 and E.6.21

on the basis of interruption costs and other risk-based considerations. This helps to identify the areas where capital investments provide the highest value for Toronto Hydro and its customers at a given time.

2.1.2. Empirical Evaluation– Econometric Benchmarking Study

To further support the appropriateness of Toronto Hydro's productivity/efficiency levels and provide the OEB with an objective evaluation of the reasonableness of the utility's 2015-2019 rate request,[5] Toronto Hydro has filed, as Appendix B to this schedule, a Custom Econometric Benchmarking Study prepared by Power System Engineering Inc. (the "PSE Report"), based on empirical analysis of total cost levels and reliability of all Ontario distributors and 85 utilities from the United States.

In addition to the OEB's guidance in the RRFE Report with respect to the use of benchmarking in evaluation of custom IR applications, in commissioning this study, Toronto Hydro was also guided by the OEB commentary in Toronto Hydro's 2012 - 2014 rate application (EB-2011-0144), in which the OEB stated that it is "always open to applicants to bring forth alternative benchmarking evidence which incorporates comparators from other jurisdictions if the distributor believes those comparisons are more relevant."[6]

As further detailed in the appended PSE Report, Toronto Hydro believes that broadening the sample of analyzed utilities, while maintaining the presence of Ontario data points and the core methodology endorsed by the OEB, allows Toronto Hydro to strike a balance between maintaining relevance to the Ontario economic and regulatory context,

[5] Nicole Stewart, *Missing in Action: Absenteeism Trends in Canadian Organizations*, (Ottawa: Conference Board of Canada, 2013), online: Sun Life Financial <http://www.sunlife.ca/static/canada/Sponsor/About%20Group%20Benefits/Focus%20Update/2013/Special%20Edition%20-%20Sept.%2023%20-%20%20Sun%20Life%20co-sponsors%20major%20new%20Conference%20Board%20of/MissinginAction_SUN%20LIFE_EN.pdf>.
[6] EB-2011-0144, Decision with Reasons and Order on the Preliminary Issue (January 5, 2012) at page 17.

and exploring the effect of additional business conditions that distinguish Toronto Hydro's operations from other Ontario local distribution companies ("LDCs").[7]

Based on its econometric benchmarking analysis, the PSE Report concludes that Toronto Hydro's past costs, as well as its 2015-2019 cost levels proposed in this application are lower than the reasonable levels of spending predicted by the econometric efficiency model. Toronto Hydro submits that these findings support the sufficiency of Toronto Hydro's past cost performance and confirm the efficiency and reasonableness of the forecasted costs underlying this application. The utility attributes the results of this assessment at least in part to the benefits of productivity initiatives described in the Past Productivity Review (Appendix A to this schedule) and those detailed elsewhere in this application.

In addition to examining the total cost efficiency levels, the PSE Report undertakes an econometric benchmarking analysis of Toronto Hydro's reliability levels. Similar to the econometric cost benchmarking exercise, the PSE Report determines the expected System Average Interruption Duration Index ("SAIDI") and System Average Interruption Frequency Index ("SAIFI") levels for Toronto Hydro based on an examination of the business conditions that affect the utility's reliability performance. The sample of observed utilities comes from a combination of Ontario distributors and utilities in the United States.[8] As discussed in more detail in the appended PSE Report and Exhibit 2B, Section E2 discussing the utility's reliability performance, Toronto Hydro's historical and projected outage duration (SAIDI) performance is better than expected by benchmarking analysis, while its historical outage frequency (SAIFI) results are poorer than predicted by the econometric model. In discussing the results of this analysis, PSE observes that

[7] The PSE Report provides additional discussion of the technical, economic, demographic and topographic factors underlying Toronto Hydro's decision to expand the study's sample to include a subset of U.S. utilities, including PSE's commentary on these factors.
[8] The samples of observed U.S. utilities differs between the Total Cost and the reliability benchmarking studies due to the availability of public information that was necessary to conduct both studies.

above-average SAIDI results speak to the quality of Toronto Hydro's operations, which allow the utility to detect and quickly address the outages occurring on its system. As to the utility's below-average past SAIFI results, PSE largely attributes them to the current age and condition of Toronto Hydro's distribution plant. Consistent with the nature and volume of Toronto Hydro's proposed 2015-2019 capital investment program, the utility's SAIFI projections are expected to converge towards the benchmark over the five-year CIR period.

The PSE Report utilizes the translogarithmic (translog) method of statistical modelling to evaluate Toronto Hydro's efficiency on a total cost basis, using a set of key business conditions derived through analysis of a comprehensive sample of electric utilities from Ontario and the United States. The translog methodology used by PSE is substantially similar to the approach employed by the OEB's own productivity consultant, Pacific Economics Group ("PEG"), for the purposes of separating Ontario's distributors into five efficiency cohorts and assigning the corresponding annual stretch factor values.[9]

Among the custom elements distinguishing the PSE model from the PEG approach used by the OEB is an extended sample of electric utilities, with data from a full sample of Ontario LDCs complemented by a set of 85 utilities from the United States, a number of which are comparable to Toronto Hydro in size, or share with the utility a number of key business conditions that are largely absent across the Ontario's electricity distribution sector.[10] In addition, the PSE benchmarking model leverages the inclusion of additional data points, thereby expanding upon the scope of key business conditions used to derive the predicted efficient cost levels for all utilities examined.

[9] Pacific Economics Group (2013), Productivity and Benchmarking Research in Support of Incentive Rate Setting in Ontario, (corrected January 24, 2014) at page 12 [the "PEG Report"].
[10] See PSE Report (Appendix B) for a comprehensive discussion of the business conditions that Toronto Hydro shares with many of the U.S. utilities included in the sample, which, in PSE's assessment are largely absent from the Ontario distribution landscape.

Chief among the additional business conditions is the "Presence of a Large Urban Core," a variable that cannot be derived from the Ontario-only sample, where Toronto Hydro is an outlier in terms of its size and the density of its urban service territory. A distinct feature of Toronto Hydro's urban downtown system is an asset-intensive downtown underground secondary distribution network, which provides increased reliability to Toronto Hydro's customers in the downtown core. These customers include critical loads such as hospitals, major bank head offices, and the Toronto Stock Exchange. The downtown secondary network, which in PSE's assessment significantly influences the utility's total operating and capital costs, is unique in its span and configuration among the Ontario utilities. At the same time, similar secondary network configurations are relatively commonplace among the U.S. utilities serving major urban centres such as New York, Chicago, Baltimore, San Francisco, and Washington DC, all of which are included in the expanded sample set used by PSE.

Beyond the downtown secondary networks, and as confirmed by PSE's cost analysis, serving large and densely populated downtown cores involves significant incremental capital expenses, all of which are largely uncommon to other Ontario's distributors given the age and configuration of their systems. Factoring in the effect of this business condition into the benchmarking model enables PSE to assess the efficiency of Toronto Hydro's operations in a more comprehensive manner, by comparing it to other utilities that are exposed to similar cost drivers. The cost consequences of serving a dense urban-metropolitan era are further examined in the appendix to the PSE report. This appendix contains an engineering study that concludes that serving a dense urban area requires significantly more capital infrastructure (and thus a higher capital cost per kW) than supplying less dense suburban and medium-urban density areas that are more typical in Ontario's distribution landscape.[11]

[11] The referenced engineering study appended to the PSE Report does, however, find that it is similarly more expensive to serve sparsely populated rural areas.

Furthermore, the appendix to the PSE Report includes a comprehensive description of other business conditions that are largely absent from other Ontario distributors' service territories. Among these atypical business conditions are:

- Spatial restrictions for underground and overhead corridors;
- Excavation challenges due to the lake proximity and unmapped legacy infrastructure;
- Large-scale and frequent plant relocations driven by third-party requests;
- Vertical city growth and incremental costs of serving high-rise buildings;
- Heavy traffic congestion and municipally-driven road work restrictions;
- Mature and dense tree canopy adjacent to, or within utility corridors;
- Specialized skill requirements for work on legacy assets (pilc, box construction);
- Physical and economic topography (rivers, ravines, major highways and railroad corridors);
- High customer mobility, and large proportion of low-income customers;
- Safety costs of confined space work and the presence of controlled substances in the plant; and
- High commercial real estate prices.

Toronto Hydro's assessment is that the cumulative effect[12] of these and other related business conditions has a significant impact on the utility's operating and capital costs – an impact that is beyond the typical levels expected from Toronto Hydro based on its customer count, load or energy throughput. By expanding the number of model observations to include the U.S. utilities serving territories characterized by a wide variety of conditions, the cumulative effect of these atypical business variables can be better accounted for. Moreover, in the combined Ontario-U.S. dataset, Toronto Hydro is

[12] Toronto Hydro understands that most of these business conditions exist to varying degrees in the service territories of other Ontario distributors. However, the utility believes that the aggregate effect of the scope and magnitude of these operating characteristics within its service territory has a significant influence on its costs, above the levels experienced by other Ontario distributors.

approaching the sample average in terms of customer size, total expenditures, load and energy throughput unlike the OEB Ontario-only model where the utility is a clear outlier.

The OEB acknowledged the outlier status of Toronto Hydro in the Ontario context, by excluding results of the utility's historical Total Factor Productivity ("TFP") assessment from the calculation of the Productivity Factor for rate-setting under the 4th Generation Incentive Rate-Setting ("4th Generation IR") regime.[13] The variability in the scale of operation and costs of observed utilities in PSE's combined dataset makes it possible to produce benchmark cost models that evaluate Toronto Hydro's performance in a rigorous manner, and allow PSE to account for the effect of business conditions not present elsewhere in Ontario (e.g., large urban core).

2.1.3. Ratemaking Incentives – the IRM Framework

Toronto Hydro's base rates have been escalating in accordance with the OEB's 3rd Generation Incentive Rate-Setting Price Cap Index ("PCI") mechanism since 2011, when the utility underwent its last rebasing proceeding (EB-2010-0142). In ensuring that its operating costs conformed to the funding levels provided by the PCI framework over the 2012-2014 period, the utility took a number of crucial steps to enhance the efficiency and promote sustainability of its operations, including:

- Conducting a Restructuring Program in 2012, which reduced the utility's headcount by approximately 200 full-time unionized and non-union employees;[14]
- Improving efficiency of its supply chain and warehousing operations by introducing a new Warehouse Management System, outsourcing a portion of warehousing operations and automating low-value activities;[15]

[13] EB-2010-0379, Report of the Board, Rate Setting Parameters and Benchmarking under the Renewed Regulatory Framework for Ontario's Electricity Distributors (December 4, 2013) at page 14.
[14] Exhibit 4A, Tab 4.
[15] Exhibit 4A, Tab 2, Schedule 12.

- Reducing administrative burden and improving service quality by outsourcing the management of 100+ facilities contractors to a single Facilities Management Organization;[16]
- Taking steps to rationalize the size of the utility's vehicle fleet and reducing the associated expenditures through a combination of outsourcing and process streamlining;[17]
- Improving the efficiency and scalability of its information technology operations by virtualizing the majority of the utility's servers and standardizing and streamlining the governance of all key IT processes;[18]
- Driving down injury frequency and avoiding the associated costs by implementing industry-leading health and safety standards and investing in safety awareness;[19]
- Introducing a new Customer Care and Billing ("CC&B") system and broadening the scope of available online self-service tools, including move processing, electronic billing etc, which improved service levels and had a positive impact on the utility's working capital requirements;[20]
- Other initiatives described throughout this application.

2.2. Future Productivity and Toronto Hydro's Productivity Culture

The utility's evidence in support of the productivity incentives built into the proposed Custom IR rate framework and the reasonableness of the utility's forecasted expenditures over the 2015-2019 horizon is based on:

1) Structural Elements of the CIR Framework;
2) Empirical Evaluation of the 2015-2019 Expenditure Forecasts;
3) Productivity Culture over the CIR Timeframe.

[16] Exhibit 4A, Tab 2, Schedule 11.
[17] Exhibit 4A, Tab 2, Schedule 10.
[18] Exhibit 4A, Tab 2, Schedule 16.
[19] Exhibit 4A, Tab 2, Schedule 14.
[20] Exhibit 4A, Tab 2, Schedule 13; Exhibit 2A, Tab 3.

2.2.1. Structural Elements of the CIR Framework

Toronto Hydro's proposed Custom IR framework contains two key elements that are expected to incent the utility to seek further efficiency and productivity improvements over the 2015-2019 timeframe. These elements are:

(a) The Custom Rate-Setting Index; and

(b) Distribution System Plan (DSP) Capital Efficiency Measures.

2.2.1.1. The Custom Rate-Setting Index

Toronto Hydro's proposed 2015-2019 rate framework entails a custom index, whereby the portion of the utility's Operations, Maintenance & Administration (OM&A) expenditures built into the 2015 base rates will increase on the basis of the OEB's Price Cap Index ("PCI") in 2016-2019 (i.e., years 2-5 of the CIR plan), while the funding for capital expenditures during this time will be provided through a Custom Capital Factor ("CCF" or "C-Factor").[21]

More specifically, the utility's OM&A expenditures built into 2015 base rates, will increase by the value determined through application of the OEB's long-standing *I-X* formula, where the value of both Inflation ("*I*") and Productivity and Stretch Factors (collectively "*X*") will be set by the OEB on an annual basis consistent with the traditional 4th Generation IR rate-setting policies. As a part of its annual update process, Toronto Hydro will apply to the OEB to adjust its base rates on the basis of updated *I* and *X* values along with the custom value of the C-factor.

As described in more detail in Exhibit 1B, Tab 2, Schedule 3, Toronto Hydro seeks a 0.3% stretch factor based on the findings of the PSE Report, which indicate that Toronto Hydro's total cost are within +/- 10% from model-predicted levels, and thereby

[21] See Exhibit 1B, Tab 2, Schedule 3 for more information about the proposed rate framework.

correspond to a Medium Efficiency Cohort (0.3% stretch factor) based on the OEB's 4th Generation IR methodology.

The Productivity Factor and Stretch Factor values built into the rate-setting mechanism facilitate the sharing of benefits from efficiency/productivity gains with customers on an ongoing basis. Toronto Hydro notes that that PEG's 2013 empirical research of Ontario distribution industry's Total factor Productivity (TFP) trends commissioned by the OEB for the purposes of setting the Productivity and Stretch Factor values for the 4th Generation IR framework initially supported a negative (-0.3%) productivity factor[22], based on the Ontario distribution sector's historical (2002-2012) productivity trends. Moreover, PEG's findings in support of a negative productivity factor excluded the TFP performance results of Toronto Hydro and Hydro One Networks (which were also negative) on the basis that these utilities are industry outliers. The OEB has ultimately determined that the value of the Productivity Factor for the 4th Generation IR regime should be 0%. Considering the cumulative effect of the OEB-determined 0% Productivity Factor, the proposed 0.3% Stretch Factor, and the actual empirical results of the industry TFP performance which could warrant a negative productivity factor, the cumulative effect of incentives built into Toronto Hydro's proposed Custom IR index is effectively greater than the 0.3% value of the *X* factor, and is likely in the range of 1% or higher. Toronto Hydro submits that this effective value of the X factor applied to the utility's OM&A expenditures constitutes a sufficient incentive for the 2015-2019 CIR rate period, especially in light of the amount of productivity/efficiency gains achieved in the preceding years, as confirmed by PSE.

The elements of the PCI framework embedded within the proposed Custom IR index effectively guarantee the OEB and Toronto Hydro customers the achievement of an

[22] Pacific Economics Group (PEG), "Productivity And Benchmarking Research In Support Of Incentive Rate Setting In Ontario: Final Report to the Ontario Energy Board" 21 November 2013, p.5.

outcome of future cost efficiencies through formulaic increases of the utility's operational expenditures capped at a level significantly below inflation. Accordingly, and in light of the requested five-year rate term, Toronto Hydro submits that the proposed rate framework builds in a sufficient amount of long-term incentives to drive continuous improvement with respect to the utility's efficiency and productivity levels.

2.2.1.2. DSP Capital Efficiency Metrics

The second component of productivity and efficiency built into Toronto Hydro's Custom IR framework are the performance measures proposed as a part of the utility's Distribution System Plan ("DSP").[23] These measures relate to the efficiency and cost effectiveness of the DSP planning and implementation, in accordance with section 5.2.3 of the Chapter 5 Filing Requirements.

The proposed measures allow the utility to closely monitor, and take actions (where warranted and/or possible) to ensure continuous improvement in the efficiency of execution of key operating tasks that ultimately form part of total capital costs and future in-service additions. The activities captured by these measures relate to the capitalized costs of supply chain and warehousing operations, as well as capitalized costs of engineering, design and related administrative functions. Toronto Hydro believes that the optimal means of driving efficiency of its capital program involves reducing the input costs of activities that are ultimately capitalized.

In addition to the above-noted measures, Toronto Hydro's DSP performance measurement framework contains two more measures of capital implementation efficiency: (i) Annual Contractor vs. Internal Construction Costs benchmarking exercise, and (ii) a nascent project aimed at developing a comprehensive framework of construction labour input costs for planned capital projects executed by the utility's

[23] Exhibit 2B, Section C.

internal crews, which is expected to improve and simplify the processes currently in use. While the former measure enables the utility to conduct annual comparisons of its internal construction efficiency relative to the costs of identical work provided by contractors competing on the open market, the latter measure is aimed at developing a comprehensive activity-based costing framework that underlies operations of industry leaders.[24] By refining and developing these performance measurement tools over the next five years, Toronto Hydro expects to enhance its ability to obtain detailed insights as to the nature and scale of work execution challenges faced by its construction crews, and to develop appropriate tools and measures to mitigate these challenges, thus facilitating further capital efficiency and productivity improvements.

In addition to the performance measurement framework, and as further detailed in Toronto Hydro's Supply Chain OM&A program,[25] the utility continues to work on strategic materials sourcing, vendor management and automation of low-value tasks associated with management of materials and implements supporting its capital program. In a similar manner, the anticipated improvements of the utility's capital planning tools and applications, such as the proposed FIM enhancements,[26] are expected to facilitate productivity and continuous improvement of the utility's capital planning processes. In addition to the incentives provided through the capital productivity performance measurement framework discussed above, this work is expected to enable Toronto Hydro to measure and, where feasible, control the costs of capital assets that it puts into service.

2.2.2. Empirical Evaluation of the 2015-2019 Expenditure Forecasts

In respect of productivity/efficiency incentives and a re-affirmation of the reasonableness of the utility's 2015-2019 total expenditure forecasts, Toronto Hydro refers to the Total

[24] For further discussion of activity-based costing please see the "Continuous Improvement" subsection of this schedule, which details the lessons learned by Toronto Hydro by examining the operations of leading North American distributors, whose operating environments are similar to the utility's.
[25] Exhibit 4A, Tab 3, Schedule 12.
[26] Exhibit 2B, Section A.

Cost Econometric Benchmarking Study prepared by PSE and appended to this Schedule as Appendix B (the "PSE Report"). As discussed above, the PSE Report examines and confirms the efficiencies associated with the utility's expenditure levels leading up to and including the 2015 Test Year. The PSE Report also applies empirical benchmarking practices to assess the reasonableness of Toronto Hydro's cost forecasts over the 2015-2019 Custom IR rate period. Similar to the conclusions regarding the utility's past expenditures and the 2015 Test Year, PSE finds that Toronto Hydro's 2016-2019 forecasted expenditures are reasonable when compared to average results predicted by the efficiency model; the utility's cost forecasts for each out-year are below the levels predicted by the econometric analysis.

Toronto Hydro believes that the approach adopted by PSE is the optimal means of conducting a forward-looking benchmarking assessment of future costs in the Ontario and broader North American context, where multi-year utility business plans are typically not published due to commercial sensitivity or the lack of normative frameworks requiring such publications. Toronto Hydro submits that the approach used by PSE constitutes a reasonable estimate of the utility's future efficiency and productivity levels, as contemplated by the OEB in the RRFE Report.

2.2.3. Productivity Culture over the CIR Timeframe

Toronto Hydro employs a number of tools, processes and approaches to facilitate the culture of continuous improvement and achievement of further efficiency and productivity gains for the benefit of the utility and its customers. Among other things, Toronto Hydro seeks to create an environment that enables employees to perform their work efficiently, incorporates corporate goals into the daily actions of front-line staff, provides effective performance feedback, and creates a support structure for implementing continuous improvement ideas.

The remainder of this section presents a sample of Toronto Hydro's activities, currently in place or contemplated during the CIR period, as they relate to culture of productivity. The activities are separated according to their underlying objectives according to the four general areas:

(a) Executing on projects with big savings potential;
(b) Creating a right environment for employees to perform their work productively;
(c) Translating corporate goals into daily actions for the front-line staff; and
(d) Creating a support structure for implementing continuous improvement ideas.

2.2.3.1. Executing on Projects with Big Savings Potential

Toronto Hydro expects to proceed with four initiatives:

- Upgrade of the Utility's Enterprise Resource Planning ("ERP") capability;
- Operating Centres Consolidation Program ("OCCP");
- Fleet Management Initiative;
- Standard Asset Assemblies Framework.

ERP Implementation

As detailed in Toronto Hydro's DSP,[27] Toronto Hydro's proposed ERP implementation is driven primarily by the need to upgrade Toronto Hydro's functionally obsolete Ellipse application, along with a number of other key IT applications that support the utility's key business processes. Beyond facilitating information technology service reliability and enabling sufficient technical support and upgrades for the Legacy Systems, Toronto Hydro views the ERP upgrade as an opportunity to streamline and automate a number of key asset management, human resources and financial processes that currently require a significant amount of manual effort or complex workarounds due to the lack of necessary IT functionalities. Accordingly, by implementing the upgraded ERP capability over the

[27] Exhibit 2B, E8.6

2015-2019 timeframe, Toronto Hydro expects to also improve the execution efficiency of a number of critical processes supporting its operations.

Operating Centres Consolidation Program

Toronto Hydro's Operational Centre Consolidation Program ("OCCP")[28] aims to secure tenure for Toronto Hydro in the northwest and northeast areas of the City while delivering benefits to ratepayers. Under the program, Toronto Hydro would vacate four facilities, two of which it currently owns, and relocate staff, equipment and operations to three facilities already owned by Toronto Hydro to achieve efficiencies and improve space utilization. The two surplus Toronto Hydro-owned facilities would be sold and the net after-tax gains on sale and related tax savings arising would be credited to ratepayers through rate riders.

Fleet Management Initiative

The Fleet Management Strategy is an ongoing project that is already yielding efficiencies at Toronto Hydro. The project's aim is to rationalize the size of the utility's vehicle fleet and attain further operating efficiencies through competitive procurement of servicing functions, and leveraging GPS capabilities to optimize maintenance cycles. By the end of 2014, the utility expects to have removed 86 vehicles from its fleet from the time of the program's inception in 2011, which amounts to a 12% reduction. Further reductions are expected as the utility continues phasing its vehicle sharing program, which is currently in a pilot stage. For more information on the vehicle sharing program please refer to Fleet and Equipment Services OM&A program.[29]

[28] Exhibit 2B, E8.2
[29] Exhibit 4A, Tab 2, Schedule 10.

Standard Asset Assemblies Framework

As discussed above, and further detailed in the utility's DSP,[30] the Asset Assemblies Framework (an undertaking that is currently in the early stages), aims to develop an enhanced framework of standard labour hour inputs for construction of a standard unit of Toronto Hydro's distribution plant. The framework is also expected to include standard adjustment factors to account for project-specific circumstances (e.g., installation in a ravine), as well as allocations for "non-wrench" time, such as regular breaks, set-up/takedown etc. Ease of performance tracking by crew leaders and supervisors is expected to be enabled through the development of a user-friendly application installed at handheld devices issued to staff. To ensure alignment between field conditions and performance expectations as well as drive continuous improvement, the input unit values would be periodically updated on the basis of field results.

While the framework is in the early stages and will undergo further testing and development during the 2015-2019 CIR timeframe, Toronto Hydro expects that it will provide the utility with key insights that will enable the optimization of construction practices, and in turn, lead to efficiency gains. As further discussed below, the implementation of standard asset assemblies is one of several key initiatives that Toronto Hydro identified during its recent outreach / fact finding to several large U.S. utilities whose operating conditions are similar to those of Toronto Hydro, and whose operating practices are seen as industry-leading.

Over the 2015-2019 timeframe, Toronto Hydro plans to investigate opportunities for additional large initiatives that have value propositions and the potential for significant efficiency and productivity gains. As discussed earlier in this schedule, the incentive elements built into the utility's proposed custom rate framework are expected to incent

[30] Exhibit 2B, Section C.

Toronto Hydro to seek out and realize further productivity improvements during the CIR period.

2.2.3.2. Creating a Right Environment for Employees to Perform Their Work Productively

At the core of this strategy lies Toronto Hydro's corporate commitment to employee health and safety, supported by a comprehensive framework of safety rules, audits and education/awareness programs. Beyond facilitating employee welfare and job satisfaction, Toronto Hydro believes that a corporate focus on employee health and safety leads to significant financial benefits. For example, the utility estimates that a lifetime cost of a permanent shoulder injury to a frontline worker is approximately $1 million, comprised of rehabilitation and accommodation costs, lost productive time, insurance premiums and other components. As discussed in more detail in the utility's Human Resource and Safety OM&A evidence,[31] permanent shoulder injuries have been relatively commonplace at Toronto Hydro prior to the introduction of the current health and safety framework. The last permanent shoulder injury at Toronto Hydro occurred in 2011.

A related area of Toronto Hydro's productivity culture focus is employee attendance, as paid lost time due to absences, injuries or illnesses provides no value to the employer or ratepayers. A 2013 Conference Board of Canada study estimates that absenteeism costs Canada's economy $16.6 billion. Having put in place a comprehensive attendance management program starting in 2007, Toronto Hydro achieved a 45% reduction in absenteeism rates between 2008 and 2013, which ranks significantly below the municipal, provincial, and national averages according to the 2013 Conference Board of Canada study.[32] Toronto Hydro will continue its attendance management program over

[31] Exhibit 4A, Tab 2, Schedule 14.
[32] The Conference Board Of Canada, "Missing in Action: Absenteeism Trends in Canadian Organizations", Briefing, September 2013;

the 2015-2019 CIR timeframe to drive sustained improvements for the benefit of the utility and its ratepayers.

Toronto Hydro also continues to leverage technological advancements in order to create optimal work surroundings and drive employee productivity. Toronto Hydro has upgraded employee work stations by replacing standard desktop computers with laptops, which employees can take home or bring along to internal or external meetings. All laptops are equipped with software, which allows Toronto Hydro's employees to access all corporate applications and databases offsite via a secure connection. In addition, all of Toronto Hydro's work centres are also Wi-Fi enabled to allow the employees easy access to any required applications from anywhere in the buildings. These strategic hardware and software upgrades enable Toronto Hydro employees to perform their duties from home, while commuting, or under any other circumstances that require employees to be away from their primary work locations. In addition to facilitating productivity, this capability assists the utility's personnel in maintaining a healthy work-life balance, which improves job satisfaction and further incents productivity.

In a similar manner, Toronto Hydro is in the process of equipping all of its service vehicles with mobile laptops and GPS capabilities, which facilitates the execution of administrative tasks in the field, provides employees access to requisite applications and resources, and allows dispatchers to quickly locate a crew in the proximity of a reported incident. In addition, and as further described in the following section, mobile capability allows Toronto Hydro to implement new short-interval performance measurement systems, which allow the utility to quickly identify problem issues and incent its field employees to achieve performance improvements. Presently, mobile capability is

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http://www.sunlife.ca/static/canada/Sponsor/About%20Group%20Benefits/Focus%20Update/2013/Special%20Edition%20-%20Sept.%2023%20-%20%20Sun%20Life%20co-sponsors%20major%20new%20Conference%20Board%20of/MissinginAction_SUN%20LIFE_EN.pdf

installed on all service vehicles that respond to system outages. The utility plans to equip the remainder of its service vehicles with mobile technology over the CIR period.

In addition to continuously evaluating its internal practices for improvement opportunities, Toronto Hydro also consider productivity/efficiency ideas in the practices of utility sector leaders. In 2012, Toronto Hydro conducted several visits to major U.S. electric utilities in an effort to identify and adopt their most successful productivity and performance management practices. The utilities that Toronto Hydro visited were Baltimore Gas and Electric ("BG&E") in Maryland and Commonwealth Edison ("ComEd") in Chicago. Toronto Hydro is in the process of implementing several of the work practices observed during these visits, including:

- short-interval performance controls for System Response Crews (discussed below);
- changes to temperature and infrared criteria for safe entry limits into confined spaces;
- outsourcing the traffic management set-up activities for roadway work; and
- implementing a standard Asset Assemblies labour input methodology.

Each of the above-mentioned practices is in various stages of development and implementation and is expected to generate productivity and performance improvements. Toronto Hydro will continue seek and implement additional industry best practices by maintaining dialogue with industry peers in the context of various industry associations and other issue-specific engagements.

2.2.3.3. Translating Corporate Goals into Daily Actions for the Front-line Staff

Key Performance Indicators

Toronto Hydro maintains a comprehensive framework of Key Performance Indicators ("KPIs") that is integrated with the utility's performance pay program and is a part of a Balanced Corporate Scorecard. The KPI framework is structured in a way to create a direct link between the individual performance expectations of each Toronto Hydro employee and the corporate performance goals for each year. Such a structure allows the utility to foster accountability and continuous improvement at every level of corporate structure.

System Response Crew Performance Monitoring

In addition to corporate-wide performance measurement, Toronto Hydro continues to implement an increasing number of sophisticated program-specific performance measurement systems, which monitor employee achievement of key operational outcomes relevant to their particular area of responsibility. One such performance measurement system has been implemented in 2013 to enable more advanced tracking of the utility's responses to Police, Fire and Ambulance ("PFA") calls. Pursuant to the conditions of its distribution licence, Toronto Hydro is required to respond to 90% of all PFA calls within one hour from receiving the call. While Toronto Hydro has historically maintained its compliance with the OEB standard, the utility obtained the idea for a more advanced tracking system from one of its U.S. utility peers.

To ensure measurement accuracy, Toronto Hydro utilizes the GPS capability installed on all of its service vehicles to gauge each system response crew's success in meeting the internal benchmark. The summary of daily activities is electronically summarized in a user-friendly dashboard, which enables in-depth performance analysis at the next day's crew meetings with supervisors and managers. Performance trends are also reviewed at

monthly meetings, where employees are provided with an opportunity to suggest practice improvements. Since this initiative has been put in place, Toronto Hydro's PFA performance rate has improved by approximately 20%, when adjusting for Major Event Days. Continuous tracking of performance statistics also allows Toronto Hydro to periodically increase the internal standards, thus driving continuous improvement in service levels and efficiency. Over the CIR period, Toronto Hydro plans to investigate opportunities for extrapolation of the PFA response tracking methodology to other areas of utility's operations, such as regular maintenance activities.

Other Activity-Based Performance Measurement

Toronto Hydro employs activity-based performance measurement across a number of its other operational programs, including:

- First Call Resolution and Average Call Duration stats for its contact centre employees;
- On Time and in Full ("OTIF") order fulfillment rate for it warehouse operations;
- Order completion rate for the utility's materials and supplies vendors;
- Service request resolution metrics for the IT program staff;
- Internal request response timelines for the Legal program staff;
- Order to Operate ("OTO") execution rates for the Control Centre employees;
- Office time spent by crew supervisors;
- Maintenance attainment rates for the utility's fleet; and
- Other activity-specific measures and metrics.

Performance Measurement over the 2015-2019 Timeframe

Over the 2015-2019 timeframe Toronto Hydro plans to continue expanding the scope and sophistication of its performance management and evaluation undertakings. Among the key areas of focus over the five-year period includes the investigation, piloting and introduction of the previously described Asset Assemblies Framework discussed earlier

in this document. Other initiatives targeting increasingly precise and sophisticated measurement of specific activities will also be considered.

2.2.3.4. Creating a Support Structure for Implementing Continuous Improvement Ideas

The utility places a significant value on the ideas generated by employees, and has put in place a number of formal channels for the identification and discussion of these ideas. The main means of soliciting productivity-enhancing feedback are meetings between Toronto Hydro employees and members of the management team that occur across the utility at regularly scheduled intervals. Toronto Hydro encourages its employees to provide open feedback on the operating practices they use in the field, including ways to improve the safety or efficiency of work execution. Toronto Hydro plans to put into place other tools for grassroots productivity initiatives identification. Among them are plans to conduct a survey across the utility's operations to address potential productivity opportunities during the CIR term. Initiatives that receive support and have potential to affect multiple programs may be further refined and considered for implementation.

Toronto Hydro-Electric-System Limited: Historic Performance and Productivity Initiatives

From Amalgamation to Present

Toronto Hydro-Electric System Limited

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A Introduction

Toronto Hydro was created in 1998 by the amalgamation of six municipal utilities. Coinciding with the fundamental restructuring of Ontario's electricity sector, the merger presented the utility with a set of challenges, which by their nature and magnitude went beyond those faced by its peers in responding to sector reform. The merger saw Toronto Hydro inherit six legacy systems, staffing complements and business processes, which it has gradually integrated, streamlined and modernized over the course of the past 15 years. For example, Toronto Hydro reduced total staff levels by approximately 40% and absenteeism rates by approximately 45%, while also reducing lost time accidents and rationalizing legacy facilities and equipment. Over time, these and other initiatives discussed in this evidence have enabled Toronto Hydro to improve its operational capabilities, while enhancing the value that it offers to its customers.

Since the restructuring in the late 1990s, the electricity industry has undergone a number of fundamental paradigm shifts. Toronto Hydro has been a full participant in these developments and a leader in Smart Meter deployment, web-based customer services and enabling renewable generation connection across its service territory. Toronto Hydro has accomplished all of this while addressing the on-going challenges of its aging infrastructure in a mature, yet rapidly intensifying urban core. Toronto Hydro submits that it's achievements to-date are importantly attributable to its on-going commitment to productivity and efficiency, as detailed by the specific initiatives presented below.

The information and examples in this schedule do not represent an exhaustive account of the aggregate activities or savings that Toronto Hydro has achieved to-date, but rather are representative of the utility's ongoing commitment to productivity and continuous improvement. In addition to illustrating the scope and nature of Toronto Hydro's productivity improvements, Toronto Hydro has endeavored to roughly quantify the impact of the avoided costs associated with these measures where possible.[1] This material provides background and context for the current snapshot of Toronto Hydro's productivity and performance during the Custom Incentive Regulation ("CIR" or "Custom IR") period (2015-2019) as discussed in Exhibit 1B, Tab 2, Schedule 5.

As noted by Power System Engineering ("PSE") in Appendix B to Exhibit 1B, Tab 2, Schedule 5, the results of an econometric benchmarking study comparing Toronto Hydro's historical total costs (2002-2013) to those of comparable Ontario and U.S. utilities indicate that Toronto Hydro's customers have on average benefitted from efficiencies in the magnitude of $156 million per year when compared to the reasonable cost levels predicted by the efficiency model. This report, in turn, complements the PSE analysis to showcase a range of concrete productivity initiatives that Toronto Hydro has undertaken since the time of its amalgamation.

[1] Given the limited availability of records from the period immediately following the amalgamation, this report's content is based in part on interviews with Toronto Hydro personnel that remained with the utility throughout its amalgamated existence. Accordingly, the quantification of benefits related to specific productivity initiatives represents estimates of directional magnitude, rather than precise calculations.

In short, Toronto Hydro is presenting a longer time-horizon of its productivity efforts to provide the OEB with a more robust picture of productivity at Toronto Hydro. Toronto Hydro's submission is that having capitalized on the productivity initiatives described in this study, Toronto Hydro is now able to deliver its services and implement its capital program at a cost significantly lower than it otherwise would have been in the absence of these critical improvements.

Toronto Hydro's productivity experience since amalgamation has been shaped by the events surrounding the merger of six neighbouring utilities into Toronto Hydro. In general, Toronto Hydro has been challenged to systematically and sustainably integrate six sets of legacy systems, human resources, as well as plant and management practices into a cohesive operation serving Canada's largest city. These integration efforts were further complicated by Ontario's rapidly evolving electricity regulation framework including the implementation of sector transformative initiatives such as Smart Meters and distributed generation.

Since amalgamation, Toronto Hydro's approach to productivity has matured and become more sophisticated. For presentation purposes, Toronto Hydro presents this evolutionary process as three general (and in some cases, overlapping) phases from post amalgamation to present. In general terms, each phase is defined by the key considerations driving the initiatives, the nature of initiatives themselves, and their implementation. In other words, the initiatives implemented during the latter phases were largely made possible by the work that took place earlier in the utility's existence. Although Toronto Hydro has identified three distinct productivity phases from amalgamation to present, as described in further detail below, a number of the activities and initiatives have evolved and persisted beyond the phase in which they were initially implemented. The three "past productivity" phases can be summarized as follows:

Phase 1- Amalgamation (1998 – 2003): *Managing the merger aftermath.*

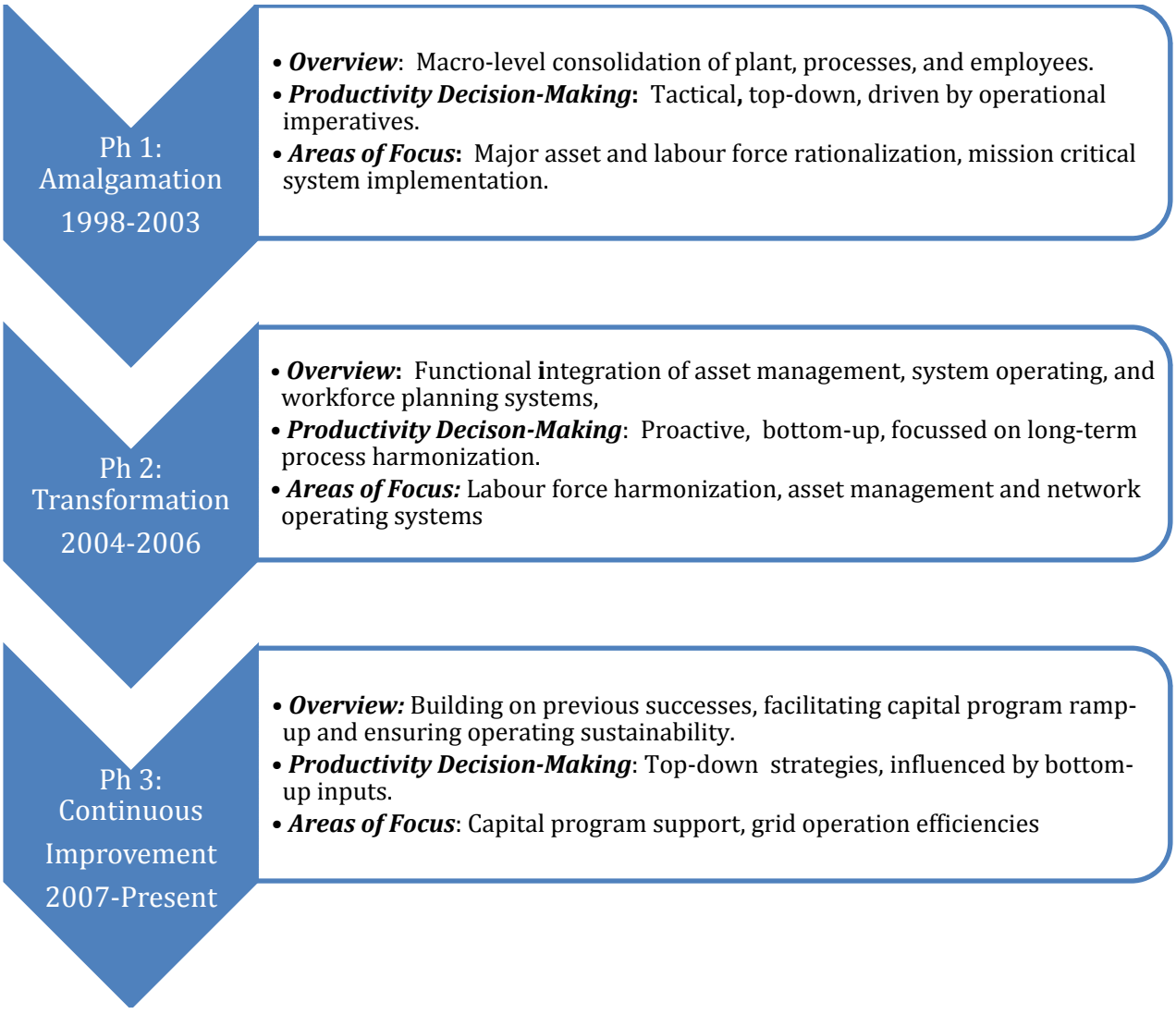
Taking steps to rationalize the areas of functional overlap resulting from the merger of six distinct utilities, while working to define a uniform operating model. This phase saw Toronto Hydro implement efficiency improvements including staff reductions and divestiture of redundant properties.

Phase 2 - Transformation (2004-2006): *Continuing on the path of human capital and asset management harmonization*.

During this phase, Toronto Hydro leveraged earlier successes in asset data-consolidation to implement critical practices and applications that enable long-term system planning and integrated grid operation. On the human resources front, Toronto Hydro achieved significant gains by working with its unions to streamline a number of overlapping job descriptions in the collective agreements. Unlike the Amalgamation phase (phase 1), where the productivity-enabling activities were often driven in part by near-term operational needs, a defining characteristic of Toronto Hydro's Transformation phase was sustainable improvements.

Phase 3 - Continuous Improvement (2007-2014): *Enabling the capital program ramp-up and grid operation efficiencies.*

Having introduced a series of asset management and grid operation applications in the Transformation phase (phase 2), Toronto Hydro further improved the efficiency of its capital planning and grid operation processes by introducing advanced grid modeling capabilities, consolidated and automated grid response applications and processes, enhancing the field supervisory functions, introducing standardized business case protocols, and outsourcing its warehouse operations.



The remainder of this report provides a sampling of the individual initiatives comprising each phase.

B Amalgamation 1998-2003

In the aftermath of Toronto's municipal amalgamation in 1998, the newly merged Toronto Hydro was, in reality, six independent entities that shared little more than a name. Each of the legacy utilities came into the merger with:

- a full complement of staff, management and collective agreements;
- unique system design, construction standards and operating procedures; and
- individual management practices and uniquely configured supporting systems.

The circumstances of Toronto Hydro's amalgamation were such that efficiency considerations were often synonymous with immediate objectives of laying down a foundation for an integrated utility: maintaining service consistency across the new territory, and complying with new legislative and regulatory requirements. As management worked to select the optimal operating models and systems for a utility of Toronto Hydro's size and sophistication, the utility was also required to accommodate a number of key external developments, such as the Y2K preparations and the opening of wholesale and retail electricity markets. While those outcomes were often by-products of work driven by other operational priorities, a number of these strategic and execution decisions led to productivity and efficiency gains. However, the financial effect of these productivity gains was often diluted by the need for significant up-front expenditures to achieve integration, including for example the costs of implementing the restructuring activities such as the Voluntary Exit Program ("VEP") and the investment into Ellipse and Banner applications.

Given the above considerations, the newly amalgamated Toronto Hydro proceeded to address the extensive areas of functional overlap resulting from the merger. This work included rationalization of the utility's real estate and staffing complements, consolidation of materials, equipment, vendor supply contracts and procurement processes and early steps towards the harmonization of asset management practices. Moreover, operational realities such as increase in the volume of customer calls saw the utility adopt some of its early outsourcing practices. Finally, the variety of IT and general management systems across the legacy utilities necessitated standardization of tools and practices throughout the utility.

Figure 1 provides a summary of these initiatives, the total estimated quantified benefit of which amounts to approximately $2,200 million, as set out in Figure 2.

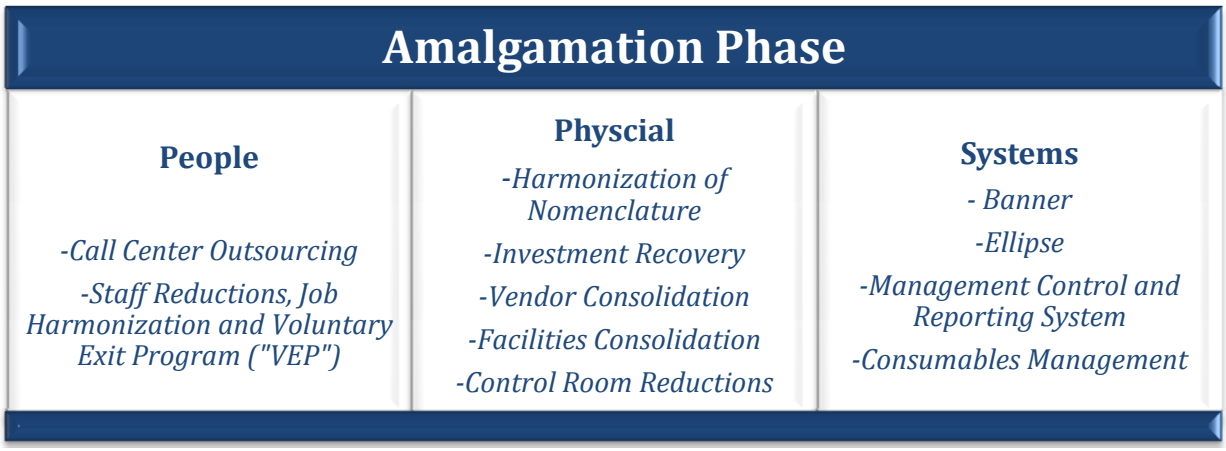


Figure 1: Amalgamation Period Productivity Initiatives

Initiative	Basis of Estimated Savings	Estimated NPV of Benefits to date
Staff Reductions and VEP	Salary savings	$1.9 billion
Facilities Consolidation	Facility Operating Cost Savings	$52 million
Control Room Rationalization	Salary savings	$29 million
Investment Recovery	Market price of scrap recovery	$94 million
Ellipse System	Efficiency savings	$71 million
Consumables Management	Staff and consumable savings	$29 million
TOTAL QUANTIFIED BENEFITS		**$2.2 billion**

Figure 2: Quantified Estimates of NPV of Productivity Initiatives – Amalgamation Phase

B.1 Call Center Outsourcing

Toronto Hydro's call center receives a steady volume of calls from its residential and commercial customers regarding any number of issues, including account updates, billing enquiries, service complaints and others. Given the differences between the customer information systems and billing practices among the six legacy utilities, the post-amalgamation call centre included representatives from each of the former LDCs who responded to customer calls from their respective former service areas.[2]

[2] Toronto Hydro abandoned this inefficient practice once it implemented a single Customer Care and Billing system, described in section B.8 of this report.

To overcome rising costs, attrition and increasing call volumes, Toronto Hydro contracted a third party call centre services provider. The initial arrangement implemented in 1999 was designed so that third-party agents would only handle the overflow calls at times when all internal Toronto Hydro operators were helping other customers. To help maintain service levels, improve customer experience, and reduce costs associated with having third-party agents on standby for potential overflow volumes, in 2002 this arrangement evolved into a framework where calls were handled by the next available agent, be it a staff member or a third party employee. This enhancement also helped mitigate the costs of an increase in call volume associated with the opening of the electricity market to retail energy contracts in 2002.

B.2 Staff Reductions, Job Harmonization and Voluntary Exit Program

At the time of amalgamation, Toronto Hydro had over 2,500 employees. Following amalgamation, one of the utility's major tasks was to consider ways in which it could rationalize its labour force by reducing the areas of duplication across the organization. The primary means of accomplishing the desired reduction was a Voluntary Exit Program ("VEP") offered across the newly merged utility. Toronto Hydro conceived the VEP as an open-ended offer, available to all employees, without restricting eligibility to specific staff or area. As a result, Toronto Hydro's total headcount was reduced by approximately 25%.

In 2001, Toronto Hydro conducted a second round of VEP in order to further rationalize its workforce. This program resulted in a reduction of approximately 270 employees – 180 union staff and 90 management staff.

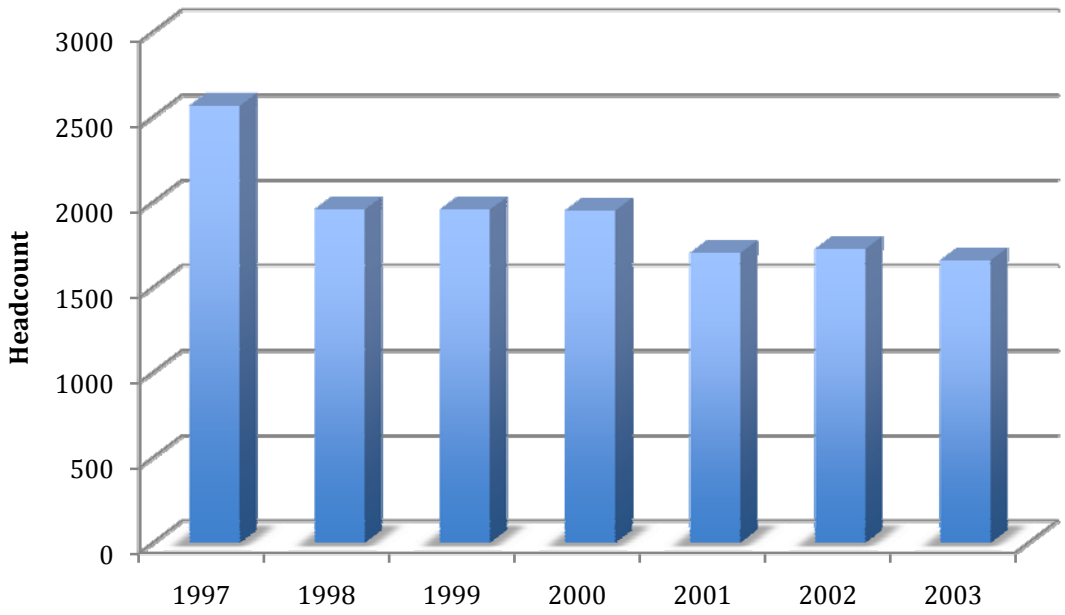


Figure 3: Toronto Hydro Employee Count (1997 – 2003)

Following the amalgamation, the utility had inherited a multitude of individual job descriptions covering generally narrow (and overlapping) areas of skill sets. In many instances, separate job descriptions and pay scales existed for functionally similar positions, adding to Toronto Hydro's administrative costs and often leading to general confusion. Even more material to the utility's operational costs were instances where the fragmented job descriptions mandated the presence of two or more "specially designated" staff members to perform a task that could have been executed by a single employee with a broader job description.

Toronto Hydro worked with its major union, CUPE Local One, to harmonize the job descriptions throughout the Transformation and the Continuous Improvement Phases. The result of this work was to reduce job descriptions from the pre-amalgamation level of 532, down to 147. An illustrative example of the positive impact of Job Harmonization is the Certified Power Cable Person (CPCP) position – a single job description spanning the skill sets of previously separate positions of underground jointer and a mechanic. Prior to harmonization, the work protocols required that representatives of both trades be present at most underground job sites. Following the harmonization, this work can be performed by one trade.

B.3 Harmonization of Nomenclature

The newly merged Toronto Hydro had six sets of distribution plant assets varying in vintage, configuration, and identification conventions totaling over 113,000 pieces of equipment. Each distribution system component requires unique identifiers that provide asset managers, control room operators, and crews with vital information on equipment's location, type, operating condition, voltage, or safety risk. Similar to air traffic control, having a common language is essential to running an electrical grid safely and productively.

Toronto Hydro's decision to standardize the system was driven by the following considerations:

- *Safety Concerns*: Lack of standard demarcation and inconsistent and duplicate nomenclature could result in interpretation mistakes, potentially compromising safety protocols of the utility's crews, controllers and engineers.

- *Lost Productivity*: Length of time spent deciphering the differing nomenclature affected the time construction and maintenance crews had to complete the requisite work.

- *Operational Costs*: Legacy conventions limited the mobility and flexibility of crews and designers to work across "borders", resulting in sub-optimal allocation of resources. To enable capital work and maintenance early in the utility's existence pending completion of harmonization, Toronto Hydro implemented a training program to acquaint its field crews with the legacy system conventions.

- *Reliability and Outage Management*: Nomenclature interpretation efforts in the field often prolonged the duration of system outages, as system controllers sought to minimize the probability of interpretation-related errors by field crews.

To implement this labour-intensive project, Toronto Hydro primarily utilized qualified field personnel who were otherwise performing accommodated duties of administrative nature due to their functional restrictions. Doing so allowed the utility to capitalize on the extensive training and experience of its accommodated staff without incurring additional labour costs.

The implementation of standard nomenclature produced significant benefits. The primary benefits were safety and the decreased time required to interpret and verify the asset nomenclature for the field crews and system operators, allowing them more time to complete the requisite tasks. Though intuitive and necessary, this initiative constituted a critical building block of Toronto Hydro's current asset management capability and has been used as inputs to many processes and systems, including Ellipse (Toronto Hydro's asset and resource management system), GEAR (Geospatially Enabled Asset Registry, Toronto Hydro's geographic asset information system), planning/construction standards, as well as others.

B.4 Vendor Consolidation

Prior to the amalgamation, the legacy local distribution companies ("LDCs") procured standard materials and equipment from multiple individual suppliers through different procurement processes. The legacy arrangement was not sustainable for a number of reasons, including:

- quality of materials was not standardized;
- contract administration and auditing functions were time consuming and inconsistent;
- economies of scale were unrealized; and
- vendor selection processes were poorly defined, duplicative and labour-intensive.

To address this, Toronto Hydro consolidated dozens of supply contracts for key materials and equipment (such as transformers, wire/cable, and pole-line hardware) into several longer-term arrangements with the most value added suppliers. At the same time, the utility developed a comprehensive vendor pre-qualification process for construction contractors, requiring all bidding vendors to be bonded and insured and specifying other quality assurance requirements.

A smaller number of suppliers resulted in an increase of order quantities. This allowed Toronto Hydro to negotiate lower overall pricing, and significantly reduce the need for vendor communication, and warranty issues which in the past necessitated a greater level of procurement staffing. In addition, having reduced the number of suppliers, Toronto Hydro ensured that further system replacement or expansion work utilized

common materials and equipment, familiar to all staff and easily replaceable in the event of a failure.

B.5 Facilities Consolidation

At the time of amalgamation, the newly-formed Toronto Hydro was in possession of 17 facilities, including office buildings and service/warehousing centres. Given the number of excess operating facilities and staff reductions the utility pursued an aggressive rationalization of its real estate. Within a year of amalgamation, Toronto Hydro reduced the number of facilities used to 5 locations.

Apart from the reduction in operating expenses (approximately $2.2 million), consolidating the utility's facilities had positive effect on the utility's operations through reduced facility operating expenses, improved logistics efficiency, communications and deployment of capital, reactive, and system response staff. Moreover, the consolidation of office and warehousing space facilitated the harmonization of staff from legacy utilities under a common corporate identity.

B.6 Control Room Rationalization

Toronto Hydro's Facilities Consolidation work allowed the utility to centralize the physical location of the legacy control centre operations early in the utility's amalgamated existence. While all six control centers operated under a single roof, they continued functioning independently of each other throughout the Amalgamation phase. Each control room maintained its own staffing complement, grid control technology, and operating procedures. Functional integration could not be completed during the early years of Toronto Hydro's consolidated existence due to the complexity of requisite changes, which required a common operating platform, a uniform system of operating procedures, and an extensive multi-step integration process requiring a complex and extensive outage coordination sequence.

Irrespective of the near-term challenges noted above, physical consolidation of control rooms and integration of control room oversight under a single management structure allowed Toronto Hydro to implement immediate efficiencies through staff reductions and operational procedures. From a complement of over 70 power system controllers and managers prior to the amalgamation, approximately 40 remained following Control Room rationalization. Additional support staff savings were realized as well. Standardization of operation procedures resulted in a reduction in number of processes from 60 to 33 and improved operational support services, system reliability and safety.

B.7 Investment Recovery

Toronto Hydro's investment recovery function ensures that retired or defective assets that are no longer operational are disposed of at maximum value through sale of the

scrap materials (copper, aluminum, lead) at the American Metal Market Exchange (AMMEX) rate at the time of the transaction.

Early in its post-amalgamation existence, Toronto Hydro adopted an organized approach to investment recovery, replacing a set of largely ad-hoc and inconsistent processes that existed prior to the amalgamation. In partnership with a metal recovery service provider, Toronto Hydro implemented a systematic program for decommissioning retired assets and recovering the value of their components on metal exchanges. The initiative led to tangible benefits for the utility's ratepayers, as the proceeds from scrap metal sales are used to offset the impact of Toronto Hydro's service revenue requirement. The average yearly recovery of materials amounted to approximately 240 tonnes, translating to an average revenue offset of approximately $2 million.

B.8 Centralized CIS Implementation

Among the key early steps taken towards the consolidation of Toronto Hydro's customer care function was the implementation of a single enterprise-wide Customer Information System ("CIS") platform. Prior to the amalgamation, each utility operated its own CIS system, complete with a set of customized functions and corresponding operating procedures.

Through a strategic review of available technologies, Toronto Hydro selected the Banner platform, used at the time by two of the six former utilities. Unlike other legacy systems that relied heavily on paper-based processes, Banner's record-keeping capabilities leveraged a largely paperless platform. In addition to streamlining the customer record keeping work, the consolidation of CIS capabilities improved billing accuracy and consistency across the service territory, leading to further administrative efficiencies.

Although intuitive, centralization of customer information management constituted a fundamental milestone for Toronto Hydro. The utility and its customers benefitted from the immediate reduction of duplicative processes and the associated costs.

B.9 ELLIPSE

Toronto Hydro's ELLIPSE platform, which was implemented in 2002, is an Enterprise Asset and Resource Management System ("EARMS"). Prior to the implementation of ELLIPSE, the pre-amalgamated utilities used various types and vintages of IT systems, custom-made data sets, and asset and resources tracking conventions. While now past its useful life and in need of replacement and upgrade to an Enterprise Resource Planning system,[3] ELLIPSE allowed Toronto Hydro to expand on the generic EARMS to specific work breakdown structures for all utility functions.

[3] See Exhibit 2B, E8. 6

ELLIPSE enabled many of Toronto Hydro's corporate strategic initiatives at the time. Specifically, it supported the initial stages of developing the following performance management tools:

- creating and reporting on internal benchmark performance of priority issues (via measures tracked in Work Management);
- preparing the utility for performance-based regulation (by providing data for analysis as well as reporting to the OEB); and
- effectively managing work and resources (by providing appropriate centralized system tools and current information).

At a more functional level, ELLIPSE streamlined business processes by introducing best practices in the way work is organized, executed, measured and reported.

Some of the benefits and capabilities that ELLIPSE enabled include:

- aiding in maintaining the distribution system assets and constructing new assets, specifically the Asset Registry, Reliability Centered Maintenance Module, and Work Management & Costing;
- ensuring availability of required inventory while reducing overall inventory levels;
- facilitating creation, execution and completion of projects;
- tracking project status;
- maintaining financial information;
- estimating, budgeting, and tracking costs;
- aiding personnel/crew assignments to maximize the capabilities of all staff;
- providing required and requested data to the OEB; and
- maintaining all manner of enterprise data.

The principal system within ELLIPSE is the Work Management System. Work Management tracks a project throughout its lifecycle, from the project's creation to its completion. The system shows the status of the project, and allows for comparison of the work completed to the work plan. Work Management is used at the inception of a project to create a record (Work Order Number) through which all data about the project is referenced and estimated costs are assigned to it. Material requirements for the project are linked to it, and the work completed against it is tracked.

The Manpower Management module of ELLIPSE allows appropriate human resources to be assigned to the projects, based on skill levels, availability, and training requirements. Specialized "whiteboarding" tools allow dynamic reallocation of staff as circumstances dictate. And, as work is completed, time is accrued against project tasks through the timekeeping system to track work completed against the plan, and feed payroll data to the financial modules.

In addition to project status data, ELLIPSE maintains information crucial to the asset management function. Through the functionality of Ellipse, Toronto Hydro gathers data such as asset installation date, condition, and maintenance activities, all of which is housed in the Ellipse Equipment Registry. The information is then used in future planning cycles to identify trends in equipment performance, reliability, condition and

the asset lifecycle, driving the planning necessary to maintain, replace or extend the life of the asset.

B.10 Management Control and Reporting System (MCRS)

Throughout the Amalgamation phase, Toronto Hydro focused on the establishment of an efficient corporate staffing structure with clear lines of management oversight and delineation of employee responsibilities, and effective information flow throughout the corporate hierarchy. A key milestone in this area was the adoption of the Management Control and Report System ("MCRS"), which involved a significant corporate culture shift. In general terms, the MCRS is a standardized and formalized corporate structure through which key performance is communicated from departmental managers to executives and vice versa.

The associated benefits included:

- accountability in the execution of core tasks;
- timeliness showing that tasks were completed within expectations;
- action driving response mechanisms and triggers;
- bottom-up and top-down communication; and
- requirements for documentation and effective change management.

The process by which Toronto Hydro maintains operational effectiveness is in large part dependent on the MCRS framework. The creation of the reporting and control system and its benefits were key to the execution of increased capital work and the transition from effective to efficient practices. For example, all capital projects use the formalized MCRS process to maximize the efficiency of the project through its life cycle. Through MCRS framework, the progress and spending associated with Capital projects are gathered, gaps between plan and actual are identified, analyzed and reported to enable the Management team make strategic decision to ensure delivery of the work program. It is also applied in all corporate projects, such as the implementation of the new Customer Information System.

B.11 Consumables Management

In performing their daily activities, Toronto Hydro's crews rely on a number of small "consumable" implements such as tape, batteries, sunscreen, glasses, gloves etc., which the utility provides for their use. Prior to the amalgamation, Toronto Hydro distributed the consumable items via two dedicated trucks that delivered the products directly to work sites. The management and administration of these activities amounted to an annual expenditure of approximately $1.4 million.

To streamline this process and reduce costs, Toronto Hydro eliminated the trucks and positions tasked with direct distribution of consumables, and established a process for crews to pick up the consumables directly at the warehousing facilities. More recently, Toronto Hydro has moved to an "open bin" distribution process, which allows crews to

obtain required parts without the need for distribution staff. The elimination of the two supply trucks and positions along with added benefits of lowered consumption has resulted in an annual savings of approximately $1million.

C Transformation: 2004-2006

The initiatives of this phase have fundamentally improved Toronto Hydro's capabilities to plan and perform its core distribution functions. Having completed the basic integration of the legacy systems, property and staff in the early 2000's, Toronto Hydro embarked on a series of initiatives aimed at enhancing the long-term efficiency of its work planning and execution practices, as well as improving the flexibility and sustainability of its labour force. Building on the earlier steps including control room integration and nomenclature consolidation, Toronto Hydro proceeded to implement the critical distribution system management applications, which improved its ability to handle system contingencies and coordinate complex outage work to enable safe and efficient maintenance and capital work execution.

While some of the projects comprising the Transformation phase were completed after its conclusion in 2006, Toronto Hydro chose 2006 to mark the end of this phase because of the utility's significant ramp-up in capital work beginning in 2007. Much of the utility's ability to accomplish this level of capital work is due to the gains achieved through the initiatives implemented during the Transformation phase. Figure 4 provides the overview of the initiatives comprising the Transformation Phase. The total estimated quantifiable benefits derived from this work are approximately $1 million, as set out in Figure 5.

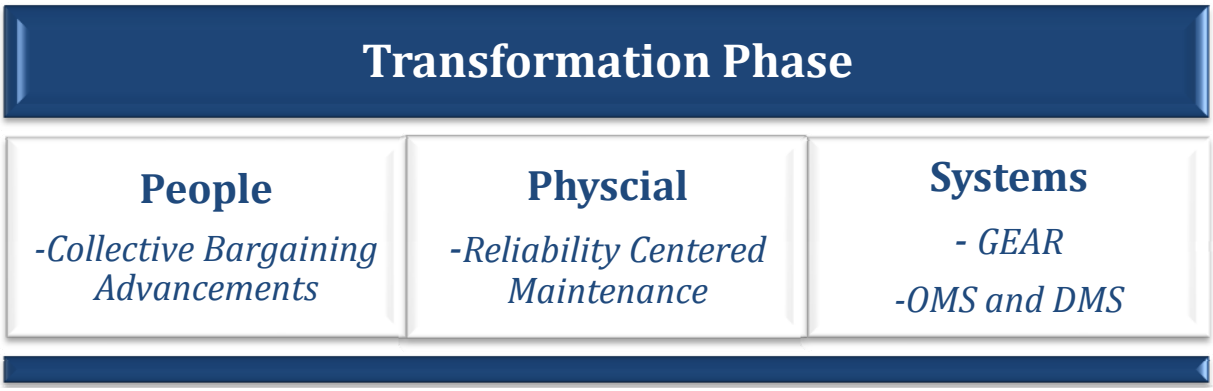


Figure 4: Transformation Period Productivity Initiatives

Initiative	Basis of Estimated Savings	Estimated NPV of Benefits to date
GEAR	Salary savings	$1 million
TOTAL QUANTIFIED BENEFITS		**$1million**

Figure 5: Quantified Estimates of NPV of Productivity Initiatives – Transformation Stage

C.1 Collective Bargaining Advancements

A large portion of Toronto Hydro's workforce consists of unionized employees. As such there are a number of negotiations and collective agreement processes which take place at regular intervals. Toronto Hydro continually strives to optimize operating costs while providing employees with competitive salaries and benefits.

Toronto Hydro has approached each collective bargaining cycle as an opportunity to focus on increasing operational effectiveness. Collective bargaining agreements reflect Toronto Hydro's commitment to improving business performance. Highlights of Toronto Hydro's collective bargaining gains are outlined in the table below.

Table 1: Collective Bargaining Summary

Collective Agreement	Change	Benefits
1999-2001	➢ Streamlined grievance procedures ➢ Flexibility in hours of work ➢ Flexibility in short term relief ➢ Opportunity for temporary employees	Increase in Toronto Hydro's operating flexibility, decreased non value added processes, and increase in resource utilization
2001-2003	➢ Leadership Development Program for Crew Leaders ➢ Future leader development program ➢ Redeployment resulting from employee surplus	Ensuring that the futures of the corporate functions are fulfilled and business continues without interruption through the training of future leaders. Internal training of leaders ensures familiarity and continuous execution of business functions.
2003-2006	➢ Apprenticeship program ➢ Eligibility window for retiree benefits extended ➢ Expanded short term relief for Crew Leader to ten days	Customized training on Toronto Hydro's distribution system and harmonized jobs provided for a higher level of work efficiency and reliability. In addition to this extension of retiree benefits assisted in stability and retention of employees. The expanded period for short term relief provided for increase in operating efficiency and improved customer service.

Collective Agreement	Change	Benefits
2009-2013	➢ Job harmonization ➢ 5 year contract ➢ Gain sharing ➢ Reporting to job site	A decrease of 31 additional job classifications with decreased hand-off. Increased job enrichment, satisfaction, and skill. A five-year contract stabilized labour allowing for long term increased capital program.
2014-2018	• 1.75% average wage increase over four years • Elimination of Post Retirement Benefits after age 65 for new Hires • Streamlining of Health & Safety committees • Expanded hours of work to include potential for afternoon schedules • Elimination of barriers to reporting to job site and satellite site • Reduced payments for travel time for overtime and simplifying overtime allocation process	Significant reduction in post-retirement benefits for future hires. Cost containment associated with payments related to work performed outside of regularly scheduled hours. Significant cost savings due to modest wage increase. Expanded ability to relocate employees across geographic boundaries. Improved customer service with ability to work outside regular hours of work.

In addition to all benefits realized in the above table, each collective agreement included the revision of clauses which improved their understanding, administration and execution, thus reducing the potential for disagreements over the interpretation or application of the collective agreements. The most recent round of bargaining resulted in a variety of changes aimed at improving efficiency and productivity, and reducing costs in both the short and long term.

C.2 Reliability Centered Maintenance

Reliability Centered Maintenance ("RCM") refers to Toronto Hydro's deployment of an established framework for the maintenance of assets in Toronto Hydro's distribution system throughout their lifecycle. Prior to the implementation of RCM, Toronto Hydro had no formalized maintenance model. Asset maintenance was either performed on a reactive basis (i.e., following equipment failure or malfunction), or according to the manufacturer's specification or "rule of thumb" inspection cycles. These maintenance programs were not optimal in managing the asset lifecycle costs.

RCM is a comprehensive approach to the lifecycle maintenance of distribution system assets. Initially developed in the airline industry to manage high maintenance costs and high failure rates, RCM has allowed Toronto Hydro to increase its analytical capabilities in determining the optimal level of maintenance expenditures and the appropriate time of intervention for a specific asset class. The RCM framework incorporates a thorough analysis of assets going beyond manufacturer's requirements to evaluate functional failures under Toronto Hydro's operating conditions. The result of these analyses is a consequence of failure which considers safety, cost and reliability. Maintenance programs are subsequently set to mitigate these consequences by establishing recommended optimal asset intervention timelines, as further described in the utility's Preventative and Predictive Maintenance program.[4]

Benefits of RCM include:

- a structured and data driven targeted maintenance program;
- reduced efforts and costs expended on maintenance programs with little resultant value; and
- increased reliability due to the effectiveness of the failure prevention program.

C.3 Geospatially Enabled Asset Registry ("GEAR")

The Transformation phase saw Toronto Hydro implement a new Geographic Information System ("GIS") replacing existing non-standardized systems inherited through amalgamation. The GIS is the fundamental tool used to model Toronto Hydro's civil and electrical distribution system. The model includes electrical single line diagrams with full electrical connectivity, scaled civil drawings, and layers of information integrated and mapped geographically to provide a "Google maps" version of Toronto's electrical and civil system. The GEAR GIS model is the basis for the Distribution Management System ("DMS") and the Outage Management System ("OMS") used in Toronto Hydro's Control Room operations functions. The records stored in GEAR are utilized to design the projects for system renewal, access, and service requirements. Tools within GEAR include queries, search functions, circuit trace, and layer management, among others. These tools are used extensively for planning, construction, cable locating, and troubleshooting purposes. An example of such functionality is a search of major distribution assets affected in localized adverse weather impacted areas. The resulting information allows Toronto Hydro's engineers and response functions to determine the extent of damage prior to arriving on site. Accuracy and currency of the GIS system is a key tool used to ensure the safety of crews, the public, and contractors.

As a result of amalgamation, Toronto Hydro inherited six different GIS or analog platforms, each of which involved its own mapping and drafting conventions. Opportunities to gain efficiencies from consolidating six differing systems included:

- reduced time for the engineers to search, interpret, plan, and prepare construction drawings;

[4] Exhibit 4A, Tab 2, Schedule 1.

- more efficient control room processes and training with common operating procedures, symbology, nomenclature, and one Distribution Management System built on one GIS model;
- reductions in system support requirements and costs;
- standardized symbols, layout, data, and rules leading to reduced time and effort to create, maintain, and utilize; and
- elimination of paper based processes.

Toronto Hydro estimates the yearly savings to be in the range of approximately $1 million, stemming from the reorganization of records functions as well as from the production of standardized map products. Savings in system maintenance, IT support and other indirect benefits are not quantified, but were byproducts of the GEAR implementation. Additional benefits include the expansion and modularity capabilities of the new GIS platform. Expansion allowed for improved integration with the central asset and corporate database Ellipse as well as the customer information system. Modularity refers to the ability to add functional modules such as additional databases and search interfaces which will allow for a greater level of flexibility as Toronto Hydro's operations evolve. This includes, for example, the integration of field data such as health indices to the geographically oriented asset records to facilitate more targeted capital investments.

C.4 Outage and Distribution Management Systems

An Outage Management System ("OMS") tracks and documents system outages in an automated fashion. The Distribution Management System ("DMS") provides visibility and automated control of the distribution system. The OMS/DMS initiative refers to the development and expansion of two centralized systems that encompassed this functionality.

Prior to the implementation of these systems, Toronto Hydro's outage management and distribution management systems and the supporting processes (OMS/DMS) were decentralized, non-standardized and in some cases completely manual and verbal. The state of OMS did not provide for visibility of outage information, nor the basic level of automation required for a distribution system of Toronto Hydro's complexity. After amalgamation, the control room was operated using a number of separate DMS systems, significantly complicating the coordinated management of the distribution system. The development of the two fundamental operational systems had a positive impact on the productivity, safety and responsiveness of Toronto Hydro's daily operations.

The project had a number of operational efficiency and effectiveness benefits:

- OMS
  - Improved customer satisfaction by providing more accurate information about the status of a service request or trouble call.

- Gained operational efficiencies and increased effectiveness of response to multiple power outages and safety related calls that occur during storms.

- Reduced operating costs by better monitoring and optimizing the allocation of trouble calls and service work assignments.

- Reduced average outage times (SAIDI) through better outage analytics and by leveraging centralized view of the grid system and work status.

- Improved asset management analysis and decisions by improving the availability of information on customer impacts of equipment failures.

- DMS
  - Facilitated cross training of Power System Controllers on all legacy electrical systems to provide greater operating flexibility and utilization of resources.

  - Standardized control room operations, support harmonization of work practices in the field, and support customer care activities to improve the flow of information to update Customers on outage information.

  - Enabled system data to be shared with the whole organization, creating better planning, response and management.

D Continuous Improvement 2007-Present

As noted in the previous section, the beginning of the Continuous Improvement phase coincided with a significant ramp-up of Toronto Hydro's capital work program. Between 2006 and 2007 Toronto Hydro's annual capital additions increased by approximately 53%. To enable the capital program of this magnitude, Toronto Hydro leveraged the productivity improvements accomplished in the earlier phases, such as advances in asset management tools and procedures, improved power system control, grid response, and dispatch functionality, and harmonization of its skilled trades designations. At the same time, the utility took further steps to increase the efficiency and cost effectiveness of its power system planning and management practices through introduction of tools such as the Feeder Investment Model ("FIM"), rationalization of its warehousing function, and implementation of a reliability-centered vegetation management framework.

Faced with rapidly growing capital renewal needs, Toronto Hydro also increased its use of outsourcing activities in the area of engineering and construction. The increased use of external construction resources enabled Toronto Hydro to strategically allocate its capital work, directing the experienced internal crews to handle the more complex projects in the downtown core, while leveraging the cost-effective contractor labour for the routine work in the areas surrounding downtown known as the "horseshoe." While it leaned more heavily on external resources, Toronto Hydro also took steps to maximize the value of outputs from its internal labour force. Chief among these productivity-

enabling steps were injury prevention, attendance management, and supervisory function enhancement programs.

Overall, the projects completed to date during the Continuous Improvement phase have resulted in the estimated quantifiable benefits NPV of approximately $214 million (Figure 7). Figure 6 below provides an overview of these initiatives.

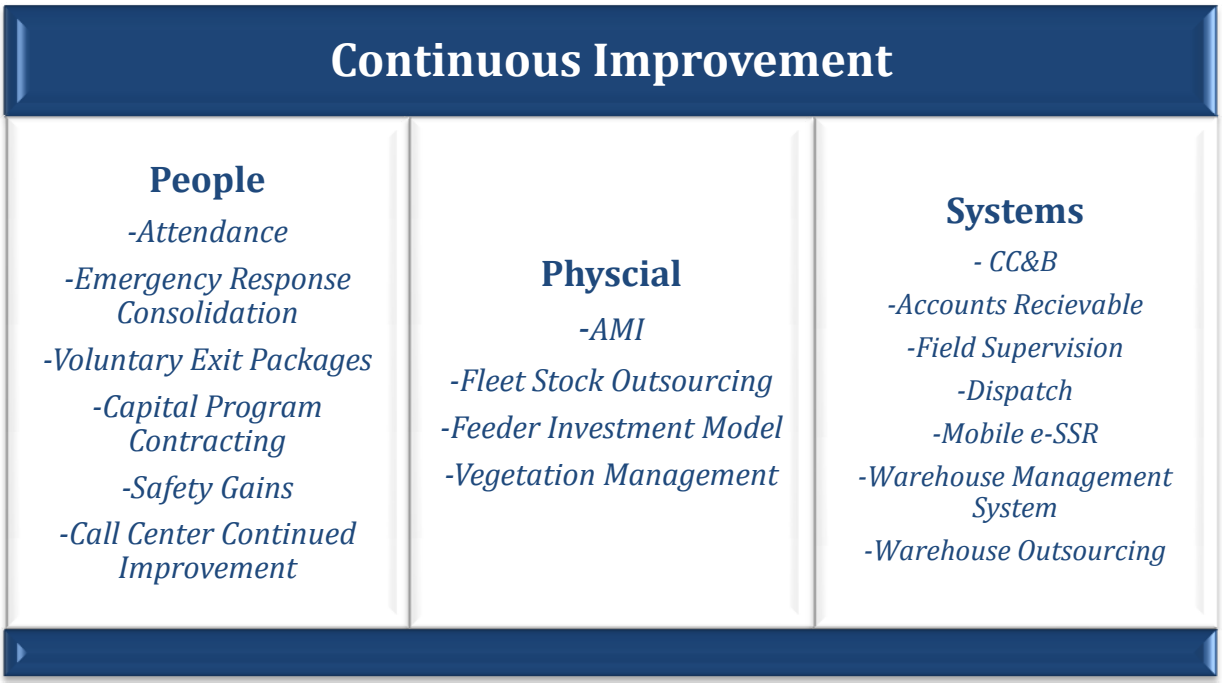


Figure 6: Continuous Improvement Productivity Initiatives

Initiative	Basis of Estimated Savings	Estimated NPV of Benefits to date
Attendance	Loss Time savings	$9 million
Emergency Response	Salary savings	$165 million
Fleet Stock Outsourcing	Salary savings	$0.4 million
Vegetation Management	Cost per km savings	$5.7 million
CC&B	Avoided upgrade cost	$3.6 million
Accounts Receivable	Salary savings	$4 million
Warehouse Management System	Salary savings	$0.5 million
Warehouse Outsourcing	Salary savings	$2 million
Safety Gains	Cost savings	$24 million
TOTAL QUANTIFIED BENEFITS		**$214 million**

Figure 7: Quantified Estimates of NPV of Productivity Initiatives – Continuous Improvement Stage

D.1 Attendance

Having put in place the foundations of a comprehensive and sustainable staffing strategy over the previous two phases, Toronto Hydro embarked on initiatives aimed at increasing the value of the employees' output, including the attendance management. Lost time due to employee absenteeism amounts to loss of productive time and value added work – this is especially true for capital and reactive work functions during heightened construction periods and storm responses. For example, in 2012 absenteeism cost the Canadian economy an estimated $16.6 billion according to a Conference Board of Canada report.[5]

A proactive campaign for higher attendance rates was launched by Toronto Hydro in 2007 and has achieved significant improvements, as evidenced by the figure below, which compares Toronto Hydro absentee rates with other public and private sector entities. As a unionized workplace Toronto Hydro takes pride in its achievements in its absenteeism metric and its associated indirect productivity impacts showcased in the Figure 8.

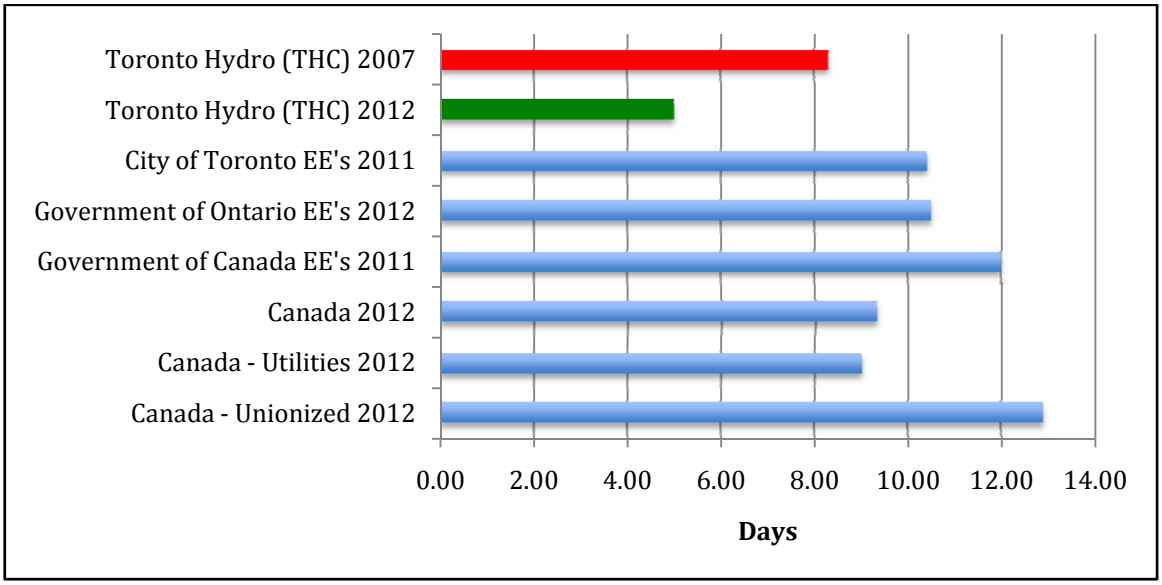


Figure 8: Absenteeism Rate Comparison

D.2 Emergency Response Staff Consolidation and Utilization

Emergency response ("ER") staff include crews who operate on a regular 7/24 365 day rotating shift basis and respond to a variety of calls including emergency calls such as, police, fire, and ambulance ("PFA") and power outage calls. Since amalgamation in 1999,

[5] Nicole Stewart, *Missing in Action: Absenteeism Trends in Canadian Organizations*, (Ottawa: Conference Board of Canada, 2013), online: Sun Life Financial <http://www.sunlife.ca/static/canada/Sponsor/About%20Group%20Benefits/Focus%20Update/2013/Special%20Edition%20-%20Sept.%2023%20-%20%20Sun%20Life%20co-sponsors%20major%20new%20Conference%20Board%20of/MissinginAction_SUN%20LIFE_EN.pdf>

Toronto Hydro has reduced the number of resources that provide ER services by more than 50%, while delivering improved service levels (SAIDI) and achieving OEB Service Quality targets i.e., emergency response target.

In addition to reducing the ER staff complement, Toronto Hydro has worked to increase the utilization (productivity) of the ER personnel during the time between trouble calls. While in the past the ER crews would exclusively respond to emergency and/or power outage calls, starting in 2012 the crews began performing additional functions during times of lower call volume including repair, maintenance, station switching, and feeder patrols.

D.3 Voluntary Exit Program

In early 2012, Toronto Hydro embarked on a third major corporate restructuring by implementing another Voluntary Exit Program (VEP) and proceeding with involuntary downsizing of non-union positions. In total, Toronto Hydro reduced its staff by 192 personnel.

Toronto Hydro offered the VEP program to non-trades and non-technical employees, of which 144 accepted a package. These packages were not made available to non-union staff, where staff reductions were instead achieved via non-voluntary downsizing (a total of 48 personnel) based on the evaluation of the organization's needs.

D.4 Capital Program Contracting

Starting in 2010, Toronto Hydro's distribution system needs led to a projected doubling of the typical yearly capital construction program. To execute this expanded capital program, Toronto Hydro required additional labour resources. Due to resourcing constraints (including time and skill sets), Toronto Hydro engaged outside contractors in order to outsource projects that could be performed by externally. Programs such as design/build construction services were issued for bidding through a request for proposal process. Strategic outsourcing of capital program support work enabled Toronto Hydro to focus on core distribution system needs led to a number of benefits being realized by Toronto Hydro, including:

- significant avoided costs of hiring full-time staff – including salary and burdens;
- a market based cost benchmark of accomplishing capital program work;
- transferring responsibility for execution to specialized third party contracting firms;
- increased flexibility for future capital program resource requirements; and
- allowing experienced internal crews to focus on complex work which exceeds the external contractors' skills and experience.

D.5 Advanced Metering Infrastructure

Savings were also enabled through the installation and activation of Advanced Metering Infrastructure ("AMI"). While AMI was driven by the provincial Smart Meter initiative to enable Time-of-Use ("TOU") billing, a number of customer tools use the data available from the AMI. These tools were specifically developed to allow Toronto Hydro customers to manage their electricity consumption. The visibility of the distribution system enabled by AMI is the cornerstone for current and future productivity and functionality gains.

AMI has allowed for automated meter reading, eliminating costs involved with manual meter reads and improving billing accuracy. Billing accuracy has improved as over 98% of meters are read automatically, whereas, in the past up to 10% of meters could not be manually read and were thus estimated.

Toronto Hydro has realized implicit savings when addressing customer outages due to an enhanced information capability inherent with smart meters. For example, Toronto Hydro is capable of reducing truck rolls for a number of customer-related issues. Calls related to customer outages can be immediately investigated as a true outage at the meter, or as an issue on the customer side such as a blown fuse. Understanding whether a meter is receiving power prevents unnecessary truck rolls which cost an average of 120$/hr. Safety risks are also eliminated, as Toronto Hydro's crews are not sent to the field in contact with potentially unsafe conditions.

Another benefit of AMI implementation is management of photovoltaic and wind renewable generating sources. With the increasing penetration of renewable generation into Toronto Hydro's distribution system, there is a need to constantly monitor thermal and capacity limits. All renewable sources are metered via Toronto Hydro's AMI infrastructure and are reported on daily for purposes of asset management and future connections. In the absence of the AMI Toronto Hydro would have had to incur costs of acquiring resources to manage the visibility of renewable generation.

The AMI systems have also allowed Toronto Hydro to integrate transformer smart meter data into the asset management process by providing actual data on asset integrity. For example, a transformer that has been rated and installed for a specific residential area previously could be operating under unknown conditions and would be replaced based on age rather than remaining actual life. In addition, transformer smart meters provide loading information that has been used to identify overloaded transformers and targeting them for changeovers before any damage to the unit occurs. Transformer smart meter data also provides loading information used to identify power diversions to facilitate revenue protection and reduce the instances of unauthorized use of power.

As an early adopter of AMI, Toronto Hydro has leveraged the potential benefits through the functionality available through these infrastructure upgrades. Expansion of initiatives focused on cost savings is an ongoing initiative, as many available functions are in the process of being integrated to enhance outage management and remote

disconnect capabilities. Data obtained through the AMI system is also available to assist customers and the utility in maximizing the use of conservation initiatives.

D.6 Fleet Stock Outsourcing

In 2012 Toronto Hydro outsourced the ownership and management of its fleet parts to a third party supplier. Prior to outsourcing, Toronto Hydro staff performed the warehousing duties of standard and heavy duty auto parts including oil, tires, breaks, etc. A dedicated parts desk staffed by Toronto Hydro stock room clerks performed the distribution function prior to outsourcing.

Outsourcing of this function resulted in the following benefits:

- elimination of risks assumed through forecasting and purchasing of parts;
- reduction in labour costs (management, administrative and parts staff);
- improved logistics of parts delivery; and
- elimination of inventory as the third party consigns the inventory.

D.7 Feeder Investment Model ("FIM")

Toronto Hydro's development of a distribution system investment model was a crucial step in efficiently planning a growing number of projects undertaken by the utility. The Feeder Investment Model ("FIM") is a risk-based analytical tool designed to identify the economically optimal replacement time for aging assets. At the highest level, the model works by balancing the cost associated with the increasing risk of failure as assets age and their condition degrades ("risk cost"), against the benefit of delaying the capital spending required for replacement by extending service life as long as possible. The "risk cost" includes the costs due to customer interruptions, emergency repairs, and asset replacements.

Prior to the implementation of the FIM, Toronto Hydro's planning engineers were required to expend extensive efforts in collecting and analyzing information for future grid investment projects. In order to justify a capital project an engineer is required to determine assets and areas requiring refurbishment/rebuild. This was accomplished through various means including multiple asset queries, reliability analysis, manual cross-referencing of maps etc. In addition to these efforts the manual project creation could not enable the consideration of certain dimensions of customer impacts.

To address the above limitations and enhance the efficiency and analytical rigor to the asset management process, Toronto Hydro proceeded with the development and implementation of the FIM, which consolidated many planning activities into one.

The benefits underlying the use of the FIM include:

- reduced time and effort expended by planning engineers to justify capital projects;

- a more efficient planning process resulting in greater quality of targeted investment planning;
- a means for Toronto Hydro to quantify the benefits of investment programs and develop a risk-based business case evaluation;
- a quantification of the impact to customers due to a power interruption; and
- decreased demands on records services for data queries through FIM raw data harmonization.

D.8 Vegetation Management Model

Toronto Hydro's distribution system includes 927 overhead feeders made up of approximately 4,200 circuit kilometres of primary distribution line. These assets require regular vegetation management given their close proximity to some 10 million trees populating Toronto streets and parks. The trees adjacent to the utility's feeders are trimmed periodically to prevent trees from growing into or close to distribution lines and causing power interruptions and equipment damage.

Prior to 2008, Toronto Hydro used a station-based tree trimming approach where feeders out of a particular station were trimmed together on a fixed three-year cycle. In 2008, the utility implemented a new tree trimming model, which shifted the scheduling approach from time-based to risk-based. Instead of being trimmed on a set three-year cycle, feeders were scheduled for trimming on variable two to five-year cycles with higher risk feeders being trimmed more frequently than lower risk feeders. The exact scheduling of feeders is determined by the model, which examines system and customer reliability risk in relation to trimming costs for each feeder. The result is a tree trimming program that maximizes reliability for a given input (trimming) cost.

D.9 Customer Care & Billing ("CC&B")

In 2008 Toronto Hydro began the work to replace its existing customer information system ("CIS") "Banner" (which was implemented following amalgamation) with a more modern system.

There were three main drivers for the purchase of a new CIS system:

- The CIS is a mission critical system and a key component of the "meter-to-cash" process. BANNER was eight years old, beyond the technical support warranty, reaching end of life, and approaching performance limitations. With rapid changes in both the electricity and customer service landscape expected to continue, it was determined that a system that would support the evolving future needs of the utility was required.

- Newer CIS platforms offered better ability for intergration with emerging technology systems. For example, easier integration with web platforms would enable the expansion of online self-service offerings and the related CIS transactional updates, addressing both customer experience and cost containment goals.

- An opportunity existed to share development and implementation costs, as well as costs for future enhancements by adopting a system that other large LDCs were moving towards. Toronto Hydro developed its system as a shared effort with Enersource. As other LDCs undergo conversion of their CC&B systems, opportunities for future cost sharing may present themselves. A common platform also minimizes LDC specific exposure to CIS limitations.

On July 7, 2011 Toronto Hydro successfully "went live" with a new CC&B application – a commercial software product of Oracle Corporation. The project was the largest and most complex ever undertaken by Toronto Hydro and included the integration of 34 different systems or interfaces. A large degree of customization of the system was necessary to accommodate Toronto Hydro's specific business requirements as well as certain complexities in the Ontario Market requirements.

By implementing CC&B Toronto Hydro realized a number of high-level tangible benefits, including:

- extensive configuration flexibility to help streamline processes and manage the evolving regulatory and legislative environment;
- improved customer management capabilities through a more comprehensive view of customer, meter, and premise information;
- system and business process support and sharing with other LDC's on the same platform;
- improved working capital through reduction of time between billing period end date and bill issuance date;
- cost containment through a reduction in manual processes and integration with related systems; and
- extensive ongoing software support and technology risk mitigation by installing a system developed by a solid and established technology provider.

Upon successful implementation CC&B, Toronto Hydro was able to offer its customers more timely, cost efficient services, with improved internal and external customer support from an integrated suite of related technologies that also include the Outage Management, Distribution Management, and Mobile Workforce Management systems.

D.10 Accounts Receivable

Toronto Hydro has achieved significant strides in productivity through the redesign of its accounts receivable business model. Outsourcing selective lower complexity functions related to meter data management, billing, collections and payment processing functions reduced overall costs, thereby allowing for the absorption of increasing labour needs brought about by the evolution to smart meters, a significant increase in meter data to support time-of-use rate structures, new billing formats such as Feed-in-Tarrif ("FIT") and MicroFIT, an increasing customer base, and the evolving regulatory framework.

Toronto Hydro was a very early adopter of ebills, offering both an internally built system as well as Canada Post's ebill solution in 2001. Toronto Hydro has enjoyed the productivity gains that this billing channel provides along with the opportunity to provide customers with choice. In more recent years, Toronto Hydro has refined and improved these ebilling offerings through such initiatives as the deployment of an enhanced Customer Identity Access Management system to better protect customer data and manage risk, increased system stability, and enhanced usability through more informative customer notifications, prominent website placement, and merging of the ebills platform under MyTorontoHydro (self-serve web portal). These initiatives have combined to improve the customer experience and ebill adoption rates, thus offsetting increasing postage and printing costs.

Toronto Hydro optimizes cash flow and minimizes bad debt through offering a wide variety of payment channels. Since the late 1990's, the pre-authorized payment plan, which allows for automatic payments from customer bank accounts, has proven to be both efficient and effective. In recent years, Toronto Hydro has simplified the process for customers by introducing an online enrollment feature, and has improved productivity through both this avoided call tactic and automating updates to the CIS to reduce manual work.

During the development phase of planning for the new CIS came the opportunity for a thorough review of business processes, with several enhancements and the elimination of certain manual processes introduced at the time the system was converted. Since then, Toronto Hydro continues to engage in process redesign activities, selecting key processes for review each year to identify further opportunities to automate, streamline, leverage new technology features, or improve the customer experience. One example is the Collections auto-dialer script which was revised to re-direct customers to the Interactive Voice Response ("IVR") for account balance and last payment information, reducing calls to Customer Service staff. Another example was an automated solution for billing exception handling that allowed for staffing reallocation to other tasks. These continuous improvement efforts have resulted in productivity gains, helping to offset increasing costs and labour requirements.

D.11 Field Supervision

Toronto Hydro's field crew supervisors are required to perform many administrative tasks to ensure that the field employees they supervise are provided with the tools and project management support they require. The supervisions tasks thus necessitate substantial desk time and limited the amount of time the supervisors were present on-site with crews. While Toronto Hydro's supervisory roles were well established, the utility identified a need to increase direct field supervision to improve program execution and productivity.

Toronto Hydro has completed an analysis of crew supervisor tasks, which triggered a new approach to increasing field supervision. Toronto Hydro also has established new tracking mechanisms to ensure that supervisors are in the field more, which helps crews accomplish work in a timely and efficient manner. For example Toronto Hydro

introduced mobile technology hardware and software which allows supervisors to perform many of their administrative tasks outside of the office. The increased supervision also aids in rapidly resolving crew issues that emerge on the job site. Through increased supervision in the field Toronto Hydro has improved the efficiency in capital work execution thus facilitating the increase in the work program volumes over the recent years.

D.12 Dispatch and Nightly Dispatch

In the past all customer inquiries, whether billing or outage related, would be routed to the customer service call center. When call center representatives received inquiries related to power outages, they would log events in the OMS and rout them to dispatch attendants who would then dispatch crews to the trouble area. When call center representatives received high numbers of power outage calls, these calls were subject to lengthy waits before the OMS events were referred to dispatch despite their receiving a higher priority at the call center. Given this suboptimal outcome of the legacy process arrangement, Toronto Hydro targeted call center outage calls as an opportunity for process improvement.

Toronto Hydro removed power outage-related calls from the call centers and routed them directly to dispatch attendants who are available 24 hours a day.[7]

Benefits of the initiative include:

- the elimination of many lengthy tasks for call center employees through the centralization of power outage calls at dispatch thus reducing redundancy in the process;
- quicker outage response times through elimination of additional steps and focusing efforts with dispatchers who are most familiar with crews and outage management;
- reducing internal labour costs through the centralization of power outage calls at dispatch; and
- improved customer response times.

D.13 Mobile eSRR

The Service Request Report ("SRR") form is used extensively by response crews to document the services they perform. Fields on the form include date, time, response crew, notes, issues, weather conditions etc. Previously, this information was completed manually by crew leaders and subsequently copies were distributed to departments and stored. The process of manual entry and paper record distribution created a number of issues including difficulty in deciphering information written on the form and the need to re-enter data electronically to keep the outage management system current. Paper records were sometimes lost, there was latency in the process of manual filing, and the

[7] Exhibit 4A, Tab 2, Schedule 3.

effort required by other departments, such as asset management, to analyze outage reports was substantial.

In 2012 Toronto Hydro instituted electronic SRR (eSRR) – an electronic mobile reporting system - in response to these issues and in recognition of opportunities for increasing efficiency of crews and subsequent record analysis. The eSSR form is completed and communicated via mobile technology delivering real-time information. The information produced is automatically updated and recorded in Toronto Hydro's OMS system. In addition to improving the recording of outage response activities, the elimination of manual efforts and enablement of accurate real-time information increased efficiency in both reactive and planning work functions.

Specific benefits that followed from the deployment include:

- elimination of data quality issues due to paper-based manual processes in the field and back-office manual re-entry of data;
- provides crew with all customer details input by Dispatcher pertaining to nature of issue that previously had to be provided verbally;
- enables real time availability on outage response activities, which removes risk and uncertainty in planning for and resourcing subsequent reactive work;
- increases dispatch and grid response utilization and efficiency through greater visibility of event status and dispatching the work electronically;
- provides data for short interval control of productivity performance for the dispatch and emergency response functions; and
- allows for time efficient queries of historical information with all relevant information to further analyze the processes as part of continuous improvement efforts.

D.14 Warehouse Management System

Toronto Hydro's Warehouse Management System ("WMS") initiative refers to the replacement of warehouse management through Ellipse, which had limited functionality in this area, with a dedicated WMS to increase capabilities such as barcoding of stock. Warehouse management activities and requirements include activities such as the tracking of assets, processing of orders and replenishment of inventory. Improving the efficiency of warehousing activities required automation throughout Toronto Hydro's warehouses as all processes previously were paper based.

Toronto Hydro undertook the deployment of a new automated WMS in order to increase productivity through inventory and labour cost reductions and through improvements to requisition lead-time (the time it takes between request and delivery of warehouse stock). The new system utilizes barcoding and scanning technology, and includes vendor and third party integration/management.

Additional benefits of the WMS included:

- improved crew service – get the right order the first time;

- improved control and visibility of tool stocks and demand;
- task duration measurement accuracy; and
- increased warehouse movement visibility.

D.15 Warehouse Outsourcing

The warehouse outsourcing initiative refers to the considerations of ownership and operation of a new warehouse for much needed increased capacity. With the enabled WMS described in the previous section, Toronto Hydro was capable of increasing its business intelligence through analytics. Warehouse outsourcing and its associated benefits were in large a result of a functional WMS.

Three warehouses were owned and operated by Toronto Hydro at Milner, Monogram, and Commissioners. Warehouses contained the inventory – such as transformers, cable, ducts and associated hardware - required for completion of capital work and for emergency response. Suppliers delivered materials to Toronto Hydro's Commissioners warehouse from where contractors, workcrews, and the other two warehouses would obtain materials need for their work programs.

As the three existing warehouses were beyond their capacity, Toronto Hydro evaluated options to meet the anticipated demands. The status quo approach would have been to purchase or lease new facilities to be operated by Toronto Hydro. This option was neither scalable nor the most cost effective. Toronto Hydro determined that employment of third party logistics ("3PL") support was the best option. This approach offered improved logistics to all Toronto Hydro service locations and contractors. The new routing model for Toronto Hydro's warehousing logistics operations is shown in the figure below.

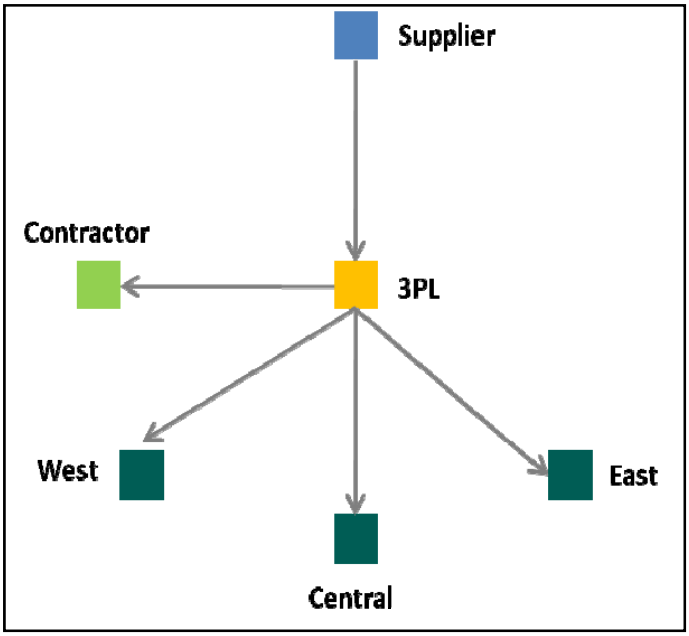


Figure 9: 4 Warehouse model of operation

Benefits from the implementation of this model include:

- capacity to deliver on 2013 capital plan with strong service levels;
- scalability for any future changes in warehouse workload, and flexibility to shrink internal TH warehouse space as required;
- payback of initial investment by early 2017; and
- platform for further service expansions and cost reductions through a strategic partnership with selected vendor

D.16 Safety Gains

Toronto Hydro has expended extensive efforts in Environmental, Health, and Safety ("EHS") initiatives which both decreased costs and improved employee health and safety. The following subsections describe the savings realized through EHS initiative.

Environment, Health, and Safety Management System ("EHSMS")

Toronto Hydro has a fully integrated Environment, Health and Safety Management System ("EHSMS") and is certified as meeting the requirements of ISO 14001 and OHSAS 18001 international standards. Toronto Hydro is the only electrical utility of its size to have accomplished this. The benefits of this approach are that only one management system is needed in place of two parallel systems. Redundancies and duplication are eliminated, as are layers of management. This has allowed Toronto Hydro to have a very efficient EHS department which is less than half the size of its peers when normalized for total number of employees in the utility.

Reduction in Occupational Injury

Occupational injury costs – which reduce overall productivity - have been reduced significantly since 2007 as a result of EHS departmental initiatives to increase workplace safety. For example, all environmental and occupational health and safety incidents are investigated, including near misses, providing valuable information used to prevent future loss-time injuries. Toronto Hydro's safety performance since 2007 has moved well below the Workplace Safety Insurance Boards ("WSIB") industry "norm".

Manual Data Entry Automation

The Construction Regulations under the *Occupational Health and Safety Act*[8] require supervisors to conduct regular inspections. In 2010 Toronto Hydro adopted software that automated leadership safety inspections thereby removing the need for 3 clerical data entry positions.

Material Safety Data Sheet ("MSDS") Management

Toronto Hydro has over 1500 MSDS's that must be updated every three years (about 500 per year) to meet legislative requirements. Toronto Hydro automated the previously manual MSDS management process using software and outsourced service. All MSDS's are now available to all employees through the utility intranet, at a significantly reduced cost and on a more timely basis.

[8] ONTARIO REGULATION 213/91 made under the *Occupational Health and Safety Act*, R.S.O. 1990, CHAPTER O.1

Contractor Prequalification Outsourcing

In order to protect Toronto Hydro from risks presented by contractors, the contractors are first evaluated or "pre-qualified". This was historically done in-house but only for a small portion (<10%) of contractors hired by Toronto Hydro due to resource constraints. Contractor pre-qualification was outsourced starting 2011 and nearly all of Toronto Hydro's contractors are evaluated for potential risk before hiring. The outsourcing, at an annual cost of approximately $40,000, is estimated to have saved three to four Full-Time Equivalent (FTE) consultants, at a cost of approximately $500,000 per year.

Designated Substance Management

The presence of designated substances (i.e., lead and asbestos) at Toronto Hydro facilities is a legacy issue that puts additional legislated demands on Toronto Hydro. The requirements include air sampling, medical/biological monitoring, specialized HEPA vacuums, uniform laundry program, specialized training, specialized occupational hygiene assessments, provision of respirators, regular respirator fit testing, and regular reporting. As much as possible, these services are provided internally by an occupational hygiene associate for an estimated cost savings of approximately $100,000 annually.

Automation of EHS Administrative Tasks

In 2010 software known as Intelex was launched. This software has automated many processes and tasks necessary for good EHS management. This includes incident reporting and investigation, controlled document administration, audit findings management, corrective action tracking and emergency response evaluation. The process is paperless and the filing is automated, as are follow-ups of any open action items from inspections, audits, investigations, emergencies, and controlled document changes. Given the volume of the documentation it would take two to three full-time clerks to achieve the same level of performance.

Continuous Environmental Scanning

In order to ensure compliance with legislated requirements it is critical to have a process in place that constantly scans for new and amended legislation. Toronto Hydro has outsourced this process at a cost of approximately $2,000/yr, saving approximately $24,000 annually if done in-house.

WSIB Claim Automation

Toronto Hydro uses software to manage WSIB claims. This eliminates the need for paper files and the associated costs. It also facilitates effective claims management and has been a key factor in Toronto Hydro's ability to achieve many favorable decisions from WSIB, limiting WSIB costs and maximizing recoveries.

D.17 Call Center Continuous Improvement

Due to the on-going changes in the government and regulatory policy affecting Ontario's electricity market, including new rate structures, technologies and service offerings, customer enquiries have become more complicated. As a result, an evolution of the

outsourced business model and tailoring of services based on market segment needs has been required. In an optimal arrangement, complex enquiries often related to commercial customer accounts would be handled by internal staff, which are typically more tenured and knowledgeable than contractors, and therefore best poised to resolve these customer enquiries most efficiently. Toronto Hydro implemented this business model in 2012, by outsourcing high-volume residential calls, allowing the in-house staff to focus on commercial calls. At present, over 80% of Toronto Hydro customer calls are outsourced to a third-party provider. Service levels continue to exceed the OEB standards and over time, with the expansion of the call centre outsourcing framework, Toronto Hydro's average cost per call has decreased.

The call center has continually focused on improving customer experience and performance. Some of these improvement activities are listed below:

- Launched an unplanned power outage map on Toronto Hydro's website to provide better information, service and convenience for customers, and the ability to report an outage on-line.

- New website features introduced for residential and small commercial customers paying TOU rates; view hourly, daily, or monthly consumption patterns, predict bill feature,, cost/consumption alerts, and energy calculator providing annual energy report and cost-saving recommendations. Also launched a mobile version to provide similar functionality for mobile devices.

- Call Back feature provided to residential and commercial customers. This feature allows customers the option of leaving a telephone number to have their call returned, instead of waiting in the queue.

- My TorontoHydro – a residential customer self-service web portal launched in August 2012 to simplify the most frequent transactions and automate a significant amount of manual work. Processes such as moving, signing up for payment methods, and accessing and downloading account information, can be performed on-line, 24/7. Customer Information System updates take place automatically, without manual intervention.

- Launched a key accounts program to provide large industrial customers with a single point of contact to meet their unique business requirements, including after-hours outage support.

- First Call Resolution ("FCR") launched to drive a more positive and results oriented customer experience by fully addressing the customer's need the first time they call.

- Launched Social Media sites to enhance communication channel options.

- Automated IVR customer satisfaction surveys implemented in 2013 to gauge customer satisfaction and identify improvement opportunities.

These activities were all undertaken to enhance the customer experience, while at the same time Toronto Hydro was reducing its in-house call center staffing levels and meeting annual call levels of between 530,000-630,000 per year.

E Summary

Since amalgamation, Toronto Hydro's productivity has been influenced by the merging of the six Toronto utilities and by the dynamic business and regulatory environment in which it operates. Toronto Hydro has made gains in staffing levels, in plant and management process, and in IT systems. At the same time, Toronto Hydro has made gains in the information and services it has provided to its customers.

As demonstrated above, all areas of the utility can list achievements. Some productivity gains are readily quantifiable, while others are more difficult to put values to. Overall, Toronto Hydro estimates that savings from the various initiatives are valued at a minimum of more than $2 billion over the period 1999-present. For a comprehensive empirical evaluation of the reasonableness of Toronto Hydro's historical and forecasted total costs, refer to the Total Cost Econometric Benchmarking Study performed by Power Systems Engineering Inc (the "PSE Report") at Exhibit 1B, Tab 2, Schedule 5, Appendix B.

Power System Engineering, Inc.

Full-service consultants

Econometric Benchmarking of Toronto Hydro's Historical and Projected Total Cost and Reliability Levels

Prepared at the Request of:

Toronto Hydro-Electric System Limited

TORONTO HYDRO

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This report is an update to the original PSE report dated July 31, 2014. This report contains results which incorporate updated cost and customer forecasts provided to PSE from Toronto Hydro.

1 Executive Summary

On October 18, 2012 the Ontario Energy Board ("the Board") released a report entitled "Renewed Regulatory Framework for Electricity Distributors: A Performance-Based Approach" ("RRF"). In the RRF, three rate-setting methods were discussed. One of those methods was labeled "custom incentive regulation," or "Custom IR."

On page 18 of the RRF, the Board states that "In the Custom IR method, rates are set based on a five year forecast of a distributor's revenue requirement and sales volumes." The RRF also lays out the use of benchmarking as a key element used to inform the Board of the reasonableness of the revenue forecasts.[1]

In a November 21, 2013 Report of the Board, titled "Rate Setting Parameters and Benchmarking under the Renewed Regulatory Framework for Ontario's Electricity Distributors,"[2] ("November 2013 Board Report") the Board clearly indicates its preference for econometric benchmarking over peer group benchmarking. Furthermore, the Board indicates its preference for total cost benchmarking over partial cost benchmarking.[3]

Power System Engineering, Inc. was asked by Toronto Hydro to conduct a benchmarking study of Toronto Hydro's past and projected total cost and reliability performance in reference to the utility's 2015-2019 Custom IR application. Toronto Hydro asked PSE to investigate the possibility of expanding the scope of utility observations in the study beyond Ontario, in order to assess the potential effect of certain business conditions experienced by Toronto Hydro.

1.1 Overview of PSE's Benchmarking Process

In accordance with the RRF and the November 2013 Board Report, Power System Engineering, Inc. ("PSE") conducted econometric total cost benchmarking of Toronto Hydro-Electric System Limited ("Toronto Hydro"). This benchmarking was done as part of Toronto Hydro's Custom IR proposal. In its 2015 Custom IR proposal, Toronto Hydro estimates its projected costs from 2015 to 2019, and its projected reliability metrics from 2015 to 2019. The purpose of PSE's benchmarking analysis is to evaluate the reasonableness of Toronto Hydro's historical and projected total cost amounts and system reliability metrics. This is done by comparing Toronto Hydro's actual or projected values with the benchmarking model's predicted values.[4]

[1] Found in "Table 1: Rate-Setting Overview – Elements of Three Methods," on page 13 of the RRF.

[2] Case EB-2010-0379.

[3] See page 19 of the November 2013 Board Report.

[4] In this paper we will use "forecasted" or "projected" costs and reliability to refer to Toronto Hydro's estimates of those values in the future, and "predicted" or "expected" or "benchmark" costs and reliability to refer to the

The benchmarking analysis uses historical cost and reliability data from a dataset comprised of multiple utilities to create a model; this model relates cost and reliability to certain variables. The model is then used to predict Toronto Hydro's "expected" (benchmarked) cost and reliability. In past stretch factor research, the Board has used an Ontario-only dataset to create the econometric model. In the present report, PSE augmented the Board's Ontario benchmarking dataset with data from U.S. investor-owned utilities. Thus the general approach of our benchmarking analysis is as follows:

1. PSE assembled the historical costs of all utilities in the dataset, along with the variables that affect cost, such as customer levels, weather, wage levels, density, etc.
2. Using the historical data, PSE estimated an econometric model that expresses the relationship between the variables and cost.
3. For each utility in the sample, we can then produce "benchmark" values. In Toronto Hydro's case, the benchmarks represent the costs we would expect for an average-performing utility with the number of customers, weather, wage levels, density, percent undergrounding, etc. faced by Toronto Hydro.
4. We then compare the costs that are expected (predicted) for Toronto Hydro by the model to Toronto Hydro's historical and projected costs, which allows us to: (1) evaluate the historical performance, and (2) determine whether forecasted costs are reasonable.

We used a similar process to analyze Toronto Hydro's past and future reliability metrics. The general strategy is the same whether using a U.S.-only dataset, or a combined Ontario/U.S. dataset.

1.2 The Need for a Combined U.S./Ontario Dataset

In the November 2013 Board Report, the Board recognized that certain distributors may have "extenuating circumstances" that dictate different treatments.[5] The summary of why different treatment is needed in the present case is that the unique size and urban characteristics of Toronto Hydro's service territory make it an outlier among Ontario distributors. For a suitable benchmarking analysis, using a dataset that includes U.S. utilities is necessary. A brief summary of Toronto Hydro's outlier status appears in this section; further discussion on why PSE believes Toronto Hydro is a candidate for a different treatment in regards to its benchmarking evaluation and stretch factor assignment is found in Section 6.

To see why Toronto Hydro is an outlier, consider that the number of customers served is generally recognized as the leading driver of cost for electric distribution utilities. In terms of customers served, Toronto Hydro is practically without peers in the Ontario industry. Perhaps Hydro One Networks could be considered a peer in terms of sheer number of customers served, yet it has operating circumstances vastly different than those found in the Toronto area. The next

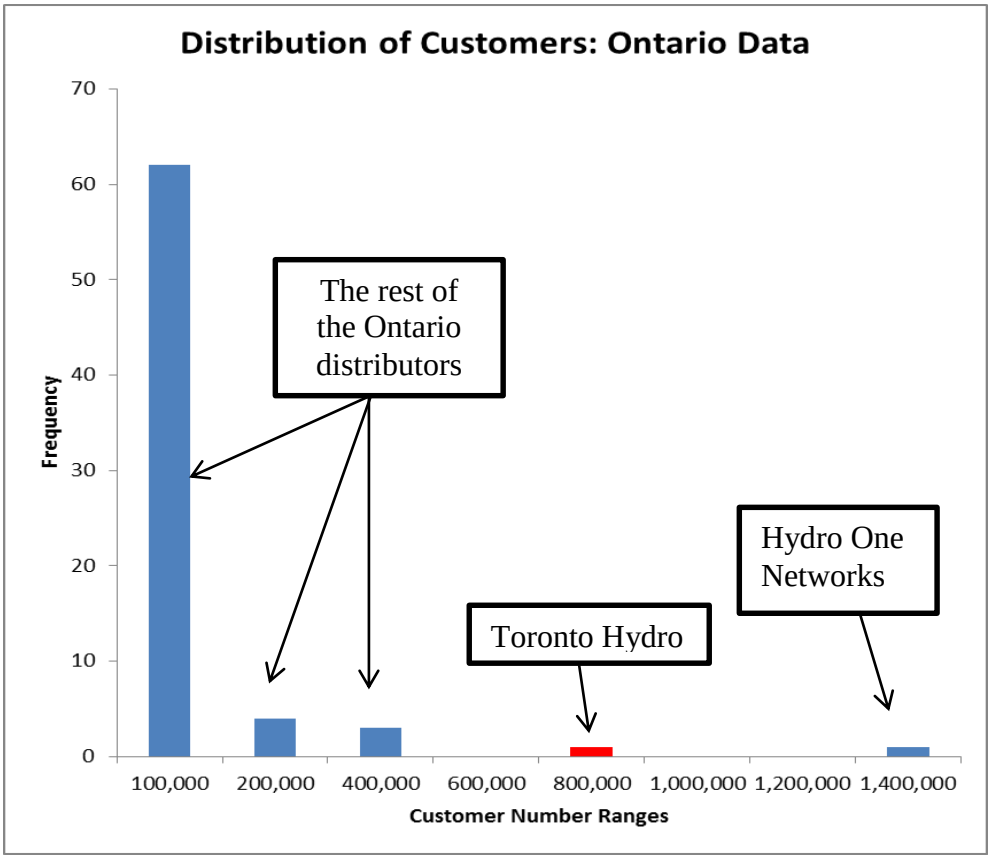
econometric model's outputs for those metrics.

[5] See page 22 of the November 2013 Board Report.

largest distributor in terms of customers served, Powerstream Inc., has fewer than half the number of electric customers of Toronto Hydro.

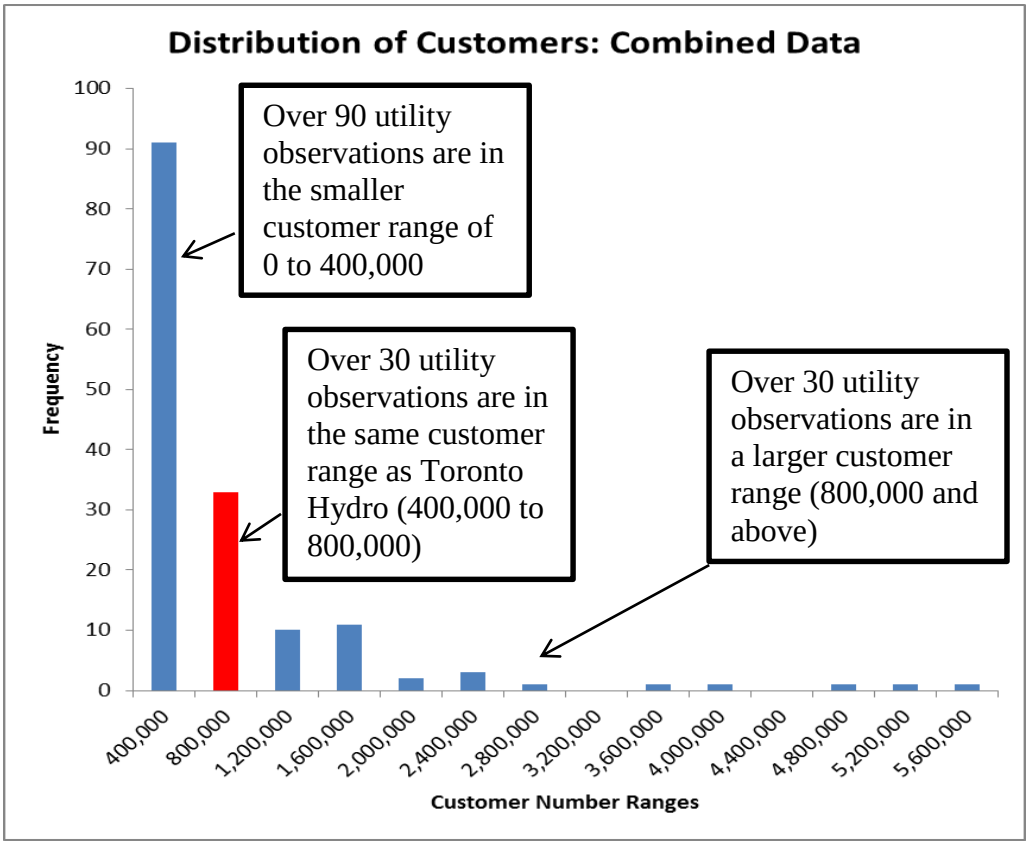
Figure 1 illustrates the vast differences between Toronto Hydro and the rest of the Ontario distributors, in terms of number of customers served. Related to this difference is the fact that Toronto Hydro also serves a large urban core (the Toronto area). Serving a large urban core presents unique cost challenges that are discussed further in another PSE report attached as an Appendix to this report entitled, "Capital Requirements for Serving Developed Environments."

Figure 1 Distribution of Customers: Ontario Dataset



After adding U.S. utilities to the Ontario dataset, Toronto Hydro ceases to be an outlier in terms of the number of customers. Figure 2 illustrates how in the combined Ontario/U.S. dataset, there are many utilities with more customers than Toronto Hydro, and many with fewer. When conducting econometric benchmarking, having a data sample with variable values that encompass those of the studied utility is essential to the accuracy of the exercise.

Figure 2 Distribution of Customers: Combined Dataset



1.3 Total Cost Benchmark Findings

As stated earlier, the RRF requests distributors include benchmarking of revenue forecasts in their Custom IR applications. In the November 2013 Board Report, the Board cites total cost econometric benchmarking as its preferred method for setting stretch factors.

PSE believes the Board's preference for total cost econometric benchmarking is the correct approach when benchmarking cost levels. Total costs are defined as the sum of (1) OM&A expenses, and (2) the depreciation and opportunity costs of capital. This is quite similar to how revenue requirements are calculated, and so total costs are somewhat analogous to the distribution portion of revenue requirements.[6] Partial cost benchmarking approaches, such as OM&A benchmarking, exclude large swaths of cost, which can skew performance evaluations.

PSE also endorses econometric benchmarking because of its increased accuracy relative to peer group approaches. The econometric benchmarking method contains the ability to statistically test included variables and results, includes a relatively large number of variables that enter the analysis, and does not require the researcher to choose a peer group or exclude large portions of

[6] Total costs are not exactly analogous to revenue requirements, however, because of the generalizations needed to offer a fair analysis between utilities with varying depreciation rates, rate of returns, historical capital addition patterns, and cost definitions.

the available data.

PSE used a total cost econometric benchmarking model to benchmark Toronto Hydro's historical costs, and its projected total costs during the Custom IR period (2015 to 2019). PSE first derived an econometric model from the historical dataset. Using that model and its parameter values, we then calculated total cost benchmarks. For past years, we used historical variables to calculate the benchmarks. For 2014 to 2019 benchmarks, we used Toronto Hydro projections for the variables that enter the model. This process serves as a benchmark evaluation of the company's projected total costs.

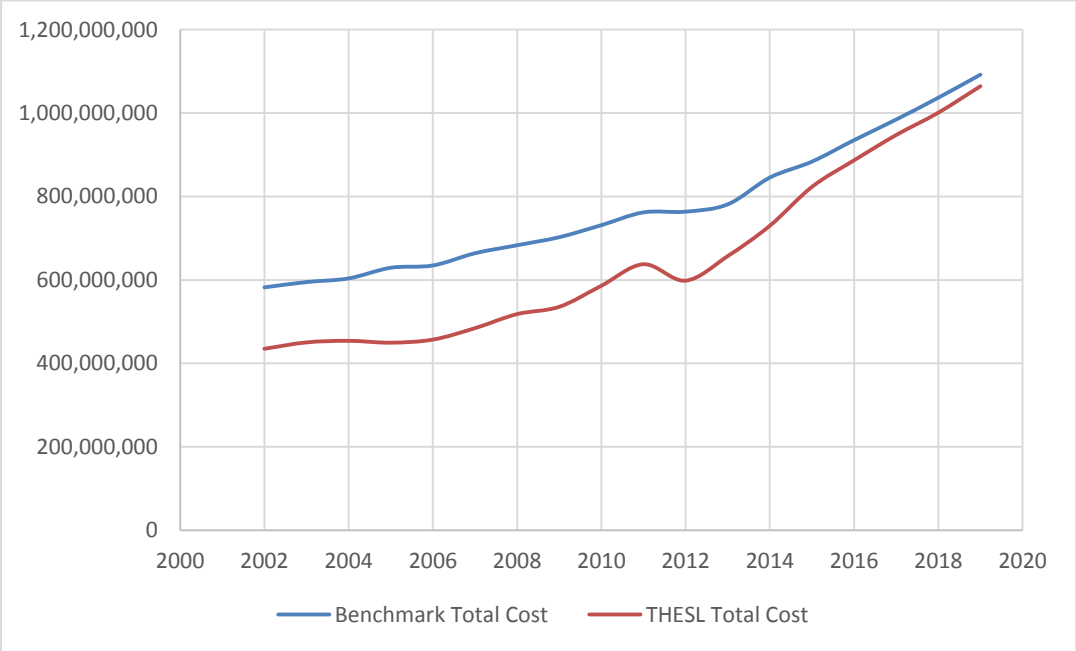
Our total cost econometric benchmarking results indicate the following findings.

1. The historical total cost levels of Toronto Hydro are below benchmark expectations at a 90% confidence level when using a dataset that includes both Ontario and U.S. utilities.

2. The projected total cost levels during the Custom IR period remain below the benchmark predictions, although they do converge towards benchmark expectations, and the "statistically below expectations" conclusion is no longer applicable at a 90% confidence level.

The following graph illustrates the historical and projected benchmarked costs and company costs for Toronto Hydro using a dataset comprised of 156 distributors from Ontario and the U.S.

Figure 3 Historical and Projected Total Costs vs. Benchmarked Costs



PSE also conducted benchmarking research using a U.S.-only dataset, which indicates similar findings to the combined dataset. Both samples show Toronto Hydro has been below its total cost benchmark values, and this persists through the projected years, albeit with a convergence towards benchmark costs. Further details and results for the U.S.-only dataset, along with the

combined Ontario-U.S. dataset, are provided in later sections.

1.4 Reliability Benchmark Findings

In addition to total cost benchmarking, PSE conducted econometric reliability benchmarking of Toronto Hydro's system average interruption frequency index ("SAIFI") and system average interruption duration index ("SAIDI"). The same reasons that necessitate a combined U.S. and Ontario sample when performing total cost benchmarking for Toronto Hydro also apply to benchmarking its reliability. Thus, we use a reliability dataset comprised of both Ontario and U.S. utilities to benchmark Toronto Hydro's SAIFI and SAIDI.

When Ontario distributors report SAIFI and SAIDI to the Board, they include all outages regardless of the cause and concentration of interruptions. In many jurisdictions throughout North America, on the other hand, utilities report SAIFI and SAIDI on a weather-normalized basis. They do this by excluding major event days ("MEDs") from the calculation of the metrics, which permits them to gauge reliability performance during normal operating conditions. In order to compare reliability performance on an equal footing, PSE used data from U.S. utilities that include all outages in their reliability metrics, regardless of the concentration of outages in a given time period.[7]

Furthermore, Ontario distributors report indexes based on a definition of "sustained outage" as lasting at least 1 minute. In the US, some distributors define a "sustained outage" as lasting at least 1 minute, while others define it as lasting at least 5 minutes.[8] We tested for this difference in the econometric modelling by including a variable for the "sustained outage" definition. We found it to have a negative correlation with SAIFI (i.e., one minute definition of "sustained" raises the expected SAIFI metric) and a positive correlation with SAIDI (i.e., one minute definition of "sustained" lowers the expected SAIDI metric). The inclusion of the variable did not meaningfully change Toronto Hydro's results, and it also reduced the size of the U.S. sample, because some utilities do not disclose their sustained outage definition. For these reasons, we left out the "sustained" variable from the final models.

PSE gathered Ontario distributors' data for the reliability indexes from the Board's RRR filings. We gathered U.S. data on utilities' non-normalized reliability indexes and their sustained outage definitions from publicly-available regulatory filings.

PSE's reliability benchmarking analysis indicates the following findings.

1. Historical SAIFI metrics for Toronto Hydro are higher than the benchmark values.
2. Projected SAIFI metrics converge towards the benchmark values through 2019.
3. Historical SAIDI metrics for Toronto Hydro are lower than the benchmark values.

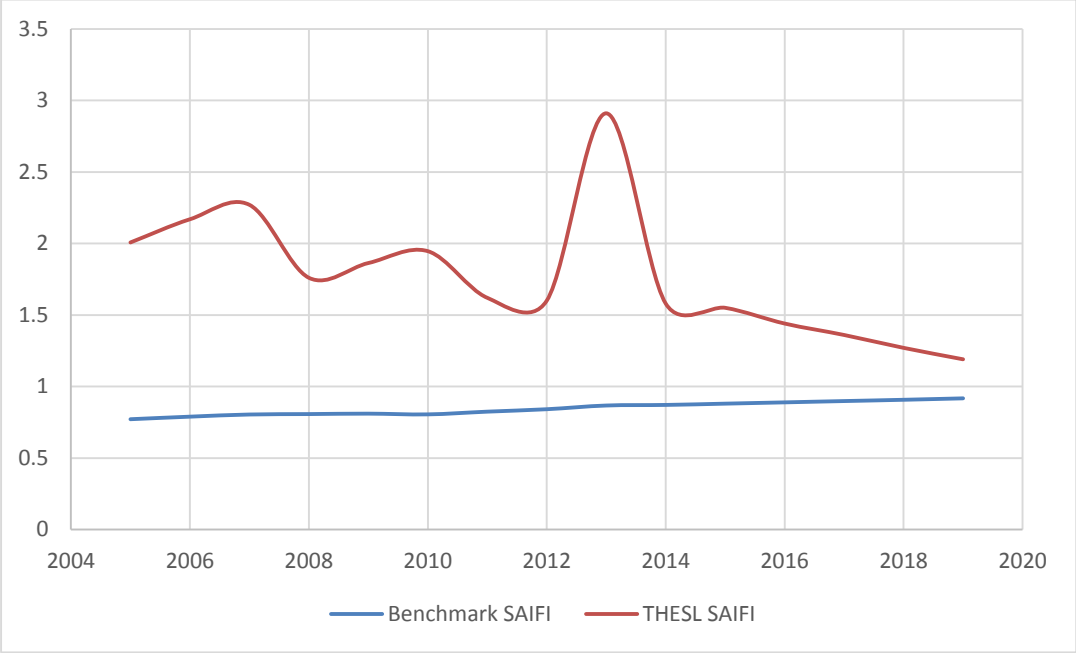
[7] The disadvantage of using indexes that include all outages is that the volatility in the indexes will be quite large, making confidence intervals larger than in (1) total cost benchmarking, and/or (2) cases where the reliability metrics excluded extreme storms.

[8] Some U.S. distributors don't disclose their sustained outage definition.

4. Projected SAIDI metrics for Toronto Hydro continue to be lower than the benchmark values.

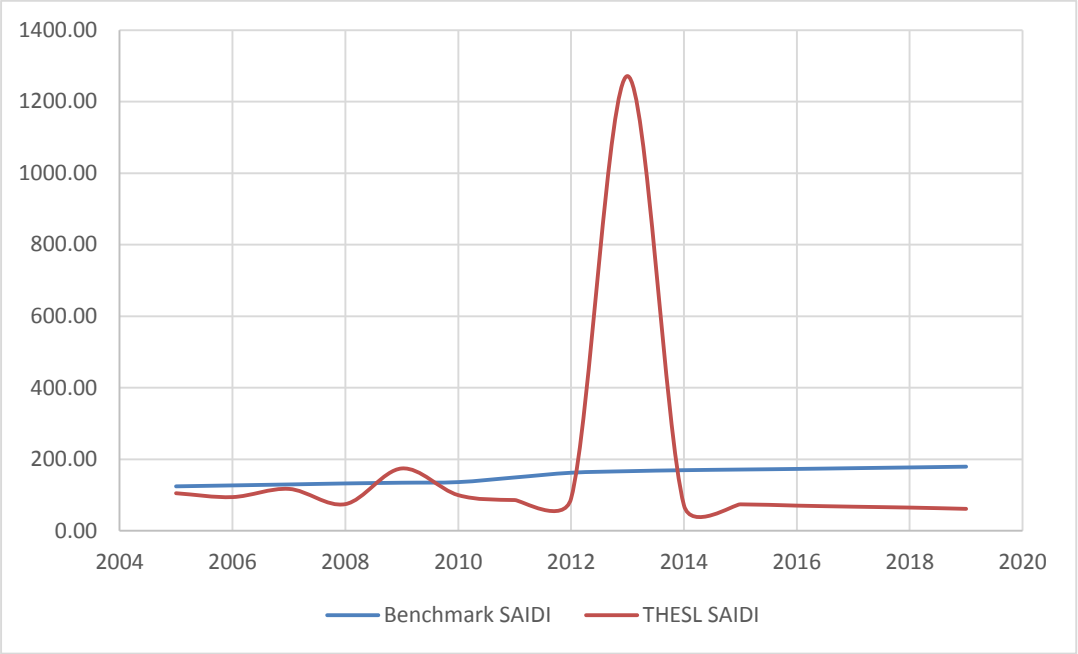
The following graph illustrates the historical and projected SAIFI values for Toronto Hydro—benchmarks and actual/projected values, using a dataset comprised of 116 Ontario and U.S. distributors. The large one-year increase in the company's 2013 SAIFI was due to an extreme weather event that occurred in December of that year.

Figure 4 Historical and Projected SAIFI vs. Benchmarked SAIFI



The following graph illustrates the historical and projected SAIDI values for Toronto Hydro against the benchmarked values, using a dataset comprised of 117 Ontario and U.S. distributors. The large one-year increase in the company's 2013 SAIDI was due to an extreme weather event that occurred in December of that year.

Figure 5 Historical and Projected SAIDI vs. Benchmarked SAIDI



PSE also conducted benchmarking research using a U.S.-only dataset for both reliability indexes. Results were again similar to the combined model, with SAIFI metrics for Toronto Hydro being higher than benchmarks, yet converging in the forecasted years, and SAIDI metrics being below benchmark values in the projected time period. Further details and results for that dataset, along with details about the combined dataset, are provided in Chapters 4 and 5.

1.5 Evaluation of Toronto Hydro's Custom IR Application

The graphs below illustrate how Toronto Hydro's historical total cost and reliability performances relate. Our results indicate that the company is missing its SAIFI benchmark value by a large margin (see yellow dot in Figure 6), while beating its SAIDI and total cost benchmarks (yellow dot in Figure 7). While more research would be necessary to ascertain Toronto Hydro's customers' exact preferences for how reliability should balance against higher rates, it seems reasonable that a large metropolitan city such as Toronto should at least strive to be at the benchmark value for the number of outages its system causes its customers. Outages are caused when the distribution system fails. A possible cause of the company's high outage levels is the aged system infrastructure. In order to address SAIFI, system investments may be needed.[9]

From a benchmark perspective, the projections to 2019 show that Toronto Hydro's spending

[9] This does not imply that Toronto Hydro's capital spending program is for the sole goal of reliability improvement. It is our understanding that there are a number of other considerations, such as public and employee safety. However, reliability is a large portion of the rationale, and is the "output" of the capital spending program that most readily lends itself to be benchmarked and evaluated.

forecasts will converge the company's SAIFI and total costs towards the benchmark expectations (red dot in Figure 6). SAIDI is projected to remain at a very strong level. Based on the projections, the projected spending will result in a utility more aligned with its externally-derived benchmark values from both a total cost and SAIFI perspective.

Figure 6 illustrates the convergence of SAIFI-to-total cost towards the benchmark values in the forecast period (the projected value gets closer to the center).

Figure 6 Toronto Hydro 2012-to-2019 SAIFI-to-Total Cost Progression Relative to 2010-2012 Sample Average

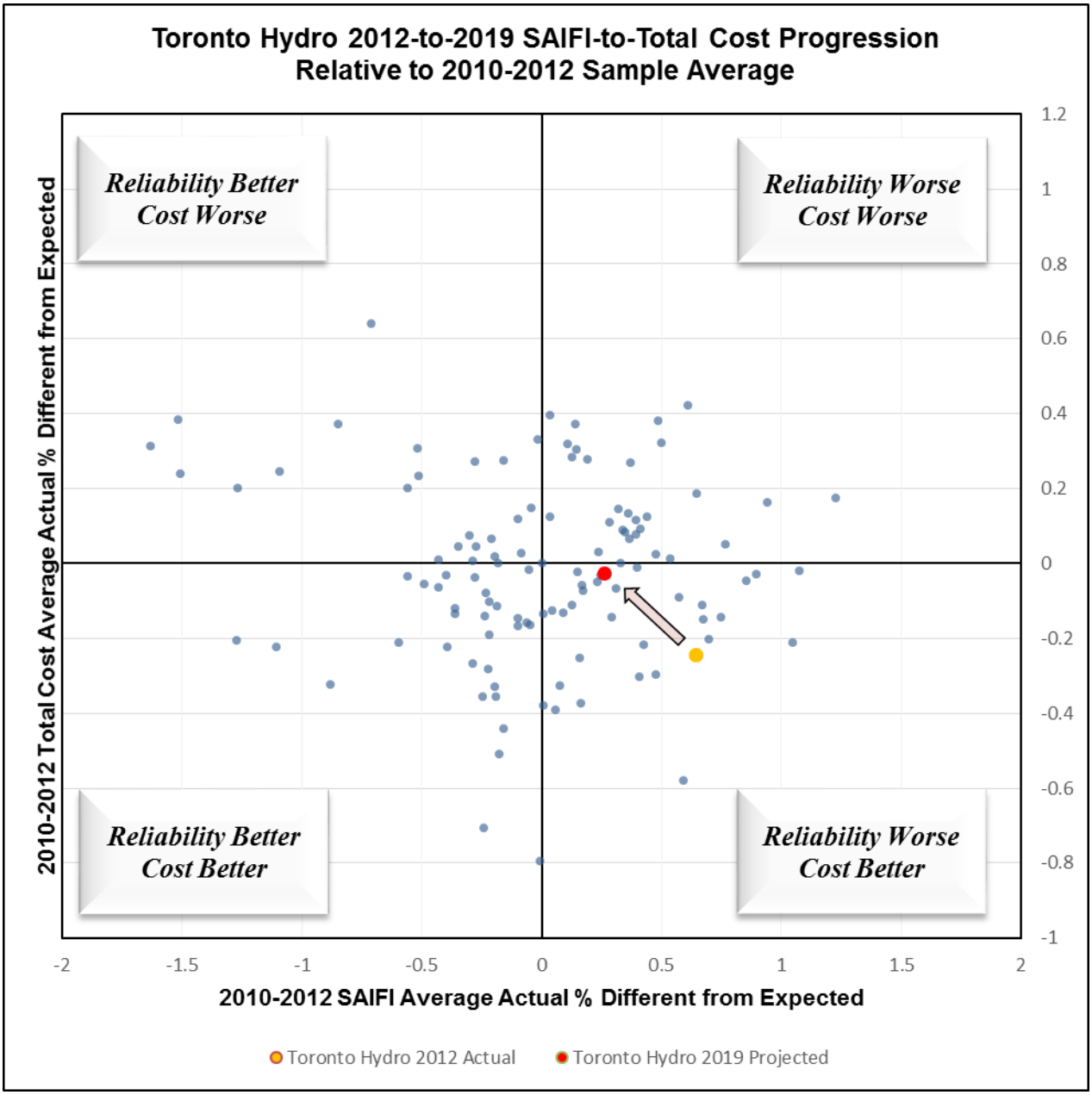
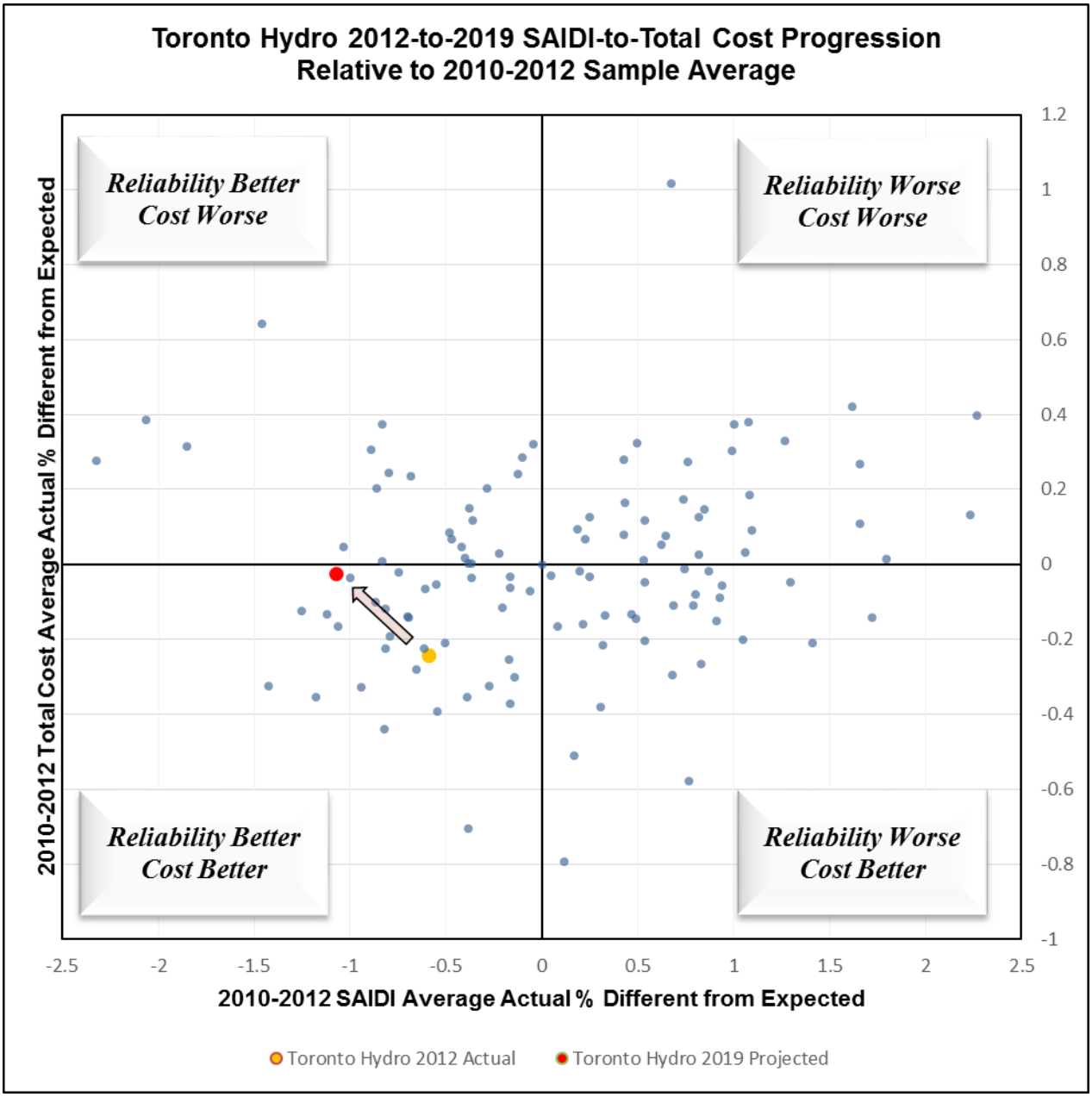


Figure 7 illustrates the current and projected position of the company's SAIDI and total costs. The company is currently better than the model expectations in both of these categories, and remains that way through 2019.

Figure 7 Toronto Hydro 2012-to-2019 SAIDI-to-Total Cost Progression Relative to 2010-2012 Sample Average



In PSE's opinion, it is certainly possible that poor SAIFI performance is a symptom of the condition of the distribution network. On this basis, increased capital spending should address SAIFI metrics through upgrading the distribution network and decreasing the number of times it fails. While poor SAIFI performance tends to be an indicator of old and failing infrastructure, and thus provides a rationale for increased capital spending, strong SAIDI (and CAIDI) performance is an indicator that the company identifies and swiftly responds to outages when

they occur. Thus, SAIDI performance tends to be more related to OM&A spending, whereas SAIFI performance is related more to capital spending.

1.6 Custom IR Conclusions

PSE's benchmark research leads us to the following statements relating to the company's Custom IR proposal:

1. Toronto Hydro is entering the Custom IR period with strong recent cost performance (i.e., costs are below the expected values), with its average 2010 to 2012 total costs being estimated at 21.5% below benchmark values using the combined dataset results.[10]

2. This strong cost performance persists to 2015, although with some moderation. Toronto Hydro's 2015 total cost level forecast is estimated to be 7.1% below benchmark values, and is, in our opinion, reasonable from a benchmarking perspective.

3. Toronto Hydro's Custom IR period (2015 through 2019) total cost level projections remain below benchmark expectations. By 2019, the company is estimated to still be below benchmark values by 2.6%. Based on this, the company's Custom IR projections are, in our opinion, reasonable from a benchmarking perspective.

4. Total costs are projected to be well within the 0.3% stretch factor range of plus/minus 10% set in the November 2013 Board Report. In terms of ranking, in the combined total cost rankings based on historical performance, Toronto Hydro is 30th out of the 156 Ontario/U.S. utilities. If Ontario distributors are isolated in the rankings, for the combined model, Toronto Hydro is ranked 15th out of the 71 distributors. Based on these findings, reducing the stretch factor from 0.6% to 0.3% seems in line with the Board's intention of assigning a 0.3% stretch factor to utilities with "normal" total cost benchmark evaluations.

5. Toronto Hydro's capital infrastructure seems to be producing a higher than expected number of outages. The company's average 2010-2012 SAIFI is 73% above benchmark expectations. This implies Toronto Hydro customers experience 73% more outages then our models predict. The SAIFI projections, assuming full funding, move the company towards the benchmark SAIFI value, reducing the number of outages experienced by customers. Thus, the company's plan to increase capital spending to address SAIFI is, in our opinion, reasonable from a benchmarking perspective.

6. Toronto Hydro's response to outages, measured by SAIDI, is quite strong and is projected to continue to be strong. The company's 2010-2012 average is 48% below benchmark expectations. This implies that Toronto Hydro customers experience 48%

[10] In this section, we discuss only the results for the combined dataset. The U.S.-only results are similar, although they indicate Toronto Hydro is even further below its benchmark values than when using the combined dataset (i.e. when using the U.S.-only dataset, Toronto Hydro's benchmarked costs are higher, thus its performance more impressive).

fewer outage minutes than our models predict. By 2015, the company's SAIDI is projected to be nearly 84% below benchmark expectations.

From a benchmark perspective, the benchmark analysis shows that THESL's spending forecasts should converge the company's SAIFI and total costs towards PSE's benchmark expectations (while SAIDI remains at a strong level). Based on the projections, the projected spending should result in a utility more aligned with its externally-derived benchmark values from both a total cost and SAIFI perspective.

2 Total Cost Benchmarking Datasets, Methods, Variable Definitions

The data for both the Ontario and U.S. utilities used in the study were acquired from publicly available data sources. There are 71 Ontario and 85 U.S. utilities in the combined sample, and 85 U.S. utilities plus Toronto Hydro in the U.S.-only sample. The data in each sample span the years 2002 to 2012.[11] The large number of observations in each sample is more than sufficient for the creation of statistically robust econometric models.

2.1 Ontario and U.S. Data Sources and Variable Definitions

The only Ontario utility serving a larger customer base than Toronto Hydro is Hydro One Networks. The next largest Ontario distributor is less than half the size of Toronto Hydro (when measured by the number of retail customers served). Furthermore, Toronto Hydro is the only Ontario distributor that serves a highly dense urban core, which provides substantial cost challenges that cannot be captured by an Ontario-only dataset. More information on the cost impacts of serving a metropolitan urban core can be found in a report located in the Appendix of this report titled, "Capital Requirements of Serving Developed Environments."

Given the fact that Toronto Hydro is an extreme outlier in the Ontario data, augmenting the Ontario dataset with U.S. observations should increase the accuracy of the Toronto Hydro result. This statement is not meant to imply, however, that an Ontario-only benchmarking dataset is inaccurate for the vast majority of Ontario distributors. Most of the Ontario distributors have output levels and business condition variables that are encompassed by the Ontario-only dataset, making the evaluation an appropriate one in those cases. Section 6 provides a more detailed discussion of the reasons for the inclusion of data from U.S. utilities in the benchmarking of Toronto Hydro.

The utilities included in the combined sample, and the number of retail customers served in 2011, are provided in the following table. The Ontario distributors are shaded in green.

Table 1 Combined Sampled Utilities

Company	Number of Customers (2011)	Company	Number of Customers (2011)
Alabama Power Co	1,434,487	United Illuminating Co	323,738
Ameren UE	1,190,478	Virginia Electric and Power Co	2,438,226
Arizona Public Service Co	1,120,236	West Penn Power Co (Allegheny Power)	717,269
Atlantic City Electric Co	547,762	Western Massachusetts Electric Co (Northeast Utilities)	206,279
Appalachian Power Company	961,129	Wisconsin Electric Power Co	1,120,964

[11] Data for 2013 is now available for U.S. utilities, but not yet, to our knowledge, for Ontario distributors.

Avista Corp	358,303	Wisconsin Power and Light Co	458,041
Baltimore Gas & Electric Co	1,240,291	Wisconsin Public Service Co	439,481
Black Hills Power Inc	68,172	Algoma Power Inc.	11,581
Carolina Power & Light Co	1,445,158	Atikokan Hydro Inc.	1,661
Central Hudson Gas & Electric Corp	274,152	Bluewater Power Distribution Corporation	35,772
Central Maine Power Co	606,813	Brant County Power Inc.	9,741
Cincinnati Gas & Electric Co (Duke Energy OH)	685,859	Brantford Power Inc.	37,967
Cleco Corp	280,857	Burlington Hydro Inc.	64,329
Cleveland Electric Illuminating Co (First Energy)	748,935	Cambridge And North Dumfries Hydro Inc.	51,586
Commonwealth Edison Co	3,818,690	Canadian Niagara Power Inc.	28,397
Connecticut Light & Power Co	1,212,276	Centre Wellington Hydro Ltd.	6,496
Consolidated Edison Co of New York Inc	3,329,304	Chapleau Public Utilities Corporation	1,293
Consumers Energy Company	1,788,799	Collus Power Corporation	15,723
Dayton Power & Light Co	513,539	Cooperative Hydro Embrun Inc.	1,954
Delmarva Power & Light Co	500,998	E.L.K. Energy Inc.	11,276
Detroit Edison	2,120,262	Enersource Hydro Mississauga Inc.	195,381
Duke Energy Corp	2,396,555	Entegrus Powerlines	40,120
Duquesne Light Co	587,610	Enwin Utilities Ltd.	85,083
El Paso Electric Co	378,547	Erie Thames Powerlines Corporation	18,094
Empire District Electric Co	166,207	Espanola Regional Hydro Distribution Corporation	3,299
Entergy Arkansas Inc	695,397	Essex Powerlines Corporation	28,094
Entergy Mississippi Inc	438,140	Festival Hydro Inc.	19,885
Entergy new Orleans Inc	159,431	Fort Frances Power Corporation	3,775
Florida Power & Light Co	4,547,047	Greater Sudbury Hydro Inc.	46,748
Florida Power Corp	1,642,146	Grimsby Power Incorporated	10,307
Georgia Power Co	2,360,487	Guelph Hydro Electric Systems Inc.	50,859
Green Mountain Power Corp	95,542	Haldimand County Hydro Inc.	21,078
Gulf Power Co	432,401	Halton Hills Hydro Inc.	21,232
Idaho Power Co	493,532	Hearst Power Distribution Company Limited	2,817
Indiana Michigan Power Co	582,822	Horizon Utilities Corporation	235,327
Indianapolis Power & Light Co	468,195	Hydro 2000 Inc.	1,208
Jersey Central Power & Light Co	1,099,194	Hydro Hawkesbury Inc.	5,521
Kansas City Power & Light Co	512,082	Hydro One Brampton Networks Inc.	137,856
Kentucky Power Co (AEP)	173,641	Hydro One Networks Inc.	1,211,071
Kentucky Utilities Co	540,839	Hydro Ottawa Limited	305,266
Louisville Gas and Electric Co	394,063	Kenora Hydro Electric Corporation Ltd.	5,572
Madison Gas and Electric Co	141,414	Kingston Hydro Corporation	26,844
MDU Resources Group, Inc.	125,802	Kitchener-Wilmot Hydro Inc.	87,965
Metropolitan Edison Co	552,631	Lakefront Utilities Inc.	9,976
Mississippi Power Co	185,768	Lakeland Power Distribution Ltd.	9,598
Monongahela Power Co	386,819	London Hydro Inc.	148,331
Nevada Power Co	838,482	Midland Power Utility Corporation	6,951
New York State Electric & Gas Corp	878,845	Milton Hydro Distribution Inc.	30,485
Niagara Mohawk Power Corp (National Grid)	1,297,616	Newmarket-Tay Power Distribution Ltd.	33,338
Northern Indiana Public Service Co	456,937	Niagara Peninsula Energy Inc.	51,162
Northern States Power Co (XCEL)	1,399,830	Niagara-On-The-Lake Hydro Inc.	8,000
Ohio Edison Co (First Energy)	1,034,534	Norfolk Power Distribution Inc.	19,032
Ohio Power Co (AEP)	1,459,875	North Bay Hydro Distribution Limited	23,850
Oklahoma Gas and Electric Co	786,522	Northern Ontario Wires Inc.	6,059
Orange and Rockland Utilities Inc	224,608	Oakville Hydro Electricity Distribution Inc.	63,614
Pacific Gas and Electric Co	5,248,288	Orangeville Hydro Limited	11,248
Pennsylvania Electric Co	589,651	Orillia Power Distribution Corporation	13,035
Pennsylvania Power Co	160,250	Oshawa Puc Networks Inc.	53,083

Portland General Electric Co	823,171	Ottawa River Power Corporation	10,555
Potomac Edison Co	388,814	Parry Sound Power Corporation	3,441
Potomac Electric Power Co	787,137	Peterborough Distribution Incorporated	35,270
PP&L Inc	1,403,889	Powerstream Inc.	332,993
PSI Energy Inc (Duke Energy IN)	782,879	Puc Distribution Inc.	32,998
Public Service Co of Colorado	1,372,892	Renfrew Hydro Inc.	4,183
Public Service Co of New Hampshire	498,175	Rideau St. Lawrence Distribution Inc.	5,839
Public Service Co of New Mexico	503,963	Sioux Lookout Hydro Inc.	2,755
Public Service Co of Oklahoma	532,395	St. Thomas Energy Inc.	16,436
Puget Sound Energy	1,083,395	Thunder Bay Hydro Electricity Distribution Inc.	49,765
Rochester Gas and Electric Corp	367,300	Tillsonburg Hydro Inc.	6,745
San Diego Gas & Electric Co	1,385,784	Toronto Hydro-Electric System Limited	709,323
Sierra Pacific Power Co	322,492	Veridian Connections Inc.	113,709
South Carolina Electric & Gas Co	663,433	Wasaga Distribution Inc.	12,324
Southern California Edison Co	4,921,228	Waterloo North Hydro Inc.	52,612
Southern Indiana Gas and Electric Co (Vectern)	146,136	Welland Hydro-Electric System Corp.	21,768
Southwestern Electric Power Co (AEP)	521,601	Wellington North Power Inc.	3,626
Southwestern Public Service (Xcel)	376,160	West Coast Huron Energy Inc.	3,697
Tampa Electric Co	675,799	Westario Power Inc.	22,257
Tucson Electric Power Co	403,340	Whitby Hydro Electric Corporation	40,337

The output variables used in the total cost econometric benchmarking research are:

- Retail customers, and
- Peak demand.

The business condition variables used in the combined total cost econometric benchmarking research are:

- Regional input prices,
- Percent residential deliveries,
- Percent electric customers (out of total gas and electric customers),
- A binary variable for urban population above one million,
- Percent electric distribution in total electric gross plant, and
- Customers per distribution line mile.

Additional variables included in the U.S.-only total cost model are:[12]

- Percent forestation,
- Elevation standard deviation, and
- Percent plant underground.

Both OM&A and total costs used in the benchmarking models for the U.S. distributors are derived using FERC Form 1 filing data.[13] U.S. electric utilities are required to file FERC Form 1

[12] The U.S.-only model uses all the other variables used for the combined model, except for customers per distribution line mile. This variable was dropped due to it not being statistically significant and/or plausibly signed.

[13] All FERC form data was downloaded by PSE from SNL Energy's database tool.

data annually, which includes operation and maintenance expenses broken down into specific cost categories (e.g. distribution, transmission, generation, customer billing, administrative and general). Form 1s also include plant in service and accumulated depreciation information that is used in constructing capital costs.

The historical calculations for U.S. utilities' capital cost have been conducted using the same procedures implemented by Pacific Economics Group ("PEG") in their benchmarking and productivity research found in Case EB-2010-0379 ("4th Generation Incentive Regulation"). This was done in order to match the capital cost calculations used in Ontario with those used for the U.S. sample. Ontario's OM&A cost and total costs are computed based on the same information available in the Board's 4th Generation Incentive Regulation data. The capital costs for Ontario distributors use the same values and procedures implemented by PEG in the 4th Generation IR proceeding.

For U.S. utilities, the output variables are calculated from FERC Form 1s and Platts UDI directories.[14] The output data for Ontario utilities comes from the Board's fourth generation incentive regulation data. We note that the PEG model used in their 4th Generation Incentive Regulation research also included kilowatt hours delivered as an output variable. This variable, however, did not come in plausibly signed and statistically significant in our models. PSE believes that energy delivered will have minimal to no impact on distribution total costs. Distribution capital and OM&A costs are ordinarily driven by the number of customers served and the peak demand the system needs to be built to serve. For these reasons, we excluded kilowatt hours delivered from the models.

Input prices are divided into two categories: capital and OM&A. The capital input price calculation is discussed in detail in the following section. The OM&A input price captures the regional market price level that each sampled company encounters when procuring OM&A inputs, such as employees or materials and services. There are two components used to construct the OM&A input price. These are labour and non-labour.

The labour component is calculated by taking wage levels of numerous job occupations and weighting them based on the U.S. Bureau of Labor Statistics ("BLS") estimates of job occupation weights in the Electric Power Generation, Transmission, and Distribution Industry. The BLS has estimates for wage levels for each job occupation by city and metropolitan area. For Ontario distributors, we gathered job occupation wage estimates from Statistics Canada, mapped each distributor to the most appropriate observation, translated job occupations to match their U.S. counterparts and then weighted the job occupation wages by the BLS estimates. This provides consistency from the U.S. and Ontario samples regarding labour input prices and also puts the input price in terms of each country's currency. We then escalated labour prices for U.S. utilities using BLS employment cost indexes for the utility sector and escalated Ontario prices using the Ontario average weekly earnings estimates.

The non-labour component of the OM&A input price uses the gross domestic product price index (GDP-PI) for U.S. The Ontario non-labour component uses the same GDP-PI in each

[14] We gathered data from annual editions of Platts, "UDI Directory of Electric Power Producers and Distributors" starting in 2003 through 2013.

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 their benchmarking research.

The "residential percentage of sales volume" variable is also calculated based on data from FERC Form 1 for U.S. utilities and the Board's 4th Generation Incentive Regulation data for Ontario utilities. The percentage of residential volume compared to total volume is a proxy for the variance in electricity loads. Commercial and industrial customer loads tend to be more level across hours of the day. As the proportion of residential volume increases, distribution systems tend to increase their system peaks and load variability. This results in higher volatility in the loads served by the system.

The variable that measures the percentage of electric customers out of total gas and electric customers is derived from both the FERC Form 1 and the FERC Form 2. The FERC Form 2 data includes the number of gas customers served by a natural gas distributor. This variable measures the economies of scope available from serving both electric and gas customers. All Ontario electric distributors distribute only electricity, and have values of 100 percent for this variable.

Toronto Hydro serves the urban core of Toronto, Ontario. Serving a densely populated urban core presents challenges that are not present in suburban or rural settings. The urban core variable used in the total cost benchmarking models is a "binary" or "dummy" variable. This variable provides key information on the added costs of serving electricity to a highly urban area. All utilities are given a value of zero unless they serve the urban core of a city whose population is above one million (U.S. cities are designated by the 2010 U.S. census). Toronto Hydro is the only Ontario utility that serves an urban core of this magnitude. For more information on the cost impacts of serving highly dense metropolitan areas, please refer to PSE's report located in the Appendix of this report entitled, "Capital Requirements for Serving Developed Environments".

The percentage of electric distribution plant in total distribution plant measures the available economies of scope that result from being a vertically integrated utility, as opposed to a distribution-only utility. We expect distribution unit costs to be lower for utilities that also have transmission and generation activities. For U.S. utilities, data for this variable is found from the utilities' FERC Form 1s. All the Ontario utilities are designated as distribution-only utilities and have a value of 100 percent for this variable.

The customer density variable measures how many retail customers are served per length of line. The customer data is the same data that is used for the retail customer variable. The "miles of line" data for both U.S. and Ontario utilities is gathered through various editions of *Platts UDI Directory of Electric Producers and Distributors*. This variable measures the challenges of serving rural areas and having customers spread across a large service territory. The lower the customer density, the higher the expected costs. Again, for more information on the cost impacts of serving a lower density and rural area please refer to the report found in the Appendix.

The percentage of forestation variable is based on GIS (geographic information system) forestation maps. Such maps are matched with the areas served by each utility to create the variable. We would expect that the higher the level of forestation, the higher OM&A costs

required for right-of-way clearing and service restoration activities. GIS variable data is available for all sampled U.S. utilities and only available for a subset of the Ontario distributors. For this reason the variable is only included in the U.S.-only sample.[15]

The elevation standard deviation variable is computed using GIS maps of elevation in each utility's service territory. The variability of elevation levels poses both construction and maintenance challenges for local delivery systems. We capture this difficulty by computing the standard deviation of the elevation levels obtained from GIS maps. As stated in the last paragraph, GIS variable data is available for all sampled U.S. utilities and only available for a subset of the Ontario distributors. For this reason the variable is only included in the U.S.-only sample.[16]

The percentage of electric distribution plant that is underground can raise the capital cost of distribution delivery, but lowers maintenance (and hence OM&A) expenses. Data for this variable comes from FERC Form 1 filings for U.S. utilities and is not available for Ontario distributors.[17] For this reason, the variable is only included in the U.S.-only sample.

The variables and the average values for the U.S. sample and Toronto Hydro's values are provided in the following table. These are the averages for 2010-2012.

[15] We did, however, find very similar total cost results to the combined model when including the subset of Ontario distributors that did have GIS data available.

[16] See prior footnote.

[17] Ontario distributors do report on the kilometers of underground and overhead line. However, they do not report the plant in service breakdowns that would enable us to construct this variable for the entire Ontario sample.

Table 2 Variables in the Total Cost Benchmarking Study: 2010-2012 Averages

Variable	Units	U.S. Sample Average	Ontario Sample Average	Combined Sample Averages	Toronto Hydro Average
Total Power Delivery Cost	Dollars ('000)*	671,994	50,735	389,241	607,375
Number of Customers	Count	960,965	67,757	554,441	709,457
Peak Demand	MW	5,501	335	3,150	4,845
Price of Capital Services	Index Number	10.094	11.938	10.933	12.516
Price of OM&A Input	Index Number	1.072	1.150	1.107	1.250
Urban Core Dummy	Binary	0.047	0.014	0.032	1.000
Percent Residential Deliveries in Total Deliveries	Percent	0.374	0.453	0.410	0.489
Percent Electric Customers in Gas & Electric Customers	Percent	0.877	1.000	0.933	1.000
Percent Distribution in Total Electric Plant	Percent	0.469	1.000	0.710	1.000
Density: Customers/Line Miles	Ratio	35.899	65.492	49.368	48.842
Percent of Service Territory Forested	Percent	0.591	NA	NA	0.183
Elevation Standard Deviation	Index	154.239	NA	NA	55.343
Percent Plant Underground	Percent	0.205	NA	NA	0.497
***U.S. cost and prices are in U.S. dollars and Canadian cost and prices are in Canadian dollars**					

We present the utilities included in the U.S.-only sample and the number of retail customers they served in 2011 in the following table.

Table 3 Sampled U.S. Utilities

Company	Number of Customers (2011)		Company	Number of Customers (2011)
Toronto Hydro-Electric System Limited	709,323		Metropolitan Edison Co	552,631
Alabama Power Co	1,434,487		Mississippi Power Co	185,768
Ameren UE	1,190,478		Monongahela Power Co	386,819
Appalachian Power Company	961,129		MDU Resources Group, Inc.	125,802
Arizona Public Service Co	1,120,236		Nevada Power Co	838,482
Atlantic City Electric Co	547,762		New York State Electric & Gas Corp	878,845
Avista Corp	358,303		Niagara Mohawk Power Corp (National Grid)	1,297,616
Baltimore Gas & Electric Co	1,240,291		Northern Indiana Public Service Co	456,937
Black Hills Power Inc	68,172		Northern States Power Co (XCEL)	1,399,830
Carolina Power & Light Co	1,445,158		Ohio Edison Co (First Energy)	1,034,534
Central Hudson Gas & Electric Corp	274,152		Ohio Power Co (AEP)	1,459,875
Central Maine Power Co	606,813		Oklahoma Gas and Electric Co	786,522
Cincinnati Gas & Electric Co (Duke Energy OH)	685,859		Orange and Rockland Utilities Inc	224,608
Cleco Corp	280,857		Pacific Gas and Electric Co	5,248,288
Cleveland Electric Illuminating Co (First Energy)	748,935		Pennsylvania Electric Co	589,651
Commonwealth Edison Co	3,818,690		Pennsylvania Power Co	160,250
Connecticut Light & Power Co	1,212,276		Portland General Electric Co	823,171
Consolidated Edison Co of new York Inc	3,329,304		Potomac Edison Co	388,814
Consumers Energy Company	1,788,799		Potomac Electric Power Co	787,137
Dayton Power & Light Co	513,539		PP&L Inc	1,403,889
Delmarva Power & Light Co	500,998		PSI Energy Inc (Duke Energy IN)	782,879
Detroit Edison	2,120,262		Public Service Co of Colorado	1,372,892
Duke Energy Corp	2,396,555		Public Service Co of new Hampshire	498,175
Duquesne Light Co	587,610		Public Service Co of new Mexico	503,963
El Paso Electric Co	378,547		Public Service Co of Oklahoma	532,395
Empire District Electric Co	166,207		Puget Sound Energy	1,083,395
Entergy Arkansas Inc	695,397		Rochester Gas and Electric Corp	367,300
Entergy Mississippi Inc	438,140		San Diego Gas & Electric Co	1,385,784
Entergy new Orleans Inc	159,431		Sierra Pacific Power Co	322,492
Florida Power & Light Co	4,547,047		South Carolina Electric & Gas Co	663,433
Florida Power Corp	1,642,146		Southern California Edison Co	4,921,228
Georgia Power Co	2,360,487		Southern Indiana Gas and Electric Co (Vectern)	146,136
Green Mountain Power Corp	95,542		Southwestern Electric Power Co (AEP)	521,601
Gulf Power Co	432,401		Southwestern Public Service (Xcel)	376,160
Idaho Power Co	493,532		Tampa Electric Co	675,799
Indiana Michigan Power Co	582,822		Tucson Electric Power Co	403,340
Indianapolis Power & Light Co	468,195		United Illuminating Co	323,738
Jersey Central Power & Light Co	1,099,194		Virginia Electric and Power Co	2,438,226
Kansas City Power & Light Co (MO)	512,082		West Penn Power Co (Allegheny Power)	717,269
Kentucky Power Co (AEP)	173,641		Western Massachusetts Electric Co (Northeast Utilities)	206,279
Kentucky Utilities Co	540,839		Wisconsin Electric Power Co	1,120,964
Louisville Gas and Electric Co	394,063		Wisconsin Power and Light Co	458,041
Madison Gas and Electric Co	141,414		Wisconsin Public Service Co	439,481
Number of Sampled Firms	86			
Average Customer Number of Sample Utilities	959,902			

2.2 Perpetual Inventory Capital Cost Method

This report evaluates Toronto Hydro's capital costs as a component of the total cost definition. PSE's measure of capital cost is based on a service price approach. This approach has a solid basis in economic theory, and is the same method chosen by PEG in their 4th Generation IR research.[18] It allows for a clear-cut and standardized way to account for differences between utilities with respect to historical plant additions. The service price approach also has ample precedent in government-sponsored cost research. It is used by the Bureau of Labor Statistics of the U.S. Department of Labor in computing multi-factor productivity indexes for the U.S. private business sector and for several subsectors, including the utility services industry.

Based on this approach, the cost of capital in each period *t* is the product of indices of the capital service price and capital quantity in place at the end of the prior period. The formula for this is given by:

$$CK_t = WKS_t \cdot XK_{t-1}$$

Here, in each period *t*, CK_t is the cost of capital, WKS_t is the capital service price index, and XK_{t-1} is the capital quantity index value at the start of the period.

The capital quantity index is constructed using inflation-adjusted data on the value of net utility plant in a benchmark year, and on gross plant additions in subsequent years. It also uses an assumption about service lives. For the sake of consistency, we use either 1989 or 2002 as the benchmark year in the current study for Ontario sampled utilities, based on PEG's prior decision in their benchmarking work. We use 1989 for all U.S. sampled utilities. Based on the benchmark year, a "triangulated weighted average" ("TWA") is used to calculate the capital stock in either 1989 or 2002. Subsequent years use the previous year's capital stock and escalate it by plant additions minus depreciation. For consistency, the plant additions have been calculated using PEG's methodology found in their 4th Generation IR research. This method is used both for the Ontario and U.S. distributors. The formulas for the capital quantity index in 1989 and in subsequent years are provided below.

$$XK^i_{1989} = \frac{Net\ Plant^i_{1989}}{TWA^i_{1989}}$$

$$XK^i_t = XK^i_{t-1} * d + \frac{Add^i_t}{WKA^i_t}$$

$$Add_t = (Gross\ Plant_t - Gross\ Plant_{t-1}) + .005 * Gross\ Plant_{t-1}$$

Under the service price approach employed in this study, capital cost has two components: opportunity cost and depreciation. The capital service price index is thus given by the formula:

[18] See Hall and Jorgensen (1967) for a seminal discussion of the use of service price methods for measuring capital cost.

$$WKS_t = r_t * WKA_{t-1} + d_t * WKA_t$$

Here, r_t is the allowed rate of return based on the Board's historical calculated returns. This same annual value is also used in the capital service price computation for the U.S utilities in the dataset. Setting the same rate of return for all distributors provides consistency in determining the capital costs, so that decisions by regulators do not enter into the benchmark evaluation, which is attempting to assess the performance of the utility itself. The parameter d_t is the economic depreciation rate. We use the same value as PEG did, 4.59%, for this parameter in the study.

The variable that the capital service price components have in common is WKA_t. This is an index of the price of capital assets used in power distribution. We compute this index using data on differences in the cost of constructing utility plant between regions, and within regions over time. In particular for U.S. distributors, we use the Handy-Whitman indexes for total power distribution plant, which vary over time and across six geographic regions. For Ontario distributors we use the annual Electric Utility Construction Price Index ("EUCPI").

We determine the relative levels of utility plant asset prices for 2012 by using the City Cost Indexes for electrical work in RS Mean's *Heavy Construction Cost Data*.[19] These indexes measure differences among cities in the cost of labour needed to install electrical equipment and differences in equipment prices. The construction service categories covered are raceways; conductors and grounding; boxes and wiring devices; motors, starters, boards, and switches; transformers and bus ducts; lighting; electric utilities; and power distribution. The level of the asset price index for each utility is the simple average of the RS Means index values for cities in the service territory. This same source is used for both U.S. and Ontario distributors. The index is already adjusted for currency differences between the two countries.

[19] RS Means (2011).

2.3 Econometric Method

The benchmarking approach used in this report is the econometric approach. PSE believes this is the most accurate and fair method to use when comparing utility cost and reliability levels. It is also the same method preferred by the Board in the November 2013 Board Report. This method is absolutely essential to use when a utility does not have a large number of very similar peers, which is certainly the case for Toronto Hydro.[20]

The econometric approach explicitly adjusts for differences in utilities' service territories. In the power distribution industry, simple rate or reliability index comparisons do not provide appropriate benchmarks when evaluating performance. Uncontrollable factors influence attainable levels of total costs; such factors include geographical size, level of forestation, consumer density, regional wage levels, mix of consumer classes, or serving an urban core. Therefore, more sophisticated tools that normalize for specific influencing factors must be employed to accurately assess performance. With this concept in mind, PSE has developed econometric benchmarking models that take into account factors that have proven to be statistically influential on distribution utility costs and reliability indexes.

The econometric benchmarking approach relies on comparisons between observed data values to the predicted values obtained from regressions. The researcher determines an appropriate functional form for the relationship between the studied metric and factors that influence it, and develops appropriate econometric methods for obtaining good parameter estimates of the specified model. In this report, we estimate the "translog cost function." The translog cost function is well established in academic literature and provides a high level of flexibility in estimating costs. This is also the same functional form preferred by the Board in the 4th Generation IR proceeding.

Cost predictions for each firm are obtained by inserting company-specific variable values into the estimated equation. Performance is defined as the percentage difference of the observed data to the predicted value of the data, as shown below.

$$Performance = \ln\left(\frac{Observed\ or\ Projected\ Cost\ Data}{Predicted\ Cost\ Data}\right)$$

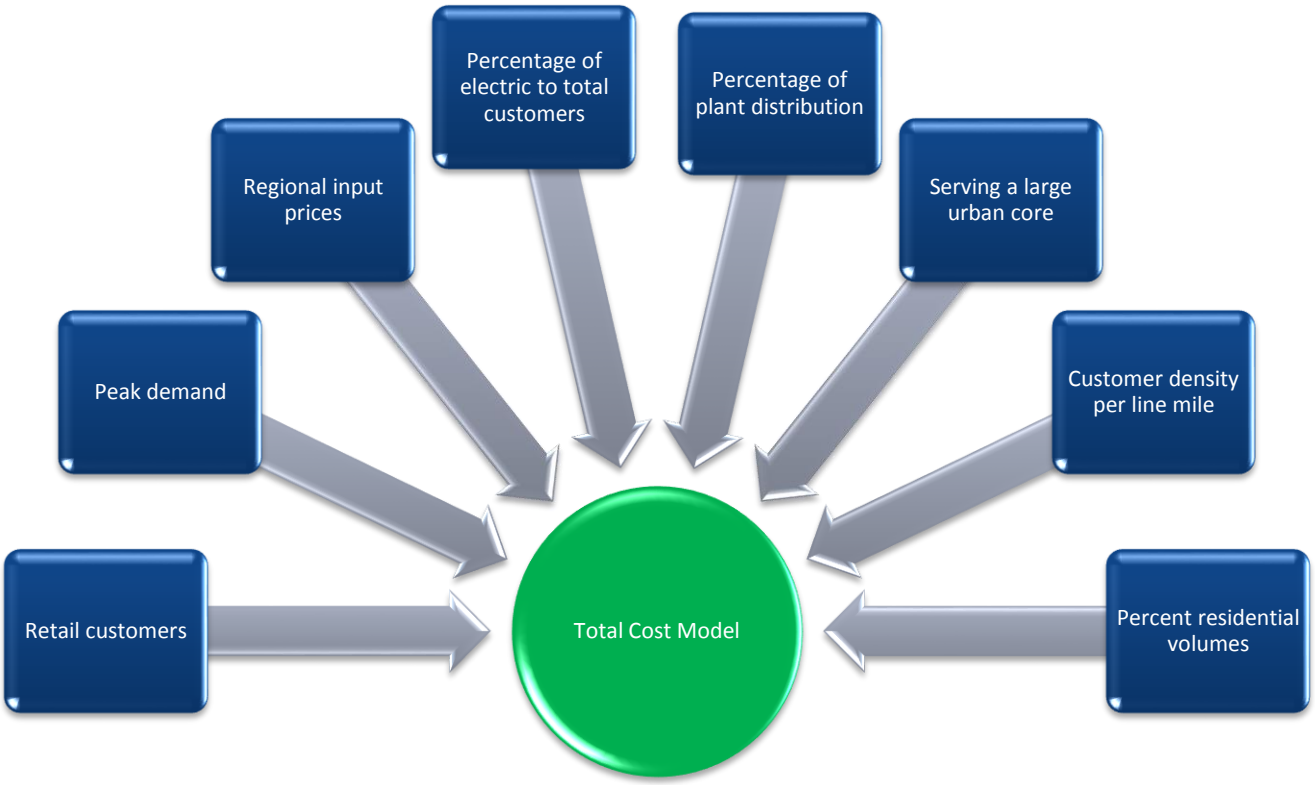
NOTE: The term "ln" above denotes the natural log. The formula above is the calculation for log arithmetically calculating percentage differences. It is typically used by both PSE and PEG to display benchmark scores.

[20] Even for utilities with a number of very similar peers, we would still advocate for using the econometric benchmarking method, because of the added variable information the model can account for and the extra information the approach can offer.

2.3.1 Variables Used

The variables included in the combined total cost analysis are shown in the figure below.

Figure 8 Variables in Econometric Cost Models



A diverse dataset which includes utilities with varying operational conditions is necessary to determine the influence on costs and reliability resulting from those conditions. There are many U.S. utilities which are either larger or smaller than Toronto Hydro, and Toronto Hydro falls well within the range of most variables. This is in contrast to an Ontario-only dataset, where Toronto Hydro tends to be an extreme outlier due to its size and urban characteristics. Due to this outlier status within the Ontario dataset, PSE considers the combined and U.S.-only benchmarking results to be more robust in revealing the cost and reliability performance of the company, relative to an Ontario-only sample.

The specification used in the cost models includes three types of variables: outputs, input prices, and business condition variables. Outputs are defined as the "work" that the utility is doing. We defined two variables as outputs: the number of retail customers served and peak demand.

The input prices are defined as the external market price for operation, maintenance, and administration (OM&A) expenses and capital service costs. The market prices for labour and capital will vary depending on the geographic location of each sampled utility. The business condition variables are the other service territory characteristics that statistically influence total cost levels. Examples of business condition variables are customer density, percentage of electric customers in total customers, percentage of forestation, etc.

2.3.2 Estimation Procedure and Translog Cost Function

As a starting point, we assume that the relationship between a utility's cost and the conditions that affect it, called "cost drivers," can be quantified and captured by a statistical function. This function, called a "cost function," allows PSE to specify cost as a dependent variable that can be explained by relevant independent or explanatory variables and associated parameters; the latter capture the effect of the independent variables on cost. Such a cost function is estimated using econometric techniques that rest on certain fundamental assumptions.

As implied by the term "independent," one of these assumptions is that the explanatory variables used in the model are factors that are outside the control of utility decision-makers. For instance, the wage paid to labour is driven by market conditions in the service territory and is largely outside the control of a firm's managers. On the other hand, the number of employees hired are within management's control, and thus cannot serve as an independent variable.

In general, cost is assumed to be a function of input prices, the output produced by the firm, and other independent variables that affect cost but are outside management's control. While a function specified in this manner can capture a reasonable level of cost variability, it does not explain all the elements that affect cost. Therefore, the function includes a random noise term to account for such idiosyncratic factors.

The following equation provides an example of a simple cost function:

$$C = \beta_o + \beta_1 * Y + \beta_2 * P + \varepsilon$$

In this equation, the terms C, Y, and P denote cost, output, and input prices, respectively. The β terms denote model parameters that capture the magnitude and sign of the effect of the explanatory variables on cost, and the error term captures random noise. The latter is assumed to be independent of the explanatory variables.

The data used to estimate this cost relationship can be from a single firm with multiple time observations (time series data), from many firms observed at a single time period (cross-sectional data), or from many firms with multiple time observations (cross-sectional time-series or panel data). The estimation procedure used to estimate model parameters is affected by the type of data used to estimate the model. In our present study, we have a panel dataset with cost data from multiple firms with observations starting in 2002 and extending to 2012. Additionally, we included Toronto Hydro's cost projections through 2019, allowing us to also benchmark those forecasts "out of sample". We use the model that is based on historical data and apply the estimated coefficients and projected independent variable values for Toronto Hydro to calculate a predicted benchmark value. This predicted benchmark value is then compared to Toronto Hydro's projected total cost amount.

A cost function can be specified as a single equation or a system of equations to get parameter estimates. A single equation model is specified as noted above. A system of equations results from applying economic theory that permits the derivation of cost share equations that are estimated along with the cost function to obtain more precise parameter estimates. The estimation procedure used for the total cost studies incorporates a system of equations that are

based on the cost shares of OM&A and capital costs. This produces more precise estimates and benchmark results. The reliability benchmarking exercise uses a single equation model only.

2.3.2.1 Statistical Tests

The precision of parameter estimates is an important dimension of the cost estimation exercise. It identifies business condition variables that have a statistically significant effect on cost. In particular, standard errors of parameter estimates, which measure the precision with which a parameter is estimated, are used to construct a test of a relevant hypothesis. The hypothesis to be tested is "the explanatory variable in question has no statistically significant effect on cost." This procedure is called the *t*-test. A variable is statistically significant if this hypothesis is rejected at a pre-specified level of confidence. We use a 90 percent confidence threshold in our research.

A cost model with plausibly signed and statistically significant parameter estimates is ultimately used to assess the cost performance of each firm in the sample. By "plausibly signed" we mean that its sign (positive/negative) accords with our intuitive understanding of the relationship between that parameter and the variable. For example, we would "expect" to see costs rise as the number of customers served increases (a positive sign for the customer parameter).

A cost model with estimated parameters is fitted with the business conditions of each utility to generate cost benchmarks, against which actual cost is evaluated. A cost benchmark reflects the performance of an average utility facing the business conditions of the utility whose values are used to generate the benchmark.

If a given utility's actual cost is below the benchmark cost, its cost performance is better than average—it spent less than did a hypothetical utility (with the same particular characteristics) would be expected to spend. If its actual cost is above the benchmark cost, its cost performance is worse than average. A statistical test of a cost efficiency hypothesis, based on the *t*-test, can also be constructed to identify whether the cost performance identified by the above exercise is statistically significantly different from average.

2.3.2.2 Model Specification

A translog function is selected for the total cost model estimated in this study. The translog cost function was the same functional form chosen by PEG in their 4th Generation Incentive Regulation benchmarking research and the same one preferred by the Board in the November 2013 Board Report. Its general form, after suppressing time and firm subscripts, is given by:

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

In this specification, $\alpha's$ and $\beta's$ are model parameters, and ε is the random noise term. In addition, Y_i quantifies output, W_j input prices, Z_h other business condition variables, and *t* is a

time trend term. This form has been widely used in cost function research.[21] A major advantage is its flexibility, which permits it to provide a good approximation for the wide range of functional forms that the data can reflect.[22]

We also note several theoretical assumptions that aid in model specification and estimation. Among these is the idea that if all input prices rise, cost also rises proportionally. This is known as linear homogeneity, and it allows the restriction that the sum of input price parameters equals one. An additional restriction is symmetry in the parameters of the price interaction terms. In addition, we use Shepherd's lemma to derive cost share equations that we estimate jointly with the cost function. The general form of the cost share equation for input *j* is given by:

$$S_j = \beta_j + \sum_i \alpha_{ij} \ln Y_i + \sum_n \beta_{jn} \ln W_n + \upsilon_j$$

For the reliability models, we also specify quadratic models that include first-order explanatory terms and their squared counterparts. These models are specified as single equation models. The following presents the general form the reliability models take. Both the SAIDI and the SAIFI models are constructed in the same manner. We illustrate the basic form of the SAIDI model below.

$$SAIDI_j = \beta_o + \sum_i \alpha_i \ln X_i + \sum_i \beta_{ii} \ln X_i * \ln X_{\mathrm{i}} + \alpha_t t + \varepsilon$$

2.3.2.3 Estimation Approach

One of the reasons for joint estimation of cost and cost share model parameters is that there is contemporaneous correlation between the error terms in these systems of equations. Such correlation allows the use of a system of regression equations that result in more efficient (precise) estimates. In this study, the systems estimator we use is Feasible Generalized Least Squares ("FGLS").

In particular, PSE uses an iterative FGLS procedure that estimates the unknown error matrix consistently.[23] The estimates we compute are equivalent to Maximum Likelihood Estimates ("MLEs").[24] Our estimates thus possess all the desirable properties of MLEs, which include consistency and efficiency. Since the cost share equations by definition must sum to one at every observation, one cost share equation is redundant and is dropped. This does not pose a problem, since yet another property of the MLE procedure is that it is invariant to any such parameterization. Hence, the choice of which equation to drop will not affect the resulting estimates.

The single equation model is estimated using generalized least squares (GLS) in order to correct

[21] In their Monte Carlo studies of functional forms' performance, Gagne and Ouellette (1998) use the translog as a benchmark because "it is the most widely used" functional form.

[22] See Guilkey, et al. (1983)

[23] See Zellner, A. (1962).

[24] See Dhrymes, P.J. (1971), Oberhofer, W. and J. Kmenta (1974) and Magnus, J.R. (1978).

for cross-sectional heteroskedasticity and autocorrelation. The parameter estimates that result from this procedure are both consistent and efficient.

2.4 Benchmarks for Future Years

The same econometric model and its associated parameter values that are estimated using historical data (and used to develop Toronto Hydro's historical benchmarks) are also used to calculate the company's benchmarks for future years. These parameter values are combined with projected variable values to calculate the expected total costs (or reliability) of Toronto Hydro in the future years of the Custom IR period.[25]

As a hypothetical and illustrative example of this procedure, assume we have a simple econometric model that only includes a constant and the number of customers as independent variables when predicting total cost levels. Using the historical sample data from 2002-2012, we estimate this simple model and find an equation that indicates:

Costs = 100 + (10*N)

where N is the number of customers served.[26] In this simplified case, the historical benchmarks would be calculated by inserting the actual number of customers for each year for the studied utility. Assume in 2002, Toronto Hydro's number of customers was 1,000. The Toronto Hydro benchmark costs for 2002 would then equal 100 + (10*1,000), or $10,100. If by 2012, Toronto Hydro's customer counts increase to 2,000, then its 2012 benchmark will equal 100 + (10*2,000), or $20,100.

This same procedure is used for developing the future year benchmarks, but instead of using actual customer number estimates, we use company projections of those variables. So if the company projects the number of customers at 2,500 in 2015, the 2015 benchmark is 100 + (10*2,500), or $25,100.

This procedure assumes that future total costs will be influenced by the independent variables in the same way that historical costs have been estimated to be influenced by the independent variables. Absent robust projected costs from a large sample of utilities, PSE is of the opinion that using the historical relationships between variables found to be statistically significant in the models is the best and most straightforward way of benchmarking future total cost levels.

PSE was provided OM&A expense, plant addition, reliability, customer counts, and line length projections from Toronto Hydro.[27] We were also provided peak demand projections, but these

[25] 2014 is also a future year for this analysis.

[26] Again this is a hypothetical, simplified model only for illustrative purposes.

[27] We were only provided OM&A expenses for the year 2015. We then escalated this amount in each year for 2016, 2017, 2018, and 2019 using the I-X formula of projected inflation of 1.7% minus a 0.3% stretch factor.

were projections of non-coincident peaks at the substation level.[28] We then adjusted the non-coincident peak demand estimates based on the historical ratio of the coincident peak demand of the Toronto Hydro system and the sum of the non-coincident substation peak demands.

Input prices need to also be projected into the future years. For the labour and non-labour components of the OM&A input price, PSE used price forecasts of the GDP-IPI and Ontario weekly average earnings from the Conference Board of Canada (Spring 2014 forecasts). The forecasts only go to 2018, so for the 2019 observation we used the 2018 growth rate and applied that same growth rate to 2019. We used the average annual 40-year growth rate in the EUCPI for the capital construction cost estimates.[29]

The rate of return for the entire period is set at the 2014 Board-calculated weighted average cost of capital of 6.56%. This assumes that interest rates and returns will stay constant from 2014 to 2019. PSE believes this assumption is a fairly conservative one, as interest rates are probably more likely to increase, rather than decrease in the next five years.

Other projected variables that enter the models include percent residential, urban core, electric customers in gas and electric operations, electric distribution in total electric gross plant, percent forestation, elevation standard deviation, and the percent plant that is underground. Since these variables are not likely to meaningfully change, they were set at their most recently available historical value for the future years. The wind variable and lightning variables were set at the average of the values from the historical period.

[28] By non-coincident we mean the projected peak values were for the annual peaks of those specific substations and not the demand coincident, or at the same time as, the system as a whole.

[29] Forty years is the assumed service life of capital when calculating the triangularized weighted average of capital in the benchmark year. This long period also enables the smoothing out of interest rate impacts.

3 Total Cost Benchmarking Results

This section provides the total cost benchmarking results for both the combined dataset (includes both Ontario and U.S. distributors) and the U.S.-only dataset (includes only U.S. utilities plus Toronto Hydro). We begin with the combined sample results.

3.1 Econometric Results for the Combined Dataset

The estimates from the total cost model based on combined data are presented in Table 4. We note that the cost function parameter estimates are plausibly signed and have reasonable magnitudes. The first order terms of all variables have the theoretically expected signs and are statistically significant.

Table 4 Combined Sample Total Cost Model Estimates

VARIABLE KEY						
		K=	Capital Price			
		N=	Number Retail Customers			
		D=	Peak Demand			
		UD=	Urban Core Dummy			
		DT=	Density: Customers/KM Line			
		PCE=	Percent Electric Customers in Gas & Electric Customers			
		PRV=	Percent Residential Deliveries in Total Deliveries			
		PDE=	Percent Distribution Plant in Total Electric Plant			

EXPLANATORY VARIABLE	ESTIMATED COEFFICIENT	T STATISTIC		EXPLANATORY VARIABLE	ESTIMATED COEFFICIENT	T STATISTIC
WK	0.539	264.115		PCE	0.104	3.637
KK	0.102	10.192				
KN	-0.019	-2.982		PDE	0.066	3.438
KD	0.017	2.717				
				PRV	0.016	2.152
N	0.967	43.413				
NN	0.021	1.178		Trend	0.003	2.943
ND	-0.024	-2.140				
				Constant	19.564	1428.487
D	0.114	5.339				
DD	0.029	4.707		System Rbar-Squared	0.985	
UD	0.007	3.614		Sample Period:	2002-2012	
DT	-0.149	-11.850		Number of Observations	1650	

Total cost increases with higher capital prices and output quantities. At the sample mean, a 1% increase in the number of customers and peak demand are estimated to raise cost by 0.97% and 0.11%, respectively. The number of customers served is clearly the dominant output-related cost driver, which is an expected result for an electric distribution total cost model. Input prices also will increase total costs. Holding the effect of all other variables constant, we find that a 1% increase in the price of capital raises cost by 0.54%. This is higher than the elasticity of the price of the OM&A input, which is about 0.46%. Based on linear homogeneity, the OM&A input price estimate is predetermined to be one minus the capital price estimate. The estimates reflect the capital intensiveness of the power distribution business.

The business condition coefficients are also signed as our hypothesis would suggest. Utilities serving largely rural areas experience greater challenges relative to their suburban counterparts.

Cost is also higher for utilities that serve an urban core, which is defined as serving a city with a population of at least one million. Unit capital costs tend to decrease as customer density increases (i.e., rural areas will cost more to serve than suburban areas), but will then begin to increase as the area transitions from a suburban setting to an urban or metropolitan setting. This notion of a "U-Shaped" cost structure (i.e., rural unit costs are high, suburban unit costs are lower, and urban core unit costs increase again) is supported by an engineering design study found in the Appendix of this report.[30]

The density variable, therefore, adjusts for serving a rural service area, whereas the urban variable adjusts for serving a large urban core. As just noted, the density variable's parameter is negative and is statistically significant, which reflects the economies achieved from serving more customers per a given line length. The urban variable is positive and statistically significant, reflecting the added costs and difficulties of serving a large urban area.

The remaining coefficients are positive, reflecting: (1) the economies obtained from diversification, in the case of utilities that serve gas customers, (2) economies of scope, in the case of utilities that are vertically integrated and, (3) economies from serving more of a non-residential load. In particular, the higher percentage of electric customers (out of total electric and gas customers), the higher the cost, due to lack of economies of diversification. The higher the percent of electric distribution plant in total electric plant, the higher the cost. This indicates that vertically integrated utilities enjoy economies of scope that are not available to distribution-only utilities. Finally, the higher the percentage of residential deliveries (out of total power deliveries), the more "peaky" the system-load becomes, likely straining the system during peak times.

The estimate of the trend variable parameter is 0.3%. This suggests a modest upward shift in cost over time. This econometric trend indicates a modest negative productivity trend for the combined U.S. and Ontario electric distribution industry.

The next table presents the Toronto Hydro benchmark results from the combined total cost model for an average of the 2010 to 2012 years.

Table 5 Average 2010-2012 Toronto Hydro Combined Sample Total Cost Benchmark Results

Year	Actual	Predicted		% Difference	P-Value
Average 2010-2012	607,374,528	752,360,858		-21.5%	0.082

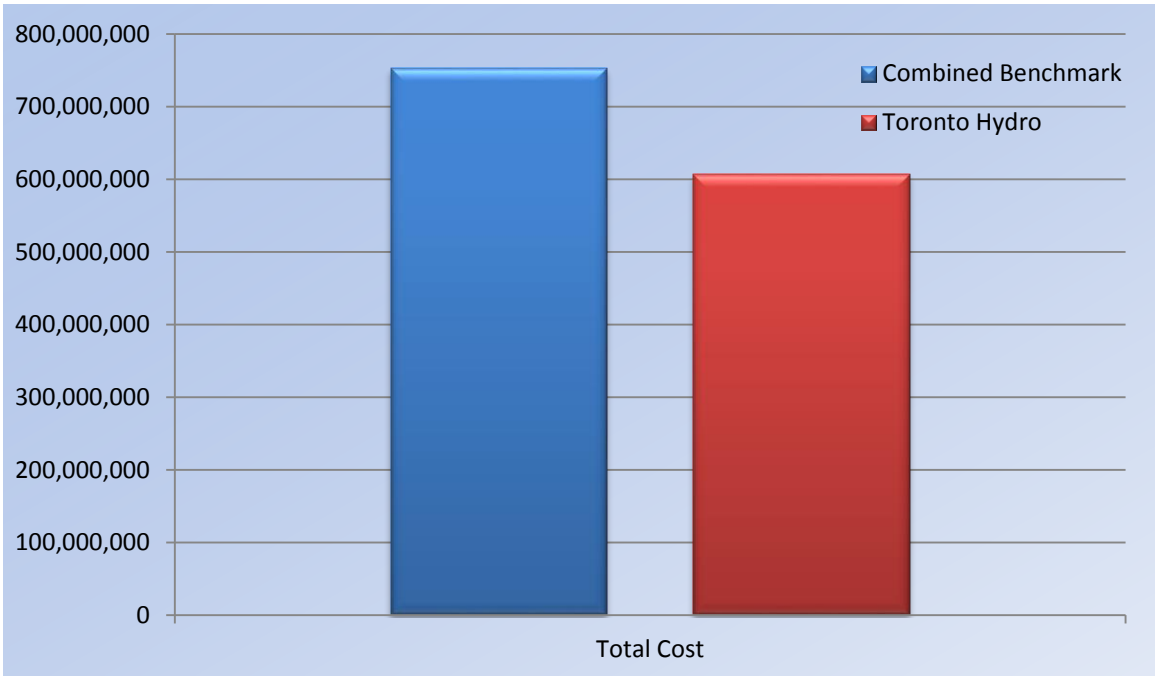
Actual cost is below the predicted or benchmark value by about 21.5 percent. This is a statistically significant difference with a 90 percent degree of confidence, and shows that when benchmarked relative to the power distributors of Ontario and the U.S., Toronto Hydro has a statistically significantly superior total cost performance.[31]

[30] The report is titled, "Capital Requirements of Serving Developed Environments".

[31] The 90 percent confidence level assumes a one-tailed rather than a two-tailed test and is the same one used by

Put into dollar terms, the 2010-2012 average total costs of Toronto Hydro were expected to be $752.4 million, but were actually $607.4 million. This is $145.0 million per year below the benchmark expectation over the 2010-2012 period. This result is illustrated in the figure below.

Figure 9 2010-2012 Combined Sample: Benchmarked Total Costs vs. Actual Costs (3-Year Average)



The following table breaks down the historical and forecast year benchmark and company total costs from 2002 to 2014 and then during the Custom IR period of 2015 to 2019. During the historical period Toronto Hydro has consistently been below its expected benchmark levels. In the second column, the percent below benchmark is illustrated. Notice that prior to 2007 the company was consistently near 30% below benchmark expectations. This is suggestive that the company's capital was in need of investment. It is our understanding that around 2006 or 2007 the company increased its capital investments. This has moved the company's total cost performance from 30% below benchmark to 17% below by 2013. This movement to invest more in capital during that time frame is a reason why Toronto Hydro's total factor productivity ("TFP") declined in the recent past.

The company's Custom IR forecasts for OM&A and capital spending keep the company below benchmark levels, although not by as much as in the historical years. Nevertheless, they indicate that the company's proposed spending levels are reasonable and well within the normal range of the model expectations.

PEG in both the 3rd and 4th Generation Incentive Regulation benchmarking reports.

Table 6 2002-2019 Combined Sample Benchmark Total Costs vs. Historical and Projected

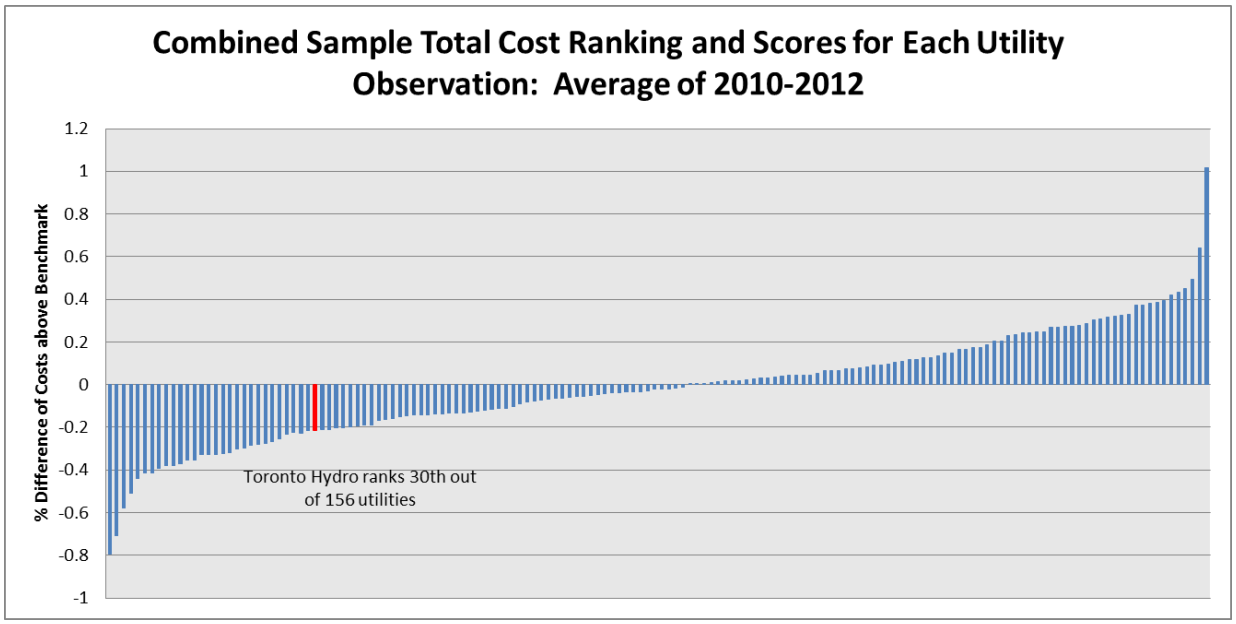
Year	Percent Below Combined Sample Total Cost Econometric Benchmark	Total Cost Econometric Benchmark, $M	Actual Total Cost THESL, $M
2002	29.2%	$582	$435
2003	27.8%	$595	$450
2004	28.5%	$604	$454
2005	33.6%	$629	$450
2006	32.8%	$635	$457
2007	31.5%	$664	$484
2008	27.7%	$683	$518
2009	27.1%	$703	$536
2010	22.1%	$731	$586
2011	17.8%	$762	$638
2012	24.4%	$764	$598
2013	17.3%	$781	$657
2014	14.7%	$845	$730

Custom IR Period

Year	Percent Below Combined Sample Total Cost Econometric Benchmark	Total Cost Econometric Benchmark, $M	Projected Total Cost THESL, $M
2015	7.1%	$884	$823
2016	5.3%	$935	$887
2017	3.8%	$985	$947
2018	3.5%	$1,037	$1,001
2019	2.6%	$1,092	$1,064

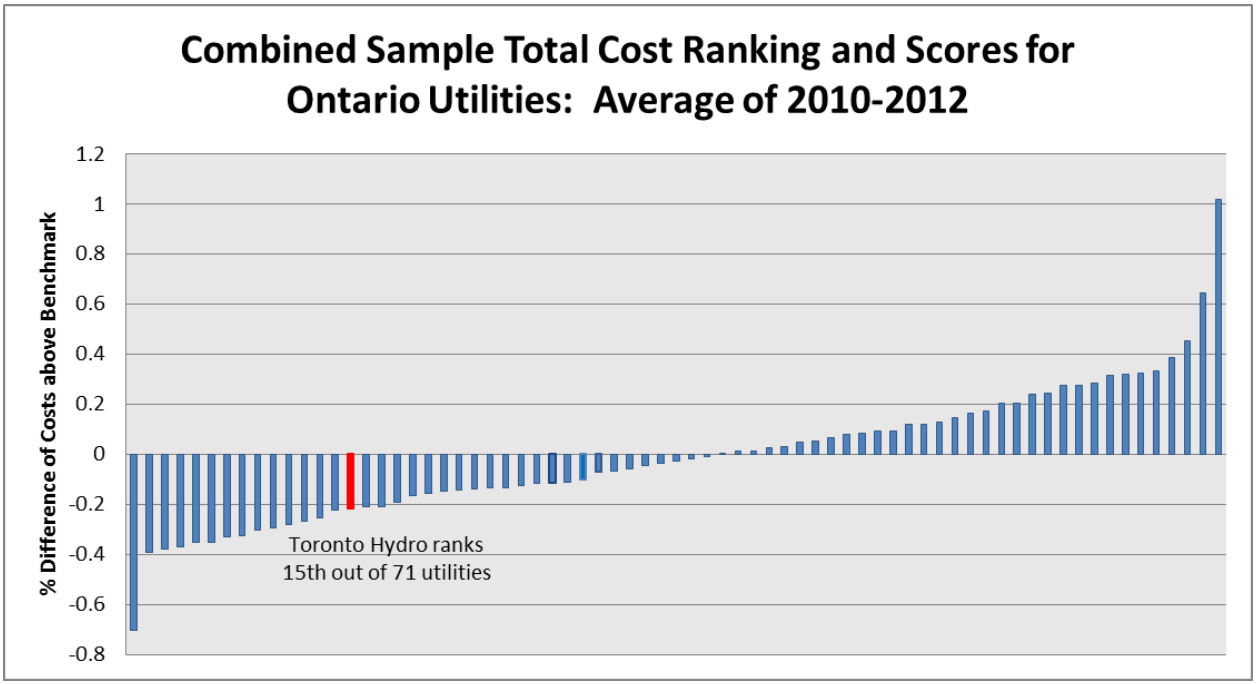
The combined sample total cost observations for each utility can be ranked based on the percent difference in the actual total costs to the benchmark total costs. Toronto Hydro finds itself 30th out of 156 utilities included in the combined sample when an average of the 2010-2012 differences are ranked. The distribution of utilities and the company's placement is illustrated in the following graph.

Figure 10 Combined Sample: Econometric Total Cost Ranking



The following figure takes the same combined benchmarking results as previously shown, but isolates the rankings to only include Ontario distributor observations. Toronto Hydro ranks 15th out of the 71 Ontario distributors in the combined benchmarking results.

Figure 11 Combined Sample, Ontario Utilities Only: Econometric Total Cost Ranking



3.2 Econometric Results for the U.S.-Only Dataset

The estimates from the total cost model based on the U.S. data are presented in Table 7. The results in the table show that the cost function parameter estimates have plausible signs and magnitudes. The first order terms of all variables that are fully interacted have the theoretically expected signs and are statistically significant.

Table 7 U.S. Total Cost Model Estimates

		K=	Capital Price			
		N=	Number Retail Customers			
		D=	Peak Demand			
		UD=	Urban Core Dummy			
		PCE=	Percent Electric Customers in Gas & Electric Customers			
		PRV=	Percent Residential Deliveries in Total Deliveries			
		PDE=	Percent Distribution Plant in Total Electric Plant			
		UG=	Percent Distribution Plant Underground			
		ED=	Elevation Standard Deviation			
		PF=	Percent Forestation			
EXPLANATORY VARIABLE	**ESTIMATED COEFFICIENT**	**T STATISTIC**		**EXPLANATORY VARIABLE**	**ESTIMATED COEFFICIENT**	**T STATISTIC**
WK	0.555	143.656		PDE	0.122	7.596
KK	0.070	4.190				
KN	-0.010	-1.022		UG	-0.035	-2.305
KD	0.013	1.278				
				ED	0.013	2.140
N	0.732	30.652				
NN	0.270	3.274		PF	0.020	3.489
ND	-0.177	-2.197				
				Trend	0.003	2.872
D	0.220	8.916				
DD	0.141	1.677		Constant	20.098	1533.465
UD	0.016	5.687		System Rbar-Squared	0.958	
PCE	0.132	4.793		Sample Period:	2002-2012	
PRV	0.039	2.604		Number of Observations	880	

We note that cost is higher the higher the output quantities. At the sample mean, a 1% increase in the number of customers is estimated to raise cost by 0.73%. A one percent hike in peak demand is estimated to increase cost by 0.22%. As in the combined model, the number of customers served is clearly the dominant output-related cost driver.

The coefficients on the additional variables were also plausible. Utilities that serve an urban core with 1 million or more residents have higher costs than suburban utilities. Cost is also higher for utilities that only serve electric customers relative to those that serve both gas and electric customers. In addition, a utility that serves a more residential load, as measured by higher values

of percent deliveries that are residential, has greater cost relative to one that serves a more commercial and industrial load.

Further, the greater the percentage of the electric plant that is distribution-related, reflecting a lesser degree of vertical integration, the higher the OM&A cost incurred by the utility. On the other hand, undergrounding distribution capital lowers cost. Finally, greater variability in elevation and the higher the percentage of forestation of a service territory result in higher cost. The estimate of the trend variable parameter is 0.3%. This suggests a modest upward shift in cost over time (i.e., negative productivity). The estimates on all of the first order variable terms are statistically significant at the 90 percent confidence level. We present the benchmark results from the model in Table 8.

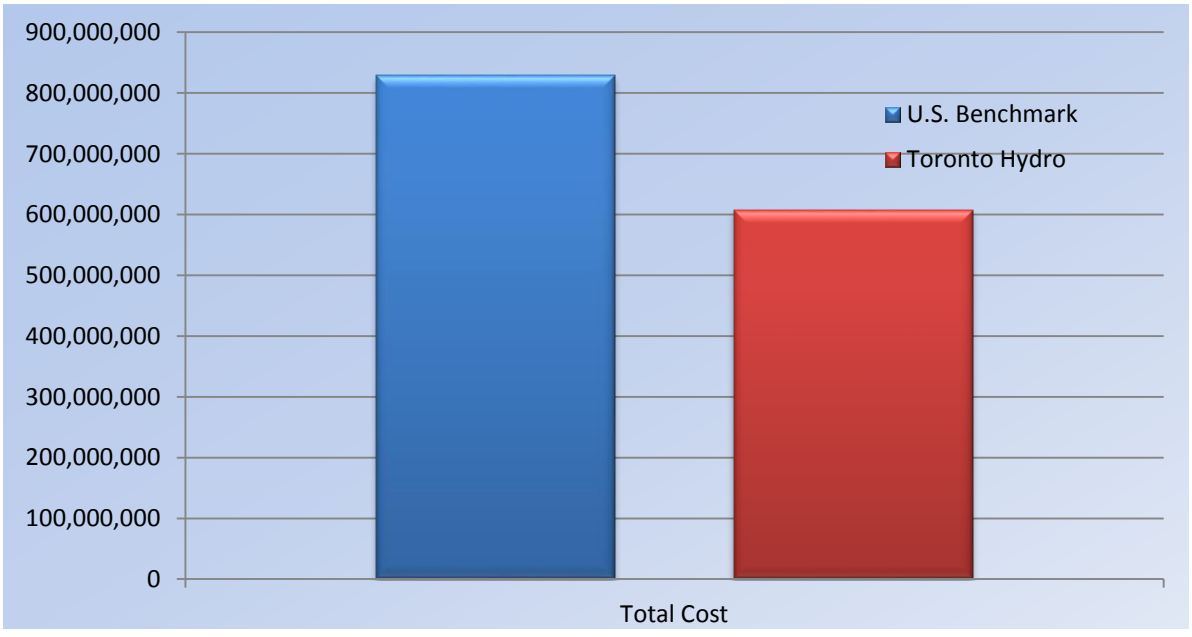
Table 8 2010-2012 Average Toronto Hydro U.S. Total Cost Benchmark Results

Year	Actual	Predicted		% Difference	P-Value
2010-2012 Average	607,374,528	828,660,305		-31.1%	0.005

We note that Toronto Hydro's three-year average cost performance is good. Actual cost is below the predicted or benchmark value by about 31%. This performance score is statistically significant at least at the 90% confidence level and shows that when benchmarked relative to the power distributors of the U.S., Toronto Hydro is a superior total cost performer.

Put into dollar terms, the 2010-2012 average total costs of Toronto Hydro were expected to be $828.7 million. The actual observed costs are 31 percent below this mark. This is an annual difference of $221.3 million. This result is illustrated in the graph below.

Figure 12 2010-2012 U.S.-Only Sample: Benchmarked Total Costs vs. Actual Costs (3-Year Average)



The next table breaks down the benchmark total costs and company total costs from 2002 to 2019. During the historical period (2002-2013), Toronto Hydro has consistently been below its expected benchmark levels. Its actual total cost is expected to remain below the benchmark in the Custom IR forecast years, though, to a lesser extent than in the historical years. A similar pattern is found for the U.S. benchmark results as was seen in the combined results. Prior to 2008, total costs were about 40% below benchmark expectations. After capital investments increased, by 2013, the benchmark scores moderated to 25% below expectations (which is still a low cost level). Similar to the combined results, this illustrates the movement to upgrade the capital infrastructure on the system lowered TFP growth.

Table 9 2002-2019 U.S.-Only Sample Benchmark Total Costs vs. Historical and Projected

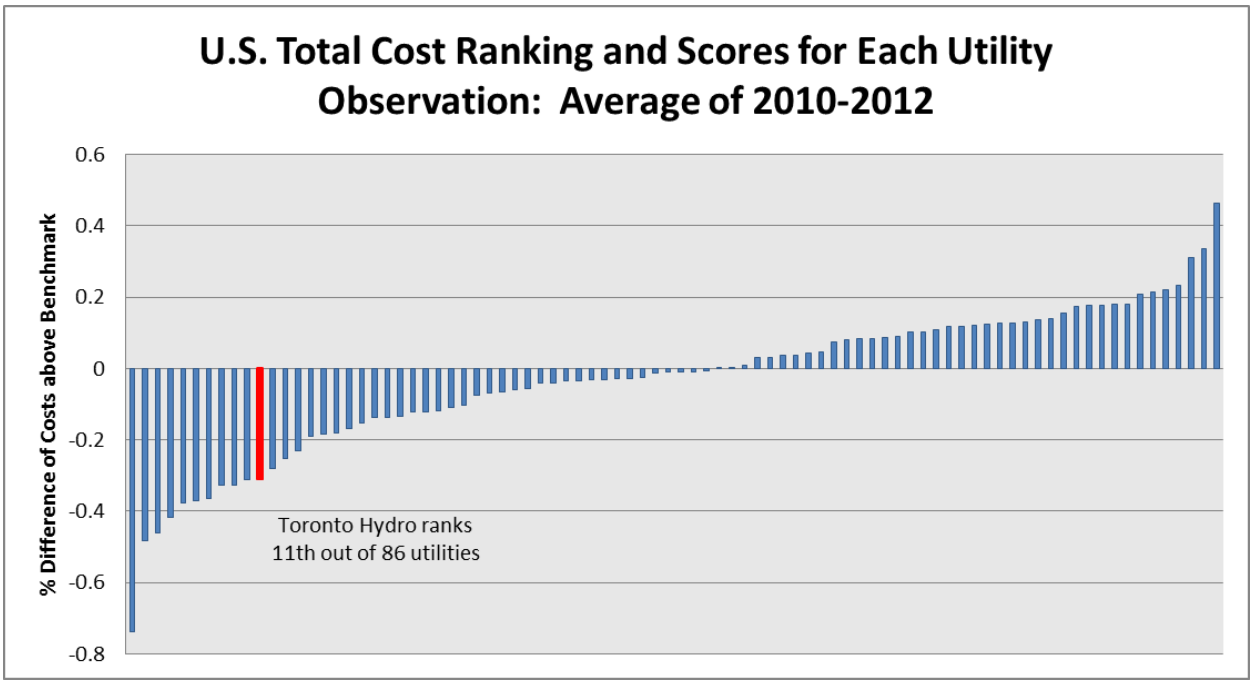
Year	Percent Below U.S. Total Cost Econometric Benchmark	Total Cost Econometric Benchmark, $M	Actual Total Cost THESL, $M
2002	40.8%	$654	$435
2003	39.2%	$667	$450
2004	38.5%	$667	$454
2005	45.1%	$706	$450
2006	44.0%	$710	$457
2007	43.9%	$752	$484
2008	39.0%	$765	$518
2009	39.4%	$795	$536
2010	33.8%	$822	$586
2011	27.6%	$840	$638
2012	32.0%	$824	$598
2013	24.6%	$841	$657
2014	21.8%	$907	$730

Custom IR Period

Year	Percent Below U.S. Total Cost Econometric Benchmark	Total Cost Econometric Benchmark, $M	Projected Total Cost THESL, $M
2015	13.1%	$938	$823
2016	11.4%	$994	$887
2017	9.9%	$1,046	$947
2018	9.5%	$1,101	$1,001
2019	8.5%	$1,159	$1,064

The U.S. total cost observations for each utility can be ranked based on the percent difference in the actual total costs to the benchmark total costs. Toronto Hydro finds itself 11th out of 86 utilities included in the U.S. sample when an average of the 2010-2012 differences are ranked. The distribution of utilities and the company's placement is illustrated in the following graph.

Figure 13 U.S.-Only Sample: Total Cost Econometric Ranking



4 Reliability Benchmarking Variable Definitions, Datasets, Models

Nearly all jurisdictions that require reporting of reliability indicators include the metrics of SAIDI, SAIFI, and Customer Average Interruption Duration Index ("CAIDI").[32] SAIDI measures the average duration of sustained interruptions per utility customer. SAIFI is a gauge of the average frequency of sustained interruptions per customer. CAIDI evaluates the average duration time per sustained interruption. SAIDI is thus the product of SAIFI and CAIDI.

$$\text{SAIDI} = \frac{\Sigma_i \text{Minutes Customer } 'i' \text{ is without Service}}{\text{Total Number of Customers on System}}$$

$$\text{SAIFI} = \frac{\Sigma_i \text{Frequency Customer } 'i' \text{ is without Service}}{\text{Total Number of Customers on System}}$$

$$\text{CAIDI} = \frac{\text{SAIDI}}{\text{SAIFI}}$$

Several jurisdictions exclude extraordinary events from reliability statistics, with the goal of increasing historical comparability. The bulk of excluded events stem from major storms. These severe storms vary in number and intensity from year to year. MED definitions are determined by each regulatory commission. Definitions vary by state; some use the IEEE standard 1366-2003 to determine what constitutes a MED.[33] Other states have customized definitions. For example, for some states, if 10 percent of a utility's customers experience an outage lasting more than a 24-hour period, a MED has occurred. States are gradually shifting towards the IEEE standard; however, considerable differences across states remain. Ontario utilities do not record reliability indices that exclude any MEDs. As a result, we benchmark Toronto Hydro's reliability using datasets with gross recorded reliability metrics which include all outages.[34]

4.1 Data Sources

The industry reliability data for U.S. utilities is gathered through reports and rate case filings made public by state commissions. Reliability indices for the Ontario utilities are obtained from the annual RRR filings to the Board.

[32] Some states only require reporting of two of these measures. However, the excluded indicator can still be determined by the researcher. SAIDI is equal to the product of SAIFI and CAIDI.

[33] The IEEE 1366-2003 standard defines the "beta" method. If outages for a certain day exceed 2.5 standard deviations from the normal day, a major event day is declared. A normal day and the standard deviation are determined by the utility's previous five years of normal day data (not including the MEDs).

[34] Toronto Hydro's reliability indexes also do not include MEDs. The future projections assume normal weather with no extreme storms. Naturally, if a major weather event occurs the company's indexes will likely be higher than the projections for that year.

The reliability benchmarking models we developed use the following variables:

- Density (customers per line mile);
- The number of retail customers;
- Percent plant that is distribution (out of total electricity plant);
- Forestation;
- The standard deviation of elevation in the service territory;
- The number of retail customers served
- Whether a utility serves an urban core with 1 million or more residents;
- The level of wind and lightning within a given service territory; and
- A time trend.

The sources for all the variables (except for the measures of weather) are detailed in Section 2.1 since they are also used in the total cost research. The variables used to construct the wind and lightning values are collected from National Climatic Data Center ("NCDC") of the National Oceanic and Atmospheric Administration ("NOAA").[35]

We constructed the wind variable using hourly weather station data for each service territory within the sample. In each hour, we subtracted the recorded wind speed by ten knots. If the wind speed was at or below ten knots, we set the value equal to zero. Similar to how cooling and heating degrees are calculated, we determined the level of wind speed above the 10 knot threshold in each hour for each service territory and summed up that value for each year.

The lightning variable measures the total number of strikes in each utility's service territory. Both the wind and lightning variables are calculated at a county-by-county level for the U.S. distributors. Wind data for the Ontario sample is generated using the closest weather station observation to each distributor. Lightning data is not available for Ontario distributors; Toronto Hydro was assigned the lightning value of Rochester Gas & Electric, which serves on the New York side of Lake Ontario.

As in the case of total cost, we benchmark Toronto Hydro's reliability using a combined dataset (made up of U.S. and Ontario utilities), and a U.S.-only sample. The former includes 46 U.S. and 70 Ontario utilities, while the latter includes 46 U.S. utilities and Toronto Hydro. The data for the U.S. utilities in each sample spans the years 2002 to 2012. In each sample, some utilities have data available from the early 2000's to 2012, while others have more limited data available. The data for the Ontario utilities spans the years 2005 to 2012. We also inserted future reliability metric projections from Toronto Hydro, which assume full funding of the proposed capital program. The following table lists the utilities found in the combined analysis.

[35] http://www.ncdc.noaa.gov/

Table 10 Sampled Utilities for Reliability Benchmarking

Company	SAIFI (Avg last 3 years)	SAIDI (Avg last 3 years)	Company	SAIFI (Avg last 3 years)	SAIDI (Avg last 3 years)
Ameren UE	1.085	173.973	E.L.K. Energy Inc.	1.048	180.624
Avista Corp	1.262	165.575	Enersource Hydro Mississauga Inc.	1.644	42.819
Baltimore Gas & Electric Co	1.900	1006.231	Entegrus Powerlines	1.890	96.000
Central Hudson Gas & Electric Corp	2.338	1602.926	Enwin Utilities Ltd.	2.201	82.394
Central Maine Power Co	3.059	810.394	Erie Thames Powerlines Corporation	2.007	302.114
Cincinnati Gas & Electric Co (Duke Energy OH)	2.247	523.055	Espanola Regional Hydro Distribution Corp	0.408	51.285
Cleveland Electric Illuminating Co (First Energy)	1.388	317.131	Essex Powerlines Corporation	4.034	331.169
Commonwealth Edison Co	1.339	318.653	Festival Hydro Inc.	2.162	107.583
Connecticut Light & Power Co	2.029	2118.454	Fort Frances Power Corporation	0.269	15.159
Consolidated Edison Co of New York Inc	0.283	434.574	Greater Sudbury Hydro Inc.	1.125	79.855
Consumers Energy Company	1.469	539.602	Grimsby Power Incorporated	1.317	118.549
Dayton Power & Light Co	1.494	377.346	Guelph Hydro Electric Systems Inc.	1.987	62.237
Detroit Edison	1.150	498.848	Haldimand County Hydro Inc.	2.244	249.969
Empire District Electric Co	2.808	1279.733	Halton Hills Hydro Inc.	2.058	96.942
Entergy Arkansas Inc	1.853	197.820	Hearst Power Distribution Company Ltd.	3.018	584.026
Florida Power & Light Co	1.189	89.704	Horizon Utilities Corporation	1.830	95.547
Florida Power Corp	1.800	113.730	Hydro 2000 Inc.	2.364	442.461
Green Mountain Power Corp	1.708	302.452	Hydro Hawkesbury Inc.	1.106	59.543
Gulf Power Co	1.839	200.885	Hydro One Brampton Networks Inc.	1.306	43.025
Indianapolis Power & Light Co	0.976	87.313	Hydro Ottawa Limited	1.621	107.665
Kansas City Power & Light Co	0.935	176.922	Kenora Hydro Electric Corporation Ltd.	3.494	142.736
Kentucky Power Co (AEP)	3.226	1073.722	Kingston Hydro Corporation	1.222	87.818
Louisville Gas And Electric Co	1.615	566.919	Kitchener-Wilmot Hydro Inc.	1.205	64.594
Madison Gas And Electric Co	0.593	53.617	Lakefront Utilities Inc.	2.215	187.156
New York State Electric & Gas Corp	2.025	970.388	Lakeland Power Distribution Ltd.	1.075	220.369
Niagara Mohawk Power Corp (National Grid)	1.136	198.910	London Hydro Inc.	1.554	68.317
Northern Indiana Public Service Co	1.393	431.224	Midland Power Utility Corporation	1.281	163.675
Ohio Edison Co (First Energy)	1.536	271.432	Milton Hydro Distribution Inc.	1.016	56.554
Ohio Power Co (AEP)	1.567	578.371	Newmarket-Tay Power Distribution Ltd.	0.467	41.571
Oklahoma Gas And Electric Co	1.743	875.749	Niagara Peninsula Energy Inc.	1.477	147.760
Orange And Rockland Utilities Inc	1.634	506.472	Niagara-On-The-Lake Hydro Inc.	0.523	65.914
Pacific Gas And Electric Co	1.250	211.285	Norfolk Power Distribution Inc.	2.141	212.790
Portland General Electric Co	0.893	188.739	North Bay Hydro Distribution Limited	4.275	152.359
Potomac Electric Power Co	2.345	545.678	Northern Ontario Wires Inc.	2.574	439.109
PSI Energy Inc (Duke Energy IN)	1.707	298.270	Oakville Hydro Electricity Distribution Inc.	1.027	39.351
Rochester Gas And Electric Corp	0.914	129.115	Orangeville Hydro Limited	2.050	172.702
San Diego Gas & Electric Co	0.878	148.776	Orillia Power Distribution Corporation	1.923	79.548
Southern California Edison Co	0.991	152.418	Oshawa Puc Networks Inc.	1.127	69.436
Southern Indiana Gas And Electric Co (Vectern)	1.398	195.629	Ottawa River Power Corporation	2.667	209.857
Tampa Electric Co	1.144	108.600	Parry Sound Power Corporation	0.341	18.487
United Illuminating Co	1.446	1204.454	Peterborough Distribution Incorporated	2.110	183.288
Virginia Electric And Power Co	2.071	335.144	Powerstream Inc.	1.245	62.529
Western Massachusetts Electric Co	1.713	615.368	PUC Distribution Inc.	3.046	185.259
Wisconsin Electric Power Co	0.667	80.988	Renfrew Hydro Inc.	2.110	115.494
Wisconsin Power And Light Co	0.978	140.719	Rideau St. Lawrence Distribution Inc.	1.378	121.799
Wisconsin Public Service Co	1.558	425.646	Sioux Lookout Hydro Inc.	1.954	213.565
Algoma Power Inc.	6.464	821.297	St. Thomas Energy Inc.	1.007	30.387
Atikokan Hydro Inc.	1.231	37.673	Thunder Bay Hydro Electricity Distribution	3.780	131.703
Bluewater Power Distribution Corporation	3.492	191.637	Tillsonburg Hydro Inc	4.793	201.273
Brant County Power Inc.	1.714	126.412	Toronto Hydro-Electric System Limited	1.715	91.620
Brantford Power Inc.	1.439	32.554	Veridian Connections Inc.	2.160	94.568

Burlington Hydro Inc.	1.178	61.495	Wasaga Distribution Inc.	1.464	92.060
Cambridge And North Dumfries Hydro Inc.	1.215	54.669	Waterloo North Hydro Inc.	1.217	84.426
Canadian Niagara Power Inc.	2.642	162.256	Welland Hydro-Electric System Corp.	1.620	87.407
Centre Wellington Hydro Ltd.	1.976	186.557	Wellington North Power Inc.	1.288	15.172
Chapleau Public Utilities Corporation	1.307	294.017	West Coast Huron Energy Inc.	0.841	62.683
Collus Power Corporation	0.775	58.723	Westario Power Inc.	2.972	265.459
Cooperative Hydro Embrun Inc.	0.322	50.072	Whitby Hydro Electric Corporation	1.128	52.952
Total Number of Sampled Firms	116				
Number of U.S. Sampled Firms	46				
Number of Ontario Sampled Firms	70				

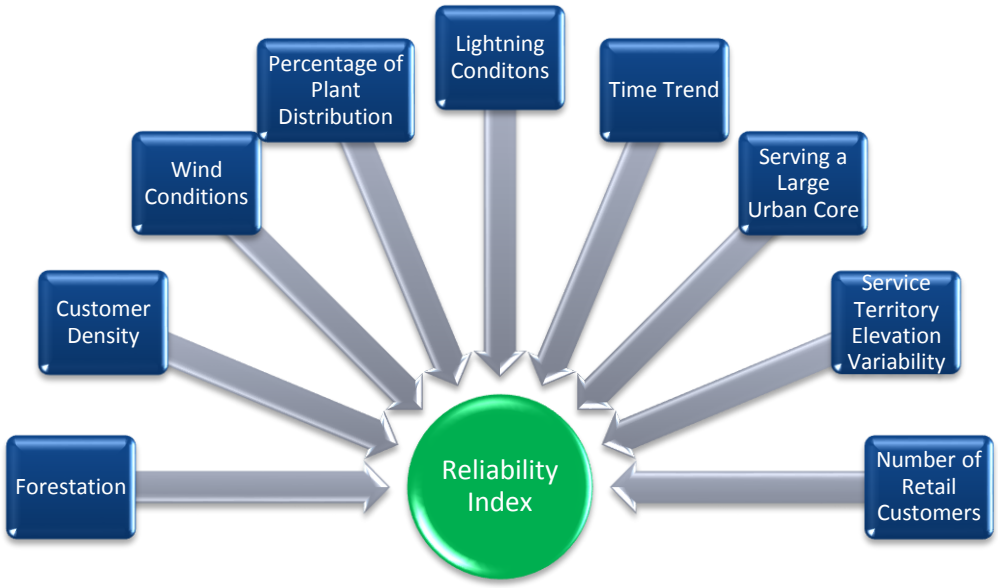
4.2 Econometric Reliability Benchmarking Model

This section offers background information on PSE's benchmarking approach and further explains how the benchmarks were calculated. The parameter estimates and benchmarking results for both the SAIFI and SAIDI models are provided in Section 5.

PSE's method of econometric modeling applies regression techniques to the sampled data to form a mathematical model. The model accepts inputs (operating conditions, service territory data, etc.) and produces an expected reliability index for each observation. By using the model, given a set of operating conditions, PSE can estimate an "expected" or benchmark reliability level for each utility in each year.

The variables included in the econometric model for SAIDI and SAIFI are shown in the figure below.[36]

Figure 14 Variables in Econometric Reliability Models



This technique allows for "apples-to-apples" comparisons, and therefore produces a more accurate assessment of performance relative to simply making industry comparisons of SAIDI and SAIFI.

5 Reliability Benchmarking Results

Four econometric models were developed which measure reliability metrics which include all outages: a combined sample model and a U.S.-only sample model for SAIDI, and a combined and U.S.-only sample model for SAIFI. The explanatory variables in the models include:

- The forestation levels in each utility's service territory,
- Customer density (measured by the number of retail customers divided by distribution line miles),
- Sum of wind knots above ten in each hour of the year,
- The percentage of underground plant in total distribution plant,
- Whether a utility serves an urban core with more than 1 million residents,
- The number of retail customers,
- Lightning, and
- Variability in elevation within the service territory.

The models also include a time trend variable. The trend variable examines how reliability data

[36] The illustration shows all the variables used in both the combined and U.S.-only models. Not all of the variables are in both models.

has changed over time.

SAIDI and SAIFI are modeled using a quadratic functional form, where model variables include logged first order and square terms. The number of customers is logged but not squared, and is included to control for scale effect. The urban core dummy is neither logged nor squared, because it is a binary variable. This form allows us to adjust for non-linearity in variables in determining reliability levels.

Each model includes utilities with varying time-series lengths covering the years 2002 to 2012.[37] This type of dataset requires an estimation procedure that accounts for the cross-sectional time-series ("panel") nature of the data. We use a feasible generalized least squares ("FGLS") estimator that corrects for cross-sectional heterogeneity and addresses the panel form of the data. The estimator accomplishes this by correcting for group-wise (utility-by-utility) heteroskedasticy, and results in parameter estimates that are more accurate, consistent, and precise than methods that do not correct for group-wise heteroskedasticy.

The results from the SAIDI models based on the combined and U.S.-only datasets are presented in the following two tables.

Table 11 Combined Sample SAIDI Econometric Model Coefficients

Variable	Coefficient Estimate	T-Stat
Constant	5.251	79.880
Customers (Y)	0.127	9.840
Customer Density (D)	-0.764	-15.237
Urban (U)	-0.025	-5.206
D*D	0.238	1.930
Trend	0.018	2.019

Table 12 U.S.-Only SAIDI Econometric Model Coefficients

Variable	Coefficient Estimate	T-Stat
Constant	5.405	64.025
Customers (Y)	0.025	0.703
Wind (W)	0.168	1.842
Customer Density (D)	-0.173	-2.115
% Forestation (F)	0.517	4.701
W*W	0.157	1.068
D*D	-2.116	-6.751

[37] Utilities in the States began reporting reliability metrics at different times.

F*F	-0.244	-0.861
Trend	0.048	4.485

All first order parameter estimates, except the number of customers, have the expected signs and are statistically significant.[38] Utilities that serve more densely populated and highly urban service territories have shorter outage durations per customer. On the other hand, utilities that serve more forested and windy service territories have longer outage durations per customer.

The SAIFI models are similarly based on a quadratic specification. The results are presented in the tables below.

Table 13 Combined Sample SAIFI Econometric Model Coefficients

Variable	Coefficient Estimate	T-Stat
Constant	0.299	8.802
Customers (Y)	0.014	1.585
Customer Density (D)	-0.159	-5.522
Wind (W)	0.061	2.124
% Plant Distribution (DS)	0.101	3.452
Urban (U)	-0.031	-7.144
D*D	0.301	3.585
W*W	0.087	3.488
DS*DS	0.033	0.948
Trend	0.012	2.714

Table 14 U.S.-Only SAIFI Econometric Model Coefficients

Variable	Coefficient Estimate	T-Stat
Constant	0.423	9.932
Customers (Y)	-0.027	-1.780
Customer Density (D)	-0.154	-4.645
% Forestation (F)	0.241	5.234
Elevation (E)	0.109	4.414
Lightning (L)	0.217	9.862
D*D	-0.970	-8.907
F*F	0.211	1.797

[38] We kept the number of customers in the model because it is basically acting as a quadratic variable that is measuring scale economies. The reason it is considered a quadratic variable is because the left-hand side variable is defined as the number of outage minutes divided by the number of customers.

E*E	0.035	1.848
L*L	0.061	4.116
Trend	0.008	1.808

Utilities with more densely populated and highly urban service territories experience fewer outage frequencies per customer. Conversely, utilities with service territories that experience more lightning, windier conditions, and are more forested have more frequent outages per customer. In addition, those whose service territory elevation levels are more variable also experience more frequent outages per customer. Finally, utilities that have more distribution plant (as a percent of all electric plant) also have higher outage frequencies per customer.

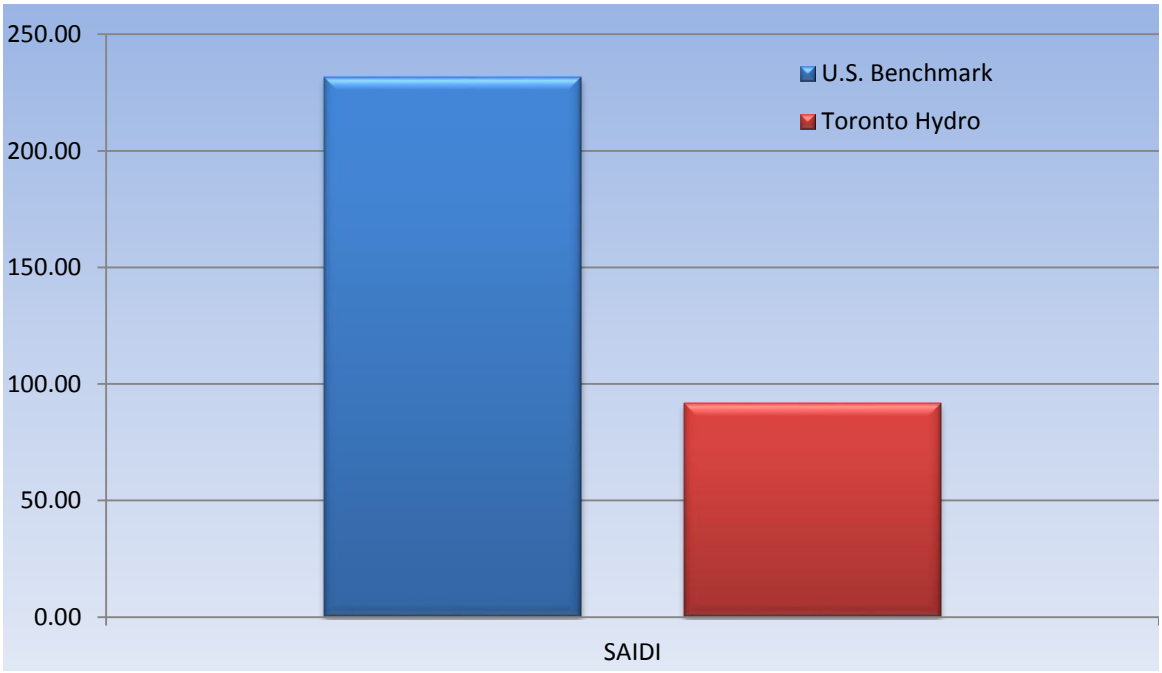
5.1 Combined Sample Econometric Reliability Results

We find that Toronto Hydro's 2010-2012 average SAIDI is 48 percent below the benchmark value when using the combined sample. This result is not, however, statistically significant at the 90 percent confidence level.

Our research on Toronto Hydro's 2010-2012 average SAIFI indicates that the reliability level in the combined dataset model is 73.4 percent above the benchmark value. This implies worse than average SAIFI performance, and is statistically significant at a 90 percent confidence level.

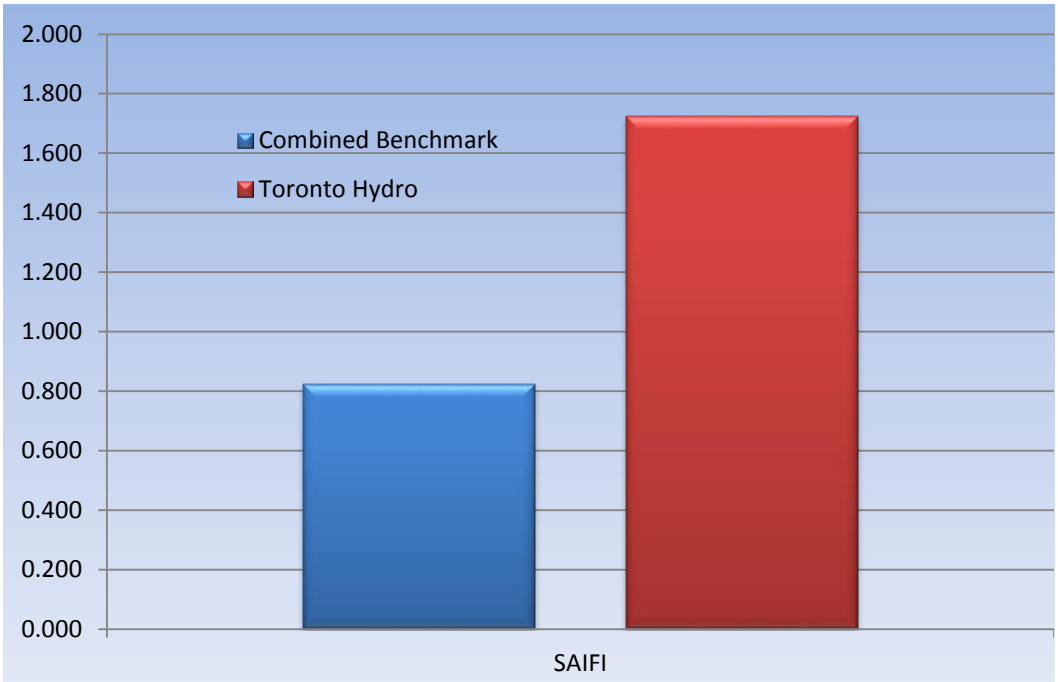
The benchmark comparisons for SAIDI are summarized in the following graph.

Figure 15 2010-2012 Combined Sample: Benchmarked SAIDI vs. Actual SAIDI (3-year Average)



The benchmark comparisons for SAIFI are summarized in the following graph.

Figure 16 2010-2012 Combined Sample: Benchmarked SAIFI vs. Actual SAIFI (3-Year Average)



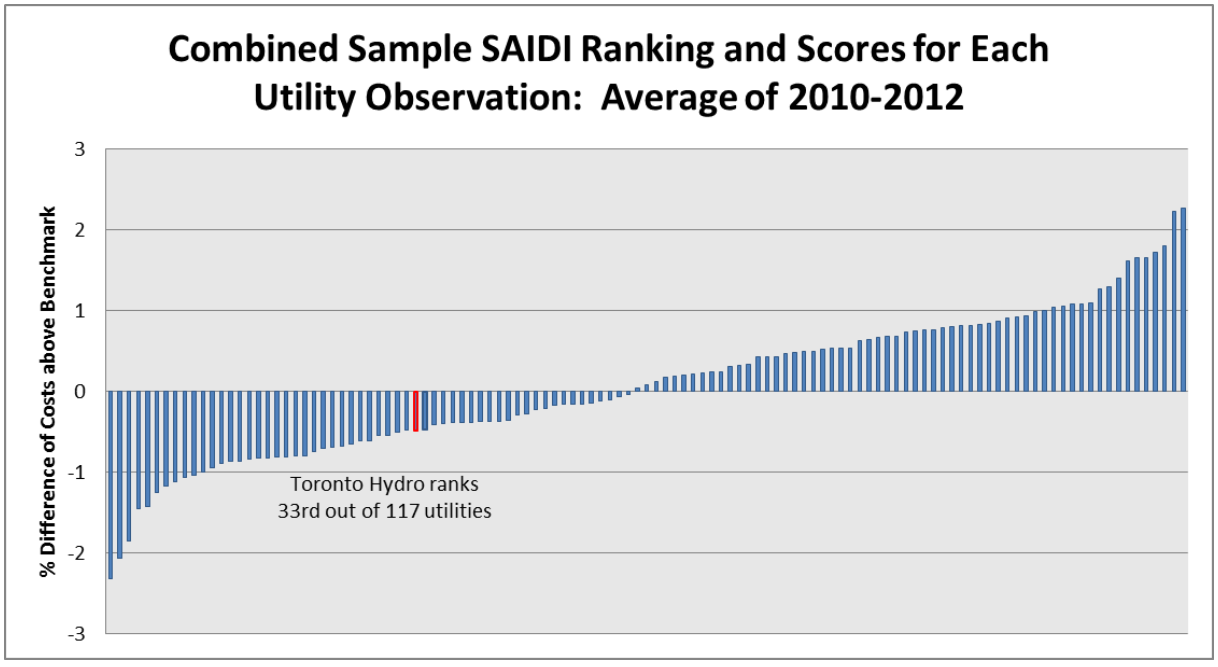
The year-by-year breakdowns for both SAIDI and SAIFI are provided in the following table. This table provides both the actual reliability values for Toronto Hydro, along with the econometric benchmark value. Notice that Toronto Hydro has consistently been below its benchmark values for SAIDI, and consistently above its benchmark values in regards to SAIFI. This is the case in the historical and forecast years. Based on Toronto Hydro's projections, its high SAIFI metrics will converge towards the benchmark value during the forecasted time period, although still remain higher than benchmark values. The Custom IR period is shaded in green.

Table 15 Combined Sample: Econometric Reliability vs. Actual and Projected Reliability

Year	SAIDI (Econometric Benchmark)	SAIDI (THESL Value)	SAIDI (% Difference)	SAIFI (Econometric Benchmark)	SAIFI (THESL Value)	SAIFI (% Difference)
2005	124.13	104.89	-17%	0.77	2.01	+96%
2006	126.75	94.06	-30%	0.79	2.17	+101%
2007	129.43	117.00	-10%	0.80	2.27	+104%
2008	132.23	74.40	-58%	0.81	1.76	+78%
2009	134.30	174.17	+26%	0.81	1.86	+83%
2010	135.97	99.60	-31%	0.81	1.95	+88%
2011	148.96	85.80	-55%	0.82	1.62	+68%
2012	162.18	90.00	-59%	0.84	1.60	+64%
2013	166.50	1271.40	+203%	0.87	2.91	+121%
2014	169.34	71.40	-86%	0.87	1.58	+60%
2015	171.13	73.80	-84%	0.88	1.55	+57%
2016	172.81	70.20	-90%	0.89	1.44	+48%
2017	174.92	67.20	-96%	0.90	1.36	+42%
2018	177.04	64.80	-101%	0.91	1.27	+34%
2019	179.14	61.20	-107%	0.92	1.19	+26%

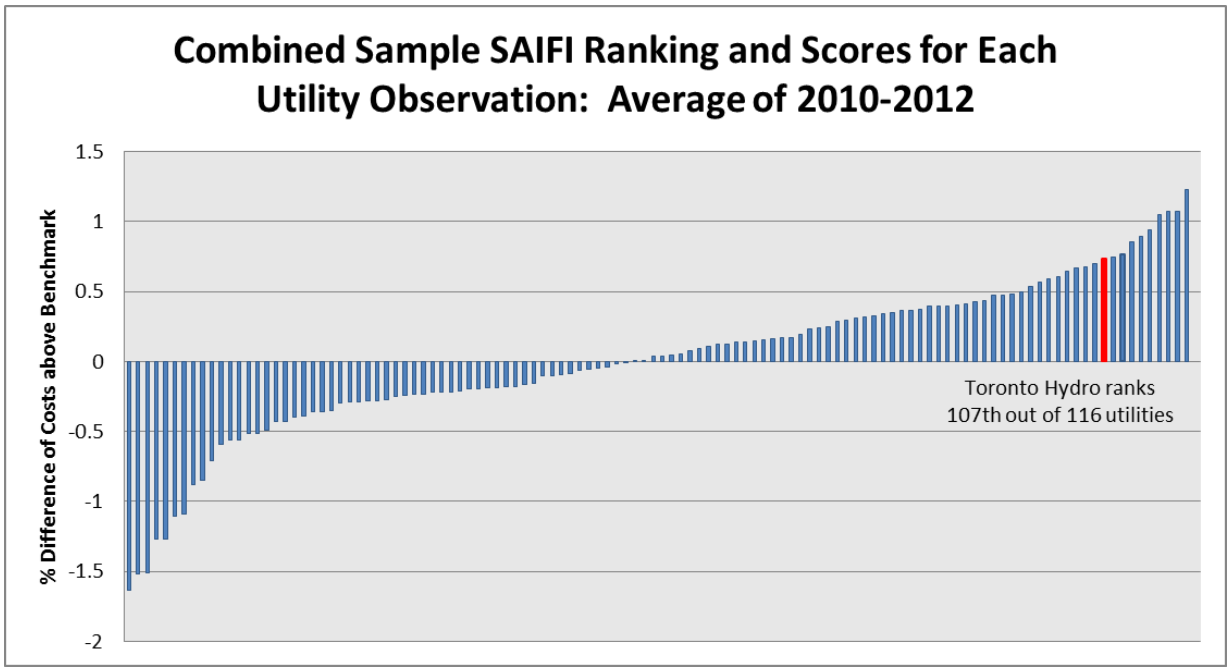
The graph below illustrates Toronto Hydro's 2010-2012 average SAIDI performance relative to the scores for the rest of the sample. The company ranks 33rd out of the 117 utilities, with its three year average SAIDI score of 48 percent below its benchmark value.

Figure 17 Combined Sample: SAIDI Econometric Ranking and Scores



The graph below illustrates Toronto Hydro's 2010-2012 average SAIFI performance relative to the scores for the rest of the sample. The company ranks 107th out of the 116 utilities, with its three year average SAIFI score of 73 percent above its benchmark value.

Figure 18 Combined Sample: SAIFI Econometric Ranking and Scores



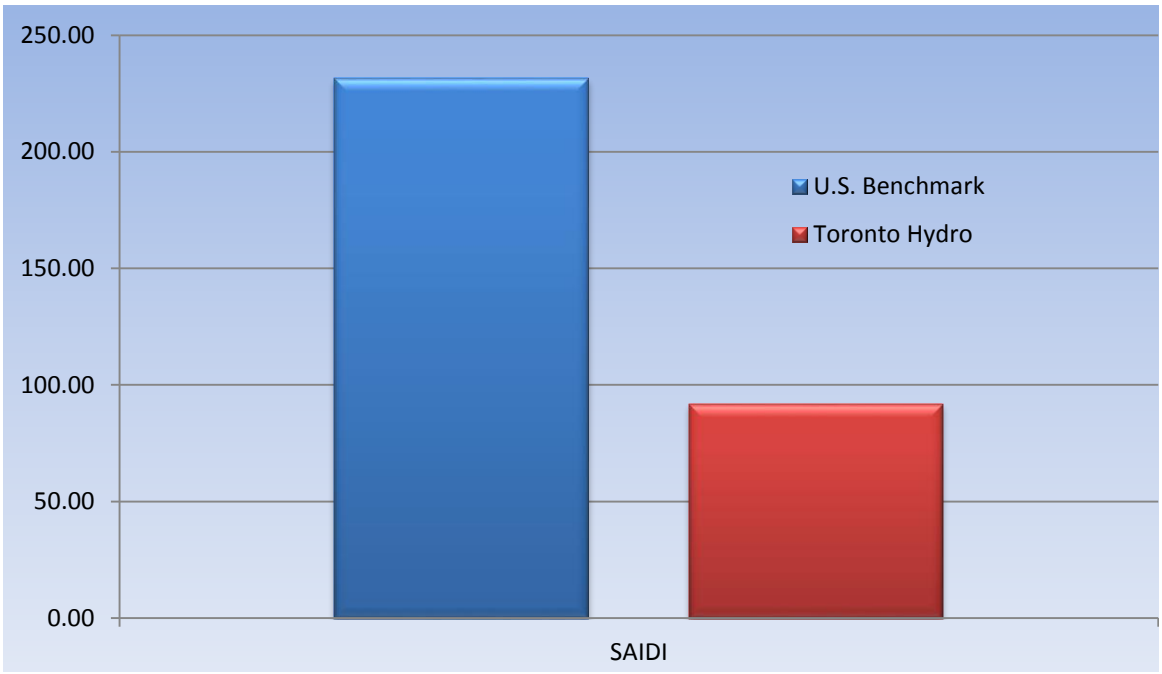
5.2 U.S. Sample Econometric Reliability Results

Toronto Hydro's 2010-2012 average SAIDI value is 92.2 percent below the benchmark value when using the U.S.-only plus Toronto Hydro sample. This benchmark value indicates a statistically superior reliability performance in outage duration management. It is statistically significant at a 90 percent confidence level.

Toronto Hydro's 2010-2012 average SAIFI value is 49.5 percent above the benchmark value when using the U.S. sample, which is a worse than average SAIFI performance. This finding is significant at a 90 percent confidence level.

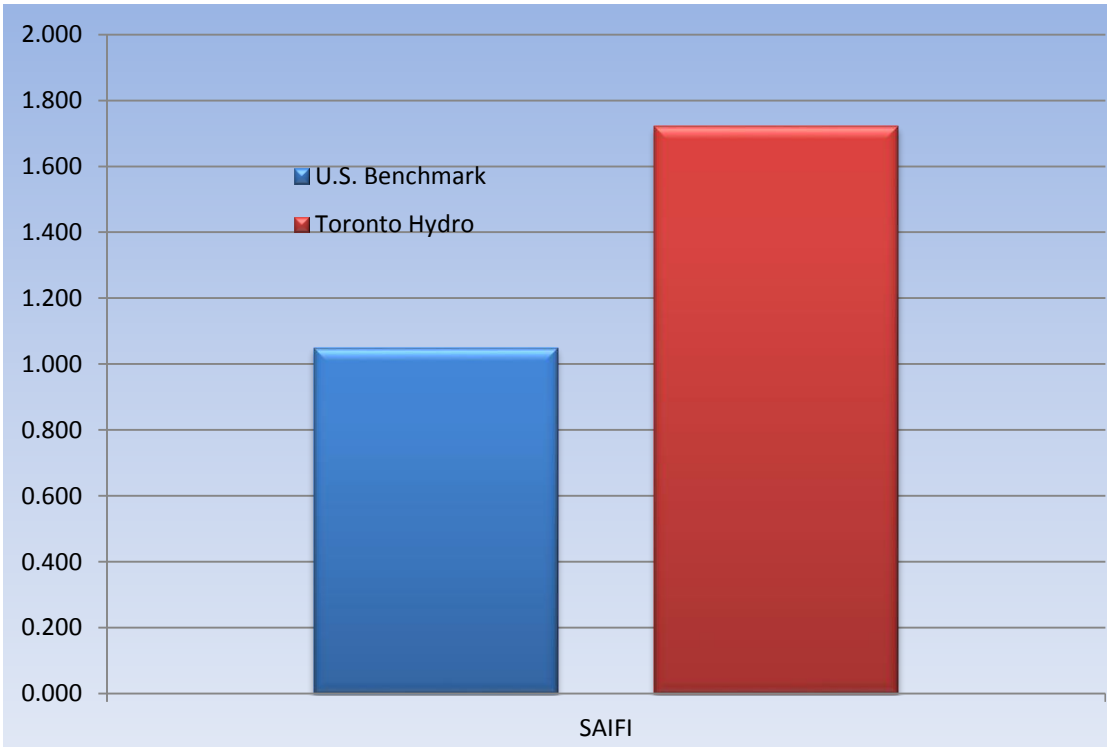
The benchmark comparisons for SAIDI are summarized in the following graph.

Figure 19 2010-2012 Average U.S.-Only Econometric Benchmarked SAIDI vs. Actual SAIDI (3-Year Average)



The benchmark comparisons for SAIFI are summarized in the following graph.

Figure 20 2010-2012 Average U.S. Econometric Benchmark Comparisons for SAIFI (3-Year Average)



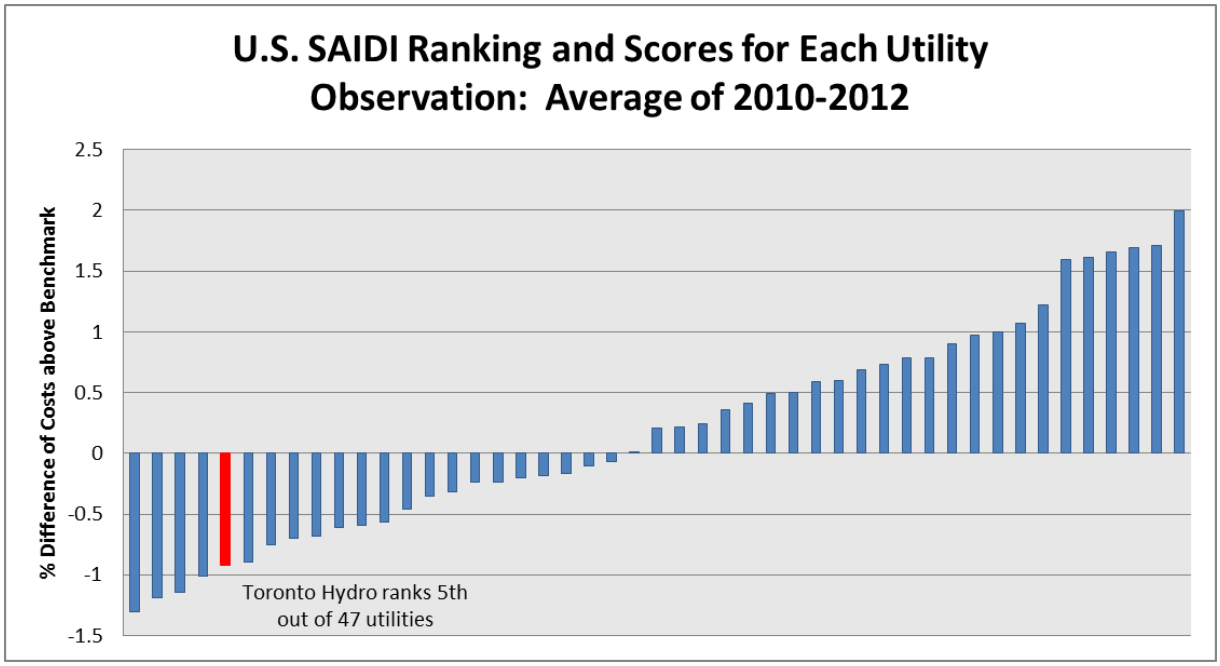
The year-by-year breakdowns for both SAIDI and SAIFI are provided in the following table. This table provides both the actual reliability values for Toronto Hydro, along with the econometric benchmark value. We note that Toronto Hydro has consistently been below its benchmark values for SAIDI, and consistently above its benchmark values in regards to SAIFI in the historical years. This pattern generally persists in the forecast years, with convergence towards the benchmark value for SAIFI. The Custom IR period is shaded in green.

Table 16 U.S. Econometric Reliability Results for All Years

Year	SAIDI (Econometric Benchmark)	SAIDI (THESL Value)	SAIDI (% Difference)	SAIFI (Econometric Benchmark)	SAIFI (THESL Value)	SAIFI (% Difference)
2005	169.89	104.89	-48%	1.07	2.01	+63%
2006	189.38	94.06	-70%	0.97	2.17	+80%
2007	205.33	117.00	-56%	0.99	2.27	+83%
2008	208.25	74.40	-103%	1.03	1.76	+54%
2009	210.14	174.17	-19%	1.00	1.86	+62%
2010	201.50	99.60	-71%	0.93	1.95	+74%
2011	234.12	85.80	-100%	1.12	1.62	+37%
2012	259.14	90.00	-106%	1.10	1.60	+38%
2013	297.35	1271.40	+145%	1.13	2.91	+95%
2014	302.72	71.40	-144%	1.13	1.58	+33%
2015	315.71	73.80	-145%	1.13	1.55	+31%
2016	328.85	70.20	-154%	1.14	1.44	+24%
2017	343.10	67.20	-163%	1.14	1.36	+18%
2018	357.75	64.80	-171%	1.14	1.27	+11%
2019	372.75	61.20	-181%	1.14	1.19	+4%

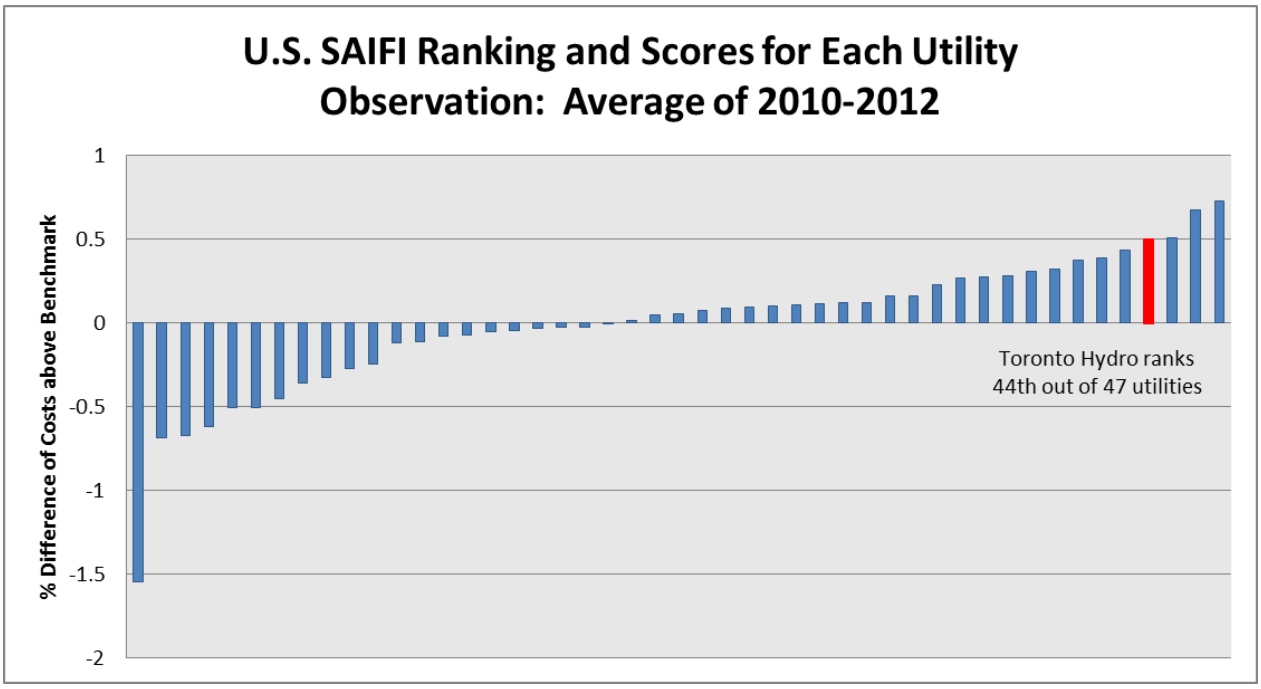
The graph below illustrates Toronto Hydro's 2010-2012 average SAIDI performance relative to the scores for the rest of the sample. The company ranks 5th out of the 47 utilities, with its three year average SAIDI score of 92.2 percent below its benchmark value.

Figure 21 U.S. SAIDI Econometric Ranking and Scores



The graph below illustrates Toronto Hydro's 2010-2012 average SAIFI performance relative to the scores for the rest of the sample. The company ranks 44th out of the 47 utilities, with its three-year average SAIFI score of 49.5 percent above its benchmark value.

Figure 22 U.S. SAIFI Econometric Ranking and Scores



6 Importance of U.S. Data for Benchmarking Toronto Hydro

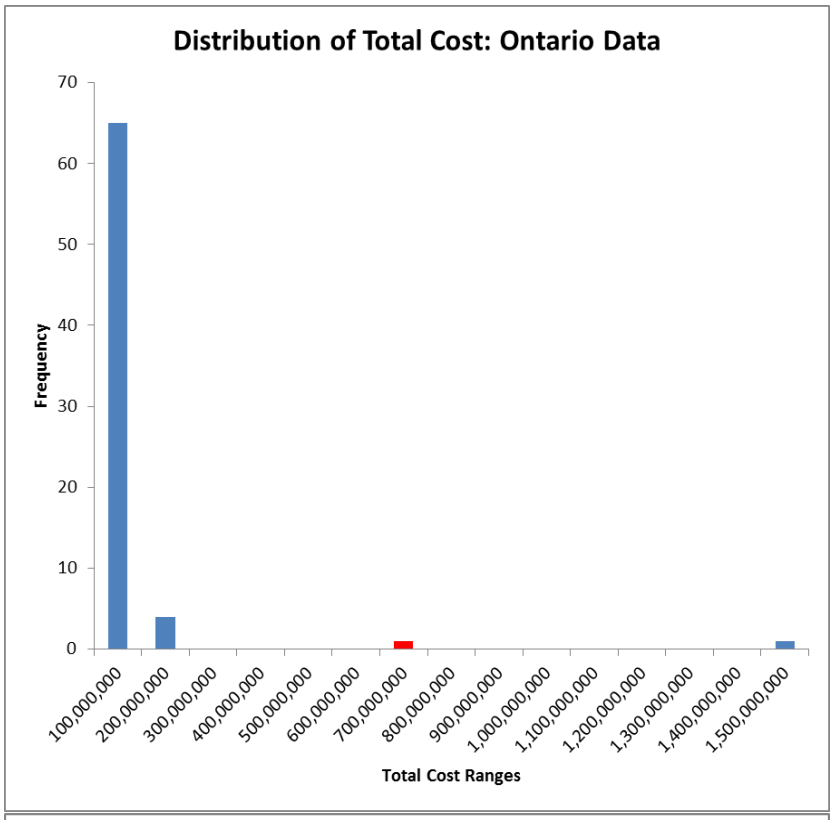
The benchmarking exercise evaluates utility performance relative to a given sample, which produces a benchmark value for each utility in the sample. The benchmark value is generated using the specific utility's independent variable values and assuming it has average efficiency relative to the sample. Thus, Toronto Hydro's benchmark values represent the values we would expect from an average utility with Toronto Hydro's specific circumstances and service territory. If the average efficiency embodied in the benchmark value is generated using firms that are very dissimilar than the utility being benchmarked (i.e., the benchmarked utility is an outlier), then its performance evaluation has a high chance of being inaccurate.

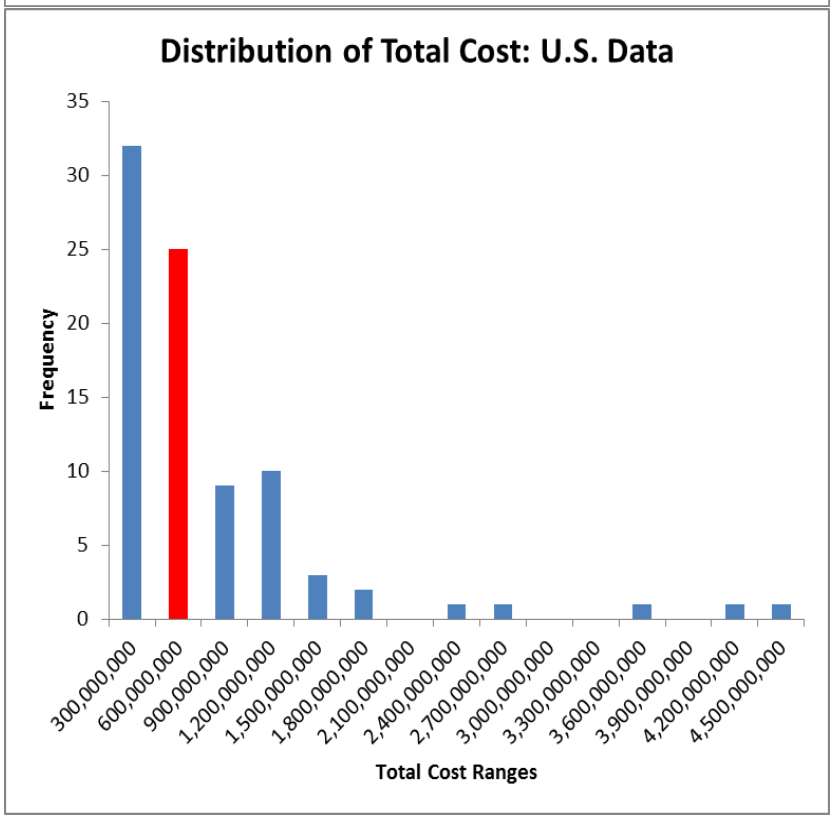
PSE authored a separate report that attempts to quantify the capital cost challenges of serving different types of developed areas.[39] In that report, PSE explains why unit capital costs will tend to decrease as customer density increases (i.e., rural areas will cost more to serve than suburban) but will then begin to increase as the developed area transitions from a suburban setting to urban or metropolitan settings.

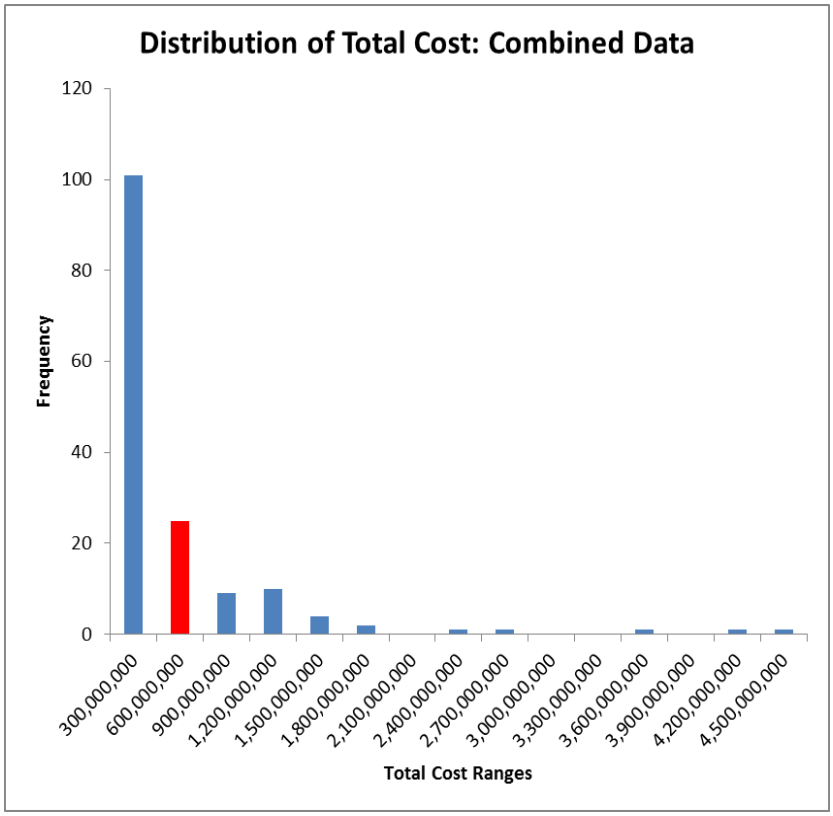
We examine the distribution of total cost data in the Ontario, U.S. and combined samples using average values of the variable over the last three years. As the figures below illustrate, Toronto Hydro's three year average total cost (flagged in red) is one of two extreme outliers in the distribution of Ontario distributors with regard to total cost. (The company on the far right in the Ontario sample is Hydro One.) On the other hand, Toronto Hydro's total cost is in the middle ranges of the total cost distribution in the U.S. and combined dataset (i.e., there are numerous utilities with lower costs, and numerous utilities with higher total costs).

[39] Please see PSE's report found in the Appendix, "Capital Requirements for Serving Developed Environments" for more details.

Figure 23 Distribution of Total Costs for Ontario-Only, U.S.-Only, and Combined Datasets

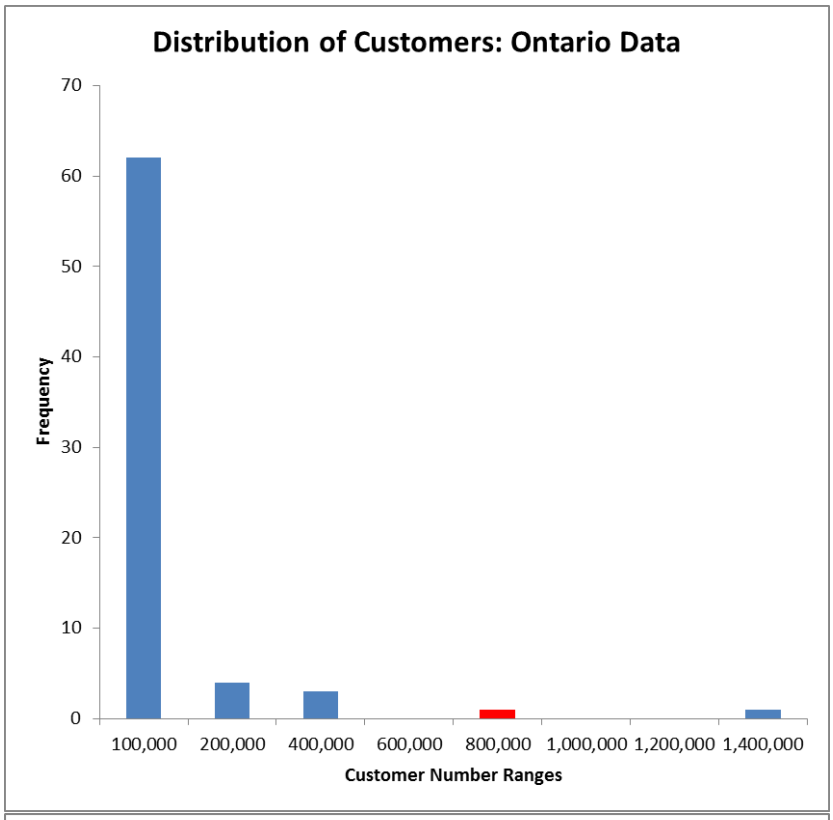


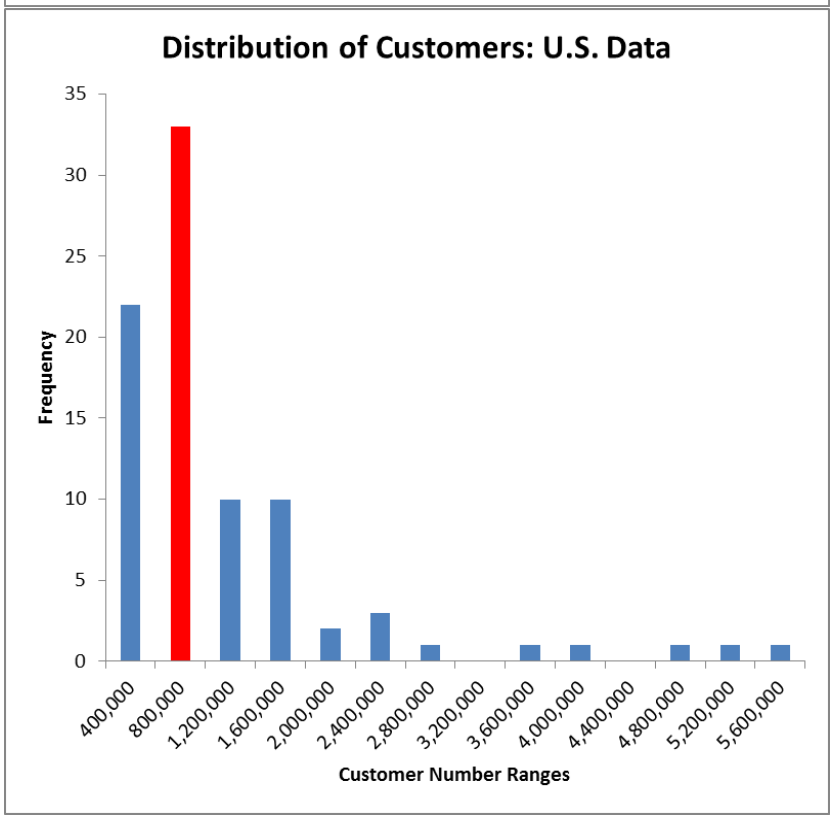


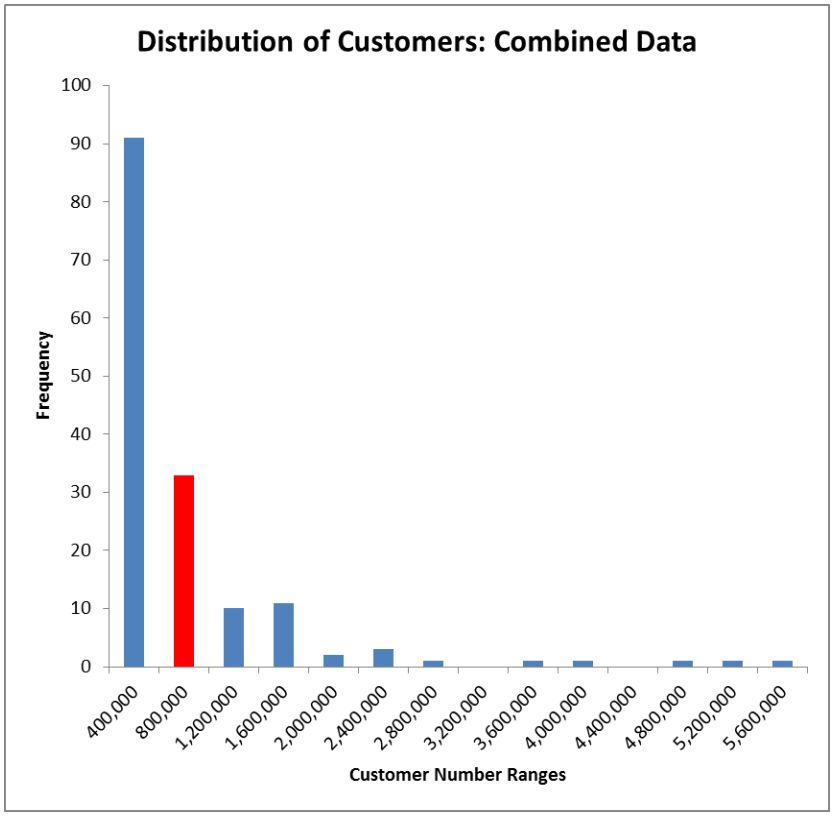


Similarly, as the top panels of Figure 24 and Figure 25 illustrate, the customer number and peak demand of Toronto Hydro are outliers in the Ontario data. Toronto Hydro's three year average customer total, as shown in red, is one of two extreme outliers in the Ontario dataset. However, Toronto Hydro's customer total is in the middle range in the U.S. and combined datasets.

Figure 24 Distribution of Customer Totals for Ontario-Only, U.S.-Only, and Combined Datasets

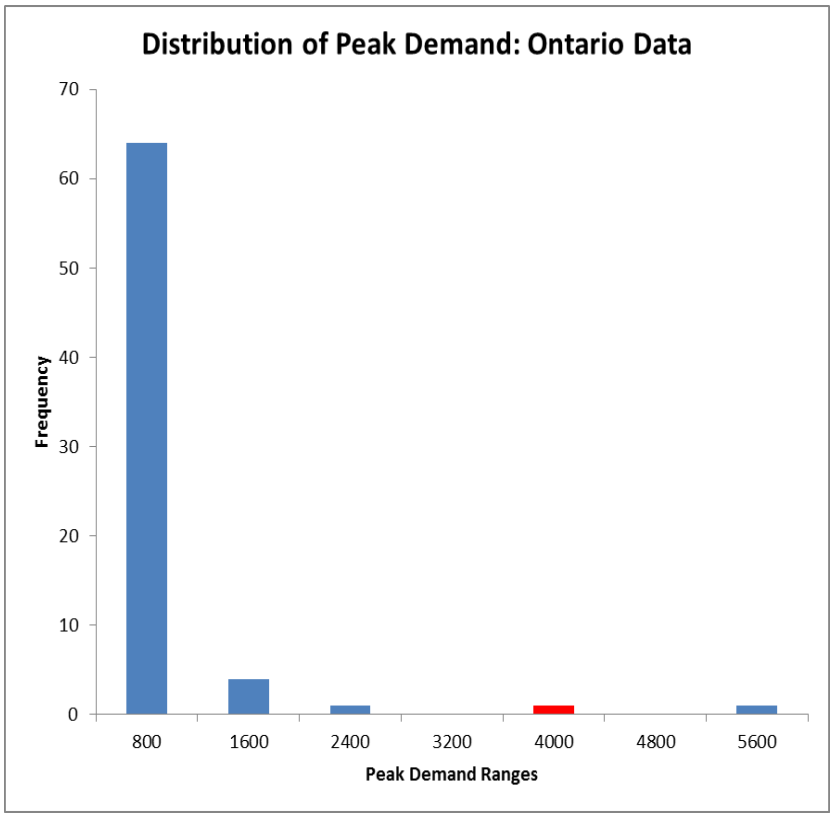


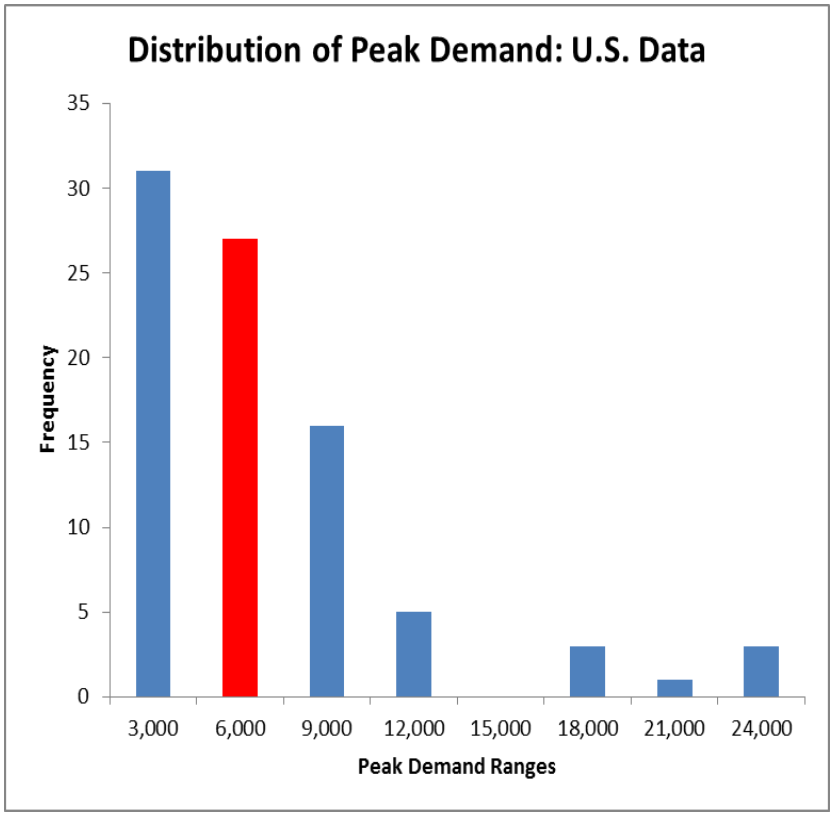


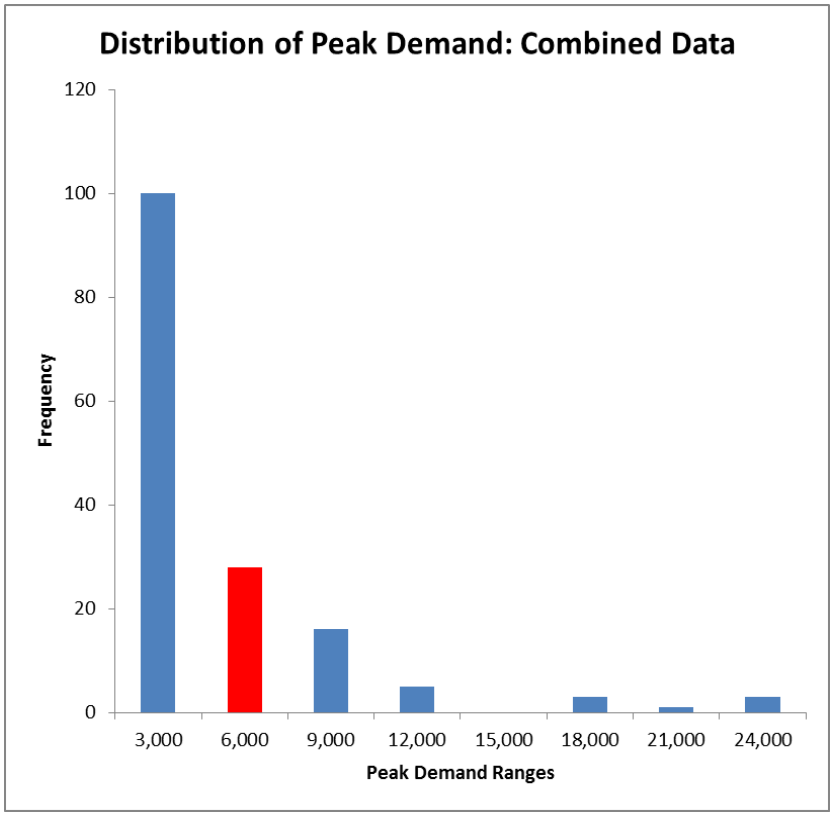

Distribution of Customers: Combined Data
Frequency
100
90
80
70
60
50
40
30
20
10
0
400,000
800,000
1,200,000
1,600,000
2,000,000
2,400,000
2,800,000
3,200,000
3,600,000
4,000,000
4,400,000
4,800,000
5,200,000
5,600,000
Customer Number Ranges

The distributions of three-year average peak demand also show Toronto Hydro to be an exterme outlier in the Ontario dataset; however, it is within the middle ranges in the U.S. and combined datasets.

Figure 25 Distribution of Peak Demand for Ontario-Only, U.S.-Only, and Combined Datasets







Based on the previous figures, we can conclude that an attempt to benchmark Toronto Hydro's

cost performance against only Ontario utilities is unlikely to produce a fair assessment. Even when accounting for the external conditions that affect its performance, the model used to generate the benchmark will embody performance based on utilities whose scale of operation is completely unlike Toronto Hydro's.

The estimation procedure is designed to fit the data through the mean of model variables. As a result, parameter estimates are most accurate for those utilities with operating conditions that vary within a reasonable range of the mean of model variables. The further a utility's operating conditions are from the mean, especially if there are minimal sample observations nearby, the less accurate the cost benchmark based on the model. Also, if only one utility faces a certain external condition (e.g. serving a large urban core), it is impossible to incorporate the effect of that condition in the benchmark analysis.

No other distributor within Ontario comes close to serving an urban center like Toronto. Therefore, any model based on the Ontario dataset is unable to capture the added costs of serving an urban core. This is in contrast to models based on the U.S. and combined datasets, which reflect the conditions of several utilities that serve a densely populated urban center. Furthermore, the U.S. and combined datasets reflect operating conditions that encompass and "surround" those of Toronto Hydro's.

In addition, due to the variation and extensiveness of the utilities represented, the U.S. and combined datasets make it possible to identify the effect of several relevant business condition variables with greater precision. They also permit the inclusion of business conditions in the model such as percent forestation, urban core, and the standard deviation of elevation within each service territory.

7 Conclusions

This report develops a framework for evaluating Toronto Hydro's 2015-2019 Custom IR application. The parameters of this framework are set by considering three important questions: (1) What is Toronto Hydro's total electric distribution cost performance, relative to the combined dataset and the U.S.-only dataset? (2) What is the company's reliability performance, relative to the combined dataset and the U.S.-only dataset? (3) Are the projected spending and reliability levels during the Custom IR period reasonable from a benchmarking perspective?

Question 1: What is Toronto Hydro's total electric distribution cost performance, relative to the combined dataset and the U.S.-only dataset?

- Toronto Hydro's historical total cost performance relative to the combined Ontario-U.S. sample and the U.S.-only sample reflects statistically significant superior performance at a 90% confidence level. This result indicates that Toronto Hydro's revenue requirements for those years were lower than they would have been if the company was an "average" cost performer with the same operating conditions.

- For both samples, projected total costs remain below benchmark values for 2015 to 2019. However, the difference is no longer statistically significant at a 90 percent confidence level, and the projected costs converge towards the benchmark values.

- For the projected years, Toronto Hydro's cost benchmark scores are in the +/- 10% range set for a 0.3% stretch factor. Toronto Hydro's historical rankings for the combined set of utilities (30^{th} out of 156) and just for Ontario utilities (15^{th} out of 71) indicate solid total cost performance.

Question 2: What is the company's reliability performance, relative to the combined dataset and the U.S.-only dataset?

- Toronto Hydro's historical and projected SAIDI performance relative to the combined Ontario-U.S. sample and U.S.-only sample is better than expected. This indicates good response times by the company when outages occur.

- Toronto Hydro's historical SAIFI performance relative to both the combined Ontario-U.S. and the U.S.-only electric industry is considerably worse than expected, based on the company's specific operating conditions. The performance scores are significant at the 90% confidence level. This performance moderates and converges towards benchmark values through the projected future time period, and is no longer statistically different from average at the 90 percent confidence level.

Question 3: Are the projected spending and reliability levels during the Custom IR period reasonable from a benchmarking perspective?

The projections to 2019 show that Toronto Hydro's spending and reliability projections should converge the company's SAIFI and total costs towards PSE's benchmark expectations (while

SAIDI should remain at a strong level). Based on the projections, the projected spending should result in a utility more aligned with its externally-derived benchmark values from both a total cost and SAIFI perspective. Thus, the projected spending and reliability levels are, in PSE's opinion, reasonable from a benchmarking perspective.

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About PSE's Economics and Market Research Group

Founded in 1974, PSE is a full-service consulting firm. PSE's benchmarking experience includes research for regulatory purposes and utility management improvement. Our benchmarking team consists of economists, planning and design engineers, rate and financial analysts, communications infrastructure consultants, and smart grid technology experts. In addition to our statistical benchmarking research, PSE's Economics and Market Research group has expertise in the areas of demand response, energy efficiency, value-based reliability planning, T&D merger valuations, load forecasting, load research, survey design, alternative regulation, and cost of service studies. For more information on PSE and a full list of services, visit our website at www.powersystem.org.

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8 Appendix

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Full-service consultants

Capital Requirements for Serving Developed Environments

Prepared at the Request of:

Toronto Hydro Electric System Limited

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July 25, 2014

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Exhibit I – Areas by Square Kilometer

1 Introduction

Electric distribution utilities operate in a capital intensive industry. There are significant costs for materials and labor associated with the installation of overhead and underground distribution lines, transformers, substations, and other associated facilities. These costs need to be depreciated over many years to ease the financial impact on electric rates. In addition to being capable of having a long life, distribution facilities must be designed and constructed in a safe and reliable manner while balancing a level of efficiency.

One important component that drives the cost of electric distribution infrastructure installations is the environment in which the facilities must be constructed. Several things may vary based on the surrounding environment, including design and construction standards utilized, equipment installed, and supporting civil infrastructure required. For example, it is typical in most rural and suburban areas for underground cable to be trenched or plowed, either directly or in conduit. This is possible because these areas contain relatively ample unsurfaced corridors that are available for utilities to install and maintain their facilities. In urban areas, underground cable is typically installed in concrete encased duct banks due to limited utility corridors and complications associated with congestion. Although there are significant cost differences between installing underground cable directly and within concrete encased duct banks, there is typically a correlation between the two based on the amount of customers served and the associated load. However, at a certain point, infrastructure costs rise at a faster rate than the associated number of customers and load needed to balance the costs.

A factor that affects the efficiency of an electric distribution utility is the capital cost of infrastructure, which may vary based on the service territory environment in which the utility serves and constructs facilities. Simply comparing the total plant value or incremental plant value year over year against the energy and/or demand the utility delivers does not provide a true representation. Rather, the cost effectiveness of distribution infrastructure for the environment in which it is installed needs to be factored into the evaluation.

The purpose of this report is to demonstrate how serving different developed environments impacts the effectiveness of capital requirements for a distribution utility. Specifically, the report closely looks at the service territory of Toronto Hydro Electric System Limited ("Toronto Hydro") and other nearby developed environments.

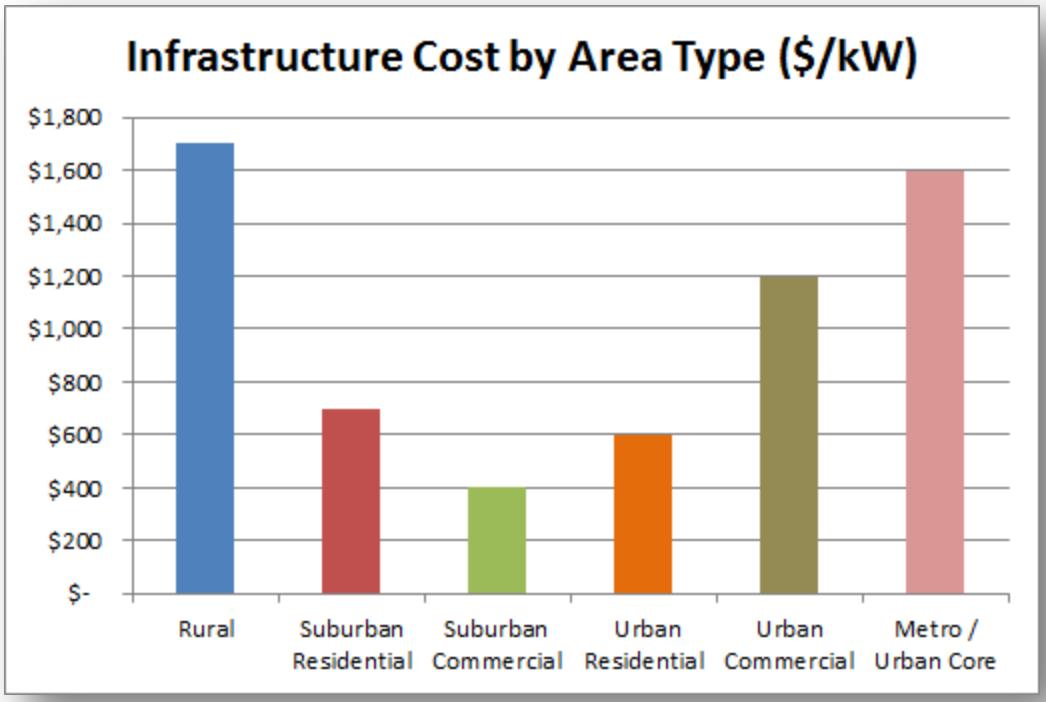

Figure 1-1 Infrastructure Cost by Area Type

Figure 1-1 illustrates the results of research and analysis completed by Power System Engineering ("PSE"). Suburban residential, suburban commercial, and urban residential areas resulted in the lowest electric distribution infrastructure cost in relation to the load level served when compared to other environments. Conversely, rural, urban commercial, and metro/urban core environments require a higher cost of electric distribution infrastructure in relation to the load level served. Factors driving these results include the density of load over which infrastructure costs can be spread, as well as the magnitude and complexity of the infrastructure required to serve the load within the given environment. Toronto Hydro's service territory comprises mainly of urban residential, urban commercial, and metro/urban core areas.

2 Toronto Hydro Service Territory

Toronto Hydro is the largest municipal electrical distribution company in Canada, serving approximately 733,000 customers in the city of Toronto. Comparatively speaking, the service territory is very unique from other distributors in Ontario due to its significant population density. The evolution of the city and its supporting infrastructure is common to other major cities found in the United States.

2.1 City of Toronto

In 1834, Toronto became a civic incorporation. Mostly occupied by British and Irish immigrants at the time, Toronto's population grew by five times between 1831 and 1891. By the 1900s, more immigrants arrived from continental Europe, including Jews, Italians, and Ukrainians, followed by Germans, Poles, Hungarians, Slavs, Greeks, and Portuguese. By the 1920s, new suburban municipalities were appearing due to an overflowing city center of approximately 500,000 people. After World War II, Toronto's economy boomed and the population grew to over 1,000,000 by 1951. In the 1970s and 1980s, migrants from West India, South Asia and East Asia arrived. Present-day Toronto is made up of the former municipalities of Toronto, North York, Scarborough, York, Etobicoke, and East York, all of which merged into a six-municipality configuration in 1967. In 1998, the six municipalities were amalgamated into a single municipality, or the present-day City of Toronto. Currently, Toronto is Canada's largest municipality and North America's fourth largest city. According to data reported by the municipal government, the population of the City of Toronto was approximately 2.8 million in 2012, while the census metropolitan area population of the Toronto area was approximately 5.5 million in 2011.

Toronto is located on a shore plain of a harbor of Lake Ontario. The core downtown area of Toronto still resides along this shore line, while the rest of the city extends east, west, and north of the harbor. The city is intersected by three rivers and numerous tributaries, including the Humber River, the Don River, and the Rouge River, which have created densely forested ravines. The ravines have affected the original grid plan, and are noticeable on Finch Avenue, Leslie Street, Lawrence Avenue, and St. Clair Avenue. The ravines are useful for drainage of the city's storm sewer system, but often experience flooding during periods of heavy rain.

The City of Toronto was originally developed according to a small-town plot with a plain grid of straight streets. The straight grid pattern was extended as the city grew, but in 1834, uncoordinated private developments replaced the grid pattern. By the 1840s, the cityscape began to take shape. King Street was a main commercial east-west pathway, while Yonge Street served as the main north-south route. During the early 1900s, skyscrapers were being built and industry grew around Yonge Street, King Street, Queen Street, and Bay Street. A picture of present-day downtown Toronto is provided below.

Figure 2-1 Image of Downtown Toronto

Today, Toronto's core downtown area consists mostly of high rise office towers, apartments and condominiums. In the heart of downtown, the surrounding landscape is almost completely paved, with little to no grassy boulevards, medians, or curbs. Moving away from the city center, housing and business can be classified as urban. The inner suburbs, close to downtown, feature mostly single-family homes and apartment buildings that range in size. Due to population density, duplexes are common, and stand-alone houses are built closely together with limited yard space. Urban commercial areas have similarly closely positioned structures, and range in height. Designated green spaces or parks, some which are quite large, are located throughout Toronto's downtown and urban areas. Further from downtown, housing becomes more traditionally suburban, with larger single-family homes and more individual yard space. Suburban commercial areas have more space between buildings, and structures are mostly two to four stories tall. In rural areas surrounding Toronto, housing and commercial operations are widely spread apart, often separated by large farm fields. Homes are mostly large, single-family homes with extensive green space. Properties may be located at the ends of long driveways and not directly next to neighboring properties.

Downtown Toronto has many interesting and noteworthy structures. These include the original Fort York complex (rebuilt 1813-15), the Grange, a gentry mansion built around 1817, St Lawrence Hall (1850), originally a public building containing a hall and shops, Osgoode Hall (rebuilt 1857-60), headquarters of the Law Society of Upper Canada, University College (1859), the Ontario Parliament Buildings (1892), the City Hall (designed 1890, completed 1899), the Royal Alexandra Theatre (1907) and Union Station (opened 1927). Later eras have largely produced more and bigger office buildings, hotels and shopping centers. However, some newer buildings, like the new City Hall (1965) and Roy Thomson Hall (1982) are noteworthy structures.

An example of the sheer magnitude of construction in the core downtown area is the First Canadian Place building, located at the corner of King Street and Bay Street. This 72 story office tower offers approximately 2.7 million square feet of office and retail space and is the

operational head office of the Bank of Montreal. At 978 feet tall, the structure is known as Canada's tallest business landmark since 1975. The building houses 10,000 office employees and records a daily pedestrian traffic of 83,000 people. A picture is provided below.

Figure 2-2 Image of First Canadian Place

Today, Toronto's three largest industries are financial services, real estate, and wholesale and retail trade. Several head banking offices are located in Toronto. In addition, Canadian insurance and investment companies are centrally based in the city, as well as the Toronto Stock Exchange. The core downtown area is also home to many Canadian head offices of industrial, resource, and retail corporations, and of American or multinational companies. Today, there are approximately 90,000 businesses in the City of Toronto, and about 196,000 businesses in the Toronto region. The city's workforce is chiefly based in professional, clerical, manufacturing, retail and service work, in that order. Toronto struggled with the effects of the Free Trade

Agreement with the U.S., as well as with the recession of the early 1990s and the global financial crisis of 2008, resulting in high unemployment. The economy has slowly improved. As of June 2014, Toronto's unemployment rate was 8.2%.

Buses, trucks and cars use Highway 401, a multi-lane crosstown throughway, and Highway 400, now the prime route north. Automobile routes such as the Gardiner Expressway along the southern edge of downtown, or the Don Valley Parkway running north, bear heavy loads. Traffic congestion can be extreme during peak travel times. In a recent study released by TomTom, Toronto was ranked as the second worst city in Canada for traffic congestion. However, the City has successfully maintained its public streetcar, bus and subway systems. According to 2013 data, Toronto's rapid transit rail network averaged approximately 900,000 passenger trips each weekday, operating four lines and 69 stations. The Government of Ontario also operates a rail and bus transit system called GO Transit in the Greater Toronto Area, which transports over 250,000 passengers every weekday.

Toronto has underground infrastructure for fresh water distribution, as well as for natural gas distribution. Much of the electrical infrastructure is also located underground due to limited aboveground space. Toronto is so densely populated and saturated that its local landfills reached capacity and municipal waste had to be shipped elsewhere. Due to the extremely tall buildings located in the core downtown area, radio towers have been built still higher in order to accurately transmit signals.

2.2 Population of Toronto and Ontario

According to population and dwelling account information collected by the Government of Canada[1], the total population of Ontario in 2011 was 12,851,821. Of this total population, the city of Toronto is categorized as a large urban area with a population of over 5 million, or nearly 40% of Ontario's total population. The next largest urban area is the Ontario part of Ottawa-Gantineau metropolitan area with a total Ontario population of 697,267, followed by Hamilton with 670,580 residents and Kitchener with 444,681 residents. The other 11 cities classified as large urban areas have between 100,000 and 370,000 residents according to 2011 data. The remainder of Ontario is comprised of 19 medium cities and 239 small cities. Figure 2-3, shown below, is a graph with data points demonstrating population density, or the number of people per square kilometer, for the large urban and medium cities in Ontario. Toronto has a population density of 2931 people per square kilometer.

[1] Government of Canada, Statistics Canada, "Population and dwelling counts, for Canada, provinces and territories, and population centres, 2011 and 2006 censuses": http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/hlt-fst/pd-pl/Table-Tableau.cfm?LANG=Eng&T=802&PR=35&S=51&O=A&RPP=999

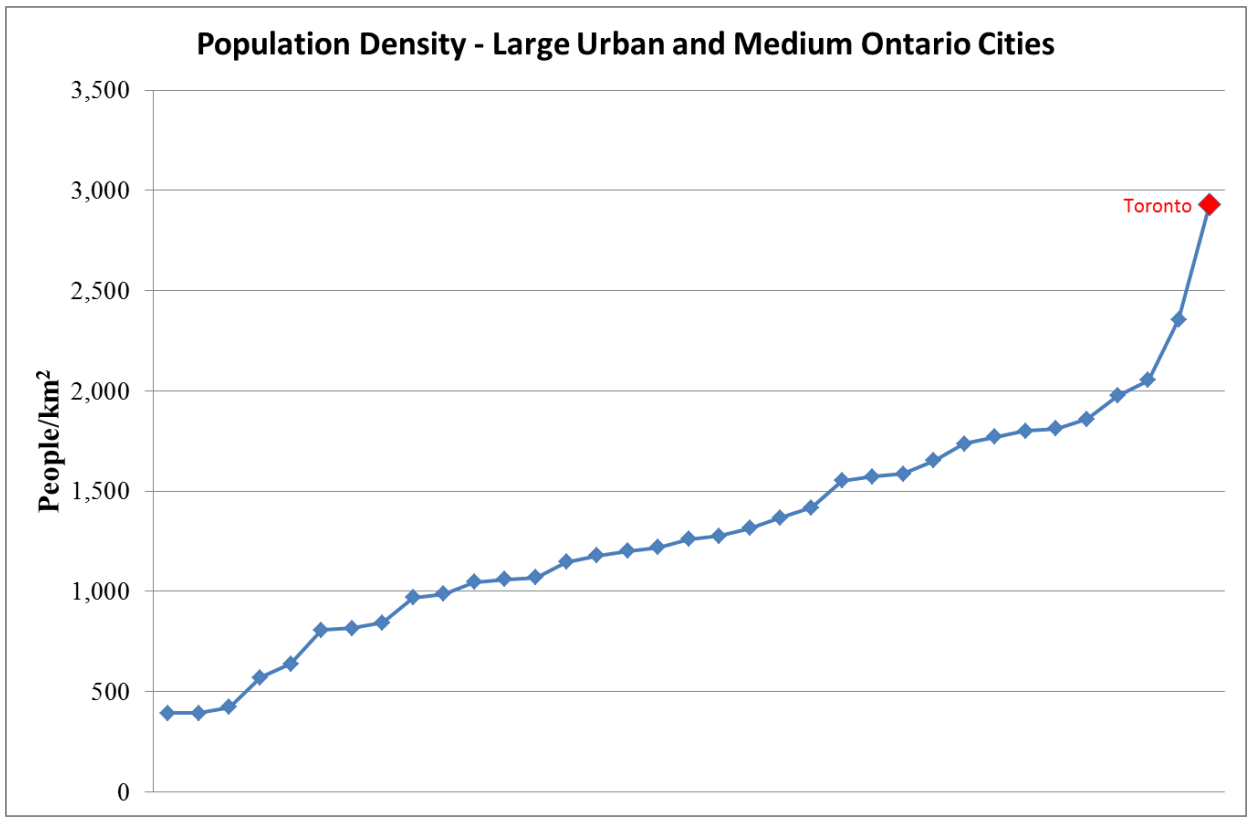

Figure 2-3 Ontario Metro Area Population of Large Urban and Medium Cities

2.3 Unique Operating Conditions

There are many unique operating conditions that apply to a highly dense urban area. For the purposes of this report, the city of Toronto will be referenced in accordance with the effect these conditions have on Toronto Hydro Electric System Limited.

Toronto's core downtown area consists of closely positioned high rise buildings, including commercial properties and apartments and condominiums. The extreme urban density experienced in the city of Toronto creates a variety of unique assets or factors that affect Toronto Hydro's ability to effectively and efficiently serve its core downtown customers.

Toronto Hydro operates a unique and dated downtown underground system, which features a network of secondary-voltage cables. The network's configuration is that of a "Spot Network," or "Grid Network," depending on the time of construction and location. In many cases, the downtown service for a high rise building is provided from a vault with two transformers, each connected to two different feeders. Other buildings have a "pilot wire" configuration. Due to the large industrial load in the downtown area, Toronto Hydro installs and maintains additional regulating and safety devices, such as transfer trips. This network contains many redundancies to buildings throughout the downtown area and is not typically used in new construction, but is maintained by Toronto Hydro to fulfill expectations of reliability.

Due to the city's age, the original grid infrastructure is comprised of legacy system configurations that correspond with the surges of growth Toronto has experienced in past decades. In addition to the secondary network and complex vault configurations, as described above, Toronto Hydro's system includes rear-lot construction, overhead box construction, and Paper Insulated Lead Cable (PILC) cable. All of these distinguishing characteristics require additional skills and costs to maintain and operate compared to utilities that do not serve dense urban and city environments.

Many buildings in Toronto have been built to the edge of the lot line which leaves no room for burying electrical equipment. This requires Toronto Hydro to pull network and connection cables to stations with available capacity that are further away. It also means that as the population grows and shifts, Toronto Hydro will need to build new stations or modify existing stations to accommodate additional breaker positions. Finally, as new high rise buildings are constructed in the limited space of the downtown core area, unconventional connection arrangements must be applied, which increases connection and expansion costs per customer.

Many overhead structures in Toronto Hydro's territory include an outdated box construction design, which is being replaced over time with a more modern structure. There are limitations for working near or with box construction, including safety concerns and the need for special training due to the large number of closely positioned live circuits. In residential communities, rear-lot facilities have become difficult to maintain over the years as a result of limited access for utility equipment. Bucket trucks cannot be used and insulated protective equipment must be in place before for work can be completed safely.

Along with the Ontario EPA regulations for working around and disposing of lead, additional regulations for PILC increase costs due to additional administrative staff, certification of vehicles, and safety training for field workers.

Furthermore, Toronto Hydro crews have physical limitations to contend with, such as equipment located in confined spaces, minimal road or sidewalk space available, and infrastructure installed under roadways. When working in a confined space, legislative requirements state that a dedicated observer must be present, so Toronto Hydro often needs to dispatch crews with multiple workers in order to be compliant. Limited sidewalk and road space causes issues with staging materials and fitting new infrastructure into existing corridors. Underground infrastructure is often located in the middle of roadways, which translates to safety concerns, as well as the need for assistance with traffic control and a schedule for working during non-critical hours. In addition, the city experiences heavy traffic congestion, which can impact the response time that a crew is able to arrive at a job site to complete a repair. These factors increase the need for staff and the difficulty of completing work safely and quickly.

Because it is an older city, Toronto has a mature urban setting, which means there may be excavation challenges when performing underground work, such as abandoned infrastructure that is not marked on the city's records, along with other historical sites and mature trees that must be preserved and worked around. In addition, Toronto Hydro utilizes a special communications infrastructure to support communications between field staff and the control room, and to enable collection of Smart Meter Data. Toronto Hydro has an extensive two-way radio system, as well as 10 communications antennae located on top of high rise towers to ensure

reliable radio communications. In addition, due to the number of multi-story buildings, more wireless collectors are needed for Smart Meter Data Collection and SCADA communication.

3 Service Territory Environments

To answer the question of how different types of service territory environments affect the level of required infrastructure and associated capital, six areas have been identified within Ontario of varying customer densities and types. These areas are not all within the same service territory of a single electric distribution provider. Rather they were identified by their characteristics and evaluated on an individual basis. These six areas will be referred to as the following for the purposes of this report:

- Area 1 – Rural
- Area 2 – Suburban Residential
- Area 3 – Suburban Commercial
- Area 4 – Urban Residential
- Area 5 – Urban Commercial
- Area 6 – Metro / Urban Core

All locations were analyzed using Google Earth and PSE internal ESRI GIS maps. The land mass of these six areas ranged from approximately 0.28 to 4.13 square kilometers and were within 50 kilometers from each other. Exhibit I illustrates the general location of each area, the proximity of the locations to each other, and the land mass for each location by square kilometer.

With the exception of the urban commercial area, the class of customers and associated proprieties were identified for each area. For residential properties, Google Earth was used to identify the number of single-family or multi-family homes. For commercial properties, a general category was established (such as office, retail, etc.) and total floor space was estimated for each building.

The following provides a summary of each area, including a description of the assessment that was completed and a screenshot image from Google Earth.

3.1 Area 1 – Rural

The selected rural area (Area 1) is located approximately 40 km north-northwest of downtown Toronto. The area is classified by PSE as a low density area primarily consisting of farm land, farm operation buildings, single-family homes, and recreational areas. The land mass of the area was measured at 4.13 square kilometers. An aerial image of Area 1 is shown in Figure 3-1.

Figure 3-1 Rural Area

Under PSE's assessment, 28 single-family homes were identified, as well as two dairy operations, two livestock operations, and seven distinguishable farmed fields (six of which appeared to be crops and one of which appeared to be a tree farm). In addition, one golf course and one commercial landscaping business were found in the area. Single-family homes were designated as such based on what appeared to be a private residence, as opposed to buildings related to farm operations, such as barns or storage sheds. In the identification of a dairy, livestock, or crop farm, buildings used for farm operations were not individually identified, but these types of buildings were found on these properties.

3.2 Area 2 – Suburban Residential

The selected suburban residential area (Area 2) is located approximately 24 km north of downtown Toronto. The area is classified by PSE as a saturated and moderately dense residential area consisting of mostly single-family homes. Buildings with commercial or retail functions and other properties of interest were also identified. The land mass of the area was measured at 1.36 square kilometers. An aerial image of Area 2 is shown in Figure 3-2.

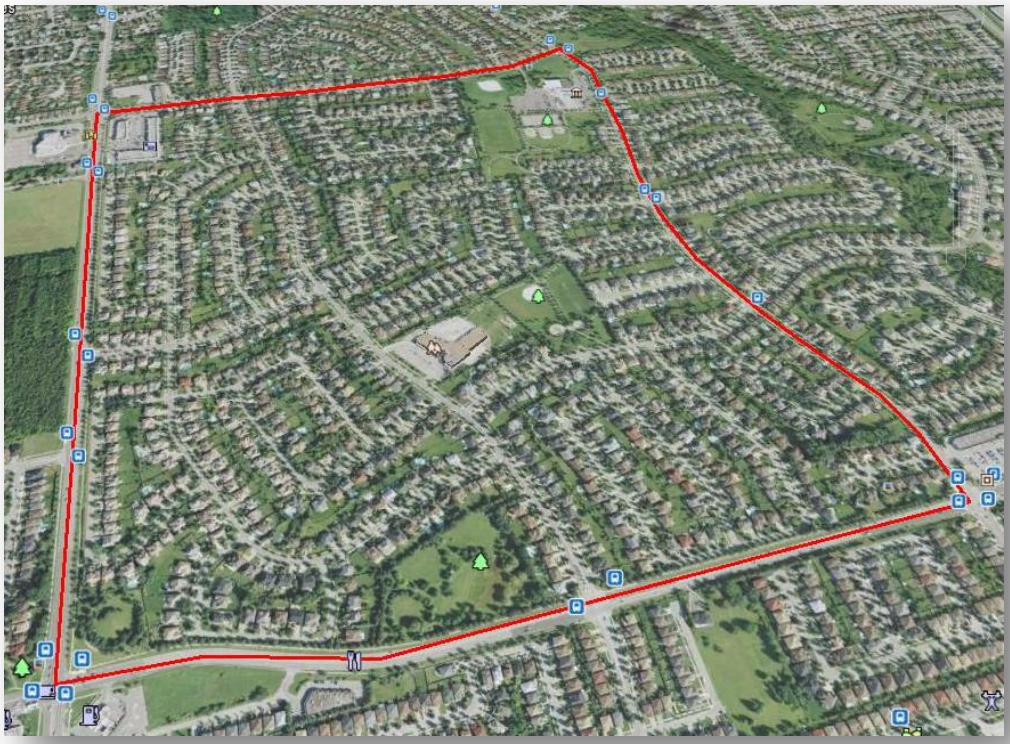

Figure 3-2 Suburban Residential Area

Under PSE's assessment, approximately 808 larger single-family homes were identified, many of which have sizable private green space. In addition, a strip mall with a combination of retail and commercial businesses was identified in the northwest corner of the selected area. The identifiable businesses included four food retail operations, one bank, one dentist, and one pharmacy. In addition, the reviewed area included one elementary school located in the center of the area, and one community center, located in the northeast corner of the area. The community center includes a large building, a baseball diamond, a soccer field, and several tennis courts.

3.3 Area 3 – Suburban Commercial

The selected suburban commercial area (Area 3) is located approximately 24 km north of downtown Toronto. The area is classified by PSE as a moderately dense commercial area consisting of mostly commercial office space, as well as some retail operations, such as restaurants or small stores. The majority of the buildings in this area ranged from two to four stories. The land mass of the area was measured at 1.04 square kilometers. An aerial image of Area 3 is shown in Figure 3-3.

Figure 3-3 Suburban Commercial Area

Under PSE's assessment, 61 commercial properties were identified. The property with the largest floor space is estimated to be 29,260 square meters, while the property with the smallest floor space is estimated to be 1,390 square meters. The total commercial floor space within the area is estimated to be 491,450 square meters.

3.4 Area 4 – Urban Residential

The selected urban residential area (Area 4) is located approximately 3 km north-northwest of downtown Toronto. The area is classified by PSE as a highly dense residential area consisting of single-family homes, apartments and condominiums, and retail operations, like restaurants and small stores. The majority of the properties in this area consisted of single-family homes, nearly all of which were side-by-side two-story duplex construction with two single-family homes located in one structure. The land mass of the area was measured at 0.39 square kilometers. An aerial image of Area 4 is shown in Figure 3-4.

Figure 3-4 Urban Residential Area

Under PSE's assessment, approximately 1000 single-family homes and 250 individual apartment or condominium units were identified. Also present in the area were approximately 75 small businesses, including approximately 25 restaurants and 50 retail storefronts. In addition, the area included several churches, two schools, and one medical clinic.

3.5 Area 5 – Urban Commercial

The selected urban commercial area (Area 5) is located approximately 2 km north-northeast of downtown Toronto. The area is classified by PSE as a highly dense commercial area consisting of mostly commercial office space. The land mass of the area was measured at 0.32 square kilometers. An aerial image of Area 5 is shown in Figure 3-5.

Figure 3-5 Urban Commercial Area

3.6 Area 6 – Metro / Urban Core

The selected metropolitan/core downtown urban area (Area 6) is located directly in the heart of downtown Toronto. The area is classified by PSE as a highly dense, mostly commercial area consisting of skyscrapers that serve as office towers, apartments and condominiums, hotels, and retail operations, including restaurants and large and small stores. The structures in this area range from 2 to 72 stories. The land mass of the area was measured at 0.28 square kilometers. An aerial image of Area 6 is shown in Figure 3-6.

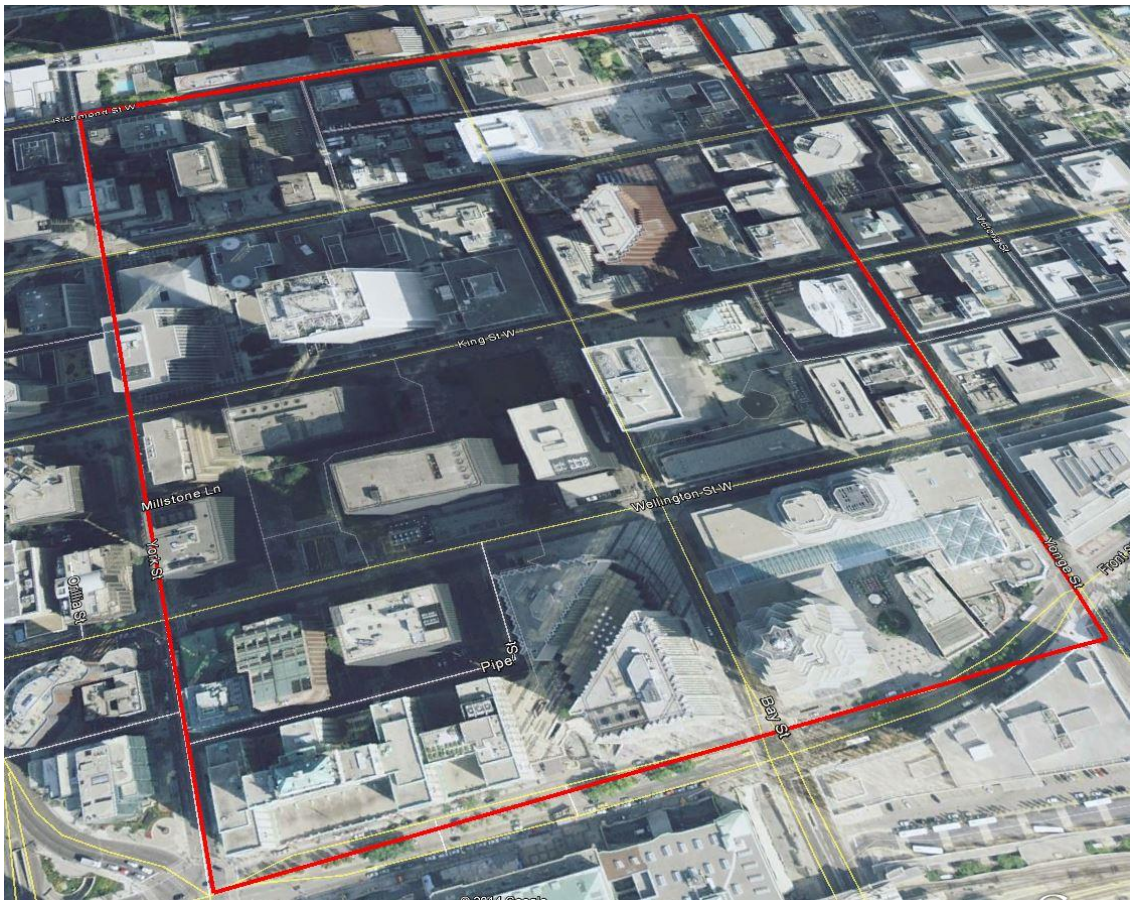

Figure 3-6 Core Downtown Area

Under PSE's assessment, approximately 55 properties were identified. The property with the largest floor space is estimated to be 251,000 square meters, while the property with the smallest floor space is estimated to be 670 square meters. Approximately 75% of the properties in the area were 10 stories or taller. The total commercial and residential floor space within the area is estimated to be 2,500,000 square meters.

4 Load Density

For each of the studied areas, PSE estimated the coincident peak load based on a combination of factors. These factors included:

- Type of customers (ex. single-family home, retail, office space, medical, etc.)
- Quantity of each customer type
- Enclosed floor space of each customer type

Being that Toronto Hydro's service territory covers Areas 4, 5, and 6, their system planning team provided estimated coincident peaks for the corresponding areas to be used as a comparison.

4.1 Area 1 – Rural

There were a total of 41 services estimated within Area 1. The customer types included residential single family, farm – livestock, farm – dairy, farm – crop, and commercial – landscaping. The total non-coincident demand for the area was estimated at 850 kW. Applying a coincident factor for each customer type, the coincident peak demand was estimated at 582 kW. Table 4-1 shows a summary of PSE's estimate.

Table 4-1 Rural Estimate

	No. of Services	Non-Coincident (kW)	Coincident Factor	Coincident (kW)
Residential Single Family	28	280	0.54	152
Farm - Livestock	2	80	0.86	69
Farm - Dairy	2	150	0.86	129
Farm - Crop	7	280	0.65	181
Commercial - Landscaping	2	60	0.86	51
Coincident Demand (kW)	**41**	**850**		**582**

4.2 Area 2 – Suburban Residential

There were a total of 821 services estimated within Area 2. The customer types included residential single family, education, medical – hospital/clinic mix, commercial – office space, commercial – restaurant, government – building/center, and other. The total non-coincident demand for the area was estimated at 9,150 kW. Applying a coincident factor for each customer type, the coincident peak demand was estimated at 4,990 kW. Table 4-2 shows a summary of PSE's estimate.

Table 4-2 Suburban Residential Estimate

	No. of Services	Non-Coincident (kW)	Coincident Factor	Coincident (kW)
Residential Single Family	808	8,100	0.50	4,063
Education	1	200	1.00	200
Medical - Hospital / Clinic Mix	2	40	0.86	34
Commercial - Office Space	1	10	1.00	10
Commercial - Restaurant	4	400	0.73	291
Government - Building/Center	1	370	1.00	370
Other	4	30	0.73	22
Coincident Demand (kW)	**821**	**9,150**		**4,990**

4.3 Area 3 – Suburban Commercial

There were a total of 61 services estimated within Area 3. The customer types included commercial – office space, commercial – textile retail, and warehouse. The total non-coincident demand for the area was estimated at 24,160 kW. Applying a coincident factor for each customer type, the coincident peak demand was estimated at 12,890 kW. Table 4-3 shows a summary of PSE's estimate.

Table 4-3 Suburban Commercial Estimate

	No. of Services	Building sqft	Non-Coincident (kW)	Coincident Factor	Coincident (kW)
Commercial - Office Space	49	4,838,450	21,773	0.52	11,425
Commercial - Textile Retail	11	419,425	2,307	0.60	1,384
Warehouse	1	32,000	80	1.00	80
Coincident Demand (kW)	**61**	**5,289,875**	**24,160**		**12,890**

4.4 Area 4 – Urban Residential

There were a total of 1,333 services estimated within Area 4. The customer types included residential single family urban, residential multiple family, education, church, medical – hospital/clinic mix, commercial – textile retail, and commercial – restaurant. The total non-coincident demand for the area was estimated at 15,147 kW. Applying a coincident factor for each customer type, the coincident peak demand was estimated at 8,853 kW. Table 4-4 shows a summary of PSE's estimate.

Table 4-4 Urban Residential Estimate

	No. of Services	Building sqft	Non-Coincident (kW)	Coincident Factor	Coincident (kW)
Residential Single Family Urban	1,000		8,000	0.50	4,010
Residential Multiple Family	250		1,500	0.50	757
Education	2		420	0.86	360
Church	5		200	0.69	138
Medical - Hospital / Clinic Mix	1	27,000	189	1.00	189
Commercial - Textile Retail	50	425,000	2,338	0.52	1,225
Commercial - Restaurant	25		2,500	0.55	1,368
Infrastructure Support					805
Coincident Demand (kW)	**1,333**	**452,000**	**15,147**		**8,853**

As previously mentioned, Area 4 is within Toronto Hydro's service territory. As a way to validate PSE's estimate, Toronto Hydro also established an estimated coincident peak load for the same area. This estimate was reported at 9,960 kVA. Assuming a 90% power factor, this equates to 8,964 kW, which is within 1.5% of PSE's estimate.

4.5 Area 5 – Urban Commercial

At the time of this report, PSE was not able to survey Area 5 with the purpose of estimating the quantity and type of customers or total enclosed floor space. As a result, PSE directly used Toronto Hydro's estimated coincident peak demand for the area. Based on the comparative results of Area 4 and Area 6 between PSE and Toronto Hydro, it is believed that additional comparison for Area 5 is not necessary.

Toronto Hydro estimated the coincident peak for Area 5 at 24,380 kVA. Assuming a 90% power factor, this equates to 21,942 kW.

4.6 Area 6 – Metro / Urban Core

Based on the number of towers and floors, it was difficult to accurately estimate the number of services within Area 6. The customer types included residential multiple family, hotel, commercial – office space, commercial – textile retail, commercial – restaurant, and government – building center. The total non-coincident demand for the area is estimated at 122,005 kW. Applying a coincident factor for each customer type, the coincident peak demand is estimated at 67,656 kW. Table 4-5 shows a summary of PSE's estimate.

Table 4-5 Metro/Urban Core Estimate

	Building sqft	Non-Coincident (kW)	Coincident Factor	Coincident (kW)
Residential Multiple Family	2,191,425	8,766	0.50	4,390
Hotel - 1 Service = 1 Unit		3,413	0.50	1,709
Commercial - Office Space	20,530,670	92,388	0.50	46,250
Commercial - Textile Retail	1,103,799	6,071	0.52	3,183
Commercial - Restaurant		11,038	0.51	5,642
Government - Building/Center	60,000	330	1.00	330
Coincident Demand (kW)	**23,885,894**	**122,005**		**67,656**

As previously mentioned, Area 6 is within Toronto Hydro's service territory. As a way to validate PSE's estimate, Toronto Hydro also established an estimated coincident peak load for the same area. This estimate was reported at 77,800 kVA. Assuming a 90% power factor, this equates to 70,020 kW, which is within 3.5% of PSE's estimate.

5 Capital Costs

A combination of developed electrical design plans by PSE and actual installations identified by Toronto Hydro were used to identify required electric distribution infrastructure to serve each of the six areas. The PSE design plans included routing overhead and underground distribution lines, placing transformers to serve the residences or businesses, and running secondary service drops to homes and other buildings located in each area. Based on the design and actual installations, a cost estimate was created by breaking down the electric distribution infrastructure into the quantity of individual poles, switches, duct banks, vaults, conductors, and transformers needed to supply electricity to the area.

Following the quantification of infrastructure facilities for each area, replacement cost estimates were established. These estimates were also based on a combination of construction cost data developed and maintained by PSE, as well as actual unit construction contract costs provided by Toronto Hydro.

5.1 Area 1 – Rural

For design of the Rural area, it was assumed that the area will be served by an overhead three-phase main line and single-phase tap lines. Residences and farms located close to the road would be served by overhead line and those with long driveways would be served by underground line fed off of the overhead line. Both overhead and pad-mounted transformers were used in the design. The minimum size of transformer used was 25 kVA and approximately one transformer would serve each residence or farm. The design utilizes a combination of overhead and underground infrastructure. The total estimated cost of a replacement installation is estimated at $963,995. A breakdown of major infrastructure components and costs are shown in Table 5-1.

Table 5-1 Rural Infrastructure Components and Costs

Poles	
Design Total	Estimated Cost
120	$217,275
Transformers	
Design Total	Estimated Cost
31	$71,100
Underground Cable Risers	
Design Total	Estimated Cost
20	$34,200

3 Phase Primary Overhead Circuit	
Design Total	Estimated Cost
2.055 kM	$49,731
1 Phase Primary Overhead Circuit	
Design Total	Estimated Cost
5.702 kM	$54,397
1 Phase Primary Underground Circuit	
Design Total	Estimated Cost
4.955 kM	$136,858

Secondary Overhead Circuit	
Design Total	Estimated Cost
0.225 kM	$3,910
Secondary Underground Circuit	
Design Total	Estimated Cost
1.17 kM	$14,824

5.2 Area 2 – Suburban Residential

For design of the Suburban Residential area, it was assumed that the area will be served by a main three-phase underground line, while single-phase underground lines would be routed through the neighborhoods. The minimum size of transformer used was 25 kVA and each transformer would serve an average of five homes. All the transformers used in the design were pad-mounted. The commercial and public buildings within the reviewed area had transformers sized to serve the load level assumed. The design utilizes mostly underground infrastructure. The total estimated cost of a replacement installation is estimated at $3,564,907. A breakdown of major infrastructure components and costs are shown in Table 5-2.

Table 5-2 Suburban Residential Infrastructure Components and Costs

Poles	
Design Total	Estimated Cost
114	$329,542
Switches	
Design Total	Estimated Cost
1	$6,420
Transformers	
Design Total	Estimated Cost
161	$570,343

3 Phase Primary Overhead Circuit	
Design Total	Estimated Cost
4.392 kM	$138,173
3 Phase Primary Underground Circuit	
Design Total	Estimated Cost
1.451 kM	$201,589
1 Phase Primary Underground Circuit	
Design Total	Estimated Cost
11.791 kM	$423,368

Underground Cable Risers	
Design Total	Estimated Cost
20	$44,460
Secondary Underground Circuit	
Design Total	Estimated Cost
28.773 kM	$455,170

5.3 Area 3 – Suburban Commercial

For design of the Suburban Commercial area, it was assumed that area will be served by overhead and underground, large conductor, three-phase lines. Taps would be made to the main lines through the use of pad-mounted switches and then routed through the business park. All the transformers used in the design were pad-mounted and were sized to serve the load level assumed. The design utilizes mostly underground infrastructure. The total estimated cost of a replacement installation is estimated at $5,662,235. A breakdown of major infrastructure components and costs are shown in Table 5-3.

Table 5-3 Suburban Commercial Infrastructure Components and Costs

Poles	
Design Total	Estimated Cost
21	$60,673
Switches	
Design Total	Estimated Cost
15	$340,180
Transformers	
Design Total	Estimated Cost
61	$808,830

3 Phase Primary Overhead Circuit	
Design Total	Estimated Cost
0.833 kM	$26,206
3 Phase Primary Underground Circuit	
Design Total	Estimated Cost
11.877 kM	$1,626,330
Secondary Underground Circuit	
Design Total	Estimated Cost
2.745 kM	$77,676

5.4 Area 4 – Urban Residential

For design of the Urban Residential, it was assumed that the area will be served by main three-phase underground lines, while single-phase underground lines would then be routed through the neighborhoods. The underground conductors would be run in duct banks and the equipment would be located in underground vaults. Secondary feeders would either run underground in duct to the homes and businesses or rise up on poles and overhead to the buildings. All the transformers used in the design were vault type and were sized to serve the load level assumed. The design utilizes mostly underground infrastructure with some overhead infrastructure. The total estimated cost of a replacement installation is estimated at $25,366,348. A breakdown of major infrastructure components and costs are shown in Table 5-4.

Table 5-4 Urban Residential Infrastructure Components and Costs

Vaults	
Design Total	**Estimated Cost**
26	$9,649,107
Cable chambers	
Design Total	**Estimated Cost**
16	$1,133,988
Secondary Handwells	
Design Total	**Estimated Cost**
60	$261,000
Underground Duct	
Design Total	**Estimated Cost**
5.896 kM	$2,738,677

3 Phase Primary Underground Circuit	
Design Total	**Estimated Cost**
11.487 kM	$2,217,722
3 Phase Primary Overhead Circuit	
Design Total	**Estimated Cost**
2.079 kM	$49,822
Secondary Underground Circuit	
Design Total	**Estimated Cost**
6.494 kM	$1,098,608
Secondary Overhead Circuit	
Design Total	**Estimated Cost**
20.060 kM	$548,389

Poles	
Design Total	**Estimated Cost**
403	$3,669,315
Switches	
Design Total	**Estimated Cost**
58	$1,397,568
Transformers	
Design Total	**Estimated Cost**
15	$296,119

5.5 Area 5 – Urban Commercial

For design of the Urban Commercial area, it was assumed that area will be served by underground, large conductor, three-phase lines. The underground conductors would be run in multiple duct concrete encased banks and the equipment would be located in underground vaults. Taps would be made to the main lines through the use of switches and then routed through the downtown area. All the transformers used in the design were vault type and were sized to serve the load level assumed. The design utilizes primarily underground infrastructure. The total estimated cost of a replacement installation is estimated at $81,988,908. A breakdown of major infrastructure components and costs are shown in Table 5-5.

Table 5-5 Urban Commercial Design Cost Estimate

Poles	
Design Total	**Estimated Cost**
198	$2,403,720
Switches	
Design Total	**Estimated Cost**
102	$3,277,056
Network Protectors	
Design Total	**Estimated Cost**
70	$7,112,490
Transformers	
Design Total	**Estimated Cost**
75	$1,974,129

Vaults	
Design Total	**Estimated Cost**
56	$27,710,256
Cable chambers	
Design Total	**Estimated Cost**
101	$9,544,399
Secondary Handwells	
Design Total	**Estimated Cost**
49	$284,200
Underground Duct	
Design Total	**Estimated Cost**
15.506 kM	$9,603,331

3 Phase Primary Underground Circuit	
Design Total	**Estimated Cost**
30.456 kM	$7,846,013
Secondary Underground Circuit	
Design Total	**Estimated Cost**
20.515 kM	$4,627,623
Secondary Overhead Circuit	
Design Total	**Estimated Cost**
4.174 kM	$152,154

5.6 Area 6 – Metro / Urban Core

For design of the Core Downtown / High Density Urban area, it was assumed that the area will be served by underground, large conductor, three-phase lines. The underground conductors would be run in multi-duct banks and the equipment would be located in underground vaults. Taps would be made to the main lines through the use of switches and then routed through the downtown area. Extensive use of network protectors was included in the Core Downtown design to ensure very reliable service. All the transformers used in the design were vault type and were sized to serve the load level assumed. The costs associated with this area are significantly higher than the other five areas due to the difficulty in constructing and operating in such a congested area. The design utilizes almost entirely underground infrastructure. The total estimated cost of a replacement installation is estimated at $105,901,695. A breakdown of major infrastructure components and costs are shown in Table 5-6.

Table 5-6 Metro/Urban Core Design Cost Estimate

Poles	
Design Total	Estimated Cost
309	$3,751,260
Switches	
Design Total	Estimated Cost
109	$3,501,952
Network Protectors	
Design Total	Estimated Cost
65	$6,604,455
Transformers	
Design Total	Estimated Cost
62	$1,631,947

Vaults	
Design Total	Estimated Cost
68	$33,648,168
Cable chambers	
Design Total	Estimated Cost
291	$27,499,209
Secondary Handwells	
Design Total	Estimated Cost
116	$672,800
Underground Duct	
Design Total	Estimated Cost
11.828 kM	$7,325,435

1 Phase Primary Underground Circuit	
Design Total	Estimated Cost
0.223 kM	$57,475
3 Phase Primary Underground Circuit	
Design Total	Estimated Cost
26.540 kM	$6,837,253
Secondary Underground Circuit	
Design Total	Estimated Cost
21.028 kM	$4,743,331
Secondary Overhead Circuit	
Design Total	Estimated Cost
0.027 kM	$984

6 Results

In reviewing the estimated coincident peak load, land mass, required electric infrastructure, and capital cost of the infrastructure for each area, a number of observations can be made. These observations include the demand density, infrastructure cost density, and infrastructure cost effectiveness.

The demand density is the amount of coincident demand within a unit of land mass. In the case of this analysis, kW per square kilometer was used. As shown in Table 6-1, the range greatly varies from 141 kW per square kilometer for the studied rural area, to 22,470 kW per square kilometer for the urban residential area, to 238,140 kW per square kilometer for the metro/urban core area.

Table 6-1 Demand Density Table

	Rural	Suburban Residential	Suburban Commercial	Urban Residential	Urban Commercial	Metro / Urban Core
Demand Density (kW/km^2)	141	3,656	12,395	22,470	68,185	238,140

The results are also illustrated in Figure 6-1. Excluding the rural area, the demand density from one area to the next increases by a factor of 1.8 to 3.5.

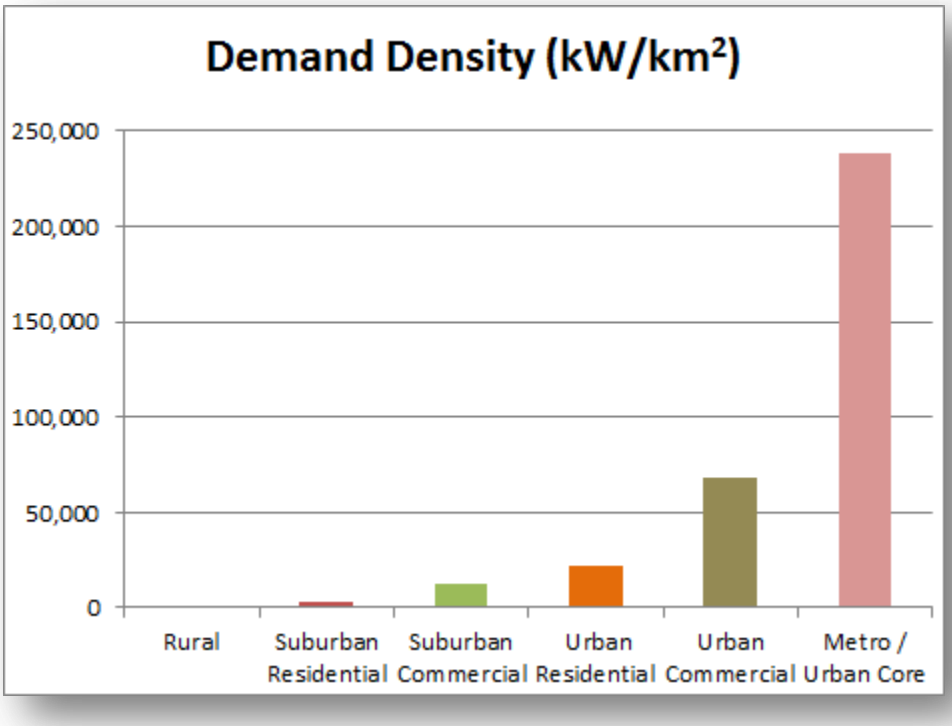

Figure 6-1 Demand Density

The infrastructure cost density, or plant cost density, is the amount of required infrastructure cost within a unit of land mass. In the case of this analysis, dollars per square kilometer was used. As shown in Table 6-2, the range greatly varies from $233,000 per square kilometer for the studied rural area to $12,690,000 per square kilometer for the urban residential area to $372,762,000 per square kilometer for the metro/urban core area.

Table 6-2 Infrastructure Cost Density

	Rural	Suburban Residential	Suburban Commercial	Urban Residential	Urban Commercial	Metro / Urban Core
Plant Cost Density ($1,000/km^2)	$ 233	$ 2,612	$ 5,445	$ 12,690	$ 78,826	$ 372,762

The results are also illustrated in Figure 6-2. Excluding the rural area, the infrastructure cost density from one area to the next increases by a factor of 1.7 to 6.2.

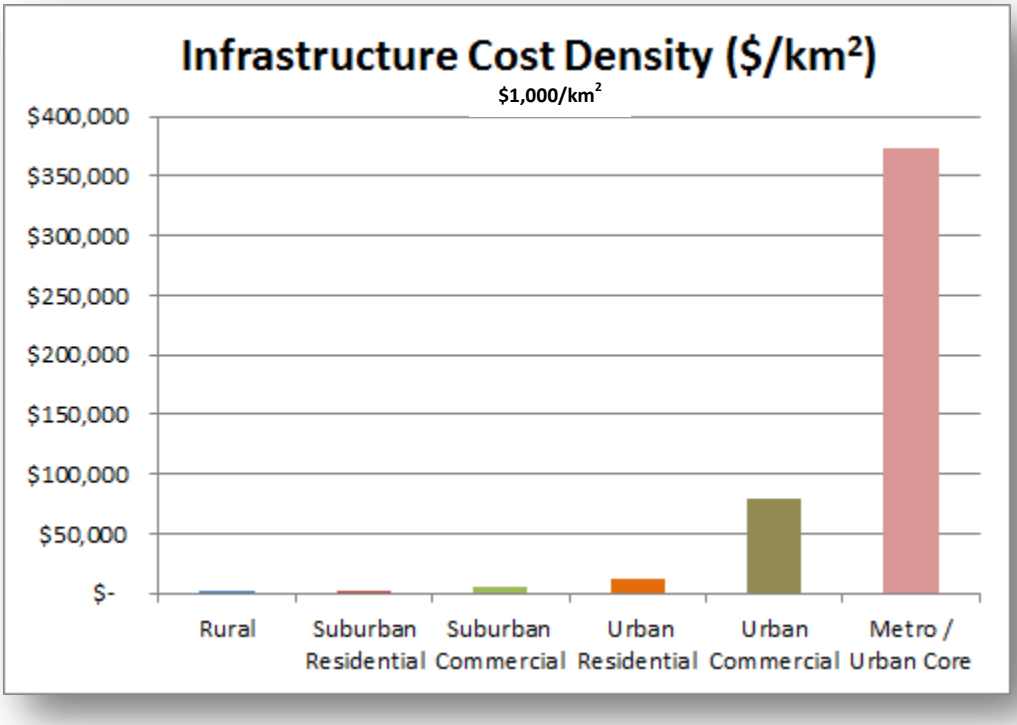

Figure 6-2 Infrastructure Cost Density

The infrastructure cost effectiveness is the cost of infrastructure required to serve a unit of coincident demand. In the case of this analysis, dollars per kW was used. As shown in Table 6-3, the range varies from $1,700 per kW for the studied rural area, to $600 per kW for the urban residential area to $1,600 per kW for the metro/urban core area.

Table 6-3 Infrastructure Cost by Area Type Table

	Rural	Suburban Residential	Suburban Commercial	Urban Residential	Urban Commercial	Metro / Urban Core
Plant Cost/Demand ($/kW)	$ 1,700	$ 700	$ 400	$ 600	$ 1,200	$ 1,600

The results are also illustrated in Figure 6-3. The infrastructure cost effectiveness from one area to the next increases or decreases by a factor of 1.3 to 2.3.

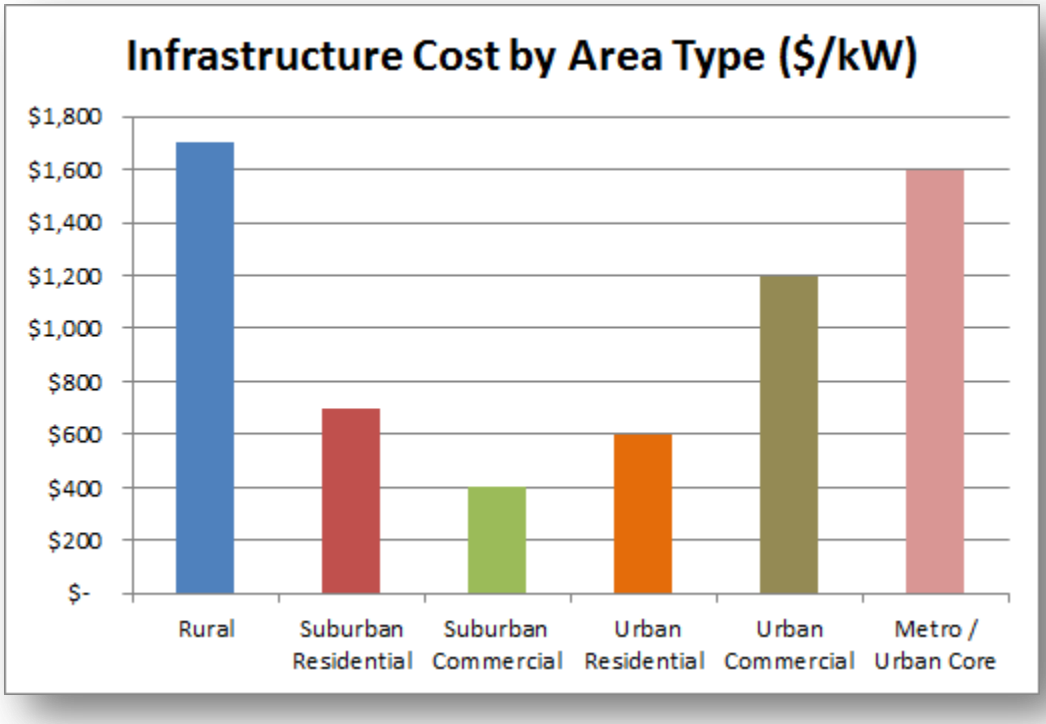

Figure 6-3 Infrastructure Cost by Area Type

It can be easily seen that the cost effectiveness of required infrastructure for the six areas studied does not result in an upward or downward trend as demand density increases. Rather, the cost effectiveness represents a U-shape where rural and metro/urban core areas are the least cost effective in terms of required infrastructure to serve the loads within the given environments. Conversely, suburban residential, suburban commercial, and urban residential areas are the most cost effective environments to serve.

In conclusion, the results of this report demonstrate that higher infrastructure costs per kW load served should be expected from a utility when serving a metro/urban core area. As demonstrated by the graphs above, both demand density and infrastructure cost density are extremely high in a metro/urban core service territory in comparison to all other types of service territories. The physical limitations for a utility operating within a highly dense, saturated downtown environment increase the costs associated with maintaining and installing electrical infrastructure to the extent that serving a core downtown area is almost as inefficient as serving a rural area. Without sacrificing a utility's effectiveness in providing power to its core downtown customers, efficiency is simply limited by the operating conditions a utility faces in this type of environment. While a utility should still fulfill all expectations of efficiency, regardless of service territory, these expectations should be reflective of the developed environment served.

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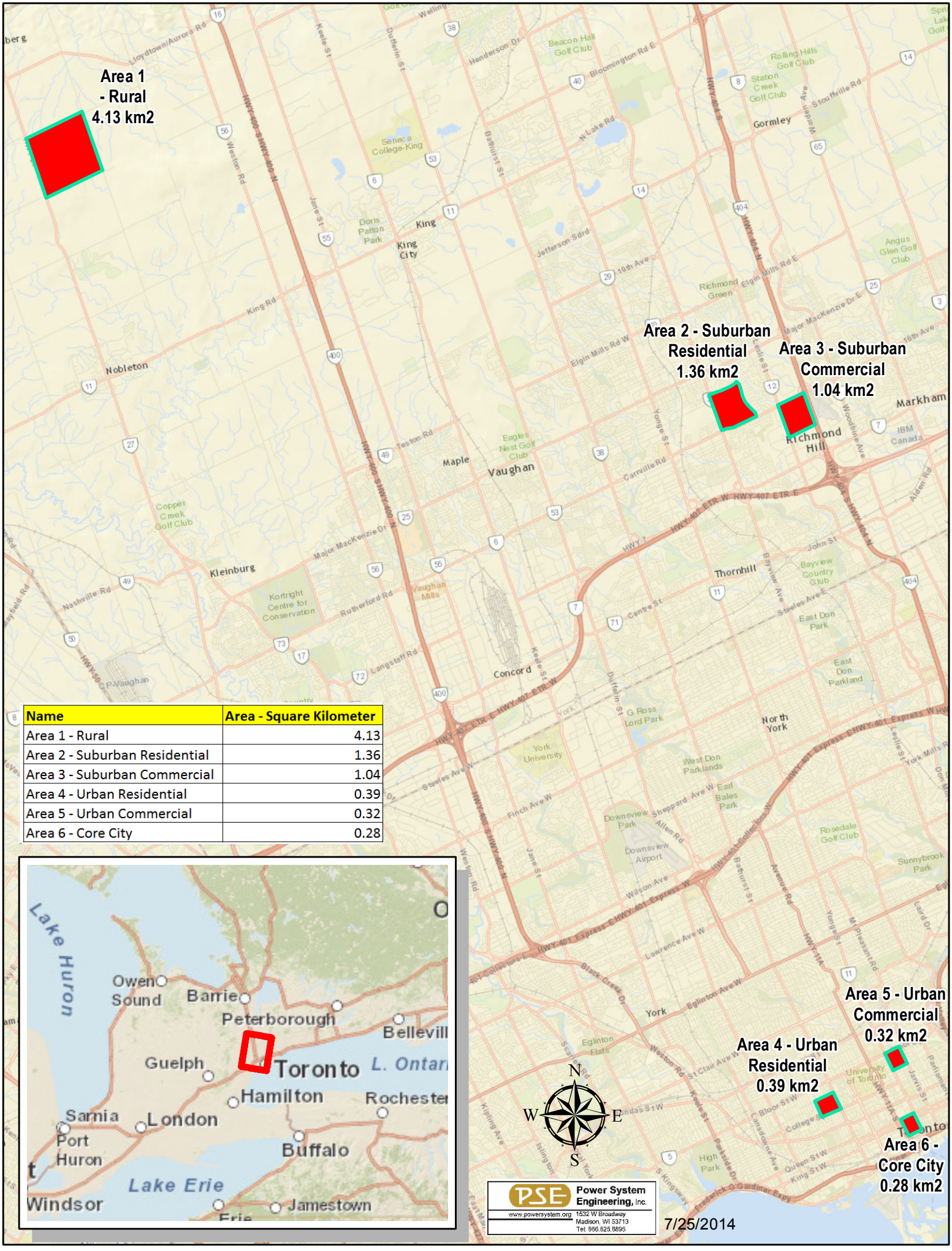

Name	Area - Square Kilometer
Area 1 - Rural	4.13
Area 2 - Suburban Residential	1.36
Area 3 - Suburban Commercial	1.04
Area 4 - Urban Residential	0.39
Area 5 - Urban Commercial	0.32
Area 6 - Core City	0.28

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Tab 2 /C
Schedule 5 /C
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1 Executive Summary

This report (the "PSE Reply Report") is in reply to:

- PEG's December 2014 report, "Toronto Hydro Electric System Limited Custom IR Application and PSE Report: *Econometric Benchmarking of Toronto Hydro's Historical and Projected Total Cost and Reliability Levels*" (the "PEG Report"), and
- PEG's corrections of errors in their PEG Report, provided in a letter on December 17, 2014 ("PEG Report Corrections").

In the PEG Report Corrections, PEG provides a revised model (Table Three in the PEG December 2014 Report) and revised total cost results (Table Four). Using PEG's revised model, THESL costs are 8.0% above the benchmark value for the most recent 2010-2012 time period.

In this Reply Report, PSE makes three necessary revisions to PEG's total cost benchmarks. These changes result in THESL's costs being 15.2% below benchmarks for the 2010-2012 period, and the 2015-2019 costs remaining within the +/- 10% band, corresponding to a 0.3% stretch factor under the 4th Generation Incentive Ratemaking framework.

The changes are:

1. PSE made THESL's projected costs comparable to its past costs and the U.S. sample by excluding bad debt expenses that were included in THESL's 2015-2019 projections in the original September 2014 PSE report,
2. PSE made cost definitions comparable and more comprehensive between THESL and the U.S. sample, by adding in THESL's CDM costs and re-inserting customer service and information expenses for the U.S. sample, and
3. PSE re-included into the model the logical, properly signed, and statistically significant urban core variable, and excluded the incorrectly signed and statistically insignificant high voltage variable proposed by PEG.

The findings using the revised model are consistent with PSE's September 2014 report, "Econometric Benchmarking of Toronto Hydro's Historical and Projected Total Cost and Reliability Levels" ("PSE September Report").

PSE also finds that the PEG Report substantiates PSE's reliability benchmarking results found in PSE's September 2014 Report, when the results are compared over the same timeline. Given the consistency in the total cost results between this PSE Reply Report and the PSE September Report, and the substantiation by PEG of PSE's reliability results, the key findings and recommendations found in PSE's September Report remain intact.

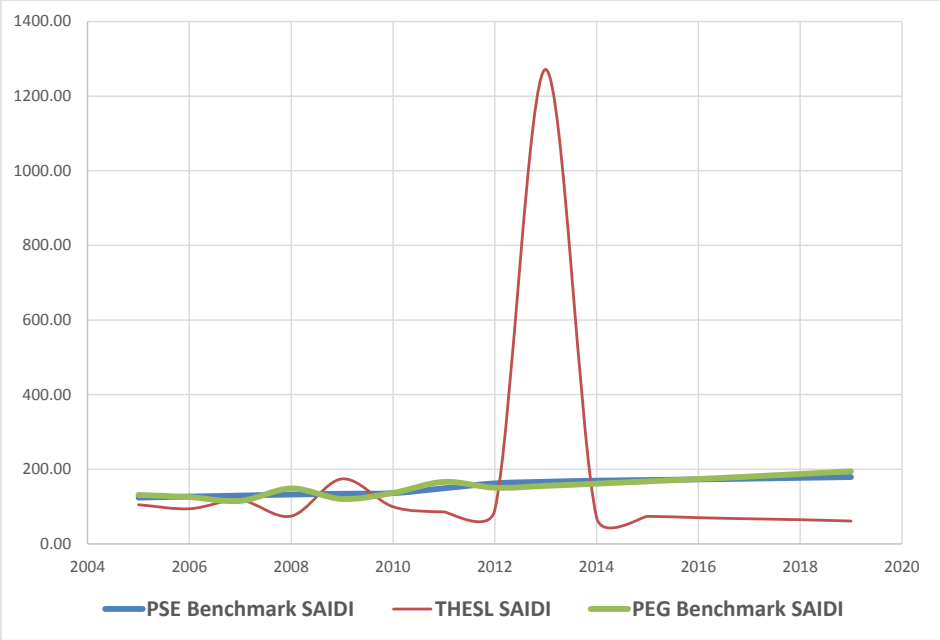
The next chapter explains in further detail how PEG's reliability research supports PSE's findings. Chapter Three provides the adjusted total cost model and results. In Chapter Four, PSE responds to some of the statements and other conclusions found throughout PEG's Report. Chapter Five provides PSE's recommendations to the Board.

2 PEG and PSE Reliability Results Are Very Similar

PEG states that PEG and PSE agree regarding THESL's SAIFI benchmarking, yet PEG states that "findings differ somewhat with respect to SAIDI".[1] PSE estimates that THESL's SAIDI is well below expected levels. PEG finds THESL's SAIDI is also below benchmarks, but not as far below as PSE found. However, the results seemingly differ because in the PEG Report, PEG was referring to the more dated time period of 2009-2011, and in the PSE September Report, we used the most recent time period of 2010-2012. When PEG's model is applied to the same time period of 2010-2012, it has THESL at 49% below SAIDI benchmark values, as compared to the 48% below in the PSE September Report. Both PSE and PEG find that THESL's SAIDI is projected to be over 100% below benchmark values by 2019.

The fact that PEG's results are nearly indistinguishable to PSE's is best illustrated by slightly modifying the graph that PSE provided in its September Report, comparing THESL's SAIDI values to benchmarks (see Figure 5 in PSE's September Report). PSE has now inserted the PEG-calculated SAIDI benchmarks (green line). PSE's September Report benchmarks are the blue line, THESL's actual and projected values are the red line. Figure 1 below shows the three values and illustrates there is little to no difference in PEG's SAIDI benchmarks and PSE's SAIDI benchmarks.

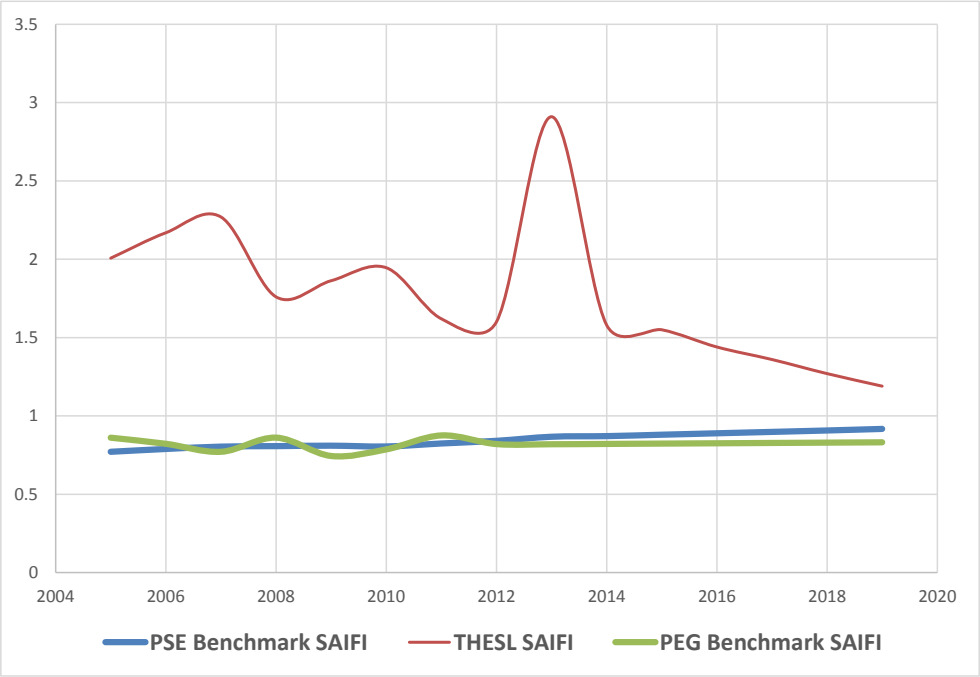
Figure 1 SAIDI: PSE, PEG, and Actual



Although PEG has already confirmed PSE's SAIFI finding, in Figure 2 we show PEG's SAIFI benchmarks (green line) compared to PSE's (blue line) and THESL's actual/projected results (red line). Notice again how similar the PEG and PSE reliability results are.

[1] Page 5 of the PEG Report.

Figure 2 SAIFI: PSE, PEG, and Actual



Despite PEG's contention to the contrary, there is actually no meaningful difference between PEG's SAIDI benchmarks and those of PSE's. The only difference arises from the different time periods being compared. The PEG Report focused on the reliability performance scores in the past (2009-2011) rather than using the Custom IR projections to formulate conclusions. Although PEG has conducted this analysis, the PEG Report did not display the future reliability projections (THESL is projected to improve in this area). This is inconsistent with PEG's analysis of THESL's total costs, where PEG's conclusions were based on THESL's results through 2019.

PEG notes that it made a number of reliability data set revisions and exclusions to PSE's data, based on whether the data could be verified with the source document, or whether the value aligned with the current document. PEG states on page 38: "In PEG's opinion, these are serious errors and omissions." PEG's statement is exaggerated. The adjustments PEG made to PSE's reliability data are minor revisions. PSE made a good faith effort to gather data from hundreds of sources scattered around the internet over the course of many years. PEG made minor changes that did not have a meaningful impact on the results. The fact that PEG's results are so similar to PSE's testifies to this fact.

The consistency in THESL's reliability results is notable, given that two separate experts used different data sets, time periods, and models to derive them. While PSE is unconvinced that PEG's included variables should have replaced those in PSE's September model, the issue is of little consequence in this case, given the extreme similarity of results.[2] The similar results should provide the Board with a high level of confidence in the reliability benchmarking provided by PSE in this proceeding.

[2] PEG inserted cooling degree days, heating degree days, undergrounding, and precipitation into the models and took out percent forestation, customer density, wind, and the number of customers from the PSE models.

3 Total Cost Results and Model

As the experience of incentive regulation in Ontario has shown, benchmarking tends to be an iterative process. Putting together data sets, explanatory variables, and models takes time and requires input from multiple stakeholders. Throughout this process, benchmarking evaluations tend to become more accurate, comprehensive, and trustworthy, resulting in improved evidence to better inform decisions.

Relative to PEG's 4th Generation Incentive Regulation benchmarking model, the PEG Report made strides in conducting a fair total cost benchmarking evaluation in relation to THESL. This was primarily done by using the U.S. data set.[3] PSE agrees with PEG that excluding uncollectible account expenses from the U.S. data is appropriate, given that bad debt expenses were excluded for all of the Ontario utilities.[4] PEG also included THESL's smart meter expenses in its cost definition. While this is unfair to THESL, since only a handful of U.S. utilities in the dataset have fully deployed smart meters, in an effort to only focus on major issues, PSE will not modify PEG's treatment of smart meters in the Reply Report results.

However, three adjustments to PEG's Research are necessary to make cost definitions comparable and to make the model align with benchmarking best practices. These are:

1. Make THESL's forecasted costs comparable to past costs by excluding bad debt expenses,
2. Make cost definitions comparable and more comprehensive between THESL and the U.S. sample by adding in THESL's CDM costs and re-inserting customer service and information expenses for the U.S. sample, and
3. Re-introduce in the model the logical, properly signed, and statistically significant urban core variable, and exclude the incorrectly signed and statistically insignificant high voltage variable.

These three adjustments are discussed in the following sections.

3.1 Adjustment #1: Bad Debt Expenses

PEG correctly states that uncollectible account expenses should be subtracted for the U.S. sample. PSE agrees that this improves the comparability of costs, but we note that PEG should also subtract out bad debt expenses for THESL's forecasted time period of 2013 to 2019 (PEG did not do this). PSE requested this data from THESL and has subtracted bad debt expenses, along with other non-comparable costs such as property taxes that were previously in the forecasted cost data. This was done in an effort to define forecasted costs in the same way in THESL's and U.S. utilities' historical costs.

[3] Recall that PSE did estimate two models, a U.S. only and a combined U.S. and Ontario model. Both models showed similar results for THESL. In the interests of brevity and time, we only discuss the U.S. model in this report. PSE does dispute, however, PEG's statement in its Responses to Interrogatories (1-THESL-60) that "PEG believes there is no value in PSE's Ontario benchmarking, because PSE selected the TFP-based cost measure for THESL while the Ontario distributors were intentionally benchmarked using a different, benchmarking-based cost measure." This is incorrect; PSE used the same cost definition for both THESL and the rest of the Ontario distributors. The only exception to this is THESL's cost 2013-2019 projections included the added costs of bad debt expenses.

[4] PSE used PEG's data set found in the 4th Generation IR to attempt to replicate PEG's cost definitions as closely as possible. In doing that, PSE was unaware that bad debt expenses were excluded (which is why THESL's projected costs include bad debt expenses). PEG made it clear that these were excluded; thus, excluding those same type of expenses from the U.S. data set and from THESL's 2013-2019 cost projections is appropriate.

In PEG's response to THESL's Interrogatories, 1-THESL-23, PEG asserts that its estimates of THESL's 2013-2019 projected costs "implicitly" subtract bad debt expenses. This is incorrect. PEG takes its 2012 costs, which excluded bad debt, and for projected costs for 2013-2019 adjusts it by PSE's annual percentage change (from Table 6 of the PSE September Report). This method does not explicitly or implicitly exclude bad debt expenses for the 2013-2019 period, because PSE's 2013-2019 costs include THESL's bad debt expenses, whereas the historical 2002-2012 costs do not.

As an illustration, PEG's 2013 total cost value is calculated using PEG's 2012 cost value and then escalated by the growth rate in PSE's total costs from 2012 to 2013. PEG believes this in some way "implicitly" subtracts out bad debt expenses. However, in the PSE total cost measure the 2012 value excludes bad debt expenses, whereas the 2013 value includes bad debt expenses. By escalating PEG's 2012 total costs by this growth rate, PEG is implicitly adding bad debt expenses into their total cost projections for THESL, creating a mismatch in costs between THESL's projected costs and those of the rest of the sample. The PSE approach is to simply subtract out bad debt expenses in the projected data so the cost definition matches the rest of the sampled data.

3.2 Adjustment #2: Conservation Demand Management Expenses

PEG excluded the entirety of the "customer service and information expenses" for all of the U.S. utilities, in an effort to exclude CDM expenses for U.S. utilities, similar to the Ontario cost definition. However, three problems arise with this: 1) THESL and other Ontario utilities also incur non-CDM customer service expenses that are not being excluded by PEG, creating a cost comparability problem and making the treatment advantageous to the U.S. and disadvantageous to THESL; 2) Eliminating a large expense category makes the total cost definition far less comprehensive, despite the Board's preference for comprehensive total cost benchmarking; and 3) There is no assurance that U.S. utilities record all of their CDM expenses within the customer service and information cost category. [5]

To solve the first two problems, PSE added in THESL's CDM expenses and re-added customer service and information expenses back into the total cost definition for U.S. utilities. This made the cost definitions comparable between THESL and the U.S. sample, addressed PEG's concern, and made the cost definitions far more comprehensive than the definition used by PEG (which excludes all customer service and information expenses).

It is not known if all U.S. utilities report CDM costs in the customer service category. PEG claims on page 25 of its Report that CDM often constitutes the largest expense for the customer service and information expenses, thus somehow justifying the exclusion of the entire cost category for the U.S. sample only (THESL non-CDM customer service and information expenses are still included in the PEG definition). However, PEG does not provide any evidence that CDM constitutes the largest expense component of the customer service and information category, when asked in 1-THESL-24 (d).

To assist with this issue, PSE contacted FERC directly; the "FERC Form 1 team" explained to PSE that each state records these expenses differently, and there is no clear guidance on the issue. More specifically, the FERC Form 1 team stated:

[5] PEG claims in its response to 1-THESL-24 (a) to have subtracted out all of the customer service and information expenses not related to CDM for both the historical and projected THESL costs. This statement is incorrect, based on PSE's review of PEG's working materials, where no such adjustment is apparent nor mentioned in the PEG Report.

> Demand-side management (DSM) is a distribution activity regulated at the local jurisdictional level, not at the Federal level. Each jurisdiction sets its own methods for the accounting for and recovery of DSM activities, including direct expensing or recovery through of some or all of the costs in a regulatory asset. They may also have specific reporting requirements for DSM activities. Look to each company's tariff, and the local jurisdictional authority, for specific information on the treatment of DSM activities, and in which regulatory accounts such activity is charged.[6]

In an effort to provide conservative evidence in this proceeding and only address clear-cut necessary changes, PSE will assume that U.S. utilities report all CDM activities in the customer service and information expense category (even though this is likely not the case for all U.S. utilities). Thus, PSE included all of THESL's CDM expenses, which are projected at $51 million in 2015. Along with the smart meter expense inclusions for THESL, this assumption also makes the PSE Reply Report less favorable to THESL (e.g., if we were able to ascertain all CDM expenses for each utility and how they were recorded, THESL's results would most likely be better).

3.3 Adjustment #3: Model Specification with Urban Core and High Voltage Variables

PEG modified PSE's U.S. model by removing the urban core variable and including a high voltage capacity variable.[7] In this PSE Reply Report, following established industry practice, PSE removed PEG's high voltage variable, which is statistically insignificant and incorrectly signed, and re-included PSE's urban core variable, which is logical, signed correctly and statistically significant at a 99% confidence level.

The fact that the high voltage variable is signed incorrectly (it should be positive, but is negative in the PEG Report Corrections) and statistically insignificant at even the 90% confidence level disqualifies the variable from being included. Business condition variables that are incorrectly signed or statistically insignificant are not included in econometric benchmarking models. PEG's use of this variable, and its exclusion of the urban core variable, are not in-line with benchmarking best practices. PEG has stated the need for business condition variables to be correctly signed and statistically significant in a report to the Board. In a report dated March 20, 2008 "Benchmarking the Costs of Ontario Power Distributors" on page 52, PEG writes:

> All included business conditions were required to have elasticity estimates that were plausible (e.g. sensibly signed) and significantly different from zero. All variables found to be statistically significant were included in the final model. Since, additionally, we consider for inclusion only variables that are predicted by theory or that seem relevant on the basis of our industry experience, the model is not a 'black box' that confounds attempts at earnest appraisal.

In this proceeding, PEG has provided conflicting models with different signs for the high voltage variable, but in both models the variable is statistically insignificant. PEG's original December 2014 Report provided a model in Table Three that showed a statistically insignificant high voltage variable, but one that was positively signed. Then in PEG Report Corrections, PEG submitted a revised Table Three; this time the high voltage variable was <u>negatively</u> signed, but still statistically

[6] Correspondence from FERC.

[7] PEG also removed the percent undergrounding variable, although failed to mention this change or explain why the change occurred in the PEG Report.

insignificant. Neither model meets the benchmarking best practice principles previously stated by PEG.[8]

The Appendix of PSE's September Report provided an engineering analysis showing that utilities will have different cost challenges based on the development characteristics of their service territories. Costs are found to be well over double for urban service territories, relative to suburban ones. Excluding the urban variable creates an omitted variable bias in PEG's model and unfairly disadvantages THESL in the process.

Excluding the urban core variable also violates benchmarking best practice. PEG wrote in a 2010 report written on behalf of Public Service Company of Colorado:

> One important result is that an econometric cost model can yield *biased* predictions of the true benchmark if relevant business condition variables are excluded from the model. It is therefore desirable to include in an econometric benchmarking model all business conditions which are believed to be relevant, for which good data are available at reasonable cost, and which have plausible and statistically significant parameter estimates.[9]

The PSE urban core variable is necessary to include and meets PEG's stated requirements for inclusion. PEG's high voltage variable does not meet those same requirements. Substituting the high voltage variable for the urban core variable is, therefore, a necessary change to the total cost model and one that is made in this PSE Reply Report.

PEG summarizes this issue by writing the following on page 3 and 4 of the PEG Report:

> The third stage of PEG's review examined PSE's business condition variables. PEG made two necessary changes to PSE's selected business conditions. The first was adding a variable to reflect MVa of transformer capacity for stations with primary voltage levels at or above 50 kV. This variable is necessary to control for US utilities' costs of owning high voltage assets. The second was eliminating the urban core dummy variable from PSE's model because it is redundant, inappropriate in electricity distribution benchmarking, and appears to distort the estimated impact of other business condition variables (especially undergrounding).

PEG seems to have added new requirements for including business condition variables. PEG claims that the urban variable is "redundant, inappropriate in electricity distribution benchmarking, and appears to distort the estimated impact of other business condition variables (especially undergrounding)". PSE addresses each of these concerns in turn below.

3.3.1 The Urban Core Variable Is Not Redundant

On page 29 of the PEG Report, PEG states: "Since PSE's model already includes a percent of plant underground variable, including an 'urban core dummy' would be redundant at best." PEG appears

[8] PSE also notes that the high-voltage expenses are included in the "TFP-based" cost measure used by PSE. PEG incorrectly criticizes PSE's use of a TFP-based cost in its Responses to Interrogatories (1-THESL-61) and in the PEG Report. The TFP-based costs capture the high-voltage costs that PEG is describing in its response. The TFP-based cost definition also excludes contributions in aid of construction (CIAC), which PEG itself subtracts from their cost definition for THESL (see PEG's response to 1-THESL-20). Besides adding smart meter expenses, the rationale for which PEG fails to empirically substantiate in its response to 1-THESL-19 , PEG is effectively advocating for the cost definition used by PSE, while at the same time criticizing PSE for its use.

[9] PEG Report of Dr. Mark Newton Lowry, President of PEG, filed on Behalf of Public Service Company of Colorado on December 17, 2010. Report title, "Statistical Analysis of Public Service of Colorado's Forward Test Year Proosal".

to be saying that the percent underground variable should be sufficient to pick up the impacts of higher costs for urban areas. This is incorrect for several reasons.

1. In our experience with hundreds of distributors, undergrounding tends to cost a great deal more in urban centers than in rural or suburban settings. In more rural and suburban settings, direct bury cables with pad mounted equipment are typically used. These are much less expensive than concrete-encased duct bank installations with underground vaults, submersible equipment and massive civil infrastructure, which are found in urban settings.
2. Similarly, overhead line construction can be found within all service area environments, but will also cost a great deal more in urban settings; these costs are not captured by an undergrounding variable.
3. The underground variable is not found in PEG's final model or in PSE's Reply model. PEG states in 1-THESL-32 the undergrounding variable was excluded because it was either statistically insignificant or had the wrong sign. It is not sensible to exclude the urban variable on the basis it is "redundant," but then also exclude the variable PEG claims serves as its replacement.

The costs of all types of construction based on the developed areas are laid out in the Appendix to the PSE September Report. PEG's statement that the percent underground variable will pick up the cost variations for an urban utility is not correct. In the end, serving an urban core simply increases costs, and our report shows that the urban core variable captures this fact.

3.3.2 The Urban Core Variable Is Not Inappropriate

We now move to PEG's claim that the urban core variable is "inappropriate in electricity distribution benchmarking." This statement is contrasted with PEG's own use of an urban core variable in prior gas distribution cost benchmarking studies. On page 28 of the PEG Report it lays out its rationale for this statement as follows:

> Some PEG studies have used this variable in gas distribution models, but the rationale for using such a dummy variable is much stronger for gas distribution because essentially all gas distribution assets are underground. A dummy variable is one means of distinguishing between the higher costs of installing and maintaining underground gas distribution assets in densely-populated, mature urban areas compared with "greenfield" suburban territories.

The reasons that costs increase for urban gas distributors are the exact same reasons costs increase for urban electric distributors. Constructing and maintaining either underground or overhead assets in a densely-populated and mature urban area will cost considerably more than constructing and maintaining either overhead or underground power lines in a suburban environment. This is the same message in the PSE September Report Appendix.

3.3.3 The Urban Core Does Not Distort the Impact of Other Variables

PEG's last criticism of the urban core variable is that it "appears to distort the estimated impact of the other business condition variables (especially undergrounding)." Recall that PEG has already eliminated the undergrounding variable from their model. Eliminating the undergrounding variable vitiates the distortion argument (similar to PEG's redundancy concerns). Furthermore, using econometrics, <u>any</u> included variable will change the estimated impacts of the other business condition variables. This is why there needs to be a theoretical basis for including variables, and they must be correctly signed and statistically significant. To not include a variable that is predicted by theory, correctly signed, and statistically significant because it will change the other business condition variables would distort the model by creating what is known in econometrics

as an "omitted variable bias." By excluding the urban core variable, PEG's model suffers from this bias.[10]

The system R-squared statistics of PEG's model and PSE's Reply Report model can be compared. R-squared statistics are measures of "goodness of fit" and basically present how much of the variation in the dependent variable (total cost) is explained by the model. PEG's R-squared is 0.926, implying that 92.6% of the variation in the data set is explained in their model. After making the three adjustments to PEG's model, the R-squared of the resulting model increases to 0.962. This supports PSE's position on the need to include variables that are logical, statistically significant, and properly signed.

In summary, standard industry practice results in including the urban core variable and excluding PEG's high voltage variable. This will also capture a highly relevant cost driver (serving an urban core), which is necessary to provide a fair and accurate model to evaluate THESL's cost performance.

3.4 PSE Reply Total Cost Model after Adjustments

The model estimates are provided in Table 1. All first order and business condition variables are logical, correctly signed, and statistically significant at a 95% level of confidence.

The PSE Reply Report total cost results are provided in Figure 3 and Table 2. THESL's costs are under the PSE Reply Report total cost benchmarks until 2015, when the company's cost is projected to move higher than its benchmarks by around four percent. THESL's projected costs assume that the company's proposed Custom IR plan is approved in full. Table 2 shows the numerical PSE Reply Report model results. THESL Custom IR projections remain within the 4th Generation IR 0.3% stretch factor range of +\- 10%.

[10] Please see PEG's statement on the prior page regarding what causes bias and how it can be prevented by including all business conditions that are plausibly signed, can have data gathered, and are statistically significant.

Table 1 PSE Reply Report Cost Model

		WK=	Capital Price			
		N=	Number Retail Customers			
		D=	Peak Demand			
		UD=	Urban Core Dummy			
		PCE=	Percent Electric Customers in Gas & Electric Customers			
		PRV=	Percent Residential Deliveries in Total Deliveries			
		PDE=	Percent Distribution Plant in Total Electric Plant			
		ED=	Elevation Standard Deviation			
		PF=	Percent Forestation			
EXPLANATORY VARIABLE	**ESTIMATED COEFFICIENT**	**T STATISTIC**		**EXPLANATORY VARIABLE**	**ESTIMATED COEFFICIENT**	**T STATISTIC**
WK	0.585	161.579		PDE	0.109	6.409
KK	0.062	3.472				
KN	-0.034	-3.051		ED	0.016	2.386
KD	0.042	3.626				
				PF	0.018	3.242
N	0.738	28.283				
NN	0.583	6.354		Trend	0.003	2.727
ND	-0.495	-5.394				
D	0.208	7.566				
DD	0.455	4.580		Constant	20.052	1418.424
UD	0.014	4.625		System Rbar-Squared	0.962	
PCE	0.122	4.238		Sample Period:	2002-2012	
PRV	0.037	2.133		Number of Observations	805	

Figure 3 PSE Reply Report Cost Model Results

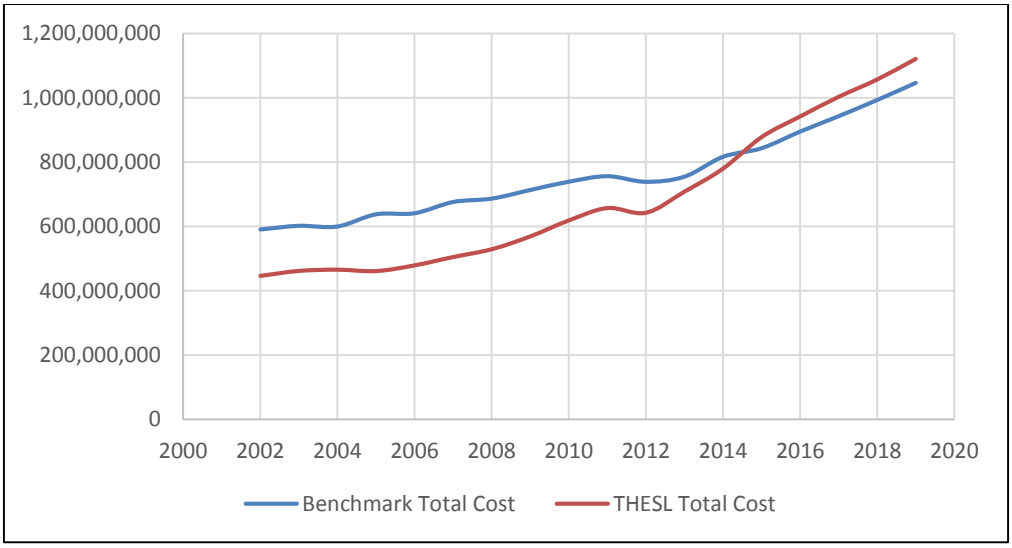


Table 2 PSE Reply Report Cost Model Results

Year	Percent of U.S. Total Cost Econometric Benchmark	Total Cost Econometric Benchmark, $M	Total Cost THESL, $M
2002	-28.0%	$591	$446
2003	-26.5%	$602	$462
2004	-25.4%	$600	$466
2005	-32.4%	$638	$461
2006	-29.2%	$641	$479
2007	-29.2%	$676	$505
2008	-26.0%	$687	$529
2009	-22.6%	$713	$569
2010	-17.8%	$739	$619
2011	-14.0%	$756	$657
2012	-13.9%	$739	$643
2013	-6.3%	$755	$708
2014	-4.6%	$816	$780
2015	4.1%	$843	$878
2016	5.2%	$895	$942
2017	6.2%	$943	$1,003
2018	6.3%	$993	$1,057
2019	7.0%	$1,046	$1,121

4 PSE Response to PEG's Statements on General Benchmarking Practices

The PEG Report embarked on some discussions that did not directly pertain to the cost and reliability models. This section provides PSE's response to some of these general topics.

4.1 Response to PEG's Chapter Five, "Simultaneous Cost and Reliability Benchmarking"

In Chapter 5 of its report ("Simultaneous Cost and Reliability Benchmarking"), PEG attempts to replicate a reliability impact analysis that PSE conducted for Wisconsin Public Service ("WPS").[11] In 2013, WPS proposed a large 5-year reliability-driven spending program to its Wisconsin regulator. WPS named this spending program the "System Modernization Reliability Project" ("SMRP"). In that proceeding, Dr. Kaufmann of PEG provided testimony on behalf of WPS regarding the quantification of consumer benefits to improving reliability and compared these benefits to the five-year costs of the spending program. Mr. Fenrick of PSE also testified on behalf of WPS and presented PSE's reliability impact benchmarking model.

PSE found that the SMRP beat industry benchmarks for reliability-improvement spending. The study showed increasing net distribution plant by 43% for an average utility would improve SAIDI by around 12%. Thus, the projected SAIDI improvement of 20 to 25% for WPS would beat industry benchmarks.

In Chapter 5 of the PEG Report in this proceeding, PEG implemented PSE's model in the WPS case incorrectly. PEG inserted the growth rate in capital expenditures, rather than the increase in distribution net plant, over the life of the plan. PSE explicitly stated in the WPS case that we used distribution net plant as the basis for the calculation. This statement can be found in Mr. Fenrick's sur-surrebuttal testimony in Case 6690-CE-198 on May 6, 2013, page 2.

When asked in the THESL interrogatories about why PEG used annual capital expenditures rather than electric net distribution plant (1-THESL-52), PEG stated that it did not use the correct input because PSE had not provided the relevant WPS testimony. However, this testimony is on the public record, and PEG was aware of it, having been involved in the WPS case. In its report in this proceeding, PEG did not correctly reproduce PSE's prior research. When questioned in Interrogatory 1-THESL-52, PEG did not acknowledge nor correct this error in its reply, despite having access to the above-noted information that demonstrates that the error was made.

Given that THESL's net plant increase is projected to be less than WPS's (around 25% for THESL's five-year plan) with reliability improvement estimated to be very similar to WPS's (at 18.7% for THESL), we expect THESL to have a better finding than WPS did. In trying to replicate PSE's study, PEG found that THESL's SAIDI projections fall a bit short of the impact benchmarks. This conclusion is based on an incorrect implementation of PSE's prior research and should be disregarded.

4.2 PEG's "Zone of Continuous Improvement" and Eight Year Custom IR Plan

PSE's September Report states: "Based on the projections, the projected spending should result in a utility more aligned with its externally-derived benchmark values from both a total cost and

[11] PSE did not put forth this model in its September report, it was only brought up in interrogatories by Board Staff, in questioning by Dr. Kaufmann to Mr. Fenrick at the Technical Conference, and then in PEG's Report.

SAIFI perspective."[12] PEG discusses how a utility should strive to improve benchmark evaluations in both cost and reliability simultaneously. PEG illustrates this on page 19 with a graph that implies that a distributor should find ways to improve both total costs and reliability at the same time, thus entering the PEG concept of the "zone of continuous improvement."

PEG's assertion is inconsistent with industry practices; all utilities know there are trade-offs between improving reliability and costs. PEG acknowledges this later on page 43, when it states there is a "common-sense linkage" between costs and reliability levels.[13]

PEG has not provided any detailed plans on how THESL can actually improve both reliability and their total cost performance at the same time. PEG's proposition that this is possible is pure speculation, not likely to be possible in practice, and ignores the "common-sense linkage" between costs and reliability. Of course, it would be desirable if all utilities could simply reduce costs and enhance reliability, but in the real world, that is not feasible for the vast majority of utilities. Benchmarking can serve as a guide to help answer what is in the best interests of a utility's customers, thus offering customers with a better balance between two competing interests (low costs and high quality service).[14]

As discussed in the prior section, it appeared that Dr. Kaufmann of PEG had no issue with WPS ramping up capital spending for a five-year period in order to improve reliability. In fact, he estimated that the benefits outweighed the added costs. On page 8 of Dr. Kaufmann's rebuttal testimony on behalf of WPS, he states:

> Nevertheless, with an estimated value of more than $21 million per year to WPS customers after 2019, I believe the benefits generated because of the SMRP will certainly exceed the total costs of the program in less than 20 years, which is less than half of the 60-year expected life of the assets to be installed under the program.[15]

By conducting this capital spending program, WPS's total cost benchmarks would suffer. Yet Dr. Kaufmann firmly rejected the idea that the program should be stretched out beyond the proposed five years. Dr. Kaufmann on behalf of WPS stated:

> Delaying the implementation of the SMRP would reduce benefits to customers. If the project's implementation was extended to 10 years, customers would receive some of the benefits later. Because there is a time value of money, this would reduce the project's benefits to customers.[16]

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[12] Page 12 of the PSE September Report.

[13] PEG clarified its agreement in its Responses to Interrogatory (1-THESL-48); it did not dispute the common-sense linkage, as described the last sentence in paragraph 2 on page 43 of the PEG Report, which states that:

> Since 'old and failing infrastructure' can be remedied by purchasing and installing new infrastructure, PSE posits a relationship between changes in THESL costs (especially the investment costs associated with installing new capital) and future changes in its SAIFI."

(Emphasis added). In other words, as costs go up (especially new capital costs), SAIFI improves.

[14] Other tools are also helpful to find the best balance between costs and reliability. THESL's Feeder Investment Model ("FIM") is an example of the utility attempting to find the most advantageous balance between capital investment and customer preferences for reliability.

[15] Case 6690-CE-198 Pre-filed Rebuttal Testimony of Lawrence Kaufmann for Wisconsin Public Service Corporation, April 23, 2013.

[16] Page 13 and 14, Case 6690-CE-198 Pre-filed Sur-Sur-Rebuttal Testimony of Lawrence Kaufmann for Wisconsin Public Service Corporation, May 6, 2013.

PSE believes this same logic is applicable in THESL's Custom IR proposal. The "zone of continuous improvement" is a standard for THESL that is likely to be impossible to achieve and, if attempted, would very likely result in far worse reliability than what would occur if the Custom IR plan is approved in full.

Furthermore, PSE sees no rationale for lengthening the Custom IR period from five years to eight years, as suggested by PEG. Improved reliability offers substantial benefits to customers. Even if THESL could deliver the same reliability outcomes in eight years rather than five (which is unrealistic given the reduced investment per year), there is little reason to delay a reliability outcome that is in the interests of customers. Dr. Kaufmann of PEG agrees in his WPS testimony quoted above. Providing a better alignment between costs and reliability is improvement.

4.3 The Meaning of the Benchmark Results

PEG states on page 12 of its Report: "PSE's conclusion that 'the company's capital was in need of investment' is simply speculation; this conclusion does not follow logically or empirically from the benchmark studies it presented." PSE would like to make it clear that we never concluded that "the company's capital was in need of investment."

What the PSE September Report actually stated was that PSE's benchmarking results are "suggestive" of this. PEG is correct in saying there is no statistically-derived basis for concluding with certainty that "the company's capital was in need of investment." But logic and common-sense "suggest" certain statements, even if they are not strictly empirical conclusions. A benchmarking result that shows a utility with lower than expected costs, yet higher than expected SAIFI, suggests to PSE that the capital infrastructure is failing more often than expected, and is likely in need of added investment.[17]

There is a common-sense linkage between cost management and reliability outcomes. The total cost benchmarking results show the expected total costs for each utility in the sample, given their business condition variable values. One method of increasing the cost efficiency benchmarking score is to have older infrastructure. All else being equal, older infrastructure will increase total costs less than newer infrastructure. Yet there are limits on increasing cost efficiency in this manner. At some point, investment is needed to renew the infrastructure.

PSE's benchmarking results found that THESL is historically a cost efficient firm, and its system is failing more often than our models suggest. Based on the common-sense linkage between costs and reliability, this result suggests to PSE that THESL's capital is in need of investment.

[17] It should also be noted that PEG, in both its Report (p. 14) and its Response to Interrogatories (1-THESL-8) mischaracterizes PSE's position on SAIFI and capital spending. It is not the case that "…PSE finds THESL's SAIFI to be reasonable because it is declining under Custom IR…" PSE never states or implies THESL's SAIFI is reasonable; instead, PSE finds THESL's plan to increase capital spending is a reasonable plan to improve SAIFI.

5 PSE Conclusions

After making the three straightforward adjustments previously discussed, PSE finds that THESL's total costs are 15.2% below benchmarks in 2010-2012. During the Custom IR period, THESL's costs remain within the 4th Generation IR 0.3% stretch factor range. THESL's SAIFI is historically above benchmarks, but converges towards benchmarks during the Custom IR period. THESL's SAIDI is below benchmarks, and is projected to continue to be lower during the Custom IR period.

Based on these results and the discussions throughout this Reply Report, PSE's conclusions are:

- A stretch factor during THESL's Custom IR plan of 0.3% is consistent with 4th Generation IR. THESL's total cost results remain in the "normal" range of +/- 10% and implies the 0.3% value. Reliability is mixed, with SAIFI being worse and SAIDI being better than expected. Throughout the Custom IR period, however, SAIDI is projected to be over 100% below benchmarks and statistically superior, whereas THESL's SAIFI is projected to converge towards the benchmark and be statistically average during the Custom IR period.
- PEG's suggestion of lengthening the Custom IR plan to eight years from five should be rejected. THESL's 5-year Custom IR proposal provides an improved alignment between reliability and costs while maintaining total cost levels within the "normal" range. Lengthening the time period will stunt this improved alignment.
- THESL's 2015 test year total cost levels are reasonable from a benchmark perspective. Even with the conservative nature of PSE's Reply Report results, THESL's 2015 total costs are in the "normal" range.
- Given the enhancement in reliability resulting from THESL's proposal (in particular for SAIFI), the Custom IR plan will better align THESL with its total cost and SAIFI benchmarks. This is an improvement and is likely to provide value to THESL customers.

ANNUAL REPORTING

This schedule details Toronto Hydro's proposed Annual Reporting activities with respect to its 2015-2019 Custom Incentive Rate-Setting ("CIR" or "Custom IR") application, which consist of three components:

1) Meeting the Ontario Energy Board's ("OEB") Scorecard Approach for Performance Measurement;
2) Reporting on the Proposed Performance Measures Framework as detailed in the Distribution System Plan (DSP);[1] and
3) Filing a rate schedule for the following year upon the OEB's update of its inflation factor.

These activities will be filed with the OEB at different times throughout the year based on the nature and purpose of each filing.

1. REPORTING ACTIVITIES

The OEB's RRFE Report[2] concluded that the appropriate device to monitor utility performance was a scorecard, noting that distributors would be required to report annually on their progress against metrics aligned with four core objectives:

1) Customer Focus;
2) Operational Effectiveness;
3) Public Policy Responsiveness; and
4) Financial Performance

The OEB is clear that its scorecard would apply to all distributors. Accordingly, annual reporting requirements will be the same for CIR, 4th Generation Incentive Rate-Setting or

[1] Exhibit 2B, Section C.
[2] Report of the Board "Renewed Regulatory Framework for Electricity Distributors: A Performance-Based Approach" (October 18, 2012) [the "RRFE Report"].

Annual Incentive Rate-Setting applicants, unless the utility proposes to do so at its discretion. Toronto Hydro proposal for its annual reporting requirements is consistent with this view.

1.1. OEB's Scorecard

Toronto Hydro intends to comply with the OEB's Scorecard, as summarized in Figure 1:[3]

Performance Outcomes	Performance Categories	Performance Measures	
Customer Focus Services are provided in a manner that responds to identified customer preferences.	Service Quality	New Residential Services Connected on Time	
		Scheduled Appointments Met on Time	
		Telephone Calls Answered on Time	
	Customer Satisfaction	First Contact Resolution	
		Billing Accuracy	
		Customer Satisfaction Survey Results	
Operational Effectiveness Continuous improvement in productivity and cost performance is achieved; and distributors deliver on system reliability and quality objectives.	Safety	Public Safety (measure to be determined)	
	System Reliability	Average Number of Hours that Power to a Customer is Interrupted	
		Average Number of Times that Power to a Customer is Interrupted	
	Asset Management	Distribution System Plan Implementation Progress	
	Cost Control	Efficiency Assessment	
		Total Cost per Customer	
		Total Cost per Km of Line	
Public Policy Responsiveness Distributors deliver on obligations mandated by government (e.g., in legislation and in regulatory requirements imposed further to Ministerial directives to the Board).	Conservation and Demand Management	Net Annual Peak Demand Savings (Percent of target achieved)	
		Net Cumulative Energy Savings (Percent of target achieved)	
	Connection of Renewable Generation	Renewable Generation Connection Impact Assessments Completed on Time	
		New Micro-embedded Generation Facilities Connected on Time	
Financial Performance Financial viability is maintained; and savings from operational effectiveness are sustainable.	Financial Ratios	Liquidity: Current Ratio (Current Assets/Current Liabilities)	
		Leverage: Total Debt (includes short-term and long-term debt) to Equity Ratio	
		Profitability: Regulated Return on Equity	Deemed (included in rates)
			Achieved

Figure 1: Measures of the Four Performance Outcomes in the OEB's Scorecard

[3] EB-2010-0379, Report of the Board Performance Measurement for Electricity Distributors: A Scorecard Approach (March 5, 2014) at page ii, Table I.

1.2. DSP Metrics

As part of its DSP, Toronto Hydro has developed a set of 12 metrics to monitor quality and drive continuous improvement in its distribution system planning and implementation efforts.[4] These metrics are summarized in Table 1.

Table 1: Proposed DSP Performance Measures Framework

Customer-Oriented Performance	Cost Efficiency/ Effectiveness of Planning and Implementation	Asset/System Operation Performance
1. System Average Interruption Duration Index "SAIDI"). 2. System Average Interruption Frequency Index ("SAIFI"). 3. Customer Average Interruption Duration Index ("CAIDI"). 4. Feeders Experiencing Sustained Interruptions ("FESI"). 5. Momentary Average Interruption Frequency Index ("MAIFI").	1. Distribution System Plan Implementation Progress. 2. Planning Efficiency: Engineering, Design and Support Costs. 3. Supply Chain Efficiency: Materials Handling On-Cost. 4. Construction Efficiency: Internal vs. Contractor Cost Benchmarking. 5. Construction Efficiency: Standard Asset Assembly Labour Input.	1. Outages caused by defective equipment. 2. Stations capacity availability.

[4] Exhibit 2B, Section C.

Toronto Hydro proposes to file an annual update on these metrics by June 30th of the year following the reporting year. For clarity, the first report would be filed in 2016 and would cover the utility's performance in the year 2015.[5] The manner of reporting is described in further detail in Exhibit 2B, Section C1.1.1, pages 4 and 5. /C

1.3. Annual Distribution Rates

Toronto Hydro's proposed rate framework[6] for the CIR application uses a custom Price Cap Index ("PCI") as the annual adjustment mechanism for its base distribution rates in 2016 to 2019. The custom PCI employs the OEB's inflation factor as an input to the formula. Accordingly, Toronto Hydro proposes to submit a distribution rate adjustment on an annual basis followings OEB's determination of the newest inflation factor (which typically occurs later in the calendar year) and at a date prior to when those rates are to come into effect. /C

[5] Although Toronto Hydro's 2015 rate year will not commence until at least May 1, 2015, the utility's proposal is to report the DSP performance measures results on a calendar year basis. In other words, the 2016 results will cover the timeline from January 1 to December 31, 2015. /C
[6] See Exhibit 1B, Tab 2, Schedule 3.

CUSTOMER ENGAGEMENT

The diversity of Toronto Hydro's customer base requires the use of a variety of engagement tools. This schedule first describes the utility's ordinary course, day-to-day engagement with its residential, non-residential, and very large customers. The schedule then discusses the various customer engagement activities that Toronto Hydro has undertaken specifically in connection with this application and the utility's 2015-2019 Distribution System Plan ("DSP"). The DSP has been filed as Exhibit 2B.

1. ORDINARY COURSE CUSTOMER ENGAGEMENT

Toronto Hydro serves a broad and diverse customer base, which it engages with in a variety of "ordinary course" interactions every year. This section describes the utility's customers and outlines some of the regular interactions that Toronto Hydro has with residential and non-residential customers.

The utility has approximately 730,000 customers, ranging from individual residential consumers up to large industrial and commercial businesses. Toronto is home to the country's largest banks, stock exchanges, major manufacturers, and other large customers that are sensitive to service interruptions. The utility powers non-residential customers from a wide variety of sectors, from data centres to large industrial and manufacturing facilities. The utility has over 80 hospital accounts, 280 healthcare and long-term care facility accounts, 690 schools accounts, and 140 college and university accounts. Toronto Hydro also supplies electricity to the Ontario's Provincial Legislature and Ministries, as well as Toronto's municipal government. Toronto has over 2,900 high-rise multi-residential condominium and apartment building accounts, many of which are "bulk-metered". Taking these behind-the-meters customers into account, Toronto Hydro's effective customer base exceeds 1 million customers.

The city of Toronto is one of North America's largest urban centers. Due to the scale and density of Toronto Hydro's franchise area, as well as the varied nature of the utility's customer base, the safe and reliable operation of the utility's distribution system affects a number of key economic drivers for the city, the province and the country.

1.1. Residential Customers

The utility has numerous "ordinary course" points of contact with its residential customers. The vast majority of such contacts occur in connection with billing matters: setting up, closing, paying, conservation and demand management ("CDM"), and otherwise relating to customer accounts.

Toronto Hydro also engages with customers when it carries out capital work. The utility's goal is to proactively mitigate customer and stakeholder concerns with Toronto Hydro's projects. To enable the effective delivery of planned capital projects while maintaining focus on customers, Toronto Hydro has a team dedicated to communication with customers in connection with planned capital projects and resolution of customer issues related to that work. These issues can range from repairs, outages, scheduling, installation of equipment, construction noise, safety, private property easements and the utility's staging areas.

Part of this engagement is driven by the City of Toronto's Municipal Consent Requirements ("MCR"), which requires that Toronto Hydro communicate with certain customers affected by capital work. Chapter 5 of the MCR states that:

> *The Applicant* [i.e., Toronto Hydro] *shall provide written notification to all adjacent properties, and all properties that will face or will have a line of sight to the proposed plant. Such notification shall outline the nature of the work and clearly describe the size, appearance and location of the proposed*

plant. The notice shall include the phone number of a contact person at the Applicant's office.

However, understanding customer needs and preferences on the execution of capital work goes beyond the City's MCR, Toronto Hydro also communicates with customers about capital projects through a variety of channels such as: letters, email, telephone, face-to-face meetings, newspapers, advertisements, newsletters, community meetings, and website. In 2013, Toronto Hydro's Customer Operations Communications Office ("COCO") distributed close to 60,000 customer letters, and communicated on over 270 projects. In 2015-2019, COCO plans to maintain its focus on communicating project information to customers who are affected by the utility's capital projects, and to address their concerns.

1.2. Non-Residential Customers

Given the variety of Toronto Hydro's non-residential customers, the utility considers the needs of its larger customers1 in terms of market segments. Broadly speaking, Toronto Hydro's customers fall into the major market segments set out in Table 1 below. The table also includes sub-categories, which provide examples of the types of businesses within each market segment:

Table 1: Major Market Segments

Major Market Segment	Illustrative Sub-Categories
Commercial	Offices
	Data Centre (Stand Alone)
	Banks
	Restaurants
	Hotels-Motels
	Retail

[1] Customers whose demand is between 50kW and 5,000 kW.

Major Market Segment	Illustrative Sub-Categories
	Malls/Plazas
	Grocery Stores
	Entertainment
Institutional / Non-Municipal Government	Offices
	Colleges/Universities
	Religious
	Schools-Elementary/Secondary
	Hospitals
	Healthcare Facilities
	Community Service/Entertainment
	Public Works/Infrastructure/Transportation
Government – Federal, Provincial and Municipal	Civic Centres
	Parks and Recreation
	TTC
	Library
	Water and Waste Water
	Toronto Community Housing
	City Corporate Services
	Police
	Fire Hall
	EMS
	Exhibition Place
	Zoo
	Toronto Parking Authority
	Public Works
	Agencies/Boards/Commissions
Industrial / Manufacturing	Food & Beverage
	Plastics/Rubber
	Chemical/Pharmaceutical
	Raw Materials/Textiles
	Electronics
	Other Manufacturing

Major Market Segment	Illustrative Sub-Categories
	Warehouse
	Refrigerated Warehouse
Multi-Residential	Apartments
	Condominiums

One of the reasons that Toronto Hydro considers its larger non-residential customers in terms of market segments is that different industries may have vastly differing operating environments/regulations, sensitivities, needs and preferences. For example, industrial and manufacturing customers maybe very sensitive to the frequency of outages – the occurrence of an outage, regardless of its duration, may require an entire batch of a product to be scrapped and production equipment to be reset and inspected. This is typically a significant cost and concern to such customers, and something that Toronto Hydro considers as it plans operations and capital investments.

In contrast with industrial and manufacturing customers, multi-residential customers may be less concerned with the frequency of outages than their duration – a brief outage may inconvenience the residents of a 500-unit condominium, whereas a long outage may entail significant costs and potentially safety concerns.

Institutional customers' interest may extend to the broader social effects of service reliability. For hospitals and other healthcare providers, outages may affect the delivery of critical care to patients. Outages affecting schools may create extreme inconvenience to large numbers of people, and may give rise to significant costs and potential safety risks if schools are required to relocate students.

Toronto Hydro has approximately 81,000 non-residential customers whose demand is less than 5MW. The utility's ordinary course engagement with such customers is similar

to its contact with residential customers, in that it generally relates to account inquiries, billing information changes, follow-up on outage restoration, energy conservation incentives or specific customer requests such as new connections.

Toronto Hydro also engages in other forms of indirect communication with customers through its interactions with industry associations on conservation, reliability and infrastructure investment issues. Organizations such as the Building Owners and Managers Association ("BOMA") and the Toronto Board of Trade can help the utility effectively disseminate critical information to their large memberships.

In addition, Toronto Hydro collaborates with the City of Toronto Better Buildings Partnership within the Energy Efficiency Office to pursue conservation opportunities within the municipal sector as well as leveraging demand response programs to support the emergency generation and preparedness plans for city affiliates such as Toronto Community Housing. Toronto Hydro is also a member of Weatherwise, a partnership convened by the City and Civic Action comprised of public, private and Not-For-Profit organizations identifying the risks of extreme weather.

1.3. Very Large Customers

Finally, Toronto Hydro has an engagement program – the Key Account Management Services program – dedicated to its very large or "key account" customers. The utility created this program to better understand and respond to the unique experiences, preferences and service needs of this type of customer. Key account customers are typically sophisticated commercial and institutional entities who have a strong grasp of their service requirements and a good working knowledge of the electricity sector.

In 2012, the initial scope of the key account management service program was to offer formal engagement meetings annually to customers with an electricity demand greater

/C

than 5 MW or with a large aggregate of multiple commercial accounts throughout the city. In 2013 , Toronto Hydro expanded the scope to include customers whose demand exceeds 1 MW and who are served by feeders that have been experiencing a high frequency of outages. Generally, Toronto Hydro prioritizes meeting with key account customers who are experiencing the worst reliability and/or that are most significantly affected by service quality issues (e.g., food processors and pharmaceutical companies who must dump product and re-sterilize equipment; health care facilities concerned with patient procedures; plastic moulding companies with equipment concerns; etc.).

Formal key account management meetings typically address the following topics:

- Review of the customer's annual reliability performance and customer experience;
- Toronto Hydro reliability investigations and root cause analysis reports;
- Improving Reliability and Services – Infrastructure Renewal Program;
- Regulatory environment, current filing, system reliability, capital plan and investments, rate impact;
- Available account management services, including single point of contact, 24/7 outage management service, energy data management, billing services; and
- Conservation and Demand Management ("CDM"), including incentive program opportunities, energy efficiency training and support, electricity savings verification.

Toronto Hydro endeavours to customize its key account management services to best suit individual customers' specific needs and preferences. This customization can occur regarding the form and frequency of how the customer prefers to be engaged. Accordingly, while Toronto Hydro aims to meet with this group of customers on a consistent basis, some may choose to forego a meeting, while others prefer multiple meetings over the course of a year in order to address specific needs and opportunities.

/C

As explained in more detail below, the information presented by Toronto Hydro is customized for each customer for their reliability experience, current and planned investments in their local area, conservation and demand programs and the rate impact of investments on their current bill.

1.3.1 Key account meeting structure and engagement materials

Toronto Hydro's key account management services meetings are currently structured around a standardized presentation. The presentation has evolved over time, but typically addresses four main topic sections:

1. **Overview:** Includes an overview of the utility, historical system spending, historical system reliability measures (i.e. SAIDI/SAIFI), drivers of outages, future investment needs, investments to improve reliability, and from time-to-time, current information on the regulatory process, including a brief, high-level discussion of recently concluded rate applications and/or pending applications.
2. **Customer Specific Details:** Includes customer specific reliability performance, reliability investigations and cause of outages, and generally serves as an opportunity to discuss the customer's experience. This typically includes a discussion of planned capital projects that will address the customer's service.
3. **Bill Information:** Using a bill sample or the customer's bill, Toronto Hydro explains the various components of the electricity bill and explains how costs could potentially be reduced.
4. **Conservation and Demand Management (CDM) programs:** Includes a status review of past and current conservation projects. Toronto Hydro introduces possible CDM program opportunities that could help reduce electricity costs for the customer.

/C

The objective of these meetings is to give large, sophisticated and knowledgeable customers (typically senior management) an opportunity to discuss their specific needs in a timely and efficient format. Therefore, the level of focus given to each section of the presentation is ultimately dictated by customer-specific needs and preferences. Generally, Toronto Hydro finds that large customers are interested in discussing the details of their specific reliability experience, potential remedies to reliability issues, and how to manage their electricity costs.

To illustrate the range of content provided to key account customers, Appendix C includes a sample of a presentation deck provided to a customer during the development of the Application. These decks were subject to updates from time-to-time and included customer-specific information. The sample deck provided does not include any customer-specific information, but rather an explanation of the type of customer-specific information that may appear on a given deck.

/C

1.3.2 Outcomes of the Key Account Process

Toronto Hydro uses the input received from the Key Account Management Services program to plan CDM programs and to inform capital and maintenance program planning in areas such as the Worst Performing Feeder program (Exhibit 2B, Section E6.21) and the Vegetation Management maintenance segment (Exhibit 4A, Tab 2, Schedule 1, Section 5). Toronto Hydro also uses these meetings to better understand the impact of momentary interruptions and to inform the prioritization of longer-term capital investments as the work plan is executed. The following are examples of projects that were created and/or prioritized in response to feedback received through key account engagement:

- A backup feed for a large financial institution was found to be susceptible to moisture related outages. On those occasions when it was active, the customer's

sensitivity to power quality made the risk unacceptable to them. Based on this customer input, operations was able to connect to an alternate feeder.

- The causes of some outages are difficult to source. For the most sensitive key account customers, Toronto Hydro has installed sophisticated power quality meters to assist in diagnosing reliability issues, which could be utility or customer equipment related.
- The supply to a particular hospital is through a heavily treed area, making it more susceptible to outages. Following discussions with the customer, Toronto Hydro responded by intensifying its tree trimming program in that location.
- A large retail mall was susceptible to frequent outages due to the deterioration of its direct buried feeder cable. After ongoing engagement, Toronto Hydro replaced the feeder as a reprioritized renewal project.

The utility plans to continue to offer the Key Account Management Services program throughout the 2015-2019 planning period. /C

For further information on the utility's day-to-day customer contacts and forms of engagement see Toronto Hydro's Customer Relationship Management program.[3]

1.3.3 Letters Of Comment From Key Account Customers

During its regular meetings in 2013 and 2014, Toronto Hydro informed key account customers about the OEB's increasing focus on customer engagement as part of the renewed regulatory framework, and invited customers to submit letters of comment outlining their concerns and opinions on matters such as service quality, reliability, and cost of electricity, as well as the utility's ongoing, renewal-focused capital investment plans. Overall, Toronto Hydro received 15 letters of comment, copies of which are attached as Appendix A. Toronto Hydro notes that it previously submitted similar letters

[3] Exhibit 4A, Tab 2, Schedule 13.

of comment with the 2012-2014 ICM application (EB-2012-0064). These were filed as Appendix B in the response to undertaking JT2.2 (Phase 1 of the proceeding). /C

2. DSP-SPECIFIC CUSTOMER ENGAGEMENT

In addition to the utility's ordinary course customer engagement activities described above, Toronto Hydro has engaged with its customers specifically around this application and the utility's DSP for 2015-2019.

Toronto Hydro's DSP-specific customer engagement activities were guided by the Ontario Energy Board's ("OEB") expectations in the RRFE Report,[5] which states that distributors should provide services in a manner that responds to identified customer preferences,[6] and Chapter 5 of the OEB's Filing Requirements for Electricity Distribution Rate Applications ("Chapter 5").[7] Chapter 5 requires that a distributor describe its customer engagement activities to obtain information on their preferences and show how it considered those preferences in its plan.[8]

/C

[5] Report of the Board "Renewed Regulatory Framework for Electricity Distributors: A Performance-Based Approach" (October 18, 2012) [the "RRFE Report"].
[6] RRFE Report at page 2.
[7] Ontario Energy Board, Filing Requirements for Electricity Transmission and Distribution Applications, Chapter 5, "Consolidated Distribution System Plan Filing Requirements," (March 28, 2013) ["Chapter 5"].
[8] Chapter 5 at section 5.0.4.

2.2. Residential and Non-Residential Customers

Toronto Hydro engaged Innovative Research Group Inc. ("Innovative"), a national consultancy with expertise in public opinion research, with particular experience in issues of public policy. Toronto Hydro asked Innovative to design and carry out a consultation process that would provide the utility with meaningful information to assist in preparing the DSP, as set out in Chapter 5. In addition, Toronto Hydro hopes that the results of Innovative's consultation will be valuable as the utility continues to carry out its proposed capital work over the term of this application. Innovative produced a detailed report documenting the process and findings of this consultation (the "Innovative Report"), a copy of which is included as Appendix B to this schedule.

Toronto Hydro asked Innovative to bring the major components of the utility's DSP to its most populous rate classes (Residential and General Service < 50 kW) as well as the utility's most populous larger customer market segments (Commercial and Industrial / Manufacturing), and to assess how customers' values and preferences align with the utility's proposed capital work. The consultation also included customers who live in condominiums or other multi-residential buildings. Toronto Hydro relied on Innovative's expertise to help determine how to effectively engage this diverse group of customers on the technical and often inaccessible topic of utility capital planning. Innovative ultimately used several methods to gauge the views of these customers:

1) an online workbook, accessible to any Toronto Hydro customer;
2) randomly recruited focus groups of residential and GS < 50 kW customers, facilitated by Innovative and based on a workbook describing the central pillars of Toronto Hydro's 2015-2019 DSP;
3) consultation with randomly recruited Commercial and Industrial / Manufacturing customers, including a panel discussion with Toronto Hydro staff moderated by Innovative, and focus groups using the same workbook;

4) a statistical telephone survey of 1,206 Toronto Hydro customers from both residential and GS < 50 rate classes.

Figure 1 illustrates the process that Innovative used to develop this model of consultation.

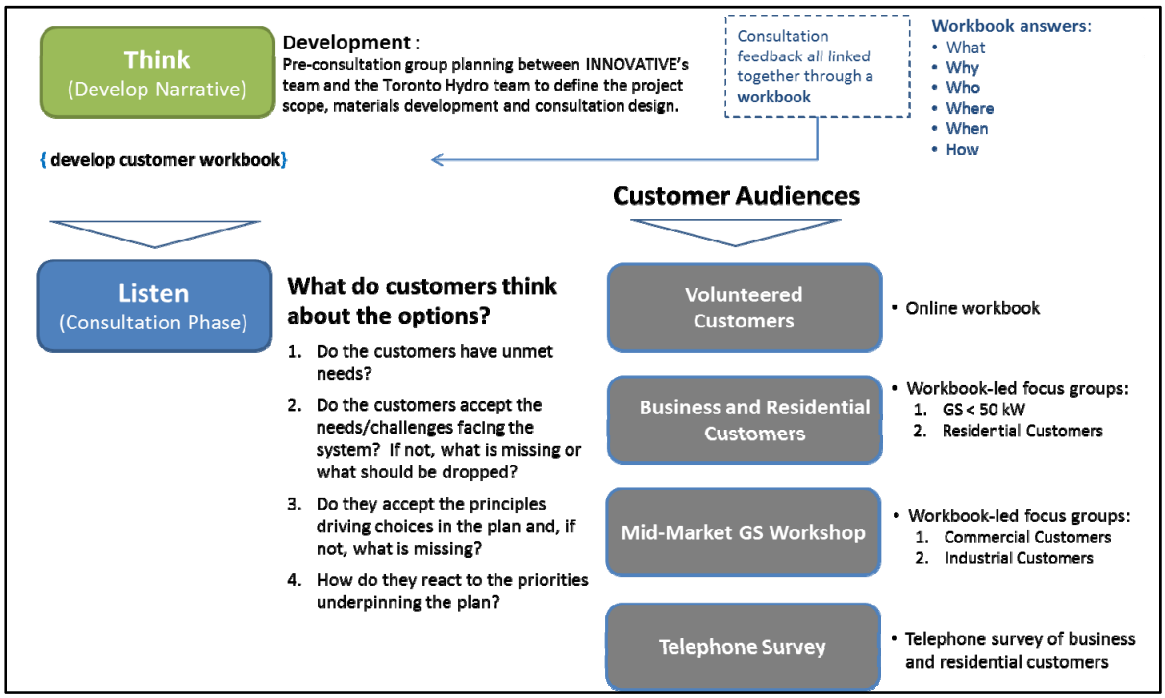

Figure 1: Innovative Research Group Consultation Structure

3. INNOVATIVE REPORT FINDINGS

The Innovative Report provides Toronto Hydro with valuable insight into its customers' perception of both the utility's priorities and those of the province's broader electricity sector. While the results of the consultation and the lessons drawn from it are addressed in more detail in the DSP, certain central themes can be briefly mentioned here:

- Customers' preferences align with central pillars of the utility's DSP. Toronto Hydro learned that, while its customers expect the utility to make prudent investment decisions, the majority accept the need for timely renewal of the

distribution system, while acknowledging that this will mean an increase in their monthly bills.

- Most customers would invest in the distribution system today in order to avoid paying more later.
- Customers believe they have an obligation to maintain the distribution system for future generations.
- While customers are generally satisfied with Toronto Hydro's response to major weather events, they would like to see enhanced communications.
- Most residential customers say that they are able to pay more for electricity, but are concerned about the potential effect that increased rates may have on vulnerable ratepayers.
- Customers also expect the utility to make prudent investments in new technologies, and that new technologies can make the distribution system more efficient and, ultimately, save ratepayers' money.
- Customers accept that Toronto Hydro should be making investment in IT systems, fleet and facilities.
- Interestingly, a large number of customers stated that Toronto Hydro should have increased rates more in the past to create a "reserve fund" to cover capital renewal investments required today.

The Innovative Report describes its methods and the results of the consultation in greater detail. For more detail on how customer value and preferences are reflected in Toronto Hydro's Asset Management Process and DSP programs, please see Exhibit 2B, E2.4.

Toronto Hydro is pleased to have received this more nuanced view of its customers' preferences on the utility's planned capital work. Toronto Hydro understands that its customers are sensitive to rate increases and expect the utility to be prudent in carrying

out its work. However, it is content to see that its customers accept the need to invest in Toronto's distribution system, despite the associated rate increases.

This is the first five-year rate application prepared by Toronto Hydro and one of the first Custom Incentive Rate-Setting ("CIR" or "Custom IR") applications prepared under the RRFE by any local distribution company (LDCs"). It also includes the most extensive and, necessarily, one of the first customer consultation exercises around any DSP. Toronto Hydro's customer engagement activities in connection with this application significantly exceed any past application-related consultation that it or any other Ontario LDC had previously undertaken. The results of this consultation will continue to inform the utility's capital work over the five-year term of the DSP, and provide an important starting point for subsequent customer consultations.

Toronto Hydro-Electric System Limited
EB-2014-0116
Exhibit 1B
Tab 2
Schedule 7
Appendix A
ORIGINAL
(20 pages)

DUNDEE

DUNDEE REALTY MANAGEMENT CORP.
State Street Financial Centre
30 Adelaide Street East, Suite 1600
Toronto, Ontario, Canada M5C 3H1
Telephone 416 365-3535
Facsimile 416 365-6565
Website www.dundeerealty.com

January 22, 2014

Mr. Chris Tyrrell
Vice-President
Customer Care and Chief Conservation Offices
Toronto Hydro Electric System Limited
5800 Yonge Street
Toronto, Ontario M2M 3T3

Dear Mr. Tyrrell:

Dundee has successfully implemented various Energy Efficiency Projects and continues to pursue energy reduction opportunities throughout our portfolio in cooperation with Save-On-Energy incentive programs and the assistance of your staff.

Unfortunately, we have recently struggled with a higher than expect frequency of power outage issues. We feel that continued focus and investment in Toronto Hydro's electrical infrastructure is essential to maintain the levels of system reliability that Dundee and our tenants expect. Many of our tenants have raised concerns that the frequency of outages could cause them to consider alternate leasing options in other facilities and this directly impacts Dundee.

We encourage and support Toronto Hydro's infrastructure renewal program as it deals with the continuing growth and development in the City of Toronto.

Yours very truly,
DUNDEE REALTY MANAGEMENT CORP.
(in its capacity as agent(s) for the owner)

Farid Malek
Director of Property Operations
Dundee Realty Management Corp.
30 Adelaide Street East, Suite 1600
Toronto, Ontario M5C 3H1
416-365-4115 office
416-365-6565 fax

May 22, 2014

Dwight Cooke
Direct Line: (416) 644-4284
E-mail: dcooke@epicrealtypartners.com

Mr. Chris Tyrrell
VP, Customer Care & Chief Conservation Officer
Toronto Hydro-Electric System Limited
5800 Yonge St
Toronto, Ontario M2M 3T3

Dear Mr. Tyrrell,

We are writing to confirm that Epic Realty Partners very much supports Toronto Hydro's infrastructure renewal program.

We believe that continued investment in Toronto Hydro's electrical infrastructure is essential to maintaining overall levels of system reliability across the city.

Epic Realty Partners is committed to energy conservation initiatives and has implemented a number of projects in an effort to ease the demands on our buildings and on the electrical system. Epic Realty Partners manages 1.7 Million square feet of Commercial buildings across the city and the reliability of the electrical infrastructure is of paramount importance to EPIC and our tenants.

Toronto has been in growth for the last few years and this continued development will in no doubt place stresses on the existing systems.

We encourage careful consideration of any infrastructure renewal program to help ensure an outcome that is in the best interest of the City of Toronto's long term growth and development.

Yours truly,
Dwight Cooke
Regional Manager of Technical Services

EPIC Realty Partners Inc.

December 18, 2013

Mr. Chris Tyrrell
VP, Customer Care & Chief Conservation Officer
Toronto Hydro-Electric System Limited
5800 Yonge Street
Toronto, Ontario M2M 3T3

Dear Mr. Tyrrell,

Further to previous communications with you and your office, I would like to reiterate, on behalf of Cadillac Fairview and the Toronto-Dominion Centre, our unqualified support for what we believe to be essential and overdue infrastructure modernization initiatives needed to upgrade the delivery of hydro services to all parts of the property. As you can imagine, due to recent "brown-outs" and "black-outs", and too frequent power interruptions, our tenants have experienced unexpected and costly stress on their operations and their ability to conduct business. Our tenants rely on uninterrupted power 24 hours a day. We strongly believe that continued investment by Toronto Hydro in its power infrastructure is essential not just for Toronto-Dominion Centre, but for the systems reliability of the entire financial core.

Toronto-Dominion Centre has made it a priority to invest in energy smart capital projects and innovations to reduce the daily demands our buildings place on Toronto's power grid. We currently manage approximately 150 gigawatts of electricity consumption annually across our six towers, making the uninterrupted delivery of services a critical issue for the property as a whole as well as our individual tenants. We have long been a leader in promoting energy efficiencies in Toronto's downtown commercial sector and therefore believe we are in a unique position to comment on this matter and its potential impact on the long term health and viability of the core and its ability to provide the thousands of tenants that call it home with cost effective, reliable service.

The "new building" construction sector has been growing at an unprecedented rate for the last few years, making Toronto a global leader in construction activity. With this level of activity expected to continue for some time, it is not unreasonable to expect these new developments place added stress on an infrastructure system that has been unable to meet existing demands.

We encourage all concerned to carefully consider all reasonable infrastructure renewal programs designed to better serve the increasing energy requirements of the City of Toronto and specifically the downtown business community. Let's keep Toronto's financial core viable and dynamic.

Sincerely,

The Cadillac Fairview Corporation Limited,

David Hoffman
General Manager
Toronto-Dominion Centre

c.c. Victor da Rosa, CHM Technical Energy Consultant, Toronto Hydro-Electric System Limited
Christine Woon, Key Account Executive, Customer Care, Toronto Hydro-Electric System Limited

Toronto-Dominion Centre
The Cadillac Fairview Corporation Limited
P.O. Box 2, Suite 3800, TD Bank Tower, Toronto, ON M5K 1A1
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YORK
UNIVERSITÉ
UNIVERSITY

OFFICE OF THE
ASSISTANT
VICE-PRESIDENT

Campus Services &
Business Operations

4700 Keele St.
Toronto ON
Canada M3J 1P3
Tel 416 736 5789
Fax 416 736 5381

January 20, 2014

Mr. Chris Tyrrell
Vice-President, Customer Care & Chief Conservation Officer
Toronto Hydro-Electric System Limited
5800 Yonge Street
Toronto, Ontario M2M 3T3

Dear Chris,

York University is a leading interdisciplinary research and teaching university in Toronto. York offers a modern, academic experience at the undergraduate and graduate level. The third largest university in the country, York is host to a dynamic academic community of 55,000 students and 7,000 faculty and staff, as well as 250,000 alumni worldwide.

York's 11 faculties and 28 research centers conduct ambitious, groundbreaking research that is interdisciplinary, cutting across traditional academic boundaries. This distinctive and collaborative approach is preparing students for the future and bringing fresh insights and solutions to real-world challenges.

York relies on Toronto Hydro's services for a sprawling campus uptown, an intimate east-side campus, and downtown business centers. The Keele Campus is located at Keele Street and Steeles Avenue West on 550 acres. The Glendon Campus is located at Bayview and Lawrence Avenues on 85 acres. York has also established a Downtown Management Facility, the Miles S. Nadal Facility at King and Bay Streets, as part of the Seymour Schulich School of Business, and Osgoode Hall Law School Professional Development Centre at Yonge and Dundas Streets.

York acknowledges Toronto Hydro's electrical infrastructure capital investment application to the Ontario Energy Board. York University recognizes the need to upgrade outdated equipment for safety and reliability reasons, as York faces similar internal electrical infrastructure issues on a daily basis. World class ground breaking research requires 24/7 reliability, especially when working with the specialty research equipment in the physics and biology areas. York observes that the reliability issue goes beyond 24/7 power availability, and must include issues of voltage and frequency excursions, and transient short term interruptions.

York University observes that on average it experiences 1.5 grid related interruptions per month. Some of these interruptions result in service outages for students, residences, classroom activities and sensitive research facilities, as well as costly recall of maintenance staff.

York University supports initiatives to improve the reliability of the Toronto Hydro grid, and quality of the power supply.

Sincerely,

Richard Francki
Assistant Vice-President
Campus Services & Business Operations

MEDALLION
CORPORATION

970 Lawrence Ave. W., Suite 304, Toronto, Ontario M6A 3B6 Tel: 416-256-3900 Fax: 416-256-2827

E-Mail: cpandell@medallioncorp.com
Web Site: www.medallioncorp.com

Direct Telecopier: (416) 256-7010

June 11, 2014

Toronto Hydro-Electric System Limited
5800 Yonge Street
Toronto, Ontario.
M2M 3T3

Attention: Mr. Christopher Tyrell, Vice President,
Customer Care & Chief Conservation Officer

Dear Sirs:

Re: Power Interruption Concerns, Consumers Road, Toronto.

We recently met with Victor da Rosa and James Wei in order to learn more about Toronto Hydro's plans to ameliorate the high frequency of power interruptions being experienced at our 505 and 515 Consumers Road properties. It was confirmed by your team, that we continue to experience a *'higher than average'* frequency of power interruptions *(both 'momentary' and 'sustained' outages)*. These frequent outages are having a **severe** negative impact upon both our client population and on the marketing of the project to our customers. We have been advised that infrastructure improvement plans have been drafted and submitted for improvements to the Leslie TS and distribution network as part of a larger submission to the Ontario Energy Board. We are writing to confirm that Medallion Corporation supports Toronto Hydro's infrastructure renewal program.

We believe that continued investment in Toronto Hydro's electrical infrastructure is essential to maintaining overall levels of system reliability across the city.

Medallion Corporation owns and manages approximately two (2) million square feet of Commercial, Industrial and Retail properties in the City of Toronto and the reliability of the electrical infrastructure is of paramount importance to Medallion and our tenants. In addition to the Commercial portfolio, Medallion has approximately eight thousand (8,000) high-rise rental residential units in the City of Toronto with several new buildings under construction or in the planning stages.

We acknowledge that the Toronto market has been in a substantial growth mode for many years and this continued development will in no doubt place stresses on the existing infrastructure and systems. The successful continued growth in Toronto is directly linked to the ability of all of the essential service providers to both maintain and upgrade the necessary infrastructure to foster this growth.

We encourage careful consideration of any infrastructure renewal program to help ensure an outcome that is in the best interest of the City of Toronto's long term growth and development.

Yours very truly,

MEDALLION CORPORATION

Christopher A. Pandell, CSM., CMD.
Director, Commercial Leasing & Operations

Cc Victor da Rosa, Toronto Hydro-Electric System Limited
James Wei, Toronto Hydro-Electric System Limited
Joseph Cacciola, Medallion Corporation

May 16, 2014

Mr. Chris Tyrell
V.P., Customer Care and Chief Conservation Officer
Toronto Hydro-Electric System limited
14 Carlton Street
Toronto, ON M5B 1K5

Dear Mr. Tyrell,

Western Harbour Castle Hotel on One Harbour Square has implemented many conservation and electricity demand reduction projects and continues to coordinate with Toronto Hydro for the CDM incentive that makes it possible to pursue additional energy conservation and demand reduction opportunities.

On the other hand, we have recently struggled with an outage situation. The continued upgrade of old assets and electrical infrastructure is essential to maintain the reliability that we aspire. Therefore, we support any Toronto Hydro Infrastructure renewal programme that will positively affect the reliability of the distribution of electricity to our property.

We forward continued coordination and cooperation.
Kind regards

Mike Flint
Director of Finance

the westin harbour castle
one harbour square, toronto, ontario m5j 1a6
t 416.869.1600 f 416.869.1420
westin.com/harbourcastle

WESTIN
HOTELS & RESORTS

January 7, 2014

Chris Tyrrell
Vice President, Customer Care & Chief Conservation Officer
Toronto Hydro-Electric System Limited
5800 Yonge St.
Toronto, Ontario
M2M 3T3

Dear Mr. Tyrrell:

Consistent with our previous communication, our operation continues to be negatively impacted by the poor reliability of our power supply.

In 2013 we experienced 21 power supply quality events that caused 35 hours of equipment downtime. The direct financial impact to our operation last year was $380,000. Further the environmental and employee safety implications associated with the process disturbances caused by the power supply quality events are significant.

Owens Corning has been implementing measures to improve the resilience of our equipment to *voltage sags* including installing 3 phase line reactors on all our variable frequency drives, utilizing auto-restarts on equipment and uninterrupted power supply (UPS) devices on control systems as well as aggressively pursuing energy conservation initiatives to reduce demand on the system. However, the severity of the voltage sags continues to overwhelm some of our counter-measures.

As partners, we expect that Toronto Hydro will intensify their efforts to reduce the frequency of power supply quality events. We strongly urge you to reassess your Infrastructure Replacement/Management Strategy to provide 24/7 reliability. We acknowledge the need to improve your infrastructure and support your Capital Investment initiatives.

The Owens Corning Toronto Plant's 140 employees are continuously competing for jobs with other plants in our network south of the border. It is becoming increasely difficult for us to offset the competitive advantage given to the US based plants by the superior reliability of their power utility.

We look forward to hearing from you and welcome your input to help us run efficiently and compete in the global market.

Sincerely,

Lucian Radut, P. Eng.
Maintenance Leader
OWENS CORNING CANADA LP
TORONTO PLANT

Wesley G. Co
Country Business Director
OWENS CORNING CANADA LP

Redpath Sugar Ltd.

95 Queen's Quay East
Toronto, ON M5E 1A3

January 2, 2014

Mr. Chris Tyrrell
Vice-President
Customer Care and Chief Conservation Offices
Toronto Hydro Electric System Limited
14 Carlton Street
Toronto ON.
M5B 1K5

Dear Mr. Tyrrell,

My name is Gary Porritt and I am the Chief Engineer at Redpath Sugar Limited. We are a Sugar Refining plant that generates most of our hydro requirements and purchases the difference from Toronto Hydro. We are synchronized to Toronto Hydro on one of the two feeders A38X or A39X, whichever is in service. We also have a new feed (2 years old) that is tapped off the same lines.

I have been working with your Save-On-Energy group over the last two years which has helped with projects and incentive money. This group has worked hard to help me complete the projects and ensure proper planning for each one was followed in order to successfully receive the incentives.

We are however looking at reliability of Toronto Hydro source and power quality for continuous service in this area which I don't see improving at present. Last year I wrote a letter of Poor Quality power causing our company some losses of equipment which I have had only the comments of the contract agreement conditions. This year we have experience 4 power interruption of minimum time, which has me concerned about what is going to happen in our area without some changes to your supply system. I would like to know how the reliability and power quality issues are being addressed. The frequency of Toronto Hydro outages at our site have increasing over the past year and I don't see this improving with the expansion of the waterfront area. I heard comments on the news about companies should have back-up generation installed at site (during this last ice storm) which has me concerned that improvements to present Toronto hydro system reliability are not being addressed. I want to know what is being done to address my concerns for future reliability.

I look forward to your comments and resolution on this item.

Yours very truly,

Redpath Sugar Ltd.

95 Queen's Quay East
Toronto, ON M5E 1A3

Gary E. Porritt

Cc Phil Guglielmi

Toronto Community Housing Corporation
931 Yonge Street
Toronto, ON M4W 2H2

Toronto Community Housing

June 23, 2014

Mr. Chris Tyrrell
Vice-President, Customer Care and Chief Conservation Officer
Toronto Hydro Electric System Ltd.
14 Carlton Street
Toronto ON M5B 1K5

Dear Mr. Tyrell,

I am writing to express Toronto Community Housing's support for Toronto Hydro's regulatory filing for its 2015 electricity rates. Toronto Community Housing is a not-for-profit corporation wholly owned by the City of Toronto, and Canada's largest provider of social housing. Our 1,600 employees work to deliver clean, safe, well-maintained and affordable homes for some 58,500 households with low and moderate incomes, and to build vibrant communities where people can thrive.

Toronto Community Housing, like many public-sector organizations including Toronto Hydro, has major capital repair needs. We are applying and pursuing innovative solutions to generate new funding to repair our aging buildings. In this light, we recognize Toronto Hydro's challenges and believe that your infrastructure renewal plan, which balances cost increases with ensuring a reliable supply of electricity for your customers, is a sound approach in the current fiscal environment.

As a landlord serving a large, diverse population that includes some of our city's most marginalized residents, our success depends in no small part on reliable and affordable electricity. We are one of Toronto Hydro's largest customers, and electricity cost increases affect our bottom line. However, we are also impacted by the social and economic costs of service disruptions caused by aging electricity system infrastructure, which can be significant as the December 2013 ice storm attests. Power outages have a disproportionate economic impact on low-income households and they pose increased safety and security risks in our communities.

.../2

Furthermore, upgrades to Toronto Hydro's infrastructure will improve Toronto Community Housing's ability to participate in energy-savings programs offered by the Ontario Power Authority which can generate revenues for our own capital repair needs.

I hope that this statement of support is useful to Toronto Hydro as you bring forward your submission to the Ontario Energy Board later this year.

Sincerely,

Greg Spearn
Interim President and Chief Executive Officer
Chief Development Officer
Toronto Community Housing

cc: N.W. Bud Purves, Chair, Toronto Community Housing Board of Directors

CAP REIT

CANADIAN APARTMENT PROPERTIES REAL ESTATE INVESTMENT TRUST

11 Church Street, Suite 401 • Toronto, Ontario M5E 1W1 • Tel. 416-861-9404 • Fax 416-861-9209

Toronto Hydro Electric System Limited
14 Carlton Street,
Toronto, Ontario
M5B 1K5

Attention: Mr. Chris Tyrrell
VP, Customer Care and CCO

Company name: CAPREIT

Address: 11 Church Street, Suite 401
Toronto, Ontario
M5E 1W1

Number of employees: 888

Sector: Multi-residential, real estate

Brief overview of business: As one of Canada's largest residential landlords, CAPREIT is a growth-oriented investment trust owning interests in 41,552 residential units, comprised of 35,372 residential suites and 29 manufactured home communities comprising 6,180 land lease sites located in and near major urban centers across Canada and Dublin, Ireland. Our portfolio serves residents across all demographic segments and is highly diversified geographically.

Vision: To be the premier residential real estate landlord in Canada, the landlord and employer of choice and the investment of choice in its industry.

Mission: To attract the right tenants by hiring the right employee and acquiring the right properties to generate the right employees and acquiring the right properties to generate the highest sustainable and profitable growth for unit holders.

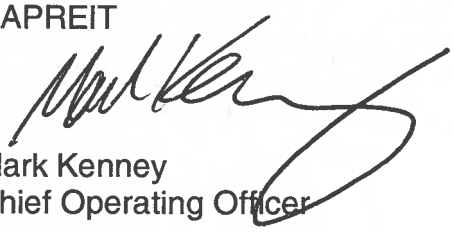
CAPREIT recognizes building on our strengths in environmental conservation, employee engagement, tenant relations and corporate governance. To achieve these objectives, CAPREIT focuses on key initiatives to enhance sustainability and social responsibility within our business. Since inception in 1997, we have implemented numerous programs to enhance our environmental performance including investments

in energy-efficient boilers, building automation, pumps, lighting, ultra low-flow fixtures, to name a few.

Working towards energy efficiency and conservation includes the reliability of electrical services. We support the Toronto Hydro infrastructure renewal to ensure reliable supply of electricity. We support repairing unreliable equipment and replacing aging infrastructure to supply the continuing electricity demand in Toronto. We support Toronto Hydro's initiatives for modernizing and improving equipment that will cater to the best public interest.

Sincerely,

CAPREIT



Mark Kenney
Chief Operating Officer

Toronto Brewery
1 Carlingview Avenue
Toronto, Ontario
M9W 5E5

October 15th, 2013

Toronto Hydro Electric System Limited
14 Carlton Street Toronto ON, M5B 1K5

Attention: Mr. Chris Tyrrell, Vice-President, Customer Care and Chief Conservation Officer

Dear Mr. Tyrrell,

Molson Coors Canada's Toronto Brewery at 1 Carlingview Drive is one of GTA's top employers with approximately 3700 employees. The plant operates 24 hours per day and 7 days per week throughout the year. Reliability of electrical supply is a paramount concern for us as it directly impacts facility production.

Interruptions of any kind, even very short term voltage surges or sags cause product waste and lost production time directly impacting the profitability of our brewery.

We recognize that failure to invest in electrical infrastructure upgrades within the City of Toronto may directly or indirectly impact our own power quality even when work is not on our feeders but elsewhere on our supply bus. The reliability of the distribution grid is a serious concern for Molson Coors' Toronto Brewery.

Molson Coors recognizes that our continued success depends on a balanced plan that addresses the need for a reliable electricity supply grid coupled with competitive rates and supports the need for the planned electrical infrastructure renewal within the City of Toronto.

Sincerely,

Ed Dickhoff P.Eng.

Director of Engineering – Toronto Brewery
ed.dickhoff@molsoncoors.com | Office 416.675.8667 | Fax 416.675.8770 | Cell 416.986.7742

WRIGLEY
A Subsidiary of Mars, Incorporated

Wrigley Canada
1123 Leslie Street
Toronto, ON
M3C 2K1

D +1-416-449-8600
M +1-866-877-3577
F +1-416-449-1774

December 17, 2013

Mr. Chris Tyrrell
VP Customer Care & Chief Conservation Officer
Toronto Hydro-Electric System Limited
5800 Yonge Street
Toronto, Ontario M2M 3T3

Dear Mr. Tyrrell,

Wrigley is subsidiary of Mars Incorporated, leading food Manufacturing Corporation in the world.
Wrigley Canada is located at 1123 Leslie Street, Toronto.
Factory is built 1962; expended over time, most recent 2005, total area approximately 180,000 square feet.
On this location we have marketing and commercial team and gum manufacturing facility.
Total number of employees on site is approximately 450.
Facility is fed by 2x3MW transformers.

During last 12 months we have experienced close to 60 power interruption, majority been during summer months. In particular this summer, during hot and humid days, we had between 2 and 3 interruptions per day. Those interruptions have significant impact on our production process. Each interruption requires the reset of different systems that can take up to 1 hr downtime. In some instances we have to scrap product, which combined with idle labor cost, compromised quality and delivery time, is loss for our factory.

In addition, we recently had instances where power outage lasted few hours, where we had to send people home and delay product shipments.

We understand that Toronto Hydro has committed to improve service by investing in the electrical infrastructure in next few years and need to obtain funds to do that.

Wrigley Canada strongly supports this initiative, as we recognize that our continued success depends on a balanced plan that address the need for reliable electricity supply grid coupled with competitive rates.

Regards,

Milica Milovic, P.Eng.
Sr. Project Engineer
Wrigley Canada

Campbell Company of Canada
60 Birmingham Street
Toronto, Ontario M8V 2B8

December 5, 2013

Toronto Hydro Electric System Limited
14 Carlton Street
Toronto, ON
M5B 1K5

Attention: Mr. Chris Tyrell, Vice-President, Customer Care and Chief Conservation Officer

Dear Mr. Tyrell,

Campbell Company of Canada's Toronto Plant has been operating at 60 Birmingham Street since 1931. The facility produces canned and cartoned aseptic soups and broths for the Canadian and U.S. market. It operates 24 hours per day, 5-7 days per week throughout the year and employs more than 450 employees.

Over the past decade, many investments have been made in technology to modernize the plant. With newer technology, interruptions of any kind, including very short-term voltage surges or sags have a profound effect on production. As a food processing plant, loss of power or steam results in significant product losses that can run into the hundreds of thousands of dollars per instance. Such losses negatively affect our ability to compete for production against our U.S. soup plants.

The reliability of the power supply to the Toronto plant is a serious concern for Campbell Company of Canada.

Campbell Canada recognizes that the continued competitiveness of our Toronto operation depends on a balanced plan that both addresses the need for a reliable electricity supply grid and provides competitive rates. It is for these reasons that Campbell Canada supports the need for the Toronto Hydro infrastructure renewal plan.

Sincerely,

Peter Stevens
Vice-President – Supply Chain, Canada

HYMOPACK LTD. LTEE.

41 MEDULLA AVE., TORONTO, ONTARIO, CANADA M8Z 5L6
TEL: (416) 232-1733 FAX: (416) 232-2194

December 10, 2013

Toronto Hydro Electric System Limited
14 Carlton Street
Toronto, Ontario
M5B 1K5

Attention: Mr. Chris Tyrrell
Vice President, Customer Care & Chief Conservation Officer

Dear Mr. Tyrrell:

Hymopack Ltd., is a retail packaging manufacturer located in the GTA area, employing over 160 employees. The plant operates 24 hours per day and 7 days per week throughout the year. Reliability of electrical supply is a paramount concern for us as it directly impacts facility production.

Interruptions of any kind, even very short term voltage surges or sags cause substantial product waste and lost production time directly impacting the profitability of our company.

We recognize that failure to invest in electrical infrastructure upgrades within the City of Toronto may directly or indirectly impact our own power quality. The reliability of the distribution grid is a serious concern for Hymopack.

Hymopack recognizes that our continued success depends on a balanced plan that addresses the need for a reliable electricity supply grid coupled with competitive rates and supports the need for the planned electrical infrastructure renewal within the City of Toronto.

Sincerely,

Gerry Maldoff

/jw

cc: Mr. Earl Provost
Mr. Michael Thompson

G:\Hymopack General\TorontoHydro-CTyrrell Dec 13.doc

BROOKFIELD
Committed to Outstanding Service

December 17, 2013

Mr. Chris Tyrrell
VP, Customer Care & Chief Conservation Officer
Toronto Hydro-Electric System Limited
5800 Yonge St
Toronto, Ontario M2M 3T3

Dear Mr. Tyrrell,

Further to our various discussions, this is to confirm that Brookfield Residential Services Ltd. fully supports any Toronto Hydro infrastructure renewal program that will positively affect condominium owners and annual expense budgets. Because of "brown outs", "black outs" and "dirty electricity" our clients have been incurring increasing operational costs related to burned out circuit boards etc.. We believe that continued investment in Toronto Hydro's electrical infrastructure is essential to maintain overall levels of system reliability across the city.

We at Brookfield Residential Services Ltd. are committed to continually searching out and recommending capital projects and energy conservation initiatives in an effort to ease the demands from our buildings on the electrical system in Toronto. We currently manage approximately 60,000 condominium suites across the city and the reliability of the electrical infrastructure is of paramount importance to the tens of thousands of condominium owners who make up our portfolio. We are currently the leading promoter of energy efficiencies in the multi-residential sector in Toronto and as such we believe that we have the unique opportunity to see the negative impact the current infrastructure is having on our clients.

As you know, the condominium sector has been in growth for the last few years and Toronto is the global leader in new condominium construction developments and is forecast to continue at this pace for the next several years. This predicted continued development growth will in no doubt place excessive stresses on the existing systems.

We encourage careful consideration of any infrastructure renewal program to help ensure an outcome that is in the best interest of the City of Toronto's long term growth and development as well as the financial health of our many client condominiums.
Regards,

Murray Johnson
Vice President,
Client Service Development
Brookfield Residential Services Ltd.

Innovative Research Group, Inc.

Toronto • Vancouver

Customer Consultation Report

Distribution System Plan Review

July 2014

Prepared for:

Toronto Hydro-Electric System Limited
14 Carlton Street
Toronto, ON, M5B 1K5

Customer Consultation Report

Distribution System Plan Review

July 2014

This report has been prepared by Innovative Research Group Inc. (INNOVATIVE) for Toronto Hydro-Electric Systems Limited (Toronto Hydro).

The conclusions drawn and opinions expressed are those of the authors.

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Introduction

About this Consultation

Innovative Research Group Inc. (INNOVATIVE) has been commission by Toronto Hydro to help the utility design, collect feedback and document its customer engagement and consultation process as part of the development of Toronto Hydro's Distribution System Plan[1] ("DSP") which was presented as the Grid Renewal Plan.

Toronto Hydro's Grid Renewal Plan is a key element of its next distribution rates application. The outcome of this application will determine Toronto Hydro's electricity distribution rates for a five year term beginning May 1, 2015 through to December 31, 2019.

The OEB's new "consumer-centric" approach to rate applications contained in the *Renewed Regulatory Framework for Electricity (RRFE)* requires LDCs to demonstrate services are provided in a manner that responds to identified customer needs and preferences[2]. Distributors are required to provide an overview of customer engagement activities that each distributor has undertaken with respect to its plans and how customer needs and preferences have been reflected in the distributor's application. While Toronto Hydro engages customers in a number of ways to explore their needs, it has not done so in the context of its capital plans. This initiative sought to bring customers directly into the process of finding the right balance between cost and reliability in Toronto Hydro's Grid Renewal Plan.

This process of identifying and reacting to customer needs and preferences as it pertains to their DSP development and execution is new to Ontario's LDCs. There is no established practices and there are a number of options available to engage with customers. The following section explains how we approached this engagement.

Approach to Meaningful Customer Engagement

It is our experience at INNOVATIVE that engaging customers in meaningful consultation can be a challenge. The reality of most consultation processes is they start out aiming to collect the views of the average person, but end up collecting the views of organized advocacy groups.

Many customers feel they don't know enough to contribute to a public consultation. Others fear the combative nature of some public processes or prefer not to risk offending friends and neighbours by taking firm positions on issues that are sometimes controversial. Moreover, many customers simply do not pay attention and remain unaware of particular consultations that they would participate in if they had been aware.

[1] In the workbook that was used for this consultation, the DSP was referred to as the "Grid Renewal Plan" as a more consumer-friendly term. As such, the term "Grid Renewal Plan" appears throughout this report and is synonymous with DSP.

[2] OEB Renewed Regulatory Framework for Electricity Sections 2.4.2, 5.0, and 5.0.4.

Running a consultation on the Grid Renewal Plan has an additional challenge – the lack of awareness of the distribution system including how it is funded, regulated and the nature of its challenges. This is well documented in Ontario Energy Board research and in INNOVATIVE's own experience.

Considering both the challenge of engaging a representative group of customers and the challenge of lack of knowledge, we built a process built on six key principles:

1. Ensure customers from across Toronto Hydro's customer-base have an opportunity to be heard.
2. Use random-sampling research elements to ensure a representative sample of customers are engaged.
3. Create open voluntary processes to allow anyone who wants to be heard to be heard.
4. Focus on fundamental value choices. Look for questions that ask people to choose between key outcomes rather than focus on the technical questions of how to reach those outcomes.
5. Create an opportunity for the public to learn the basics of the distribution system so they can provide a more informed point of view.
6. Test the consultation material ahead of time for clarity of language, appropriateness of questions, ability to respond to questions, and the right balance between comprehensiveness and simplicity.

Since this was the first time Toronto Hydro so explicitly engaged customers in the development of their DSP, a specific effort was made to collect participant comments on the process itself. While most customers felt this approach to engagement was effective at soliciting their feedback on Toronto Hydro's 5 Year Grid Renewal Plan, other ideas on how to improve upon the process were collected throughout the consultation. This is discussed in detail throughout the body of this report.

Customer Consultation Overview

Based on the principles outline above, INNOVATIVE worked with Toronto Hydro staff to design a multifaceted customer engagement program which included a combination of traditional consultation services as well as qualitative and quantitative research elements. This comprehensive consultation was designed to engage various rate classes and collect feedback on preferences and priorities as they relate Toronto Hydro's 5 Year DSP.

The consultation encompassed four core elements of customer engagement.

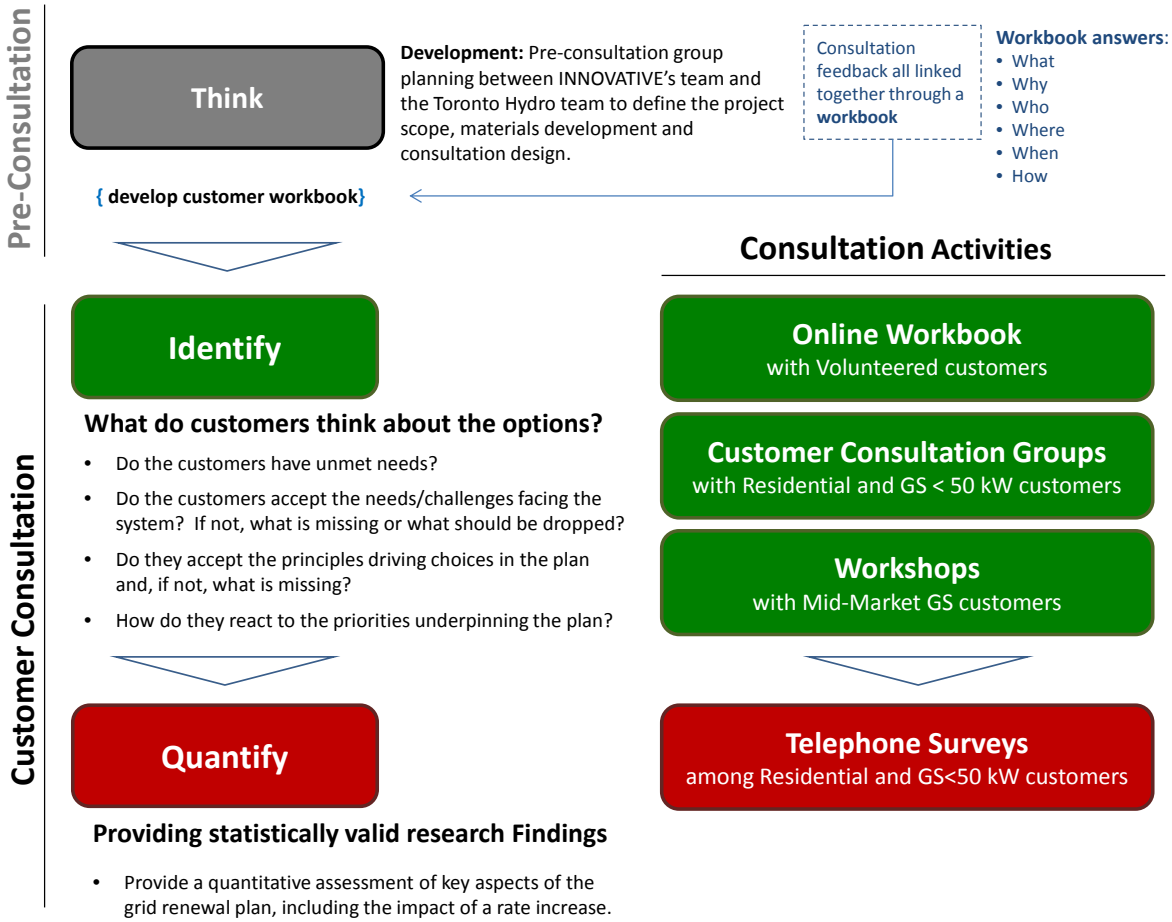
1. **Online Workbook**: The online workbook was promoted through traditional print advertising and social media as well as Toronto Hydro's website. This first phase of the consultation was available to all Toronto Hydro customers who wanted to participate.
2. **General Service and Residential Consultation Groups:** The General Service and Residential Customer phase of Toronto Hydro's multi-faceted customer consultation was used as an engagement tool to educate customers, access customer preferences and priorities, gauge customer acceptance of rate increases, as well as inform subsequent phases of the consultation.

The groups were randomly recruited and held in different locations across the city. A workbook was used to provide the participants with core information about Ontario electricity system and Toronto Hydro's Grid Renewal Plan. They were provided incentives in recognition of their time commitment.

3. **Mid-Market General Service Workshops**: General Service customers over 50 kW (GS > 50kW) were engaged through a series of randomly recruited workshops. They were provided incentives in recognition of their time commitment.
4. **Random Telephone Surveys**: INNOVATIVE conducted telephone surveys with residential and general service (GS < 50kW) customers to provide a quantitative assessment of key aspects of the grid renewal plan. Customer lists for both respondent groups were provided by Toronto Hydro and the sample was randomly-selected by INNOVATIVE.

There were three stages in developing and implementing this consultation:

- **Think**: The first stage was developing the core background material and key questions for the workbook. INNOVATIVE and Toronto Hydro worked together to review the Grid Renewal Plan to identify potential questions that would allow customers to share their needs and preferences and then to develop a workbook that would provide the information needed to allow customers with different levels of initial knowledge to find answers to those questions.
- **Identify**: The second step was to find out the range of view in the public about the Grid Renewal Plan through the more qualitative elements of the process. This included an online workbook using a voluntary sample and a series customer discussion groups and workshops using randomly recruited samples of residential and GS customers. In parallel, Toronto Hydro continued its one-on-one meetings with major customers.
- **Quantify**: The third step was quantitative - randomly recruited telephone surveys of residential and GS customers. Randomly recruited surveys allow us to draw generalizable conclusions that can be applied to the broader population of Toronto Hydro customers. The surveys were developed based on the feedback from the qualitative research.



The consultation was designed so anyone who is interested would have an opportunity to participate in the process through the online workbook. However, in our approach, we distinguish between responses from the opinion research discipline (random recruits and scientific polls) and responses from an "open invitation" consultation discipline.

The small group results are presented as numeric counts to help readers remember that qualitative research only identifies points of view, it does not project the incidence of that point of view in the broader public.

The results from the workbook and random surveys are presented as percentages due to the larger numbers involved.

- Readers are cautioned that the workbook results represent the views of volunteers. The workbook sample is not randomly selected and cannot be generalised to the broader public.
- The telephone surveys are based on random samples so we can reliable project the incidence to the broader population of Toronto Hydro Customers.
- In some instances, the quantitative total may be greater than 100% due to rounding. This is in keeping with standard research practice.

It is important to note that these consultations occurred as Toronto Hydro was developing its plan. One critical change that occurred during the consultation is that the forecasted bill increase of the Toronto Hydro DSP changed between the qualitative and quantitative phase. Readers should bear this in mind when considering differences in results between the qualitative and quantitative phase.

Workbook Development

As we noted earlier, a key challenge in getting public feedback on Toronto Hydro's Grid Renewal Plan is the lack of knowledge of customers about the Ontario electricity system, and Toronto Hydro's role in the system and the local distribution system. The DSP itself is a very detailed and extensive document that uses technical language. Our challenge was to briefly cover these key issues and to frame meaningful questions about customer needs and preferences.

The process of developing the consultation workbook began in the fall of 2013. INNOVATIVE and Toronto Hydro staff began the process of reviewing Toronto Hydro's Grid Renewal Plan while INNOVATIVE conducted one night of exploratory groups on October 3rd, 2013 with randomly selected members of the general public asking who pay at least some attention to current events to ask what they were looking for in a consultation process and what they needed to know to make up their minds on whether Toronto Hydro's Grid Renewal Plan and associated rate plan was reasonable or not.

Based on the initial review of the plan, exploratory groups, and feedback from testing, the workbook was divided into key sections that explained Toronto Hydro' electric system, the challenges facing the system, and how Toronto Hydro intended to meet those challenges over time.

The final consultation workbook had six distinct chapters:

1. **Introduction**: the purpose of the discussion, where the discussion fits
2. **Electricity 101**: how the overall system works and the players involved in operating and regulating the system.
3. **Toronto's Grid Today**: a discussion of the structure and key elements of Toronto Hydro's distribution system.
4. **Challenges Facing the Grid**: a discussion of the various challenges facing the grid.
5. **How We're Managing Grid Pressures**: an overview of recent and current initiatives to manage the challenges.
6. **The Bottom Line**: A section covering the level of planned spending for 2015 to 2019 by general Plant (described as Business Support), System Access, System Service and System Renewal, the expected impact on rates and reliability and feedback on priorities, pacing and overall reaction.

Although the sophistication of customers varied, the same basic workbook was used in all qualitative customer engagements – the online workbook, the residential and small GS discussion groups and the mid-sized GS workshops. The key change between audiences is that the bill references were varied to reflect the details of that specific rate class. As the customer went through the consultation workbook – either independently or through a facilitated session – they were prompted with questions related to

system reliability, system challenges, and preferences on the direction of Toronto Hydro's proposed Grid Renewal Plan.

Another key element of the workbook were the questions. In developing the questions, we looked for questions that could work also on telephone without all the information in the workbook.

The needs questions were the easiest. We started with a basic satisfaction question and then asked an open-ended question about how Toronto Hydro could improve its services. We let customers go to whatever topics they wanted to cover with no boundaries. Later in the workbook we probed satisfaction with the number and duration of routine outages and probed the impacts of those outages. We also zeroed in on major events by asking customers if they had experienced an outage during the ice storm or flooding, how satisfied they were with Toronto Hydro's response and how Toronto Hydro could improve its services during those events.

Preferences took a bit more thinking. We were looking for value choices rather than technical issues. Key topics for preferences included:

- Should the utility follow a run-to-failure or a pro-active replacement strategy?
- What are acceptable outcomes for the number and duration of outages?
- Given the other major needs for investment, how important is it to invest in modernizing the Grid?
- Willingness to participate in centrally controlled demand response programs?
- Whether the overall Grid Renewal Plan was heading in the right or wrong direction and why?
- Whether Toronto Hydro had the balance right in its spending priorities and which areas should have more or less priority?
- Whether Toronto Hydro's goals are too high, too low or about right with probes for which are too high and which too low?

One challenging topic was system access. System access spending is mandated by legislation or other external obligations. There is little room for changes. In that area we simply asked how reasonable some of the major spending areas were to customers.

The final substantive question asked about the cost of the Plan and the outcomes it planned to receive. Sometimes this questions is asked with a simply support or oppose response scale, but we found that type of scale didn't effective capture customer responses. Instead, we gave customers four options as well as a not sure opt out:

- Toronto Hydro should plan to achieve higher outcomes, even if the rates need to go up even more.
- I am satisfied with the balance between outcomes and the proposed rate increase.
- I don't like the rate increase, but I think it is necessary to maintain the grid to a reasonable standard.
- I think the bill impact is too high and Toronto Hydro needs to scale back its plans.

The workbook concluded with a final set of five questions to assess the workbook and process itself.

The workbooks can be found in the **Appendix** of this report.

Executive Summary

More than 300 customer participated in the qualitative stages of the consultation where we explored the range of responses, while another 1,200 customers responded to the quantitative stage where we documented the incidence of needs and preferences across the customer population.

The following section provides the detailed findings on the needs and the preferences of Toronto Hydro's General Service and residential customer base. In this section, we provide a high level overview of Toronto Hydro customers' needs and preferences.

Customer Needs

Most Toronto Hydro customers are generally satisfied with the job Toronto Hydro does running the electricity distribution system. This pattern was consistent across all forms of customer input.

Overall Satisfaction across Consultation Activities

	Directional				Generalizable	
	Residential Groups	GS under 50 kw Groups	Mid-Market GS Workshop	Online Workbook	Residential Survey	GS Survey
Very Satisfied	6	5	9	26%	23%	19%
Somewhat satisfied	15	21	25	49%	50%	54%
Somewhat dissatisfied	9	4	7	12%	14%	13%
Very dissatisfied	3	1	0	9%	10%	8%
Don't know	0	0	0	4%	3%	7%

When we asked what Toronto Hydro can do better to improve services, comments focused on four major areas:

- Lower prices.
- A general desire for improved reliability or increased investment in infrastructure to improve reliability.
- Faster restoration times, particular during major outages such as the summer flooding or ice storm.
- Improved communications, again particularly during major outages.

This paradox of *lower prices* while seeking *service improvements* is the key dilemma the consultation sought to explore and better understand.

The consultation focused deeper on the question of outages. In the qualitative stage, the workbook shared information about the systems current average level of reliability and sought customer feedback on satisfaction with current levels of reliability and response to major events. With the flooding in the summer and the ice storm in December of 2013, major events were at the forefront of customer thoughts.

As the tables below illustrate, while a majority of customers are satisfied with the average frequency and duration of outages and with Toronto Hydro's management of recent major events, a significant minority are not satisfied.

Customer Satisfaction with Current Average Outage Frequency

	Directional			
	Residential Groups	GS under 50 kw Groups	Mid-Market GS Workshop	Online Workbook
Very Satisfied	5	3	4	16%
Somewhat satisfied	12	14	13	37%
Somewhat dissatisfied	7	6	9	25%
Very dissatisfied	9	7	7	20%
Don't know	0	1	0	2%

Customer Satisfaction with Current Average Outage Duration

	Directional			
	Residential Groups	GS under 50 kw Groups	Mid-Market GS Workshop	Online Workbook
Very Satisfied	4	4	9	17%
Somewhat satisfied	13	10	15	38%
Somewhat dissatisfied	9	7	12	24%
Very dissatisfied	7	10	4	19%
Don't know	0	0	1	2%

Customer Satisfaction with Management of Major Events

	Directional			
	Residential Groups	GS under 50 kw Groups	Mid-Market GS Workshop	Online Workbook
Very Satisfied	3	4	10	27%
Somewhat satisfied	12	13	13	39%
Somewhat dissatisfied	7	4	10	15%
Very dissatisfied	9	6	4	14%
Don't know	0	3	3	5%
Refused / No response	2	1	1	N/A

The qualitative consultation activities spent additional time on exploring the impacts of outages on customers, acceptable frequencies and durations of outages as well as trade-offs between frequency and duration. Those findings are detailed in the following section.

The telephone survey built on the qualitative feedback and asked questions about customer preferences on the trade-off between cost and reliability.

Customer Preferences

Looking at the question of reliability performance, the residential and GS customer surveys asked respondents to choose between three options on how Toronto Hydro should respond to the frequency and duration of outages. Both residential and GS customers gave similar responses to both duration and frequency.

- Roughly 30% said Toronto Hydro should spend what is needed to reduce the number and frequencies of outages.
- Between 10 and 15% said Toronto Hydro accept more or longer outages to reduce costs.
- Between 34% and 41% said Toronto Hydro should spend what is needed to maintain the current number and frequencies of outages.

Although most spending in system access is mandated, most customers felt spending on connections, enabling other civic improvements and meters as reasonable with some reservations noted in the following qualitative sections of this report. The qualitative elements raised the topic of system access in an effort to help participants understand where Toronto Hydro's of the capital is spent.

The main focus for exploring customer preferences in the quantitative surveys was on *system renewal*, *system service* and *general plant issues*. The results from the qualitative elements were used to inform the customer surveys and the details are reported later, so for brevity we will focus on the generalizable survey results in this discussion.

On system renewal, the customer surveys asked respondents to pick between two points of view:

- Toronto Hydro 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.
- Toronto Hydro should lower its investment in renewing the system's aging infrastructure to lessen the impact of any bill increase; even if that means more or longer power outages.

A majority of both residential and retail customers believe Toronto Hydro should replace aging infrastructure, even if that means their bill will increase.

On system service, the surveys explored the issue of new technology. Again, the surveys asked respondents to pick between two points of view:

- In these tough economic times, investments in new technologies are more of a luxury than a necessity and will cost customers more than they are willing to pay.
- Investments in new technology will increase system reliability, make our local distribution system more efficient, and save us money in the long run.

This time, at least 60% of both residential and GS customers said they believe investments in new technology will deliver important benefits and did not see them as unaffordable luxuries.

The surveys took the same approach to general plant spending. The two points of view included:

- Toronto Hydro should find ways to make do with the buildings, equipment and IT systems it already has.
- While Toronto Hydro should be wise with its spending, it is important that its staff have the equipment and tools they need to manage the system efficiently and reliably.

Again, a majority of both residential and GS customers say it is important that staff have the equipment and tools they need to manage the system efficiently and reliably.

Customer Reaction to Rate Impacts

As we found earlier in the needs discussion, Toronto Hydro's customers are conflicted when it comes to the DSP and the rate application.

Many customers are feeling a financial pinch. Others reacted to the latest stories in the newspapers about waste and mismanagement or perks and compensation in any part of the electricity system when considering Toronto Hydro's plan. As noted earlier, few customer welcome the idea of a rate increase.

Yet, reliable electricity service is critical to Toronto Hydro's customers. The recent major event outages reminded Torontonians that electricity is an indispensable necessity. It's not just about making do without lighting and television. Customers had to throw out spoiled food and do without showers or laundry. For others there was no heat and noted difficulty preparing food. Workplaces closed and had to send employees home for, in some cases, extended periods of time. Credit card systems and ATMs went down. Traffic signals, public transit and gas pumps were inoperable. There are few illusions about the need for reliable electricity in Toronto today.

Of course, coming into this process few customers had much understanding of what it takes to build and maintain their local distribution. Many participants in the qualitative exercises expressed appreciation for the opportunity to learn about some of those details. In the surveys we could not provide the same level of information but were able to raise awareness of the complexity through the choice and attitudinal questions.

At the end of each of these consultation processes, we concluded with a question to assess whether customers feel Toronto Hydro has found the right balance or not.

Customer Views on Cost and Outcomes of DSP

	Directional				Generalizable	
	Residential Groups	GS under 50 kw Groups	Mid-Market GS Workshop	Online Workbook	Residential Survey	GS Survey
Plan higher outcomes, even if rates go up	5	6	5	14%	4%	3%
Satisfied with balance	8	4	11	16%	15%	15%
Don't like increase but feel it is necessary	17	13	20	32%	39%	30%
Bill impact is too high, scale back plans	1	2	2	34%	34%	41%
Don't know / Refused	2	6	3	6%	8%	11%

In every consultation activity, the largest group is those who are either satisfied Toronto Hydro has found the right benefit of costs and outcomes or those who say they are unhappy with the price increase but feel it is necessary. While a significant minority say the price increase is too high and the plan should be scaled back, they are partially offset by a smaller group of customers that feel Toronto Hydro should aim for higher outcomes, even if their rates increase.

There is no simple answer to electricity utility spending in the public's view. Price increases are undesirable, but lower reliability is unacceptable and the need to invest in building and maintaining the distribution system is understood and accepted. As a result, Toronto Hydro customers reluctantly accept the proposed DSP and its accompanying price increase as an unfortunate necessity.

Online Workbook

Online Workbook
with Volunteered Customers

PURPOSE: To inform customers on the details of Toronto Hydro's proposed DSP and obtain feedback on the proposed plan

Summary

The following summary highlights key findings from residential customer feedback collected through an online workbook tool designed for Toronto Hydro.

Context: Familiarity & Satisfaction with the System

- More than three quarters (77%) have at least some understanding of the electricity distribution process; in fact, one in four (24%) say they could explain the details of the system to others. Almost all (95%) have at least somewhat of an understanding of how the parts of the system work together and which services Toronto Hydro is responsible for.
- Three quarters are either "very" (26%) or "somewhat" (49%) satisfied with the job Toronto Hydro is doing running their local distribution system. Suggested improvements include lower rates (25%) and eliminating/controlling power outages (16%).

System Reliability: Experiences and Perceptions

- Just over half of respondents feel that the current frequency (53%) and duration (55%) of power outages is acceptable. This leaves almost half who feel both are currently unacceptable.
- Almost all (91%) had experienced at least one power outage over the past two years, half of which lasted fewer than 12 hours. We see evidence of the two major storms of 2013 in the proportion reporting outages lasting longer than 12 hours.
- Almost three quarters (73%) were impacted by at least one of the major storms. Regardless of how long they were without power, most did not report any major inconveniences, and they were at least somewhat satisfied (66%) with how Toronto Hydro responded to these major storms. As heard in other research, respondents here feel there is a need for improvement when it comes to communicating the status and estimated length of outages.

Challenges Facing the System

- More than two thirds (68%) feel it is reasonable to prioritize connecting new customers over other investments. Slightly fewer feel it is reasonable to prioritize moving existing infrastructure to accommodate other projects (65%) or maintaining and upgrading grid customer meters to meet provincial standards (63%).
- The majority (73%) prefer a proactive approach over a run-to-failure strategy with aging equipment.

Modernizing the Grid

- Almost all (93%) feel they understand the challenges facing Toronto Hydro and what they are planning to do to meet those challenges.
- More than half (56%) feel it is "very important" for Toronto Hydro to invest now in modernizing the grid.
- Half (52%) say Toronto Hydro's investment plan is heading in the right direction, primarily because they feel it is necessary to upgrade for the future (57%). One in five (20%) say the plan is headed in the wrong direction.
- Just over half (53%) say the balance is right when it comes to how much Toronto Hydro is spending on each investment priority. Those who feel the priorities should be changed would like to see more spent on modernizing the grid (53%) and less spent on management salaries (20%) and construction projects (20%).
- Half (51%) feel that Toronto Hydro's goals are just right. One in four (24%) say they are aiming too high, while only one in ten (12%) say they are aiming too low. Rate increases (39%) are the primary concern among those who say the goals are too high.
- Overall, three-in-five (62%) approve of Toronto Hydro's plan. About half of this group (32%) don't like the rate increase but feel it is necessary. One third (34%) feel the bill impact is too high and plans should be scaled back.

Feedback on Workbook Approach

- Respondents deem the workbook "interesting" (35%) and "well done" (32%). The majority (56%) feel it contained the right amount of information, and more than one in four (27%) said there wasn't any content missing as far as they were concerned.
- Almost half (45%) say they prefer an online workbook for this type of consultation.

Methodology

About the Online Workbook

Throughout the fall and winter of 2013, Toronto Hydro and INNOVATIVE staff began developing an accessible customer workbook designed to both inform customers of the 5-year grid renewal plan and collect customer feedback.

The online workbook was divided into key sections that explained Toronto Hydro's electric system, the challenges facing the system, and how Toronto Hydro intended to meet those challenges over time. The online workbook had six distinct chapters:

1. Introduction
2. Electricity 101
3. Toronto's Grid Today
4. Challenges Facing the Grid
5. How We're Managing Grid Pressures
6. The Bottom Line

As the respondents went through the online workbook, they were prompted with questions related to system reliability, system challenges, and what the distribution system plan means to them. In total, the online workbook contained 35 questions, with opportunities for open-ended responses and additional comments. All responses were anonymous and kept strictly confidential.

For customers, this was an opportunity to learn more about Toronto Hydro's plan and to share their feedback. The ultimate goal was to ensure alignment between Toronto Hydro's operational plans and their customers' preferences and priorities.

Customer feedback was also incorporated into the design of subsequent consultation phases.

Field Dates:

The online workbook was available for Toronto Hydro customers to access for 37 days between February 21, 2014 and April 1, 2014.

Participation:

To ensure customer privacy, answers were grouped together with those of others who completed the same question and the information provided was used for statistical purposes only.

Responses to the online workbook are as follows:

- 1,233 unique visitors came to the online workbook's landing page.
- 485 customers moved beyond the online workbook's landing page and identified themselves as either residential customers or business customers (467 residential/18 business customers).
- 300 qualified customers completed at least the profiling section of the online workbook (291 residential/9 business customers).
- 209 customers completed the entire online workbook by answering all questions (202 residential/7 business customers).

The results are based on completed answers to the online workbook questions by residential customers. Due to the small sample size, business customer responses are not reported in the body of this document, but rather recorded as footnotes below each chart.

Promoting the Online Workbook:

The online workbook was promoted by Toronto Hydro through traditional print advertising (the Toronto Star), Toronto Hydro's web site, customer bill inserts, and Toronto Hydro's social media accounts, including Facebook and Twitter.

Hosting the Online Workbook:

The online workbook was hosted by INNOVATIVE under the URL: *www.torontohydroworkbook.com*.

The online workbook was designed to prevent respondents from completing the questions more than once and to save the progress of respondents in the event of survey mid-termination.

Cookies were used in the design of the online workbook to ensure that respondents only completed the online workbook once. Cookies are small amounts of data that attach to a user's computer hard drive when they visit a web site. When respondents reached the final webpage, the survey was considered complete and the site was no longer accessible to the internet protocol (IP) address used to complete the online workbook.

At the same time, the site saved respondent answers if they left the online workbook or experienced a mid-termination before reaching the final webpage of the workbook. When respondents returned to the online workbook, all previously entered answered were saved and appeared in the workbook linked to the user's internet protocol (IP) address.

We do not link the information we store in cookies to any personally identifiable information submitted on our site.

Respondent feedback data was only ever available to INNOVATIVE project team staff through a secure data retrieval portal.

Validating Customer Responses:

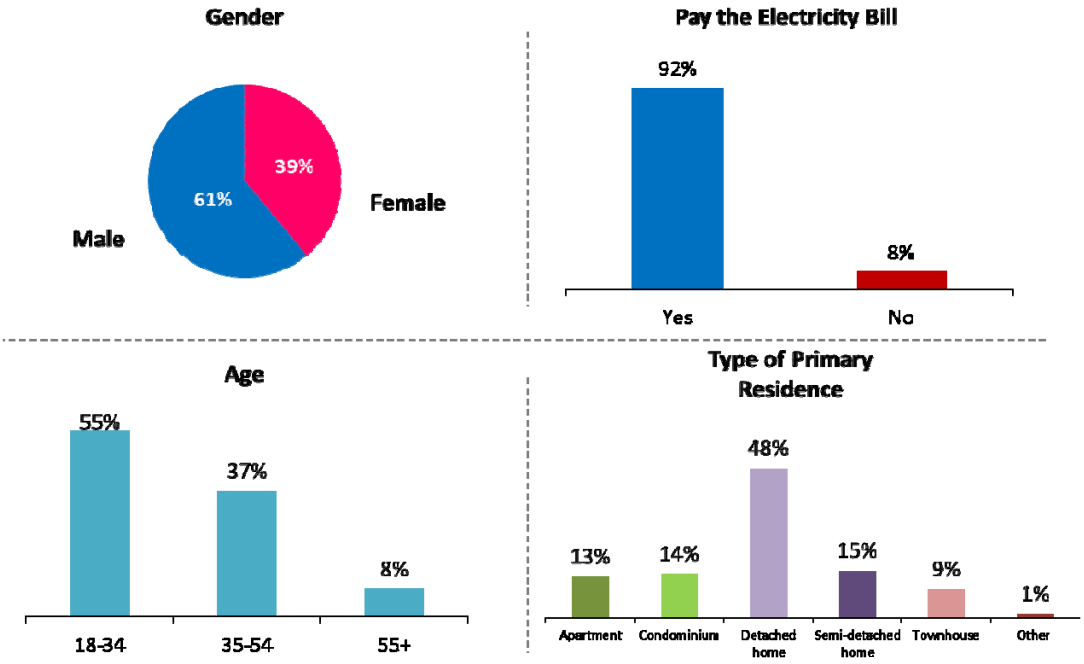
Respondents who visited the online workbook were asked to self-identify as either a residential or business customer of Toronto Hydro. Respondents were then asked to provide the postal code that corresponded to either their residence or business serviced by Toronto Hydro and answer the remaining questions from the perspective of the self-identified customer type.

Only feedback from customers who provided a valid postal code were included in this report. In total, seven residential customers were removed from the dataset due to invalid postal codes that did not correspond with Toronto Hydro's service area.

Respondent Profile

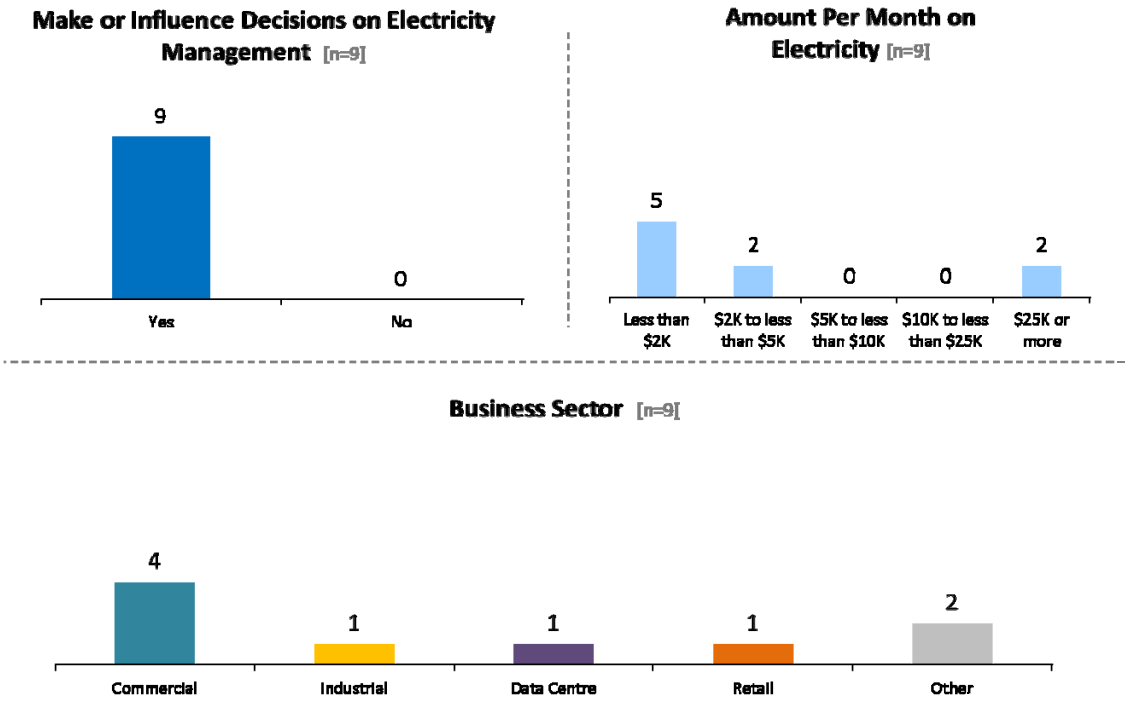
The following details the demographic characteristics of qualified respondents who completed the profiling section of the Online Workbook [n=291 residential and n=9 business customers].

Figure 1.A: Residential Customer Profile



For business respondents, a total of nine respondents at least completed the profiling section of the online workbook. The total number of business respondents who completed the online workbook was seven.

Figure 1.B: Business Customer Profile



Respondent Feedback

A total of 202 residential customers completed Toronto Hydro's online workbook. However, 291 residential customers completed at least the profiling questions within the online workbook. Answers from the 89 semi-complete respondents have been included in the findings.

Responses provided by business customers are included in the following charts as footnotes because only nine business customers semi-completed the online workbook (seven business customer completed the entire online workbook).

Context: Familiarity & Satisfaction with the System

This section provides an introduction in terms of how familiar respondents are with the electricity system, how the different parts work together, and Toronto Hydro's role in the system.

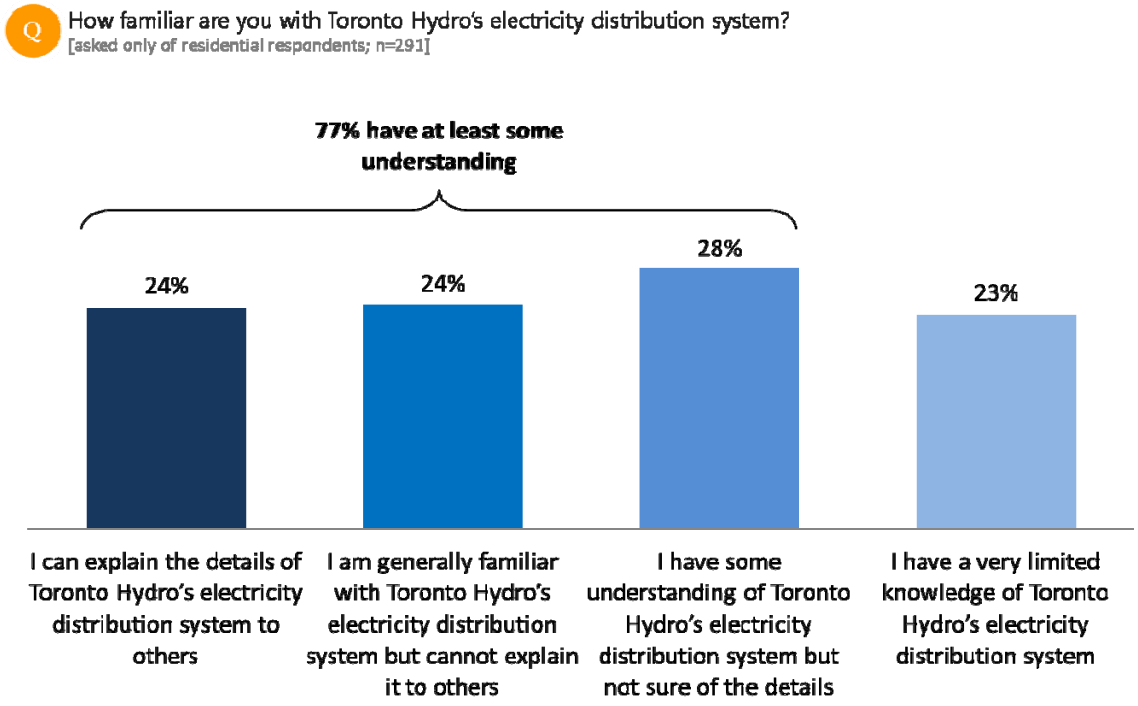
Familiarity with the System

- More than three quarters (77%) of residential respondents report having at least some level of understanding when it comes to Toronto Hydro's electricity distribution system. One in four (24%) say they can explain the details of the system to others.
- Given what they already knew and what they had read in the online workbook, almost all (95%) respondents say they understand the important parts of the electricity system, how they work together and which services Toronto Hydro is responsible for. Half (50%) say they understand this "somewhat well", while almost as many (45%) say they understand this "very well".

Satisfaction with Toronto Hydro

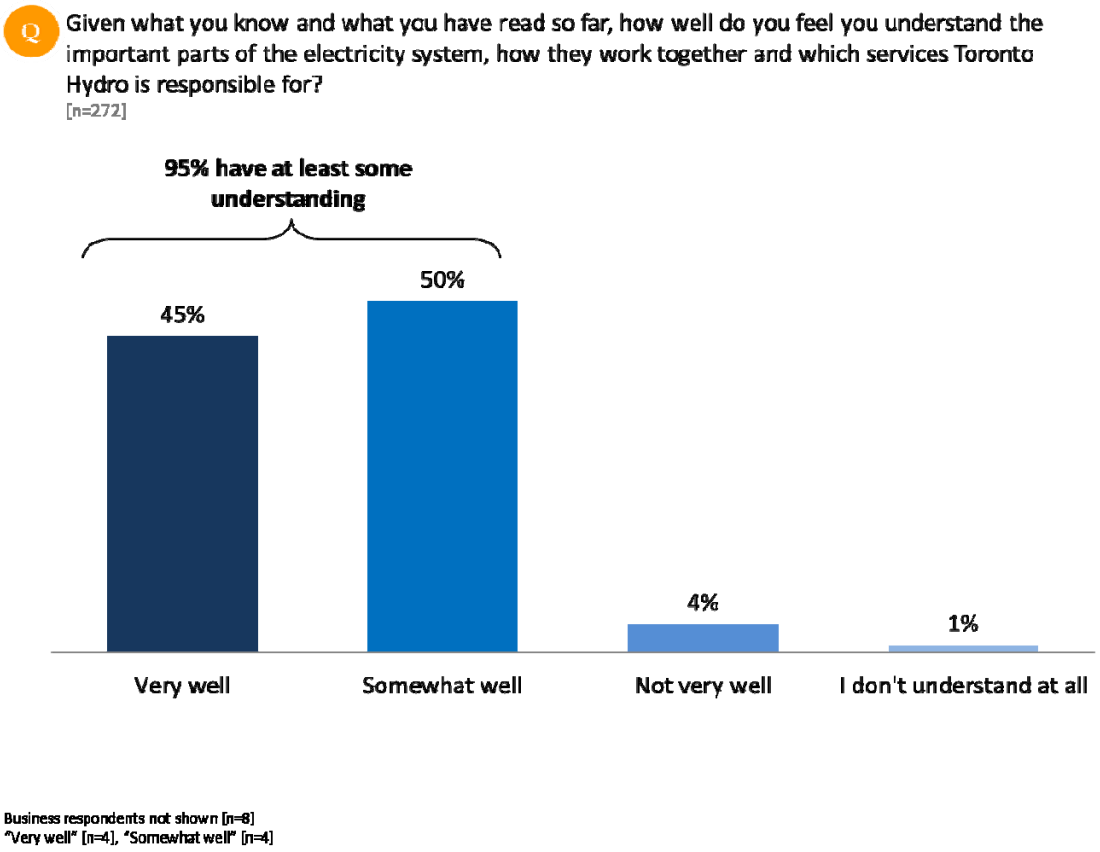
- Three quarters of respondents are either "very" (26%) or "somewhat" (49%) satisfied with the job Toronto Hydro is doing running their local distribution system.
- Asked to suggest ways in which Toronto Hydro can improve its service, lower rates topped the list at 25%, followed by eliminating/controlling power outages (16%), and improving the infrastructure (13%).

Figure 1.1: Familiarity with Electricity Distribution System



Half of residential respondents say they can explain the details of Toronto Hydro's electricity distribution system to others (24%) or that they are generally familiar with it, but can't explain it to others (24%). An additional three in ten (28%) say they have some understanding of the system but are not sure of the details. The final quarter (23%) report having a very limited knowledge of Toronto Hydro's electricity distribution system.

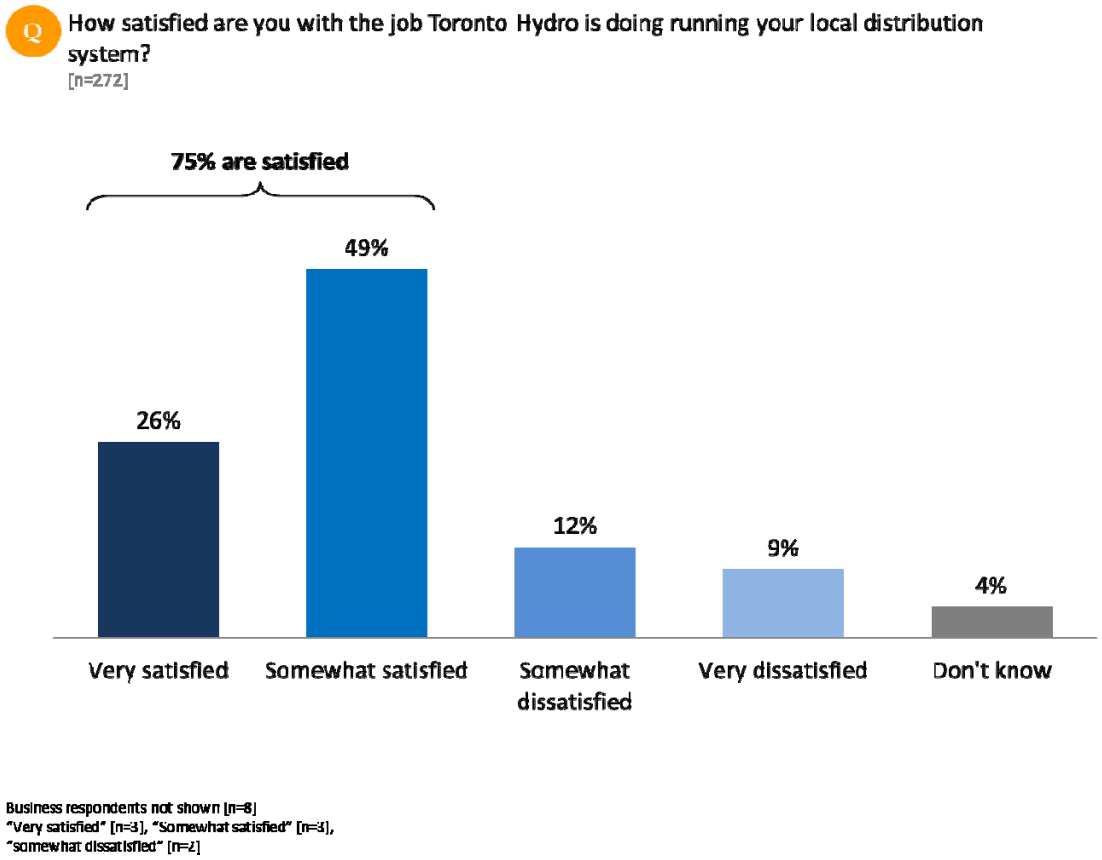
Figure 1.2: Understanding Toronto Hydro's Role



Based on what they already knew, and what they had read in the online workbook, almost all (95%) residential respondents feel they understand the important parts of the electricity system, how they work together and which services Toronto Hydro is responsible for either "very well" (45%) or "somewhat well" (50%).

Of the 8 business respondents, 4 indicate they understand the system "very well" and the remaining 4 say they understand it "somewhat well".

Figure 1.3: Satisfaction with Toronto Hydro

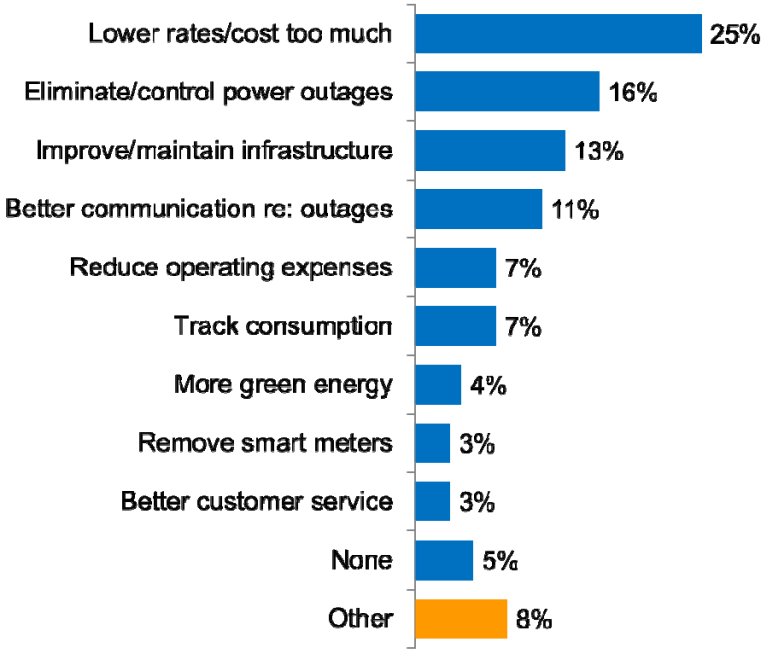


Half (49%) of residential respondents are "somewhat" satisfied with the job Toronto Hydro is doing running the local distribution system, and a further one in four (26%) are "very" satisfied. About one in five are either "somewhat" (12%) or "very" (9%) dissatisfied.

Business respondents are also satisfied with the job Toronto Hydro is doing as 6 out of 8 respondents indicated they are either "very" or "somewhat" satisfied.

Figure 1.4: Improving Service

Q Is there anything in particular that Toronto Hydro can do to improve its service to you?
[n=102]



Business respondents not shown [n=2]
"Track consumption" [n=1] and "Other" [n=1]

In particular, lowering rates and reducing power outages top the list of things residential respondents feel Toronto Hydro can do to improve their service. There were also suggestions for improving the infrastructure, better communication regarding outages, reducing salaries and tracking consumption.

For business respondents, only two provided an answer. One said "track consumption" and the other response did not fall into any of the above categories.

System Reliability

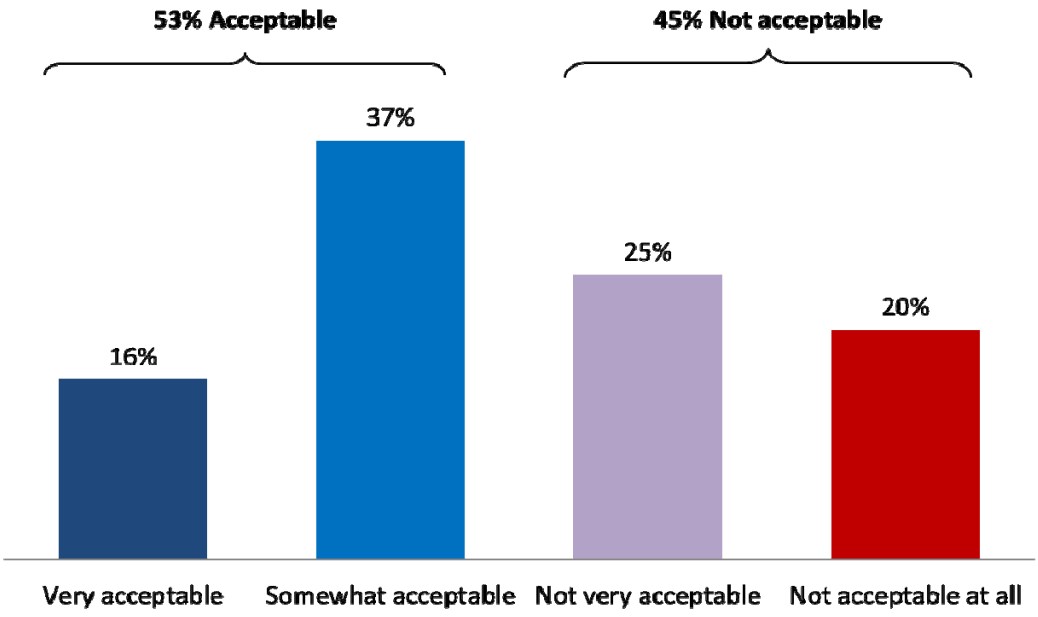
This section of the workbook explores experiences with power service interruptions and measures respondents' expectations of the frequency and length of these interruptions.

Experiences with Power Service Interruptions

- Half (53%) of residential respondents say the current average number of electricity outages is either "very" (16%) or "somewhat" (37%) acceptable.
- Results are very similar when it comes to average amount of outage time, with just over half (55%) finding the current average outage time either "very" (17%) or "somewhat" (38%) acceptable.
- Nine in ten (91%) residential respondents have experienced at least one power outage in the past two years, with some experiencing up to six or more. Half of these outages lasted for fewer than 12 hours.
- For one in five (19%), the power outage had little or no impact on them personally, but others were inconvenienced with issues like food spoilage (16%), having to relocate (15%), or having no heat (13%).
- There is no general consensus on what length of time leads to costs and consequences becoming serious as the result of a power outage, with answers ranging from one hour to more than three to five days.
- A plurality (33%) feel that two power outages per year are reasonable, although one in six (17%) feel no outages are reasonable. Over half (55%) think an hour or less is a reasonable duration for a service interruption, while one in ten (11%) maintain that no outage is acceptable.
- Almost three quarters (73%) were affected by at least one of 2013's major storms. One in ten (9%) were impacted by the flooding in July, while almost four times as many (35%) were hit by the ice storm in December. Three in ten (29%) were affected by both of these storms.
- Whether personally impacted or not, two thirds (66%) are satisfied with Toronto Hydro's management of these events. Despite being generally satisfied, some (31%) would have preferred better communication on the status of the outages.

Figure 1.5: Perception of Outage Frequency

Q How acceptable is the current average number of electricity outages?
[n=227]

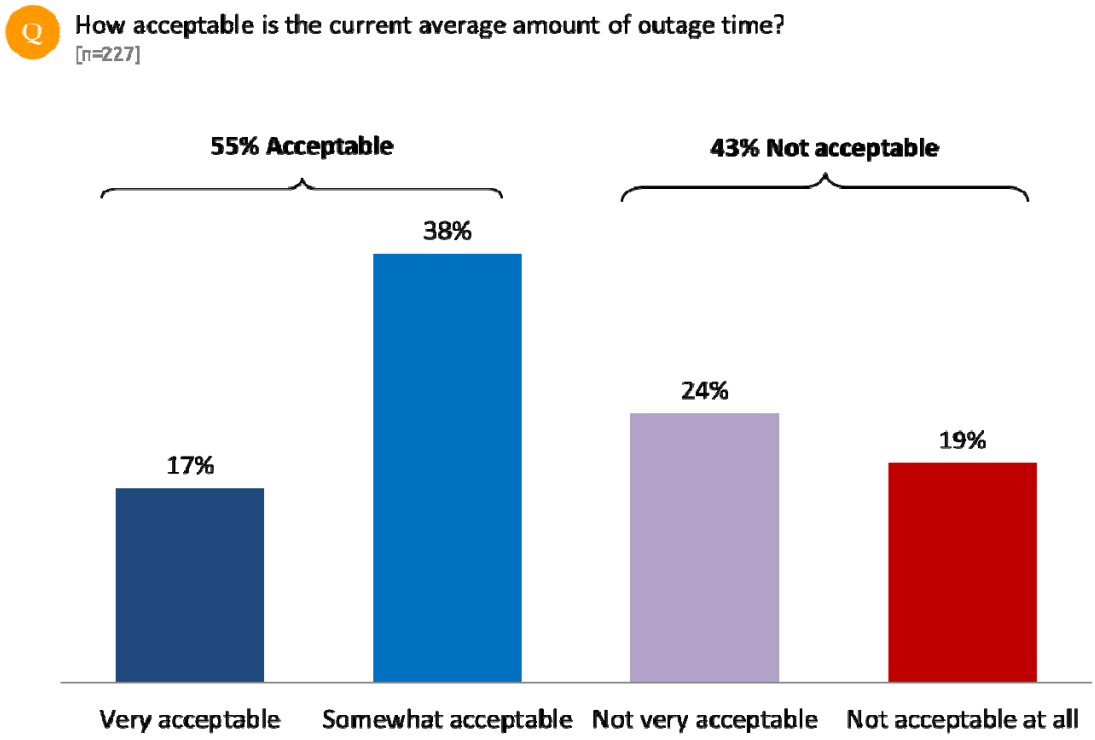


Note: 'Don't know' (2%) not shown
Business respondents also not shown [n=7]
"Very acceptable" [n=3], "Somewhat acceptable" [n=1],"Not very acceptable" [n=2],"Not acceptable at all" [n=1]

Just over half (53%) of residential respondents find the current average number of electricity outages either "very" (16%) or "somewhat" (37%) acceptable. One in four (25%) find the number "not very acceptable" and slightly fewer (20%) say it is "not acceptable at all".

For the 7 business respondents who answered, 3 find the current level "very acceptable", 1 finds it "somewhat acceptable", 2 find it "not very acceptable", and the remaining 1 finds it "not acceptable at all".

Figure 1.6: Perception of Outage Duration

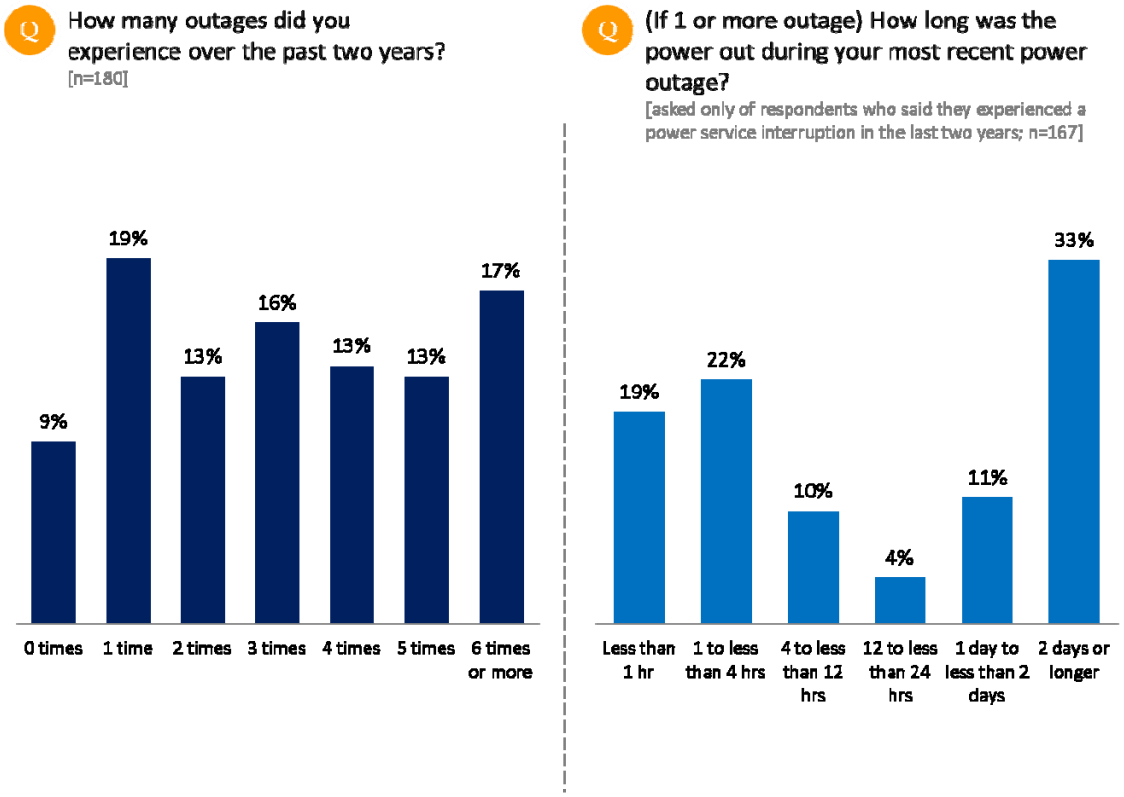


Note: 'Don't know' (2%) not shown
Business respondents also not shown [n=7]
"Very acceptable" [n=3], "Somewhat acceptable" [n=1], "Not very acceptable" [n=1], "Not acceptable at all" [n=2]

Similar to the responses noted for the frequency of outages, over half (55%) of residential respondents find the current average duration of outages either "very" (17%) or "somewhat" (38%) acceptable. One in four (24%) find the number "not very acceptable" and slightly fewer (19%) say it is "not acceptable at all".

For the 7 business respondents who answered, 3 find the current level "very acceptable", 1 finds it "somewhat acceptable", 1 finds it "not very acceptable", and the remaining 2 find it "not acceptable at all".

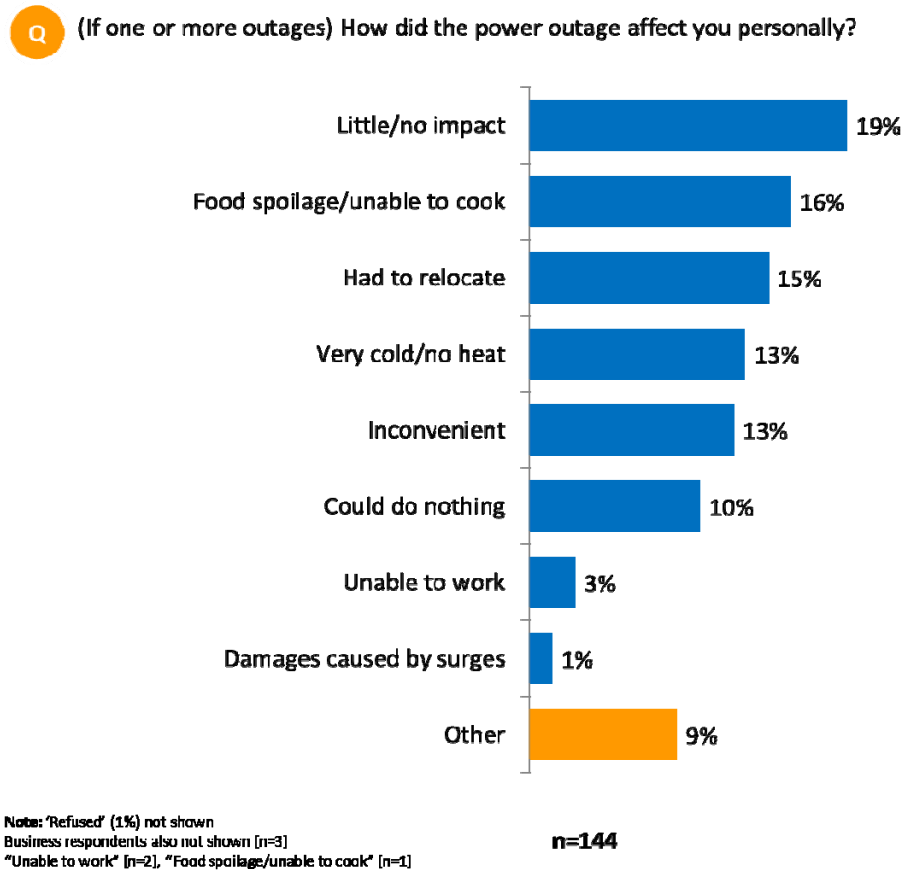
Figure 1.7: Power Service Interruption Experiences



Most residential respondents experienced a power service interruption in the past two years. Nine in ten (91%) indicated they had at least one power outage. One in five (19%) had only one outage in the past two years, while almost as many (17%) were hit by six or more.

Some outages (likely those related to one of the major storms of 2013) reportedly lasted two days or longer, but most lasted fewer than 12 hours. One in five (19%) service interruptions lasted less than an hour, with slightly more (22%) lasting between one and four hours.

Figure 1.8: Impact of Power Service Interruption

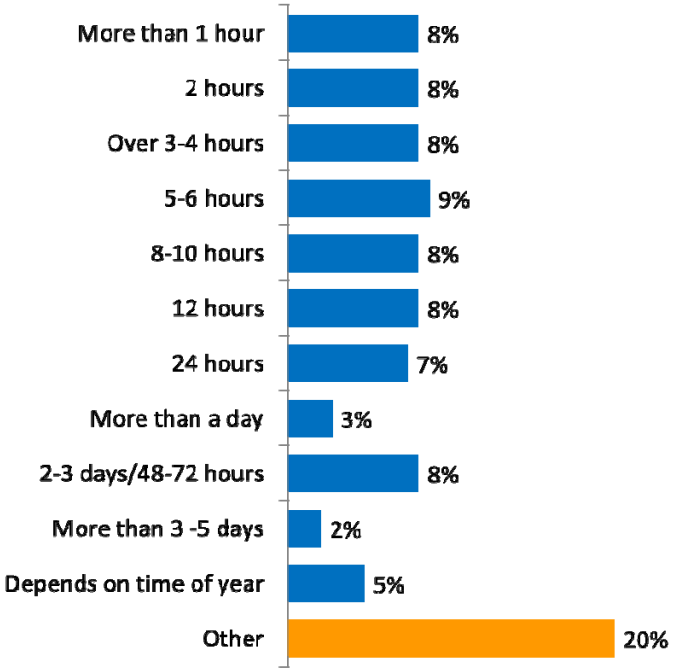


Concerning the impact of these service interruptions, one in five (19%) report little or no impact, followed by food spoilage/unable to cook (16%), had to relocate (15%), and having no heat (13%). Only one percent reported damages due to surges.

For business respondents, 3 out of the 8 respondents who answered the question experienced a service interruption. Two were left "unable to work", and one experienced "food spoilage/unable to cook".

Figure 1.9: Time at Which Costs and Consequences Become More Serious

Q Is there a certain length of time at which the costs and consequences of an outage become more serious for you?



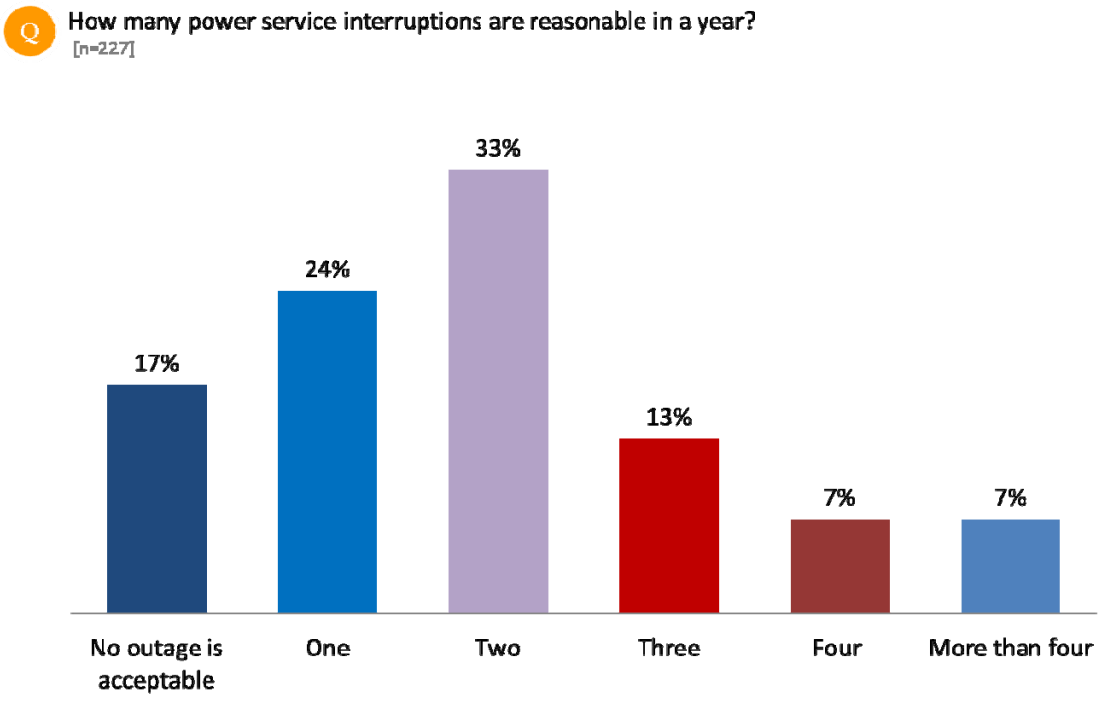
Note: 'Refused' (5%) /'Don't know' (1%) /'None' (1%) not shown
Business respondents also not shown [n=4]
"Other" [n=3], "5-6 hours" [n=1]

n=150

There is no clear point beyond which residential respondents feel the costs and consequences of an outage become more serious for them. Equal proportions say it's more than 1 hour, 2 hours, 3-4 hours, 8-10 hours, 12 hours, or 2-3 days. For five percent, it depends on what time of year the outage occurs.

Concerning business respondents, 3 out of 4 responded "other" and the remaining respondent said 5-6 hours.

Figure 1.10: Reasonable Frequency of Power Service Interruptions

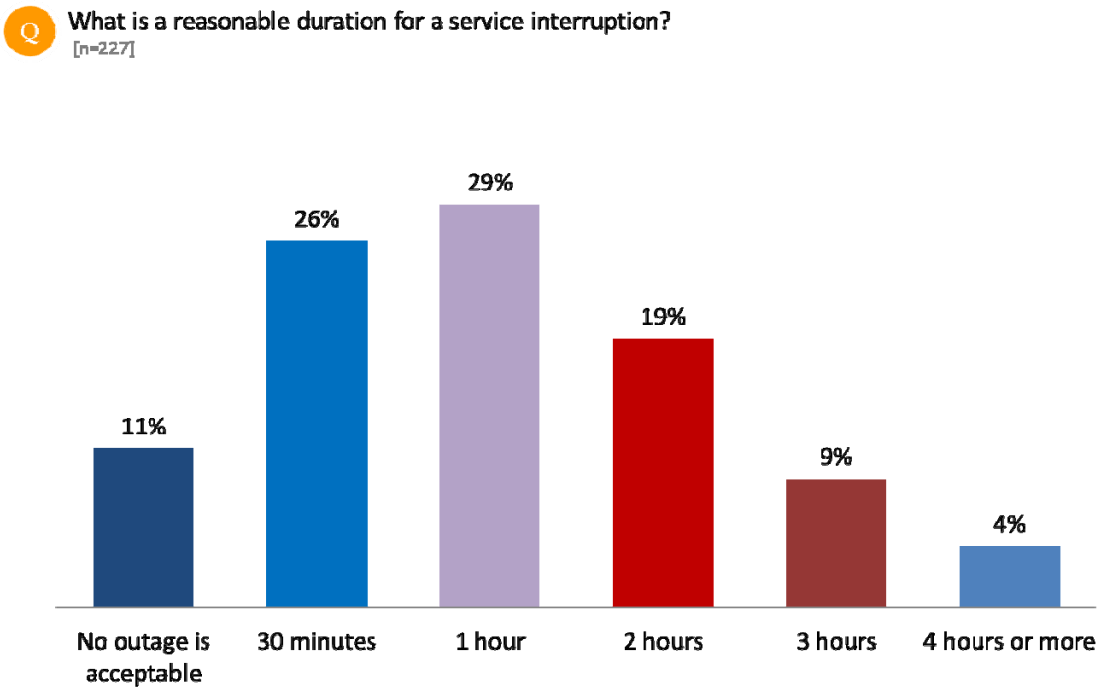


Business respondents not shown [n=7].
"No outage is acceptable" [n=2], "One" [n=3], "Three" [n=1], "Four" [n=1]

According to residential respondents, two power service interruptions a year is the most reasonable. One is seen as the next most reasonable (24%), followed by none (17%), followed by three outages (13%), then four outages (7%) and finally more than four (7%) outages per year.

Most business respondents indicated that one outage is acceptable (n=3), followed by none (n=2), then three (n=1) or four (n=1).

Figure 1.11: Reasonable Duration for Service Interruption

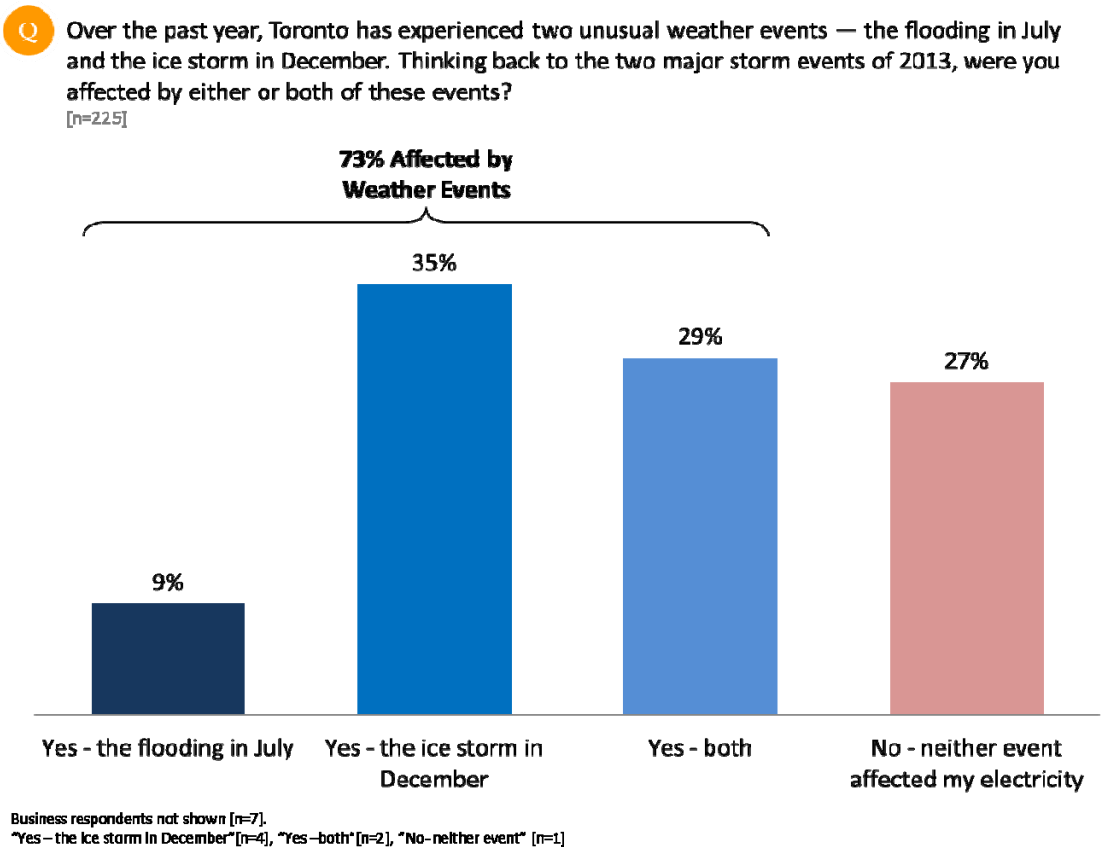


Business respondents not shown [n=7].
"No outage is acceptable" [n=3], "30 minutes" [n=3], "2 hours"[n=1]

More than half (55%) of residential respondents feel that an outage lasting an hour or less is acceptable (29% say 1 hour, 26% say 30 minutes). One in five (19%) deem an outage of two hours to be reasonable. One in ten (11%) hold that no outage is acceptable.

Business respondents stated that 30 minutes (n=3) or 2 hours (n=1) is the most reasonable duration for a service interruption, although almost half (n=3) prefer no outages at all.

Figure 1.12: Impact of Major Storms in 2013

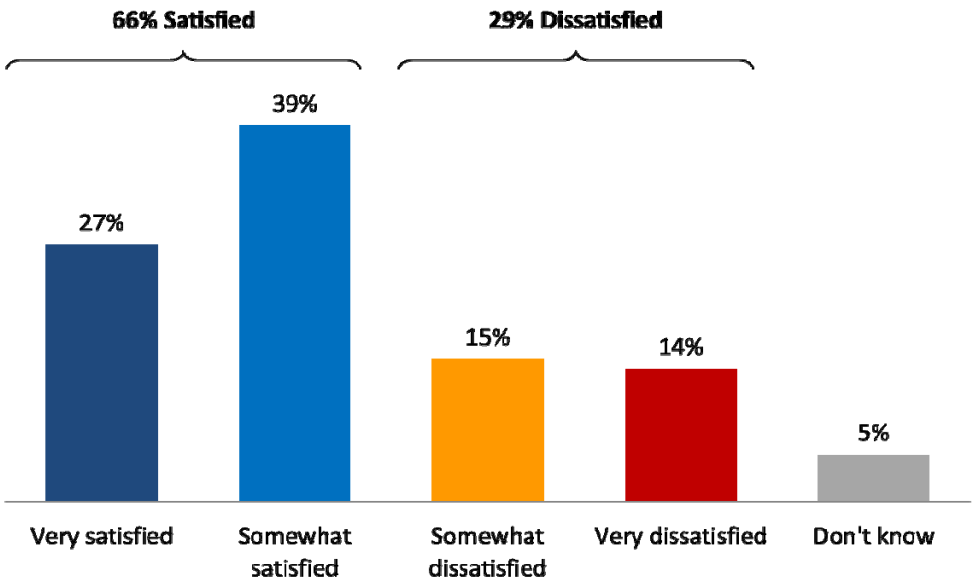


About three quarters (73%) of residential respondents were impacted by one or both of the two major storms of 2013. More than a third (35%) were affected by the ice storm, while one in ten (9%) were impacted by the flooding in July. Three in ten (29%) were affected by both storms.

Four business respondents were affected by December's ice storm, two were impacted by both, and one was not affected by either storm.

Figure 1.13: Satisfaction with Management of Storms

Q Whether you were personally affected or not, how satisfied are you with Toronto Hydro's management of these events?
[n=225]

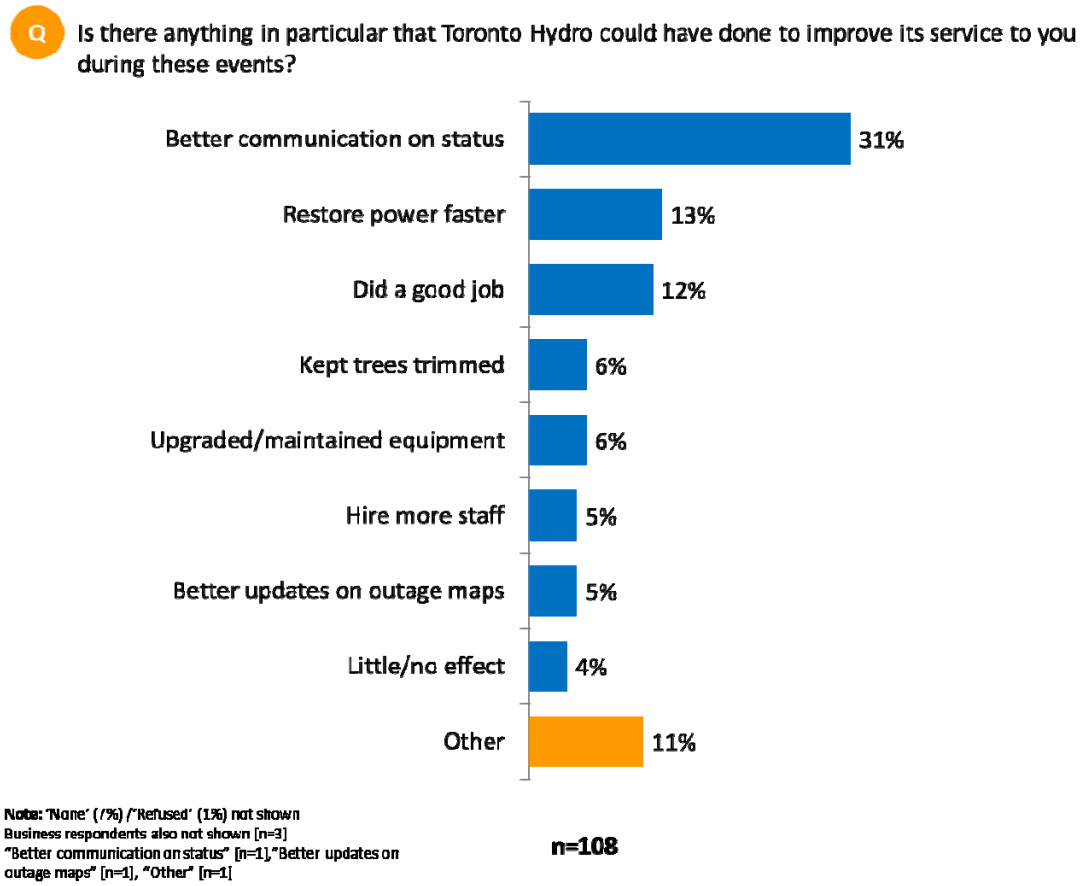


Business respondents not shown [n=7].
"Very Satisfied" [n=2], "Somewhat Satisfied" [n=3], "Very Dissatisfied" [n=1] and "Don't Know" [n=1]

Two thirds (66%) are satisfied (27% "very" and 39% "somewhat") with Toronto Hydro's management of the major storms of 2013. About one in seven (15%) are "somewhat dissatisfied", and a similar proportion (14%) are "very dissatisfied".

Among business respondents, 2 were "very satisfied", 3 were "somewhat satisfied", and 1 was "very dissatisfied".

Figure 1.14: Improving Service During Major Storms



A plurality of residential respondents (31%) would have liked better communication on the status during the storms. Others would have liked their power restored faster (13%), or better updates on the outage maps (5%). Some suggested proactive measures like keeping trees trimmed (6%), hiring more staff (5%) and upgrading equipment (6%).

Among business respondents, 1 would like better communication on status, and 1 would like better updates on outage maps.

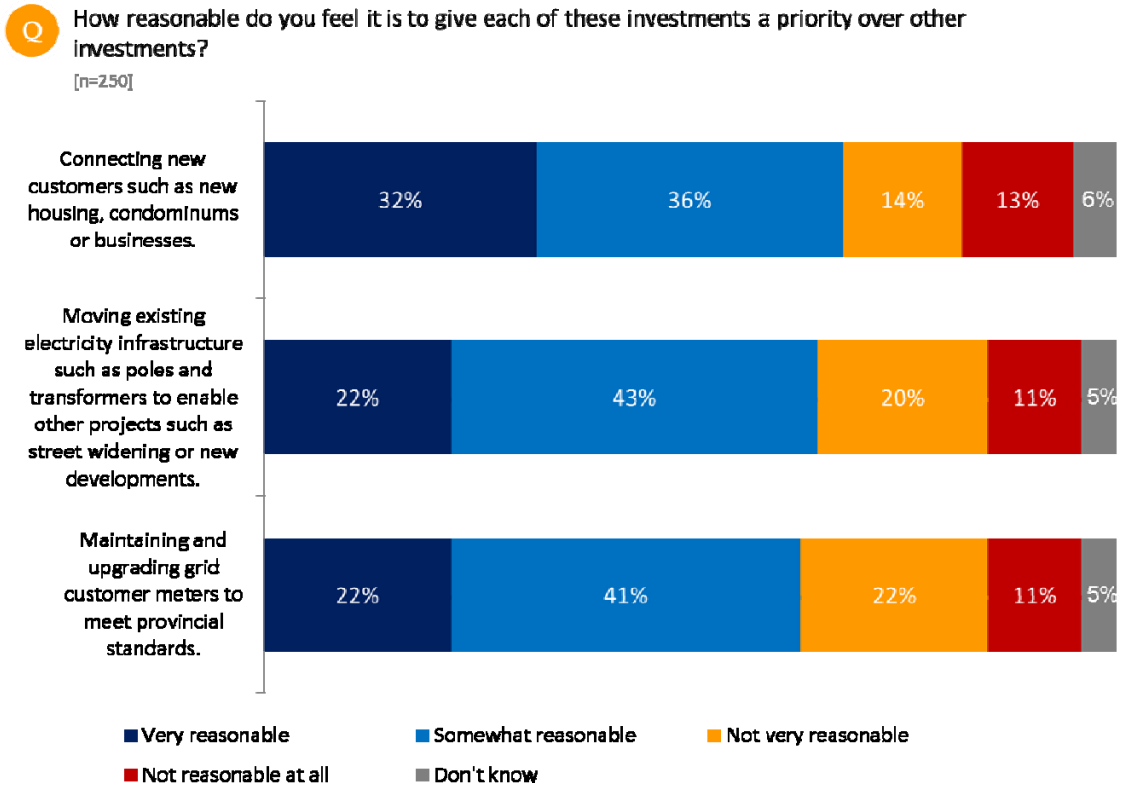
Challenges Facing the Distribution System

This section explores respondent views concerning service of the local distribution system. It focuses on the degree of satisfaction with the current system and means of improving the system in the future.

Understanding and Improving the Local Distribution System

- Overall, residential respondents agree it is reasonable to prioritize connecting new customers, moving existing infrastructure to enable other projects such as street widening or new developments, and maintain and upgrading grid customer meters to meet provincial standards over other investments.
- A solid majority (73%) of residential respondents prefer replacing equipment before it breaks down over running to failure.

Figure 1.15: Spending Priorities



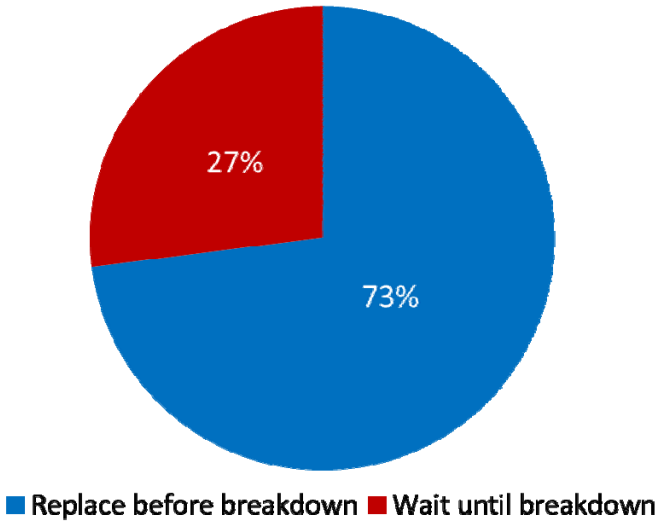
Overall, residential respondents agree it is reasonable to give each of the three investments tested priority over other grid investments.

- 32% feel it is “very reasonable” to prioritize connecting new customers such as new housing, condominiums, or businesses. Another 36% find it “somewhat reasonable”.

- 22% feel it is “very reasonable” and 43% feel it is “somewhat reasonable” to prioritize moving existing electricity infrastructure to enable other projects such as street widening or new developments.
- The result is very similar (22% “very”, 41% “somewhat reasonable”) for prioritizing maintaining and upgrading grid customer meters to meet provincial standards.

Figure 1.16: Running-to-Failure

Q Thinking about the aging equipment in the grid, do you feel it’s best to wait until the equipment breaks down to get full value from each piece of equipment, even if it means power outages, or do you feel the best approach is to replace the equipment before it breaks down to avoid power outages, even if it means not getting all the use possible from each piece of equipment?
[n=245]



Business respondents not shown [n=8]
“Replace before breakdown” [n=7], “Wait until breakdown” [n=1]

Around three quarters of residential respondents (73%) would rather Toronto Hydro replace equipment before it breaks down to avoid power outages, rather than a run-to-failure approach (27%).

For business respondents, 7 out of 8 agreed with replacing equipment before breakdown.

Modernizing the Grid

This section touches on customer understanding of the challenges currently facing the Toronto Hydro grid and reaction to proposed investments into the system, including priorities, spending plans, and the balance between rate increases and investments into system improvements.

Understanding Toronto Hydro's Responsibility & Grid Challenges

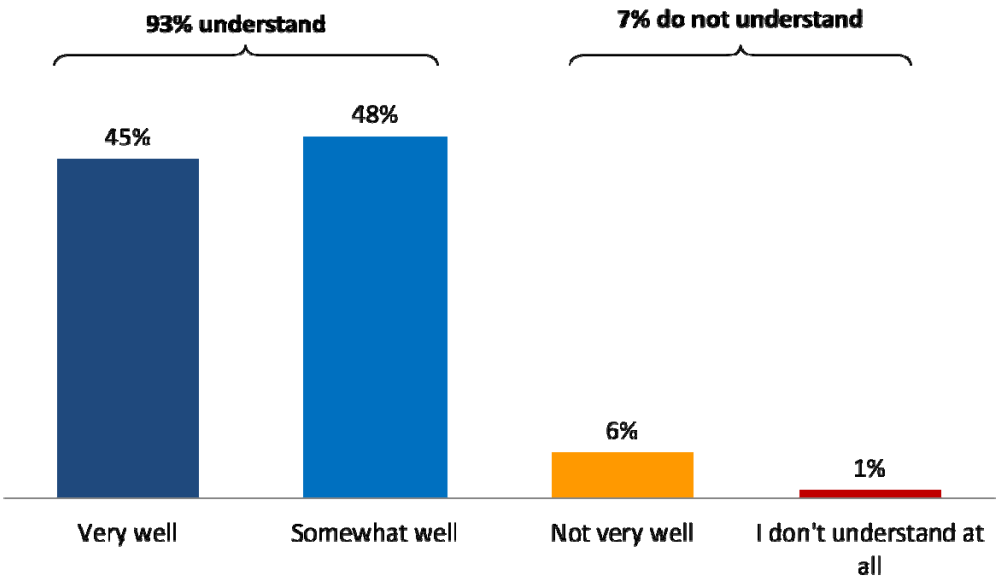
- Based on what they already knew and had been exposed to in the online workbook, almost all (93%) feel they understand the challenges facing the Toronto Hydro grid and what they are planning to do to meet those challenges.
- More than half (56%) of residential respondents agree that it is "very important" for Toronto Hydro to invest now in modernizing the grid. An additional three in ten (30%) feel this is "somewhat important".
- Respondents are divided on whether or not they would participate in Demand Response (DR) programs. Three-in-ten (31%) say they are "not likely at all" to participate, while slightly fewer (27%) say they are "very likely" to participate. The remaining two-in-five are either "somewhat" (22%) or "not very" (19%) likely to take part in a DR program.

Reaction to Toronto Hydro's Investment Plan

- Half (52%) of residential respondents say it seems like Toronto Hydro's investment plan is headed in the right direction. One in five (20%) feel it is headed in the wrong direction, and the remaining 28% don't know. Those who feel Toronto Hydro is headed in the right direction tend to feel that way because they feel it is necessary to upgrade for the future (57%).
- A slim majority (53%) of residential respondents say the balance seems right when it comes to how much Toronto Hydro is spending on each of its investment priorities. Among those who feel the priorities should be changed, there is a desire for more spending on modernizing the grid (53%), and less spending on management salaries (20%) and construction projects (20%).
- Given the option of a proactive or reactive approach to maintaining the grid, half (51%) feel that Toronto Hydro's goals are about right. One-in-four (24%) say their goals are too high, and half as many (12%) say they are aiming too low. Those who feel the goals are too high are concerned about rate increases (39%), while those who say the goals are too low would like to see more effort put into replacing aging equipment (20%).
- Overall, three-in-five (62%) approve of Toronto Hydro's plan and the outcomes it is expected to achieve, even if half this group (32%) don't like the rate increase (but feel that it is necessary to maintain the grid to a reasonable standard). However, one third (34%) feel the bill impact is too high and Toronto Hydro needs to scale back its plans.

Figure 1.17: Understanding the Distribution System and Its Challenges

Q Given what you know and what you have read so far, how well do you feel you understand the challenges facing the Toronto Hydro grid and what they are planning to do to meet those challenges?
[n=210]



Business respondents not shown [n=7].
"Very well" [n=3], "Somewhat well" [n=4]

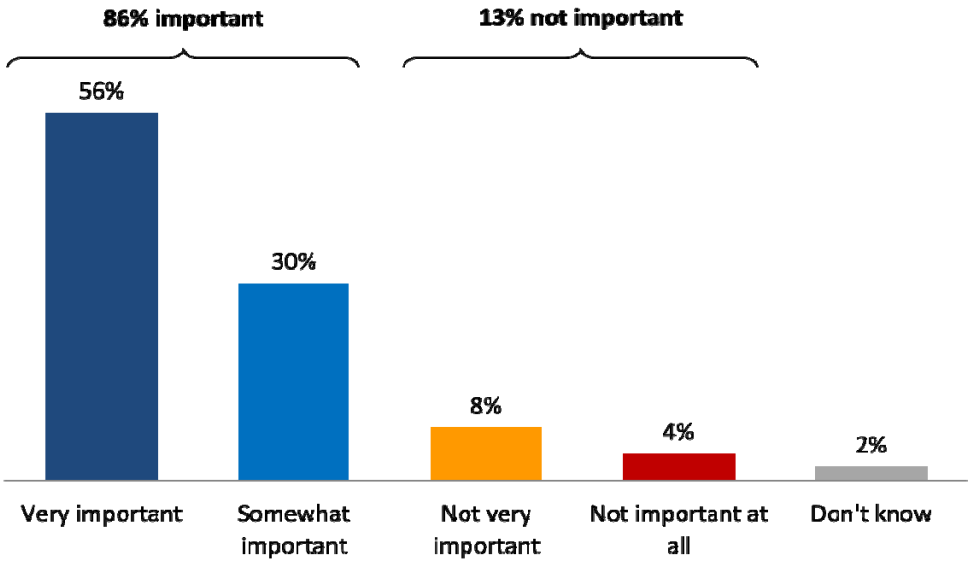
Given what they already knew and what they read in the online workbook, more than nine-in-ten (93%) respondents feel they understand the challenges facing the Toronto Hydro grid and what they are planning to do to meet those challenges. About half (48%) say they understand this "somewhat well", while almost as many (45%) say they understand it "very well".

Of the 7 business respondents who answered, 3 indicate they understand the challenges "very well" and the remaining 4 say they understand it "somewhat well".

Figure 1.18: Modernizing the Grid

Q Modernizing the grid can allow Toronto Hydro to improve reliability. Given there are many other areas of needed investment, such as connecting new customers, replacing aging equipment and expanding capacity for long-term growth, how important do you feel it is for Toronto Hydro to invest now in modernizing the grid?

[n=223]



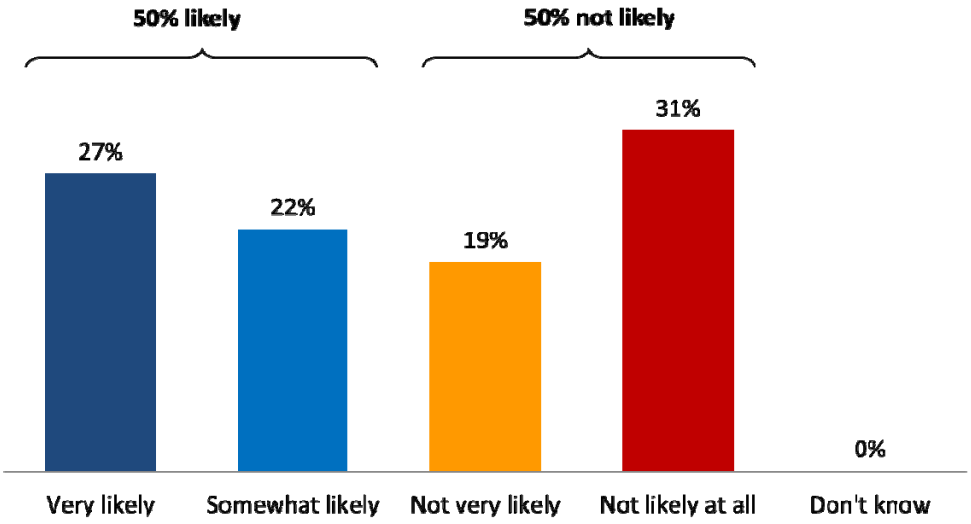
Business respondents not shown [n=7].
"Very important" [n=4], "Somewhat important"[n=2], "Not very important" [n=1]

A majority (56%) of residential respondents feel it is "very important" for Toronto Hydro to invest now in modernizing the grid. Another three-in-ten (30%) say this is "somewhat important". Only about one in ten (12%) feel it is either "not very" or "not at all" important to invest in the grid now.

Of the 7 business respondents who answered, 4 feel it is "very important" to invest in the grid now, 2 feel it is "somewhat important", and only 1 feels it is "not very important"

Figure 1.19: Demand Response Programs

Q How likely is it that you would participate in Demand Response programs that would allow electricity system managers to turn off equipment you are using? For residential customers, this would involve automated devices to turn off your water heater and air conditioner for short periods during times of peak demand.
[n=214]



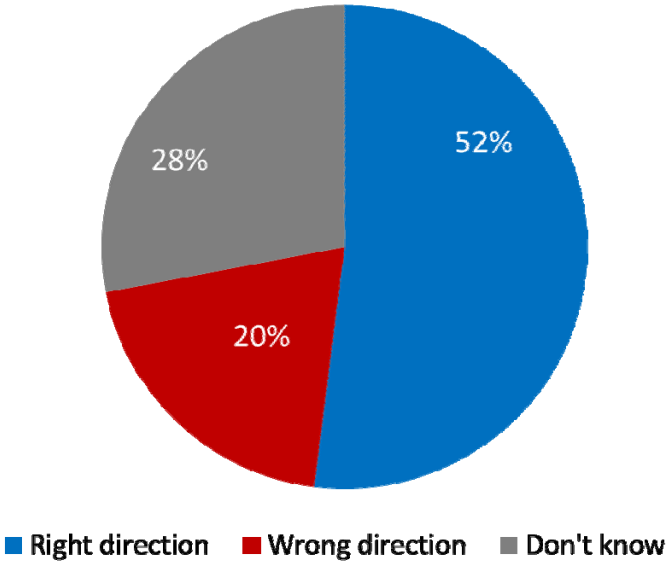
Business respondents not shown [n=6].
"Very likely" [n=1], "Somewhat likely" [n=3], "Not very likely" [n=1], "Not likely at all" [n=2]

Residential respondents are divided on whether or not they would participate in Demand Response programs. Half are either "very" (27%) or "somewhat" (22%) likely to participate in a DR program, while the other half are "not very likely" (19%) or "not likely at all" (31%) to do so.

Business respondents are also split on whether or not they would participate in DR programs. Of the 6 who responded, 1 said they were "very likely", 3 said "somewhat likely", 1 said "not very likely", and the remaining 2 said "not likely at all".

Figure 1.20: Reaction to Investment Plan

Q From what you have read and what you may have heard elsewhere, does Toronto Hydro's investment plan seem like it is going in the right direction or the wrong direction?
[n=210]



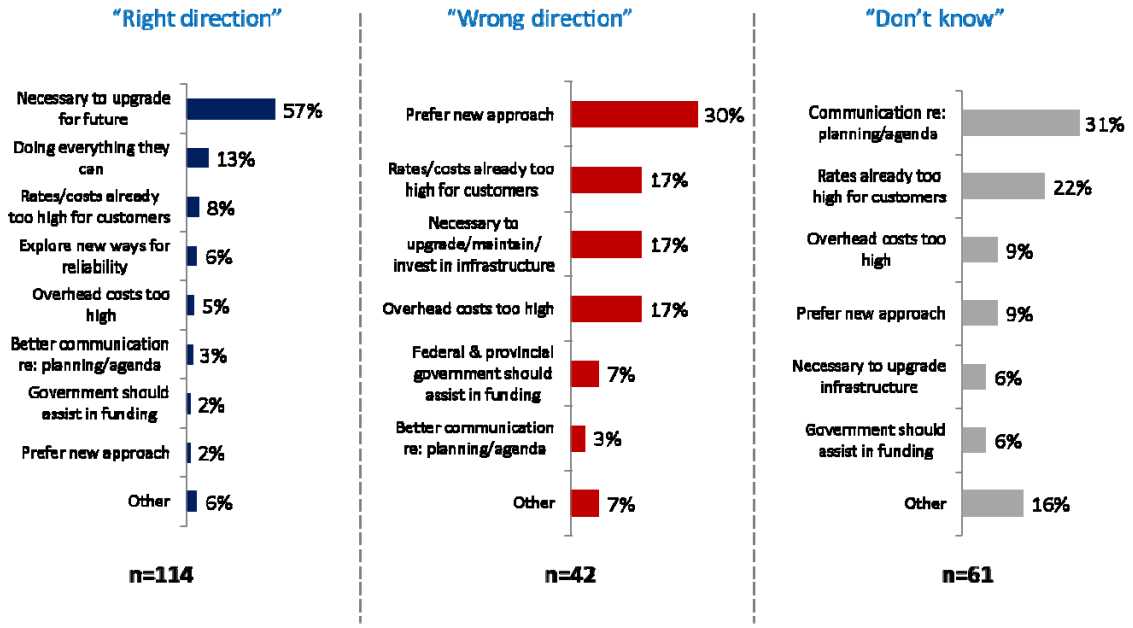
Business respondents not shown [n=7].
"Right direction" [n=4], "Wrong direction" [n=1], "Don't know" [n=2]

Just over half of residential respondents (52%) think Toronto Hydro's investment plan seems like it is going in the right direction. One in five (20%) say it is going in the wrong direction, and the remainder (28%) don't know.

Among business respondents, 4 say the plan is going in the right direction, 1 says wrong direction, and the other 2 don't know.

Figure 1.21: Reaction to Investment Plan (Reasons)

Q And why do you feel that way?

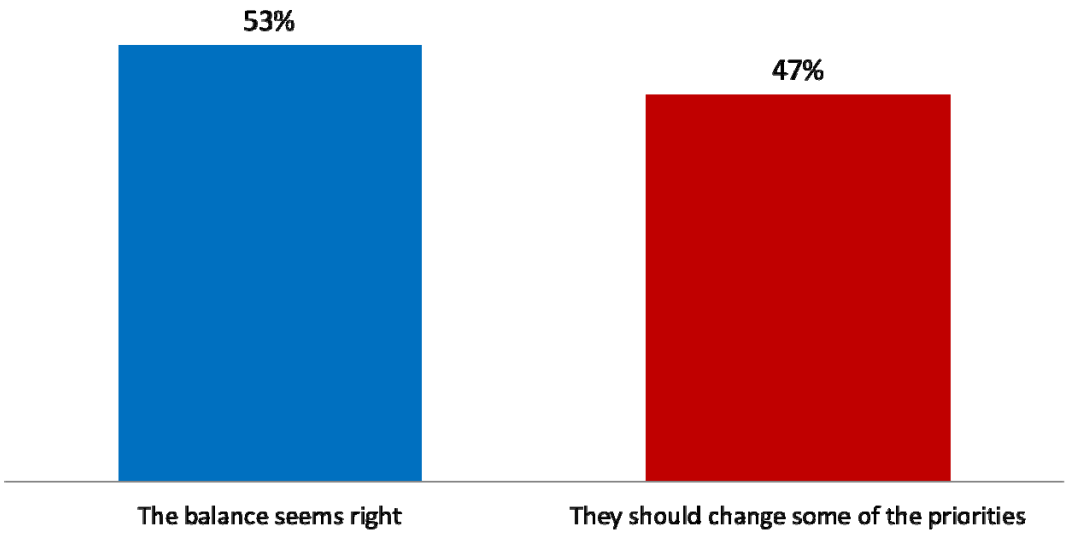


Business respondents also not shown [n=6].
"Rates/costs already too high" [n=2], "Doing everything they can" [n=2], "Necessary to upgrade equipment" [n=1], "Other" [n=1]

- Those who feel the plan is heading in the right direction primarily feel that way because they think it is necessary to upgrade for the future (57%).
- Among those who feel the plan is headed in the wrong direction, poor management/planning is the main reason (30%).
- Those who don't know are, for the most part, either concerned about communication regarding the plan (31%), or they feel that rates are already too high (22%).

Figure 1.22: Investment Priorities

Q When you look at how much Toronto Hydro is spending on each of its investment priorities, do you think they have the balance right or would you change the relative priorities?
[n=206]

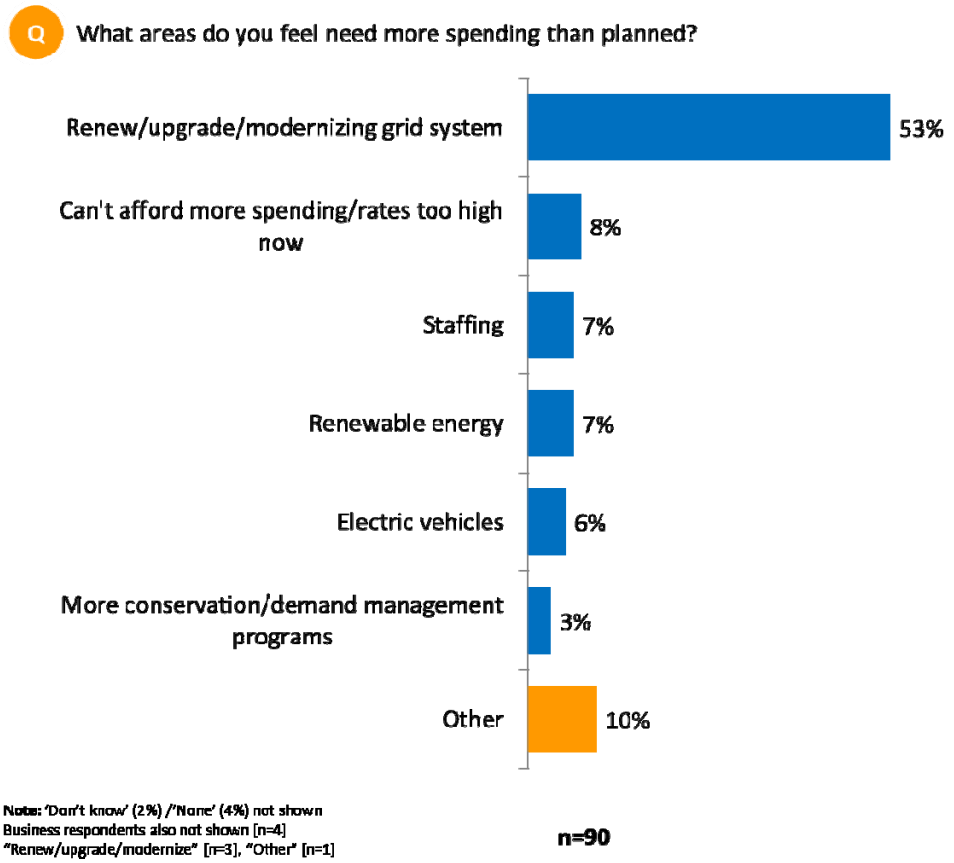


Business respondents not shown [n=7].
"The balance seems right" [n=4], "They should change the priorities" [n=3]

By a fairly slim margin (53% versus 47%), residential respondents feel Toronto Hydro has the balance right when it comes to how much they are spending on each of its investment priorities.

The result is similar among business respondents; with 4 saying the balance seems right and 3 saying they should change some of their priorities.

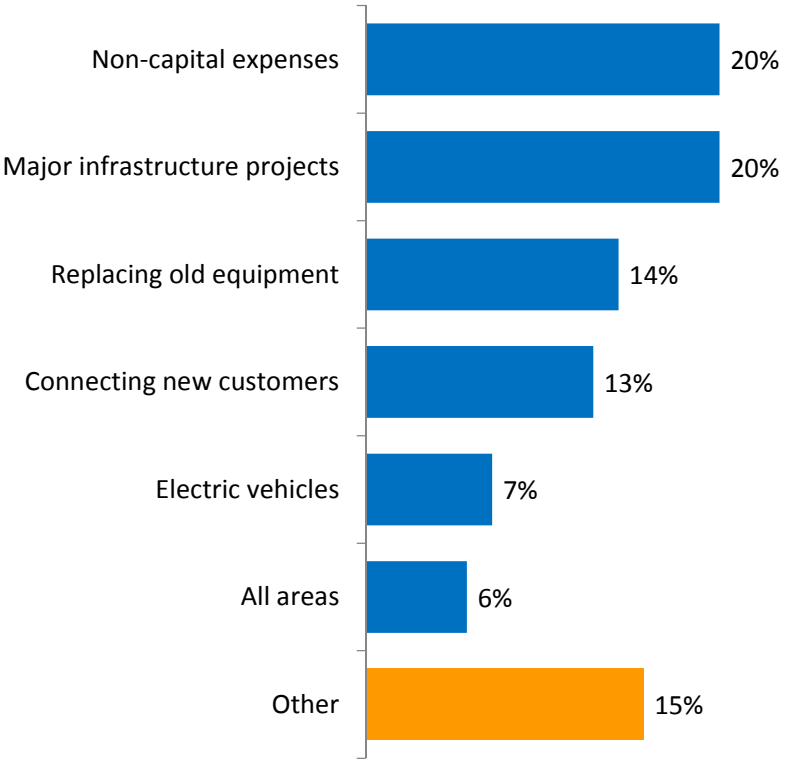
Figure 1.23: Investment Priorities (Where to Spend More)



Asked where they feel Toronto Hydro should be spending more than planned, more than half (53%) said they want more spent on modernizing the grid system.

Figure 1.24: Investment Priorities (Where to Spend Less)

Q What areas do you feel should have less spending than planned?



Note:'None' (4%) 'Refused' (1%) not shown
Business respondents also not shown [n=5]
"Non-capital expenses" [n=1], "Major infrastructure projects"[n=1],"Replacing old equipment" [n=1], "Other" [n=2]

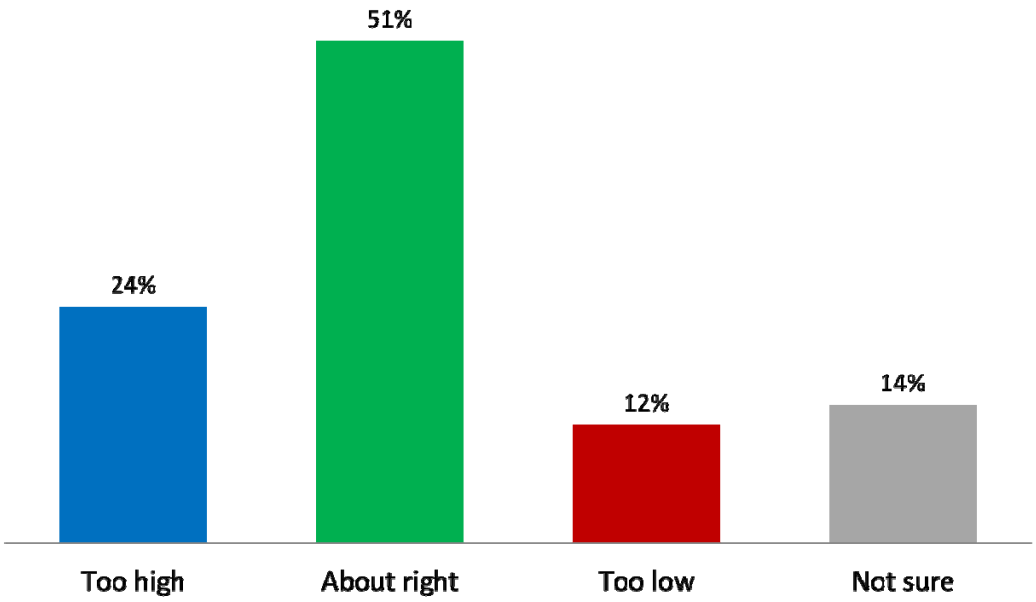
n=71

Asked where Toronto Hydro should be spending *less* than planned, responses were more varied. One-in-five (20%) wanted to reduce spending on non-capital expenses[3] or major electric infrastructure projects (which often disrupt day-to-day life), while others wanted to cut back investment on replacing old equipment (14%) or connecting new customers (13%).

[3] Non-capital expenses include items related to Toronto Hydro's operating budget.

Figure 1.25: Spending Proposal

Q When you consider the options outlined in the table on the previous page, do you think Toronto Hydro's goals are too high, too low or about right?
[n=200]



Business respondents not shown [n=7]
"Too high" [n=2], "About right" [n=2], "Too low" [n=1], "Not sure" [n=2]

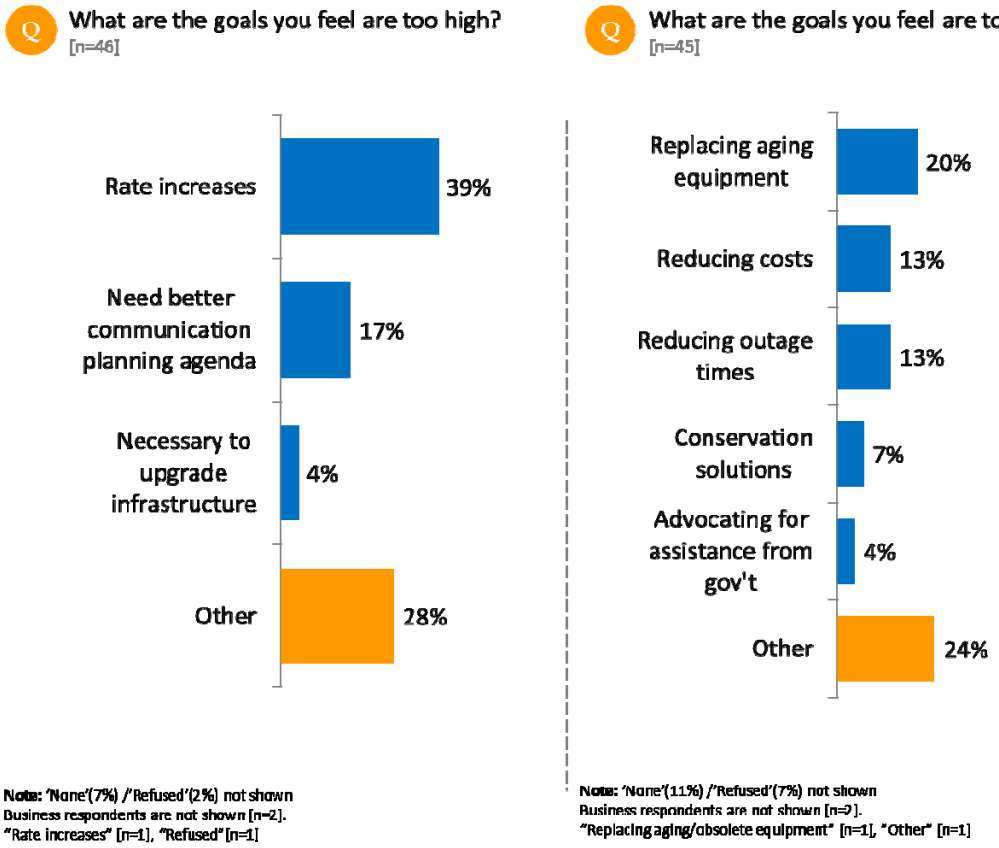
Half of residential respondents (51%) think (*<u>based on a table below</u> which was shown in the online workbook*) Toronto Hydro's goals are "about right". One in four (24%) feel their goals are too high, while half as many (12%) feel they are aiming too low. The remaining respondents (14%) are not sure.

	"RUN-TO-FAILURE" APPROACH	TORONTO HYDRO'S PROPOSED PLAN
Description	With this approach, Toronto Hydro would only replace equipment as it fails (with the exception of critical assets such as stations equipment). This is a purely reactive approach using close to the minimum amount of funding that Toronto Hydro could receive from the Ontario Energy Board.	1. Proactively replace highest-risk aging and obsolete equipment at a pace that maintains reliability and targets the worst performing feeders first. 2. Improve system reliability by investing in modern grid technologies and reconfiguring circuits.
Estimated increase in monthly bill	• Average of $1.24 per year from 2015-2019 • Total increase by 2019 = **$6.18/month**	• Average of $2.35 per year from 2015-2019 • Total increase by 2019 = **$11.75/month**
Reliability outcomes by 2019	• Number of outages for the average customer: **1.6/year** • Time without power for the average customer: **1.38 hours/year** • Percentage of customers on feeders experiencing seven or more interruptions a year: **13 per cent**	• Number of outages for the average customer: **1.15/year** • Time without power for the average customer: **0.65 hours/year** • Percentage of customers on feeders experiencing seven or more interruptions a year: **6 per cent**
Percentage of equipment past end-of-life in 2020	**31 - 34 per cent**	**25 - 28 per cent**

Business respondents are more evenly divided on this question. Equal numbers feel the goals are "about right" (n=2) or "too high" (n=2). Another respondent feels the goals are "too low" and the remaining is not sure.

Note: forecasted rate increases were updated throughout the course of the consultation. This resulted in different forecasted rate increases used in the subsequent customer telephone surveys. For more information, please see **Section 4: Customer Telephone Surveys**.

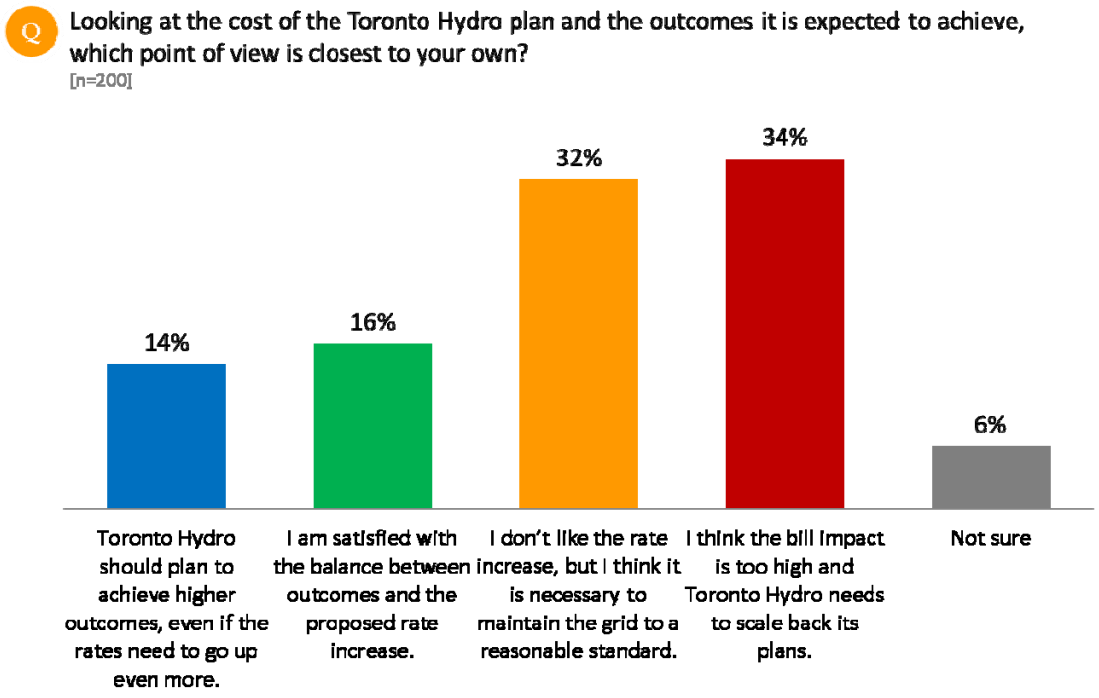
Figure 1.26: Reaction to Spending Proposal



Rate increases are the main reason (39%) that some feel Toronto Hydro's goals are too high, followed by the need for better communication or planning of their agenda (17%).

For those who feel the goals are too low, some says it's because they want to replace aging equipment (20%), while others say they want to reduce costs (13%) or outage times (13%). Still others feel the goals are too low because they want Toronto Hydro to pursue conservation solutions (7%), or they feel Toronto Hydro should be advocating for assistance from the government (4%).

Figure 1.27: Acceptance of Rate Increase



Business respondents not shown [n=7]
"Toronto Hydro should plan to achieve higher outcomes, even if the rates need to go up even more" [2], "I am satisfied with the balance between outcomes and the proposed rate increase" [n=2], "I don't like the rate increase, but I think it is necessary to maintain the grid to a reasonable standard" [n=1], "I think the bill impact is too high and Toronto Hydro needs to scale back its plans" [n=1],"Not sure" [n=1]

One third (34%) of residential respondents think the bill impact is too high and Toronto Hydro needs to scale back its plans. A similar proportion (32%) say they don't like the rate increase, but think it is necessary to maintain the grid to a reasonable standard. Half as many (16%) are satisfied with the balance between outcomes and the proposed rate increase, and slightly fewer (14%) say Toronto Hydro should plan to achieve higher outcomes, even if the rates need to go up even more.

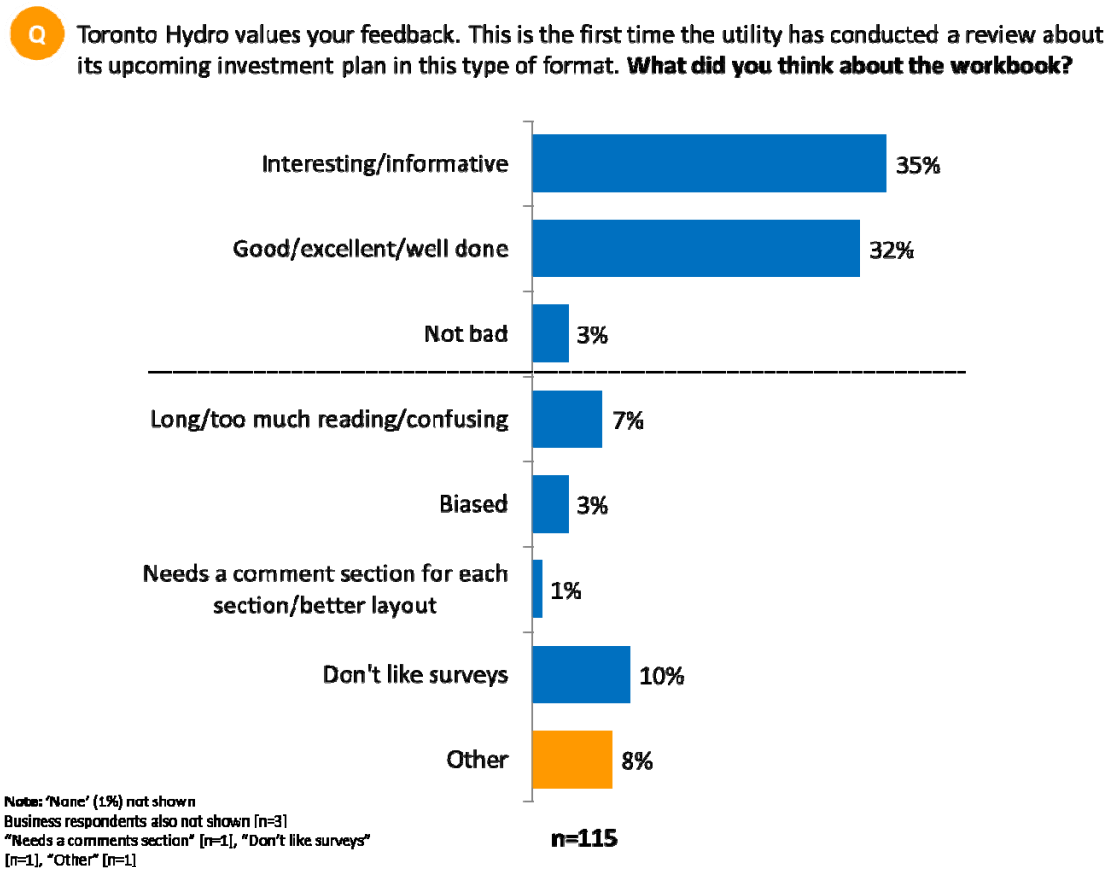
Of the business respondents, 2 of 7 say Toronto Hydro should plan to achieve higher outcomes, even if the rates need to go up even more. Another 2 say they are satisfied with the balance between outcomes and the proposed rate increase. One doesn't like the rate increase but thinks it is necessary to maintain the grid, and one thinks the bill impact is too high and Toronto Hydro should scale back its plans. The remaining business respondent is not sure.

Feedback on Workbook Approach

This section provides respondent feedback on the online workbook itself and the research process.

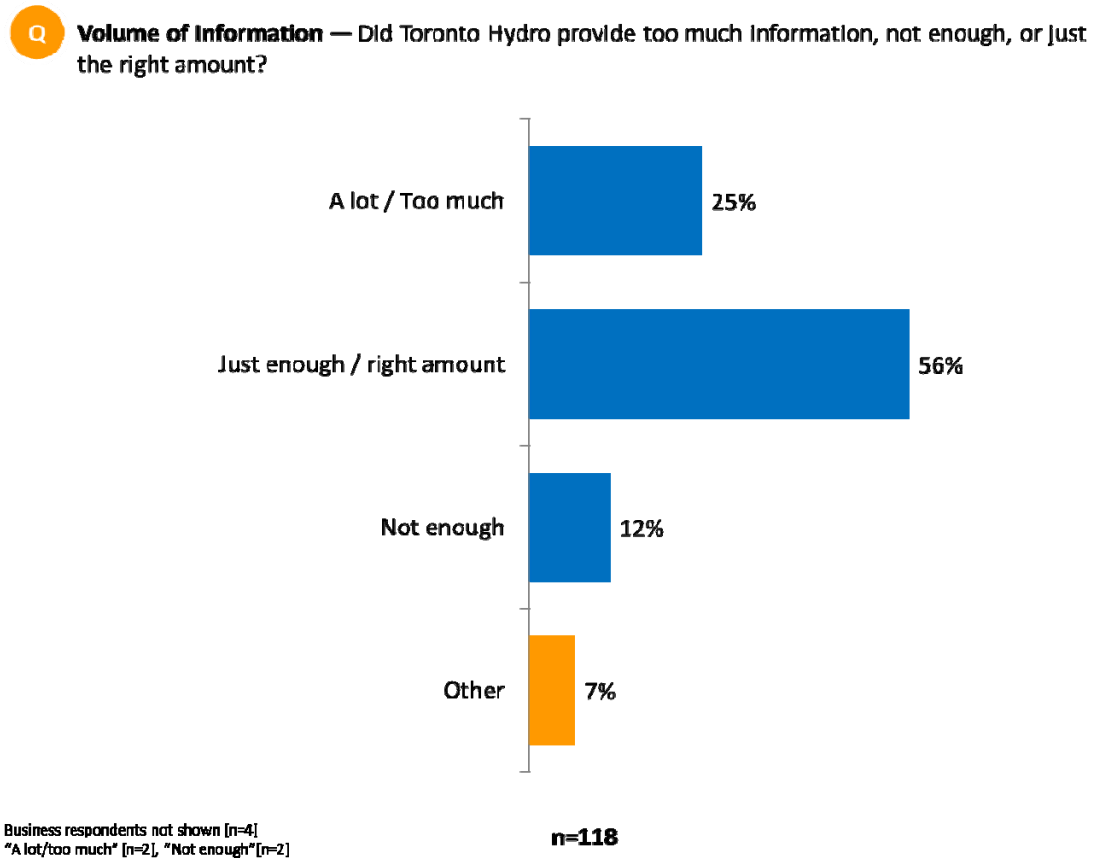
In summary, respondents reacted favourably to the workbook, saying it was interesting (35%) and well done (32%). Most (56%) found it to contain the right amount of information, and over a quarter (27%) said there was not any content missing that they would have liked to have seen included. The primary outstanding questions were communication on costs/spending (21%), and improving system reliability (11%). For this type of consultation, an online workbook is the preferred format by almost half (45%).

Figure 1.28: General Feedback



Feedback on the workbook was generally positive, with about two thirds finding it interesting / informative (35%) or well done (32%). There were a few who found the workbook too long or confusing (7%), biased (3%) or that it needed space for comments in each section (1%).

Figure 1.29: Volume of Information

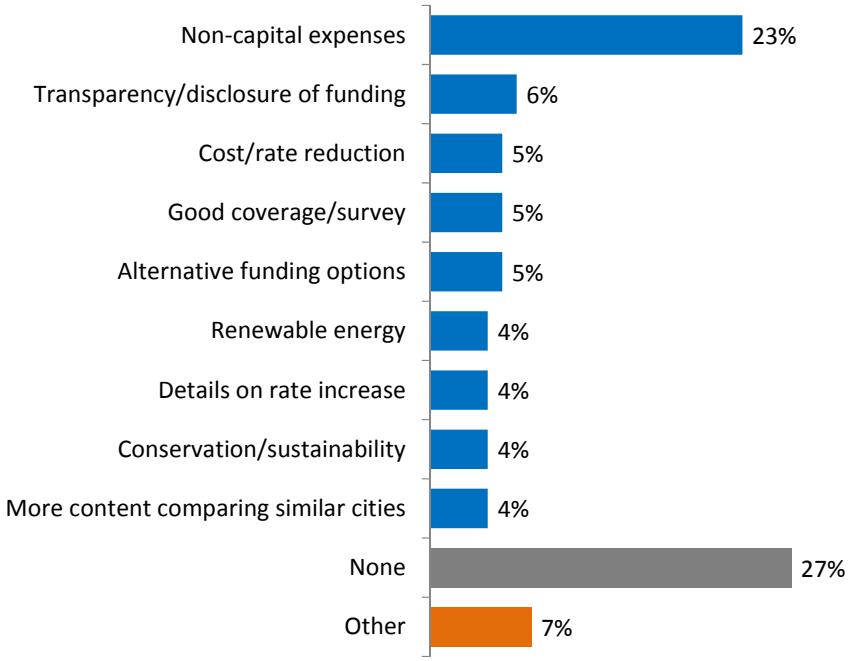


Most (56%) residential respondents felt the workbook contained the right amount of information. One in four (25%) felt it was too much information, and about one in ten (12%) felt there was not enough information.

Business respondents were divided with 2 saying there was too much information, and 2 saying there wasn't enough information.

Figure 1.30: Content Covered

Q **Content Covered —** Was there any content missing that you would have liked to have seen included?



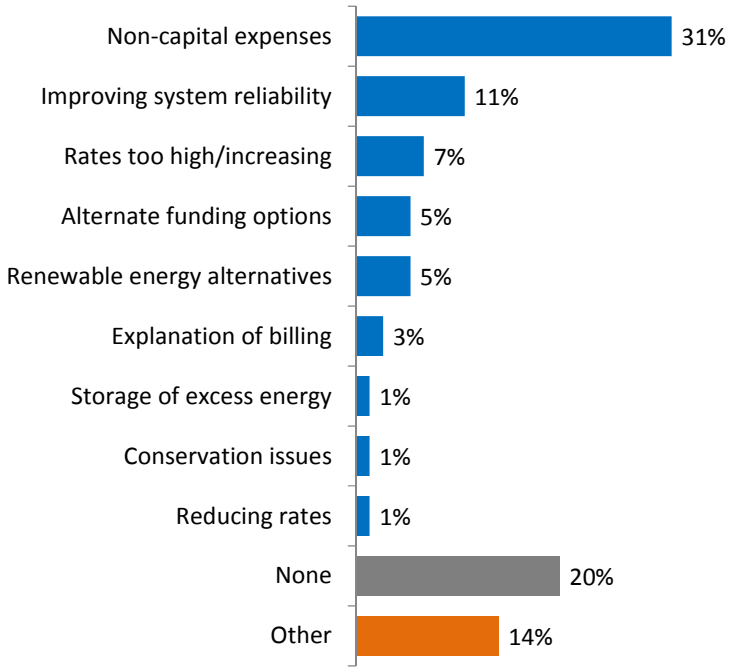
Note: 'Don't know' (2%) /'Refused' (1%) not shown
Business respondents also not shown [n=3]
"Transparency/disclosure of funding"[n=1], "Other" [n=1], "Don't know"[n=1]

n=94

A plurality (27%) didn't feel there was any content missing from the workbook. Areas were respondents would have liked to have seen additional information tended to focus on non-capital expenses (23%).

Figure 1.31: Outstanding Questions

Q **Outstanding Questions —** Is there anything that you would still like answered?



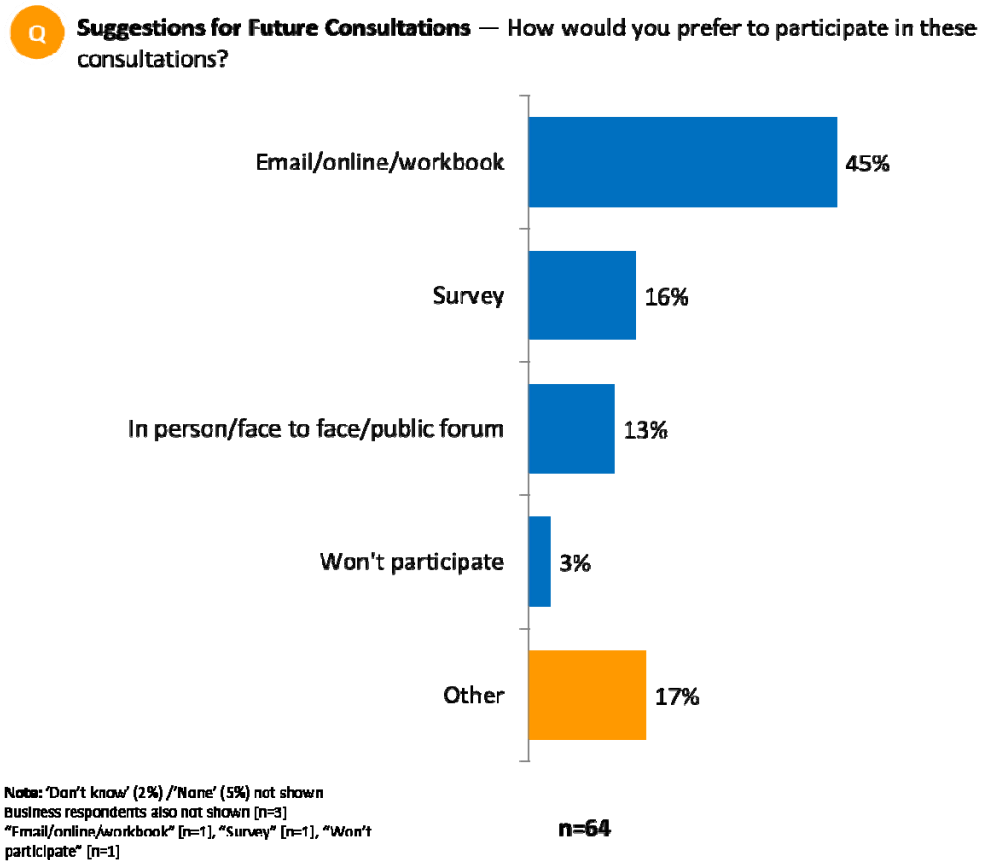
Note: 'Don't know' (1%) /'Refused' (3%) not shown
Business respondents also not shown [n=3]
"Other" [n=3]

n=75

Nearly a third (31%) of residential respondents would like more details on non-capital expenses and spending. One in ten (11%) would like to know more about improving system reliability. Fewer had outstanding questions about rates being too high (7%), alternative funding options (5%), and renewable energy alternatives (5%).

One-in-five (20%) respondents had no outstanding questions.

Figure 1.32: Suggestions for Future Customer Engagement



An online format seems to be the favoured approach to this type of consultation among online respondents, with almost half (45%) saying they prefer an email/online/workbook format. Significantly fewer prefer a survey (16%), or an in-person forum (13%).

Workbook-based Facilitated Discussion

Customer Consultation Groups
with RS and GS Customers

PURPOSE: To gain qualitative input/ response to proposed DSP from RS and GS < 50 kW customers and to feed into survey design

Summary

The following summary highlights key findings from the general service (under 50 kW) and residential consultation sessions held in North York, Central Toronto, Etobicoke, and Scarborough.

System Reliability: Customer Experience and Expectation

Most participants in the consultation groups had experienced an average of two to four power service interruptions at their businesses and/or homes in the past twelve months. The duration of the service interruption lasted from a few minutes to many hours in some cases. Both general service and residential customers reported losses of revenue and productivity within their respective businesses and households due to outages.

All of the participants in the group stated that they wanted better customer service from Toronto Hydro and its staff. Specifically, several participants in the group stated Toronto Hydro should improve its communication with customers especially when outages and other similar power service interruptions occur.

Improving Service of the Local Distribution System

Residential customers are concerned about both the frequency and duration of the outages and would prefer less of both. The general service users stated that depending on the type of business, both frequency and duration of outages can have major consequences.

Most participants in the consultations were unfavourable towards conservation and demand management programs because they did not want to lose control over their electrical equipment.

For the most part, general service and residential customers are satisfied with the job Toronto Hydro is doing running the local distribution system. When asked about improvements, the main suggestions concerned limiting rate increases, reducing power service interruptions, and having better communication with customers regarding and during power outages. Further, participants stated that Toronto Hydro should have saved up and created a reserve capital fund to use in case of emergencies and to replace aging equipment.

Coverage of Distribution System Topics

Most of the participants in both groups found the workbook to be very informative, providing the group with the right amount of information needed to discuss the issues at hand.

Many stated that they wanted to have more information on Toronto Hydro's operating budget, revenues, expenses and their profits and losses reports. Several wondered what other options there were for system investment besides the run-to-failure approach and Toronto Hydro's grid renewal plan.

A few of the participants thought the workbook consisted of too much technical information and they felt they were not qualified to answer some of the questions regarding reasonable investments, measures on connection issues, maintaining smart meters, and moving of electricity infrastructure.

Lastly, some of the participants stated that they wanted more time both to prepare and read through the workbook, and to express their views on the proposed plan during the consultation discussions.

System Renewal

Most participants support the policy of replacing equipment before it breaks down, and see this as a fiscally prudent approach to controlling system costs in the long term. When it comes to Toronto Hydro's overall grid investment plan, most felt they are heading in the right direction, but they would have preferred a "gradual cost increase".

Most stated that Toronto Hydro should spend and prepare more rigorously to cover major issues which in the long term would save money. In contrast, a few stated that they wanted an updated grid that would bring costs down in the long term. Others felt that Toronto Hydro should find effective and better ways to maintain and upkeep the current aging infrastructure.

Many within the residential groups felt that Toronto Hydro should invest more in renewable generation and renewable energy. Additionally, a few felt they did not have enough information or knowledge to comment on Toronto Hydro's planned spending.

Response During Major Weather Events

Almost everyone mentioned wanting better communication from Toronto Hydro to its customers during major weather events. Specifically, they stated Toronto Hydro should have engaged and consulted with customers on emergency management fixes and updates during extreme weather events.

Participants stated that Toronto Hydro should review and modify its emergency plans and make it a more "hands on" approach. Further, they went on to state that during major events Toronto Hydro should hire help from other Canadian cities, provinces, and private contractors. Lastly, most seemed to agree that Toronto Hydro should advise and inform people when services are going to be restored during major events.

Many felt that major event catastrophes could have been avoided if Toronto Hydro better maintained its system by investing in new equipment and/or had been proactive about removing or pruning trees around wires.

Toronto Hydro's Proposed Plan and Rate Impact

Most participants (53 of 64) accepted Toronto Hydro's plan to increase customer rates by the proposed amount; with 23 saying they support the proposed rate increase and 30 saying they don't like it, but think it is necessary.

Most felt that Toronto Hydro's proposed plan was well researched and documented. Moreover, they felt that there was a balanced perspective on the risks, benefits, and overall cost effectiveness of the proposed plan. Further, participants in the consultation stated that the evidence given was satisfactory for the proposed plan to be effective. They went on to say that Toronto Hydro appears to be proactive and seemed to be putting money where it would have the highest and most effective return.

Some participants felt unsure about Toronto Hydro's proposed plan and whether or not it was headed in the right direction. These participants felt they didn't have enough information to effectively answer the questions, while some others felt a sense of distrust toward Toronto Hydro. Moreover, most were disappointed that Toronto Hydro had found itself caught up in the present situation of aging infrastructure equipment.

Some felt Toronto Hydro should invest more in preventative methods and be more proactive with its spending. Various participants also thought that Toronto Hydro should work in conjunction with the Province of Ontario and the City of Toronto to get funding, instead of raising prices for customers. Participants recommended that since all of the revenue and profits accumulated from Toronto Hydro electricity bills were going back into a municipal body, that public money should be used to subsidize the proposed rate increase for the ratepayers.

General Service and residential customer permission on Toronto Hydro's proposed rate increase:

Looking at the cost of the Toronto Hydro plan and the outcomes it is expected to achieve, which point of view is closest to your own? [*based on 64 respondents*]

Response	Sum Total
Toronto Hydro should plan to achieve higher outcomes, even if the rates need to go up even more	**11**
I am satisfied with the balance between outcomes and the proposed rate increase	**12**
I don't like the rate increase, but I think it is necessary to maintain the grid to a reasonable standard	**30**
I think the bill impact is too high and Toronto Hydro needs to scale back its plans	**3**
Not sure	**4**
No response	**4**
Total	**64**

How Could the Consultation Process be Improved?

At the conclusion of the sessions, participants were asked what they thought of this approach to customer consultation and how it could be improved.

The majority of the participants in the groups felt that the consultation process was helpful, accountable, and transparent. There were a few who felt the purpose of the consultation was to highlight the accomplishments of Toronto Hydro.

Some liked the consultation process but wanted other sides of the argument to be present. Others wanted to know more about the role of other provincial players within the system. Finally, some participants wanted to know what would happen after the initial five years and what Toronto Hydro's long term plan was for the future.

Most liked the way the consultation was conducted and the roundtable format, which gave all a chance to share their opinions. Many of the participants in the consultation suggested an online survey to get more of a quantifiable and democratic response.

Some participants in the group felt that they needed to have more information to provide educated answers and substantive feedback. Some stated that they would have liked to see an expert panel discussion on the pros and cons of the proposed plan. Others agreed and thought that the pros and cons of modernizing the grid should have been laid out in the workbook and explained in further detail during the consultation.

Methodology

About the General Service and Residential Customer Consultation

Innovative Research Group (INNOVATIVE) was engaged by Toronto Hydro-Electric System Limited (Toronto Hydro) to conduct a series of general service and residential customer consultation sessions designed to identify the needs and preferences of consumers as they relate to the proposed Five Year Grid Renewal Plan.

The consultation sessions were held in North York on February 3, 2014, Central Toronto on February 4, 2014, Etobicoke on February 6, 2014, and Scarborough on February 12, 2014. A total of 64 general service and residential customers participated in these consultation sessions.

North York: February 3, 2014

General Service under 50 kW Rate Class	7 participants
Residential Rate Class	6 participants

Central Toronto: February 4, 2014

General Service under 50 kW Rate Class	7 participants
Residential Rate Class	8 participants

Etobicoke: February 6, 2014

General Service under 50 kW Rate Class	7 participants
Residential Rate Class	10 participants

Scarborough: February 12, 2014

General Service under 50 kW Rate Class	10 participants
Residential Rate Class	9 participants

Recruiting Consultation Participants

General Service customers in the under 50 kW rate class were randomly selected by telephone from customer lists and screened for appropriateness as session participants. General Service customers qualified for the consultation if they managed or oversaw their business' electricity bill. This was to ensure they were at least somewhat knowledgeable of their electricity costs and could have an informed discussion on the impact of the proposed rate increases.

Customer recruitment lists were randomly generated and provided to INNOVATIVE by Toronto Hydro.

An incentive of $100 was provided to all general service and residential customers who participated in the consultation sessions.

All consultation sessions were video recorded to verify participant feedback and quotes.

Consultation Session Structure

The consultation sessions were structured around the themes contained in the workbook, which was developed by INNOVATIVE and Toronto Hydro staff in the fall of 2013.

The workbook themes included the following:

1. What is this about?
2. Electricity 101
3. Toronto's Grid Today
4. Challenges Facing the Grid
5. How We're Managing Grid Pressures
6. The Bottom Line

All consultation participants were sent electronic copies of the workbook via email as part of a pre-read package in advance of the sessions.

At the start of the sessions, the facilitator gave an overview explaining the purpose of the consultation and why Toronto Hydro is seeking feedback from general service and residential customers.

After explaining the purpose of the consultation, hardcopy workbooks were distributed to act as a session guide and for participants to record their answers to the questions contained within.

The facilitator then led the participants through the workbook section by section to ensure they understood the information and to answer any questions they had about the content.

When it came to the questions within the workbook, participants were asked to fill in their answers independently. The facilitator then led a group discussion on the answers participants provided and what the various issues meant for them or their businesses.

Hardcopy workbooks were collected from the participants at the conclusion of each consultation session.

Each consultation session ran for approximately 2.5 hours.

Informing the Consultation Process

In addition to identifying customer needs and preferences as they relate to the proposed DSP, feedback collected from this phase of the consultation was used to inform the design of the telephone survey and used in the subsequent online consultation phase of Toronto Hydro's customer engagement program as part of their rate application.

NOTE: Results contained within this report are based on a limited sample and should be interpreted as directional only.

Participant Feedback

The following section highlights the general feedback from each consultation group.

North York Consultation Sessions

General Service under 50 kW Rate Class (North York)

System Reliability: Customer Experience and Expectation

Communication was the biggest concern, particularly during outages when business owners and managers need to make decisions on how to run their daily operations. Another concern shared by many was the bills they receive. Bills were considered confusing and hard to read in terms of how much electricity they are consuming. Further, some would prefer monthly bills because every other financial aspect of their business is conducted on a monthly basis.

Improving Service of the Local Distribution System

The general service users stated that depending on the type of business, both frequency of outages and duration of outages can have major consequences. Some commented that the three hour mark is where they might do things differently, like sending staff home, closing their business for the day, etc. While it was generally felt that Toronto Hydro comes up short when it comes to communication during outages,

it then became apparent that most were not making much effort to get updates aside from perhaps making a phone call.

One outage per year lasting no longer than 30 minutes was generally agreed upon as reasonable, though there was one individual who maintained that no outages are acceptable.

There was some discussion about trees that may be older or damaged and which are located close to hydro wires. The feeling was that Toronto Hydro is not being adequately responsive to requests to deal with these trees.

System Renewal

Everyone felt they understood the challenges facing Toronto Hydro 'somewhat well', and felt that they had done a good job of conveying the information. It was agreed that getting to a 'very well' level of understanding was an unreasonable goal given all that is involved.

Initially participants strongly preferred that aging equipment be replaced before it fails. For one participant, it was considered to be an assumed part of running Toronto Hydro because their job is to keep the lights on. Upon further conversation, a few began to feel that it is more financially prudent to try to maximize the lifecycle of equipment, but to be prepared to replace it as soon as breakdown occurs.

Coverage of Distribution System Topics

At this point in the discussion, it was generally agreed that there was a steep learning curve in understanding the system to be able to answer some of the questions in the workbook effectively.

Response During Major Weather Events

There was group consensus that more information was needed during storms. Specifically, participants wanted to know the estimated duration of the outages so that they could take appropriate measures for their business.

Only a couple of participants reported having tried to contact Toronto Hydro during either of the storms, and they described being transferred from one person to another and ultimately not getting the information they were looking for.

Toronto Hydro's Proposed Plan and Rate Impact

Most felt the proposed plan was headed in the right direction, but there were a couple who weren't sure. One participant was unsure due to his current difficulties in getting an accurate bill from his smart meter readings. He felt that the technology needed to be fixed before moving forward. Another felt there was a lot of information to take in and he simply hadn't had time to give it any thought.

Among those who thought the plan was headed in the right direction, the priorities were fixing the billing and improving customer service.

When asked, only one participant suggested that the spending priorities needed to be adjusted. Specifically, he felt that it would be good to spend more on renewable generation if possible, as there may be some long term benefit. Most felt they didn't know enough about the subject matter to be able to give an opinion. One participant wondered about the actual amount of money being spent.

Everyone struggled to give an opinion on Toronto Hydro's outcome goals with the DSP, but most seemed to be supportive. One participant commented that he would be willing to pay for it if the system was more reliable and so he felt Toronto Hydro should be spending more.

How Could the Consultation Process be Improved?

Most felt the current process worked for them. Some suggested an online survey.

Residential Rate Class (North York)

System Reliability: Customer Experience and Expectation

Many of the residential participants from North York felt that Toronto Hydro should improve its communication with its customers, specifically regarding outage issues. Moreover, several stated that they wanted to be regularly updated on the overall development plan of Toronto Hydro and how their particular regions of the city would be impacted.

Several commented that replacing aging equipment before or after breakdown depends on how critical the equipment is and the extent and duration of the outage For these participants, the decision was nuanced, as they thought seniors' residences, hospitals, and residential homes would have different priorities and thus a cost-benefit analysis was required to properly assess the situation.

Improving Service of the Local Distribution System

As the discussion began, participants almost immediately wondered why Toronto Hydro hadn't been putting money aside to maintain the grid. It was agreed that grid upgrades are needed, but some think it could be done and should be done without the customer having to pay for it.

Participants spoke about having a high number of power outages and subsequent inconveniences and food spoilage. It was felt that such frequent outages (at least once per month for one individual) were entirely unacceptable.

Most felt that Toronto Hydro should better invest in aging infrastructure, in particular changing old overhead systems with the Canadian climate in mind. One individual thought that Toronto Hydro should better manage contractors to avoid extra costs.

There was a desire for more long term information, that is, what happens after the implementation of the five year plan.

Communication with customers was a common theme, particularly during power outages. It was felt that planned outages should be properly communicated, and that communication during major outages should be better.

System Renewal

Some participants stated that Toronto Hydro should prepare more rigorously to cover major issues, thereby allowing them to save money in the long term. Others stated that they wanted an updated grid that would bring costs down in the long term.

There was some suggestion that Toronto Hydro should find effective and better ways to maintain and upkeep aging infrastructure, or that the city of Toronto should be paying for system improvements rather than customers.

Participants were divided on "run to failure" versus extending equipment lifecycles. Ultimately, everyone favoured whichever option would cost the least overall – whether that means proactively replacing equipment to avoid failure or leaving equipment in place as long as possible was not agreed upon. One individual said a cost-benefit analysis would be required in order to answer the question properly.

Coverage of Distribution System Topics

Most found the workbook to be very informative, providing the group with the right amount of information needed to discuss the issues at hand.

Some felt there were other issues that were not covered in the workbook, while others felt that they needed more time to cover all of the topics.

Response During Major Weather Events

Many of the participants felt that major event catastrophes could have been avoided if Toronto Hydro better maintained its system by investing in new equipment.

During the storms, it was felt that Toronto Hydro was not well organized and was lacking in efficiency.

Concerning communication during major weather events, many felt that Toronto Hydro should have relayed up to date information regarding power outages during both the flooding in July and the ice storm in December of 2013. Participants stated that if they had updated information from Toronto Hydro, they could have made informed decisions about their needs for accommodation, food, and so forth.

Many reported having tried to call Toronto Hydro during these major outages, but none were satisfied with the response they received and felt that no one was giving them any information. It was acknowledged by one pariticipant that Toronto Hydro has been proactive with her in the past in terms of warning her of *planned* outages.

Toronto Hydro's Proposed Plan and Rate Impact

Most participants were unable to answer whether Toronto Hydro's plan seemed to be going in the right or wrong direction because they felt they needed to have more information to answer the question effectively.

For those who thought that Toronto Hydro's Five Year Grid Renewal Plan was not headed in the right direction, a variety of reasons were provided as to why the felt this way. Some felt the plan didn't seem practical, while others felt they needed to know what would happen once the five year plan was over.

For a couple of participants there was the sense that the present situation could have been avoided with preventative planning in place. Finally, there were those who simply objected to customers having to pay to implement the plan.

How Could the Consultation Process be Improved?

Within the group, there was a general consensus among participants that the consultation process was both effective and engaging. One of the participants suggested that he would prefer a referendum amongst Toronto Hydro customers to make a decision on the proposed plan.

Presented with the option, participants liked the idea of a year-long consumer advisory group.

Central Toronto Consultation Sessions

General Service under 50 kW Rate Class (Central Toronto)

System Reliability: Customer Experience and Expectation

In the general service group, everyone felt that they understood the electricity system at least 'somewhat well', but some would have liked to see more financial information in the workbook.

The group struggled with regard to the current frequency and duration of power outages. While they realized it may not be a realistic goal, many would still prefer to see zero outages. One participant didn't believe the average numbers presented in the workbook as she felt they were inflated in order for Toronto Hydro to make their case for a rate increase. Two gentlemen didn't want to allow for any power outages, as a way of communicating to Toronto Hydro that striving for anything other than zero is not good enough.

It was agreed by all that reducing duration is more important than reducing frequency of outages because it is the duration that really impacts their businesses.

Improving Service of the Local Distribution System

Power interruptions were the main theme in terms of desired improvements. Participants would like to see fewer outages and better customer service during outages. One participant would like to see Toronto Hydro help businesses avoid difficulties during power outages by providing them with generators.

There was general agreement that shorter duration of outages is more important that reducing frequency.

Some felt that the customer service issue extended beyond the realm of outages and that improvement was needed overall. One participant commented that he finds the Toronto Hydro website difficult to use.

Coverage of Distribution System Topics

The group generally felt that the questions regarding required investment priorities (questions 4, 5 and 6) should have been left out of the workbook as there was nothing to be done about them. They found

the types of investments themselves to be reasonable, but most didn't feel there was much point in discussing them as part of the consultation.

System Renewal

Many participants in the group had thoughts on where Toronto Hydro's main priorities should lie, whether it is investing in underground infrastructure, working less with developers in favour of residential and business customers, or reducing spending on things like electric vehicles.

Everyone in the group felt that, from a business perspective, they cannot afford the time lost if hydro equipment breaks down, and so they prefer replacement before breakdown.

Response During Major Weather Events

The primary request was for information on when the power would be restored, although it was recognized that this may not be possible.

One participant wondered why the tree trimming budget had been reduced last year.

Toronto Hydro's Proposed Plan and Rate Impact

Modernizing the grid was considered to be very important because of the perception that it gets at the root of the problem and can prevent business losses due to outages. One participant felt she was unable to answer the question because she was skeptical about the entire process and the information she was being presented with in the workbook.

Interest in participating in CDM programs was minimal. There was the sense that business owners/managers would be losing control over their business equipment which could impact their business, revenue and customers. One participant didn't like the "Big Brother" feel of the program.

Many felt unable to gauge whether or not Toronto Hydro's plan seemed to be heading in the right direction in terms of spending priorities. One participant was confused and wondered why Toronto Hydro doesn't have money set aside for this situation. A couple of participants felt that more should be spent on modernizing the grid.

Asked about Toronto Hydro's goals, most feel that the change is necessary, but they don't want a rate increase. On the other hand, one individual would like to see Toronto Hydro aim higher, even if it means a bigger rate increase. Two participants felt they were not able to answer the question without having more time to consider all of the information.

How Could the Consultation Process be Improved?

An online approach was suggested as an optional approach to this consultation. Others said that more time was needed to be able to read the workbook.

A couple of participants felt that the decisions had already been made, so they weren't sure what the point of the consultation was.

A few participants had issues with the questions, but were unable to come up with suggestions for improving them.

Asked what further information they would like to have, a few participants said they would like to have been given more financial information.

Presented with the option, participants liked the idea of a year-long consumer advisory group.

Residential Rate Class (Central Toronto)

System Reliability: Customer Experience and Expectation

Overall, most participants feel that the current average number and duration of outages was at least "somewhat acceptable". Some were willing to accept more and longer outages, but there were a couple who felt that no outages are acceptable. One participant suggested that "understandable" may be a more appropriate term than "acceptable".

When discussing the consequences of power outages, participants mentioned medical equipment, elevators, food spoilage, gas pumps, public transportation and those who work from home being unable to work.

All of the participants in the group stated that they want better customer service from Toronto Hydro and its staff. Specifically, several said Toronto Hydro should improve its communication measures with its customers, especially when outages and other similar incidents occur.

Participants also stated that Toronto Hydro should focus on replacing aging infrastructure for safety concerns. They went on to say that old distribution units can be fire hazards to communities. One of the participants said that he would like Toronto Hydro to invest more in upgrading infrastructure and to replace overhead lines to avoid future outages.

Improving Service of the Local Distribution System

Several participants stated that Toronto Hydro should continue to concentrate on reducing the number and duration of outages. A couple of participants said that more money should be spent on preventative maintenance of equipment. One specifically stated that he would like Toronto Hydro to invest more capital into sophisticated infrastructure and solar panels.

Generally, participants would like to see an improvement in customer service, specifically, they would like Toronto Hydro to be more responsive when they call with issues or concerns. Communication during major outages was also raised, as well as during more minor outages. One participant who expressed having frequent summer "pop-offs" shared her frustration with not being able to get an explanation. Door to door or automated dialing were suggested as means of communication during major outages.

Several would like either a more granular breakdown of their bill, or some other type of adjustments that would make their bill easier to understand.

Coverage of Distribution System Topics

Some of the participants stated they would have liked the workbook to tell a better story on how electricity reaches users and how much work goes on behind the scenes to keep Toronto lit up.

Several said they were not sure whether they were qualified to answer questions 4, 5, and 6 on page 11 regarding reasonable investment measures on connection issues, maintaining smart meters, and moving electricity infrastructure.

System Renewal

Participants in this group did not have much to say about system renewal during the majority of the discussion. Many felt that Toronto Hydro should have planned and saved ahead for the infrastructure maintenance and replacement costs. One of the participants in particular said that he wanted Toronto Hydro to do a better job with the upkeep of transmission wires.

Response During Major Weather Events

Many participants said that Toronto Hydro should have had better communication with its customers during the flooding and ice storm. Some went on to say that Toronto Hydro should not label these major storm events as "*unusual*" since Toronto Hydro should be ready for these types of situations to arise due to changing climate patterns.

Toronto Hydro's Proposed Plan and Rate Impact

Many felt unable to comment on whether they felt the balance of the spending plan looks right. The workbook was described as a good primer, but lacked the details required to make a judgment on the plan. Participants wanted more information behind the numbers – where do they come from and what exactly will the impact of the relative spending amounts be in the longer term. Conversely, some wondered what the future would look like if these investments were not made.

There were several questions about the various proportions indicated throughout the workbook in terms of the proportion of equipment over a certain age, etc.

As the discussion progressed, many wondered why Toronto Hydro hadn't planned on and budgeted for replacing aging equipment.

Almost everyone felt that the goals set by Toronto Hydro are too low and that more should be spent in order to do more and do it sooner. One participant felt it is their duty as citizens to undertake something like this for the sake of future generations. One participant felt there was a significant infrastructure deficit and he was not sure that the plan in its current form addressed it sufficiently.

Some participants wanted to know what the situation would look like in 2019 after the plan has been implemented. It was generally agreed that five years wasn't going to solve the problem. There were some who wondered about the layoffs referred to in the workbook, given the amount of work about to be undertaken.

How Could the Consultation Process be Improved?

One of the participants questioned why this type of consultation was not carried out by Toronto Hydro before and why it was not mandated by the OEB in previous years. Another participant, while liking the information, wanted Toronto Hydro to spend less on the workbooks (e.g. less glossy photos).

Some thought that the workbook should have had more choices laid out for participants to choose from instead of just two. In particular, one participant stated that some of the examples and comparative case studies did not help explain which plan was better. Another said that more information is needed as questions are raised (e.g. one-fourth of the electricity bill goes to Toronto Hydro, but where does the rest go?).

Others were basically fine with the workbook, but wished they had had more time in advance to read it so that they could come to the group prepared to discuss it.

Several participants wanted to have more information in the workbook. One individual felt that the workbook seemed incomplete, especially when it came to fully disclosing the numbers and price of choices. Further, he stated that up to page 30 the workbook was effective, but after page 30, the workbook became uninformative.

As for specific information, some participants requested information on Toronto Hydro's operating budget while others stated that they would have liked more information on alternative forms of energy (e.g. wind farms and solar panels) that Toronto Hydro was currently investing in. They also wanted to know more about the role of other provincial players within the system. Another also requested information regarding excess power and where it goes.

Presented with the option, participants liked the idea of a year-long consumer advisory group.

Etobicoke Consultation Sessions

General Service under 50 kW Rate Class (Etobicoke)

System Reliability: Customer Experience and Expectation

Several participants in the group stated that Toronto Hydro's service was great because power outages were few in frequency and short in duration. One of the participants who runs a service-based business stated that she would like Toronto Hydro to provide some type of notification as to when an outage might occur so that she can inform her customers and close the store to avoid any revenue shortfalls.

One participant felt that Toronto Hydro's prices have increased too fast, and service has not improved in terms of reliability. He went on say that communication during outages should be more open and transparent.

About half of the group felt that the current average number and duration of outages is acceptable. There were a few in the group who said that no outages are acceptable, and while they recognized that this may not be achievable, they still feel that in terms of goal setting, Toronto Hydro should be aiming for zero. One participant said she would like to have no outages but not if it was going to cost her significantly more.

There were two participants who reported experiencing many more outages than the average range, but they felt the duration of their outages was reasonable.

Two hours was agreed upon as the limit after which there would business implications such as food that would need to be thrown out, or businesses closed and staff sent home.

Improving Service of the Local Distribution System

Several participants agreed they want Toronto Hydro to clear out the trees that are currently blocking or interfering with the distribution lines.

A widely supported suggestion for improvement was communication during outages. One participant commented that the technology is there to use social media to provide updates and that in a place like Toronto Hydro they could have someone dedicated to that type of communication.

A couple of participants spoke of frequent outages and said they would like to see improvement in that regard.

Coverage of Distribution System Topics

Most of the participants in the group thought that the workbook was effective in explaining the proposed Toronto Hydro plan and that the consultation process was an effective approach for hearing the concerns of the general service users. One participant felt that the workbook was informative but too general.

Participants for the most part struggled to answer the questions about investment priorities (4, 5 and 6), but didn't necessarily feel the questions should have been left out. One participant described them as impossible to answer based on the information she had in front of her.

System Renewal

Several participants in the group said that although Toronto Hydro's plan is headed in the right direction, there should be more transparency. Further, they felt that Toronto Hydro should let customers know the full costs of upgrading the system and the challenges Toronto Hydro faces in both the long and short term in modernizing the grid.

Many stated that Toronto Hydro should invest more in renewable generation and renewable energy. A few felt that they did not have enough information or knowledge to comment on Toronto Hydro's planned spending.

In response to CDM programs, most were in favour and said they would participate as long as they are made aware of planned outages in advance. However, there were a few who simply wouldn't trust anyone to put a meter on their equipment. One individual said he didn't feel the program is even necessary because there hasn't been a brownout due to lack of power in more than a decade.

Response During Major Weather Events

Several participants stated that Toronto Hydro should have taken the time to cut trees before the storm so that the trees would not become a major problem after the storm. And, several felt that Toronto Hydro should generally be more prepared and proactive in their approach to dealing with major weather events.

Many wished Toronto Hydro had better communicated with its customers during both the flood and the ice storm. They specifically stated that they wanted to be notified as to when services would be restored in their businesses and neighbourhoods.

Toronto Hydro's Proposed Plan and Rate Impact

All agreed that modernizing the grid was at least "somewhat important" in order to keep businesses up and running. They didn't necessarily know where it fit in with other investment priorities though.

Based on what they knew already and what they read in the workbook, most participants felt they understood the challenges facing Toronto Hydro.

The majority felt that Toronto Hydro's plan was moving in the right direction and thought that replacing the aging infrastructure was vital in renewing the grid.

One participant stated that, although Toronto Hydro's plan is headed in the right direction, he feels as if Toronto Hydro has started to modernize the grid too late since the demand for electricity has been increasing substantially over the last fifty years.

A couple of participants felt Toronto Hydro generally had the right balance, but she wondered why modernizing the grid was separate from replacing aging and obsolete equipment. And, if the items were to be separate, they wondered why modernizing the grid was such a low priority or even why it was part of a general capital upgrade.

While a couple in the group were satisfied with the balance between outcomes and the proposed rate increase, most don't like the rate increase, even if they feel it is necessary in order to maintain the grid to a reasonable standard. One participant wanted to know why the dividend being paid to the city of Toronto isn't being used to fund the plan.

One participant felt he didn't know enough to make a judgment on the plan, but he felt that the public cannot afford any more rate increases.

How Could the Consultation Process be Improved?

For the most part, participants found the consultation enjoyable and informative. One participant said she was intrigued when she got the recruitment call, and she enjoyed the process. On the other hand another participant, felt the process was about trying to convince customers that Toronto Hydro's rate increase is justified.

When asked, most said they would be interested in an advisory panel, but one participant added the caveat that such a panel would need to have some kind of "power" or ability to enforce decisions.

Residential Rate Class (Etobicoke)

System Reliability: Customer Experience and Expectation

Outages were mentioned as the primary area of concern. A few participants in the group mentioned experiencing frequent outages and not being able to communicate with Toronto Hydro about it. Two participants expressed frustration in not being able to get a response from Toronto Hydro in spite of calling them multiple times.

Several participants mentioned more communication of information during outages. Further, a couple of respondents said they wanted Toronto Hydro to minimize the number and duration of power outages. Another participant mentioned faster response times by Toronto Hydro when there is a blackout.

A couple of participants wondered why Toronto Hydro isn't being more proactive about either removing or pruning trees or burying lines underground.

Others said they were generally satisfied with Toronto Hydro and had no suggestions for improvements.

In terms of the average frequency and duration of outages, participants were generally accepting. In their own lives, they would find an outage lasting longer than a day to be problematic.

Improving Service of the Local Distribution System

Multiple participants said that replacing equipment is a priority, especially modernizing the grid and replacing old equipment. A few mentioned spending more money on knowledgeable employees. A couple of participants said that connecting renewable generation needs to be a higher priority. And one individual said that money needs to be spent on improving reliability.

Coverage of Distribution System Topics

Several participants said that the workbook was very informative and appeared to be filled with valuable information. One member of the group stated that both the workbook and consultation overall was very easy to follow. One added that although it was the right length, the information in the workbook was more technically oriented than needed. Mostly, participants in the group asked for more time to be able to read and evaluate the information presented in the workbook.

One participant thought that the workbook was interesting but very self-serving. Another participant said the workbook was too simple to be able to accurately assess the plan. Several said there was not enough information as the workbook seemed to present too narrow of a scope to be able to properly assess Toronto Hydro's plan. One individual also commented that they would have liked to know more about Toronto Hydro's communication and engagement plans.

System Renewal

Several of the participants thought that Toronto Hydro and its customers have no choice but to deal with a rate increase because at this point, customers need to deal with the "growing pains" of modernization. In contrast, others felt that the proposed plan was just a way for Toronto Hydro to raise the rates but that nothing would really improve.

Everyone preferred the strategy of replacing equipment before it breaks down as being more cost-effective than the run-to-failure option. One participant compared it fixing a problem with his car, saying it's always more if he waits.

Response During Major Events

Many participants said they would like better communication during major outages, especially with regards to when service will resume, so that they can plan accordingly.

One participant gave Toronto Hydro kudos for handling both major storms as well as possible under the circumstances.

Overall, for every person who had a complaint about how Toronto Hydro responded to the major storms, there was someone else defending them for doing the best they could do when dealing with an "act of God".

Toronto Hydro's Proposed Plan and Rate Impact

With only two exceptions, everyone said they don't like the rate increase but they feel it is necessary to maintain the grid to an acceptable standard. One individual wondered why the provincial government wasn't stepping in to ease the burden on customers.

One participant said that the plan is presented in isolation and that there are no contrasting views or other pertinent information. Further, many of the participants said they needed more information before they made up their mind.

When asked about improvements to the system, several said less money should be spent on upgrading customer meters and connecting customers. Another mentioned that Toronto Hydro should stop focussing its energy on debt reduction and delivery charges. One participant also stated that updating IT structure should be less of a priority while others thought that renewable generation and reliability goals should be more of a priority.

How Could the Consultation Process be Improved?

When asked about the consultation process, one participant commented that it feels like Toronto Hydro has already made up its mind and that the consultations are too late. A couple of other participants thought the process should be more inclusive and include Toronto Hydro staff who can answer any outstanding questions. There was also a suggestion that the workbook should have been written by a third party.

When asked about specific topics and questions, one participant mentioned that information about operating costs including administration costs, benefits, and salaries were not properly explained. Another participant said that rebates should have been discussed. One person also asked how Toronto Hydro will be improving their communications systems going forward.

Scarborough Consultation Sessions

General Service under 50 kW Rate Class (Scarborough)

System Reliability: Customer Experience and Expectation

Most of the participants in the group said Toronto Hydro should reduce outages. One in particular added that Toronto Hydro could offer business customers credit or a rebate for time and revenue lost when power is out.

Further, communications seemed to be a prevalent issue with most participants. Some said that there needs to be more communication with the public as well as improved customer service.

Improving Service of the Local Distribution System

A couple of participants mentioned upgrading equipment and the grid with more modern technology. And, as noted above there was a desire for better communication.

Coverage of Distribution System Topics

A few participants said that the workbook was long but straight-forward. On the other hand, a couple of participants said they felt like information had been left out. Another said that the workbook does a reasonable job of explaining a very complex set of systems.

Many said there was too much information in the workbook. One said there was too much on technological systems and there was too much jargon. On the other hand, another participant said they wished there was more information on the technological side. A couple of participants thought the workbook covered the relevant areas sufficiently. However, one in the group wished there was more detail on where the money is being spent.

Response During Major Weather Events

Some participants expressed a need for improvement and for priority to be given to schools and seniors' residences during major weather events. Participants suggested that more workers from other areas should be brought in to help with large scale power outages or during major weather events. The lack of information or ability to reach someone at Toronto Hydro was also mentioned.

Lastly, several participants felt that during major weather events power should be restored to businesses and larger buildings before restoring power to single houses.

Toronto Hydro's Proposed Plan and Rate Impact

Two participants said they thought the proposed plan was headed in the right direction as aging equipment needs to be updated in order to prepare for the future. One participant said it was headed in the right direction because Toronto Hydro is building an effective system for the good of users.

When asked about how Toronto Hydro spends its money, a few said more money should be spent on improving the grid and more money for micro-generators that can keep vital equipment functioning in the event of a power outage longer than 30 minutes. Another participant commented that more money should be spent on employee talent and recruitment.

An individual who was unsure about the direction said they don't have enough information and don't know if Toronto Hydro's priority is making money or serving Torontonians.

One participant said there should be a realistic assessment of costs for the *"unusual costs*" that were referred to in one part of the workbook. Another participant said there should be less spent at the top level of execution planning. Still another said the real benefits do not seem to justify the costs. Construction also seemed to be an issue of contention. A couple of participants mentioned a lot of Toronto Hydro money and resources were being wasted in supporting new developments and construction projects.

When it comes to goals and priorities, some said the goals were reasonable but that the city should be able to handle more of the expenses without the consumers picking up the costs. One participant said the priority should be with replacing aging and obsolete equipment. Another participant felt there should be more of a focus on training and retention of employees.

How Could the Consultation Process be Improved?

At the end of the session, there were two questions for which participants wanted answers. The first was *"if we don`t have to answer technical stuff on the grid, why is there so much complex technical stuff in this booklet?"* and the second was *"how does Toronto Hydro compare to other service providers?"*

When discussing improvements to the consultation process, one participant said that perhaps Skype or email could be used while another participant said that there should be more lead time for reading the information provided. Two suggested making the focus groups shorter. And one participant wanted more information on renewable energy sources.

Residential Rate Class (Scarborough)

System Reliability: Customer Experience and Expectation

Several participants mentioned improving communications especially when there are power outages. One individual suggested that there should be an option to call someone at Toronto Hydro when there is an emergency. Another said that improvements to the website would also be helpful.

Many participants mentioned that the number of power outages should be reduced and one in particular felt that rebates should be given in the event of outages. There was also a request for more realistic estimates on times needed for repairs. One of the participants in the group wanted underground cables to be put in. Another suggested eliminating peak use times.

Improving Service of the Local Distribution System

Several participants stated that Toronto Hydro should replace aging infrastructure and not wait until the equipment fails to replace it.

Coverage of Distribution System Topics

Most of the participants found the workbook to be very informative, and that it covered all of the necessary topics sufficiently. Specifically, one participant commented that the workbook was helpful and the language and content were easy to understand.

A few said that the workbook consisted of too much information at once. However, at the same time they realized that to explain everything clearly, the workbook needed to include a great deal of information. One of the participants felt there needed to be more on costs for improvements but less on other things.

System Renewal

Many mentioned spending more on modernizing the grid. A couple of these participants said that more money should be spent on preventative maintenance of equipment. In particular, one participant said that more spending needs to be spent on underground cables.

Most didn't seem to know what should be prioritized with regards to spending. One individual said that less money should be spent on expanding capacity and accommodating construction projects in the city. Some wondered why Toronto Hydro couldn't set money aside for future expenses/costs.

Response During Major Weather Events

Almost everyone mentioned that communication from Toronto Hydro could be improved during major weather events. One participant suggested a real person instead of a recording on the phone. Others said there needs to be a better system for giving updates on the state of repairs during these major weather events. One participant suggested that until the power came back on Toronto Hydro could have provided temporary generators.

Toronto Hydro's Proposed Plan and Rate Impact

None of the participants in the group said Toronto Hydro was headed in the *"*wrong direction" and most participants who said *"not sure"* provided no further comments concerning why they said that. However, one participant who thought Toronto Hydro was headed in the right direction said that renewing equipment must be a priority. Another who agreed that Toronto Hydro was heading in the right direction thought that more money should be spent on preventative maintenance of equipment.

Most didn't seem to know what should receive less spending. However, one participant said that less money should be spent on expanding capacity and accommodating construction projects in the city.

How Could the Consultation Process be Improved?

All of the participants in the group agreed that the consultation was well put together. Further, most thought there was just enough information in the consultation to be an informative and accountable discussion. Another wanted to hear more about costs for modernization. Smart meters were also raised as a potential discussion topic.

Questionnaire Results

The following tables are the tabulations of participant feedback to questions in the hardcopy workbooks, which were returned at the end of each consultation session.

Note: "GS" = general service less than 50 kW customers, while "RS" = residential customers. Due to the high occurrence of non-response to *open-ended* questions and subsequent small sample size, these results are not segmented by region, but rather only between general service and residential customers.

Blue tallies denote feedback from **North York Customers (GS and RS)**
Orange tallies denote feedback from **Toronto Customers (GS and RS)**.
Green tallies denote feedback from Etobicoke Customers (GS and RS).
Purple tallies denote feedback from **Scarborough Customers (GS and RS)**
Numbers in red denote the sum of all participant feedback tallies.

1. How well do you feel you understand the important parts of the electricity system, how they work together and which services Toronto Hydro is responsible for?

Response	GS	RS	Total	GS	RS	Total	GS	RS	Total	GS	RS	Total	Sum Total
Very well	3	0	3	1	4	5	3	3	6	3	3	6	**20**
Somewhat well	4	5	9	6	4	10	4	6	10	6	6	12	**41**
Not very well	0	1	1	0	0	0	0	1	1	1	0	1	**3**
I don't understand at all	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total	**7**	**6**	**13**	**7**	**8**	**15**	**7**	**10**	**17**	**10**	**9**	**19**	**64**

2. How satisfied are you with the job Toronto Hydro is doing running your local distribution system?

Response	GS	RS	Total	GS	RS	Total	GS	RS	Total	GS	RS	Total	Sum Total
Very satisfied	0	0	0	1	3	4	1	2	3	3	1	4	**11**
Somewhat satisfied	6	1	7	5	3	8	4	4	8	6	7	13	**36**
Somewhat dissatisfied	1	2	3	0	2	2	2	4	6	1	1	2	**13**
Very dissatisfied	0	3	3	1	0	1	0	0	0	0	0	0	**4**
Don't know	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total	**7**	**6**	**13**	**7**	**8**	**15**	**7**	**10**	**17**	**10**	**9**	**19**	**64**

3: Is there anything in particular that Toronto Hydro can do to improve its service to you? (OPEN-ENDED)

Response	General Service	Residential	Sum Total
Better communication with customers /improved customer service	6	8	**14**
Improve and invest more in electricity system to make it more reliable to make it more reliable	6	5	**11**
Lower costs of electricity rate	4	6	**10**
Faster/better response times during power outages	3	2	**5**
Service is good	3	0	**3**
Cut trees where overhead wires to avoid entanglement	2	0	**2**
Better and accurate smart meter readings	1	0	**1**
Simpler invoices	1	0	**1**
Safety	1	0	**1**
Improve and invest more in electricity system to make it more reliable	0	1	**1**
Other	0	3	**3**
Don't know	1	0	**1**
No response / refused	3	8	**11**
Total	**31**	**33**	**64**

4. Under provincial legislation, there are several types of investments Toronto Hydro must make when the need presents itself. How reasonable do you feel it is to give each of these investments priority over other investments (for example, replacing aging equipment)? **Connecting new customers such as new housing, condominiums or businesses.**

Response	GS	RS	Total	GS	RS	Total	GS	RS	Total	GS	RS	Total	Sum Total
Very reasonable	4	1	5	4	6	10	3	5	8	3	3	6	**29**
Somewhat reasonable	3	2	5	2	2	4	3	4	7	6	5	11	**27**
Not very reasonable	0	0	0	0	0	0	0	0	0	0	1	1	**1**
Not reasonable at all	0	1	1	0	0	0	0	0	0	0	0	0	**1**
Don’t know	0	1	1	1	0	1	1	0	1	1	0	1	**4**
No response / refused	0	1	1	0	0	0	0	1	1	0	0	0	**2**
Total	**7**	**6**	**13**	**7**	**8**	**15**	**7**	**10**	**17**	**10**	**9**	**19**	**64**

5. Under provincial legislation, there are several types of investments Toronto Hydro must make when the need presents itself. How reasonable do you feel it is to give each of these investments priority over other investments (for example, replacing aging equipment)? **Maintaining and upgrading customer meters to meet provincial standards.**

Response	GS	RS	Total	GS	RS	Total	GS	RS	Total	GS	RS	Total	Sum Total
Very reasonable	2	1	3	1	2	3	1	3	4	2	4	6	**16**
Somewhat reasonable	4	2	6	2	4	6	2	4	6	5	3	8	**26**
Not very reasonable	0	1	1	3	0	3	1	0	1	1	1	2	**7**
Not reasonable at all	1	1	2	0	2	2	2	1	3	1	0	1	**8**
Don't know	0	0	0	1	0	1	1	0	1	1	0	1	**3**
No response / refused	0	1	1	0	0	0	0	2	2	0	1	1	**4**
Total	**7**	**6**	**13**	**7**	**8**	**15**	**7**	**10**	**17**	**10**	**9**	**19**	**64**

6. Under provincial legislation, there are several types of investments Toronto Hydro must make when the need presents itself. How reasonable do you feel it is to give each of these investments priority over other investments (for example, replacing aging equipment)? **Moving existing electricity infrastructure such as poles and transformers to enable other projects such as street widening or new developments.**

Response	GS	RS	Total	GS	RS	Total	GS	RS	Total	GS	RS	Total	Sum Total
Very reasonable	4	0	4	1	2	3	3	4	7	3	2	5	**19**
Somewhat reasonable	3	3	6	3	4	7	2	2	4	4	3	7	**24**
Not very reasonable	0	0	0	0	0	0	0	1	1	1	3	4	**5**
Not reasonable at all	0	2	2	0	1	1	1	1	2	0	0	0	**5**
Don't know	0	0	0	2	1	3	1	0	1	2	1	3	**7**
No response / refused	0	1	1	1	0	1	0	2	2	0	0	0	**4**
Total	**7**	**6**	**13**	**7**	**8**	**15**	**7**	**10**	**17**	**10**	**9**	**19**	**64**

7. Wait until equipment breaks down or replace equipment before it breaks down?

Response	GS	RS	Total	GS	RS	Total	GS	RS	Total	GS	RS	Total	Sum Total
Wait until breakdown	2	0	2	2	0	2	1	0	1	5	0	5	**10**
Replace before breakdown	5	5	10	5	7	12	3	8	11	4	9	13	**46**
No response / refused	0	1	1	0	1	1	3	2	5	1	0	1	**8**
Total	**7**	**6**	**13**	**7**	**7**	**15**	**7**	**10**	**17**	**10**	**9**	**19**	**64**

8. Do you feel the current average number of electricity outages is acceptable or not acceptable?

Response	GS	RS	Total	GS	RS	Total	GS	RS	Total	GS	RS	Total	Sum Total
Very acceptable	1	0	1	0	2	2	1	2	3	1	1	2	**8**
Somewhat acceptable	2	1	3	1	3	4	4	4	8	7	4	11	**26**
Not very acceptable	3	2	5	1	2	3	1	1	2	1	2	3	**13**
Not acceptable at all	1	3	4	4	1	5	1	3	4	1	2	3	**16**
Don't know	0	0	0	1	0	1	0	0	0	0	0	0	**1**
Total	**7**	**6**	**13**	**7**	**8**	**15**	**7**	**10**	**17**	**10**	**9**	**19**	**64**

9. Do you feel the current average amount of outage time is acceptable or not acceptable?

Response	GS	RS	Total	GS	RS	Total	GS	RS	Total	GS	RS	Total	Sum Total
Very acceptable	1	0	1	0	2	2	1	1	2	2	1	3	**8**
Somewhat acceptable	0	3	3	1	3	4	3	3	6	6	4	10	**23**
Not very acceptable	3	1	4	3	1	4	1	5	6	0	2	2	**16**
Not acceptable at all	3	2	5	3	2	5	2	1	3	2	2	4	**17**
Don't know	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total	**7**	**6**	**13**	**7**	**8**	**15**	**7**	**10**	**17**	**10**	**9**	**19**	**64**

(Questions 10 and 11 asked about the number of outages experienced in the past two years and duration of the most recent outage).

12: How did the power outage affect your business or you personally? (OPEN-ENDED)

Response	General Service	Residential	Sum Total
Closed business due to outage	5	0	**5**
Had to use back-up generator -Increased production costs	1	0	**1**
Negatively affected business (loss of production, loss of revenue)	14	1	**15**
No heat	0	1	**1**
Not affected	5	8	**13**
Personal loss	0	12	**12**
Safety Concern	1	0	**1**
Spoiled goods and loss of money	0	7	**7**
Other	0	2	**2**
Don't Know	3	0	**3**
No response / refused	2	2	**4**
Total	**31**	**33**	**64**

13: Is there a certain length of time at which the costs/consequences of an outage become more serious for you or your business? (OPEN-ENDED)

Response	General Service	Residential	Sum Total
0-1 hours	6	4	**10**
1-4 hours	8	4	**12**
6-12 hours	3	8	**11**
More than 24 hours	4	9	**13**
More than a week	0	1	**1**
Other	3	1	**4**
Don't know	2	0	**2**
No response / refused	5	6	**11**
Total	**31**	**33**	**64**

14. How many power service interruptions are reasonable in a year?

Response	GS	RS	Total	GS	RS	Total	GS	RS	Total	GS	RS	Total	Sum Total
No outage is acceptable	3	3	6	2	0	2	1	1	2	2	2	4	**14**
One	1	1	2	2	2	4	3	3	6	2	1	3	**15**
Two	2	2	4	1	4	5	0	2	2	3	2	5	**16**
Three	0	0	0	1	1	2	2	1	3	2	3	5	**10**
Four	0	0	0	0	1	1	0	1	1	1	0	1	**3**
More than four	1	0	1	0	0	0	0	0	0	0	1	1	**2**
No response / refused	0	0	0	1	0	1	1	2	3	0	0	0	**4**
Total	**7**	**6**	**13**	**7**	**8**	**15**	**7**	**10**	**17**	**10**	**9**	**19**	**64**

15. What is a reasonable duration for a service interruption?

Response	GS	RS	Total	GS	RS	Total	GS	RS	Total	GS	RS	Total	Sum Total
No outage is acceptable	1	3	4	1	0	1	0	0	0	2	2	4	**9**
30 minutes	5	1	6	4	1	5	2	2	4	4	4	8	**23**
1 hour	0	0	0	0	2	2	0	1	1	1	2	3	**6**
2 hours	1	1	2	1	5	6	4	1	5	1	0	1	**14**
3 hours	0	1	1	1	0	1	0	2	2	1	1	2	**6**
4 hours or more	0	0	0	0	0	0	0	2	2	1	0	1	**3**
No response / refused	0	0	0	0	0	0	1	2	3	0	0	0	**3**
Total	**7**	**6**	**13**	**7**	**8**	**15**	**7**	**10**	**17**	**10**	**9**	**19**	**64**

16. Thinking back to the two major storm events of 2013, were you affected by either or both of these events?

Response	GS	RS	Total	GS	RS	Total	GS	RS	Total	GS	RS	Total	Sum Total
Yes – the flooding in July	0	0	0	2	2	4	1	0	1	0	0	0	**5**
Yes – the ice storm in December	0	2	2	4	4	8	2	2	4	4	6	10	**24**
Yes – both	6	3	9	0	0	0	2	6	8	0	1	1	**18**
No – neither weather events	1	1	2	1	2	3	2	1	3	6	2	8	**16**
No response / refused	0	0	0	0	0	0	0	1	1	0	0	0	**1**
Total	**7**	**6**	**13**	**7**	**8**	**15**	**7**	**10**	**17**	**10**	**9**	**19**	**64**

17. Whether you were personally affected or not, how satisfied are you with Toronto Hydro's management of these events?

Response	GS	RS	Total	GS	RS	Total	GS	RS	Total	GS	RS	Total	Sum Total
Very satisfied	0	0	0	0	1	1	3	2	5	1	0	1	**7**
Somewhat satisfied	2	0	2	3	6	9	3	3	6	5	3	8	**25**
Somewhat dissatisfied	2	2	4	1	1	2	0	1	1	1	3	4	**11**
Very dissatisfied	2	4	6	2	0	2	0	2	2	2	3	5	**15**
Don't know	0	0	0	1	0	1	1	0	1	1	0	1	**3**
No response / refused	1	0	1	0	0	0	0	2	2	0	0	0	**3**
Total	**7**	**6**	**13**	**7**	**8**	**15**	**7**	**10**	**17**	**10**	**9**	**19**	**64**

18: Is there anything in particular that Toronto Hydro could have done to improve its service to you or your business during these events?

Response	General Service	Residential	Sum Total
Better communication	8	17	**25**
Better customer service	2	1	**3**
Better maintenance of aging equipment	1	1	**2**
Contingency plans in place	4	0	**4**
Invest more in electricity system	1	1	**2**
Pruning of trees	1	0	**1**
Resolve outage issues faster	3	2	**5**
Other	2	0	**2**
No response / refused	9	11	**20**
Total	**31**	**33**	**64**

19. How important do you feel it is for Toronto Hydro to invest now in modernizing the grid?

Response	GS	RS	Total	GS	RS	Total	GS	RS	Total	GS	RS	Total	Sum Total
Very important	5	3	8	4	7	11	4	5	9	5	8	13	**41**
Somewhat important	2	2	4	1	0	1	3	1	4	4	1	5	**14**
Not very important	0	1	1	0	0	0	0	0	0	1	0	1	**2**
Not important at all	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Don't know	0	0	0	0	0	0	0	0	0	0	0	0	**0**
No response / refused	0	0	0	2	1	3	0	4	4	0	0	0	**7**
Total	**7**	**6**	**13**	**7**	**8**	**15**	**7**	**10**	**17**	**10**	**9**	**19**	**64**

20. How likely is that you would participate in Demand Response programs that would allow electricity system managers to turn off equipment you are using?

Response	GS	RS	Total	GS	RS	Total	GS	RS	Total	GS	RS	Total	Sum Total
Very likely	1	1	2	1	4	5	4	2	6	1	2	3	**16**
Somewhat likely	0	2	2	3	1	4	1	2	3	1	0	1	**10**
Not very likely	3	3	6	0	1	1	0	3	3	4	1	5	**15**
Not at all likely	3	0	3	1	1	2	1	2	3	2	2	4	**12**
No response / refused	0	0	0	2	1	3	1	1	2	2	4	6	**11**
Total	**7**	**6**	**13**	**7**	**8**	**15**	**7**	**10**	**17**	**10**	**9**	**19**	**64**

21. How well do you feel you understand the challenges facing the Toronto hydro grid and what they are planning to do to meet those challenges?

Response	GS	RS	Total	GS	RS	Total	GS	RS	Total	GS	RS	Total	Sum Total
Very well	1	1	2	4	4	8	2	1	3	0	0	0	**13**
Somewhat well	6	2	8	3	4	7	3	7	10	9	7	16	**41**
Not very well	0	3	3	0	0	0	1	1	2	0	0	0	**5**
I don't understand at all	0	0	0	0	0	0	0	0	0	0	0	0	**0**
No response / refused	0	0	0	0	0	0	1	1	2	1	2	3	**5**
Total	**7**	**6**	**13**	**7**	**8**	**15**	**7**	**10**	**17**	**10**	**9**	**19**	**64**

22. Does Toronto Hydro's investment plan seem like it is going in the right direction or the wrong direction?

Response	GS	RS	Total	GS	RS	Total	GS	RS	Total	GS	RS	Total	Sum Total
Right direction	4	0	4	3	5	8	5	4	9	7	5	12	**33**
Wrong direction	3	1	4	2	0	2	0	1	1	1	0	1	**8**
Not sure	0	5	5	2	3	5	1	4	5	1	2	3	**18**
No response / refused	0	0	0	0	0	0	1	1	2	1	2	3	**5**
Total	**7**	**6**	**13**	**7**	**8**	**15**	**7**	**10**	**17**	**10**	**9**	**19**	**64**

23: Right/Wrong/ Unsure Direction: And why do you feel that way? (In relation to Q22) (OPEN-ENDED)

Response	General Service	Residential	Sum Total
Right direction - Investment plan and replace before breakdown makes sense	13	10	**23**
Unsure - Not enough information	7	6	**13**
Wrong direction - mistrust/previous plans failed	3	1	**4**
Wrong direction - More investment needed	0	1	**1**
Wrong direction - previous plans failed	0	1	**1**
Wrong Direction - Problems still persist in electricity system	1	0	**1**
Wrong direction - too costly	0	4	**4**
Wrong direction- Previous plans failed	0	1	**1**
No response / refused	7	9	**16**
Total	**31**	**33**	**64**

24. When you look at how much Toronto Hydro is spending on each of its investment priorities, do you think they have the balance right or would you change the relative priorities?

Response	GS	RS	Total	GS	RS	Total	GS	RS	Total	GS	RS	Total	Sum Total
The balance looks right	7	0	7	2	5	7	3	3	6	7	6	13	**33**
They should change some of the priorities	0	6	6	4	3	7	3	5	8	2	3	5	**26**
No response / refused	0	0	0	1	0	1	1	2	3	1	0	1	**5**
Total	**7**	**6**	**13**	**7**	**8**	**15**	**7**	**10**	**17**	**10**	**9**	**19**	**64**

25: What areas do you feel need MORE spending than planned? (OPEN-ENDED)

Response	General Service	Residential	Sum Total
Good balance in budget	2	1	**3**
Modernize the grid	7	9	**16**
More information needed	2	4	**6**
Plan ahead - proactive approach	1	0	**1**
Provide better reliability	0	1	**1**
Renewable Generation	2	5	**7**
Replacing aging equipment	1	1	**2**
Other	1	3	**4**
Don't know	3	3	**6**
No response / refused	12	6	**18**
Total	**31**	**33**	**64**

26: What areas do you feel need LESS spending than planned? (OPEN-ENDED)

Response	General Service	Residential	Sum Total
Accommodating construction projects	1	5	**6**
Debt reduction	1	1	**2**
Good balance in budget	2	0	**2**
Not enough information	3	1	**4**
Spend less on burying cables	1	0	**1**
Spend less on renewable generation	1	0	**1**
Stop accommodating electric vehicles	1	1	**2**
Stop spending money to connect new customers	0	4	**4**
Other	1	2	**3**
Don't know	3	3	**6**
No response / refused	17	16	**33**
Total	**31**	**33**	**64**

27. When you consider the options outlined in the table on the previous page, do you think Toronto Hydro's goals are too high, too low or about right?

Response	GS	RS	Total	GS	RS	Total	GS	RS	Total	GS	RS	Total	Sum Total
Too high	0	2	2	1	0	1	1	1	2	1	1	2	**7**
About right	3	2	5	3	3	6	4	5	9	5	5	10	**30**
Too low	1	1	2	1	3	4	0	0	0	1	0	1	**7**
Not sure	3	1	4	0	2	2	1	2	3	1	2	3	**12**
No response / refused	0	0	0	2	0	2	1	2	3	2	1	3	**8**
Total	**7**	**6**	**13**	**7**	**8**	**15**	**7**	**10**	**17**	**10**	**9**	**19**	**64**

28: What are the goals you feel are too HIGH? (OPEN-ENDED)

Response	General Service	Residential	Sum Total
Funding for new equipment	2	2	**4**
More information needed	0	5	**5**
Plan is too costly overall	1	1	**2**
Reduce power outages	0	1	**1**
Run-to-Failure approach	1	0	**1**
Other	2	0	**2**
Don't know	1	1	**2**
No response / refused	24	23	**47**
Total	**31**	**33**	**64**

29: What are the goals you feel are too LOW? (OPEN-ENDED)

Response	General Service	Residential	Sum Total
Better reliability	1	0	**1**
Hiring better workers and staff	1	0	**1**
Infrastructure renewal	1	4	**5**
More information needed	0	1	**1**
Reducing costs for consumers	0	2	**2**
Reducing power interruptions	1	0	**1**
Renewable Energy	2	1	**3**
Don't know	1	4	**5**
No response / refused	24	21	**45**
Total	**31**	**33**	**64**

30. Looking at the cost of the Toronto Hydro plan and the outcomes it is expected to achieve, which point of view is closest to your own?

Response	GS	RS	Total	GS	RS	Total	GS	RS	Total	GS	RS	Total	Sum Total
Achieve higher outcomes	3	0	3	1	3	4	1	1	2	1	1	2	**11**
Satisfied with the rate increase	1	0	1	0	2	2	1	3	4	2	3	5	**12**
Rate increase is necessary	2	5	7	3	2	5	3	5	8	5	5	10	**30**
Scale back plans	0	1	1	0	0	0	0	0	0	2	0	2	**3**
Not sure	1	0	1	1	1	2	1	0	1	0	0	0	**4**
No response / refused	0	0	0	2	0	2	1	1	2	0	0	0	**4**
Total	**7**	**6**	**13**	**7**	**8**	**15**	**7**	**10**	**17**	**10**	**9**	**19**	**64**

31: What did you think about the workbook? (OPEN-ENDED)

Response	General Service	Residential	Sum Total
Biased information	2	2	**4**
Clear and easy to understand	2	2	**4**
Effective form of engagement	5	5	**10**
Informative	10	11	**21**
Not clear	0	1	**1**
Not enough information	1	5	**6**
Too much information	1	2	**3**
Other	0	1	**1**
No response / refused	10	4	**14**
Total	**31**	**33**	**64**

32: Volume of information - Did Toronto Hydro provide too much information, not enough, or just the right amount? (OPEN-ENDED)

Response	General Service	Residential	Sum Total
Enough information	23	19	**42**
Not enough information	4	6	**10**
Too much information	4	6	**10**
No response / refused	0	2	**2**
Total	**31**	**33**	**64**

33: Content covered - Was there any content missing that you would have liked to have seen included? (OPEN-ENDED)

Response	General Service	Residential	Sum Total
Better breakdown of bill	2	1	**3**
Cost analysis	0	1	**1**
Costs cutting measures	0	1	**1**
Customer service	1	0	**1**
Financial reports	2	3	**5**
Financial Reports (operating budget, etc.)	1	0	**1**
More information	1	1	**2**
Not enough information	1	1	**2**
Other available options	0	2	**2**
Renewable Energy	2	1	**3**
Smart Meters	0	1	**1**
Waste management	1	0	**1**
Other	3	5	**8**
Don’t know	1	1	**2**
No response / refused	16	15	**31**
Total	**31**	**33**	**64**

34: Outstanding Questions - Is there anything that you would still like answered? (OPEN-ENDED)

Response	General Service	Residential	Sum Total
Better explanation of bill	1	1	**2**
Clarification on increase	0	1	**1**
Communication plan	0	1	**1**
Comparison study	1	0	**1**
Contingency plans	1	1	**2**
History of Toronto Hydro	1	0	**1**
Impact of plan on costs for consumers	1	0	**1**
More engagement	0	1	**1**
More information on long term energy plan	1	2	**3**
Renewable energy technologies	0	1	**1**
Time of Use question	0	1	**1**
Tree pruning clarification	1	1	**2**
Other	3	4	**7**
No response / refused	21	19	**40**
Total	**31**	**33**	**64**

35: Suggestions for future consultations - How would you prefer to participate in these consultations? (OPEN-ENDED)

Response	General Service	Residential	Sum Total
Focus group - was effective	6	8	**14**
More information	1	1	**2**
More time to prepare	2	1	**3**
Online engagement	4	1	**5**
Online survey	1	1	**2**
Process should be more engaging and comprehensive	0	2	**2**
Referendum vote	0	1	**1**
Shorter	0	1	**1**
Shorter session	2	0	**2**
Telephone interview	0	1	**1**
Other	2	3	**4**
Don’t know	1	0	**1**
No response / refused	12	13	**25**
Total	**31**	**33**	**64**

Mid-Market GS Workshops

Workshop Presentations and Discussion Groups
with Mid-market GS Customers

PURPOSE: To gain qualitative input/ response to proposed DSP from GS > 50 kW customers and to feed into survey design

Summary

The following summary highlights key findings from the commercial and industrial customer consultation sessions held in the Toronto area on March 31st and April 2nd of 2014.

System Reliability: Customer Experience and Expectation

- Most participants in the consultation groups have experienced power service interruptions at their businesses in the past twelve months. The duration of the service interruption lasted from a few minutes to many days in some cases. The frequency of outages averaged around two to three power service interruptions per year.
- Both commercial and industrial users reported losses of revenue and productivity within their respective businesses due to power service interruptions.
- Service-based commercial users would like Toronto Hydro to concentrate on limiting the duration of outages. Similarly, larger industrial businesses in the manufacturing sector wanted Toronto Hydro to focus on limiting the duration or length of power service interruptions per year. They stated that longer outages can have a serious consequence to productivity, as production cannot continue for long periods of time and can cause a *"logistical nightmare"* with workers.
- Alternatively, other manufacturing businesses stated that they would want Toronto Hydro to concentrate on limiting the frequency of outages as every time there is an outage their production equipment is forced to shut down, and that the time required to reset their production equipment could lead to significant loss of productivity.
- A number of participants stated that with a rate increase should come an obligation on behalf of Toronto Hydro to proactively communicate with customers on how the additional funds are being spent and to provide on-going status updates on the grid renewal plan.
- Both commercial and industrial customers stated that they wanted better customer service from Toronto Hydro staff. Specifically, many suggested better customer communications around power outages. Participants in the group stated that they wanted to know how long outages would last so they could prepare for a *"contingency plan"* and not suffer losses in productivity.

Improving Service of the Local Distribution System

- Overall, both commercial and industrial customers are satisfied with the work Toronto Hydro is doing maintaining the local distribution system. As stated above, when participants in the groups

were asked about improvements, the main suggestions concerned limiting rate increases, reducing power service interruptions and better customer communications around power outages.

- Participants in the groups were impressed overall by Toronto Hydro's accomplishments in reducing employee headcount, keeping absenteeism low, working safely, and improving the coordination of capital projects.
- Large scale industrial customers expressed concerns about electricity costs. They stated that, unlike commercial-service based businesses that can more readily pass costs onto their customers, many industrial manufacturers operating within the Toronto Hydro grid are unable to pass on costs as their products are sold in competitive, international markets. A number of industrial customers suggested that rate increases could put them at a disadvantage with competing firms operating in jurisdictions with lower electricity costs.
- When it came to the choice between "running-to-failure" or replacing equipment before it breaks down, most participants prefer the more proactive approach of replacing equipment before it breaks.

Coverage of Distribution System Topics

- Overall, participants in the consultation sessions felt the workbook did an effective job of covering the topics they expected and allowed them to have a meaningful discussion about Toronto Hydro's grid renewal plan.

System Renewal

- Most participants felt the proposed pace of system renewal is "about right". That is, most agreed that the plan balanced the need to replace aging infrastructure with customer bill impacts.
- Most commercial and industrial participants (36 of 41) accepted the need to increase customer rates by the proposed amount; with 16 of 41 saying they support the proposed rate increase and 20 of 41 saying they don't like it, but think it is necessary. On the contrary, 2 of 41 participants believe the rate increase is unreasonable and opposed it.
- The main reasons for the opposition to the bill increase was because both commercial and industrial businesses are concerned about their ability to pay and the impact it will have on their competitiveness with other firms in lower-cost jurisdictions.
- Those who accepted the proposed DSP believed the plan seemed reasonable and was necessary to maintain system reliability.

Response During Major Weather Events

- Participants in both the commercial and industrial groups stated that Toronto Hydro staff worked *"tremendously hard"* during the major weather events of 2013. All of the participants in the groups stated that they were both pleased by the service received and applauded the hard work Toronto Hydro did to repair the damages caused by both the flooding in July and the ice storm in December.
- Participants in both the commercial and industrial groups also understood that Toronto Hydro's hands were tied during the major events of 2013 and they did the best job *"humanly possible"* given the circumstances.

- Some of the participants in the group stated that they wanted Toronto Hydro to do a better job in updating their website and customer service call centres during the major weather events. Specifically, participants stated that Toronto Hydro could have had a better online format (e.g. *"tell us areas where the outage is occurring, give us an ETA for fixing issues on the Toronto Hydro main page").* Participants went on to say that Toronto Hydro should better advertise its website and social media accounts to get people engaged and *"in the know"* of what's happening with electricity outages/issues in the Toronto area.

Toronto Hydro's Proposed Plan and Rate Impact

- A number of commercial and industrial customers expressed concern over what they saw as poor fiscal management at Toronto Hydro. Specifically, participants questioned why Toronto Hydro did not save money in anticipation of grid renewal requirements. As owners and managers, these groups of commercial and industrial participants explained that they have to budget and have some sort of reserve fund to replace their equipment and business tools – so why didn't Toronto Hydro have a contingency plan in place for grid renewal needs? However, after the moderators explained the OEB mandate, participants in both the commercial and industrial groups understood that Toronto Hydro's regulatory regime does not allow it to have a reserve fund.
- Overall, all of the participants understood the proposed "Grid Renewal Plan" and the process Toronto Hydro must go through to apply for a rate increase (e.g. through the OEB). Participants in both the commercial and industrial groups were generally intrigued by the role played by interveners and the OEB hearings and rate setting process. Most felt that these steps help keep the rate setting process fair, where different perspectives on the proposed rate increase would be represented, and ultimately assist the process in being more accountable.
- Participants in both the commercial and industrial groups were genuinely pleased and happy about Toronto Hydro's cost saving efforts and plans.
- Participants in both the commercial and industrial groups said that both the consultation and workbook only looked at 11% of the bill. They inquired about the rest of the 89% left over and if that portion of the bill would also have an increase. They understood that Toronto Hydro was only responsible for distribution of electricity (11% of the bill), but irrespectively stated they would have a hard time budgeting their total costs spent on electricity if they were "left in the dark" about the undiscussed 89% of the bill (e.g. transmission and generation costs as well as global adjustment, regulatory costs and debt retirement).
- Furthermore, participants wondered how much of an increase they can afford by stating that *"if there is increase in all sectors of the bill, then it will have a negative effect on our business' bottom line".* Participants in both the commercial and industrial groups stated they could live with a rate increase – but said that they would have to consider the other parts of the bill (e.g. transmission and generation costs) to come to a final decision on whether to support a rate increase or not. However, they went on to state within the context of Toronto Hydro's proposed plan they were willing to live with the rate increase if it is a necessary course of action to maintain reliability within the distribution system.

Mid-Market permission on Toronto Hydro's proposed DSP

Looking at the cost of the Toronto Hydro plan and the outcomes it is expected to achieve, which point of view is closest to your own? [*Based on 41 responses*]

Response	Sum Total
Toronto Hydro should plan to achieve higher outcomes, even if the rates need to up even more;	**5**
I am satisfied with the balance between outcomes and the proposed rate increase;	**11**
I don't like the rate increase, but I think it is necessary to maintain the grid to a reasonable standard;	**20**
I think the bill impact is too high and Toronto Hydro needs to scale back its plans	**2**
Not sure	**0**
No response / Refused	**3**
Total	**41**

How Could the Consultation Process be Improved?

- At the conclusion of the sessions, participants were asked what they thought of this approach to commercial and industrial consultation and how it could be improved.
- Some of the participants in the commercial and industrial groups wanted to know why Toronto Hydro did not address these problems related to grid renewal before as well as why this type of customer consultation was only happening now, and not on an on-going basis. Participants stated that they would have liked Toronto Hydro to take a more pro-active approach in discussing the proposed plans with its customers.
- The vast majority stated they very much liked this approach to customer consultation. They felt the workbook-led format allowed them to have a meaningful discussion on what is often seen as a confusing and complex topic.
- Participants went on to say that they appreciated Toronto Hydro for actively seeking feedback from its commercial and industrial customers and that they would like to see this approach incorporated into on-going policy decision-making.

- Participants had very little to suggest in terms of ways in which the process could be improved. One suggestion was to have even more specific and relevant information in the workbook about the rate proposal process.

Methodology

About the Mid-Market GS Workshop Consultation

INNOVATIVE conducted a series of commercial and industrial customer consultation sessions designed to identify the needs and preferences of Toronto Hydro's mid-market consumers as they relate to the proposed 5-Year DSP.

Two evening workshops were conducted at a rented hotel space between 5:30 pm and 9:00 pm. Each 3.5 hour session was customized for either COMMERCIAL or INDUSTRIAL customers. The workshops were divided between a presentation and question and answer session managed by Toronto Hydro staff and a facilitated discussion session lead by moderators from INNOVATIVE.

- Presentation and Q&A: approximately 1.25 hours
- Break: 15 minutes.
- Facilitated discussion: approximately 2 hours

GS > 50 kW customers were recruited for each the commercial and industrial workshops to participate in the group presentation and Q&A. After the group presentation, three smaller facilitated breakout discussion sessions were scheduled for the second half of the evening.

Both workshops were located off of Hwy 401 in Toronto. The commercial customer workshop was held in North York on March 31st, 2014, while the industrial customer workshop was held in Etobicoke on April 2nd, 2014.

A total of 41 commercial and industrial customers participated in these consultation sessions:

Commercial Workshop (21 Commercial Customers): March 31, 2014

Group One	5 participants
Group Two	8 participants
Group Three	8 participants

Industrial Workshop (20 Industrial Customers): April 2, 2014

Group One	8 participants
Group Two	6 participants
Group Three	6 participants

Recruiting Consultation Participants

Commercial and industrial users were randomly selected by telephone from customer lists and screened for appropriateness as session participants. Users qualified for the consultation if they managed or oversaw their commercial or industrial business' electricity bill. This was to ensure they were at least somewhat knowledgeable of their electricity costs and could have an informed discussion on the impact of the proposed rate increases.

The customer screening process ensured that only customers who met the following criteria qualified to participate in the workshops:

- Participants must work at businesses that receive an electricity bill from **Toronto Hydro.**
- Participants must be in-charge of **managing** or **overseeing** their business' Toronto Hydro electricity bill(s).
- Participants had to be willing participate in a Toronto Hydro presentation and read through a 30 page workbook. Furthermore, participants were required to write out answers to a series of questions and carry on a discussion in English.

A list of mid-market customers was provided to INNOVATIVE by Toronto Hydro. In terms of consumption, customers included in this list ranged from over 50 kW to 1 MW in size. Approximately 3,000 mid-market customer contacts were provided.

Given the longer time commitment required of workshop participant than in previous customer consultation sessions, a larger incentive of $150 was provided to all commercial and industrial customers who participated in the consultation sessions.

All consultation sessions were video recorded to verify participant feedback and quotes.

Facilitated Discussion Session Structure

The consultation sessions were structured around the themes contained in the workbook. The workbook themes included the following:

1. Introduction
2. Electricity 101
3. Toronto's Grid Today
4. Challenges Facing the Grid
5. How We're Managing Grid Pressures
6. The Bottom Line

- All mid-market participants were sent electronic copies of the workbook via email as part of a pre-read package in advance of the workshops.
- At the start of the sessions, the facilitator gave an overview explaining the purpose of consultation and why Toronto Hydro is seeking feedback from business users.
- After explaining the purpose of the consultation, hardcopy workbooks were distributed to act as a session guide and for participants to record their answers to the questions contained within.

- The facilitator then led the participants through the workbook section by section to ensure they understood the information and to answer any questions they had about the content.
- When it came to the questions within the workbook, participants were asked to fill in their answers independently. The facilitator then led a group discussion on the answers participants provided and the implications for their commercial or industrial businesses.
- Hardcopy workbooks were collected from the participants at the conclusion of each consultation session.
- Each consultation session ran for approximately 2 hours.

Informing the Consultation Process:

In addition to identifying customer needs and preferences as they relate to the proposed DSP, feedback collected from this phase of the consultation was used to inform the design of the telephone survey.

NOTE: Results contained within this report are based on a limited sample and should be interpreted as directional only.

Participant Feedback

The following section highlights the general feedback from each night of the consultation discussion group.

Commercial Workshop Session

General Overview

Generally, participants in the commercial consultation group felt that the proposed Grid Renewal Plan was reasonable, effective, and representative of the electrical power needs of the businesses in the Toronto region.

Some of the participants in the group thought that Toronto Hydro should spend more in the grid renewal plan to achieve higher outcomes. Two of the participants in the group stated that they were satisfied with the present balance between the bill and reliability of services. No one was opposed to a bill increase, as they all thought that it was necessary.

Generally participants within this commercial group agreed that the rate increase was necessary to replace aging infrastructure. In particular, some participants felt that the Grid Renewal Plan was reasonable and not an “easy fix” to a complex problem.

System Reliability: Customer Experience and Expectation

Most participants in the consultation groups have experienced power service interruptions at their commercial businesses in the past twelve months. The duration of the service interruption lasted from a few minutes to many days in some cases. The frequency of outages averaged around one to three power service interruptions per year. Further, commercial users reported loss of both revenue and productivity within their respective businesses due to outages.

Most of the participants in the groups stated that they wanted better customer service from Toronto Hydro and its staff. Specifically, several stated that Toronto Hydro should improve its communication measures with its customers especially when outages and other similar power service interruptions occur.

Several participants stated that the problem with outages is that they didn't know how long the outages would last. They thought that better communication is needed from Toronto Hydro so that businesses can figure out how to mitigate the impact of power outages.

Participants also wanted Toronto Hydro to regularly update them on how their money is being spent and the state of the grid renewal.

Improving Service of the Local Distribution System

Some of the participants in the industrial groups wanted Toronto Hydro to let them know of any planned outages and when power would be coming back on. *"Let us know how long outages will be, so we can plan accordingly".*

Commercial users stated that depending on the type of business, both frequency and duration of outages can have major consequences. Further, one of the participants recommended that Toronto Hydro give higher priority to larger businesses during outages since they employ a large part of the community and have a greater impact on the local economy.

System Renewal

While most commercial participants stated that their businesses could afford the proposed rate increase and believed it was necessary to maintain system reliability, a few voiced concerned about the impact it could have on some their suppliers and customers who struggle financially.

Most participants in the commercial workshop believe they would likely be able to pass on any rate increase to their customers as this would be a common cost borne by similar businesses and the competition.

Coverage of Distribution System Topics

Most of the commercial users found the workbook to be very informative, providing the group with the right amount of information needed to discuss the issues at hand.

Many of the participants in the consultation groups stated that they wanted to have more information on *"Toronto Hydro's operating budget and their corporate structure".* In particular, some of the participants stated that they wanted more time to prepare and read through the workbook, and also be given more discussion time during the consultation to express their views on the proposed plan.

Further, other participants in the groups felt that the workbook did not contain enough information, as they would have liked to see the operating budget, revenues, expenses, and profits and losses reports.

Lastly, participants also felt that both the workbook and the consultation process did not have a wide array of choices when it came to the investment plans Toronto Hydro was proposing.

Several participants stated that they would want Toronto Hydro to make commercial users more aware about conservation efforts and how to be more energy efficient (e.g. shutting down of extra equipment). Further, participants in the commercial groups also stated they wanted Toronto Hydro to install more accurate smart meters within businesses.

A few of the participants in the commercial user groups stated that Toronto Hydro should invest more in renewable generation and renewable energy.

Most stated that Toronto Hydro should spend and prepare more *"rigorously"* to cover major issues which in the long term *"save money".* A select few stated that they wanted an updated grid that would bring costs down in the long term. One of the participants felt that Toronto Hydro should find effective and better ways to maintain and upkeep aging and old infrastructure.

Response During Major Weather Events

Almost every participant in the commercial groups mentioned better communication from Toronto Hydro to its customers during major weather events. Several of these participants also said there needs to be a better system of updating on the state of repairs during these major weather events.

Many stated that events such as the two major storms of 2013 could have been avoided if Toronto Hydro better maintained its system by investing in new equipment.

Overall, participants in the commercial groups felt that Toronto Hydro should have relayed better, up-to-date information regarding power outages during both the flooding in July and the ice storm in December of 2013. The participants said that if they had more accurate information from Toronto Hydro, they could have made better decisions concerning staffing.

Participants in the commercial sessions stated that they hoped Toronto Hydro could have restored service sooner during the major storms. Further, some participants stated that Toronto Hydro should have engaged and consulted with customers on emergency management fixes and updates.

Some pointed out that the widespread outages were the result of things that happened due to adverse weather and that there was little Toronto Hydro could do prevent such outages.

Toronto Hydro's Proposed Plan and Rate Impact

Some voiced concern over "the other 89 percent" of their bill because it represents a much larger proportion of their expense than the distribution portion. At the same time, they expressed relief that the rate increase applied only to the small portion of their bill that goes to Toronto Hydro.

As an alternative to a rate increase, some suggested moving the cost of required investments from ratepayers to taxpayers. Various participants in the groups suggested that Toronto Hydro work in conjunction with the Province of Ontario and the City of Toronto to get funding, instead of asking business customers to pay more.

A number of participants suggested that since all of the profits accumulated from Toronto Hydro electricity bills were going back into a municipal body, that public money should be used to subsidize the proposed rate increase for the ratepayers.

Further, a few participants were also critical of what they believed was mismanagement at Toronto Hydro and the Ontario Energy Board, blaming them for the present situation where Toronto Hydro is requesting a rate increase.

Some participants felt Toronto Hydro should invest more in preventative methods and be more proactive with its spending. Further, one of the participants stated Toronto Hydro should subsidize its large scale commercial customers with the cost and installation of backup generators.

However, after much concern voiced over a proposed rate increase, most of the commercial participants in the group accept the proposed rate increase, so long as it meant better and more reliable service for their businesses.

How Could the Consultation Process be Improved?

The commercial users within the group enjoyed the consultation process, as they thought it was an effective way to engage people and get them to start talking about electrical distribution issues, which many felt are often taken for granted.

Generally, participants in the commercial consultation group felt that the proposed Grid Renewal Plan was reasonable, effective, and representative of the electrical power needs of the businesses in the Toronto region.

However, a number of the participants in the commercial groups stated that they wanted access to progress reports that would update them on system renewal projects and that this in turn would make Toronto Hydro seem more accountable and transparent.

Industrial Workshop Session

General Overview

As seen in other Toronto Hydro consultations, most industrial customers do not like the idea of a price increase over the next 5 years, but generally feel it's necessary to maintain the system reliability.

In terms of the Toronto Hydro's workshop consultation materials, most participants felt the information presented made a compelling case to justify the need for increased investments in system renewal and new technologies that would support system reliability.

System Reliability: Customer Experience and Expectation

From the perspective of industrial customers, most were relatively satisfied with the level of system reliability their businesses receive from Toronto Hydro.

However, it's important to note that most participants in this group largely agreed that poor system reliability far outweighed the costs of Toronto Hydro's proposed rate increase for their rate class.

Improving Service of the Local Distribution System

While most accept the proposed rate increase, a number of the participants wanted Toronto Hydro to increase their efforts to help businesses find ways to reduce their electricity consumption to offset the impact of the proposed rate increase. Specifically, a number of participants cited that Conservation Demand Management (CDM) measures did not save their businesses much money. These participants found that the CDM measures were *"not worth their time, service, or effort"* and largely found it to be an inconvenience.

Overall, a common theme cited by participants within the industrial group was better communication from Toronto Hydro (e.g. customer service, better updates, and quicker repairs). Specifically, a number of participants in the industrial groups felt that Toronto Hydro could improve their customer services by better providing businesses with accessible information on the status of power outages and the length of time it will take to restore it. Participants suggested more timely and accurate web site updates on power service interruptions as well as mobile apps that would provide updates to customer account contacts.

Coverage of Distribution System Topics

Most participants in this group felt that the workbook helped them better understand the challenges facing their local distribution system and that a proactive approach to system renewal is better than a reactive one.

While out of scope for this consultation a few participants wanted more information on the other 89% of their electricity bill, outside of their distribution costs. Overall, the participants thought the workbook was easy to read, well put together, and comprehensive.

System Renewal and Rate Impact

While most participants in this group thought that Toronto Hydro's plan was headed the right direction, a few were not sure, as they thought they needed more information to come to a full conclusion on what the rate increase would mean for their businesses.

Customers who did not accept the price increase generally cited that they were not convinced that Toronto Hydro had made enough efforts to cut costs elsewhere or find operational efficiencies that could help pay for the increased in required capital expenditures. Although these concerns were shared by other industrial customers, most participant in these workshops accepted the proposed price increase.

When given the pacing option between "invest now" or "pay more later", most participants felt that Toronto Hydro should begin investing in system renewal now in order to avoid ratepayers from paying more in the future to fund delayed system renewal investments.

As heard in other consultations with business owners and managers, a number of participants in the industrial groups felt that Toronto Hydro should have created a reserve fund in anticipation of required capital expenditures required for system renewal.

Finally, some of the participants in the industrial group said that they would like to see a line on the bill (e.g. *"system renewal investment")* – which makes both the proposed plan and bill increase seem more accountable and transparent.

How Could the Consultation Process be Improved?

Participants in the group stated one way to improve the consultative process was to have less of a presentation element and more of an open-dialogue process. Some participants also thought the consultation was rushed through and wanted to be given more of an opportunity to express their concerns and opinions.

On the other hand, some of the participants in the industrial groups stated the consultation process made them understand the issues facing the distribution system at a level where they could have a meaningful and informed discussion about system priorities and challenges. One of the participants felt that consultation on system renewal and capital investing should be an ongoing and regular customer engagement process, as opposed to only part of Toronto Hydro's rate application process.

Questionnaire Results

The following tables are the tabulations of participant feedback to questions in the hardcopy workbooks which were returned at the end of each consultation session.

Due to the high occurrence of non-response to *open-ended* questions and subsequent small sample size, these results are not segmented by region, but rather only between commercial and industrial customers.

Blue tallies denote feedback from **Commercial (Co)** customers.
Red tallies denote feedback from **Industrial (Ind)** customers.
Numbers in green denote the sum of both Commercial and Industrial participant feedback tallies

Missing values are recorded beneath each table to indicate the number of participants who left a particular question unanswered.

Q1. How well do you feel you understand the important parts of the electricity system, how they work together and which services Toronto Hydro is responsible for?

Response	Co1	Co2	Co3	Total	Ind1	Ind2	Ind3	Total	Sum Total
Very well	2	1	3	6	5	4	4	11	**19**
Somewhat well	5	4	4	13	3	1	2	6	**19**
Not very well	0	2	0	2	0	1	0	1	**3**
I don't understand at all	0	0	0	0	0	0	0	0	**0**
Total	**7**	**7**	**7**	**21**	**8**	**6**	**6**	**20**	**41**

Q2. How satisfied are you with the job Toronto Hydro is doing running your local distribution system?

Response	Co1	Co2	Co3	Total	Ind1	Ind2	Ind3	Total	Sum Total
Very satisfied	1	0	3	4	1	3	1	5	**9**
Somewhat satisfied	4	4	4	12	6	3	4	13	**25**
Somewhat dissatisfied	2	3	0	5	1	0	1	2	**7**
Very dissatisfied	0	0	0	0	0	0	0	0	**0**
Don't know	0	0	0	0	0	0	0	0	**0**
Total	**7**	**7**	**7**	**21**	**8**	**6**	**6**	**20**	**41**

Q3: Is there anything in particular that Toronto Hydro can do to improve its service to you? (OPEN-ENDED)

Response	Co	Ind	Sum Total
Better communication during emergencies	**3**	**11**	**14**
Explanation of billing/breakdown of usage	**1**	**1**	**2**
Better customer service	**0**	**2**	**2**
Faster service regarding outages/eliminate	**7**	**2**	**9**
Reduce rates	**2**	**0**	**2**
Upgrade system	**2**	**1**	**3**
Updates on system status/progress	**1**	**0**	**1**
Other	**4**	**1**	**5**
No response / Refused	**1**	**2**	**3**
Total	**21**	**20**	**41**

Q4. Under provincial legislation, there are several types of investments Toronto Hydro must make when the need presents itself. How reasonable do you feel it is to give each of these investments a priority over other investments (for example, replacing aging equipment)?

Connecting new customers such as new housing, condominiums or businesses.

Response	Co1	Co2	Co3	Total	Ind1	Ind2	Ind3	Total	Sum Total
Very reasonable	0	4	3	7	1	3	2	6	**13**
Somewhat reasonable	6	3	3	12	4	1	4	9	**21**
Not very reasonable	1	0	0	1	1	1	0	2	**3**
Not reasonable at all	0	0	0	0	1	0	0	1	**1**
Don't know	0	0	1	1	0	0	0	0	**1**
No response / Refused	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**20**	**2**
Total	**7**	**7**	**7**	**21**	**8**	**6**	**6**	**20**	**41**

Q5. Under provincial legislation, there are several types of investments Toronto Hydro must make when the need presents itself. How reasonable do you feel it is to give each of these investments a priority over other investments (for example, replacing aging equipment)? **Maintaining and upgrading customer meters to meet provincial standards.**

Response	Co1	Co2	Co3	Total	Ind1	Ind2	Ind3	Total	Sum Total
Very reasonable	1	3	3	7	4	2	2	8	**15**
Somewhat reasonable	6	3	2	11	2	2	2	6	**17**
Not very reasonable	0	1	1	2	1	1	1	3	**5**
Not reasonable at all	0	0	1	1	0	0	1	1	**2**
Don't know	0	0	0	0	0	0	0	0	**0**
No response / Refused	0	0	0	0	1	1	0	2	**2**
Total	**7**	**7**	**7**	**21**	**8**	**6**	**6**	**20**	**41**

Q6. Under provincial legislation, there are several types of investments Toronto Hydro must make when the need presents itself. How reasonable do you feel it is to give each of these investments a priority over other investments (for example, replacing aging equipment)? **Moving existing electricity infrastructure such as poles and transformers to enable other projects such as street widening or new developments.**

Response	Co1	Co2	Co3	Total	Ind1	Ind2	Ind3	Total	Sum Total
Very reasonable	3	2	3	8	2	1	4	7	**15**
Somewhat reasonable	2	3	3	8	4	4	1	9	**17**
Not very reasonable	2	2	0	4	1	0	1	2	**6**
Not reasonable at all	0	0	0	1	1	0	0	1	**1**
Don't know	0	0	1	0	0	0	0	0	**1**
Total	**7**	**7**	**7**	**21**	**8**	**5**	**6**	**20**	**41**

Q7. Wait until equipment breaks down or replace equipment before it breaks down?

Response	Co1	Co2	Co3	Total	Ind1	Ind2	Ind3	Total	Sum Total
Wait until breakdown	2	2	4	8	0	0	2	2	**10**
Replace before breakdown	5	5	3	13	7	4	4	15	**28**
No response / Refused	0	0	0	0	1	2	0	3	**3**
Total	**7**	**7**	**7**	**21**	**8**	**6**	**6**	**20**	**41**

Q8. Do you feel the current average number of electricity outages is acceptable or not acceptable?

Response	Co1	Co2	Co3	Total	Ind1	Ind2	Ind3	Total	Sum Total
Very acceptable	2	0	3	5	1	0	1	2	**7**
Somewhat acceptable	2	4	2	8	6	5	3	14	**22**
Not very acceptable	1	2	1	4	0	1	1	2	**6**
Not acceptable at all	2	1	0	3	1	0	0	1	**4**
Don't know	0	0	1	1	0	0	1	1	**2**
Total	**7**	**7**	**7**	**21**	**8**	**6**	**6**	**20**	**41**

Q9. Do you feel the current average amount of outage time is acceptable or not acceptable?

Response	Co1	Co2	Co3	Total	Ind1	Ind2	Ind3	Total	Sum Total
Very acceptable	2	0	3	5	1	1	2	4	**9**
Somewhat acceptable	0	3	3	6	4	3	2	9	**15**
Not very acceptable	4	2	1	7	1	2	2	5	**12**
Not acceptable at all	1	2	0	3	1	0	0	1	**4**
Don't know	0	0	0	0	1	0	0	1	**1**
Total	**7**	**7**	**7**	**21**	**8**	**6**	**6**	**20**	**41**

Q12: How did the outage affect your business? (OPEN-ENDED)

Response	Co	Ind	Sum Total
Loss of sales/revenue/productivity	**7**	**7**	**14**
Closed	**3**	**2**	**5**
Food/product spoilage	**1**	**2**	**3**
Not affected/not during business hours	**1**	**3**	**4**
Had a generator	**2**	**2**	**4**
Other	**5**	**1**	**6**
No response / Refused	**2**	**3**	**5**
Total	**21**	**20**	**41**

Q13: Is there a certain length of time at which the costs/consequences of an outage become more serious for your business? (OPEN-ENDED)

Response	Co	Ind	Sum Total
Every minute	3	1	4
30 - 60 minutes	1	1	2
1 hour +	4	2	6
2 hours +	2	5	7
One day	1	3	4
36 - 48 hours +	2	1	3
Depends on the season/time of year	1	2	3
Other	6	4	10
No response / Refused	1	1	2
Total	21	20	41

Q14. How many power service interruptions are reasonable in a year?

Response	Co1	Co2	Co3	Total	Ind1	Ind2	Ind3	Total	Sum Total
No outage is acceptable	3	3	3	9	1	0	1	2	11
One	2	3	1	6	2	2	0	4	10
Two	2	1	3	6	4	4	3	11	17
Three	0	0	0	0	1	0	1	2	2
Four	0	0	0	0	0	0	1	1	1
More than four	0	0	0	0	0	0	0	0	0
Total	7	7	7	21	8	6	6	20	41

Q15. What is a reasonable duration for a service interruption?

Response	Co1	Co2	Co3	Total	Ind1	Ind2	Ind3	Total	Sum Total
No outage is acceptable	4	3	2	9	1	0	2	1	12
30 minutes	2	3	5	10	4	2	2	8	18
1 hour	1	0	0	1	0	2	1	4	4
2 hours	0	0	0	0	2	1	0	4	3
3 hours	0	0	0	0	1	0	0	1	1
4 hours or more	0	1	0	1	0	0	1	1	2
No response / Refused	0	0	0	0	0	1	0	1	1
Total	7	7	7	21	8	6	6	20	41

Q16. Thinking back to the two major storm events of 2013, were you affected by either or both of these events?

Response	Co1	Co2	Co3	Total	Ind1	Ind2	Ind3	Total	Sum Total
Yes – the flooding in July	1	0	0	1	3	1	1	5	**6**
Yes – the ice storm in December	0	4	3	7	2	0	3	5	**12**
Yes – both	2	3	2	7	2	2	0	4	**11**
No – neither weather event affected my electricity	4	0	2	6	1	3	2	6	**12**
Total	**7**	**7**	**7**	**21**	**8**	**6**	**6**	**20**	**41**

Q17. Whether you were personally affected or not, how satisfied are you with Toronto Hydro's management of these events?

Response	Co1	Co2	Co3	Total	Ind1	Ind2	Ind3	Total	Sum Total
Very satisfied	2	0	1	3	3	4	0	7	**10**
Somewhat satisfied	3	2	2	7	2	1	3	6	**13**
Somewhat dissatisfied	2	3	0	5	2	0	3	5	**10**
Very dissatisfied	0	2	1	3	1	0	0	1	**4**
Don't know	0	0	2	2	0	1	0	1	**3**
No response / Refused	0	0	1	1	0	0	0	0	**1**
Total	**7**	**7**	**7**	**21**	**8**	**6**	**6**	**20**	**41**

Q18: Is there anything in particular that Toronto Hydro could have done to improve its service to your business during these events? (OPEN-ENDED)

Response	Co	Ind	Sum Total
Better communication	**3**	**7**	**10**
Did their best/good job	**2**	**2**	**4**
Upgrade system	**5**	**2**	**7**
None	**1**	**1**	**2**
Other	**3**	**2**	**5**
No response / Refused	**7**	**6**	**13**
Total	**21**	**20**	**41**

Q19. How important do you feel it is for Toronto Hydro to invest now in modernizing the grid?

Response	Co1	Co2	Co3	Total	Ind1	Ind2	Ind3	Total	Sum Total
Very important	6	6	1	13	5	4	5	14	**27**
Somewhat important	1	1	6	8	3	2	1	6	**14**
Not very important	0	0	0	0	0	0	0	0	**0**
Not important at all	0	0	0	0	0	0	0	0	**0**
Don't know	0	0	0	0	0	0	0	0	**0**
Total	**7**	**7**	**7**	**21**	**8**	**6**	**6**	**20**	**41**

Q20. How likely is that you would participate in Demand Response programs that would allow electricity system managers to turn off equipment you are using?

Response	Co1	Co2	Co3	Total	Ind1	Ind2	Ind3	Total	Sum Total
Very likely	5	5	0	10	2	3	3	8	**18**
Somewhat likely	1	2	5	8	2	2	2	6	**14**
Not very likely	0	0	1	1	1	0	0	1	**2**
Not at all likely	1	0	1	2	1	1	1	3	**5**
No response / Refused	0	0	0	0	2	0	0	2	**2**
Total	**7**	**7**	**7**	**21**	**8**	**6**	**6**	**20**	**41**

Q21. How well do you feel you understand the challenges facing the Toronto hydro grid and what they are planning to do to meet those challenges?

Response	Co1	Co2	Co3	Total	Ind1	Ind2	Ind3	Total	Sum Total
Very well	1	2	2	5	3	4	2	9	**14**
Somewhat well	6	5	5	16	4	2	4	10	**26**
Not very well	0	0	0	0	0	0	0	0	**0**
I don't understand at all	0	0	0	0	0	0	0	0	**0**
No response / Refused	0	0	0	0	1	0	0	1	**1**
Total	**7**	**7**	**7**	**21**	**8**	**6**	**6**	**20**	**41**

Q22. Does Toronto Hydro's investment plan seem like it is going in the right direction or the wrong direction?

Response	Co1	Co2	Co3	Total	Ind1	Ind2	Ind3	Total	Sum Total
Right direction	6	4	4	14	3	6	5	14	**28**
Wrong direction	0	0	1	1	0	0	0	0	**1**
Not sure	1	3	2	6	4	0	1	5	**11**
No response / Refused	0	0	0	0	1	0	0	1	**1**
Total	**7**	**7**	**7**	**21**	**8**	**6**	**6**	**20**	**41**

Q23: And why do you feel that way? (OPEN-ENDED)

Response	Co	Ind	Sum Total
Aging infrastructure must be upgraded	6	7	13
A proactive approach	4	2	6
Need to know more	1	2	3
Cost concerns	2	2	4
Don't know	0	3	3
Other	7	1	8
No response / Refused	1	3	4
Total	**21**	**20**	**41**

Q24: What areas do you feel need more spending than planned? (OPEN-ENDED)

Response	Co	Ind	Sum Total
Aging equipment/infrastructure	9	5	14
Renewable energy	1	2	3
Other	5	7	12
No response / Refused	6	6	12
Total	**21**	**20**	**41**

Q25. When you look at how much Toronto Hydro is spending on each of its investment priorities, do you think they have the balance right or would you change the relative priorities?

Response	Co1	Co2	Co3	Total	Ind1	Ind2	Ind3	Total	Sum Total
The balance looks right	4	5	5	14	3	6	4	13	**27**
They should change some of the priorities	3	2	1	6	3	0	2	5	**11**
No response / Refused	0	0	1	1	2	0	0	2	**3**
Total	**7**	**7**	**7**	**21**	**8**	**6**	**6**	**20**	**41**

Q26: What areas do you feel should have less spending than planned? (OPEN-ENDED)

Response	Co	Ind	Sum Total
Electric vehicles	3	1	4
Connecting new customers	1	1	2
Upgrading customer meters	1	2	3
Other	4	2	6
No response / Refused	12	14	26
Total	**21**	**20**	**41**

Q27. When you consider the options outlined in the table on the previous page, do you think Toronto Hydro's goals are too high, too low or about right?

Response	Co1	Co2	Co3	Total	Ind1	Ind2	Ind3	Total	Sum Total
Too high	0	0	1	1	0	0	1	1	**2**
About right	3	5	5	13	5	6	4	15	**28**
Too low	0	1	0	1	2	0	0	2	**3**
Not sure	4	1	1	6	0	0	0	0	**6**
No response / Refused	0	0	0	0	1	0	1	2	**2**
Total	**7**	**7**	**7**	**21**	**8**	**6**	**6**	**20**	**41**

Q28: What are the goals you feel are too high? (OPEN-ENDED)

Response	Co	Ind	Sum Total
Cost	2	1	3
Equipment upgrade	1	1	2
Other	3	3	6
Don't Know	1	0	1
No response / Refused	14	15	29
Total	21	20	41

Q29: What are the goals you feel are too low? (OPEN-ENDED)

Response	Co	Ind	Sum Total
Aging infrastructure	3	6	9
Rates concerns	3	0	3
Don't Know	1	0	1
No response / Refused	14	14	28
Total	21	20	41

Q30. Looking at the cost of the Toronto Hydro plan and the outcomes it is expected to achieve, which point of view is closest to your own?

Response	Co1	Co2	Co3	Total	Ind1	Ind2	Ind3	Total	Sum Total
Toronto Hydro should plan to achieve higher outcomes, even if the rates need to go up even more	0	0	0	0	4	0	1	5	5
I am satisfied with the balance between outcomes and the proposed rate increase.	2	1	1	4	4	2	1	7	11
I don't like the rate increase, but I think it is necessary to maintain the grid to a reasonable standard	5	4	5	14	0	3	3	6	20
I think the bill impact is too high and Toronto Hydro needs to scale back its plans	0	0	1	1	0	0	1	1	2
Not sure	0	0	0	0	0	0	0	0	0
No response / Refused	0	2	0	2	0	1	0	1	3
Total	7	7	7	21	8	6	6	20	41

S1: Toronto Hydro values your feedback. This is the first time the utility has conducted a review about its upcoming

investment plan in this type of format. What did you think about the workbook? (OPEN-ENDED)

Response	Co	Ind	Sum Total
Good	7	9	16
Informative	4	7	11
Biased	2	0	2
Other	4	0	4
No response / Refused	4	4	8
Total	**21**	**20**	**41**

S2: Volume of Information — Did Toronto Hydro provide too much information, not enough, or just the right amount?

Response	Co	Ind	Sum Total
Too much, use more simple examples	1	1	2
Needed more information	5	7	12
Right amount of information	11	9	20
Other	2	0	2
No response / Refused	2	3	5
Total	**21**	**20**	**41**

S3: Content Covered — Was there any content missing that you would have liked to have seen included? (OPEN-ENDED)

Response	Co	Ind	Sum Total
Well covered	3	1	4
None	8	6	14
Other	5	2	7
Don't Know	1	1	2
No response / Refused	4	10	14
Total	**21**	**20**	**41**

S4: Outstanding Questions — Is there anything that you would still like answered? (OPEN-ENDED)

Response	Co	Ind	Sum Total
Bill breakdown	2	1	3
None	10	3	13
Other	3	3	6
No response / Refused	6	13	19
Total	**21**	**20**	**41**

S5: Suggestions for Future Consultations — How would you prefer to participate in these consultations? (OPEN-ENDED)

Response	Co	Ind	Sum Total
Same face-to-face discussion / focus groups	6	6	12
Other	6	2	8
No response / Refused	9	12	21
Total	**21**	**20**	**41**

Customer Telephone Surveys

Telephone Surveys
among Residential and GS Customers

PURPOSE: To obtain statistically significant quantitative feedback on the proposed DSP and assess reaction to customer opinions obtained from the previous research phases

Summary

The following summary highlights the key findings from two telephone surveys of 1,006 Toronto Hydro residential customers and 200 General Service <50 kW customers:

General Satisfaction

- About half (48%) of residential customers are familiar with their local distribution system, while General Service customers are slightly less familiar (43%). High volume electricity consumers are more familiar than those who consume less.
- Three-quarters (73%) of residential and General Service customers are satisfied with Toronto Hydro. Residents consuming the least power are most satisfied, while General Service customers using the highest volume of electricity (84%) are the most satisfied.
- When asked how to improve service, four-in-ten want cheaper (39% RS; 40% GS) and more consistent service/less power outages (12%RS; 6% GS). A quarter (26%) of residential customers and nearly three-in-ten (28%) GS customers said Toronto Hydro could do “nothing/already satisfied”.

System Reliability

- Two-thirds (66%) of residents and more than half (55%) of General Service customers experienced power outages during extreme weather. Not including extreme weather, six-in-ten (57%) residential customers and about half (49%) of General Service customers experienced "other" power outages in the last twelve months.
- Roughly two-thirds (64%) of General Service customers report costs to their business during “other” power outages.
- Regarding the frequency of outages, seven-in-ten (70%) residential customers think Toronto Hydro should spend what is needed to either reduce (31%) or maintain (39%) the level of power outages. General Service numbers are similar (67%) on the **frequency** of outages.
- Three-quarters (74%) of residential and two-thirds (67%) of General Service customers think Toronto Hydro should spend what is needed to either reduce (33% RS; 30% GS) or maintain (41% RS; 37% GS) the **length** of power outages.

System Challenges & Priorities

- On infrastructure investment, six-in-ten (60%) residential customers and half (51%) of General Service customers believe that Toronto Hydro should invest in its aging infrastructure to reduce future outages, even if it means higher bills. Highest support for infrastructure investment among residential customers is in Central Toronto (68%).

- On investment in new technologies, two-thirds (67%) of residential customers and six-in-ten (61%) General Service customers agree that investments in new technology will increase system reliability, make local distribution system more efficient and save money in the long run. About two-in-ten (RS: 19%; GS: 20%) preferred the argument against investment in new technologies. Again, residents in Central Toronto region (73%) are most likely to agree to investment in new technologies.
- Two-thirds (66%) of residential customers and over half (56%) of General Service customers believe that Toronto Hydro should be wise with its spending on equipment and tools, but they also think it is important that staff have the equipment and tools needed to manage the system efficiently and reliably.

Overall Assessment of Plan

Residential Acceptance: Nearly six-in-ten residential (58%) customers accept the rate increase. Most of that support appears reluctant (39%): they "don't like the increase, but feel it's necessary to maintain the grid". However, only a third (34%) thinks the rate increase is unreasonable and would not support it.

Q: Looking at the cost of the Toronto Hydro plan and outcomes it is expected to achieve, which point of view is closest to your own? Would you say…?	
Toronto Hydro should plan to achieve higher outcomes, even if the rates need to go up even more	4%
I am satisfied with the balance between outcomes and the proposed rate increase	15%
I don't like the rate increase, but I think it is necessary to maintain the grid to a reasonable standard	39%
I think the bill impact is too high and Toronto Hydro needs to scale back its plans	34%
No response	8%

General Service Acceptance: General Service customers are less supportive of rate increases than residential customers: just under half (48%) of organizational customers support the proposed Toronto Hydro plan and about four-in-ten (41%) think the bill impact would be too high.

Q: Looking at the cost of the Toronto Hydro plan and outcomes it is expected to achieve, which point of view is closest to your own? Would you say…?	
Toronto Hydro should plan to achieve higher outcomes, even if the rates need to go up even more	3%
I am satisfied with the balance between outcomes and the proposed rate increase	15%
I don't like the rate increase, but I think it is necessary to maintain the grid to a reasonable standard	30%
I think the bill impact is too high and Toronto Hydro needs to scale back its plans	41%
No response	11%

Methodology

INNOVATIVE conducted two customer surveys by telephone for Toronto Hydro:

1. A residential customer survey conducted among **1,006 respondents** between June 10 and 25, 2014; and
2. A general service customer (GS < 50 kW) survey conducted among **200 respondents** between June 10 and 25, 2014.

Note: No calls were made on **June 12, 2014** – the date of the Ontario provincial election – given the increased likelihood of customers being out of their homes or offices, as well as a potential preoccupation with provincial policy issues which could bias survey responses.

Participants were randomly selected from customer lists provided by Toronto Hydro (30,000 residential records and 6,000 GS records).

- A sample of 1,006 residential customers is considered accurate to within ±3.1 percentage points, 19 times out of 20.
- A sample of 200 General Service customers is considered accurate to within ±6.9 percentage points, 19 times out of 20.

The margin of error in both surveys will be larger within each sub-grouping of the samples.

Questionnaire Design

The questionnaires were designed to simulate the journey that respondents in the Online Workbook and Workbook-led Consultation Sessions experienced. This included a combination of educating the customer, having customers reflect on their personal experience with their distribution system, and having them make value judgments on trade-offs between system reliability and bill impact.

As part of simulating the "*workbook journey*", the questionnaires were informed by and incorporated feedback from the previous phases of Toronto Hydro's customer engagement. This included sharing both supportive and non-supportive feedback in the survey from previous phases of Toronto Hydro's customer consultation as it related to Toronto Hydro's proposed capital work and the associated rate increase. Wording of questions differed slightly between the Residential and General Service survey – for example, in the preambles the size of monthly bills differed between residential and general service customers – but otherwise remained generally consistent.

One notable difference between surveys is an additional question on service reliability and cost that was added to the General Service survey: "Thinking back to the most recent power outage – which was caused by something other than last year's floods or ice storm – how did it affect your organization in terms of cost?..."

The average survey ran at approximately 10 minutes. Both survey instruments can be found at the end of this section of the report.

Fielding the Survey

Residential (RS) Customer Survey:

For the purposes of executing the residential survey, Toronto Hydro provided INNOVATIVE with a confidential list containing 30,000 of their residential customers' contact information. Toronto Hydro built this contact list by randomly selecting records from among approximately 700,000 residential contact records on file in their customer database.

The contact list included only residential customers with residential landline contact information on file and who had been a customer of Toronto Hydro since at least January 1, 2013. The information contained in the contact list included customer name, home telephone number, home address, service area, and total annual usage between January 1 and December 31, 2013.

Only one customer per household was eligible to complete the residential survey. Survey respondents were screened to certify that only the resident primarily responsible for paying their Toronto Hydro electricity bill was interviewed. This step was taken to ensure that survey respondents represented the most qualified person within a household to answer questions about their electricity bill and how Toronto Hydro's proposed rate increase would have a relative impact on their bill.

Before retiring any randomly selected telephone number from the contact list, 12 attempts were made to reach a potential respondent for each unique telephone number, or until an interviewer received a hard refusal. Each number was called twice a day for the first four days and once a day for the final four. Each night – from June 10th to June 25th, new sample was released from the contact list to replace completed or retired numbers.

Toronto Hydro's residential customers were contacted at their home by telephone between 4pm and 9pm on weekdays; between 10am and 8pm on Saturdays; and between 11am and 8pm on Sundays.

General Service (GS) Customer Survey:

The GS survey consisted of 200 customers drawn from a confidential list provided to INNOVATIVE by Toronto Hydro. Toronto Hydro provided a list of approximately 6,000 GS < 50 kW contact records, randomly selected from its customer database.

GS customers were contacted on weekdays between 9am to 4pm. In addition, customers were screened to ensure they were in charge of managing the electricity bill at their organization.

All fieldwork was conducted using INNOVATIVE's computer-assisted telephone interviewing (CATI) system.

Sample Design

The two surveys followed a stratified random sampling methodology. This is a method of sampling that involves the division of a population into smaller groups known as strata. In stratified random sampling, the strata are formed based on members' shared attributes or characteristics (in this case, customer service area or electricity usage). A random sample from each stratum is taken in a number proportional to the stratum's size when compared to the customer population. These subsets of the strata are then pooled to form a random sample.

In the first survey, residential customers were initially divided into strata based on service area populations. Within service area populations, residential customers were then divided into quartiles based on annual electricity usage to ensure the sample had a proportionate mix of customers from low, medium-low, medium-high, and high electricity usage households.

Residential Sample Design:

The following table illustrates the segmentation of the residential survey sample by Toronto Hydro's customer service areas.

Service Area	Customer Distribution	Target Sample	Actual Sample	Difference
East York	4.0%	40	41	+1
Etobicoke	14.7%	147	147	0
North York	21.9%	219	220	+1
Scarborough	21.7%	217	220	+3
Central Toronto	32.3%	323	324	+1
York	5.4%	54	54	0
TOTAL	**100.0%**	**1,000**	**1,006**	**+6**

Within service area populations, customers were divided into quartiles based on annual electricity usage. The table below illustrates the actual survey interviews by usage quartile within Toronto Hydro's six customer service areas.

Service Area	Low Usage	Medium-Low Usage	Medium-High Usage	High Usage	Total
East York	10	10	10	11	**41**
Etobicoke	37	37	36	37	**147**
North York	55	55	55	55	**220**
Scarborough	54	56	55	55	**220**
Central Toronto	81	81	81	81	**324**
York	13	14	13	14	**54**
TOTAL	**250**	**253**	**250**	**253**	**1,006**

GS Sample Design:[4]

The survey of General Service customers also divided the respondents by region and annual electricity usage to reflect the actual distribution of Toronto Hydro GS customers:

Service Area	Customer Distribution	Target Sample	Actual Sample	Difference
East York	4.1%	8	8	0
Etobicoke	8.2%	16	16	0
North York	20.2%	40	43	+3
Scarborough	10.4%	21	22	+1
Central Toronto	47.0%	94	96	+2
York	10.1%	20	15	-5
TOTAL	**100.0%**	**199**	**200**	**+1**

[4] Throughout this section, the term ***Outer Toronto*** is used to reference the regions of Etobicoke, North York, Scarborough and York.

Again, within service area populations, GS customers were divided into quartiles based on annual electricity usage. The table below illustrates the actual survey interviews by usage quartile within Toronto Hydro's six customer service areas.

Service Area	Low Usage	Medium-Low Usage	Medium-High Usage	High Usage	Total
East York	2	2	2	2	**8**
Etobicoke	4	4	4	4	**16**
North York	11	10	11	11	**43**
Scarborough	6	5	6	5	**22**
Central Toronto	25	25	19	27	**96**
York	5	5	4	1	**15**
TOTAL	**53**	**51**	**46**	**50**	**200**

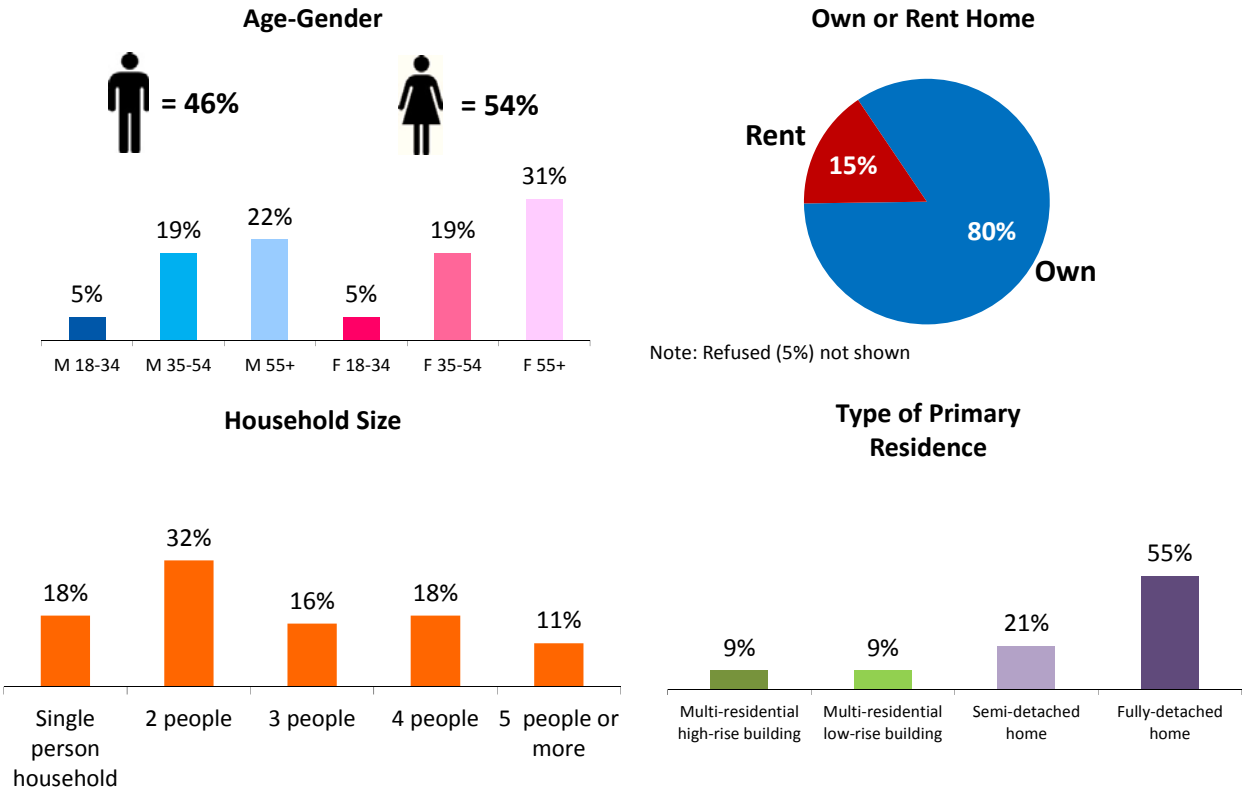
Sample Weights

Weights have not been applied to either the residential or GS data as the stratified random samples are accurate representations of Toronto Hydro's actual customer distribution and type.

Demographic Profiles

The following details the demographic characteristics of respondents who completed the Residential Ratepayer Survey [n=1,006].

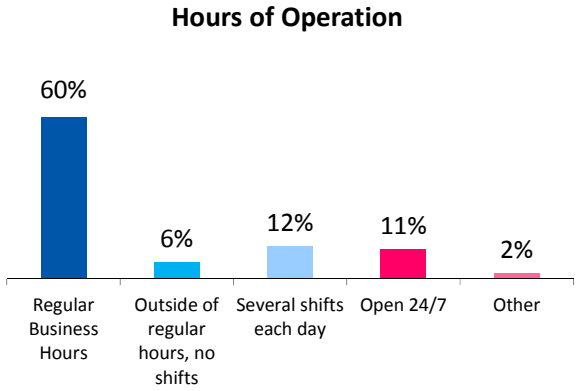
Figure 4.A: Residential Customer Profile

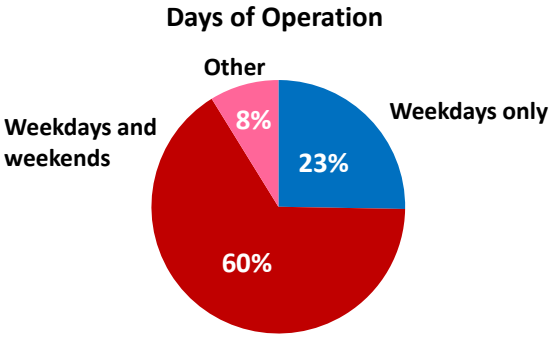


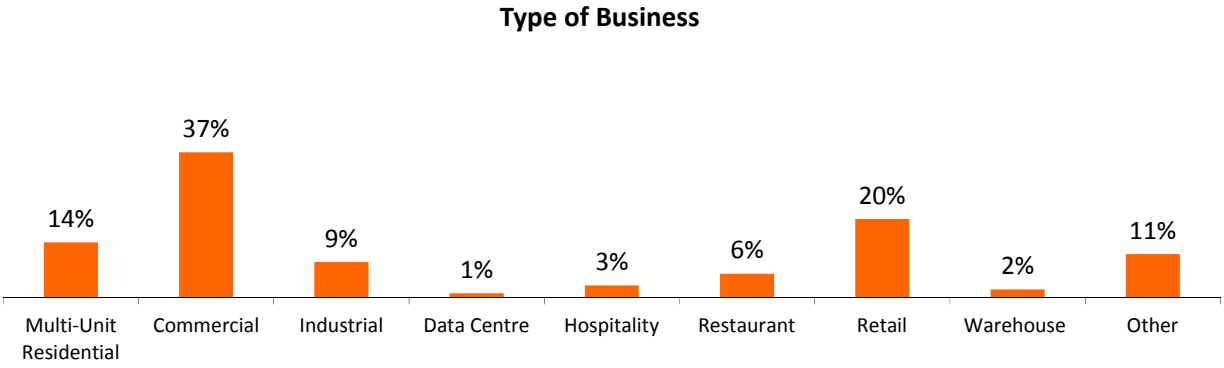
Firmographic Profiles

Below are the firmographics of respondents who completed the General Service Ratepayer Survey [n=200].

Figure 4.B: GS Customer Profile







Respondent Feedback

Familiarity and Satisfaction

This section of the workbook explores familiarity and experiences with the local distribution system and satisfaction with Toronto Hydro in running that system. The results for residential customers will be presented first, followed by general service (GS) customers.

Familiarity and Satisfaction Summary

- Almost half of residential customers (48%) are familiar with the local distribution system, while General Service customers are slightly less familiar (43%).
    - Residential consumers in East York (59%) and York (54%) are the most familiar with the system.
    - High consumption consumers (55% RS; 44% GS) are more familiar with the system than low (45% RS; 36% GS) level consumers.
    - General Service respondents in Central Toronto/East York (49%) are much more familiar with the system than those in the Golden Horseshoe (36%).
- Three-quarters (73%) of residential and General Service customers are satisfied with the job Toronto Hydro is doing.
    - The highest consumption residential customers (84%) are the most satisfied.
- When asked how to improve service, a plurality (39% RS; 40% GS) want reduced rates and charges, followed by more consistent service/less power outages (12%).
- A quarter (26%) of residential customers and nearly three-in-ten (28%) GS customers say Toronto Hydro could do "nothing/already satisfied".

Preamble for Familiarity and Satisfaction Section

Prior to answering the questions in the General Satisfaction Section, respondents were presented with a preamble concerning key components of Ontario's electricity system. The preamble read as follows:

"To start, I'd like to ask you a few questions about the electricity system…

As you may know, Ontario's electricity system has three key components: ***generation***, ***transmission*** *and* ***distribution****.*

- ***Generating stations*** *convert various forms of energy into electric power;*
- ***Transmission lines*** *connect the power produced at generating stations to where it is needed across the province; and*
- ***Distribution lines*** *carry electricity to the homes and businesses in our communities.*

Today we're going to talk about your ***local distribution system*** *which is maintained and operated by Toronto Hydro."*

Familiarity with Local Electricity Distribution System

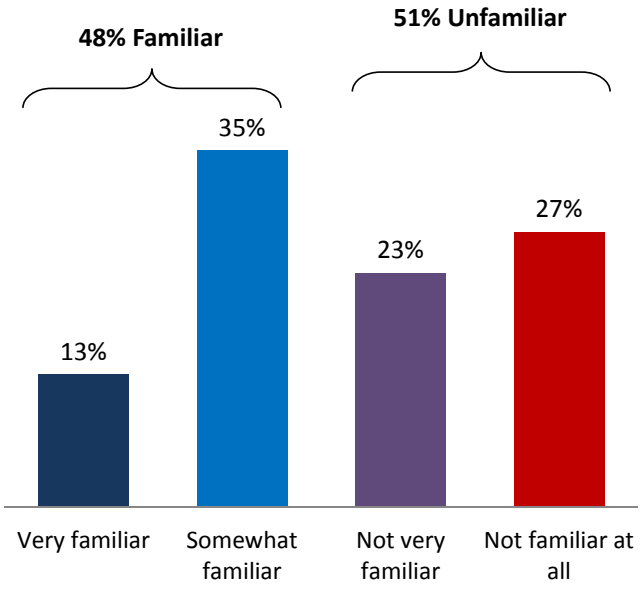
Almost half of residential respondents (48%) are familiar with their local distribution system. Of those who indicated they are familiar, 13% say they are *very* familiar with the system.

- The East York (59%) and York (54%) Regions have the highest level of familiarity with the local system.
- Differences in consumption level are also related to familiarity. High (55%) levels of consumption are associated with greater familiarity than low (45%) level consumption.
- Single person households (40%) are the least familiar with their local electricity distribution system (2: 50%; 3 or 4: 49%; 5 or more: 57%). And owners (50%) are more familiar than renters (39%).

Figure 4.1 RS: Familiarity with the Local Distribution System

Q Today we're going to talk about your local distribution system which is maintained and operated by Toronto Hydro. How familiar are you with the local electricity distribution system? Would you say…

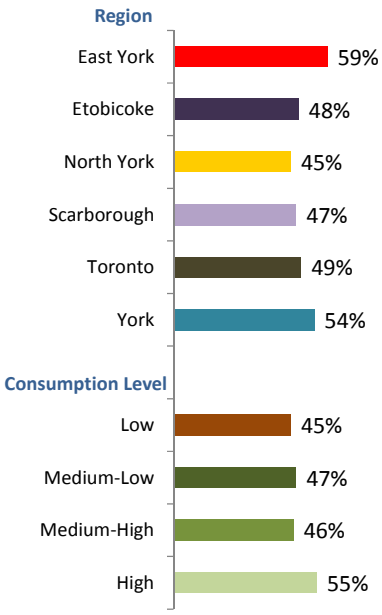
[asked of all respondents; n= 1,006]



Note: 'Don't know'/'Refused' (1%) not shown

Sample Breakdown

Those who say "familiar"



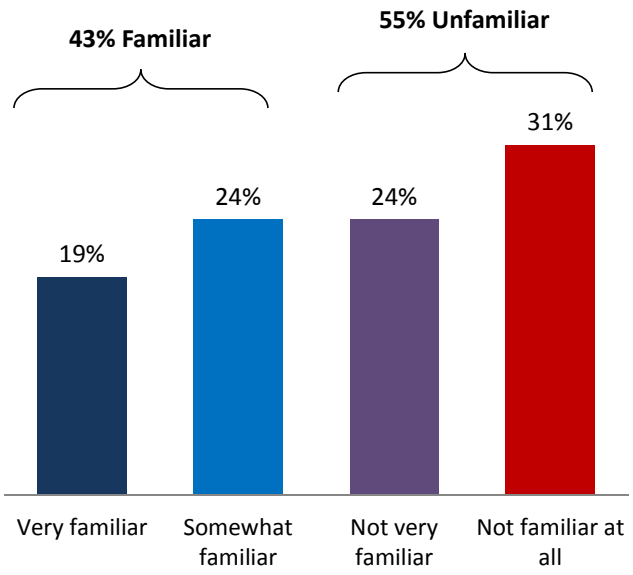
Of the General Service respondents, more than four-in-ten (43%) are familiar with their local distribution system. Of those who indicated they are familiar, 19% say they are *very* familiar with the system.

- Half (49%) of General Service customers in Central Toronto/East York are familiar, while only 36% of Golden Horseshoe customers state the same.
- Low (36%) consumption organizations are the least familiar with their local distribution system.
- Bill size appears to affect familiarity: those organizations with larger bills are more familiar with the system (<$500/month: 37%; between $500 and $1000: 46%; $1000+/month: 54%)

Figure 4.1 GS: Familiarity with the Local Distribution System

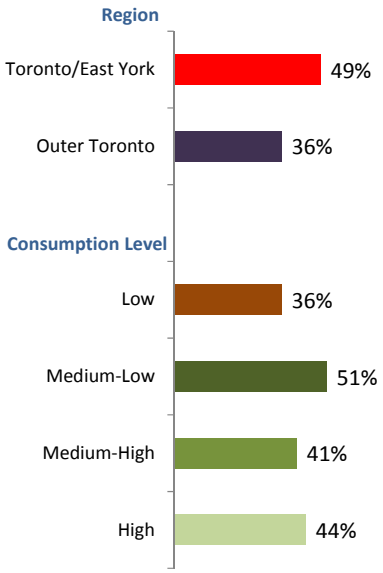
Q Today we're going to talk about your local distribution system which is maintained and operated by Toronto Hydro. How familiar are you with the local electricity distribution system? Would you say…

[asked of all respondents; n= 200]



Sample Breakdown ▸▸

Those who say "familiar"



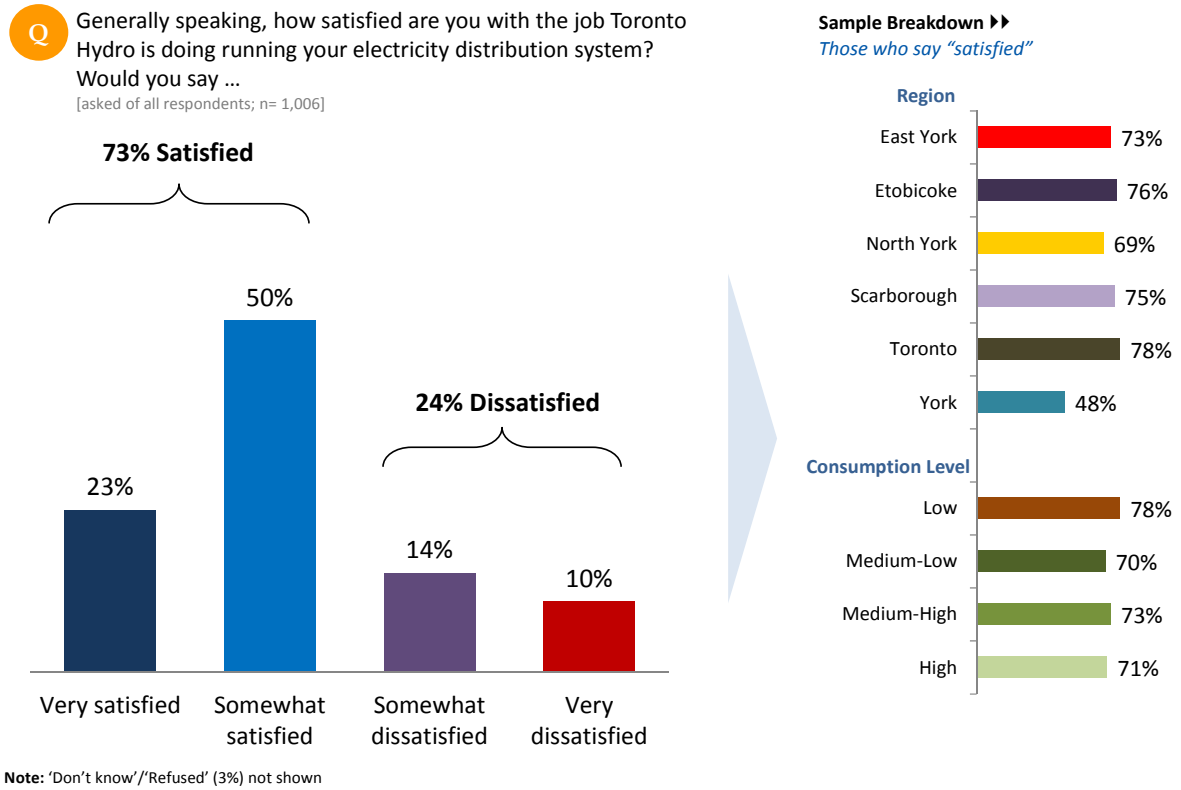
Note: 'Don't know'/'Refused' (3%) not shown

Satisfaction with Toronto Hydro Running the Distribution System

Almost three-quarters (73%) of residential customers are satisfied with the job Toronto Hydro is doing running their electricity distribution system, with nearly a quarter (24%) of residential customers responding "very satisfied".

- All regions but one are mostly satisfied with Toronto Hydro: North York (69%), East York (73%), Scarborough (75%), Etobicoke (76%) and Central Toronto (78%) all range between seven-in-ten and three-quarters satisfied. However, in York, just under half (48%) of residential customers are satisfied with the job Toronto Hydro is doing.
- Those residents consuming the lowest amount (78%) of power are most satisfied with Toronto Hydro, between five and eight percent higher than respondents with higher consumption levels (70-73%).
- Residents of houses (fully-detached: 72%; semi-detached: 73%) are a bit less satisfied with Toronto Hydro than those in multi-residential buildings (less than five stories: 81%; greater than five stories: 76%)
- Single and two-person households (77%) are slightly more satisfied with Toronto Hydro than respondents in larger households (three: 72%; four: 66%; five or more: 72%).
- Residents who agree that their electricity bill "has a major impact on my finances" are less satisfied (68%) with Toronto Hydro than those who do not feel their bill has a major impact on their finances (82%).

Figure 4.2 RS: Satisfaction with Toronto Hydro



Note: 'Don't know'/'Refused' (3%) not shown

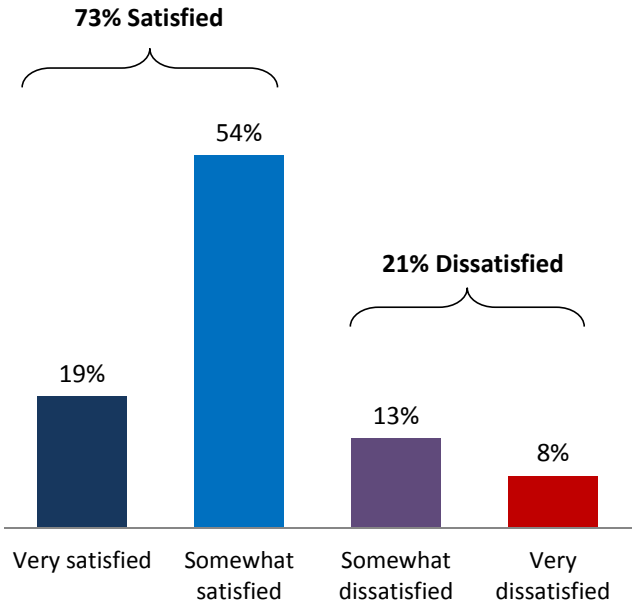
Like residential customers, almost three-quarters (73%) of General Service customers are satisfied with the job Toronto Hydro is doing running the distribution system. About two-in-ten (19%) General Service customers are very satisfied with Toronto Hydro.

- The highest consumption volume (84%) General Service consumers are the most satisfied with Toronto Hydro.
- Organizations who feel their electricity bill has "a major impact on their bottom line" (76%) are slightly less satisfied with Toronto Hydro than those who do not feel it has a major impact on their finances (86%).

Figure 4.2 GS: Satisfaction with Toronto Hydro

Q Generally speaking, how satisfied are you with the job Toronto Hydro is doing running your electricity distribution system? Would you say …

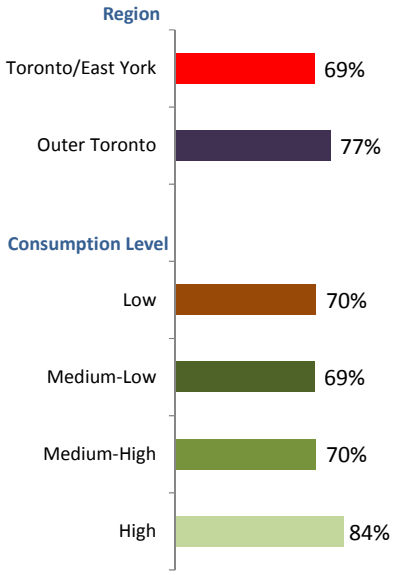
[asked of all respondents; n= 200]



Note: 'Don't know'/'Refused' (7%) not shown

Sample Breakdown

Those who say "satisfied"



How to Improve Service

When asked how Toronto Hydro could improve service, a plurality of residential (39%) and General Service (40%) customers suggest that Toronto Hydro could "reduce rates and charges".

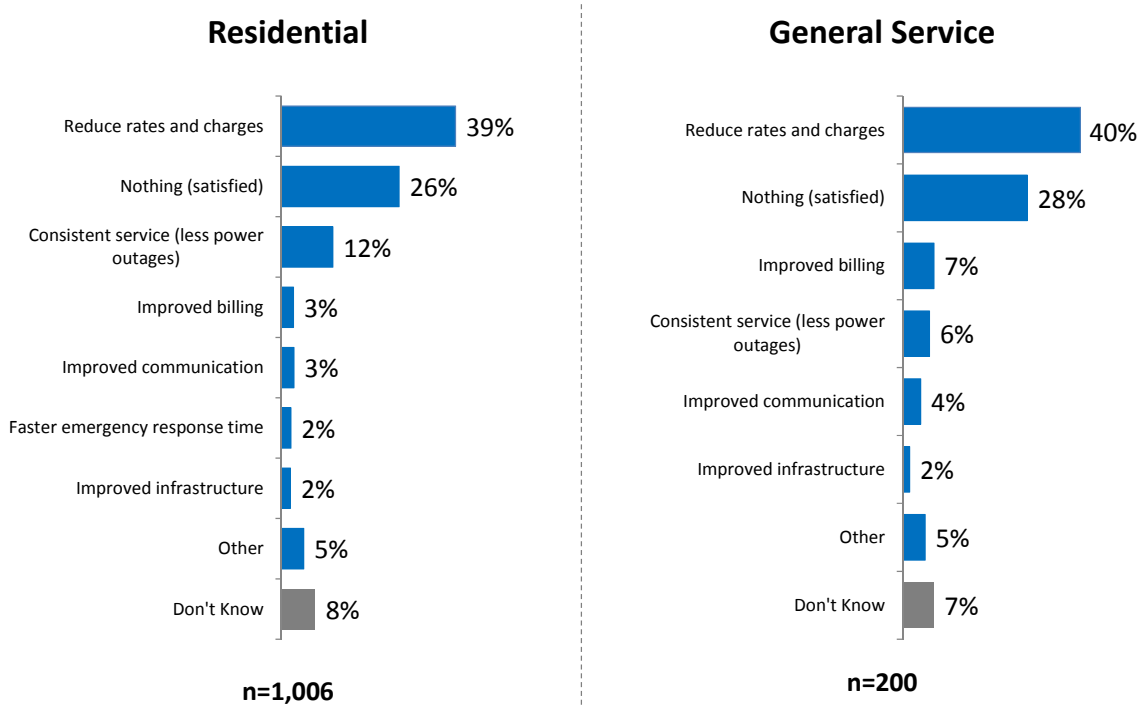
Other areas for improvement mentioned by residential respondents include "more consistent service/less power outages" (12%), "improved billing" (3%), "improved communication" (3%), "faster emergency response time" (2%), and "improved infrastructure" (2%).

A quarter (26%) of residential customers and nearly three-in-ten (28%) General Service customers say Toronto Hydro could do "nothing to improve their service".

Figure 4.3 RS/GS: How to Improve Service

Is there anything in particular **Toronto Hydro** can do to improve their service to you?

Q Is there anything in particular **Toronto Hydro** can do to improve their service to your organization?



Electricity Bill Knowledge

This section explores Residential and General Service respondent perceptions and knowledge of their electricity bill. It specifically focuses on the breakdown of the bill and what portion respondents estimate goes to Toronto Hydro.

Electricity Bill Knowledge Summary

- Most residential (35% familiar) and General Service (36%) respondents are not overly familiar with the breakdown of their electricity bill.
- In the Residential survey, East York (44%) and York (43%) prove the most familiar with their billing; highest consumption (40%) customers are more familiar than lowest (31%).

Preamble for Bill Knowledge & Impact Section

For this component of the survey, respondents were presented with a preamble concerning the breakdown of costs of an electricity bill. The two surveys provided different preambles based on targeted respondents.

The preamble for **residential customers** read as follows:

"I'd now like to talk with you about your electricity bill …

*While some customers pay more and others pay less, the **average residential customer pays about $132 a month** for electricity of **which $33 or approximately 25% goes to Toronto Hydro**. The rest of the bill goes to power generation companies, transmission companies, the provincial government and regulatory agencies."*

The **General Service** preamble explained it slightly differently:

"I'd now like to talk with you about your electricity bill …

*While some customers pay more and others pay less, the **average small and medium-sized business pays about $330 a month** for electricity of **which $80 or approximately 25% goes to Toronto Hydro**. The rest of the bill goes to power generation companies, transmission companies, the provincial government and regulatory agencies."*

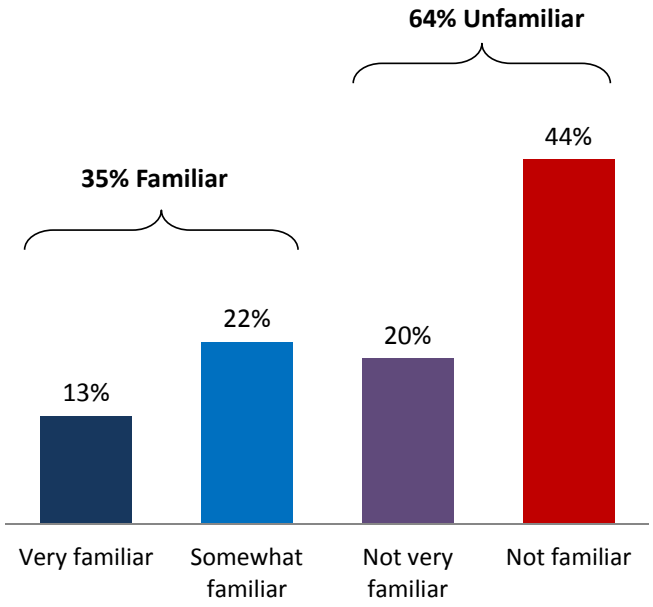
Familiarity with Share of Bill Going to Toronto Hydro

After the preamble, when asked about the breakdown of their electricity bill, 35% state they were familiar with the amount of their electricity bill that went to Toronto Hydro. In contrast, nearly two-thirds (64%) indicate they are not familiar with the breakdown of their bill.

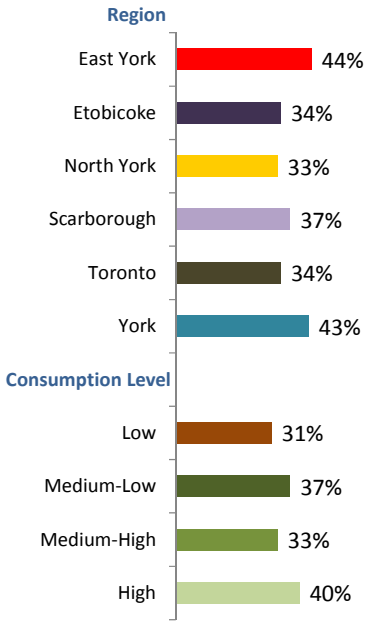
- Regionally, East York (44%) and York (43%) are the most familiar with their electrical bill, with all other regions (33-37%) close to the mean (35%).
- Those with the highest consumption (40%) prove more familiar with their bill than the lowest (31%).
- Single-detached home-owners (39%) are more familiar with their bill than other residents (Semi-detached home: 31%; Multi less than five stories: 25%; Multi more than five stories: 33%).

Figure 4.4 RS: Familiarity with Share of Bill Going to Toronto Hydro

Q Before this survey, how familiar were you with the amount of your electricity bill that went to Toronto Hydro? Would you say …
[asked of all respondents; n= 1,006]



Sample Breakdown
Those who are "familiar" with their electricity bill



Note: 'Don't know'/'Refused' (0%) not shown

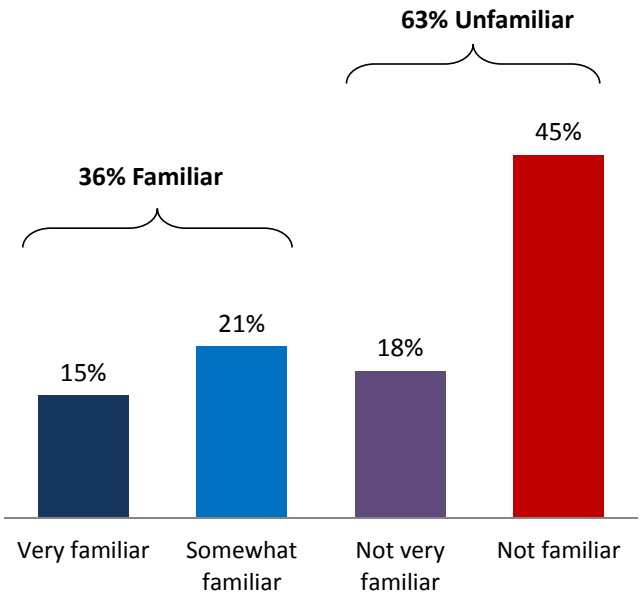
Similar levels of familiarity occur in the GS survey: 36% of respondents say they are familiar with the amount of their bill going to Toronto Hydro, while 63% indicate they are not familiar with how their bill is broken down.

- By region (Central Toronto/East York: 38%; Outer Toronto: 34%) and at all consumption levels, there tends to be low knowledge concerning the breakdown of electricity bills.
- Organizations paying the lowest amount for electricity are the least familiar with their electricity bill (<$500/month: 24%; $500 to <$1000/month: 41%; >$1000/month: 46%).

Figure 4.4 GS: Familiarity with Share of Bill Going to Toronto Hydro

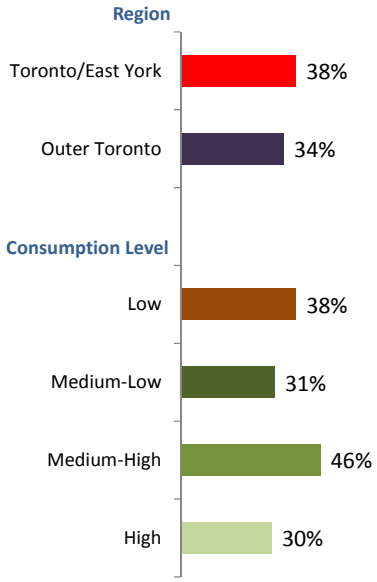
Q Before this survey, how familiar were you with the amount of your organization's electricity bill that went to Toronto Hydro? Would you say …

[asked of all respondents; n= 200]



Sample Breakdown ▸▸

Those who are "familiar" with their electricity bill



Note: 'Don't know'/'Refused' (2%) not shown

System Reliability

This section covers the feedback provided by respondents on previous power service interruptions, due to weather and non-weather related events, as well as the cost of service interruption to General Service respondents. It also discusses perceptions surrounding spending and reducing the number and length of power service interruptions.

System Reliability Summary

- Two-thirds (66%) of residents and just over half of organizations (55%) experienced power service interruptions during extreme weather.
- Not including unusual weather events, six-in-ten (57%) residential customers experienced "other" power outages in the last twelve months. About half (49%) of General Service customers report the same.
- When asked how much the "other" power outages cost their organization, almost two-thirds (64%) of General Service customers report at least some cost to their business.
- To address the number of outages, three-in-ten (31%) residential customers think Toronto Hydro should spend what is needed to reduce the number of power outages and four-in-ten (39%) think it should spend what is needed to maintain the current level.
- Two-thirds (67%) of GS customers think Toronto Hydro should spend what is needed to either reduce (30%) or maintain (37%) the length of power outages.

Preamble for Power Service Interruptions

Prior to the question being asked in this section, a preamble concerning power interruptions and extreme weather was provided. The preamble read as follows:

"This past year Toronto Hydro customers experienced unusually extreme weather – a wind storm in July and an ice storm in December. These storms caused power outages across the Toronto Hydro service area."

Power Service Interruptions

Two-thirds (66%) of residential customers experienced power outages in their homes during the extreme weather last year. The ice storm caused four-in-ten (41%) to lose power and five percent lost power due solely to the flooding; one-in-five (20%) lost power due to both. A third (32%) of Residential customers did not have an interruption in service due extreme weather.

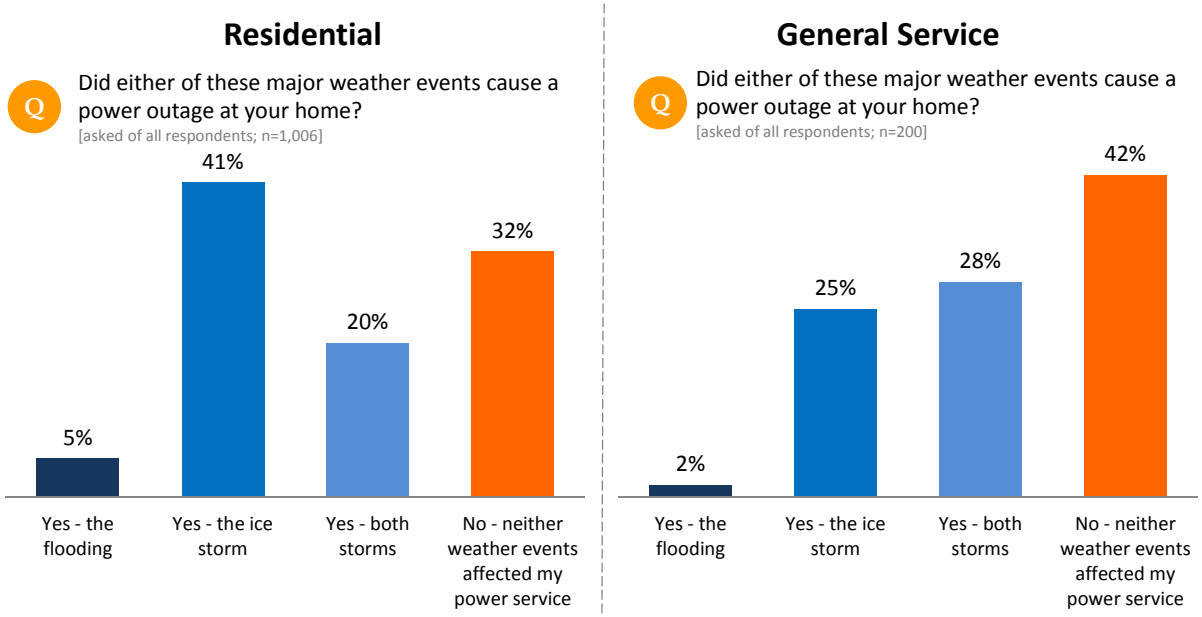
- Central Toronto residents (44%) are much less likely to report outages during the extreme weather than other regions (Scarborough 72%; Etobicoke 73%; York 79%; North York 80%; East York 93%).
- Low consumption residential consumers (62%) are a bit less likely to report outages during the extreme weather than higher consumers (68-69%).
- Single-detached (74%) and semi-detached (64%) homes are the most likely to report power outages during the extreme weather and high-rises (5+ stories: 42%) the least likely.
- Owners (69%) experienced power outages more frequently than renters (55%).

Among the General Service customers, 55% experienced outages and more about four-in-ten (42%) did not have weather events affect their power service. One-in-four (25%) lost power due to the ice storm and nearly three-in-ten (28%) lost power due to both the ice storm and the flooding. Only two percent lost power during the Toronto flooding.

- For General Service, no statistically significant differences by region.
- Low (47%) consumers report slightly fewer outages during the extreme weather than higher energy consumers (60%: Medium-low; 54%: Medium-High; 54%: High).
- Organizations with a monthly bill of over $1000/month are much more likely to lose power during extreme weather than those paying less than $500/month (41%) or $500 to $1000/month (56%).
- Of the GS respondents who agree that their electricity bill "has a major impact on the bottom line" of their organizations, 65% report an outage during extreme weather, compared to just 41% who disagree with the statement.

Figure 4.5 RS/GS: Power Service Interruptions

This past year Toronto Hydro customers experienced unusually extreme weather – flooding last July and an ice storm in December. These major weather events caused power outages across the Toronto Hydro service area.



Note: 'Don't know'/'Refused' (1%) not shown

Note: 'Don't know'/'Refused' (5%) not shown

Other Power Outages

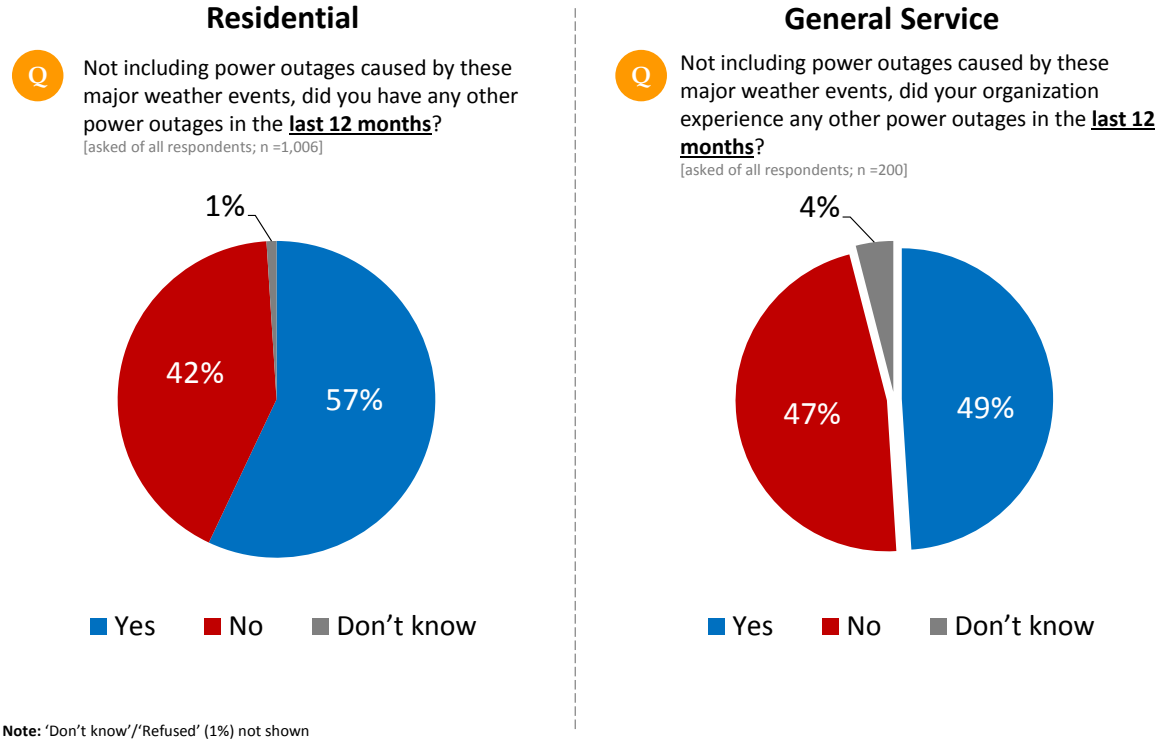
Not including power outages caused by major weather events, nearly six-in-ten (57%) residential customers say they experienced "other" power outages in the last twelve months. Only about four-in-ten (42%) residential customers did not experience such an outage.

- Looking by region, residential customers in York (81%) and East York (73%) are the most likely to report "other" power outages, while those in North York (66%), Etobicoke (47%) and Scarborough (45%) are less likely to report them.
- Residents living in houses (single-detached: 61%; semi-detached: 62%) and low-rise buildings (53%) are much more likely to report "other" outages than those living in 5+ story buildings (35%).
- More residence owners (59%) report "other" outages than do renters (48%).

General Service reports slightly better service during normal weather with roughly a 50/50 split (49% experienced outages; 47% did not; 4% don't know).

- Outer Toronto GS customers (57%) are slightly more likely to report an "other" power outage than those organizations based in Central Toronto and East York (41%).
- Commercial businesses (52%) are slightly more likely to report "other" power outages than Retail and Restaurants (42%).

Figure 4.6 RS/GS: Other Power Outages



Note: 'Don't know'/'Refused' (1%) not shown

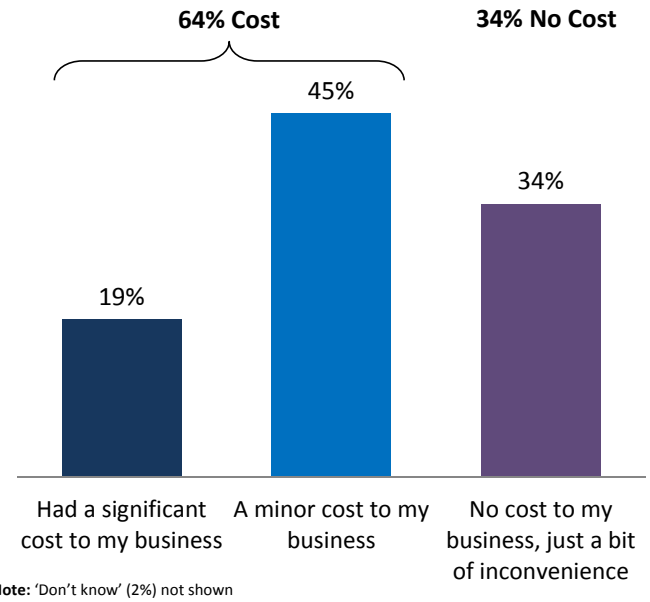
Only General Service respondents who responded "Yes" were asked an additional question on the cost of other (i.e. not caused by extreme weather) power outages: "how did it affect your organization in terms of cost?"

Almost two-thirds (64%) of General Service customers report that the most recent power outage cost their business. For two-in-ten (19%) organizational customers, it had a significant cost to their business. About one-third (34%) of respondents respond it had "no cost to their business, just a bit of inconvenience".

- Of GS respondents who state that their electricity bill "has a major impact on the bottom line" of their organizations, 74% report a business cost to the recent outage with 24% dealt a significant cost.
- By region, seven-in-ten (70%) of Outer Toronto GS customers report a cost to their business, compared with six-in-ten (59%) in Toronto and East York. However, the cost impact appears to be more significant among respondents in Toronto/East York: a quarter (26%) of Toronto/East York customers had a significant cost to their business, compared with just 15% of Outer Toronto GS customers.
- Higher consumption organizations (High (67%); Medium-high (79%) are more likely to report a cost to the power outage than lower consumption customers (Medium-Low: 54%; Low: 59%).

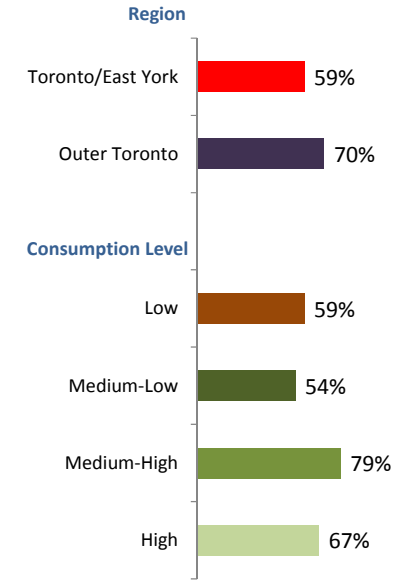
Figure 4.7 GS: Commercial Cost of Outages

Q Thinking back to the most recent power outage – *which was caused by something other than last year's floods or ice storm* – how did it affect your organization in terms of cost? Would you say the most recent power outage…
[asked of 'Yes' GS respondents; n= 98]



Note: 'Don't know' (2%) not shown

Sample Breakdown ▸▸
Those who incurred a cost



Preamble for Addressing the Frequency of Service Outages

The next question focused on how, according to the respondent, Toronto Hydro should address the number of outages financially. A preamble concerning the average number of power interruptions was provided before the question concerning addressing the number of outages. The preamble read as follows:

"Despite best efforts, no electrical distribution system can deliver perfectly reliable electricity. As a general rule, the more reliable the system, the more expensive the system is to build and maintain.

With that said –not including outages caused by extreme weather – the average Toronto Hydro customer experiences between one and two power outages per year."

Addressing the Frequency of Service Outages

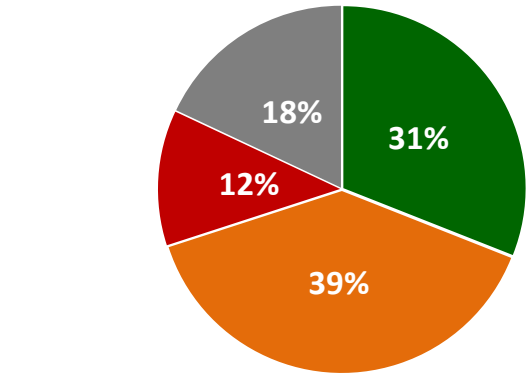
Three-in-ten (31%) residential customers think Toronto Hydro should spend what is needed to reduce the number of power outages and four-in-ten (39%) think it should spend what is needed to maintain the current level. Just 12% state that Toronto Hydro should accept more power outages in order to keep customer costs down. Under two-in-ten (18%) don't know or refused to answer.

- Regionally, the only difference is that North York (30%) residents are less likely to want to "spend to maintain" than the rest of the GTA.
- There is little difference on this question when looking at consumption levels.
- Residents who agree that their electricity bill "has a major impact on their bottom line" are much less likely to want to "spend to maintain" (33%) than those who do not feel their bill has a major impact on their bottom line (48%).

Figure 4.8 RS: Addressing the Frequency of Service Outages

Q With that said, **not including outages caused by extreme weather**, the average Toronto Hydro customer experiences **between one and two power outages** per year.

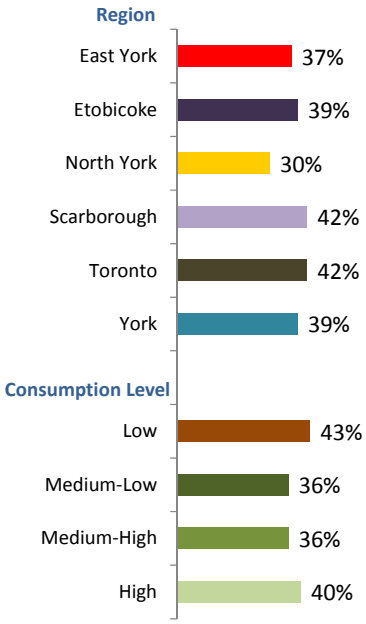
In your view, how do you think Toronto Hydro should address the **number** of customer power outages? Would you say …
[asked of all respondents; n = 1,006]



- Spend what is needed to reduce the number of power outages
- Spend what is needed to maintain the current level of outages
- Accept more power outages in order to keep customer costs down
- Don't Know/Refused

Sample Breakdown

Those who say "Spend what is needed to maintain the current level of outages"



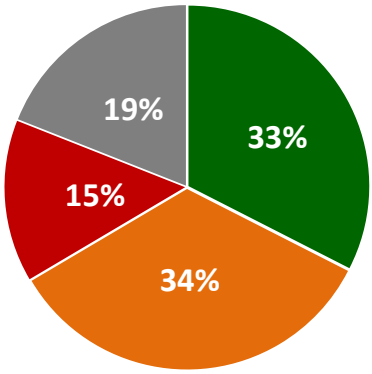
General Service customers respond likewise on how to address the number of outages: a third (33%) think that Toronto Hydro should spend what is needed to reduce the number of power outages and a third (34%) say it should spend what is needed to maintain the current level.

- Across region and consumption patterns there are no significant differences in opinion. Those with larger bills are less likely to want to "spend to maintain" ($1000+/month: 22% vs. 39% <$1000/month).

Figure 4.8 GS: Addressing the Frequency of Service Outages

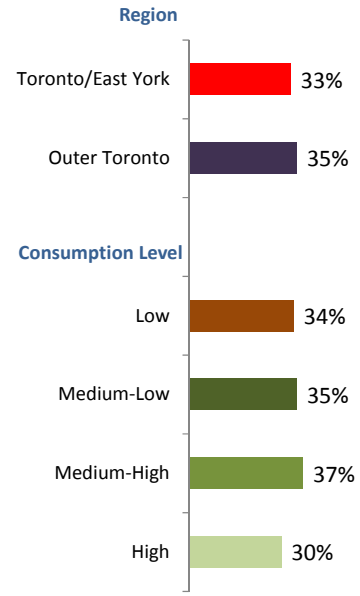
Q With that said, **not including outages caused by extreme weather**, the average Toronto Hydro customer experiences **between one and two power outages** per year.

In your view, how do you think Toronto Hydro should address the **number** of customer power outages? Would you say …
[asked of all respondents; n = 200]



- Spend what is needed to reduce the number of power outages
- Spend what is needed to maintain the current level of outages
- Accept more power outages in order to keep customer costs down
- Don't Know/Refused

Sample Breakdown
Those who say "Spend what is needed to maintain the current level of outages"



Preamble for Addressing the Duration of Service Outages

Before the follow-up question on how Toronto Hydro should address the length of time without power, respondents were read the following preamble:

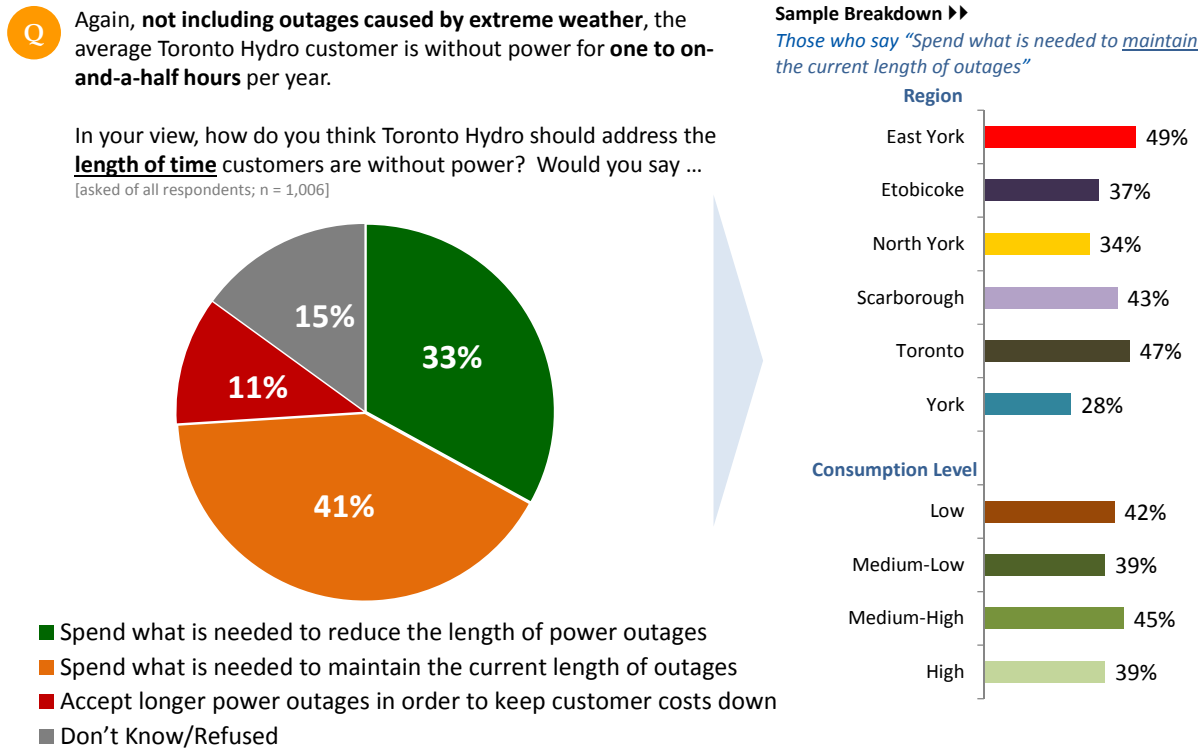
*"Again, **not including outages caused by extreme weather**, the average Toronto Hydro customer is without power for **one to one-and-a-half hours** per year."*

Addressing the Duration of Service Outages

Three-quarters (74%) of residential customers think Toronto Hydro should spend what is needed to either reduce (33%) or maintain (41%) the length of power outages. Only one-in-ten (11%) think that Toronto Hydro should accept longer power outages to keep costs down.

- Residents of East York (49%) and Central Toronto (47%) are the most likely to say "spend to maintain" the length of outages.
- No significant patterns by consumption level.
- Residents who say that their electricity bill "has a major impact on their bottom line" are less likely to want Toronto Hydro to "spend to maintain" (37%) than those unaffected financially by their bill (48%).

Figure 4.9 RS: Addressing the Duration of Service Outages

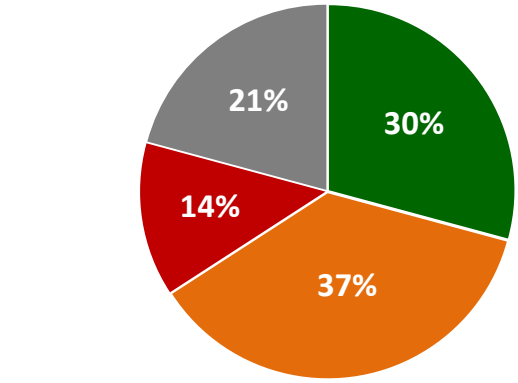


General Service customers are slightly less likely to think Toronto Hydro should spend what is needed to reduce (30%) or maintain (37%) the length of power outages. No significant differences arise within region or consumption.

Figure 4.9 GS: Addressing the Duration of Service Outages

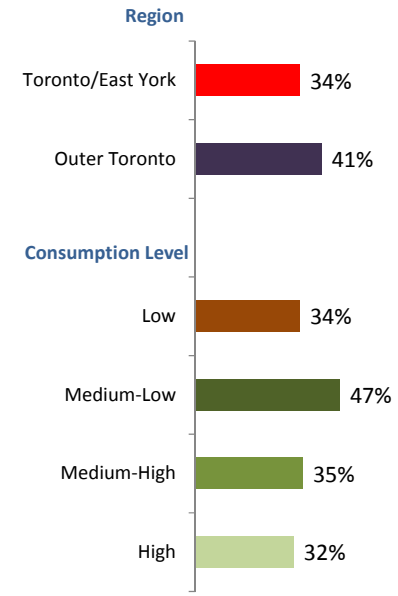
Q Again, **not including outages caused by extreme weather**, the average Toronto Hydro customer is without power for **one to on-and-a-half hours** per year.

In your view, how do you think Toronto Hydro should address the **length of time** customers are without power? Would you say …
[asked of all respondents; n = 200]



- Spend what is needed to reduce the length of power outages
- Spend what is needed to maintain the current length of outages
- Accept longer power outages in order to keep customer costs down
- Don't Know/Refused

Sample Breakdown ▸▸
Those who say "Spend what is needed to maintain the current length of outages"



System Challenges & Priorities

This section explores respondents' support for various types of investment including infrastructure, technology and tools and equipment.

System Challenges & Priorities Summary

Investment in Aging Infrastructure

Six-in-ten (60%) residential customers and half (51%) of General Service customers believe that Toronto Hydro should invest in aging infrastructure to reduce future power outages, even if it means their bills may increase.

- Highest support among residential customers for infrastructure investment lies in Central Toronto (68%).

Investment in New Technologies

Two-thirds (67%) of residential customers and six-in-ten (61%) General Service customers agree that investments in new technology will increase system reliability, make the local distribution system more efficient and save money in the long run. About two-in-ten (RS: 19%; GS: 20%) prefer the view that the utility should not invest in new technologies.

- Residents in the Toronto region (73%) are most likely to agree to investment in new technologies.

Investment in Equipment and Tools

Two-thirds (66%) of Residential customers believe that Toronto Hydro should be wise with its spending, but they also think it is important that staff have the equipment and tools needed to manage the system efficiently and reliably.

- Residential customers struggling with the cost of their electricity bill (63%) are less likely to believe it is important that Toronto Hydro has proper equipment and tools than those who are unaffected financially by the electricity bill (74%).

Preamble for System Challenges & Priorities Section

At this point in the survey, respondents were presented with a preamble concerning the status of current electricity infrastructure and the need to rebuild it to prevent future service disruptions:

"As you may be aware, much of your local electricity system is aging and needs to be replaced in the near future. The time lost to power service interruptions ***caused by aging equipment*** *has been growing steadily over the past decade.*

According to Toronto Hydro's engineers, almost 60% of Toronto's electricity distribution infrastructure needs to be rebuilt over the next two decades. The price of these upgrades is approximately ***$5.6 billion overall****.*

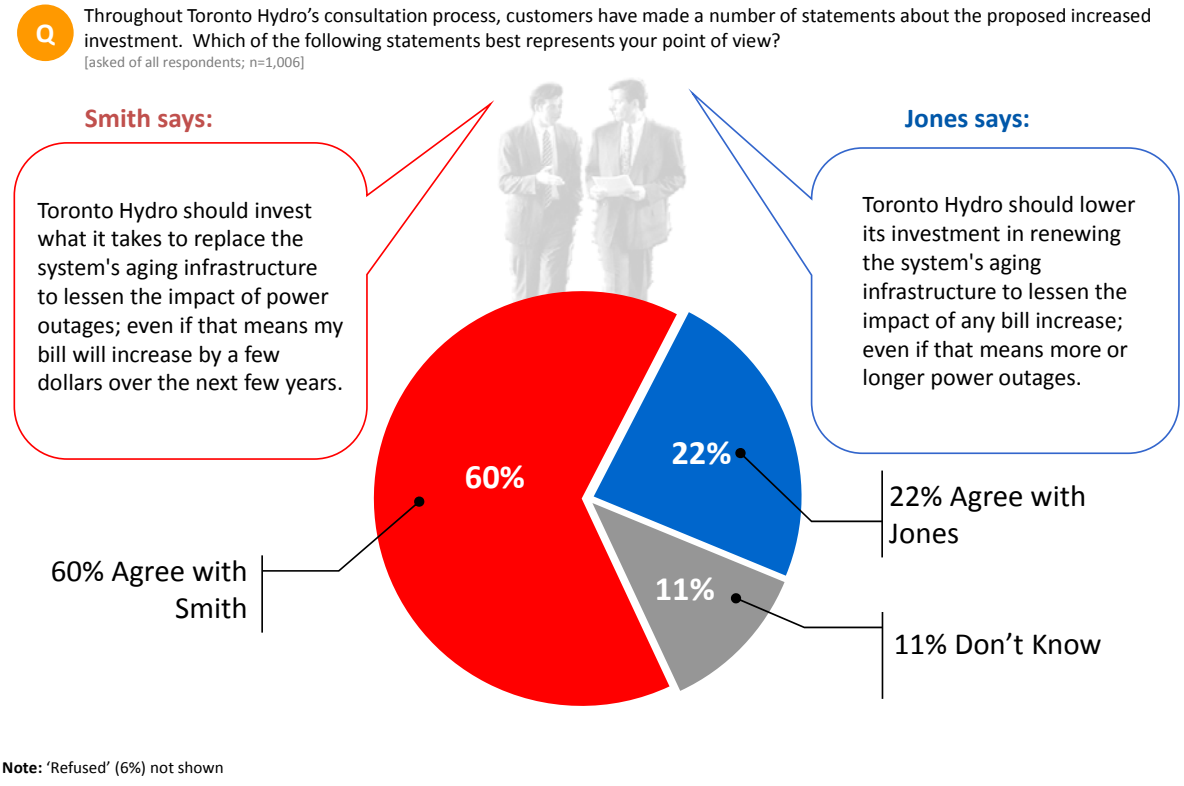
As part of its 5-year plan, Toronto Hydro is proposing to continue its significant annual infrastructure renewal investment program. Although this plan will allow Toronto Hydro to make necessary investments, ***it will have an impact on customer bills****."*

Investment in Aging Infrastructure

Six-in-ten (60%) residential customers believe that Toronto Hydro should invest what it takes to replace the system's aging infrastructure to lessen the impact of power outages, even if it means their bills will increase. In opposition, 22% of respondents think Toronto Hydro should lower its investment in renewing the system's aging infrastructure even if it means there will be more or longer outages.

- Highest support for infrastructure investment lies in Central Toronto (68%), with the lowest in Etobicoke (55%) and Scarborough (54%).
- There are no significant differences across consumption or residence type for investing in aging infrastructure.
- Residents who claim that their electricity bill "has a major impact on their bottom line" (51%) are much less likely to support investment in aging infrastructure than those who are unaffected financially by the electricity bill.

Figure 4.10 RS: Investment in Aging Infrastructure



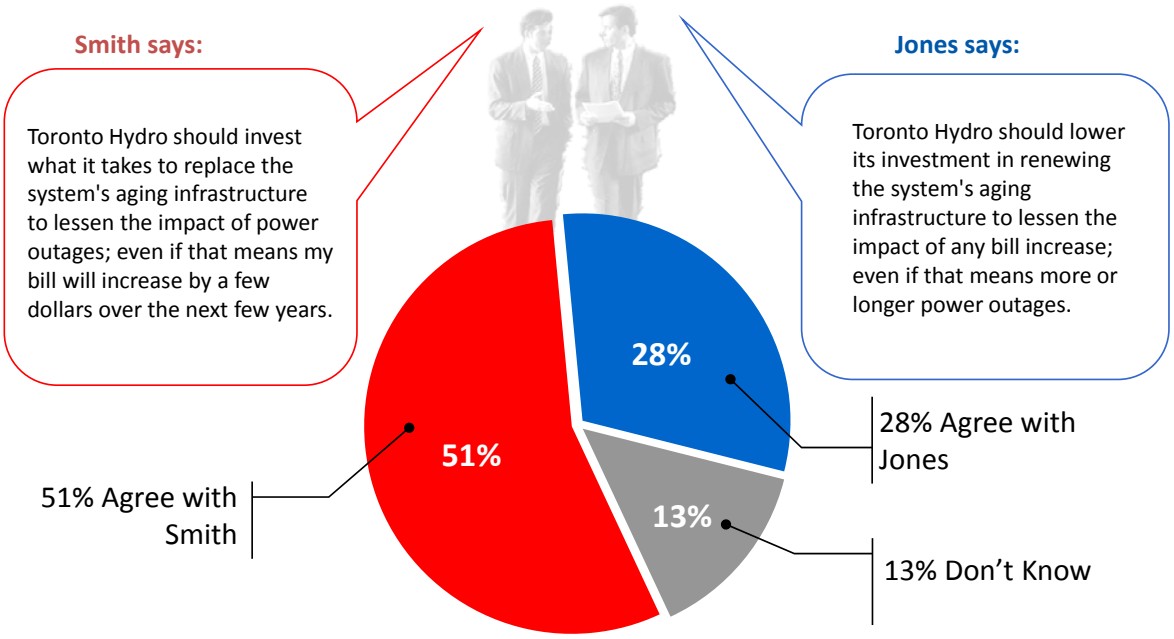
Note: 'Refused' (6%) not shown

As for General Service customers, half (51%) think Toronto Hydro should invest what it takes to replace the system's aging infrastructure to lessen the impact of power outages, despite a possible bill increase. Less than three-in-ten (28%) think Toronto Hydro should lower its investment in aging infrastructure, even if that means more outages.

- Central Toronto and East York (57%) are somewhat more likely to support investment in aging infrastructure than Outer Toronto (45%).

Figure 4.10 GS: Investment in Aging Infrastructure

Q Throughout Toronto Hydro's consultation process, customers have made a number of statements about the proposed increased investment. Which of the following statements best represents your point of view?
[asked of all respondents; n=200]



Note: 'Refused' (9%) not shown

Investment in New Technology

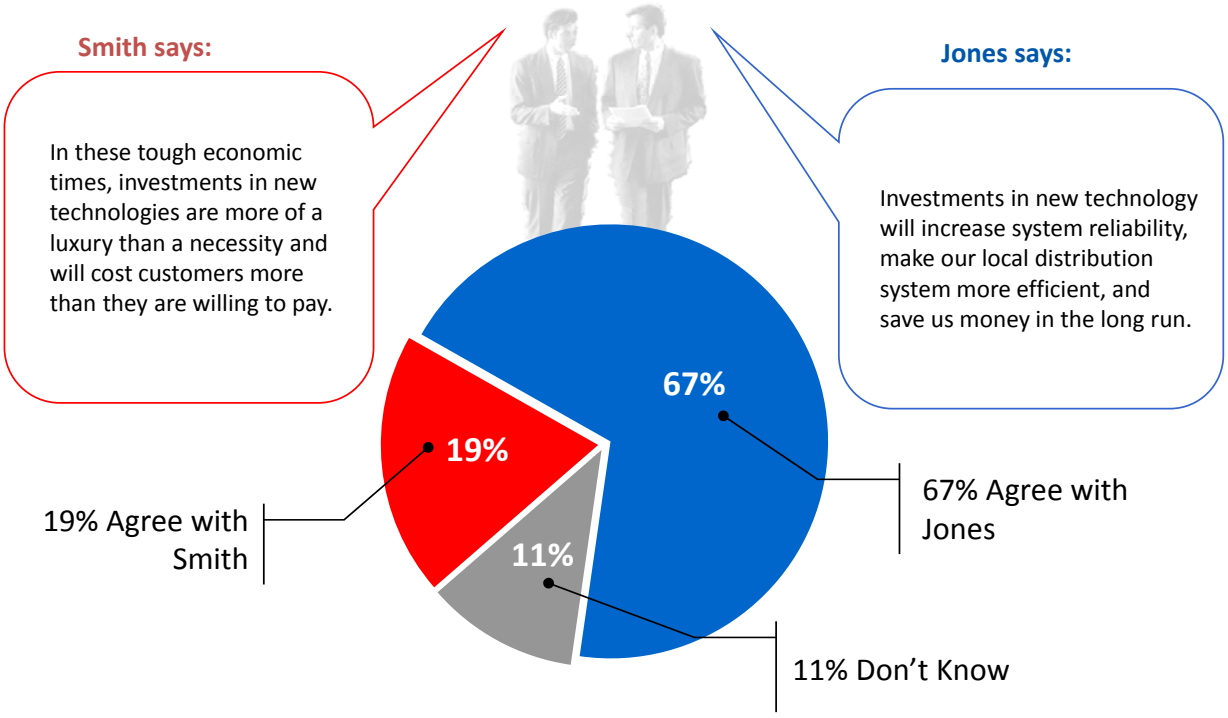
Following the questions on infrastructure investment, customers weighed in on investment in new technology.

Two-thirds (67%) of residential customers agree that investments in new technology will increase system reliability, make local distribution system more efficient and save money in the long run. Just two-in-ten (19%) prefer the counter-argument that new technologies are a luxury, not a necessity and would cost the customers more than they are willing to pay.

- Customers in Central Toronto (73%) are most likely to agree on the benefits of investment in new technology.
- Consumption rate does not appear to affect opinion on investment in new technology.
- Residential customers claiming that their electricity bill "has a major impact on their bottom line" (66%) are somewhat less likely to support investment in new technology than those who are unaffected financially by the electricity bill (75%).

Figure 4.11 RS: Investment in New Technology

Q Other Toronto Hydro customers have made a number of statements about aging infrastructure and future investments required to improve the reliability of the electricity system. Which of the following statements best represents your point of view?
[asked of all respondents; n=1,006]



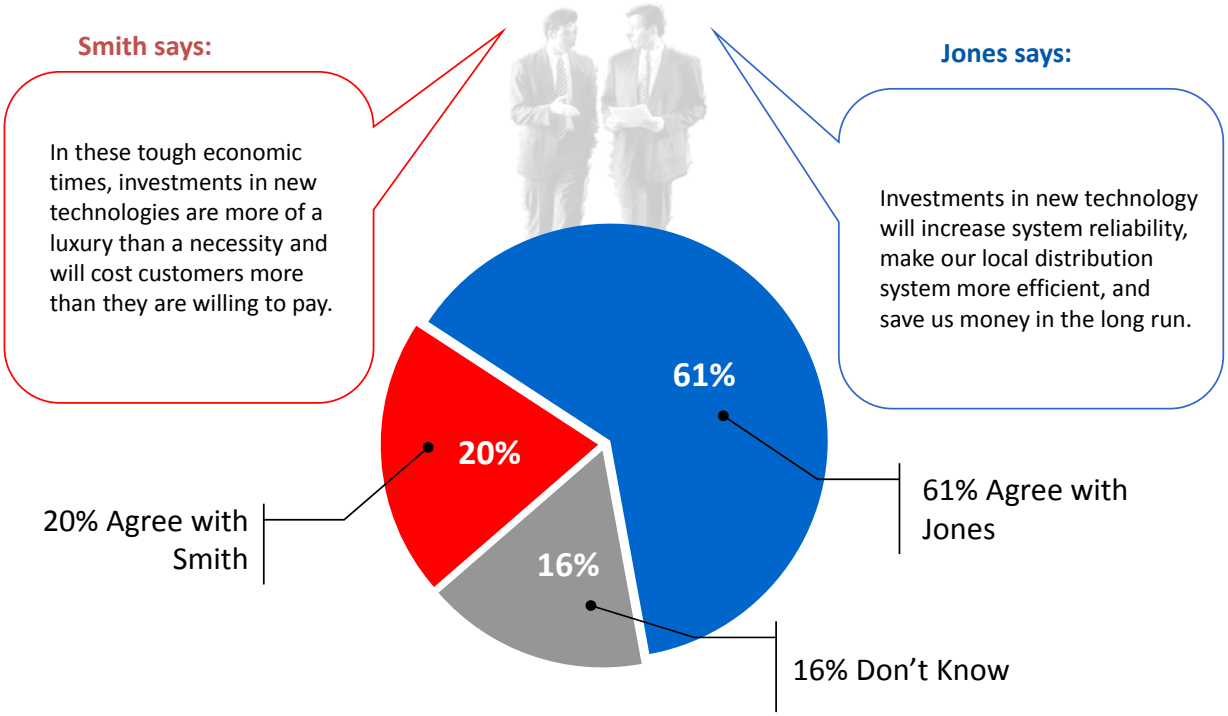
Note: 'Refused' (3%) not shown

Six-in-ten (61%) General Service customers agree with the statement praising investments in new technology, compared with just two-in-ten (20%) who prefer the counter argument

- No significant differences emerge by region or consumption.
- Those paying more on their monthly bill ($1000+: 50%) are less likely to agree that investment in new technology will increase reliability, efficiency and save money in the long-run.

Figure 4.11 GS: Investment in New Technology

Q Other Toronto Hydro customers have made a number of statements about aging infrastructure and future investments required to improve the reliability of the electricity system. Which of the following statements best represents your point of view?
[asked of all respondents; n=200]



Note: 'Refused' (4%) not shown

Preamble for Investment in Equipment and Tools

For the following question on investment in equipment and tools, respondents were read this brief preamble:

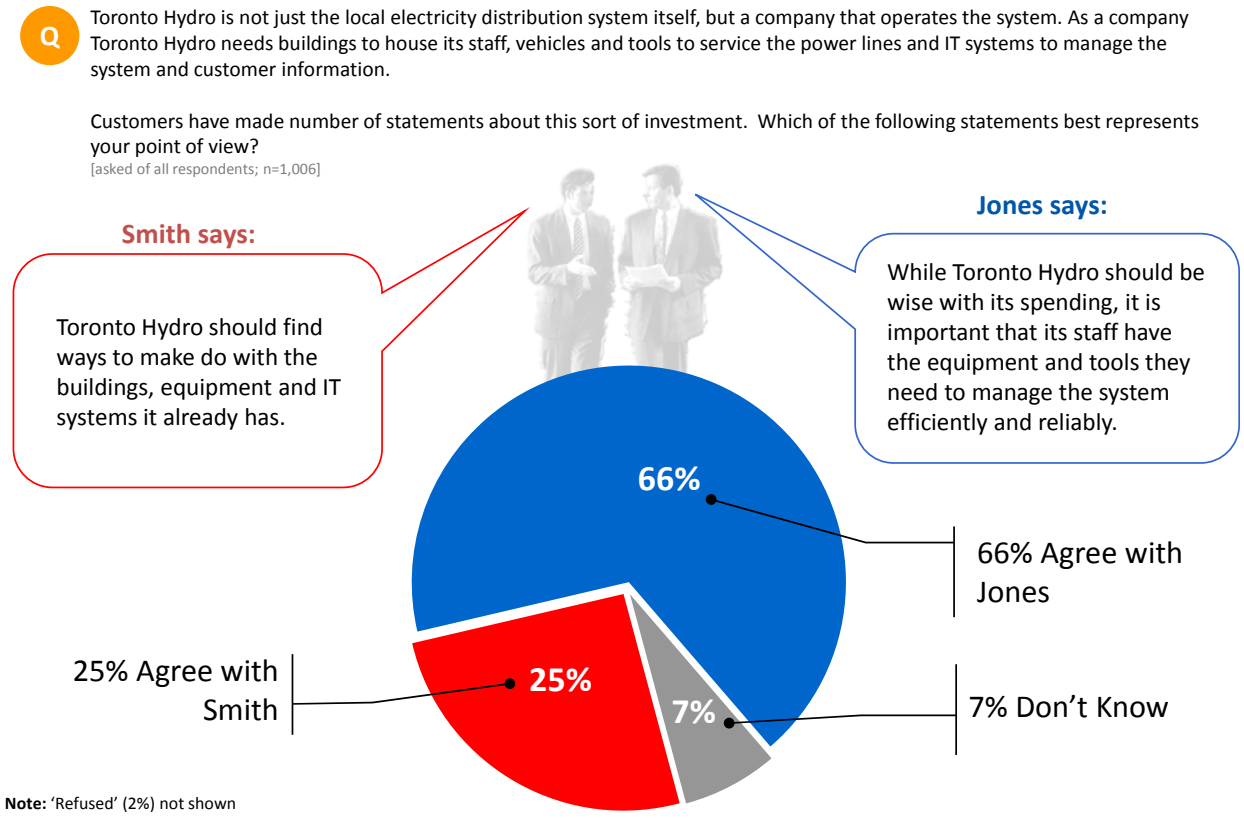
"Toronto Hydro is not just the local electricity distribution system itself, but a company that operates the system. As a company, Toronto Hydro needs buildings to house its staff, vehicles and tools to service the power lines and IT systems to manage the system and customer information."

Investment in Equipment and Tools

Two-thirds (66%) of Residential customers believe that Toronto Hydro should be wise with its spending, but they also think it is important that staff have the equipment and tools needed to manage the system efficiently and reliably. One-quarter (25%) of respondents think that Toronto Hydro should find ways to make do with the buildings, equipment and IT systems it already has.

- Across region and consumption patterns there is little change in belief on properly equipping Toronto Hydro to manage its system.
- Residential customers struggling with the cost of their electricity bill (63%) are less likely to believe it is important that Toronto Hydro has proper equipment and tools than those who are unaffected financially by the electricity bill (74%).

Figure 4.12 RS: Investment in Equipment and Tools



Note: 'Refused' (2%) not shown

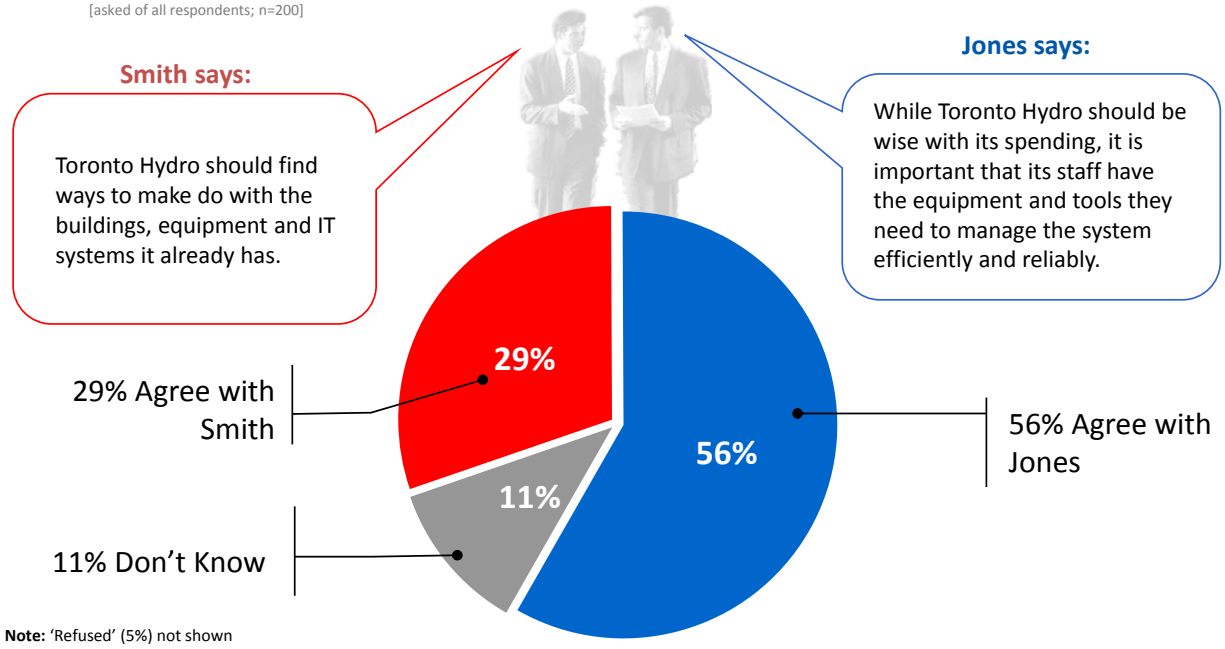
Less than six-in-ten (56%) General Service customers believe that, while Toronto Hydro should be wise with its spending, it is important that Toronto Hydro's staff have the equipment and tools they need to manage the system efficiently and reliably.

- Regionally, there is little difference among General Service customers.
- High consumption organizations (64%) are the most likely to agree with the positive statement on investing in Toronto Hydro equipment and tools.

Figure 4.12 GS: Investment in Equipment and Tools

Q Toronto Hydro is not just the local electricity distribution system itself, but a company that operates the system. As a company Toronto Hydro needs buildings to house its staff, vehicles and tools to service the power lines and IT systems to manage the system and customer information.

Customers have made number of statements about this sort of investment. Which of the following statements best represents your point of view?
[asked of all respondents; n=200]



Note: 'Refused' (5%) not shown

Reaction to Previous Customer Consultation Input

This section measures agreement with some of the key opinion statements provided by Toronto Hydro's customers in previous phases of the consultation.

Customer Reaction Statements Summary

Of the thirteen customer input statements provided in the questionnaire, the statement with the most support among residential customers is "I think Toronto Hydro should do more to help customers find ways to reduce the electricity consumption and costs".

Similarly, among General Service customers, the most supported statement was the business version of the same question: "I think Toronto Hydro should do more to help business customers find ways to reduce their electricity consumption and costs."

The statement with the lowest level of agreement is "when it comes to reducing power outages and improving reliability, the first priority should be business customers, then residential customers."

Again, the statement with the lowest level of General Service agreement is "when it comes to reducing power outages and improving reliability, the first priority should be business customers."

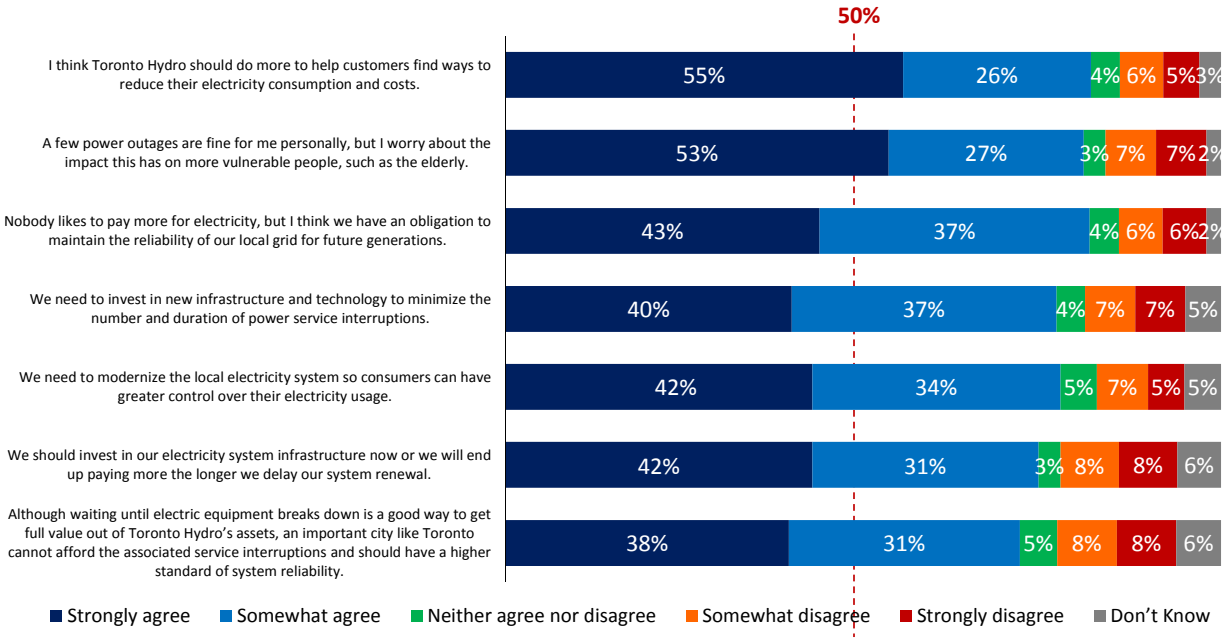
Residential Customer Reaction

A majority of residential respondents agree with all of the customer input statements provided in the questionnaire except one: "When it comes to reducing power outages and improving reliability, the first priority should be business customers, then residential customers." (31% agree; 57% disagree; 37% strongly disagree).

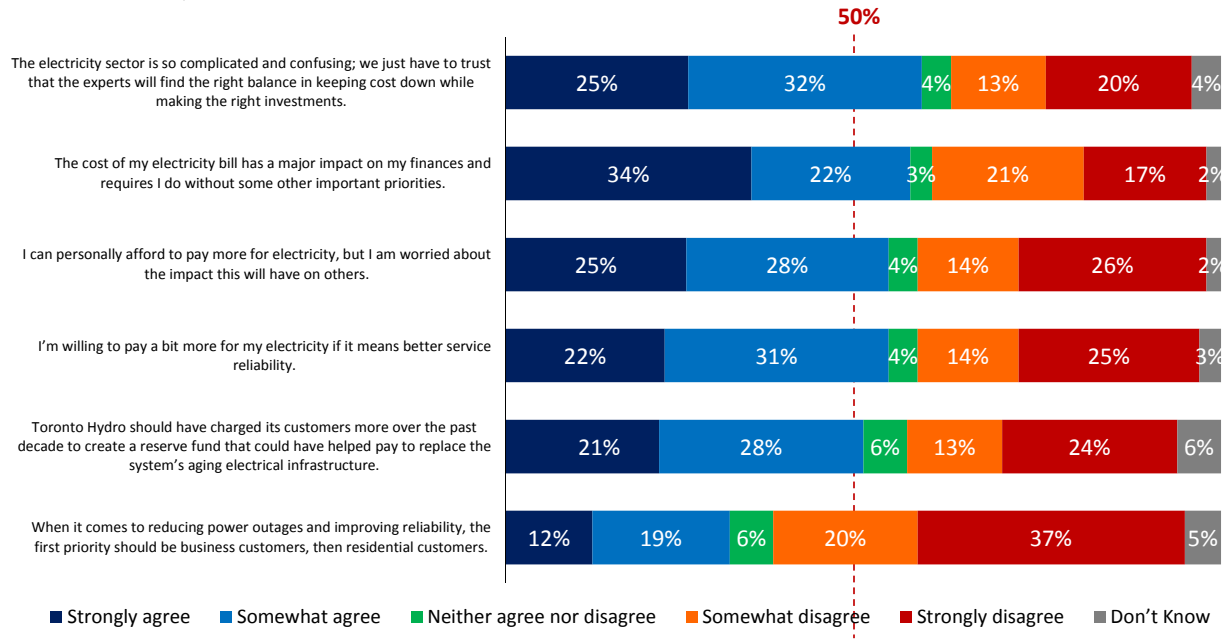
Of the thirteen statements put forth to residential customers, three of them have at least 80% support. These three statements focus on cost, the vulnerability of the elderly and the future of infrastructure. In the statement with the most support, eight-in-ten (81%) agree that "I think Toronto Hydro should do more to help customers find ways to reduce the electricity consumption and costs" and 55% of respondents strongly agree. Eight-in-ten (80%) residential customers also agree that "a few power outages are fine for me personally, but I worry about the impact this has on more vulnerable people, such as the elderly". This statement on the vulnerability of the elderly also has intense agreement: over half (53%) of residential customers strongly agree. Eight-in-ten (80%) of those surveyed also agree that "nobody likes to pay for more for electricity, but I think we have an obligation to maintain the reliability of our local grid for future generations". Again, this statement elicits strong intensity of agreement (43% strongly agree).

Figure 4.13 RS: Reaction to Customer Input

Q The following statements have been made by customers throughout Toronto Hydro's consultation process. For each statement, please tell me if you strongly agree, somewhat agree, somewhat disagree or strongly disagree.
[asked of all respondents; n=1,006]



Q The following statements have been made by customers throughout Toronto Hydro's consultation process. For each statement, please tell me if you strongly agree, somewhat agree, somewhat disagree or strongly disagree.
[asked of all respondents; n=1,006]



GS Customer Reaction

A majority of General Service agree with ten of the thirteen statements provided in the questionnaire. The strongest agreement is on cost savings: "I think Toronto Hydro should do more to help business customers find ways to reduce their electricity consumption and costs." Nearly eight-in-ten (78%) agree with that statement, with six-in-ten who strongly agree.

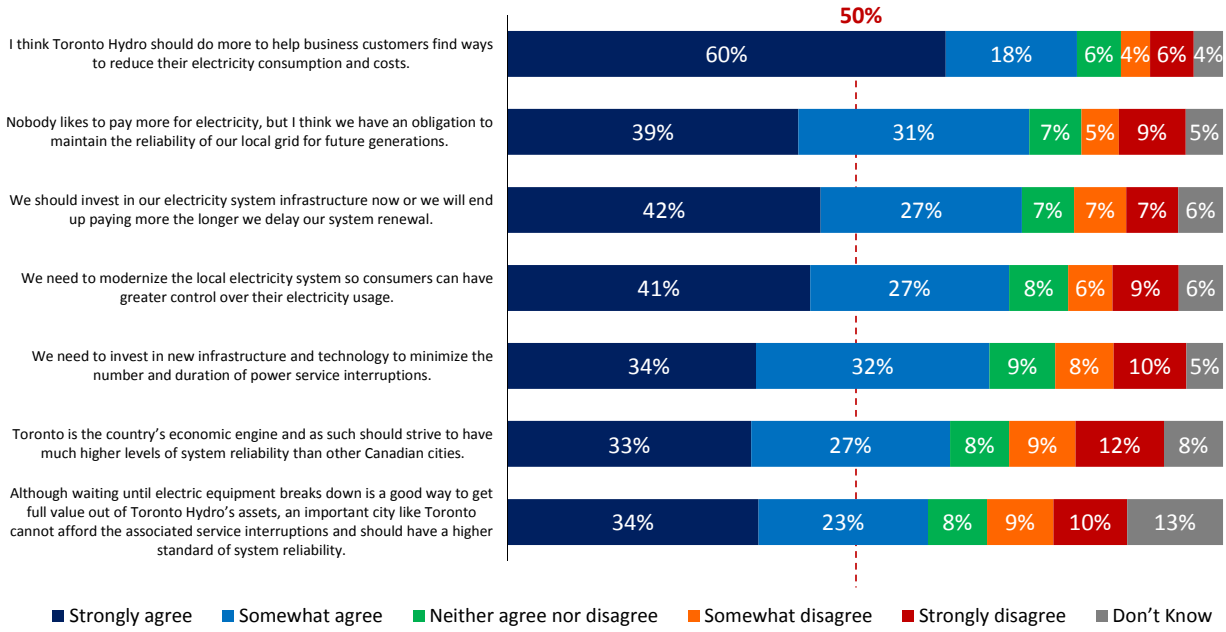
Less than half of General Service respondents agree with three of the thirteen statements:

- Only 43% think that their organization would be willing to pay a bit more for electricity if it means better service reliability, with intense disagreement (29% strongly disagree).
- 43% also believe that Toronto Hydro should have charged its customers more over the past decade to create a reserve fund for infrastructure, with again 29% who strongly disagree.
- And just 32% agree that when it comes to reducing power outages and improving reliability, the first priority should be business customers.

Figure 4.13 GS: Reaction to Customer Input

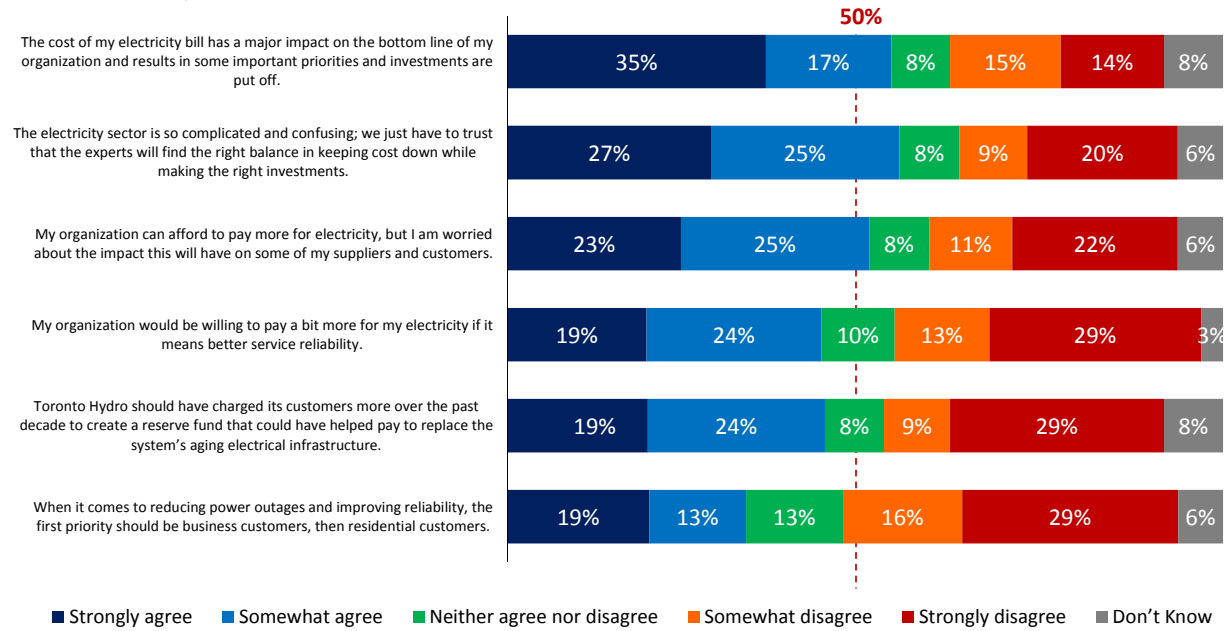
Q The following statements have been made by customers throughout Toronto Hydro's consultation process. For each statement, please tell me if you strongly agree, somewhat agree, somewhat disagree or strongly disagree.

[asked of all respondents; n=200]



Q The following statements have been made by customers throughout Toronto Hydro's consultation process. For each statement, please tell me if you strongly agree, somewhat agree, somewhat disagree or strongly disagree.

[asked of all respondents; n=200]



Assessment of Plan

This section explores the degree of acceptance that Toronto Hydro's customers give for a rate increase. Acceptance is defined as either support for a rate increase or agreeing that it is necessary. This section also explores the underlying reasons for acceptance and opposition to a rate increase, probing more specifically through open-ended questions.

Acceptance of Rate Increase Summary

Nearly six-in-ten residential (58%) customers accept the rate increase. However, most of these respondents offer reluctant acceptance (39%): they don't like the increase, but feel it's necessary to maintain the grid. Only a third (34%) thinks the rate increase is unreasonable.

- The highest rates of acceptance come from Central Toronto (67%), East York (65%), and York (63%) with less support in the rest of Outer Toronto (North York: 53%; Etobicoke: 52%; Scarborough: 52%).
- Consumption rates have little effect on acceptance numbers.
- Residential customers who feel their electricity bills are a significant toll on their finances are much less likely to accept a rate increase (51% "toll on their finances" support the increase; 70% "not a toll").
- Single-person households (53%) are least likely to support the rate increases.

General Service customers are less willing to accept of rate increases than residential customers: just under half (48%) of organizational customers support the proposed Toronto Hydro plan. Much of that acceptance appears to be reluctant: they "don't like the rate increase, but feel it is necessary" (30%). Four-in-ten (41%) think the bill impact is too high and Toronto Hydro needs to scale back.

- Regionally there is little difference in opinion among GS customers.
- However, businesses that consume high levels of electricity (60%) are much more likely to accept a rate increase than low consumption businesses (34%).

Reasons why customers accept or opposed Toronto Hydro's proposed DSP:

- In the residential breakdown, those who are most strongly accepting of the rate increase cite "concerns over future infrastructure needs" (29%) and "better service" (22%) as their key reasons.
- Those who are satisfied with the balance give "reasonable cost" (31%) as the main reason.
- Residents who are reluctantly accepting -they don't like it, but it's necessary- cite "reasonable cost" (22%), "necessary sacrifice" (18%),"better service" (14%) and the "future infrastructure crisis" (11%) as the main reasons.
- Six-in-ten (60%) of those against the rate increase cite "cost too much" as the reason for their disapproval, followed by "concerns about non-capital expenses" (15%).

Preamble for Assessment of Plan Section

Prior to the questions given in the Assessment of Plan Section, residential customers were presented with a preamble concerning the breakdown of pricing for Toronto Hydro's 5-year plan:

*To maintain the reliability of the local electricity system, Toronto Hydro's proposed 5 year plan will cost an estimated **$500 million** per year. This includes …*

- ***54%** to replace aging infrastructure;*
- ***19%** to maintain metering and connect new customers to the electricity system;*
- ***13%** to invest in tools, computers and software systems, vehicles and facilities needed to manage the electricity system;*
- ***8%** to expand system capacity to accommodate future growth; and*
- ***6%** for new technologies to make the system more efficient, reliable and safe.*

*To fund this plan, Toronto Hydro is proposing the **average residential customers' rate increase by $2.90** on the distribution portion of their bill for the next five years. So, by 2019, the average residential household will be paying an **estimated $14.50 more per month** on the distribution portion of its electricity bill.*

*(Note: in the GS Survey, the two bolded phrases in the last paragraph were replaced with "**average small and medium-sized business customers' rate increase by $5.75"** and **"estimated $28.75 more per month"**, respectively. The rest of the preamble remained the same for organizational customers.)*

Note: In the online workbook and the workbook-led facilitated discussions, the monthly bill impact was presented differently from the telephone surveys. The telephone surveys were updated to reflect adjustments to Toronto Hydro's capital plan made over the course of the consultation process.

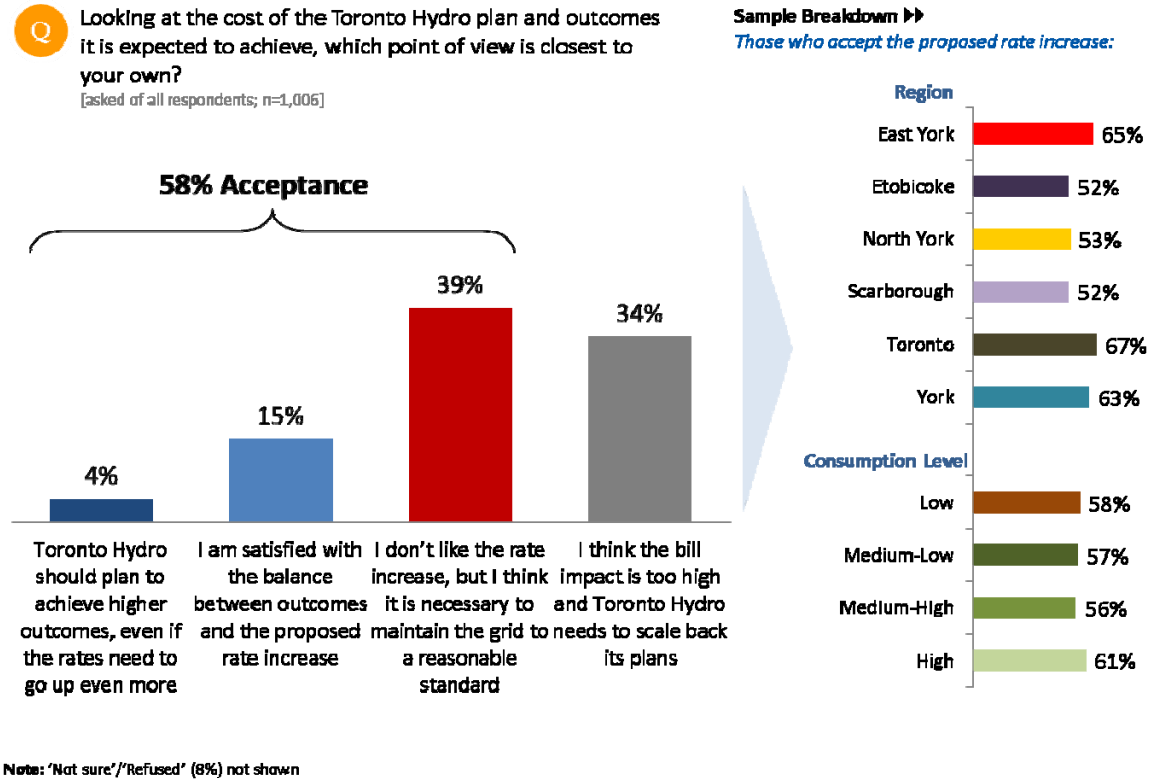
- **For Residential**: Toronto Hydro's proposal is expected to lead to a total increase of approximately **$11.75** on the average residential customer's monthly bill by 2019.
- **For GS < 50 kW**: Toronto Hydro's proposal is expected to lead to a total increase of approximately **$30.50** on the average small business customer's monthly bill by 2019.

Assessment of Plan

When asked the "acceptance question" on rate increases, nearly (58%) six-in-ten residential customers agree to the rate increase. Four percent (4%) of respondents think that Toronto Hydro should plan to achieve higher incomes even with increased rates and 15% state they were satisfied with the balance between outcomes and the proposed rate increase. Four-in-ten (39%) residents don't like the rate increase, but think it's necessary to maintain the infrastructure. Just one-third (34%) of respondents feel the bill impact is too high and Toronto Hydro needs to scale back its plans.

- Looking regionally, Central Toronto (67%), East York (65%) and York (63%) are most likely to accept the rate increases. The rest of Outer Toronto (Etobicoke: 52%, Scarborough: 52%; North York: 53%) are the least supportive of the rate increase.
- A majority of support exists across all consumption levels (56-61%).
- Residential customers who feel their electricity bills are a significant toll on their finances are much less likely to support a rate increase (51% "toll on their finances" support the increase; 70% "not a toll").
- Single-person households (53%) are the least likely to support the rate increase.

Figure 4.14 RS - Acceptance of Rate Increase



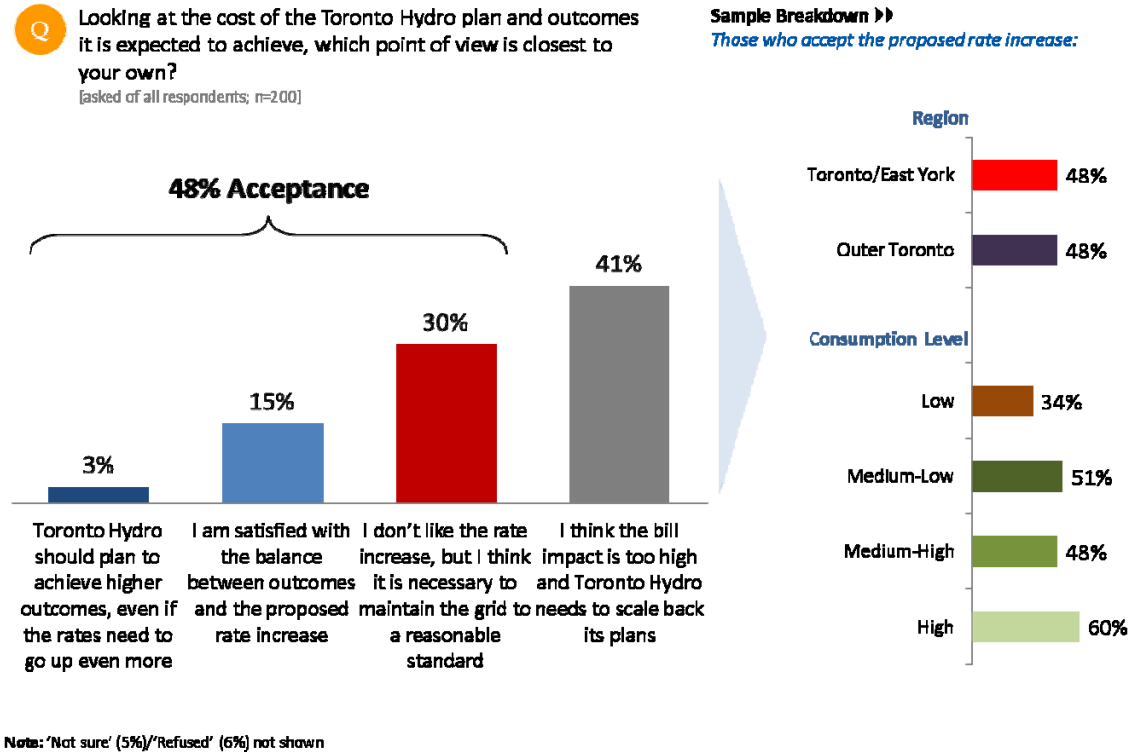
Note: 'Not sure'/'Refused' (8%) not shown

General Service customers, on the other hand, are less likely to support rate increases: just under half (48%) of GS respondents accept the increase.

Breaking down "acceptance": 3% of GS respondents thought Toronto Hydro should plan to achieve even higher outcomes despite rates; 15% were satisfied with the balance between outcomes and proposed rate increase and 30% do not like the rate increase, but think it's necessary to maintain the grid. Four-in-ten (41%) think the bill impact is too high and Toronto Hydro needs to scale back its plan.

- No significant differences emerge by region for General Service customers.
- Consumption appears to play a significant role in assessment of the plan: just a third (34%) of low consumption customers accept the plan compared to six-in-ten among high consumption organizations (60%).
- GS customers struggling with the cost of their electricity bill (46%) are less likely to accept the proposed increase than those who are unaffected financially by their electricity bill (67%).

Figure 4.14 GS - Acceptance of Rate Increase



Note: 'Not sure' (5%)/'Refused' (6%) not shown

Opinions on Proposed Rate Increase

For residential customers, due to the larger sample size, the responses can be broke down into four groups: “acceptance- hydro should plan higher”; “acceptance-satisfied with the balance”; “acceptance-don’t like, but necessary” and “no acceptance- cost impact too high”.

When broken down into these subgroups, some striking differences emerge:

- Residents who are most strongly accepting of the plan are most likely to answer "future infrastructure crisis" (29%) and "better service” (22%) as the reasoning, with "reasonable cost" (12%) as the third key driver.
- For those who accept and are "*satisfied with the balance*", the most important reason is again cost (31%) - it is "reasonable" to them. Other key reasons include the "future infrastructure crisis" (13%), "better service" (13%) and "necessary sacrifice" (11%).
- For those who reluctantly accept -*they don't like it, but feel it is necessary*- the "reasonable cost" (22%), "necessary sacrifice" (18%) and "better service" (14%) and the “future infrastructure crisis” (11%) were given as the main reasons.
- Among those against the proposed increase, six-in-ten (60%) state "cost too much" as the reason and about one-in-seven (15%) citing “concerns about non-capital expenses”.

Figure 4.15 RS – Opinion on Proposed Rate Increase

Q And why do you say that? (Rate increase for local distribution system)
Residential Customers

ACCEPTANCE- HYDRO SHOULD PLAN HIGHER	% RS
Future infrastructure crisis	29%
Better service most important	22%
Cost increase reasonable	17%
Necessary sacrifice	7%
Cost too much	5%
Other	12%
Don't know/Refused	7%

N=41

ACCEPTANCE - SATISFIED WITH BALANCE	% RS
Cost increase reasonable	31%
Future infrastructure crisis	13%
Better service most important	13%
Necessary sacrifice	11%
Satisfied with Toronto Hydro (general)	7%
Concerns about non-capital expenses	4%
Cost too much	3%
Other	6%
Don’t know/Refused	11%

N=151

ACCEPTANCE - DON'T LIKE, BUT NECESSARY	% RS
Cost increase reasonable	22%
Necessary sacrifice	18%
Better service most important	14%
Future infrastructure crisis	11%
Concerns about non-capital expenses	8%
Efficiency	4%
Cost too much	4%
Someone else should pay	3%
Other	6%
Don't know/Refused	10%

N=392

NO ACCEPTANCE - IMPACT TOO HIGH	% RS
Cost too much	60%
Concerns about non-capital expenses	15%
Efficiency	8%
Someone else should pay	5%
Future infrastructure crisis	1%
Other	7%
Don't know/Refused	4%

N=339

For general service customers, the responses are be broken down into the same four groups: “acceptance- hydro should plan higher”; “acceptance-satisfied with the balance”; “acceptance- don’t like, but necessary” and “no acceptance- cost impact too high”.

When broken down into these subgroups, some striking differences emerge:

- Residents who are most strongly accepting of the plan are most likely to answer “better service most important” (50%). It is important to note however, that this group consists of only 6 customers.
- For those who accept and are "*satisfied with the balance*", the most important reason is that they see the cost as reasonable (40%). Other key reasons include the “better service" (17%), “future infrastructure crisis" (13%) and "necessary sacrifice" (10%).
- Those who give reluctant acceptance -*they don't like it, but feel it is necessary* - are most likely to see it as a necessary sacrifice (17%), many are worried the cost is high (13%), while some others are motivated by “future infrastructure crisis” (10%) and “better service” (10%).
- Among those against the proposed increase, about half (48%) state "cost too much" and after that the main reasons are “concerns about efficiency” (12%) and “concerns about non-capital expenses” (12%).

Figure 4.15 GS – Opinion on Proposed Rate Increase

Q And why do you say that? (Rate increase for local distribution system)
General Service Customers

ACCEPTANCE- HYDRO SHOULD PLAN HIGHER	% GS
Better service most important	50%
Cost increase reasonable	17%
Necessary sacrifice	17%
Other	17%

N=6

ACCEPTANCE - SATISFIED WITH BALANCE	% GS
Cost increase reasonable	40%
Better service most important	17%
Future infrastructure crisis	13%
Necessary sacrifice	10%
Refused	10%
Good for business	3%
Other	3%
Don't Know	3%

N=30

ACCEPTANCE - DON'T LIKE, BUT NECESSARY	% GS
Necessary sacrifice	17%
Cost too much	13%
Future infrastructure crisis	10%
Better service most important	10%
Efficiency	7%
Cost increase reasonable	7%
Someone else should pay the costs	5%
Concerns about non-capital expenses	5%
Refused	5%
Good for business	3%
Other	10%
Don't Know	8%

N=60

NO ACCEPTANCE - IMPACT TOO HIGH	% GS
Cost too much	48%
Efficiency	12%
Concerns about non-capital expenses	12%
Someone else should pay the costs	10%
Better service most important	2%
Refused	2%
Necessary sacrifice	1%
Other	6%
Don't Know	6%

N=82

Survey Instruments

Residential Survey Instrument

Section A: Introduction

Hello, my name is _____ and I'm calling from **Innovative Research Group** on behalf of **Toronto Hydro**, your local utility for electricity. Innovative Research Group is a national public opinion research firm. We have been commissioned by **Toronto Hydro** to help them better understand the needs and preferences of customers who are responsible for paying their household's electricity bill.

Toronto Hydro – which distributes electricity to customers in the Toronto area – is in the process of developing its 5-year grid investment plan and wants to hear from their customers to help inform this plan.

A1. Would you mind if I had ten minutes of your time to ask you some questions? All your responses will be kept strictly confidential.

Yes	1	[**continue**]
No – NOT PRIMARY BILL PAYER	2	[**go to TRANSFER-1**]
No – BAD TIME	3	**ARRANGE CALLBACK**
No – HARD REFUSAL	4	[**Terminate**]

MONIT

This call may be monitored or audio taped for quality control and evaluation purposes.

PRESS TO CONTINUE	1

A2. Have I reached you at your home phone number?

INTERVIEWER NOTE; IF "NO" ASK: May I speak to someone who does live there?

Yes - SPEAKING, CONTINUE	1	[**continue to A3**]
YES - TRANSFERRED – (GO BACK TO INTRODUCTION)	2	[back to INTRO]
No - NOT AVAILABLE – (ARRANGE CALLBACK)	3	[ARRANGE CALLBACK]
Refused – LOG (THANK AND TERMINATE)	9	[Terminate]

A3. Are you the person primarily responsible for paying the electricity bill in your household?

Yes	1	[continue to A4]
No	2	[go to TRANSFER-1]
Don't know (**DNR**)	98	[**Terminate**]

TRANSFER-1

Can I speak with the person in your household who usually pays the electricity bill?

Yes	1	[**BACK TO** *INTRO*]
No – NOT AVAILABLE/BAD TIME – (ARRANGE CALLBACK)	2	[ARRANGE CALLBACK]
No – HARD REFUSAL	3	[**Terminate**]
Don't know (**DNR**)	98	[**Terminate**]

A4. Can you confirm that your household receives an electricity bill from Toronto Hydro?

Yes	1	[**continue**]
No	2	[Terminate]
Don't know (**DNR**)	98	[Terminate]

GENDER Note gender by observation:

Male	1
Female	2

Section B: General Satisfaction

B5. PREAMBLE-1

To start, I'd like to ask you a few questions about the electricity system …

As you may know, Ontario's electricity system has three key components: **generation, transmission** and **distribution**.

- **Generating stations** convert various forms of energy into electric power;
- **Transmission lines** connect the power produced at generating stations to where it is needed across the province; and
- **Distribution lines** carry electricity to the homes and businesses in our communities.

Today we're going to talk about your **local distribution system** which is maintained and operated by **Toronto Hydro**.

How familiar are you with the **local electricity distribution system**? Would you say … [READ LIST]

Very familiar	1
Somewhat familiar	2
Not very familiar	3
Not familiar at all	4
Don't know (**DNR**)	98
Refused (**DNR**)	99

B6. Generally speaking, how satisfied are you with the job **Toronto Hydro** is doing running your local distribution system? Would you say … [**READ LIST**]

Very satisfied	1
Somewhat satisfied	2
Somewhat dissatisfied	3
Very dissatisfied	4
Don't know (**DNR**)	98
Refused (**DNR**)	99

B7. Is there anything in particular **Toronto Hydro** can do to improve their service to you? [**OPEN**]

Don't know (**DNR**)	98
Refused (**DNR**)	99

Section C: Bill Knowledge

I'd now like to talk with you about your electricity bill …

C8. While some customers pay more and other pay less, the **average residential customer pays about $132 a month** for electricity of **which $33 or approximately 25% goes to Toronto Hydro**. The rest of the bill goes to power generation companies, transmission companies, the provincial government and regulatory agencies.

Before this survey, how familiar were you with the amount of your electricity bill that went to Toronto Hydro? Would you say … [READ LIST]

Very familiar	1
Somewhat familiar	2
Not very familiar	3
Not familiar	4
Don't know (**DNR**)	98
Refused (**DNR**)	99

Section D: System Reliability

D9. This past year Toronto Hydro customer experienced unusually extreme weather –flooding last July and an ice storm in December. These major weather events caused power outages across Toronto Hydro's service area.

Did either of these storms cause a power outage at your home?

INTERVIEWER NOTE: Make sure respondents specify which storm affected their power.

Yes – flooding	1
Yes – the ice storm	2
Yes – both storms	3
No – neither weather events affected my power service	4
Don't know (**DNR**)	98
Refused (**DNR**)	99

[Ask all respondents]

D10. Not including power outages caused by these extreme weather events, did you have any other power outages in the **last 12 months**?

Yes	1
No	2
Don't know (**DNR**)	98
Refused (**DNR**)	99

[**Ask all respondents**]

D11. Despite best efforts, no electrical distribution system can deliver *perfectly reliable* electricity. The more reliable the system, the more expensive the system is to build and maintain.

With that said –not including **outages caused by extreme weather** – the average Toronto Hydro customer experiences **between one and two power outages** per year.

In your view, how do you think **Toronto Hydro** should address the **number** of customer power outages? Would you say … [READ LIST]

[Rotate response code 1 and 3]

Spend what is needed to reduce the number of power outages	1
Spend what is needed to maintain the current level of outages	2
Accept **more** power outages in order to keep customer costs down	3
Don't Know (**DNR**)	98
Refused (**DNR**)	99

D12. Again, **not including outages caused by extreme weather**, the average Toronto Hydro customer is without power for **one-and-a-half hours** per year.

In your view, how do you think Toronto Hydro should address the **length of time** customers are without power? Would you say … [READ LIST]

[Rotate response code 1 and 3]

Spend what is needed to reduce the length of power outages	1
Spend what is needed to maintain the current length of power outages	2
Accept **longer** power outages in order to keep customer costs down	3
Don't Know (**DNR**)	98
Refused (**DNR**)	99

Section E: System Challenges & Priorities

E13. As you may be aware, much of your local electricity system is aging and needs to be replaced in the near future. The time lost to power service interruptions **caused by aging equipment** has been growing steadily over the past decade.

According to Toronto Hydro's engineers, almost 60% of Toronto's electricity distribution infrastructure needs to be rebuilt over the next two decades. The price of these upgrades is approximately **$5.6 billion overall**.
As part of its 5-year plan, Toronto Hydro is proposing to continue its significant annual infrastructure renewal investment program. Although this plan will allow Toronto Hydro to make necessary investments, **it will have an impact on customer bills**.

Throughout Toronto Hydro's consultation process, customers have made a number of statements about this proposed increased investment. Which of the following statements best represents your point of view?
[Read and Rotate statements 1 and 2]
Some customers have said …

> Toronto Hydro 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. 1
>
> Others have said …
>
> Toronto Hydro should lower its investment in renewing the system's aging infrastructure to lessen the impact of any bill increase; even if that means more or longer power outages. 2
>
> Don't know (**DNR**) 98
> Refused (**DNR**) 99

E14. Other Toronto Hydro customers have made a number of statements about aging infrastructure and future investments required to improve the reliability of the electricity system. Which of the following statements best represents your point of view?
[Read and Rotate statements 1 and 2]

Some customers have said…

> In these tough economic times, investments in new technologies are more of a luxury than a necessity and will cost customers more than they are willing to pay. 1

Others have said …

> Investments in new technology will increase system reliability, make our local distribution system more efficient, and save us money in the long run. 2
>
> Don't know (**DNR**) 98
> Refused (**DNR**) 99

E15. Toronto Hydro is not just the local electricity distribution system itself, but a company that operates the system. As a company, Toronto Hydro needs buildings to house its staff, vehicles and tools to service the power lines and IT systems to manage the system and customer information.

Again, customers have made number of statements about this sort of investment. Which of the following statements best represents your point of view?
[Read and Rotate statements 1 and 2]

Some customers have said …

Toronto Hydro should find ways to make do with the buildings, equipment and IT systems it already has.	1

Others have said …

While Toronto Hydro should be wise with its spending, it is important that its staff have the equipment and tools they need to manage the system efficiently and reliably.	2
Don't know (**DNR**)	98
Refused (**DNR**)	99

Section F: Reaction to Customer Consultation Input

The following statements have been made by customers throughout Toronto Hydro's consultation process.

For each statement, please tell me if you strongly agree, somewhat agree, somewhat disagree or strongly disagree.

Strongly agree	1
Somewhat agree	2
Neither agree nor disagree (**DNR**)	3
Somewhat disagree	4
Strongly disagree	5
Don't Know (**DNR**)	98
Refused (**DNR**)	99

RANDOMIZE QUESTIONS

F16. The cost of my electricity bill has a major impact on my finances and requires I do without some other important priorities.

F17. I'm willing to pay a bit more for my electricity if it means better service reliability.

F18. I can personally afford to pay more for electricity, but I am worried about the impact this will have on others.

F19. We need to modernize the local electricity system so consumers can have greater control over their electricity usage.

F20. We need to invest in new infrastructure and technology to minimize the number and duration of power service interruptions.

F21. We should invest in our electricity system infrastructure **now** or we will end up paying more the longer we delay our system renewal.

F22. The electricity sector is so complicated and confusing; we just have to trust that the experts will find the right balance in keeping cost down while making the right investments.

F23. A few power outages are fine for me personally, but I worry about the impact this has on more vulnerable people, such as the elderly.

F24. When it comes to reducing power outages and improving reliability, the first priority should be business customers, then residential customers.

F25. Although waiting until electric equipment breaks down is a good way to get full value out of Toronto Hydro's assets, an important city like Toronto cannot afford the associated service interruptions and should have a higher standard of system reliability.

F26. I think Toronto Hydro should do more to help customers find ways to reduce their electricity consumption and costs.

F27. Toronto Hydro should have charged its customers more over the past decade to create a reserve fund that could have helped pay to replace the system's aging electrical infrastructure.

F28. Nobody likes to pay more for electricity, but I think we have an obligation to maintain the reliability of our local grid for future generations.

END BATTERY

Section G: Overall Assessment of Plan

G29. PREAMBLE

To maintain the reliability of the local electricity system, Toronto Hydro's proposed 5 year plan will cost an estimated **$500 million**. This includes …

- **54%** to replace aging infrastructure;
- **19%** to maintain metering and connect new customers to the electricity system;
- **13%** to invest in tools, computers and software systems, vehicles and facilities needed to manage the electricity system;
- **8%** to expand system capacity to accommodate future growth; and
- **6%** for new technologies to make the system more efficient, reliable and safe.

To fund this plan, Toronto Hydro is proposing the **average residential customers' rate increase by $2.90** on the distribution portion of their bill for the next five years. So, by 2019, the average residential household will be paying an **estimated $14.50 more per month** on the distribution portion of its electricity bill.

G30. Looking at the cost of the Toronto Hydro plan and outcomes it is expected to achieve, which point of view is closest to your own? Would you say **[READ LIST]…?**
Rotate response code order: "4 to 1" vs. "1 to 4"

Toronto Hydro should plan to achieve higher outcomes, even if the rates need to go up even more	1
I am satisfied with the balance between outcomes and the proposed rate increase	2
I don't like the rate increase, but I think it is necessary to maintain the grid to a reasonable standard	3
I think the bill impact is too high and Toronto Hydro needs to scale back its plans	4
Not sure (DNR)	98
Refused (DNR)	99

Ask only if G30 = 1, 2, 3 or 4

G31. And why do you say that? [OPEN]

Don't know (**DNR**)	98
Refused (**DNR**)	99

Section H: Demographics

These last few questions are for statistical purposes only and we remind you again that all of your responses are completely confidential.

H32. In which year were you born? [Enter YEAR]

INTERVIEWER NOTE: if REFUSE; ask "AGE".

AGE: Can you tell me what age category do you fall into? [READ LIST]

Less than 18	0
18-25	1
25-34	2
35-44	3
45-54	4
55-64	5
65 years or older	6
Refused (**DNR**)	99

H33. Do you own or rent your home?

Own	1
Rent	2
Refused (**DNR**)	99

H34. How would you describe your primary residence? Would you say you live in … [READ LIST]

A fully-detached home;	1
A semi-detached home;	2
An apartment or condo building **less than 5 stories**; or	3
An apartment or condo building **5 stories or higher**?	4
Refused (**DNR**)	99

H35. Counting yourself, how many people live in your household?

1 person	1 **SKIP TO END**
Enter number of people	2---7
8 or more	8
Refused (**DNR**)	99 **SKIP TO END**

Ask only if H35 = 2 thru 8

H36. And how many of them are under 18?

None	0
Enter number of children	1---7
8 or more	8
Refused (**DNR**)	99

These are all the questions we have for you today. Thank you very much for taking the time to complete this survey.

General Service Survey Instrument

Section A: Introduction

Hello, my name is _____ and I'm calling from **Innovative Research Group** on behalf of **Toronto Hydro**, your local utility for electricity.

A1 QUAL PREAMBLE:

Innovative Research Group is a national public opinion research firm. We have been commissioned by **Toronto Hydro** to help them better understand the needs and preferences of their customers.

Toronto Hydro – which distributes electricity to customers in the Toronto area – is in the process of developing its 5-year grid investment plan and wants to hear from their customers to help inform this plan.

A1. Would you mind if I had ten minutes of your time to ask you some questions? All your responses will be kept strictly confidential.

Yes	1	[**continue**]
No – NOT PRIMARY BILL PAYER	2	[**go to TRANSFER-1**]
No – BAD TIME	3	**ARRANGE CALLBACK**
No – HARD REFUSAL	4	[**Terminate**]

MONIT

This call may be monitored or audio taped for quality control and evaluation purposes.

PRESS TO CONTINUE	1

A2. Just to confirm, does your organization receive an electricity bill from **Toronto Hydro**?

YES	1	**[continue]**
NO	2	**[Terminate]**
DK (volunteered)	98	**[Terminate]**

A3. As part of your job, are you in-charge of <u>managing</u> or <u>overseeing</u> your organization's electricity bill?

Yes	1	[**Continue to A4]**
No	2	CAN I SPEAK TO THE PERSON WHO MANAGES YOUR ORGANIZATION'S **ELECTRICITY** BILL?**[Return to NEW]**
DK	3	CAN I SPEAK TO THE PERSON WHO MANAGES YOUR ORGANIZATION'S **ELECTRICITY** BILL? **[Return to NEW]**

A4. Do you make OR oversee decisions about electricity management for your organization at a single facility, multiple facilities across Toronto OR multiple facilities in and outside Toronto? [If prompt required, read list]

Only at the facility I work at	1
All operations in Ontario	2
Operations in Ontario and outside Ontario	3
Don't know (**DNR**)	98
Refused (**DNR**)	99

A5. Thinking about the areas of your organization that you manage, how much would you estimate is spent <u>every month</u> on electricity provided by **Toronto Hydro**? Would you say … [READ LIST]

Less than $500	1
$500 to less than $1,000	2
$1,000 to less than $2,000	3
$2,000 to less than $5,000	4
$5,000 to less than $10,000	5
$10,000 to less than $25,000	6
$25,000 or more	7
Don't know (**DNR**)	98
Refused (**DNR**)	99

A6. Which of the following best describes the sector in which your organization operates?

MASH (Municipalities, Academic, Schools, Hospitals	1
Multi-residential	2
Commercial	3
Manufacturing/Industrial	4
Data Centre	5
Hospitality	6
Restaurant/Tavern	7
Retail	8
Warehouse	9
Other	88
Don't know (**DNR**)	98
Refused (**DNR**)	99

Section B: General Satisfaction

B7. **PREAMBLE-1**

To start, I'd like to ask you a few questions about the electricity system …

As you may know, Ontario's electricity system has three key components: **generation, transmission** and **distribution**.

- **Generating stations** convert various forms of energy into electric power;
- **Transmission lines** connect the power produced at generating stations to where it is needed across the province; and
- **Distribution lines** carry electricity to the homes and businesses in local communities.
-

Today we're going to talk about your **local distribution system** which is maintained and operated by **Toronto Hydro**.

How familiar are you with the **local electricity distribution system**? Would you say … [READ LIST]

Very familiar	1
Somewhat familiar	2
Not very familiar	3
Not familiar at all	4
Don't know (**DNR**)	98
Refused (**DNR**)	99

B8. Generally speaking, how satisfied are you with the job **Toronto Hydro** is doing running your local distribution system? Would you say … [**READ LIST**]

Very satisfied	1
Somewhat satisfied	2
Somewhat dissatisfied	3
Very dissatisfied	4
Don't know (**DNR**)	98
Refused (**DNR**)	99

B9. Is there anything in particular **Toronto Hydro** can do to improve their service to your organization? [**OPEN**]

Don't know (**DNR**)	98
Refused (**DNR**)	99

Section C: Bill Knowledge and Impact

I'd now like to talk with you about your electricity bill …

C10. While some customers pay more and other pay less, the **average small and medium-sized business pays about $330** for electricity of **which $80 or approximately 25% goes to Toronto Hydro**.. The rest of the bill goes to power generation companies, transmission companies, the provincial government and regulatory agencies.

Before this survey, how familiar were you with the amount of your electricity bill that went to Toronto Hydro? Would you say … [READ LIST]

Very familiar	1
Somewhat familiar	2
Not very familiar	3
Not familiar	4
Don't know (**DNR**)	98
Refused (**DNR**)	99

Section D: System Reliability

D11. This past year Toronto Hydro customer experienced unusually extreme weather – flooding last July and an ice storm in December. These major weather events caused power outages across Toronto Hydro's service area.

Did either of these storms cause a power outage at your organization?

INTERVIEWER NOTE: Make sure respondents specify which storm affected their power.

Yes – flooding	1
Yes – the ice storm	2
Yes – both storms	3
No – neither weather events affected my power service	4
Don't know (**DNR**)	98
Refused (**DNR**)	99

[Ask all respondents]

D12. Not including power outages caused by these major weather events, did your organization experience any other power outages in the **last 12 months**?

Yes	1
No	2
Don't know (**DNR**)	98
Refused (**DNR**)	99

D13. Thinking back to the most recent power outage – *which was caused by something other than last year's floods or ice storm* – how did it affect your organization in terms of cost?

Would you say the most recent power outage …
[Rotate response codes 1 and 3]

Had a significant cost to my business	1
A minor cost to my business	2
No cost to my business, just a bit of inconvenience	3
Don't know (**DNR**)	98
Refused (**DNR**)	99

[Ask all respondents]

D14. Despite best efforts, no electrical distribution system can deliver *perfectly reliable* electricity. As a general rule, the more reliable the system, the more expensive the system is to build and maintain.

With that said –not including **outages caused by extreme weather** – the average Toronto Hydro customer experiences **between one and two power outages** per year.

In your view, how do you think **Toronto Hydro** should address the **number** of customer power outages? Would you say … [READ LIST]

[Rotate response code 1 and 3]

Spend what is needed to reduce the number of power outages	1
Spend what is needed to maintain the current level of outages	2
Accept **more** power outages in order to keep customer costs from rising	3
Don't Know (**DNR**)	98
Refused (**DNR**)	99

D15. Again, **not including outages caused by extreme weather**, the average Toronto Hydro customer is without power for **one-and-a-half hours** per year.

In your view, how do you think Toronto Hydro should address the **length of time** customers are without power? Would you say … [READ LIST]

[Rotate response code 1 and 3]

Spend what is needed to reduce the length of power outages	1
Spend what is needed to maintain the current length of power outages	2
Accept **longer** power outages in order to help keep customer costs from rising	3
Don't Know (**DNR**)	98
Refused (**DNR**)	99

Section E: System Challenges & Priorities

E16. As you may be aware, much of your local electricity system is aging and needs to be replaced in the near future. The time lost to power service interruptions **caused by aging equipment** has been growing steadily over the past decade.

According to Toronto Hydro's engineers, almost 60% of Toronto's electricity distribution infrastructure needs to be rebuilt over the next two decades. The price of these upgrades is approximately **$5.6 billion overall**.

As part of its 5-year plan, Toronto Hydro is proposing to continue its significant annual infrastructure renewal investment program. Although this plan will allow Toronto Hydro to make necessary investments, **it will have an impact on customer bills**.

Throughout Toronto Hydro's consultation process, customers have made a number of statements about this proposed increased investment. Which of the following statements best represents your point of view?

[Read and Rotate statements 1 and 2]

Some customers have said …

Toronto Hydro 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. 1

Others have said …

Toronto Hydro should lower its investment in renewing the system's aging infrastructure to lessen the impact of any bill increase; even if that means more or longer power outages. 2

Don't know (**DNR**) 98
Refused (**DNR**) 99

E17. Other Toronto Hydro customers have made a number of statements about aging infrastructure and future investments required to improve the reliability of the electricity system. Which of the following statements best represents your point of view?

[Read and Rotate statements 1 and 2]

Some customers have said…

In these tough economic times, investments in new technologies are more of a luxury than a necessity and will cost customers more than they are willing to pay. 1

Others have said …

Investments in new technology will increase system reliability, make our local distribution system more efficient, and save us money in the long run. 2

Don't know (**DNR**) 98
Refused (**DNR**) 99

E18. Toronto Hydro is not just the local electricity distribution system itself, but a company that operates the system. As a company, Toronto Hydro needs buildings to house its staff, vehicles and tools to service the power lines and IT systems to manage the system and customer information.

Again, customers have made number of statements about this sort of investment. Which of the following statements best represents your point of view?
[Read and Rotate statements 1 and 2]

Some customers have said …

Toronto Hydro should find ways to make do with the buildings, equipment and IT systems it already has.	1

Others have said …

While Toronto Hydro should be wise with its spending, it is important that its staff have the equipment and tools they need to manage the system efficiently and reliably.	2
Don't know (**DNR**)	98
Refused (**DNR**)	99

Section F: Reaction to Customer Consultation Input

The following statements have been made by customers throughout Toronto Hydro's consultation process.

For each statement, please tell me if you strongly agree, somewhat agree, somewhat disagree or strongly disagree.

Strongly agree	1
Somewhat agree	2
Neither agree nor disagree (**DNR**)	3
Somewhat disagree	4
Strongly disagree	5
Don't Know (**DNR**)	98
Refused (**DNR**)	99

RANDOMIZE QUESTIONS

F19. The cost of my electricity bill has a major impact on the bottom line of my organization and results in some important priorities and investments are put off.

F20. My organization would be willing to pay a bit more for electricity if it means better service reliability.

F21. My organization can afford to pay more for electricity, but I am worried about the impact this will have on some of my suppliers and customers.

F22. We need to modernize the local electricity system so consumers can have greater control over their electricity usage.

F23. We need to invest in new infrastructure and technology to minimize the number and duration of power service interruptions.

F24. We should invest in our electricity system infrastructure **now** or we will end up paying more the longer we delay our system renewal.

F25. The electricity sector is so complicated and confusing; we just have to trust that the experts will find the right balance in keeping cost down while making the right investments.

F26. Toronto is the country's economic engine and as such should strive to have much higher levels of system reliability than other Canadian cities.

F27. When it comes to reducing power outages and improving reliability, the first priority should be business customers, then residential customers.

F28. Although waiting until electric equipment breaks down is a good way to get full value out of Toronto Hydro's assets, an important city like Toronto cannot afford the associated service interruptions and should have a higher standard of system reliability.

F29. I think Toronto Hydro should do more to help business customers find ways to reduce their electricity consumption and costs.

F30. Toronto Hydro should have charged its customers more over the past decade to create a reserve fund that could have helped pay to replace the system's aging electrical infrastructure.

F31. Nobody likes to pay more for electricity, but I think we have an obligation to maintain the reliability of our local grid for future generations.

END BATTERY

Section G: Overall Assessment of Plan

G32. **PREAMBLE**

To maintain the reliability of the local electricity system, Toronto Hydro's proposed 5 year plan will cost an estimated **$500 million**. This includes …

- **54%** to replace aging infrastructure;
- **19%** to maintain metering and connect new customers to the electricity system;
- **13%** to invest in tools, computers and software systems, vehicles and facilities needed to manage the electricity system;
- **8%** to expand system capacity to accommodate future growth; and
- **6%** for new technologies to make the system more efficient, reliable and safe.
-

To help pay for this plan, Toronto Hydro is proposing the **average small and medium-sized business customers' rate increase by $5.75** on the distribution portion of their bill for the next five years. So, by 2019, the average small and medium-sized business will be paying an **estimated $28.75 more per month** on the distribution portion of its electricity bill.

G33. Looking at the cost of the Toronto Hydro plan and outcomes it is expected to achieve, which point of view is closest to your own? Would you say **[READ LIST]…?**
Rotate response code order: "4 to 1" vs. "1 to 4"

Toronto Hydro should plan to achieve higher outcomes, even if the rates need to go up even more	1
I am satisfied with the balance between outcomes and the proposed rate increase	2
I don't like the rate increase, but I think it is necessary to maintain the grid to a reasonable standard	3
I think the bill impact is too high and Toronto Hydro needs to scale back its plans	4
Not sure (DNR)	98
Refused (DNR)	99

Ask only if G33 = 1, 2, 3 or 4

G34. And why do you say that? [OPEN]

Don't know (**DNR**)	98
Refused (**DNR**)	99

Section H: Firmographics

These last few questions are for statistical purposes only and we remind you again that all of your responses are completely confidential.

H35. Which of the following best describes the **hours of operation** of your business? Would you say … [**READ LIST**]

We are open 24/7	1
We operate several shifts each day, but are not open 24/7	2
We operate during regular business hours only	3
We operate outside of regular business hours, but do not have shifts	4
Other (please specify): _____	88

H36. And, which of the following best describes when your business operates through the week? Would you say … [READ LIST]

We operate on weekdays only	1
We operate on weekdays and weekends	2
Other (please specify): _____	88

These are all the questions we have for you today. Thank you very much for taking the time to complete this survey.

Workbook Appendices:

Toronto Hydro's Grid Renewal Plan

Residential Workbook

General Service Workbook

Your Grid: Pressures on Toronto's Electric System

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Have your say about Toronto Hydro's proposed grid renewal plan and its impact on your rates

Toronto Hydro-Electric System (Toronto Hydro) is in the midst of modernizing a distribution system that was largely built in the 1950s and 1960s. The pace at which this is accomplished will inevitably impact your electricity rates and service reliability. The purpose of this consultation is to gather your feedback on Toronto Hydro's proposed five-year grid renewal and modernization plan for 2015 to 2019.

About This Consultation

This consultation focuses specifically on what Toronto Hydro does: taking electricity from the provincial grid and distributing it to people and businesses in Toronto.

The electricity industry in Ontario is regulated by the Ontario Energy Board, which recently developed a new framework requiring local distribution companies to gather customer preferences on electricity investments. **Your feedback will be presented to the regulator when Toronto Hydro files its rate application for 2015 to 2019**. During the rate hearing process, Toronto Hydro will be held accountable for the way you were consulted and the ways in which the utility's plans respond to what you said.

Will you be expected to answer technical questions about the grid?

Toronto Hydro **does not** expect you to make electrical engineering decisions. The utility is asking you about the electricity issues that matter most to you, and if you feel Toronto Hydro's priorities for investing your electricity dollars are reasonable.

Toronto's distribution system is aging, the city is facing unprecedented growth in the downtown core, and a variety of innovative grid technologies are providing new opportunities for electricity management. This workbook is designed to give you enough background about these issues to develop an informed opinion.

The most important parts of this workbook are the survey questions. By completing them, you can ensure that Toronto Hydro considers your views as they relate to future investments in the distribution grid.

Where are the survey questions located?

Questions are located on pages:

- 8
- 9
- 11
- 12
- 14
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- 28
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- 35

How much will Toronto Hydro's proposed grid renewal plan cost me?

About one quarter of your electricity bill currently goes to Toronto Hydro. That's about $33 per month for the average residential customer. Toronto Hydro's proposed grid renewal plan will add:

- approximately **$2.35** each year to an average residential customer's monthly bill for the period of 2015 to 2019,
- which amounts to a total increase of approximately **$11.75** per month by 2019 compared to 2014.

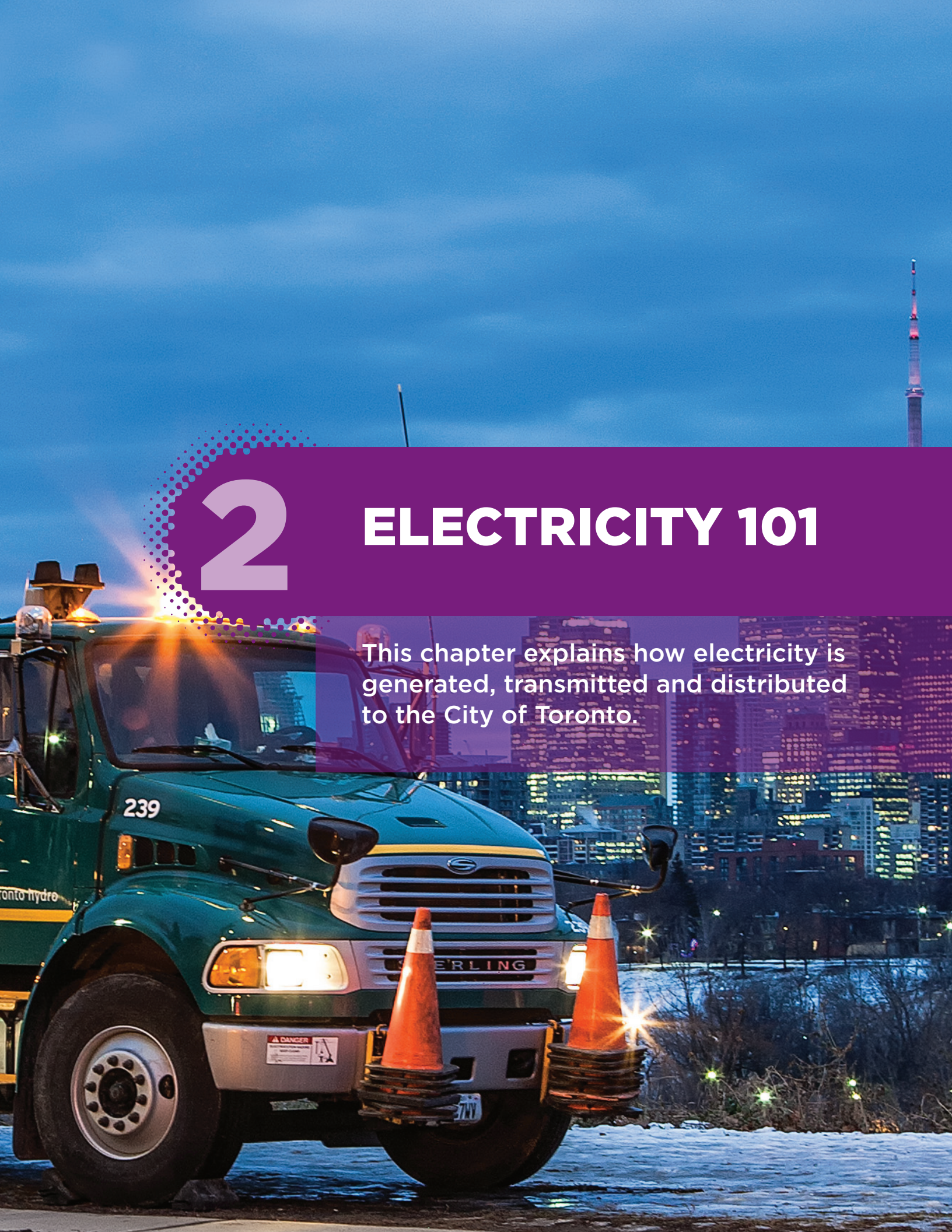
These bill impacts include capital investments and operating expenses. Toronto Hydro is planning to keep increases in operating expenses below inflation for the duration of the plan, which is why this consultation focusses solely on capital investments in the system.

How This Consultation is Being Managed

This public consultation process is being managed by a third-party research company. They will compile the results of all surveys and submit a report to Toronto Hydro. Your responses will be combined with others to protect your privacy.

You Can Participate in a Separate Conversation About Long-Term Energy Planning

Do we have enough electrical infrastructure to meet Toronto's needs? The Central Toronto Integrated Regional Resource Plan looks at where demand for electricity is growing and how this can be best managed over the next 25 years. Options considered include: conservation, local distributed generation, transmission and distribution infrastructure. You'll pay later for the choices being made today about your electricity system. Visit **torontohydro.com/haveyoursay** for more information.



2 ELECTRICITY 101

This chapter explains how electricity is generated, transmitted and distributed to the City of Toronto.

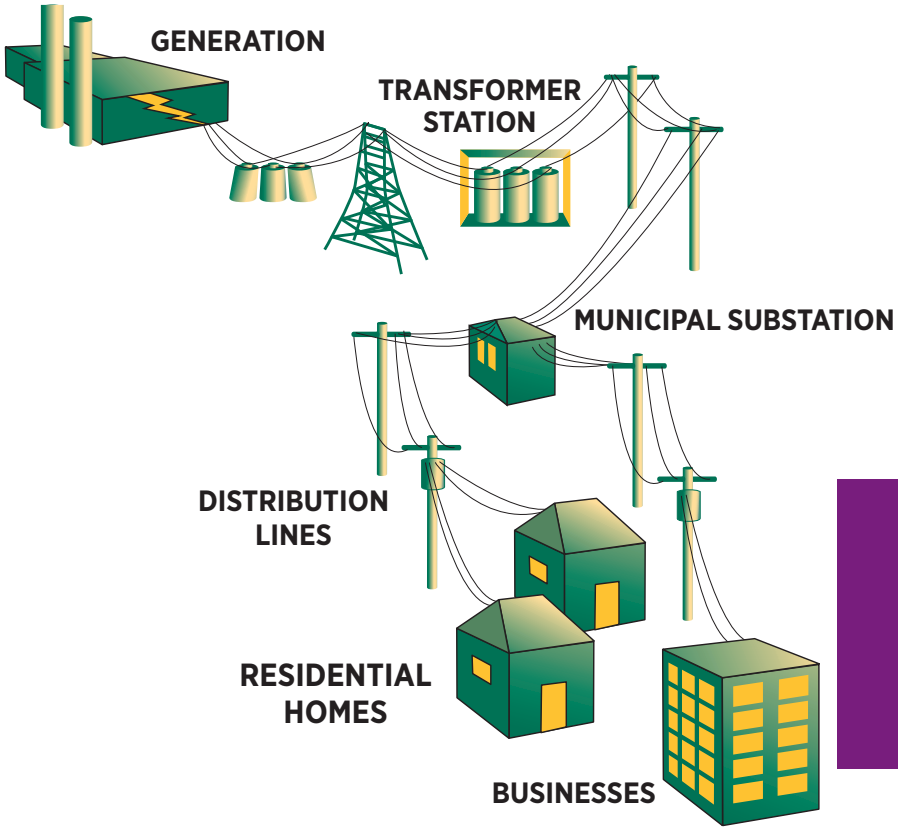
Understanding Toronto Hydro's Role in Ontario's Electricity System

There are three main components to all electricity systems: generation, transmission and distribution.

Where Electricity Comes From

In Ontario, 70 per cent of electricity is generated by **Ontario Power Generation**. This provincially-owned organization has generating stations across Ontario that produce electricity from hydroelectric, nuclear and fossil fuel sources.

Once electricity is generated, it must be delivered to urban and rural areas in need of power. This happens by way of high voltage transmission lines that serve as highways for electricity. The province has more than 30,000 kilometres of transmission lines*, owned mostly by **Hydro One**.



Toronto Hydro

Toronto Hydro is responsible for the last step of the journey: distributing electricity to customers in Toronto.

The City of Toronto

The City of Toronto is Toronto Hydro's sole owner and shareholder. The Ontario Energy Board allows Toronto Hydro to earn a specified annual return, part of which is used to pay an annual dividend to the shareholder. The City uses this dividend to fund city services like snow removal and garbage collection. Toronto Hydro reinvests the remaining portion of this amount back into the utility.

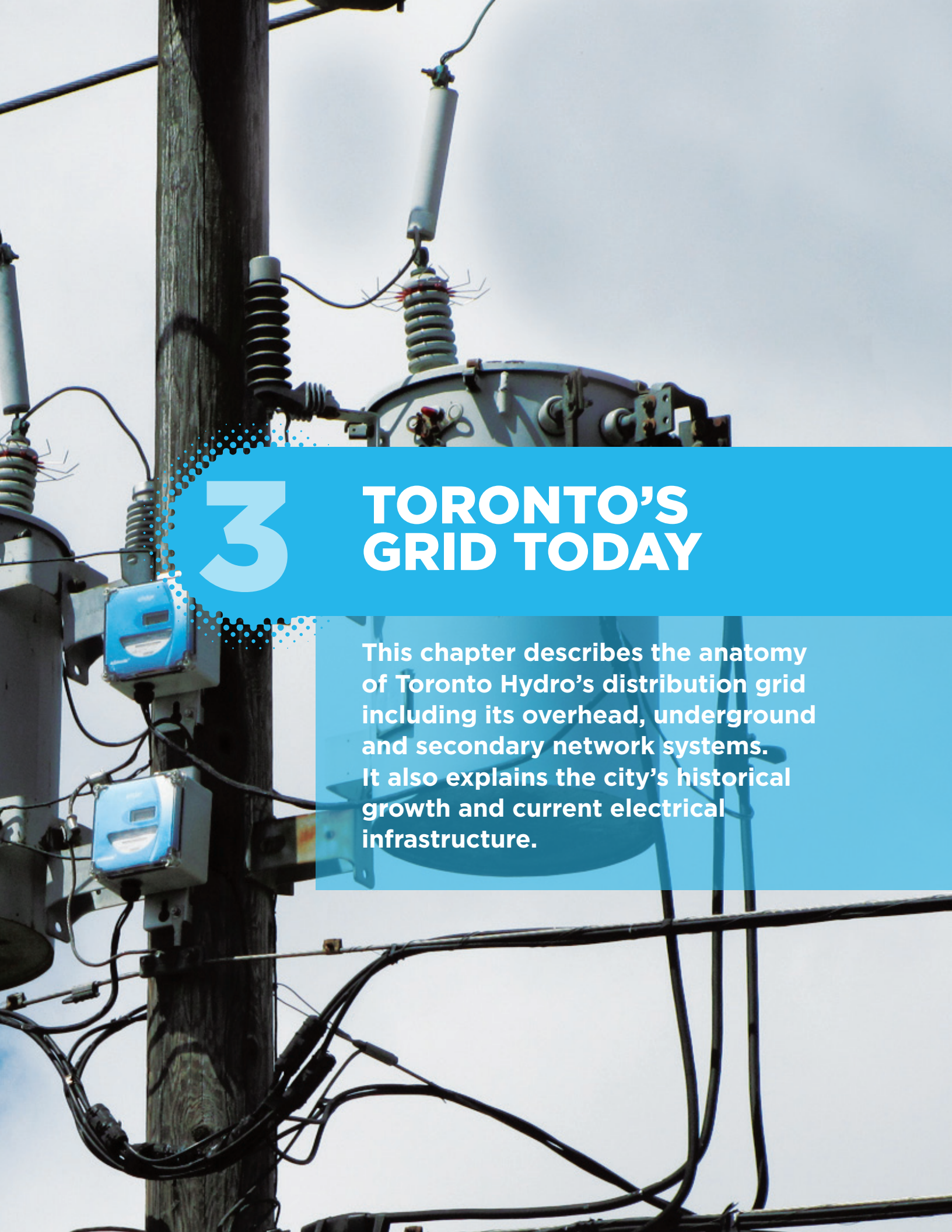
How are Electricity Rates Determined?

Toronto Hydro is funded by the distribution rates paid by its customers. Periodically, Toronto Hydro is required to file an application with the Ontario Energy Board to determine the funding available to operate and maintain the distribution system. Toronto Hydro must submit evidence to justify the amount of funding it needs to safely and reliably distribute electricity.

Who Protects Consumer Interests?

Toronto Hydro's evidence is assessed in an open and transparent public process known as a **rate hearing**. A number of public intervenors with electricity industry expertise submit their own evidence challenging Toronto Hydro's plans and assumptions. At the end of the process, the Ontario Energy Board weighs the evidence and decides on the rates Toronto Hydro can charge for distribution.

*Source: IESO. The Power System, **www.ieso.ca**



3 TORONTO'S GRID TODAY

This chapter describes the anatomy of Toronto Hydro's distribution grid including its overhead, underground and secondary network systems. It also explains the city's historical growth and current electrical infrastructure.

The Nuts and Bolts of Toronto Hydro's Distribution Grid

Toronto's electricity grid is comprised of overhead, underground and secondary network systems. The mix is largely due to the utility's amalgamation. In 1998, Toronto Hydro merged with North York Hydro, Scarborough Hydro, East York Hydro, York Hydro, and Etobicoke Hydro. Each utility operated independent distribution systems, and as a result, the infrastructure varies from region to region. Toronto Hydro has been working to gradually standardize this equipment, which will help improve reliability and safety across the city, and make system operation more efficient.

A Look at Toronto Hydro's Growth

Toronto Hydro has been serving the city since 1911 and has experienced many changes over the years.

The first electrically-powered trolley bus and electric traffic lights were introduced in the **1920s**. Street lighting was introduced in the **1930s** and was upgraded following World War II.

Between **1945** and **1955**, the City's power consumption increased by 75 per cent thanks to the post-war baby boom and immigration. The dramatic growth created a need to expand the system. Toronto Hydro built 12 new municipal substations. Much of the equipment installed during this decade is still in operation today.

The **1970s** saw dramatic skyline changes with the addition of the CN Tower, First Canadian Place, and the Royal Bank Plaza. As society started to become more environmentally conscious, Toronto Hydro introduced energy conservation programs and incentives to many of its customers.

In the early **1980s**, Toronto Hydro introduced a computerized control system to remotely monitor the distribution system and respond more quickly to emergencies.

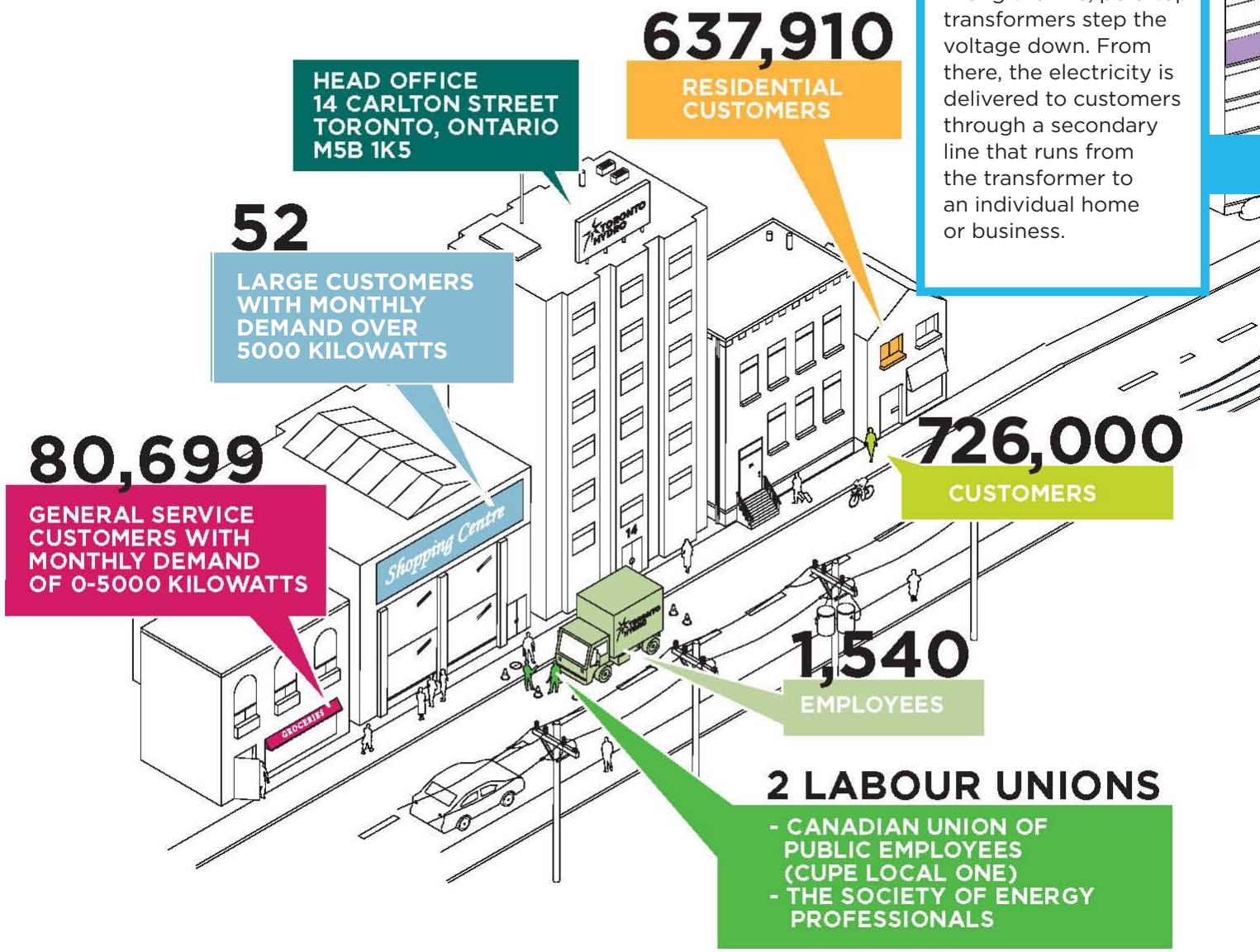
In **2006**, facing the challenges described in the following chapters, Toronto Hydro embarked on the largest infrastructure renewal program in its history.

About Toronto Hydro

Toronto Hydro owns and operates **$2.6 billion** in capital assets and is the largest municipal electrical utility in Canada. It distributes **about 19 per cent of Ontario's electricity demand**.

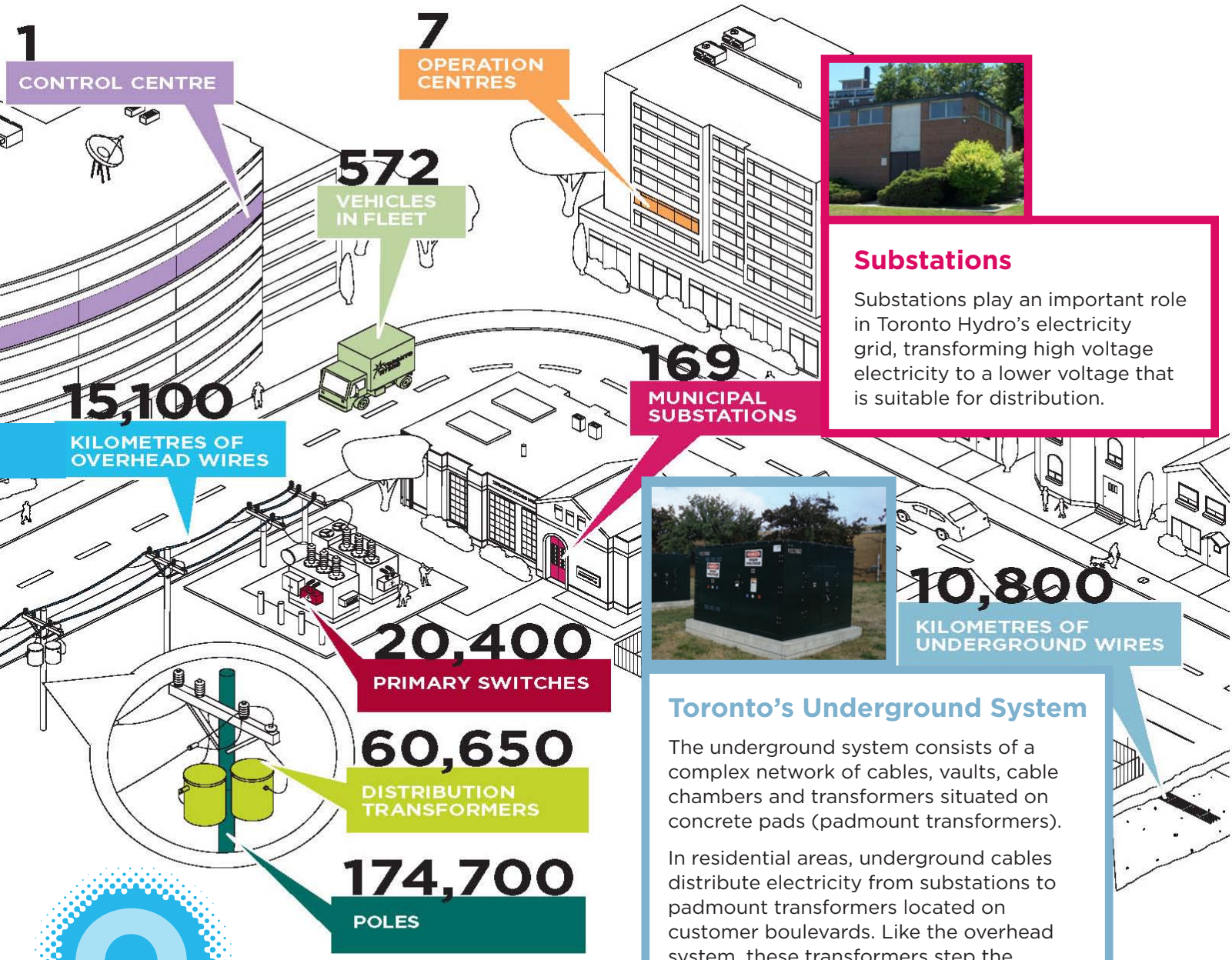
Toronto's Overhead System

The overhead system is made up of distribution lines that operate at either 4.16 kilovolts, 13.8 kilovolts or 27.6 kilovolts. These primary lines are strung across hydro poles. Along the line, pole-top transformers step the voltage down. From there, the electricity is delivered to customers through a secondary line that runs from the transformer to an individual home or business.



1. Given what you know and what you have read so far, how well do you feel you understand the important parts of the electricity system, how they work together and which services Toronto Hydro is responsible for?

   _____ Very well
   _____ Somewhat well
   _____ Not very well
   _____ I don't understand at all



Substations

Substations play an important role in Toronto Hydro's electricity grid, transforming high voltage electricity to a lower voltage that is suitable for distribution.

Toronto's Underground System

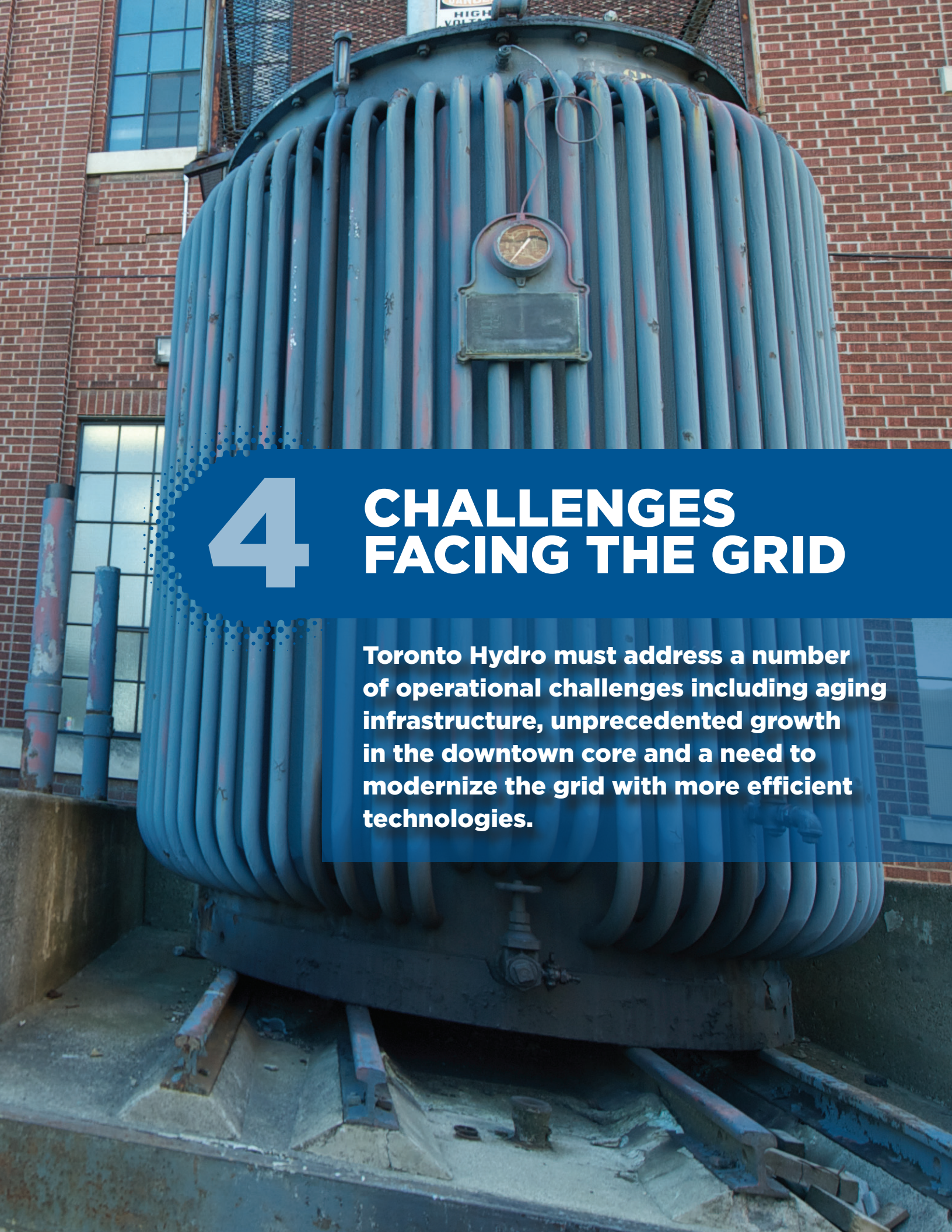
The underground system consists of a complex network of cables, vaults, cable chambers and transformers situated on concrete pads (padmount transformers).

In residential areas, underground cables distribute electricity from substations to padmount transformers located on customer boulevards. Like the overhead system, these transformers step the electricity down to a lower voltage, and current is delivered to customers through a secondary line. When distributing electricity to urban areas or larger customers, bigger vault transformers are used. Cable chambers are located throughout the underground system to provide crews with access to feeder cables.

2. How satisfied are you with the job Toronto Hydro is doing running your local distribution system?

   _____ Very satisfied
   _____ Somewhat satisfied
   _____ Somewhat dissatisfied
   _____ Very dissatisfied
   _____ Don't Know

3. Is there anything in particular that Toronto Hydro can do to improve its service to you?



4 CHALLENGES FACING THE GRID

Toronto Hydro must address a number of operational challenges including aging infrastructure, unprecedented growth in the downtown core and a need to modernize the grid with more efficient technologies.

Toronto's Renaissance: Accommodating a City Under Construction

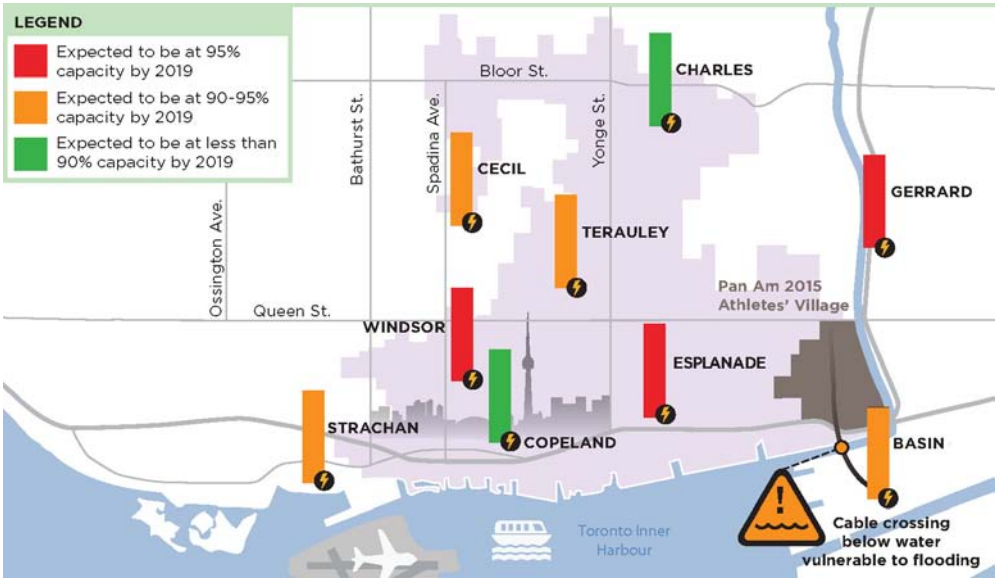
Recently crowned the fourth largest city by population in North America and a continued leader in high rise development, Toronto is a city under construction. Toronto Hydro plays an important role in this growth.

Toronto Hydro is required by law to:
- Connect new customers to the grid
- Accurately meter customer electricity consumption
- Expand or move distribution equipment to accommodate certain projects initiated by the City of Toronto, TTC, Metrolinx and GO Transit

The rate of Toronto's growth is making it increasingly difficult to fulfill these responsibilities while maintaining system performance:
- There are more skyscrapers under construction than New York City, Chicago and Mexico City
- There are more than 75 potential relocation projects slated for construction by the end of 2019

Growth from high-rise construction is putting immediate and longer-term pressures on the existing grid.

Downtown Stations are Overloaded



To help ensure the city's continued economic success and its ability to serve the growing population, Toronto Hydro is investing in expanding the capacity of its stations and feeders.

Under provincial legislation, there are several types of investments Toronto Hydro must make when the need presents itself. How reasonable do you feel it is to give each of these investments a priority over other investments (for example, replacing aging equipment)?

4. Connecting new customers such as new housing, condominiums or businesses. (Provincial regulations set connection fees which cover unusual costs).
   _____ Very reasonable _____ Somewhat reasonable
   _____ Not very reasonable _____ Not reasonable at all _____ Don't Know

5. Maintaining and upgrading customer meters to meet provincial standards.
   _____ Very reasonable _____ Somewhat reasonable
   _____ Not very reasonable _____ Not reasonable at all _____ Don't Know

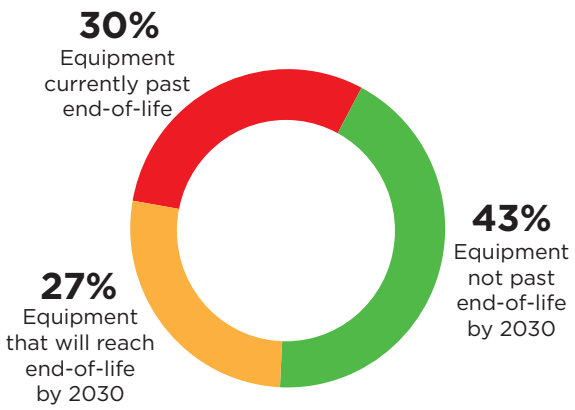
6. Moving existing electricity infrastructure such as poles and transformers to enable other projects such as street widening or new developments. (Provincial regulations set fees which cover unusual costs).
   _____ Very reasonable _____ Somewhat reasonable
   _____ Not very reasonable _____ Not reasonable at all _____ Don't Know

Aging Equipment: All Good Things Must Come to an End

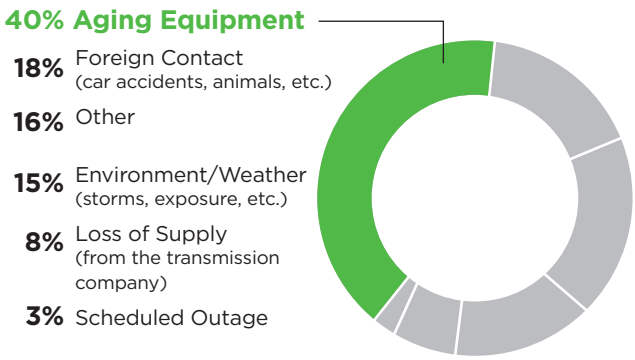
A large part of Toronto Hydro's distribution system was installed in the 1950s and 1960s. This infrastructure has served the city well beyond its expected lifespan. But now the grid is at a point where renewal investments can no longer be deferred without affecting service reliability.

Almost 60% of the city's distribution infrastructure needs to be rebuilt over the next two decades. The price of these upgrades is approximately $5.6 billion overall.

How Fast is the System Aging?



Aging Equipment is Responsible for Approximately 40% of Outages



About 30 per cent of our distribution equipment is past its end of life and an additional 30 per cent will reach this state over the next 20 years.

7. Thinking about the aging equipment in the grid, do you feel it's best to wait until the equipment breaks down to get full value from each piece of equipment, even if it means power outages, or do you feel the best approach is to replace the equipment before it breaks down to avoid power outages, even if it means not getting all the use possible from each piece of equipment?

_____ Wait until break down

_____ Replace before break down

A Look at Toronto Hydro's Service Reliability

Aging infrastructure is a major challenge to service reliability. Toronto Hydro is managing this through grid renewal and modernization.

Toronto Hydro uses two main measures to evaluate service reliability: frequency and duration.

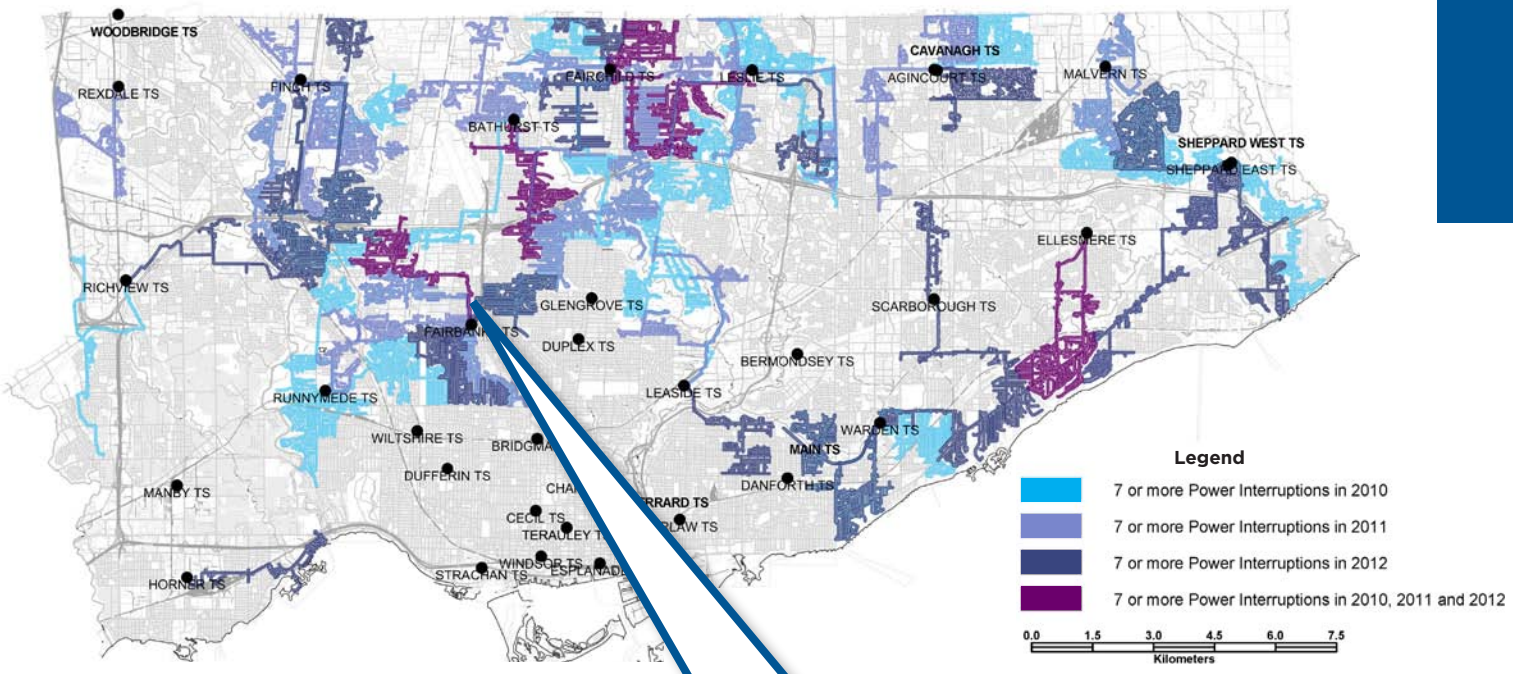
Over the past decade, the average customer has experienced:
- Between **1.4** and **2** outages per year.
- Between **60** and **90** minutes without power per year.

While outage frequency and duration averages are trending downwards, actual customer experiences vary. Some customers on newer parts of the system may not experience any outages while others are experiencing as many as 20 outages per year.

The Least Reliable Equipment on the Block

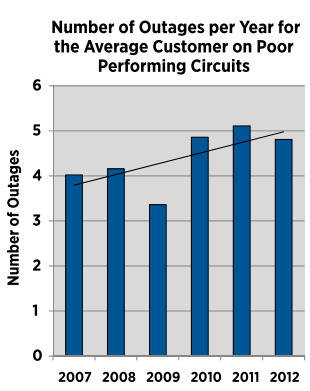
Toronto Hydro pays special attention to circuits with exceptionally poor performance. Engineers maintain a list of circuits experiencing seven or more outages in a year, and addressing this list is a continuous effort. The system is aging at such a rate that new poor performing circuits are added to the list almost as fast as Toronto Hydro can deal with existing problem circuits.

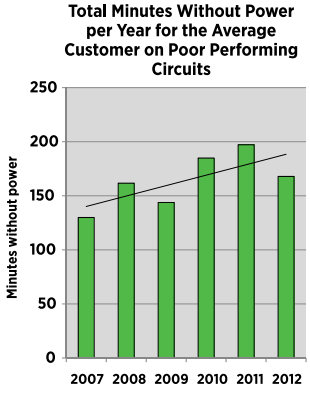
Where are Poor Performing Circuits Located?



Customers Located in These Areas are Receiving Poor Service Reliability

Over the past decade, the average customer on a poor performing circuit has experienced:
- **five outages** per year (compared to the system average of two)
- **150 to 200 minutes without power** per year (compared to the system average of 60 to 90 minutes for the year)





Without sufficient investment in renewing and modernizing the distribution grid, Toronto Hydro expects service reliability of poor performing circuits to continue deteriorating.

8. Do you feel the current average number of electricity outages is acceptable or not acceptable?
   _____ Very acceptable _____ Somewhat acceptable
   _____ Not very acceptable _____ Not acceptable at all _____ Don't Know

9. Do you feel the current average amount of outage time is acceptable or not acceptable?
   _____ Very acceptable _____ Somewhat acceptable
   _____ Not very acceptable _____ Not acceptable at all _____ Don't Know

10. How many outages have you experienced over the past two years?
    _____ INSERT ACTUAL NUMBER

11. (IF 1 OR MORE OUTAGE) How long was the power out during your most recent power outage?
    _____ INSERT ACTUAL NUMBER

12. (IF 1 OR MORE OUTAGE) How did the power outage affect you personally?

    _____

    _____

    _____

    _____

    _____

    _____

13. Is there a certain length of time at which the costs and consequences of an outage become more serious for you?

    _____

    _____

    _____

    _____

    _____

    _____

No system delivers perfectly reliable electricity. Generally, the more reliable the system, the more expensive the system is to build and maintain. Please answer the following two questions.

14. How many power service interruptions are reasonable in a year?
    _____ No outage is acceptable
    _____ One _____ Two _____ Three _____ Four _____ More than four

15. What is a reasonable duration for a service interruption?
    _____ No outage is acceptable
    _____ 30 minutes _____ 1 hour _____ 2 hours _____ 3 hours
    _____ 4 hours or more

Changing Weather Patterns

Climate change is raising the risk of severe weather events impacting the system more frequently in the future. Toronto has experienced several major storms over the last year-and-a-half alone:

- At the peak of **Hurricane Sandy** (October 2012), 65,000 customers were without power.
- The **torrential downpour** on July 8, 2013, caused severe flooding in stations and the underground system. Approximately 300,000 customers were affected — about half of all customers — and thousands experienced extended outages.
- On December 21, 2013, Toronto experienced the worst **ice storm** in its history. Freezing rain caused massive destruction to trees and power lines, leading to widespread and extended outages. About 300,000 customers were impacted and some people were without power for as long as 12 days. Many customers spent their holidays in City of Toronto warming stations.

Planning for the weather

Toronto Hydro is studying the results of these unusual weather events to determine whether changes are needed to any of the utility's best practices. In the meantime, Toronto Hydro anticipates that a number of the planned capital investments for 2015 to 2019 will help improve system performance during major weather events. For example, replacing "box construction" circuits (explained on page 20) with taller, higher-voltage circuits will help reduce the impact of falling trees and branches in certain areas.

Why not move everything underground?

There are pros and cons to both overhead and underground circuits. Underground circuits were hit harder than overhead circuits in the summer flooding, while overhead circuits were hit harder in the ice storm. Underground circuits can cost many times more than simply replacing the existing overhead lines; the cost for moving all circuits underground would be in the range of **$15 billion**. Toronto Hydro must consider these options in light of the other capital needs discussed in this workbook and the need to keep increases in customer bills as low as possible.

16. Over the past year, Toronto has experienced two unusual weather events — the flooding in July and the ice storm in December. Thinking back to the two major storm events of 2013, were you affected by either or both of these events?

_____ Yes – the flooding in July
_____ Yes – the ice storm in December
_____ Yes – Both
_____ No – neither weather event affected my electricity

17. Whether you were personally affected or not, how satisfied are you with Toronto Hydro's management of these events?

_____ Very satisfied
_____ Somewhat satisfied
_____ Somewhat dissatisfied
_____ Very dissatisfied
_____ Don't Know

18. Is there anything in particular that Toronto Hydro could have done to improve its service to you during these events?

Grid Modernization

The pressures of economic growth and system aging are at the heart of Toronto Hydro's investment plan for 2015 and beyond. For the most part, responding to these pressures will involve rebuilding and expanding the system using tried and true distribution technology. At the same time, technological innovation in the industry has begun to change the way that utilities can manage the system and the way that customers can use the grid. The following section highlights some of the pressures – and opportunities – associated with the evolving technological landscape.

Here are some of the modern grid management technologies that Toronto Hydro is exploring:

Feeder Automation

- Enables automated switching to detect and isolate power interruptions.
- Helps reduce the number of customers affected by an outage.
- Significantly improves restoration time and service reliability in a cost-effective manner.

Power Line Monitors

- Log power line disturbances and diagnose the causes.
- Help engineers address the root causes of interruptions to help prevent them
- Are capable of reporting outage locations in real time.

Transformer Monitors

- Detect overloaded transformers and theft of power.
- Help predict end-of-life of transformers to assist with proactive maintenance and planning.

Energy Storage

- Energy storage facilities can be used to store excess supply during off-peak hours.
- The stored energy can be rapidly deployed by system operators to address local capacity issues throughout the distribution system and to moderate peak power costs.

19. Modernizing the grid can allow Toronto Hydro to improve reliability. Investments such as automated switches may allow Toronto Hydro to minimize the number of people impacted by outages and to restore electricity to most customers in a matter of seconds. Given there are many other areas of needed investment, such as connecting new customers, replacing aging equipment and expanding capacity for long-term growth, how important do you feel it is for Toronto Hydro to invest now in modernizing the grid?

_____ Very important
_____ Somewhat important
_____ Not very important
_____ Not important at all
_____ Don't Know

Here are some of the new technologies that are changing the way that customers use the grid:

Electric Vehicles

- Studying the grid impacts of electric vehicles allows Toronto Hydro to develop charging profiles for all vehicle models.
- Helps the utility predict the impacts of electric vehicles on the lifespan and performance of equipment and make proactive upgrades when necessary.

Making Room for Renewable Generation Projects

Solar power and energy-from-waste facilities are renewable forms of distributed generation that are growing in popularity and affordability. Toronto Hydro is mandated to connect distributed generation as part of the province's Feed-in Tariff program. Since 2012, Toronto Hydro has connected more than 375 distributed generation projects to the grid.

5 HOW WE'RE MANAGING GRID PRESSURES

This chapter covers the work Toronto Hydro is doing to address grid challenges. It includes information about historical grid investments, ongoing capital projects and productivity improvements.

Working Hard to Improve Reliability

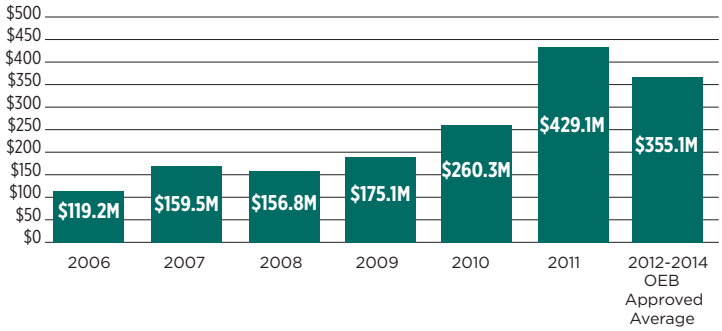
Since 2006, Toronto Hydro has invested approximately $2.5 billion in infrastructure renewal. This investment represents some of the largest construction programs in the utility's history, replacing approximately:

- **1,800 kilometres of aging lines**
- **17,000 old poles**
- **14,000 transformers**

From 2006 to 2009, Toronto Hydro gradually increased its capital spending on poor performing feeders and underground cables that were negatively impacting reliability.

In 2010 and 2011, the utility increased spending to a level needed to execute a broader grid renewal and modernization program.

Toronto Hydro has increased capital spending



The following case studies provide a snapshot of major projects being executed across Toronto Hydro's distribution system. Feel free to read about whichever projects interest you.

What's Happening with the Overhead System?

Box Construction

- Refers to a type of overhead feeder installed in the former City of Toronto.

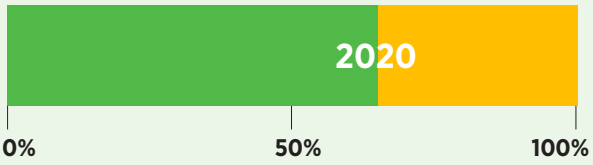
CHALLENGES:

- Close arrangement of circuits make it difficult for crews to safely access equipment.
- Power outages last twice as long as modern overhead feeders.
- Electrical capacity is one third of modern feeders making it difficult to accommodate the increasing number of large customers in the downtown core.

SOLUTION:

- Toronto Hydro is gradually converting box construction to modern standards, which will help improve safety, reliability and flexibility.

PROGRESS BY 2020:



PLAN FOR 2015-2019:

- The utility is dedicating approximately **3 per cent** of its budget to box construction conversion.

What's Happening with the Overhead System?

Rear Lot Feeders

- Refers to a type of overhead construction installed in residential backyards during the 1950s and 1960s.

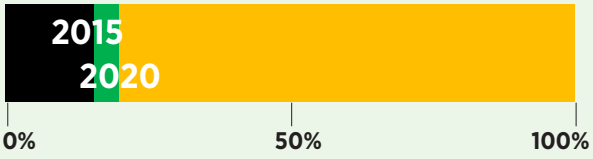
CHALLENGES:

- Location makes it difficult and more costly to access and repair, especially during major storms.
- Due to its age and condition, it's expected to fail at an increasing rate.
- Poor accessibility is a potential safety risk for crews and the public.

SOLUTION:

- The utility is converting these feeders to safer and more reliable underground streetside construction.

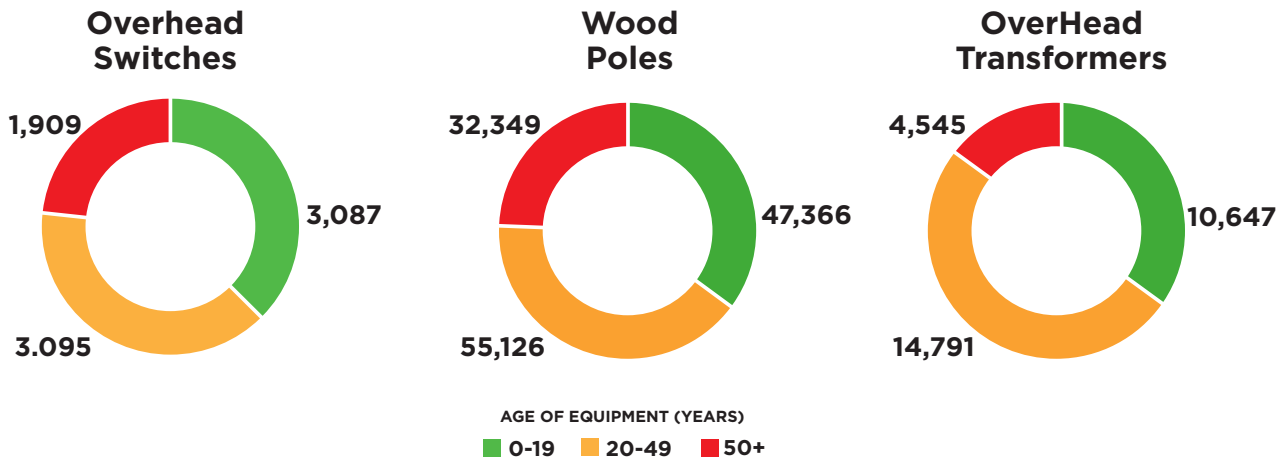
PROGRESS BY 2020:



PLAN FOR 2015-2019:

- Toronto Hydro is expecting to dedicate approximately **2 per cent** of its budget to convert this legacy construction to standard.

How Old is the Overhead System?



What's Going on with the Underground System?

Direct Buried Cable

- Refers to a legacy type of underground construction where cables are laid directly in underground trenches without a protective barrier.

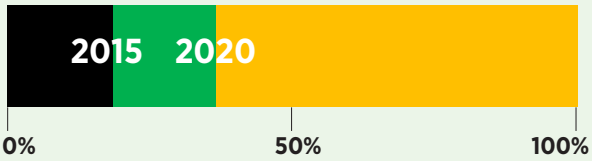
CHALLENGES:

- Cables are susceptible to outages because they are exposed to environmental stress, including excessive moisture.
- Majority of these cables are in need of immediate repair or replacement.
- In 2011, direct buried cables caused more than half of all outages associated with underground equipment.

SOLUTION:

- Toronto Hydro is replacing direct buried cable with water resistant cables in plastic ducts, encased in protective concrete.
- This construction is cost-effective because it extends the life of the system and allows for easier repairs.

PROGRESS BY 2020:



PLAN FOR 2015-2019:

- Underground circuit renewal is expected to account for approximately **18 per cent** of the proposed budget.
- It is the largest capital program in the plan, addressing underground equipment including direct buried cable, switches and transformers.

What's Going on with the Underground System?

Chambers, Vaults and Ducts

- Refers to underground civil infrastructure that houses and protects Toronto Hydro's electrical equipment.

CHALLENGES:

- These assets are deteriorating and causing outages.
- They also pose a potential safety hazard for crews working in vaults and chambers.

SOLUTION:

- Toronto Hydro is gradually rebuilding these structures.

PLAN FOR 2015-2019:

Underground civil renewal work is expected to account for approximately **2 per cent** of the renewal budget for 2015-2019.

Leaking Paper Insulated Lead Covered Cable

Paper insulated lead covered (PILC) cable was the first type of underground cable installed in Toronto.

CHALLENGES:

- As they age, the lead casings are cracking and leaking oil.
- Leaking cables can fail and "flashover", sometimes violently.
- Stricter safety regulations have made repairs costly and time consuming.

SOLUTION:

- The utility has been targeting feeders with the oldest stock of PILC cables and repairing all of the leaks at once.

PLAN FOR 2015-2019:

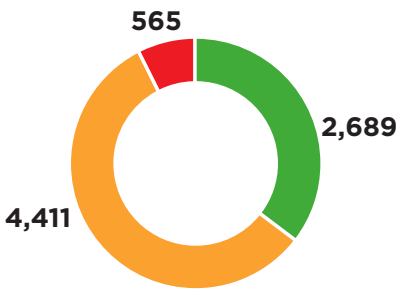
- PILC repair work is expected to account for approximately **0.4 per cent** of the budget for 2015-2019.

How Old is the Underground System?

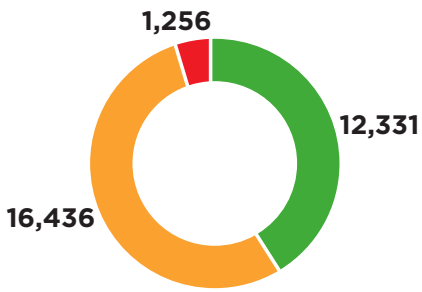
AGE OF EQUIPMENT (YEARS)

0-19 20-49 50+

Underground Switches



Underground Transformers



What's Happening to the Underground Network in the Downtown Core?

Network Vaults

Refers to civil infrastructure that houses underground transformers and other underground electrical equipment unique to the downtown system.

CHALLENGES:

- Old age, water damage and salt contamination are causing rebar and the roofs of network vaults to deteriorate and corrode.
- In some cases, the roofs are collapsing.
- Roofs are leaking and water is damaging electrical equipment.

SOLUTION:

- Toronto Hydro has been rebuilding vaults using higher quality materials like galvanized rebar and corrosion-resistant beams.
- This results in cost savings for customers because it lengthens the life of new structures.

PLAN FOR 2015-2019:

- Toronto Hydro plans to dedicate approximately **2 per cent** of its budget to rebuilding network vaults.

Obsolete Network Equipment

Refers to electrical assets in the downtown network system that are failing and are no longer used.

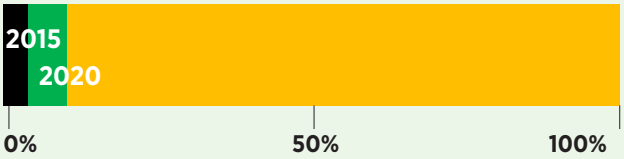
CHALLENGES:

- Some electrical assets are failing as a result of their age and wear; particularly fibertop network units installed in the original system.
- These failures have resulted in vault fires which require extensive repairs and cause outages impacting a large number of customers.

SOLUTION:

- Toronto Hydro expects to continue the gradual, proactive replacement of this equipment.

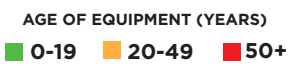
PROGRESS BY 2020:

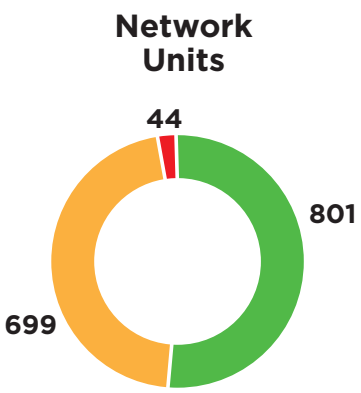


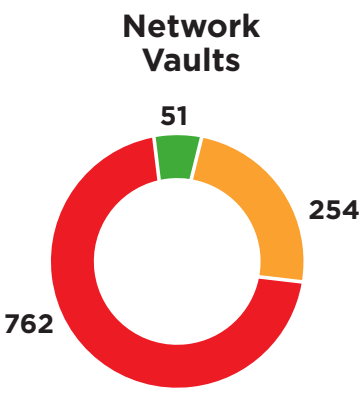
PLAN FOR 2015-2019:

- Toronto Hydro plans to dedicate approximately **2 per cent** of its capital budget to these network projects.

How Old is the Underground Network?







What's Going on with Toronto Hydro's Distribution Stations?

Obsolete Stations Switchgear

Refers to electrical equipment used to switch load between feeders inside the substation.

CHALLENGES:

- Some switchgear is past its designed lifespan and is now obsolete.
- Toronto Hydro is custom fabricating certain parts that are no longer available, but this is increasingly expensive, unreliable and unsustainable.
- Obsolete equipment poses potential safety risks to staff within the substation building and could potentially cause significant damage to surrounding equipment.

SOLUTION:

- Toronto Hydro expects to replace a number of these units over the course of its capital plan through its Stations Switchgear Renewal program. This is expected to help minimize maintenance and operating costs and improve system reliability.

PLAN FOR 2015-2019:

- The Stations Switchgear Renewal program accounts for approximately **4 per cent** of the proposed budget and three quarters of the total proposed stations renewal budget.

Stations Expansion

Toronto Hydro is expanding the capacity of its distribution grid through stations upgrades and expansions.

CHALLENGES:

- The city's growing population is stressing the grid.

SOLUTION:

- Toronto Hydro is addressing this with a mix of cost-effective solutions including new stations, stations upgrades and the purchase of mobile switchgear units that can be deployed during widespread outages.

PROGRESS:

- Copeland Station, a new underground transformer station, is being constructed at the Roundhouse Park next to the CN Tower to help alleviate capacity constraints in the downtown core.
- The station will add additional capacity equivalent to 70 skyscrapers, allowing Toronto Hydro to take other aging stations offline for needed repairs and upgrades.
- The project is expected to be completed by the end of 2014.

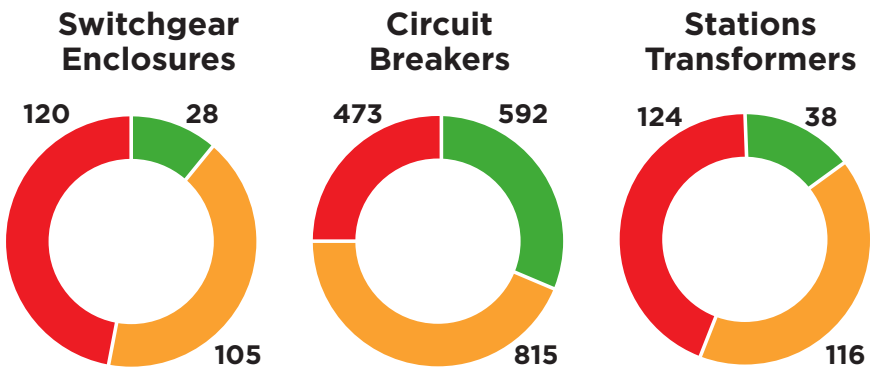
PLAN FOR 2015-2019:

- Toronto Hydro plans to dedicate approximately **14 per cent** of its renewal budget to stations expansion.

How old is the Distribution Stations Equipment?

AGE OF EQUIPMENT (YEARS)

0-19 20-49 50+



What's Happening with Grid Modernization?

Feeder Automation

Refers to overhead intelligent switches installed on feeders to detect and isolate outages.

- The switches are programmed to recognize feeder outages and will open and close accordingly.
- Toronto Hydro has installed automated switches on 10 of its worst performing feeders to test its effectiveness.

PLAN FOR 2015-2019:

- Intelligent switches have proved to be a cost effective technology that significantly reduces outage impacts on problem feeders.
- Toronto Hydro is considering dedicating approximately **3 per cent** of its capital budget to feeder automation projects.

How is Toronto Hydro Keeping the Business Running?

In addition to investing in grid renewal, Toronto Hydro must invest in the tools required to keep the utility going. This includes vehicles, facilities and information technology (IT).

CHALLENGES:

- Vehicles must be well maintained so that crews can carry out work safely and efficiently.
- IT is an increasingly important aspect of utility management. Engineers, project managers and construction crews have shifted from manual paper drawings to digital records made possible by computer software that helps staff design and track projects.
- Computers and software require regular maintenance and updates.

SOLUTION:

- Toronto Hydro is continuing to replace basic IT hardware and upgrade software as necessary.
- Toronto Hydro plans to replace the radio system that crews use to communicate with system operators when working in vaults and chambers to help reduce safety risks. The existing system will no longer be supported by the vendor after 2016.
- The utility also plans to replace its main resource management IT system which supports a number of critical engineering, project planning, human resource and finance functions.
- These systems are outdated and no longer adequately supported by the vendor.

Stretching your Electricity Dollars

Reducing Strain on the Grid

Toronto Hydro is reducing strain on the grid by supporting provincial conservation and demand management programs for residential, business and industrial customers. These programs are not generally an alternative to renewing the aging distribution system in the near-term, but they may help defer the need for capacity expansion and renewal investments over the longer-term.

Conservation Program Results from 2012

Here is a look at conservation programs provided to customers and the electricity savings they yielded.

saveONenergy℠ Conservation Programs	**Results**	**MW Saved**	**MWH Saved**
FRIDGE & FREEZER PICK-UP	**2,802** refrigerators and freezers collected	**0.2**	**1,092**
COUPONS	Bi-annual customer events and coupons for energy efficient products held at participating retailers	**0.2**	**3,606**
DEMAND RESPONSE CONTRACTUAL DR3	**48** commercial and industrial customers contracted to reduce energy use at specified times	**14.7**	**312**
SMALL BUSINESS LIGHTING	**3,498** lighting retrofits installed	**2.5**	**9,383**
HEATING & COOLING INCENTIVE	**13,047** participants received an incentive for installing an ENERGY STAR® qualified central heating or cooling system	**2.8**	**4,782**
***peaksaver* PLUS®**	**43,149** installation	**22.9**	**169**
RETROFIT PROGRAM	**1,168** project applications	**15.9**	**80,294**

Total 2012 Results: **112,200 MWh** and a total demand reduction of **61,088 MW**

20. For conservation and demand management programs to slow the pace of renewal and expansion, they must provide an acceptable level of certainty. How likely is it that you would participate in Demand Response programs that would allow electricity system managers to turn off equipment you are using? For residential customers, this would involve automated devices to turn off your water heater and air conditioner for short periods during times of peak demand.
    _____Very likely
    _____Somewhat likely
    _____Not very likely
    _____Not at all likely

Smart Grid, Smart People, Smart Business

Toronto Hydro is trying to temper the cost of investment by improving the productivity and efficiency of its overall business. Here's how the utility is finding ways to do more with less:

- **Reducing employee headcount** — Toronto Hydro has reduced staff levels by 35% and senior executives by 65% since 1998.
- **Keeping absenteeism low** — According to Statistics Canada, Toronto Hydro's absentee rate is 15% below the average for public and private sector companies.
- **Working safely** — Toronto Hydro is avoiding injuries and staying productive on the job site. The utility has achieved 3.5 million hours without a lost-time injury.
- **Reducing operating costs** — Toronto Hydro is downsizing work centres and relocating staff from leased buildings to utility-owned facilities that are better suited to the business.
- **Improving coordination of capital projects** — Toronto Hydro is executing more cost-efficient projects by grouping high-priority projects with lower priority projects in the same neighbourhoods. This allows the utility to use its crews and equipment more efficiently, and reduces the set up time and number of permits required to complete work.

21. Given what you know and what you have read so far, how well do you feel you understand the challenges facing the Toronto Hydro grid and what they are planning to meet those challenges?
    _____ Very well
    _____ Somewhat well
    _____ Not very well
    _____ I don't understand at all

22. From what you have read and what you may have heard elsewhere, does Toronto Hydro's investment plan seem like it is going in the right direction or the wrong direction?
    _____ Right direction
    _____ Wrong direction
    _____ Not sure

23. And why do you feel that way?

6 THE BOTTOM LINE

This chapter examines Toronto Hydro's proposed plan for 2015 to 2019, what it will cost and where the dollars will go.

Here's What We've Covered so Far:

The Ontario Energy Board (OEB) requires that Toronto Hydro gather customer feedback on the utility's proposed investment plans. Toronto Hydro will present your feedback to the OEB as part of the rate setting process. The OEB and a number of public intervenors will hold Toronto Hydro accountable for both the way that you were consulted and the way that the utility's final plan reflects what you said.

About a quarter of your electricity bill goes to Toronto Hydro. The money that Toronto Hydro receives is invested in the local distribution system and the people, buildings and vehicles that support it.

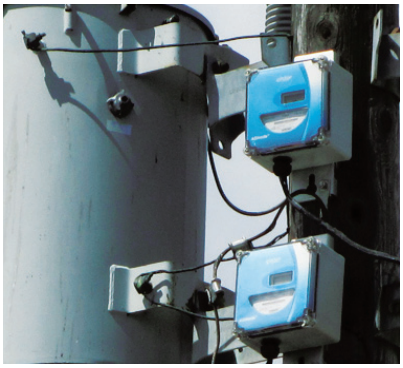
Much of Toronto's existing distribution system was built in the 1950s and 60s. Toronto Hydro's customers have benefited from the longer than expected lifespan of this equipment.

Today, much of the system is at an age where it must be replaced to maintain the reliability that Torontonians expect. Renewing the system will help ensure that the next generation of electricity users enjoys the same long-term value-for-money as previous generations.

Toronto Hydro is also dealing with other pressures, like the need to build more system capacity to accommodate the city's growth and the need to upgrade outdated and unsupported IT systems.

At the same time, the industry is changing, and Toronto Hydro has the opportunity to explore innovative grid modernization technologies that will help the utility cost-effectively improve system performance and reduce the risks and costs associated with aging equipment over the long-run.

Renewing the system for the next generation will take more than a decade, but delaying these investments is expected to gradually worsen reliability across the system and lead to even higher bill increases down the road.



In recognition of growing capital needs, Toronto Hydro has been working to reduce operating costs by reducing employee headcount, avoiding injuries, and downsizing work centres.

The Dollars and Cents

Toronto Hydro is preparing a 2015-2019 investment plan that will require an annual bill increase of approximately $2.35 on the monthly bill. This amounts to a total increase of approximately $11.75 per month by 2019 compared to 2014 electricity rates.

Here's how Toronto Hydro believes your electricity dollars should be invested during these years:

Replacing Aging and Obsolete Equipment
These investments are paced and prioritized to maintain reliability standards and to address the worst performing feeders first. Introduction of modern equipment standards is expected to reduce the impact of storms.

47.1%

Expanding Capacity for Long-term Growth
Expanding the capacity and flexibility of the local distribution network to accommodate forecasted growth in electricity demand.

14.3%

Connecting Customers
Bringing new customers onto the system; these investments are mandatory, but the cost is generally recovered through the additional revenue that new customers contribute.

11.2%

Improving Reliability by Reconfiguring Circuits
Targetted investments to cost-effectively reduce the impact and frequency of outages. For example, converting main feeder sections from overhead to underground will help reduce the impact of future storms.

8.0%

Updating IT Infrastructure
Replacing outdated and unsupported software and communications systems that are critical to Toronto Hydro's planning, operations and outage response.

7.8%

Accommodating Construction Projects in the City
Relocating or reconfiguring distribution equipment that is on or near the path where other agencies are working.

3.3%

Modernizing the Grid
Introducing innovative technologies — like intelligent switches and sensors — that are expected to cost-effectively improve the reliability of the system and reduce the risks and costs associated with aging equipment.

3.2%

Maintaining and Upgrading Customer Meters
Routine meter replacements and improvements to data quality.

1.9%

Building Maintenance
Routine capital investments to maintain Toronto Hydro's facilities.

1.3%

Connecting Renewable Generation
Installing protection and control equipment and energy storage facilities that allow for the efficient use of new renewable generation connections.

0.9%

Vehicles and Equipment for Crews
Routine capital investments in Toronto Hydro's fleet of trucks, cars and equipment

0.7%

Accommodating Electric Vehicles
Accommodating electric vehicle connections to the grid and investing in ways to manage and optimize electric vehicle storage capacity on the system

0.1%

Have Your Say: Is Toronto Hydro Investing Wisely?

Let's Talk Priorities:

24. When you look at how much Toronto Hydro is spending on each of its investment priorities, do you think they have the balance right or would you change the relative priorities?

    _____ The balance looks right
    _____ They should change some of the priorities

25. What areas do you feel need more spending than planned?

26. What areas do you feel should have less spending than planned?

Let's Talk Pacing

Toronto Hydro's proposal is expected to lead to a total increase of approximately $11.75 on the average residential customer's monthly bill by 2019. A lower bill impact is possible in the short-term, but there are trade-offs: system performance will be worse and future bill impacts will be higher. The following table compares Toronto Hydro's plan to another likely utility management practice called "run-to-failure." This approach is typical for smaller utilities with newer systems.

	"RUN-TO-FAILURE" APPROACH	TORONTO HYDRO'S PROPOSED PLAN
Description	With this approach, Toronto Hydro would only replace equipment as it fails (with the exception of critical assets such as stations equipment). This is a purely reactive approach using close to the minimum amount of funding that Toronto Hydro could receive from the Ontario Energy Board.	1. Proactively replace highest-risk aging and obsolete equipment at a pace that maintains reliability and targets the worst performing feeders first. 2. Improve system reliability by investing in modern grid technologies and reconfiguring circuits.
Estimated increase in monthly bill	• Average of $1.24 per year from 2015-2019 • Total increase by 2019 = **$6.18/month**	• Average of $2.35 per year from 2015-2019 • Total increase by 2019 = **$11.75/month**
Reliability outcomes by 2019	• Number of outages for the average customer: **1.6/year** • Time without power for the average customer: **1.38 hours/year** • Percentage of customers on feeders experiencing seven or more interruptions a year: **13 per cent**	• Number of outages for the average customer: **1.15/year** • Time without power for the average customer: **0.65 hours/year** • Percentage of customers on feeders experiencing seven or more interruptions a year: **6 per cent**
Percentage of equipment past end-of-life in 2020	**31 - 34 per cent**	**25 - 28 per cent**

Why Does Toronto Hydro Think This Pace is Best?

As seen in the table above, Toronto Hydro estimates that a "run-to-failure" approach, when compared to the proposed plan, would result in double the average duration of outages across the system and more than double the percentage of customers on poor performing feeders. Because of the aging system, Toronto Hydro would expect reliability to continue worsening well beyond 2019 if the utility stuck with a "run-to-failure" approach.

Of course, the two plans presented here are **not** the only options for pacing system investment. Toronto Hydro can invest more or less capital to achieve a wide variety of outcomes.

So how did Toronto Hydro arrive at the proposed plan?
Since the utility is so large, Toronto Hydro's engineers rely on a software model to help calculate the year in which it is most cost-effective to rebuild any given part of the system. The model suggests that Toronto Hydro should, in fact, be spending more than it is proposing in the years 2015 to 2019.

So why is Toronto Hydro proposing to invest less than the model recommends?
In reality, there are constraints that prevent the utility from spending above a certain amount. One such restriction is the limited number of skilled resources available to carry-out the work. Resource limitations are also and important reason why Toronto Hydro believes it is wise to invest now and not later: increasing the number of qualified trades people takes time, and the industry will not train new workers unless there is a consistent and predictable amount of work. This means that the longer Toronto Hydro allows the system to age, the less likely it is that the utility will be able to keep up with investment needs.

Ultimately, Toronto Hydro believes that the proposed plan will deliver improved system performance at a pace that is sustainable for both the utility and the customer.

27. When you consider the options outlined in the table on the previous page, do you think Toronto Hydro's goals are too high, too low or about right?

_____ Too high
_____ Too low
_____ About right
_____ Not sure

28. What are the goals you feel are too high?

_____
_____
_____
_____
_____
_____
_____
_____

29. What are the goals you feel are too low?

_____
_____
_____
_____
_____
_____
_____
_____

30. Looking at the cost of the Toronto Hydro plan and the outcomes it is expected to achieve, which point of view is closest to your own?

_____ Toronto Hydro should plan to achieve higher outcomes, even if the rates need to go up even more.

_____ I am satisfied with the balance between outcomes and the proposed rate increase.

_____ I don't like the rate increase, but I think it is necessary to maintain the grid to a reasonable standard.

_____ I think the bill impact is too high and Toronto Hydro needs to scale back its plans.

_____ Not sure

What Do You Think About This Review?

Toronto Hydro values your feedback. This is the first time the utility has conducted a review about its upcoming investment plan in this type of format. What did you think about the workbook?

1. Volume of Information — Did Toronto Hydro provide too much information, not enough, or just the right amount?

2. Content Covered — Was there any content missing that you would have liked to have seen included?

3. Outstanding Questions — Is there anything that you would still like answered?

4. Suggestions for Future Consultations — How would you prefer to participate in these consultations?

Technical Glossary

Cable Chamber — An opening to the underground duct system that facilitates the installation, removal, inspection and repair of cables.

Cable Fault — A hole in a cable caused by a short circuit (due to corrosion, overloading over time, water, age) which can result in an explosion.

Circuit — A continuous system of conductors providing a path for electricity.

Circuit Breaker — A protective switch in a substation that automatically disconnects power to the circuit in the event of a fault. Performs the same function as a circuit breaker in a home.

Conductor — An object that permits the flow of electricity, like a wire or cable that allows electricity to flow along its length.

Distribution Transformer — A piece of equipment required to reduce voltage to a level that can be used by customers in their homes and businesses.

Feeder — A distribution circuit carrying power from a substation to customers. Feeders consist of circuits and other electrical equipment supported by civil infrastructure like poles and ducts.

Kilovolt = 1,000 volts

Megawatt — Equals 1,000 kilowatts or enough to power 10,000 100-watt light bulbs.

Primary Cables — Cables that distribute electricity throughout the system at a higher ('primary') voltage (i.e. greater than 750 volts).

Secondary Cables (or Mains) — Low voltage cables that are connected to the secondary (low voltage) side of the distribution transformer and deliver current to customers.

Substations — Large power transformers and miscellaneous protection and control equipment (e.g. circuit breakers) that transform electricity from a higher primary voltage to a lower primary voltage. Substations are part of generation, transmission and distribution systems.

Switch — A device for isolating a piece of equipment or a section of feeder to allow repairs or replacements to be made on them while in a safe, de-energized state.

Transformer — A device used to transform voltage levels to facilitate the transfer of power from the generating plant to the customer.

Transformer Vault — A large room (above - or below-ground) that houses transformers, switches and protective equipment.

Volt — A measure of electricity. The Standard International unit of electro-motive force, the difference of potential that would carry one ampere of current against a resistance of one ohm.*

Watt — A measure of the work electricity can do.

1,000 watts = 1 kilowatt (the amount of power used by 10 100-watt light bulbs)

1,000,000 watts = 1,000 kilowatts = 1 megawatt

*Source: Oxford Dictionary of Current English

Your Grid: Pressures on Toronto's Electric System

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Have your say about Toronto Hydro's proposed grid renewal plan and its impact on your rates

Toronto Hydro-Electric System (Toronto Hydro) is in the midst of modernizing a distribution system that was largely built in the 1950s and 1960s. The pace at which this is accomplished will inevitably impact your electricity rates and service reliability. The purpose of this consultation is to gather your feedback on Toronto Hydro's proposed five-year grid renewal and modernization plan for 2015 to 2019.

About This Consultation

This consultation focuses specifically on what Toronto Hydro does: taking electricity from the provincial grid and distributing it to people and businesses in Toronto.

The electricity industry in Ontario is regulated by the Ontario Energy Board, which recently developed a new framework requiring local distribution companies to gather customer preferences on electricity investments. **Your feedback will be presented to the regulator when Toronto Hydro files its rate application for 2015 to 2019**. During the rate hearing process, Toronto Hydro will be held accountable for the way you were consulted and the ways in which the utility's plans respond to what you said.

Will you be expected to answer technical questions about the grid?

Toronto Hydro **does not** expect you to make electrical engineering decisions. The utility is asking you about the electricity issues that matter most to you, and if you feel Toronto Hydro's priorities for investing your electricity dollars are reasonable.

Toronto's distribution system is aging, the city is facing unprecedented growth in the downtown core, and a variety of innovative grid technologies are providing new opportunities for electricity management. This workbook is designed to give you enough background about these issues to develop an informed opinion.

The most important parts of this workbook are the survey questions. By completing them, you can ensure that Toronto Hydro considers your views as they relate to future investments in the distribution grid.

Where are the survey questions located?

Questions are located on pages:

- 8
- 9
- 11
- 12
- 14
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- 18
- 27
- 28
- 32
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- 35

How much will Toronto Hydro's proposed grid renewal plan cost me?

About one quarter of your electricity bill currently goes to Toronto Hydro. That's about $73 per month for the average small business owner. Toronto Hydro's proposed grid renewal plan will add:

- approximately **$6.10** each year to an average small business owner's monthly bill for the period of 2015 to 2019,
- which amounts to a total increase of approximately **$30.50** per month by 2019compared to 2014.

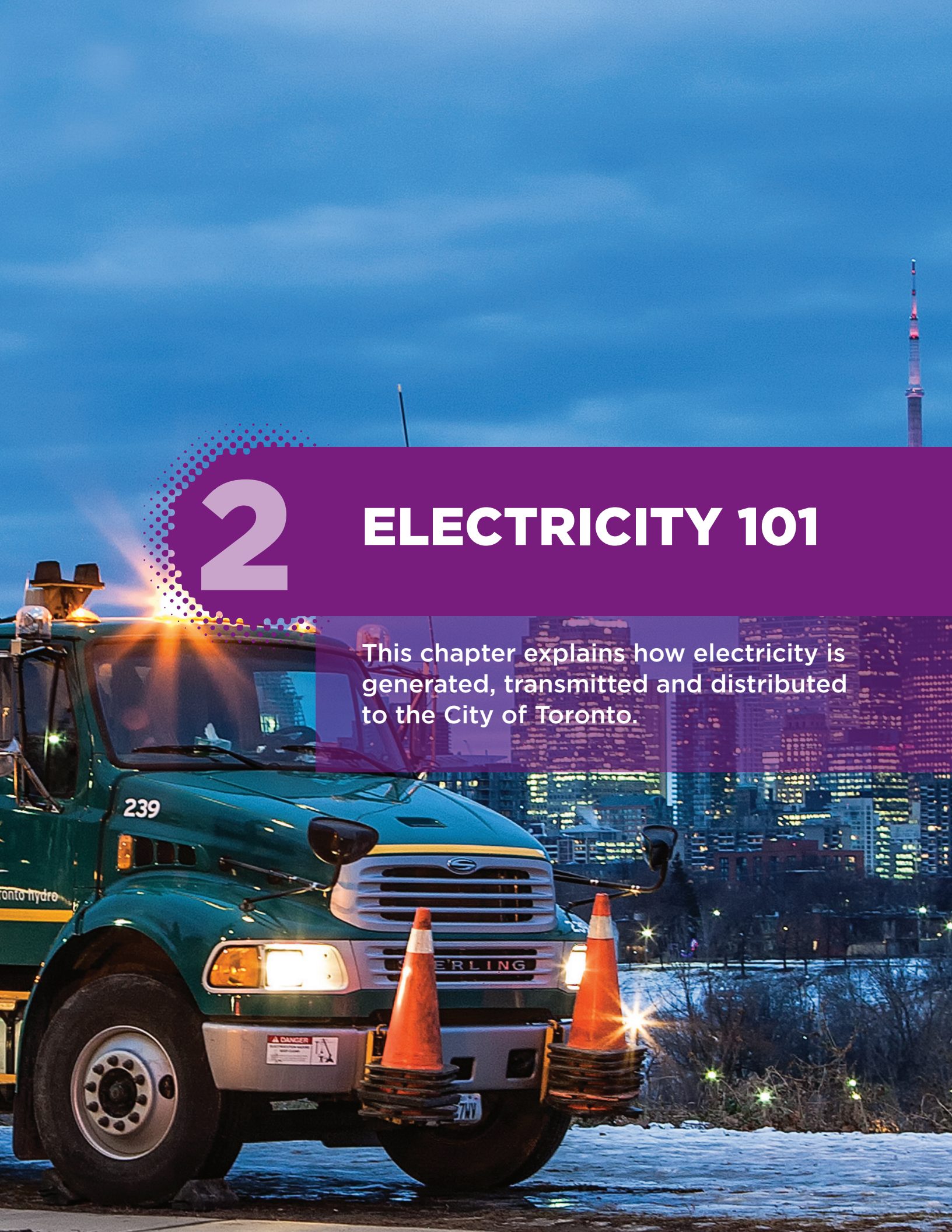
These bill impacts include capital investments and operating expenses. Toronto Hydro is planning to keep increases in operating expenses below inflation for the duration of the plan, which is why this consultation focusses solely on capital investments in the system.

How This Consultation is Being Managed

This public consultation process is being managed by a third-party research company. They will compile the results of all surveys and submit a report to Toronto Hydro. Your responses will be combined with others to protect your privacy.

You Can Participate in a Separate Conversation About Long-Term Energy Planning

Do we have enough electrical infrastructure to meet Toronto's needs? The Central Toronto Integrated Regional Resource Plan looks at where demand for electricity is growing and how this can be best managed over the next 25 years. Options considered include: conservation, local distributed generation, transmission and distribution infrastructure. You'll pay later for the choices being made today about your electricity system. Visit **torontohydro.com/haveyoursay** for more information.



2 ELECTRICITY 101

This chapter explains how electricity is generated, transmitted and distributed to the City of Toronto.

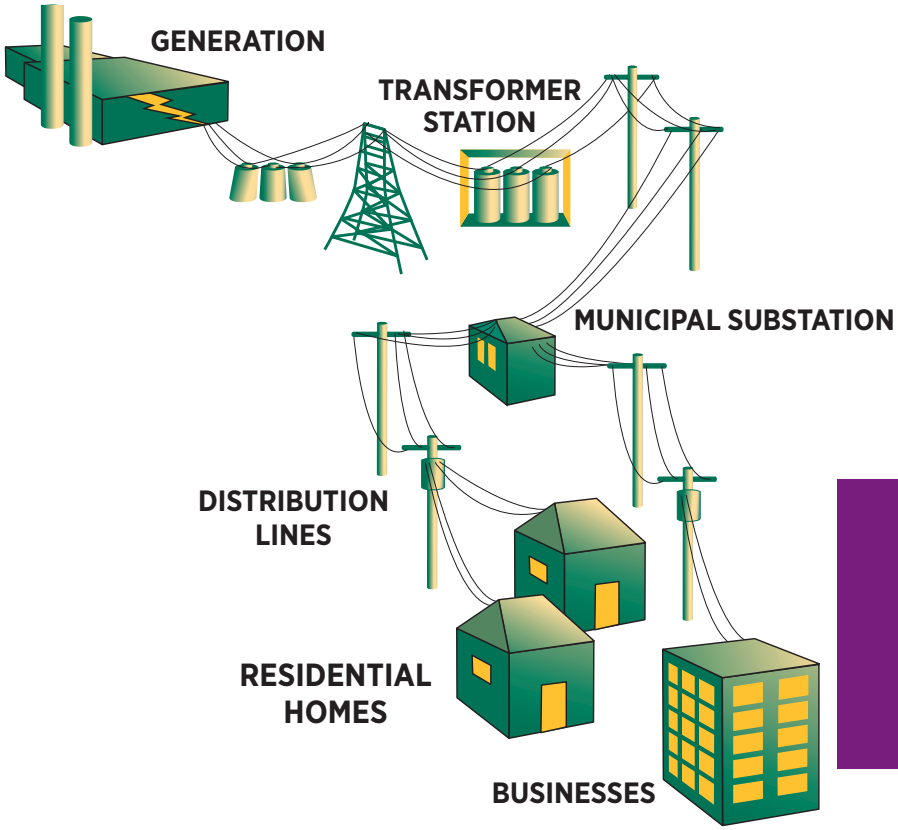
Understanding Toronto Hydro's Role in Ontario's Electricity System

There are three main components to all electricity systems: generation, transmission and distribution.

Where Electricity Comes From

In Ontario, 70 per cent of electricity is generated by **Ontario Power Generation**. This provincially-owned organization has generating stations across Ontario that produce electricity from hydroelectric, nuclear and fossil fuel sources.

Once electricity is generated, it must be delivered to urban and rural areas in need of power. This happens by way of high voltage transmission lines that serve as highways for electricity. The province has more than 30,000 kilometres of transmission lines*, owned mostly by **Hydro One**.



Toronto Hydro

Toronto Hydro is responsible for the last step of the journey: distributing electricity to customers in Toronto.

The City of Toronto

The City of Toronto is Toronto Hydro's sole owner and shareholder. The Ontario Energy Board allows Toronto Hydro to earn a specified annual return, part of which is used to pay an annual dividend to the shareholder. The City uses this dividend to fund city services like snow removal and garbage collection. Toronto Hydro reinvests the remaining portion of this amount back into the utility.

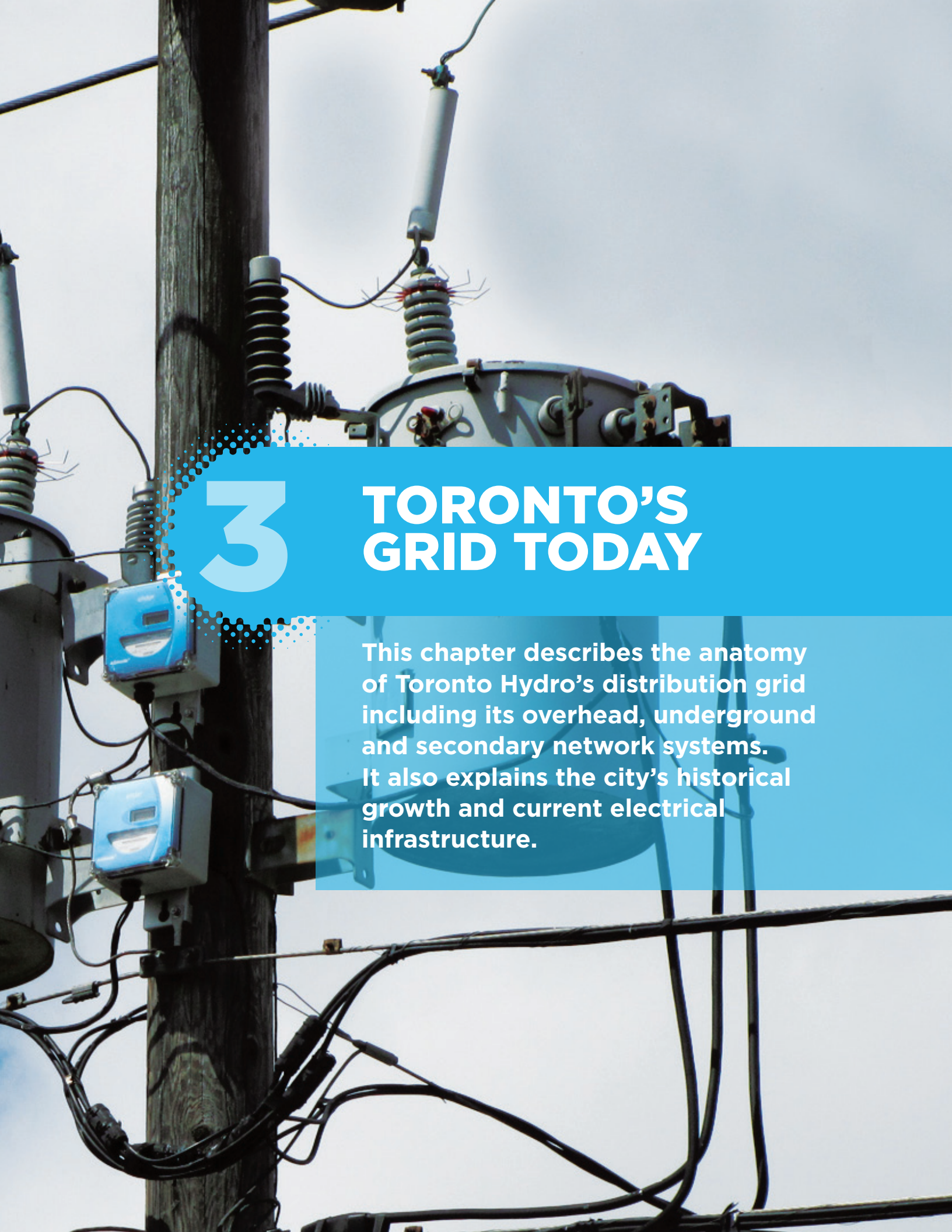
How are Electricity Rates Determined?

Toronto Hydro is funded by the distribution rates paid by its customers. Periodically, Toronto Hydro is required to file an application with the Ontario Energy Board to determine the funding available to operate and maintain the distribution system. Toronto Hydro must submit evidence to justify the amount of funding it needs to safely and reliably distribute electricity.

Who Protects Consumer Interests?

Toronto Hydro's evidence is assessed in an open and transparent public process known as a **rate hearing**. A number of public intervenors with electricity industry expertise submit their own evidence challenging Toronto Hydro's plans and assumptions. At the end of the process, the Ontario Energy Board weighs the evidence and decides on the rates Toronto Hydro can charge for distribution.

*Source: IESO. The Power System, **www.ieso.ca**



3 TORONTO'S GRID TODAY

This chapter describes the anatomy of Toronto Hydro's distribution grid including its overhead, underground and secondary network systems. It also explains the city's historical growth and current electrical infrastructure.

The Nuts and Bolts of Toronto Hydro's Distribution Grid

Toronto's electricity grid is comprised of overhead, underground and secondary network systems. The mix is largely due to the utility's amalgamation. In 1998, Toronto Hydro merged with North York Hydro, Scarborough Hydro, East York Hydro, York Hydro, and Etobicoke Hydro. Each utility operated independent distribution systems, and as a result, the infrastructure varies from region to region. Toronto Hydro has been working to gradually standardize this equipment, which will help improve reliability and safety across the city, and make system operation more efficient.

A Look at Toronto Hydro's Growth

Toronto Hydro has been serving the city since 1911 and has experienced many changes over the years.

The first electrically-powered trolley bus and electric traffic lights were introduced in the **1920s**. Street lighting was introduced in the **1930s** and was upgraded following World War II.

Between **1945** and **1955**, the City's power consumption increased by 75 per cent thanks to the post-war baby boom and immigration. The dramatic growth created a need to expand the system. Toronto Hydro built 12 new municipal substations. Much of the equipment installed during this decade is still in operation today.

The **1970s** saw dramatic skyline changes with the addition of the CN Tower, First Canadian Place, and the Royal Bank Plaza. As society started to become more environmentally conscious, Toronto Hydro introduced energy conservation programs and incentives to many of its customers.

In the early **1980s**, Toronto Hydro introduced a computerized control system to remotely monitor the distribution system and respond more quickly to emergencies.

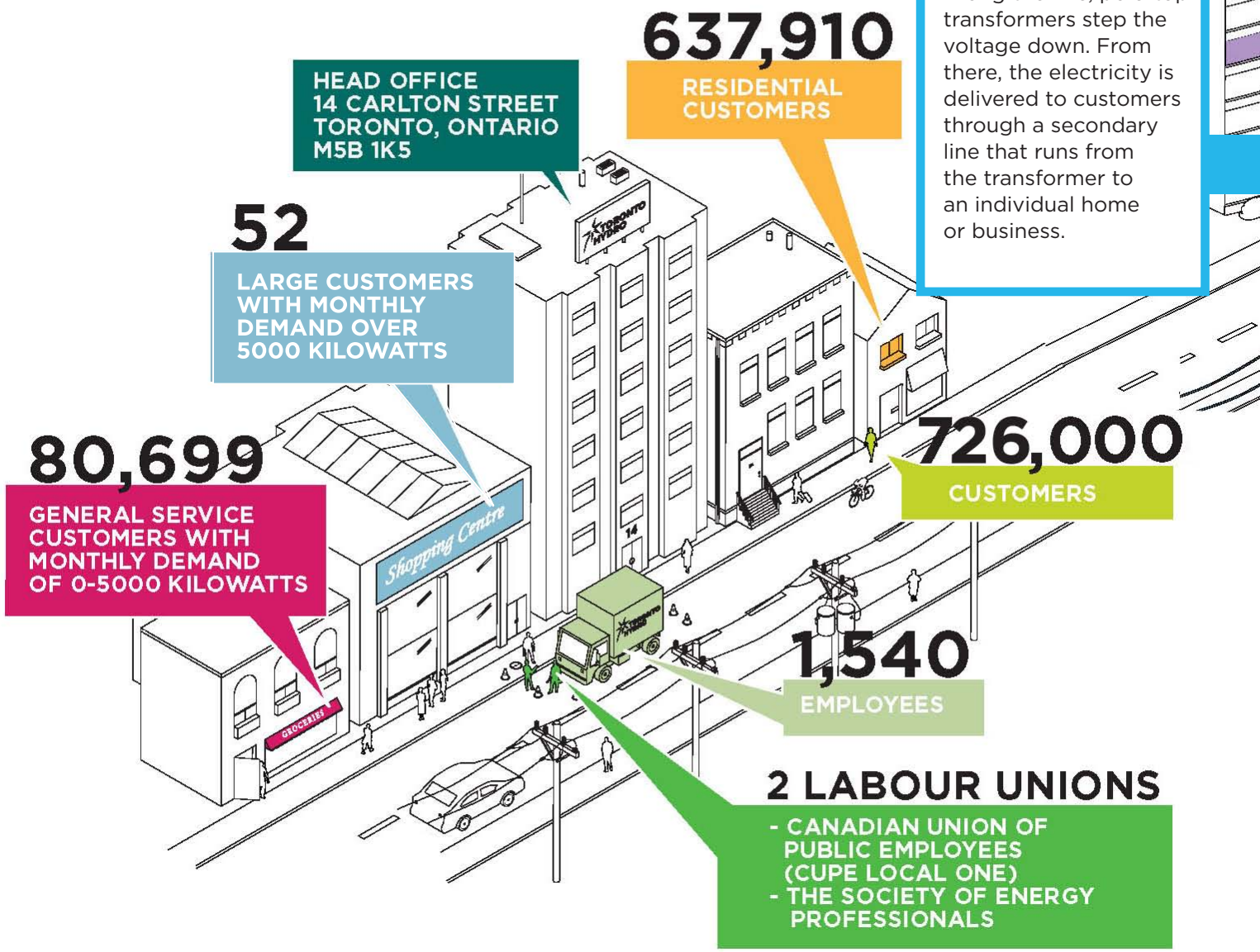
In **2006**, facing the challenges described in the following chapters, Toronto Hydro embarked on the largest infrastructure renewal program in its history.

About Toronto Hydro

Toronto Hydro owns and operates **$2.6 billion** in capital assets and is the largest municipal electrical utility in Canada. It distributes **about 19 per cent of Ontario's electricity demand**.

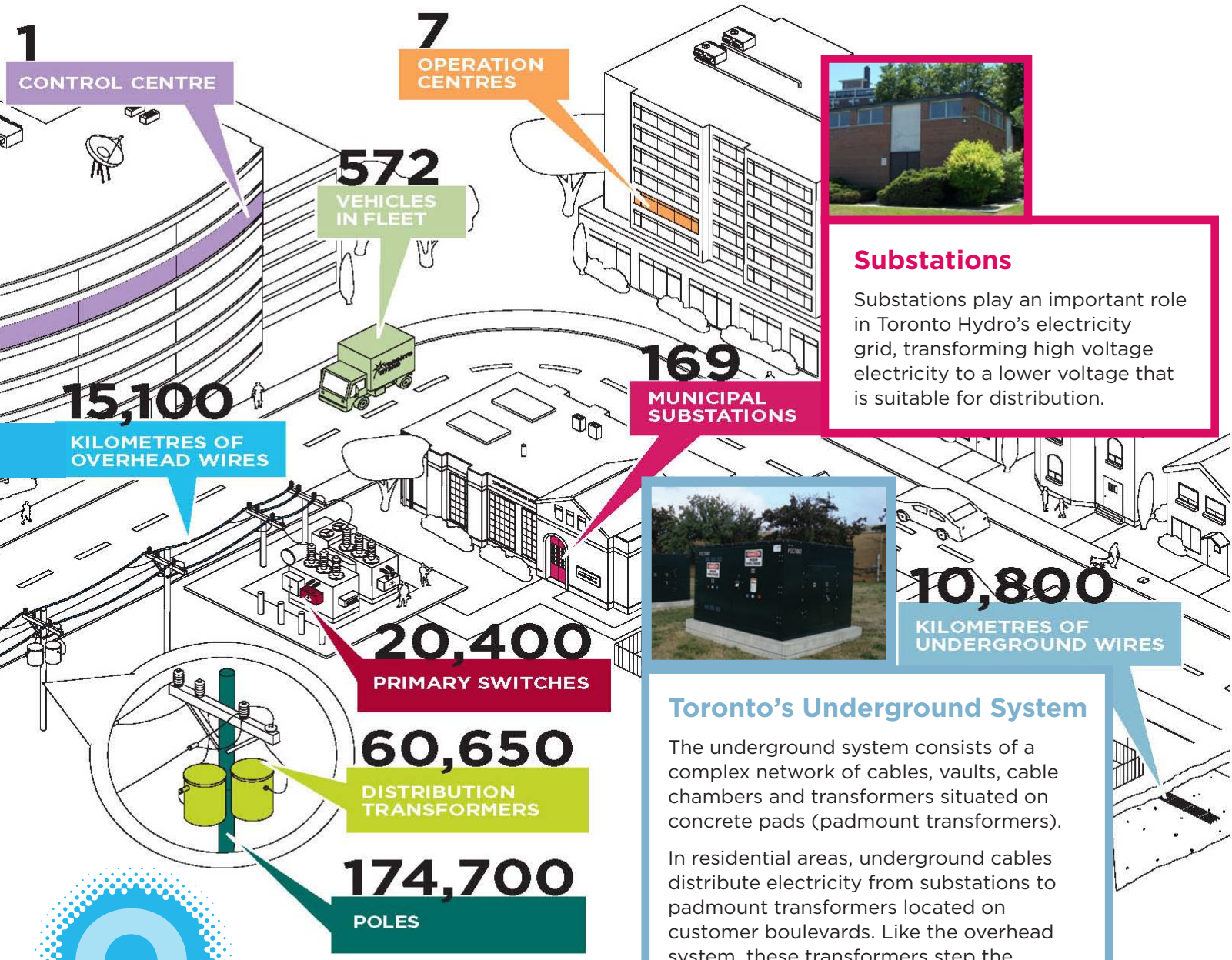
Toronto's Overhead System

The overhead system is made up of distribution lines that operate at either 4.16 kilovolts, 13.8 kilovolts or 27.6 kilovolts. These primary lines are strung across hydro poles. Along the line, pole-top transformers step the voltage down. From there, the electricity is delivered to customers through a secondary line that runs from the transformer to an individual home or business.



1. Given what you know and what you have read so far, how well do you feel you understand the important parts of the electricity system, how they work together and which services Toronto Hydro is responsible for?

   _____ Very well
   _____ Somewhat well
   _____ Not very well
   _____ I don't understand at all



Substations

Substations play an important role in Toronto Hydro's electricity grid, transforming high voltage electricity to a lower voltage that is suitable for distribution.

Toronto's Underground System

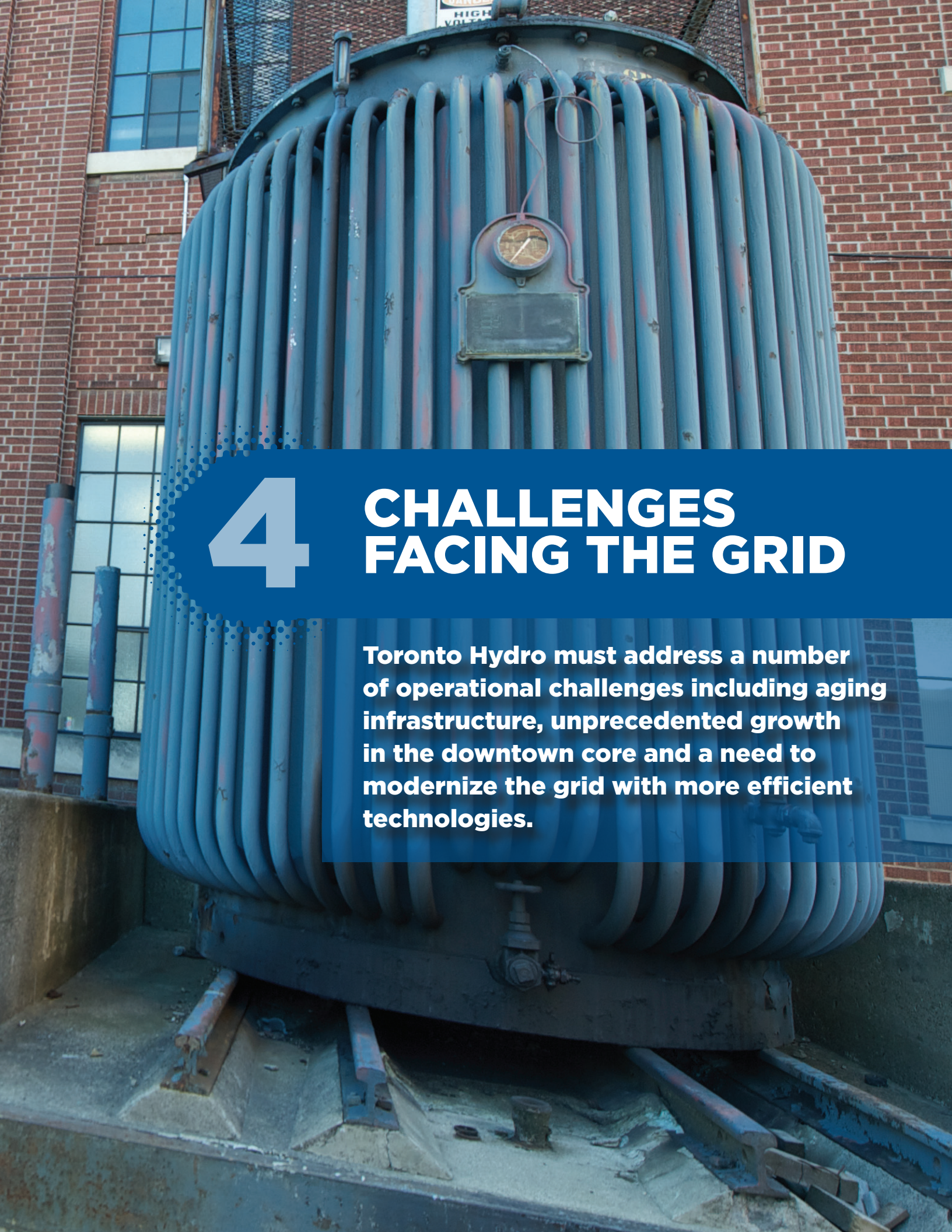
The underground system consists of a complex network of cables, vaults, cable chambers and transformers situated on concrete pads (padmount transformers).

In residential areas, underground cables distribute electricity from substations to padmount transformers located on customer boulevards. Like the overhead system, these transformers step the electricity down to a lower voltage, and current is delivered to customers through a secondary line. When distributing electricity to urban areas or larger customers, bigger vault transformers are used. Cable chambers are located throughout the underground system to provide crews with access to feeder cables.

2. How satisfied are you with the job Toronto Hydro is doing running your local distribution system?

   _____ Very satisfied
   _____ Somewhat satisfied
   _____ Somewhat dissatisfied
   _____ Very dissatisfied
   _____ Don't Know

3. Is there anything in particular that Toronto Hydro can do to improve its service to you?



4 CHALLENGES FACING THE GRID

Toronto Hydro must address a number of operational challenges including aging infrastructure, unprecedented growth in the downtown core and a need to modernize the grid with more efficient technologies.

Toronto's Renaissance: Accommodating a City Under Construction

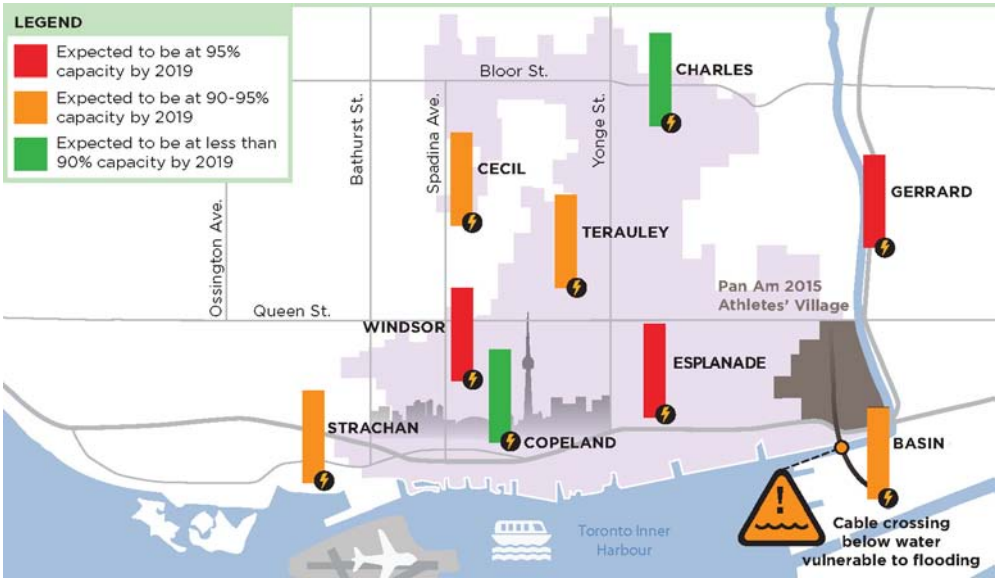
Recently crowned the fourth largest city by population in North America and a continued leader in high rise development, Toronto is a city under construction. Toronto Hydro plays an important role in this growth.

Toronto Hydro is required by law to:
- Connect new customers to the grid
- Accurately meter customer electricity consumption
- Expand or move distribution equipment to accommodate certain projects initiated by the City of Toronto, TTC, Metrolinx and GO Transit

The rate of Toronto's growth is making it increasingly difficult to fulfill these responsibilities while maintaining system performance:
- There are more skyscrapers under construction than New York City, Chicago and Mexico City
- There are more than 75 potential relocation projects slated for construction by the end of 2019

Growth from high-rise construction is putting immediate and longer-term pressures on the existing grid.

Downtown Stations are Overloaded



To help ensure the city's continued economic success and its ability to serve the growing population, Toronto Hydro is investing in expanding the capacity of its stations and feeders.

Under provincial legislation, there are several types of investments Toronto Hydro must make when the need presents itself. How reasonable do you feel it is to give each of these investments a priority over other investments (for example, replacing aging equipment)?

4. Connecting new customers such as new housing, condominiums or businesses. (Provincial regulations set connection fees which cover unusual costs).
   _____ Very reasonable _____ Somewhat reasonable
   _____ Not very reasonable _____ Not reasonable at all _____ Don't Know

5. Maintaining and upgrading customer meters to meet provincial standards.
   _____ Very reasonable _____ Somewhat reasonable
   _____ Not very reasonable _____ Not reasonable at all _____ Don't Know

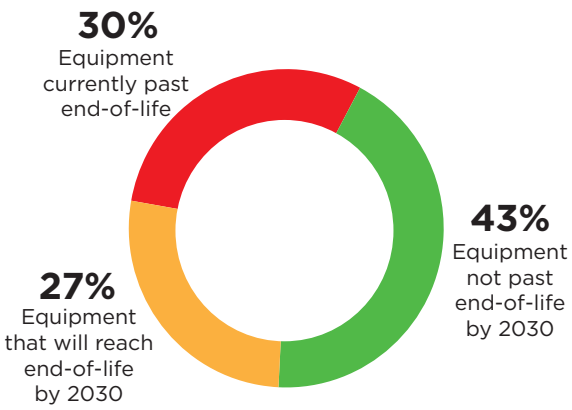
6. Moving existing electricity infrastructure such as poles and transformers to enable other projects such as street widening or new developments. (Provincial regulations set fees which cover unusual costs).
   _____ Very reasonable _____ Somewhat reasonable
   _____ Not very reasonable _____ Not reasonable at all _____ Don't Know

Aging Equipment: All Good Things Must Come to an End

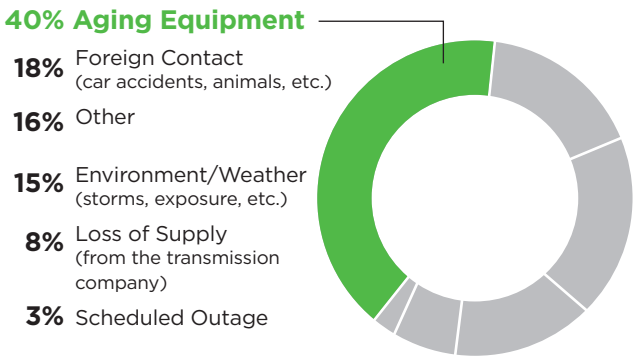
A large part of Toronto Hydro's distribution system was installed in the 1950s and 1960s. This infrastructure has served the city well beyond its expected lifespan. But now the grid is at a point where renewal investments can no longer be deferred without affecting service reliability.

Almost 60% of the city's distribution infrastructure needs to be rebuilt over the next two decades. The price of these upgrades is approximately $5.6 billion overall.

How Fast is the System Aging?



Aging Equipment is Responsible for Approximately 40% of Outages



About 30 per cent of our distribution equipment is past its end of life and an additional 30 per cent will reach this state over the next 20 years.

7. Thinking about the aging equipment in the grid, do you feel it's best to wait until the equipment breaks down to get full value from each piece of equipment, even if it means power outages, or do you feel the best approach is to replace the equipment before it breaks down to avoid power outages, even if it means not getting all the use possible from each piece of equipment?

_____ Wait until break down _____ Replace before break down

A Look at Toronto Hydro's Service Reliability

Aging infrastructure is a major challenge to service reliability. Toronto Hydro is managing this through grid renewal and modernization.

Toronto Hydro uses two main measures to evaluate service reliability: frequency and duration.

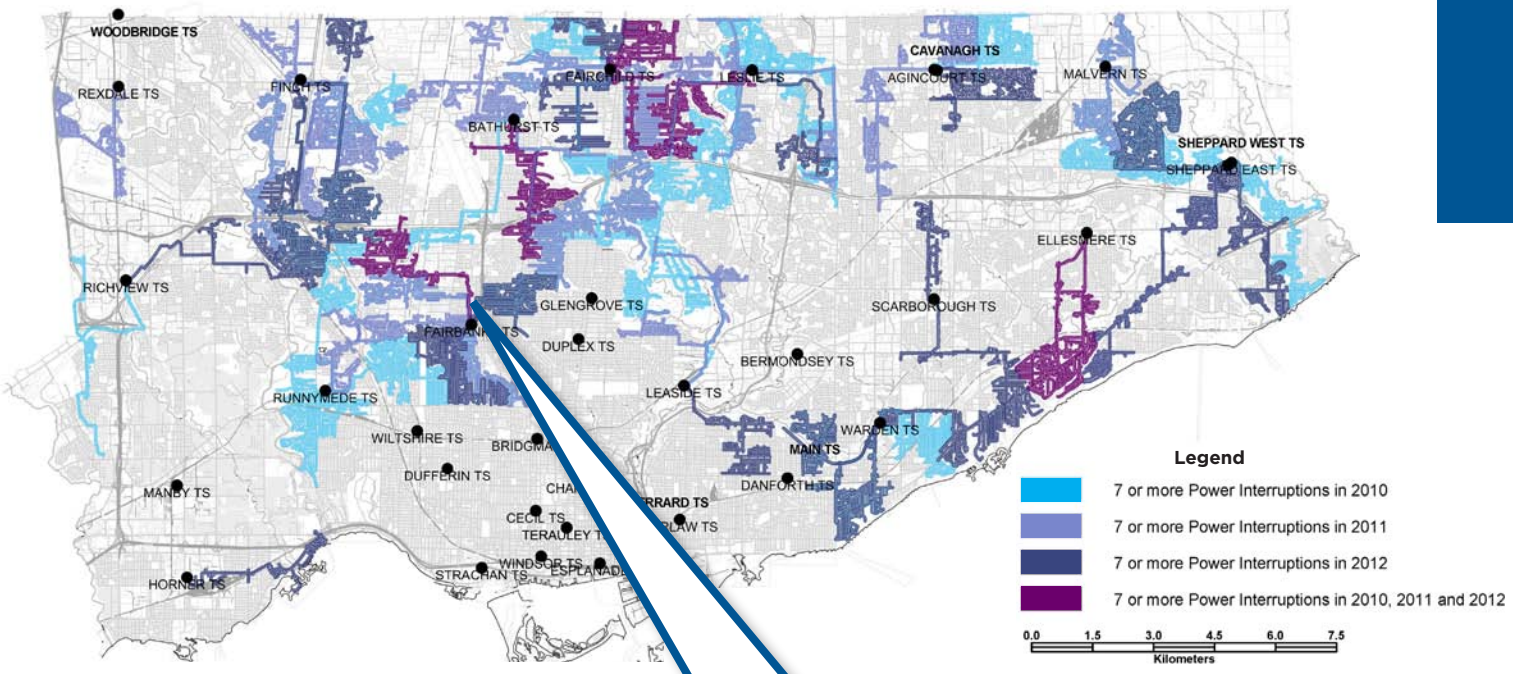
Over the past decade, the average customer has experienced:
- Between **1.4** and **2** outages per year.
- Between **60** and **90** minutes without power per year.

While outage frequency and duration averages are trending downwards, actual customer experiences vary. Some customers on newer parts of the system may not experience any outages while others are experiencing as many as 20 outages per year.

The Least Reliable Equipment on the Block

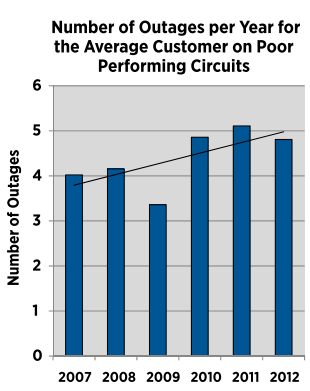
Toronto Hydro pays special attention to circuits with exceptionally poor performance. Engineers maintain a list of circuits experiencing seven or more outages in a year, and addressing this list is a continuous effort. The system is aging at such a rate that new poor performing circuits are added to the list almost as fast as Toronto Hydro can deal with existing problem circuits.

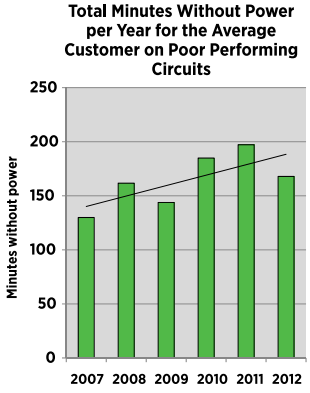
Where are Poor Performing Circuits Located?



Customers Located in These Areas are Receiving Poor Service Reliability

Over the past decade, the average customer on a poor performing circuit has experienced:
- **five outages** per year (compared to the system average of two)
- **150 to 200 minutes without power** per year (compared to the system average of 60 to 90 minutes for the year)





Without sufficient investment in renewing and modernizing the distribution grid, Toronto Hydro expects service reliability of poor performing circuits to continue deteriorating.

8. Do you feel the current average number of electricity outages is acceptable or not acceptable?
   _____ Very acceptable _____ Somewhat acceptable
   _____ Not very acceptable _____ Not acceptable at all _____ Don't Know

9. Do you feel the current average amount of outage time is acceptable or not acceptable?
   _____ Very acceptable _____ Somewhat acceptable
   _____ Not very acceptable _____ Not acceptable at all _____ Don't Know

10. How many outages have you experienced over the past two years?
    _____ INSERT ACTUAL NUMBER

11. (IF 1 OR MORE OUTAGE) How long was the power out during your most recent power outage?
    _____ INSERT ACTUAL NUMBER

12. (IF 1 OR MORE OUTAGE) How did the power outage affect your business?

    _____

    _____

    _____

    _____

    _____

    _____

13. Is there a certain length of time at which the costs and consequences of an outage become more serious for you?

    _____

    _____

    _____

    _____

    _____

    _____

No system delivers perfectly reliable electricity. Generally, the more reliable the system, the more expensive the system is to build and maintain. Please answer the following two questions.

14. How many power service interruptions are reasonable in a year?
    _____ No outage is acceptable
    _____ One _____ Two _____ Three _____ Four _____ More than four

15. What is a reasonable duration for a service interruption?
    _____ No outage is acceptable
    _____ 30 minutes _____ 1 hour _____ 2 hours _____ 3 hours
    _____ 4 hours or more

Changing Weather Patterns

Climate change is raising the risk of severe weather events impacting the system more frequently in the future. Toronto has experienced several major storms over the last year-and-a-half alone:

- At the peak of **Hurricane Sandy** (October 2012), 65,000 customers were without power.
- The **torrential downpour** on July 8, 2013, caused severe flooding in stations and the underground system. Approximately 300,000 customers were affected — about half of all customers — and thousands experienced extended outages.
- On December 21, 2013, Toronto experienced the worst **ice storm** in its history. Freezing rain caused massive destruction to trees and power lines, leading to widespread and extended outages. About 300,000 customers were impacted and some people were without power for as long as 12 days. Many customers spent their holidays in City of Toronto warming stations.

Planning for the weather

Toronto Hydro is studying the results of these unusual weather events to determine whether changes are needed to any of the utility's best practices. In the meantime, Toronto Hydro anticipates that a number of the planned capital investments for 2015 to 2019 will help improve system performance during major weather events. For example, replacing "box construction" circuits (explained on page 20) with taller, higher-voltage circuits will help reduce the impact of falling trees and branches in certain areas.

Why not move everything underground?

There are pros and cons to both overhead and underground circuits. Underground circuits were hit harder than overhead circuits in the summer flooding, while overhead circuits were hit harder in the ice storm. Underground circuits can cost many times more than simply replacing the existing overhead lines; the cost for moving all circuits underground would be in the range of **$15 billion**. Toronto Hydro must consider these options in light of the other capital needs discussed in this workbook and the need to keep increases in customer bills as low as possible.

16. Over the past year, Toronto has experienced two unusual weather events — the flooding in July and the ice storm in December. Thinking back to the two major storm events of 2013, were you affected by either or both of these events?

_____ Yes – the flooding in July
_____ Yes – the ice storm in December
_____ Yes – Both
_____ No – neither weather event affected my electricity

17. Whether you were personally affected or not, how satisfied are you with Toronto Hydro's management of these events?

_____ Very satisfied
_____ Somewhat satisfied
_____ Somewhat dissatisfied
_____ Very dissatisfied
_____ Don't Know

18. Is there anything in particular that Toronto Hydro could have done to improve its service to you during these events?

Grid Modernization

The pressures of economic growth and system aging are at the heart of Toronto Hydro's investment plan for 2015 and beyond. For the most part, responding to these pressures will involve rebuilding and expanding the system using tried and true distribution technology. At the same time, technological innovation in the industry has begun to change the way that utilities can manage the system and the way that customers can use the grid. The following section highlights some of the pressures – and opportunities – associated with the evolving technological landscape.

Here are some of the modern grid management technologies that Toronto Hydro is exploring:

Feeder Automation

- Enables automated switching to detect and isolate power interruptions.
- Helps reduce the number of customers affected by an outage.
- Significantly improves restoration time and service reliability in a cost-effective manner.

Power Line Monitors

- Log power line disturbances and diagnose the causes.
- Help engineers address the root causes of interruptions to help prevent them
- Are capable of reporting outage locations in real time.

Transformer Monitors

- Detect overloaded transformers and theft of power.
- Help predict end-of-life of transformers to assist with proactive maintenance and planning.

Energy Storage

- Energy storage facilities can be used to store excess supply during off-peak hours.
- The stored energy can be rapidly deployed by system operators to address local capacity issues throughout the distribution system and to moderate peak power costs.

19. Modernizing the grid can allow Toronto Hydro to improve reliability. Investments such as automated switches may allow Toronto Hydro to minimize the number of people impacted by outages and to restore electricity to most customers in a matter of seconds. Given there are many other areas of needed investment, such as connecting new customers, replacing aging equipment and expanding capacity for long-term growth, how important do you feel it is for Toronto Hydro to invest now in modernizing the grid?

_____ Very important
_____ Somewhat important
_____ Not very important
_____ Not important at all
_____ Don't Know

Here are some of the new technologies that are changing the way that customers use the grid:

Electric Vehicles

- Studying the grid impacts of electric vehicles allows Toronto Hydro to develop charging profiles for all vehicle models.
- Helps the utility predict the impacts of electric vehicles on the lifespan and performance of equipment and make proactive upgrades when necessary.

Making Room for Renewable Generation Projects

Solar power and energy-from-waste facilities are renewable forms of distributed generation that are growing in popularity and affordability. Toronto Hydro is mandated to connect distributed generation as part of the province's Feed-in Tariff program. Since 2012, Toronto Hydro has connected more than 375 distributed generation projects to the grid.

5 HOW WE'RE MANAGING GRID PRESSURES

This chapter covers the work Toronto Hydro is doing to address grid challenges. It includes information about historical grid investments, ongoing capital projects and productivity improvements.

Working Hard to Improve Reliability

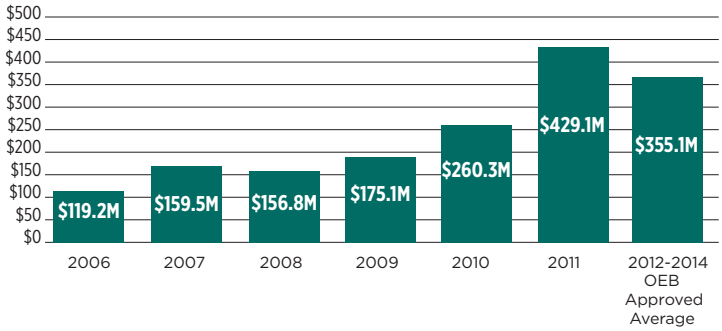
Since 2006, Toronto Hydro has invested approximately $2.5 billion in infrastructure renewal. This investment represents some of the largest construction programs in the utility's history, replacing approximately:

- **1,800 kilometres of aging lines**
- **17,000 old poles**
- **14,000 transformers**

From 2006 to 2009, Toronto Hydro gradually increased its capital spending on poor performing feeders and underground cables that were negatively impacting reliability.

In 2010 and 2011, the utility increased spending to a level needed to execute a broader grid renewal and modernization program.

Toronto Hydro has increased capital spending



The following case studies provide a snapshot of major projects being executed across Toronto Hydro's distribution system. Feel free to read about whichever projects interest you.

What's Happening with the Overhead System?

Box Construction

- Refers to a type of overhead feeder installed in the former City of Toronto.

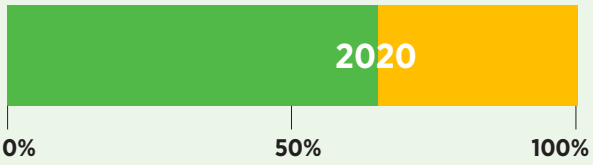
CHALLENGES:

- Close arrangement of circuits make it difficult for crews to safely access equipment.
- Power outages last twice as long as modern overhead feeders.
- Electrical capacity is one third of modern feeders making it difficult to accommodate the increasing number of large customers in the downtown core.

SOLUTION:

- Toronto Hydro is gradually converting box construction to modern standards, which will help improve safety, reliability and flexibility.

PROGRESS BY 2020:



PLAN FOR 2015-2019:

- The utility is dedicating approximately **3 per cent** of its budget to box construction conversion.

What's Happening with the Overhead System?

Rear Lot Feeders

- Refers to a type of overhead construction installed in residential backyards during the 1950s and 1960s.

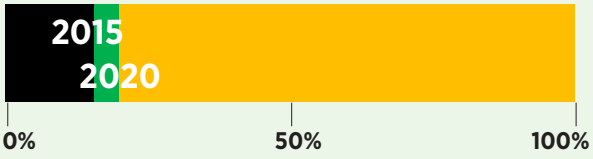
CHALLENGES:

- Location makes it difficult and more costly to access and repair, especially during major storms.
- Due to its age and condition, it's expected to fail at an increasing rate.
- Poor accessibility is a potential safety risk for crews and the public.

SOLUTION:

- The utility is converting these feeders to safer and more reliable underground streetside construction.

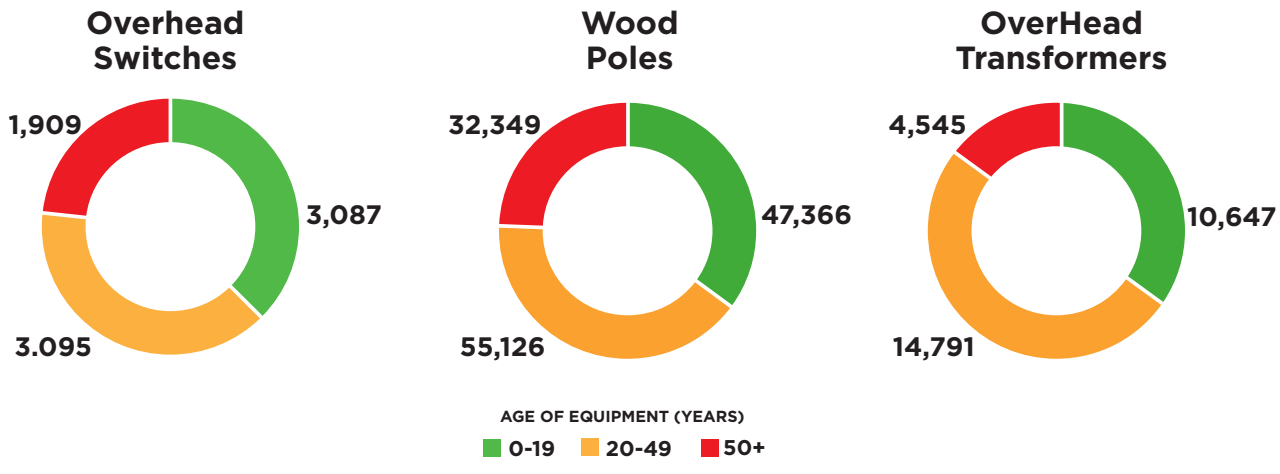
PROGRESS BY 2020:



PLAN FOR 2015-2019:

- Toronto Hydro is expecting to dedicate approximately **2 per cent** of its budget to convert this legacy construction to standard.

How Old is the Overhead System?



What's Going on with the Underground System?

Direct Buried Cable

- Refers to a legacy type of underground construction where cables are laid directly in underground trenches without a protective barrier.

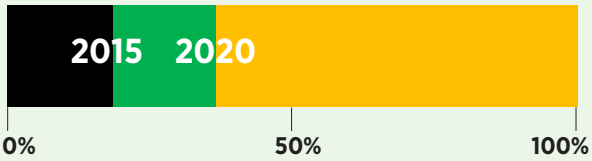
CHALLENGES:

- Cables are susceptible to outages because they are exposed to environmental stress, including excessive moisture.
- Majority of these cables are in need of immediate repair or replacement.
- In 2011, direct buried cables caused more than half of all outages associated with underground equipment.

SOLUTION:

- Toronto Hydro is replacing direct buried cable with water resistant cables in plastic ducts, encased in protective concrete.
- This construction is cost-effective because it extends the life of the system and allows for easier repairs.

PROGRESS BY 2020:



PLAN FOR 2015-2019:

- Underground circuit renewal is expected to account for approximately **18 per cent** of the proposed budget.
- It is the largest capital program in the plan, addressing underground equipment including direct buried cable, switches and transformers.

What's Going on with the Underground System?

Chambers, Vaults and Ducts

- Refers to underground civil infrastructure that houses and protects Toronto Hydro's electrical equipment.

CHALLENGES:
- These assets are deteriorating and causing outages.
- They also pose a potential safety hazard for crews working in vaults and chambers.

SOLUTION:
- Toronto Hydro is gradually rebuilding these structures.

PLAN FOR 2015-2019:
Underground civil renewal work is expected to account for approximately **2 per cent** of the renewal budget for 2015-2019.

Leaking Paper Insulated Lead Covered Cable

Paper insulated lead covered (PILC) cable was the first type of underground cable installed in Toronto.

CHALLENGES:
- As they age, the lead casings are cracking and leaking oil.
- Leaking cables can fail and "flashover", sometimes violently.
- Stricter safety regulations have made repairs costly and time consuming.

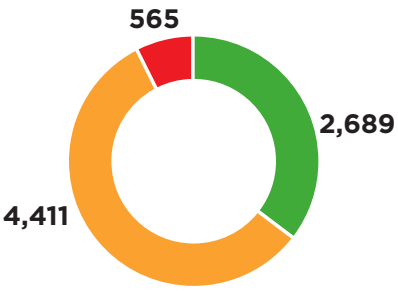
SOLUTION:
- The utility has been targeting feeders with the oldest stock of PILC cables and repairing all of the leaks at once.

PLAN FOR 2015-2019:
- PILC repair work is expected to account for approximately **0.4 per cent** of the budget for 2015-2019.

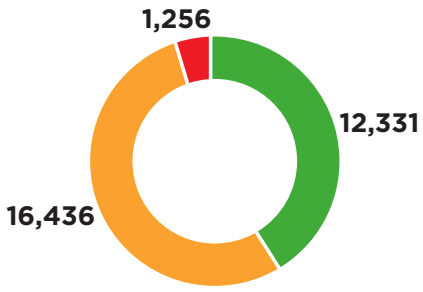
How Old is the Underground System?

AGE OF EQUIPMENT (YEARS)
0-19 20-49 50+

Underground Switches



Underground Transformers



What's Happening to the Underground Network in the Downtown Core?

Network Vaults

Refers to civil infrastructure that houses underground transformers and other underground electrical equipment unique to the downtown system.

CHALLENGES:

- Old age, water damage and salt contamination are causing rebar and the roofs of network vaults to deteriorate and corrode.
- In some cases, the roofs are collapsing.
- Roofs are leaking and water is damaging electrical equipment.

SOLUTION:

- Toronto Hydro has been rebuilding vaults using higher quality materials like galvanized rebar and corrosion-resistant beams.
- This results in cost savings for customers because it lengthens the life of new structures.

PLAN FOR 2015-2019:

- Toronto Hydro plans to dedicate approximately **2 per cent** of its budget to rebuilding network vaults.

Obsolete Network Equipment

Refers to electrical assets in the downtown network system that are failing and are no longer used.

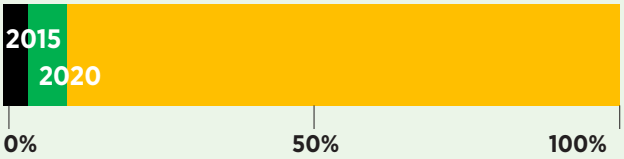
CHALLENGES:

- Some electrical assets are failing as a result of their age and wear; particularly fibertop network units installed in the original system.
- These failures have resulted in vault fires which require extensive repairs and cause outages impacting a large number of customers.

SOLUTION:

- Toronto Hydro expects to continue the gradual, proactive replacement of this equipment.

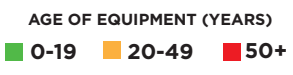
PROGRESS BY 2020:

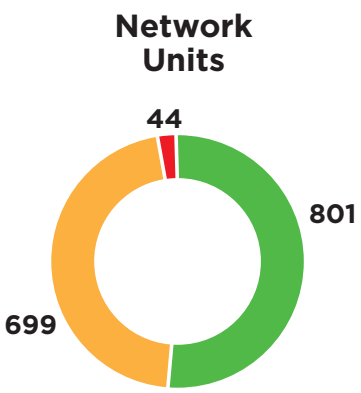


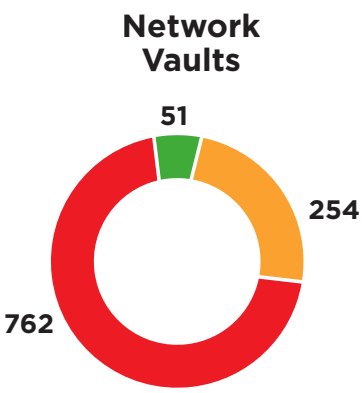
PLAN FOR 2015-2019:

- Toronto Hydro plans to dedicate approximately **2 per cent** of its capital budget to these network projects.

How Old is the Underground Network?







What's Going on with Toronto Hydro's Distribution Stations?

Obsolete Stations Switchgear

Refers to electrical equipment used to switch load between feeders inside the substation.

CHALLENGES:

- Some switchgear is past its designed lifespan and is now obsolete.
- Toronto Hydro is custom fabricating certain parts that are no longer available, but this is increasingly expensive, unreliable and unsustainable.
- Obsolete equipment poses potential safety risks to staff within the substation building and could potentially cause significant damage to surrounding equipment.

SOLUTION:

- Toronto Hydro expects to replace a number of these units over the course of its capital plan through its Stations Switchgear Renewal program. This is expected to help minimize maintenance and operating costs and improve system reliability.

PLAN FOR 2015-2019:

- The Stations Switchgear Renewal program accounts for approximately **4 per cent** of the proposed budget and three quarters of the total proposed stations renewal budget.

Stations Expansion

Toronto Hydro is expanding the capacity of its distribution grid through stations upgrades and expansions.

CHALLENGES:

- The city's growing population is stressing the grid.

SOLUTION:

- Toronto Hydro is addressing this with a mix of cost-effective solutions including new stations, stations upgrades and the purchase of mobile switchgear units that can be deployed during widespread outages.

PROGRESS:

- Copeland Station, a new underground transformer station, is being constructed at the Roundhouse Park next to the CN Tower to help alleviate capacity constraints in the downtown core.
- The station will add additional capacity equivalent to 70 skyscrapers, allowing Toronto Hydro to take other aging stations offline for needed repairs and upgrades.
- The project is expected to be completed by the end of 2014.

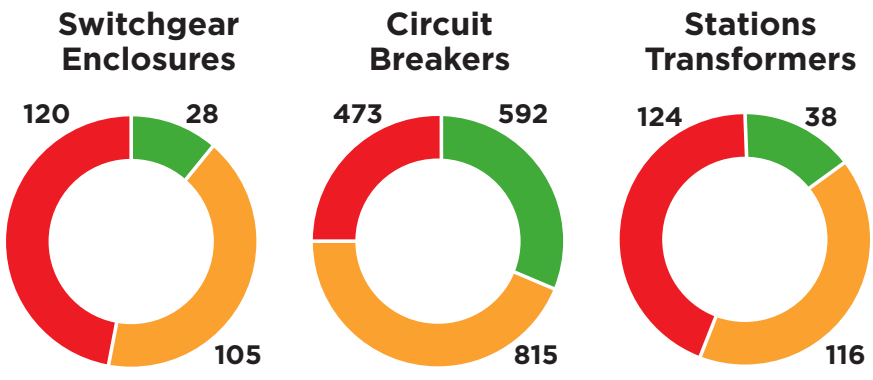
PLAN FOR 2015-2019:

- Toronto Hydro plans to dedicate approximately **14 per cent** of its renewal budget to stations expansion.

How old is the Distribution Stations Equipment?

AGE OF EQUIPMENT (YEARS)

0-19 20-49 50+



What's Happening with Grid Modernization?

Feeder Automation

Refers to overhead intelligent switches installed on feeders to detect and isolate outages.

- The switches are programmed to recognize feeder outages and will open and close accordingly.
- Toronto Hydro has installed automated switches on 10 of its worst performing feeders to test its effectiveness.

PLAN FOR 2015-2019:

- Intelligent switches have proved to be a cost effective technology that significantly reduces outage impacts on problem feeders.
- Toronto Hydro is considering dedicating approximately **3 per cent** of its capital budget to feeder automation projects.

How is Toronto Hydro Keeping the Business Running?

In addition to investing in grid renewal, Toronto Hydro must invest in the tools required to keep the utility going. This includes vehicles, facilities and information technology (IT).

CHALLENGES:

- Vehicles must be well maintained so that crews can carry out work safely and efficiently.
- IT is an increasingly important aspect of utility management. Engineers, project managers and construction crews have shifted from manual paper drawings to digital records made possible by computer software that helps staff design and track projects.
- Computers and software require regular maintenance and updates.

SOLUTION:

- Toronto Hydro is continuing to replace basic IT hardware and upgrade software as necessary.
- Toronto Hydro plans to replace the radio system that crews use to communicate with system operators when working in vaults and chambers to help reduce safety risks. The existing system will no longer be supported by the vendor after 2016.
- The utility also plans to replace its main resource management IT system which supports a number of critical engineering, project planning, human resource and finance functions.
- These systems are outdated and no longer adequately supported by the vendor.

Stretching your Electricity Dollars

Reducing Strain on the Grid

Toronto Hydro is reducing strain on the grid by supporting provincial conservation and demand management programs for residential, business and industrial customers. These programs are not generally an alternative to renewing the aging distribution system in the near-term, but they may help defer the need for capacity expansion and renewal investments over the longer-term.

Conservation Program Results from 2012

Here is a look at conservation programs provided to customers and the electricity savings they yielded.

saveONenergy℠ Conservation Programs	**Results**	**MW Saved**	**MWH Saved**
FRIDGE & FREEZER PICK-UP	**2,802** refrigerators and freezers collected	**0.2**	**1,092**
COUPONS	Bi-annual customer events and coupons for energy efficient products held at participating retailers	**0.2**	**3,606**
DEMAND RESPONSE CONTRACTUAL DR3	**48** commercial and industrial customers contracted to reduce energy use at specified times	**14.7**	**312**
SMALL BUSINESS LIGHTING	**3,498** lighting retrofits installed	**2.5**	**9,383**
HEATING & COOLING INCENTIVE	**13,047** participants received an incentive for installing an ENERGY STAR® qualified central heating or cooling system	**2.8**	**4,782**
***peaksaver* PLUS®**	**43,149** installation	**22.9**	**169**
RETROFIT PROGRAM	**1,168** project applications	**15.9**	**80,294**

Total 2012 Results: **112,200 MWh** and a total demand reduction of **61,088 MW**

20. For conservation and demand management programs to slow the pace of renewal and expansion, they must provide an acceptable level of certainty. How likely is it that you would participate in Demand Response programs that would allow electricity system managers to turn off equipment you are using? For residential customers, this would involve automated devices to turn off your water heater and air conditioner for short periods during times of peak demand.
    _____Very likely
    _____Somewhat likely
    _____Not very likely
    _____Not at all likely

Smart Grid, Smart People, Smart Business

Toronto Hydro is trying to temper the cost of investment by improving the productivity and efficiency of its overall business. Here's how the utility is finding ways to do more with less:

- **Reducing employee headcount** — Toronto Hydro has reduced staff levels by 35% and senior executives by 65% since 1998.
- **Keeping absenteeism low** — According to Statistics Canada, Toronto Hydro's absentee rate is 15% below the average for public and private sector companies.
- **Working safely** — Toronto Hydro is avoiding injuries and staying productive on the job site. The utility has achieved 3.5 million hours without a lost-time injury.
- **Reducing operating costs** — Toronto Hydro is downsizing work centres and relocating staff from leased buildings to utility-owned facilities that are better suited to the business.
- **Improving coordination of capital projects** — Toronto Hydro is executing more cost-efficient projects by grouping high-priority projects with lower priority projects in the same neighbourhoods. This allows the utility to use its crews and equipment more efficiently, and reduces the set up time and number of permits required to complete work.

21. Given what you know and what you have read so far, how well do you feel you understand the challenges facing the Toronto Hydro grid and what they are planning to meet those challenges?
    _____ Very well
    _____ Somewhat well
    _____ Not very well
    _____ I don't understand at all

22. From what you have read and what you may have heard elsewhere, does Toronto Hydro's investment plan seem like it is going in the right direction or the wrong direction?
    _____ Right direction
    _____ Wrong direction
    _____ Not sure

23. And why do you feel that way?

6 THE BOTTOM LINE

This chapter examines Toronto Hydro's proposed plan for 2015 to 2019, what it will cost and where the dollars will go.

Here's What We've Covered so Far:

The Ontario Energy Board (OEB) requires that Toronto Hydro gather customer feedback on the utility's proposed investment plans. Toronto Hydro will present your feedback to the OEB as part of the rate setting process. The OEB and a number of public intervenors will hold Toronto Hydro accountable for both the way that you were consulted and the way that the utility's final plan reflects what you said.

About a quarter of your electricity bill goes to Toronto Hydro. The money that Toronto Hydro receives is invested in the local distribution system and the people, buildings and vehicles that support it.

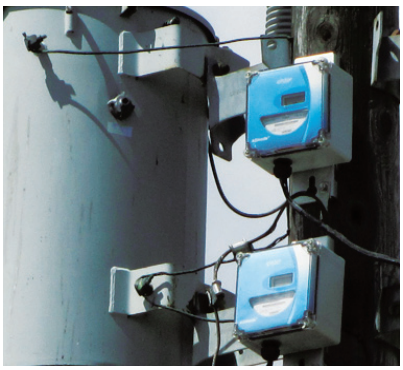
Much of Toronto's existing distribution system was built in the 1950s and 60s. Toronto Hydro's customers have benefited from the longer than expected lifespan of this equipment.

Today, much of the system is at an age where it must be replaced to maintain the reliability that Torontonians expect. Renewing the system will help ensure that the next generation of electricity users enjoys the same long-term value-for-money as previous generations.

Toronto Hydro is also dealing with other pressures, like the need to build more system capacity to accommodate the city's growth and the need to upgrade outdated and unsupported IT systems.

At the same time, the industry is changing, and Toronto Hydro has the opportunity to explore innovative grid modernization technologies that will help the utility cost-effectively improve system performance and reduce the risks and costs associated with aging equipment over the long-run.

Renewing the system for the next generation will take more than a decade, but delaying these investments is expected to gradually worsen reliability across the system and lead to even higher bill increases down the road.



In recognition of growing capital needs, Toronto Hydro has been working to reduce operating costs by reducing employee headcount, avoiding injuries, and downsizing work centres.

The Dollars and Cents

Toronto Hydro is preparing a 2015-2019 investment plan that will require an annual bill increase of approximately $2.35 on the monthly bill. This amounts to a total increase of approximately $11.75 per month by 2019 compared to 2014 electricity rates.

Here's how Toronto Hydro believes your electricity dollars should be invested during these years:

Replacing Aging and Obsolete Equipment
These investments are paced and prioritized to maintain reliability standards and to address the worst performing feeders first. Introduction of modern equipment standards is expected to reduce the impact of storms.

47.1%

Expanding Capacity for Long-term Growth
Expanding the capacity and flexibility of the local distribution network to accommodate forecasted growth in electricity demand.

14.3%

Connecting Customers
Bringing new customers onto the system; these investments are mandatory, but the cost is generally recovered through the additional revenue that new customers contribute.

11.2%

Improving Reliability by Reconfiguring Circuits
Targetted investments to cost-effectively reduce the impact and frequency of outages. For example, converting main feeder sections from overhead to underground will help reduce the impact of future storms.

8.0%

Updating IT Infrastructure
Replacing outdated and unsupported software and communications systems that are critical to Toronto Hydro's planning, operations and outage response.

7.8%

Accommodating Construction Projects in the City
Relocating or reconfiguring distribution equipment that is on or near the path where other agencies are working.

3.3%

Modernizing the Grid
Introducing innovative technologies — like intelligent switches and sensors — that are expected to cost-effectively improve the reliability of the system and reduce the risks and costs associated with aging equipment.

3.2%

Maintaining and Upgrading Customer Meters
Routine meter replacements and improvements to data quality.

1.9%

Building Maintenance
Routine capital investments to maintain Toronto Hydro's facilities.

1.3%

Connecting Renewable Generation
Installing protection and control equipment and energy storage facilities that allow for the efficient use of new renewable generation connections.

0.9%

Vehicles and Equipment for Crews
Routine capital investments in Toronto Hydro's fleet of trucks, cars and equipment

0.7%

Accommodating Electric Vehicles
Accommodating electric vehicle connections to the grid and investing in ways to manage and optimize electric vehicle storage capacity on the system

0.1%

Have Your Say: Is Toronto Hydro Investing Wisely?

Let's Talk Priorities:

24. When you look at how much Toronto Hydro is spending on each of its investment priorities, do you think they have the balance right or would you change the relative priorities?

    _____ The balance looks right
    _____ They should change some of the priorities

25. What areas do you feel need more spending than planned?

26. What areas do you feel should have less spending than planned?

Let's Talk Pacing

Toronto Hydro's proposal is expected to lead to a total increase of approximately $30.50 on the average small business owner's monthly bill by 2019. A lower bill impact is possible in the short-term, but there are trade-offs: system performance will be worse and future bill impacts will be higher. The following table compares Toronto Hydro's plan to another likely utility management practice called "run-to-failure." This approach is typical for smaller utilities with newer systems.

	"RUN-TO-FAILURE" APPROACH	TORONTO HYDRO'S PROPOSED PLAN
Description	With this approach, Toronto Hydro would only replace equipment as it fails (with the exception of critical assets such as stations equipment). This is a purely reactive approach using close to the minimum amount of funding that Toronto Hydro could receive from the Ontario Energy Board.	1. Proactively replace highest-risk aging and obsolete equipment at a pace that maintains reliability and targets the worst performing feeders first. 2. Improve system reliability by investing in modern grid technologies and reconfiguring circuits.
Estimated increase in monthly bill	• Average of $3.45 per year from 2015-2019 • Total increase by 2019 = **$17.25/month**	• Average of $6.10 per year from 2015-2019 • Total increase by 2019 = **$30.50/month**
Reliability outcomes by 2019	• Number of outages for the average customer: **1.6/year** • Time without power for the average customer: **1.38 hours/year** • Percentage of customers on feeders experiencing seven or more interruptions a year: **13 per cent**	• Number of outages for the average customer: **1.15/year** • Time without power for the average customer: **0.65 hours/year** • Percentage of customers on feeders experiencing seven or more interruptions a year: **6 per cent**
Percentage of equipment past end-of-life in 2020	**31 - 34 per cent**	**25 - 28 per cent**

Why Does Toronto Hydro Think This Pace is Best?

As seen in the table above, Toronto Hydro estimates that a "run-to-failure" approach, when compared to the proposed plan, would result in double the average duration of outages across the system and more than double the percentage of customers on poor performing feeders. Because of the aging system, Toronto Hydro would expect reliability to continue worsening well beyond 2019 if the utility stuck with a "run-to-failure" approach.

Of course, the two plans presented here are **not** the only options for pacing system investment. Toronto Hydro can invest more or less capital to achieve a wide variety of outcomes.

So how did Toronto Hydro arrive at the proposed plan?

Since the utility is so large, Toronto Hydro's engineers rely on a software model to help calculate the year in which it is most cost-effective to rebuild any given part of the system. The model suggests that Toronto Hydro should, in fact, be spending more than it is proposing in the years 2015 to 2019.

So why is Toronto Hydro proposing to invest less than the model recommends?

In reality, there are constraints that prevent the utility from spending above a certain amount. One such restriction is the limited number of skilled resources available to carry-out the work. Resource limitations are also and important reason why Toronto Hydro believes it is wise to invest now and not later: increasing the number of qualified trades people takes time, and the industry will not train new workers unless there is a consistent and predictable amount of work. This means that the longer Toronto Hydro allows the system to age, the less likely it is that the utility will be able to keep up with investment needs.

Ultimately, Toronto Hydro believes that the proposed plan will deliver improved system performance at a pace that is sustainable for both the utility and the customer.

27. When you consider the options outlined in the table on the previous page, do you think Toronto Hydro's goals are too high, too low or about right?

_____ Too high
_____ Too low
_____ About right
_____ Not sure

28. What are the goals you feel are too high?

_____
_____
_____
_____
_____
_____
_____
_____

29. What are the goals you feel are too low?

_____
_____
_____
_____
_____
_____
_____
_____

30. Looking at the cost of the Toronto Hydro plan and the outcomes it is expected to achieve, which point of view is closest to your own?

_____ Toronto Hydro should plan to achieve higher outcomes, even if the rates need to go up even more.

_____ I am satisfied with the balance between outcomes and the proposed rate increase.

_____ I don't like the rate increase, but I think it is necessary to maintain the grid to a reasonable standard.

_____ I think the bill impact is too high and Toronto Hydro needs to scale back its plans.

_____ Not sure

What Do You Think About This Review?

Toronto Hydro values your feedback. This is the first time the utility has conducted a review about its upcoming investment plan in this type of format. What did you think about the workbook?

1. Volume of Information — Did Toronto Hydro provide too much information, not enough, or just the right amount?

2. Content Covered — Was there any content missing that you would have liked to have seen included?

3. Outstanding Questions — Is there anything that you would still like answered?

4. Suggestions for Future Consultations — How would you prefer to participate in these consultations?

Technical Glossary

Cable Chamber — An opening to the underground duct system that facilitates the installation, removal, inspection and repair of cables.

Cable Fault — A hole in a cable caused by a short circuit (due to corrosion, overloading over time, water, age) which can result in an explosion.

Circuit — A continuous system of conductors providing a path for electricity.

Circuit Breaker — A protective switch in a substation that automatically disconnects power to the circuit in the event of a fault. Performs the same function as a circuit breaker in a home.

Conductor — An object that permits the flow of electricity, like a wire or cable that allows electricity to flow along its length.

Distribution Transformer — A piece of equipment required to reduce voltage to a level that can be used by customers in their homes and businesses.

Feeder — A distribution circuit carrying power from a substation to customers. Feeders consist of circuits and other electrical equipment supported by civil infrastructure like poles and ducts.

Kilovolt = 1,000 volts

Megawatt — Equals 1,000 kilowatts or enough to power 10,000 100-watt light bulbs.

Primary Cables — Cables that distribute electricity throughout the system at a higher ('primary') voltage (i.e. greater than 750 volts).

Secondary Cables (or Mains) — Low voltage cables that are connected to the secondary (low voltage) side of the distribution transformer and deliver current to customers.

Substations — Large power transformers and miscellaneous protection and control equipment (e.g. circuit breakers) that transform electricity from a higher primary voltage to a lower primary voltage. Substations are part of generation, transmission and distribution systems.

Switch — A device for isolating a piece of equipment or a section of feeder to allow repairs or replacements to be made on them while in a safe, de-energized state.

Transformer — A device used to transform voltage levels to facilitate the transfer of power from the generating plant to the customer.

Transformer Vault — A large room (above - or below-ground) that houses transformers, switches and protective equipment.

Volt — A measure of electricity. The Standard International unit of electro-motive force, the difference of potential that would carry one ampere of current against a resistance of one ohm.*

Watt — A measure of the work electricity can do.

1,000 watts = 1 kilowatt (the amount of power used by 10 100-watt light bulbs)

1,000,000 watts = 1,000 kilowatts = 1 megawatt

*Source: Oxford Dictionary of Current English

Toronto Hydro-Electric System Limited
EB-2014-0116
Exhibit 1B
Tab 2
Schedule 7
Appendix C
Filed: 2015 Jan 15
(38 pages)

Key Account Customer Name

Attendees

Date

Action Log

Note: If applicable, this slide contains information about customer-specific issues and outlines the action items undertaken by the parties to address those issues.

Agenda

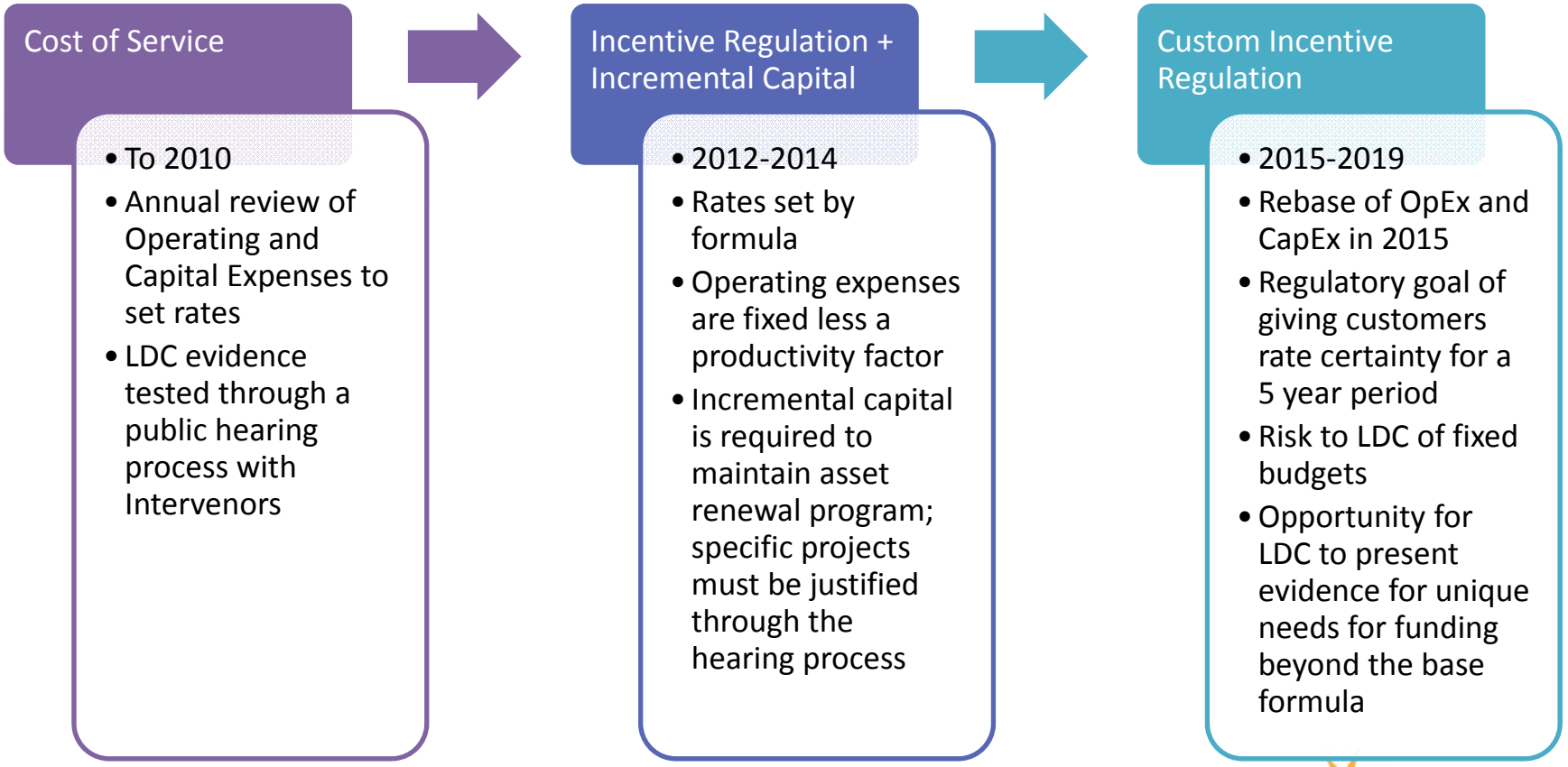
1. Introduction
2. Improving Reliability and Services – Infrastructure Renewal Program
3. Key Account Management Services
4. Conservation and Demand Management (CDM)

Regulatory Infrastructure Renewal Up-date

- The Ontario Energy Board (OEB) has approved the Toronto Hydro 2013 Rate Application
  - Decision issued on April 2, 2013

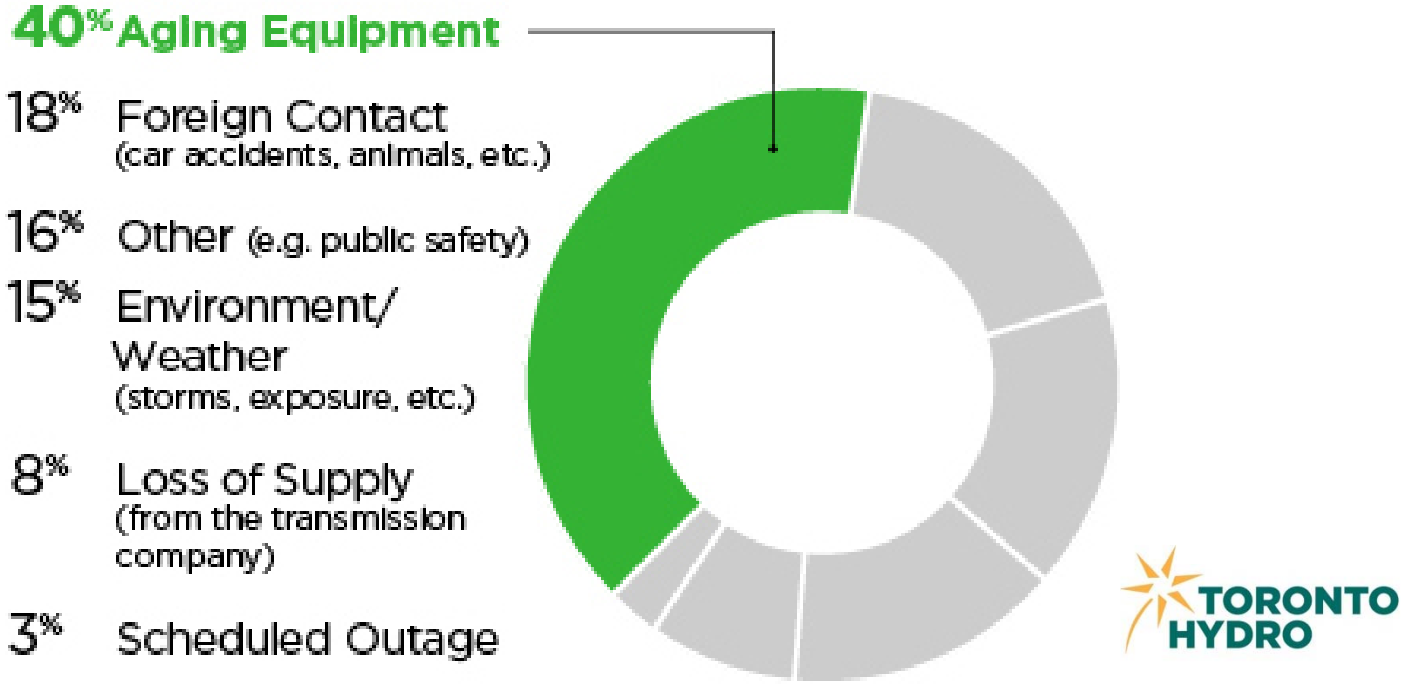
- Toronto Hydro requested a rate increase to cover Incremental Capital for a variety of asset renewal projects
  - The capital program is intended to enhance safety and reliability of the distribution system for the benefit of customers and employees.
  - The decision provides for an increase in capital spending to address aging electricity distribution infrastructure, and allows for the construction of the new Copeland Transformer station in downtown Toronto to relieve existing stations and provide for future load growth in the area. Copeland Station will be the first transformer station built in downtown Toronto since the 1960s.

Regulatory Environment



40% of Outages in Toronto are Due to Aging Equipment

- Some areas of the city are experiencing an unacceptable number of power outages. Thanks to our capital investment in infrastructure, equipment-related outages are down 10% since 2009. In 2013, we expect to invest approximately $327 million in infrastructure upgrades to help improve service reliability.

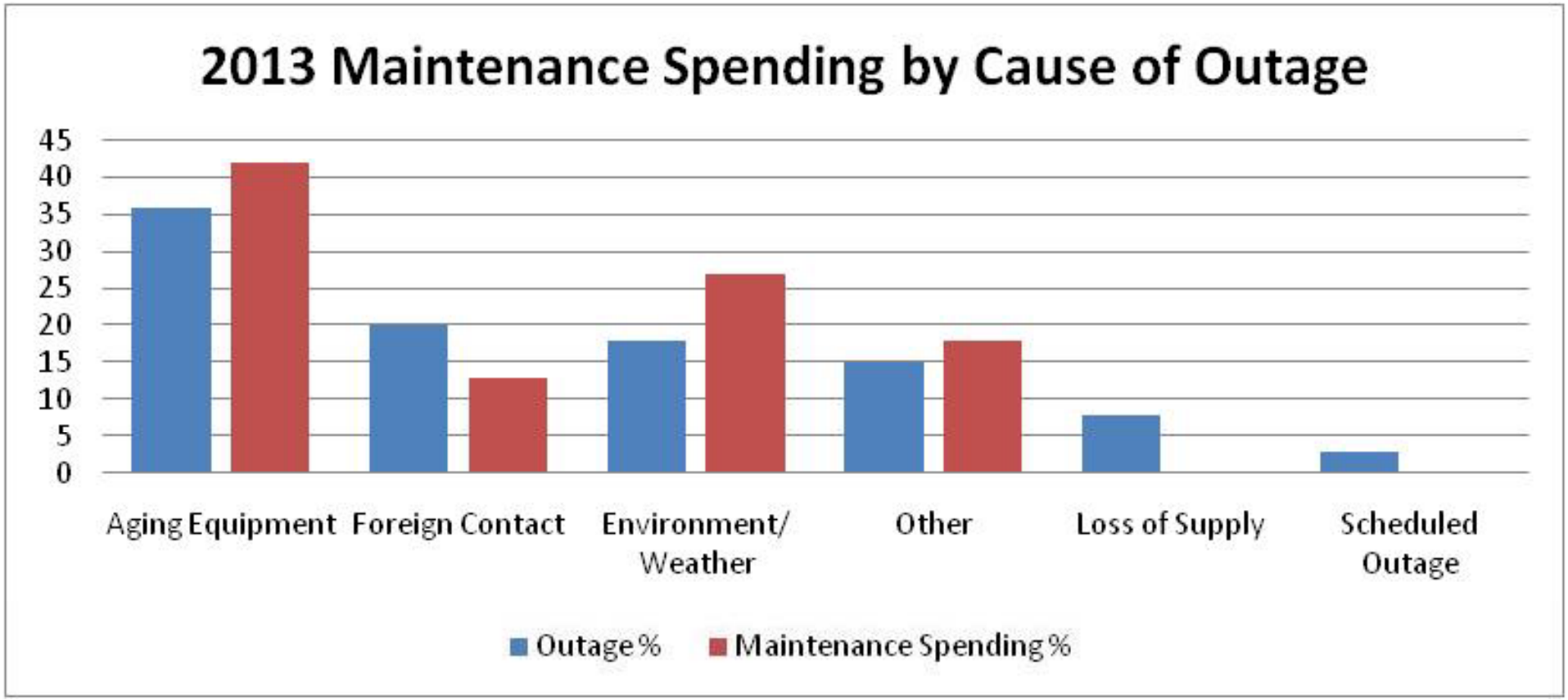


Investments to Improve Reliability

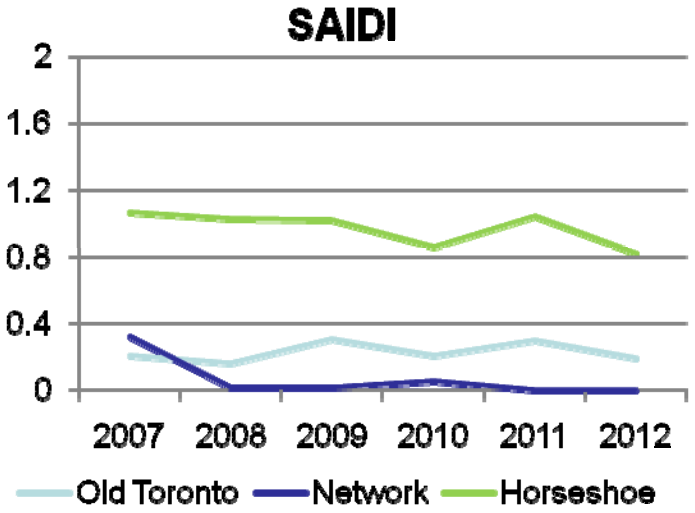
2013 Capital Investment by Ward (approximate)

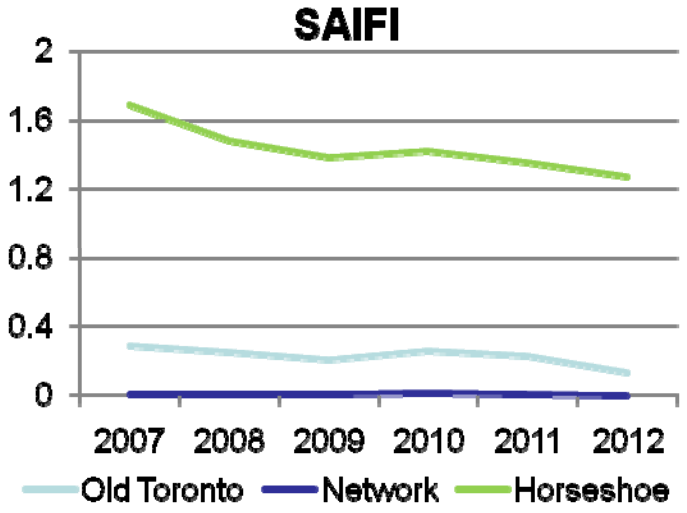
	Capital Projects Category			
Ward	**Overhead**	**Stations**	**Underground**	**Total Ward**
1	5,740,767	507,036	3,449,452	$9,697,255
2	6,808,892			$6,808,892
3	2,545,439		268,122	$2,813,561
5	4,549,263	855,846	227,422	$5,632,531
6	2,469,781			$2,469,781
7	5,554,819		753,738	$6,308,557
8	876,595	1,558,702	3,912,393	$6,347,690
9	1,821,589		2,289,126	$4,110,714
10	660,842	826,110	317,566	$1,804,517
11	5,859,475	326,000	7,784	$6,193,259
12	2,920,027			$2,920,027
13	1,025,728		478,720	$1,504,448
14	63,788		206,859	$270,647
15	930,827			$930,827
16	37,947	83,300	1,727,030	$1,848,277
17	1,609,892		439,587	$2,049,479
18	120,902	87,935	2,312,805	$2,521,642
19	2,532,504	311,571	156,994	$3,001,070
20	12,000	761,971	6,799,544	$7,573,515
21	926,585		2,841,381	$3,767,966
22	79,534	422,007	3,175,399	$3,676,939
23	4,573,675	623,154	1,842,894	$7,039,723
24	559,957	332,500	2,199,797	$3,092,254
25	889,820		3,274,502	$4,164,322
26	497,859		2,031,802	$2,529,661
27	16,166	472,648	3,865,500	$4,354,314
28	700,000		7,532,868	$8,232,868
29			253,009	$253,009
30	1,991,317	151,503	436,254	$2,579,074
31			151,444	$151,444
32	10,323		1,031,598	$1,041,920
33	208,844		4,409,712	$4,618,556
34	1,661,766		717,608	$2,379,374
35	611,172			$611,172
36	816,927		309,593	$1,126,520
37	69,495	228,302	124,219	$422,016
38	205,755	126,888	261,134	$593,777
39		7,900	3,312,212	$3,320,112
40			3,798,678	$3,798,678
41	43,405	516,456	5,404,131	$5,963,992
42			7,726,828	$7,726,828
43	243,327	417,387	787,988	$1,448,702
44			2,705,952	$2,705,952
N/A	456,139	78,007	183,099	$717,246
N/A (Across City)	2,419,113	82,500	3,536,880	$6,038,493
Grand Total	**$63,122,256**	**$8,777,723**	**$85,261,624**	**$157,161,604**

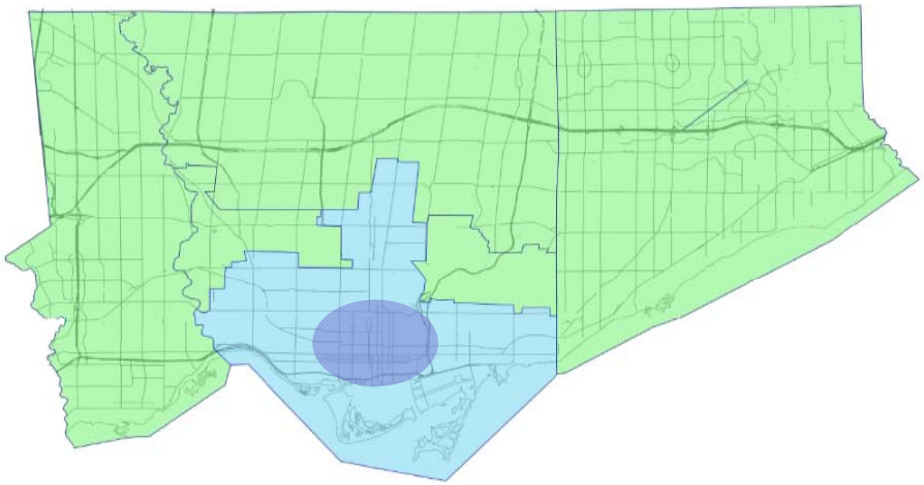
Investments to Improve Reliability



Provincial Measures for Reliability





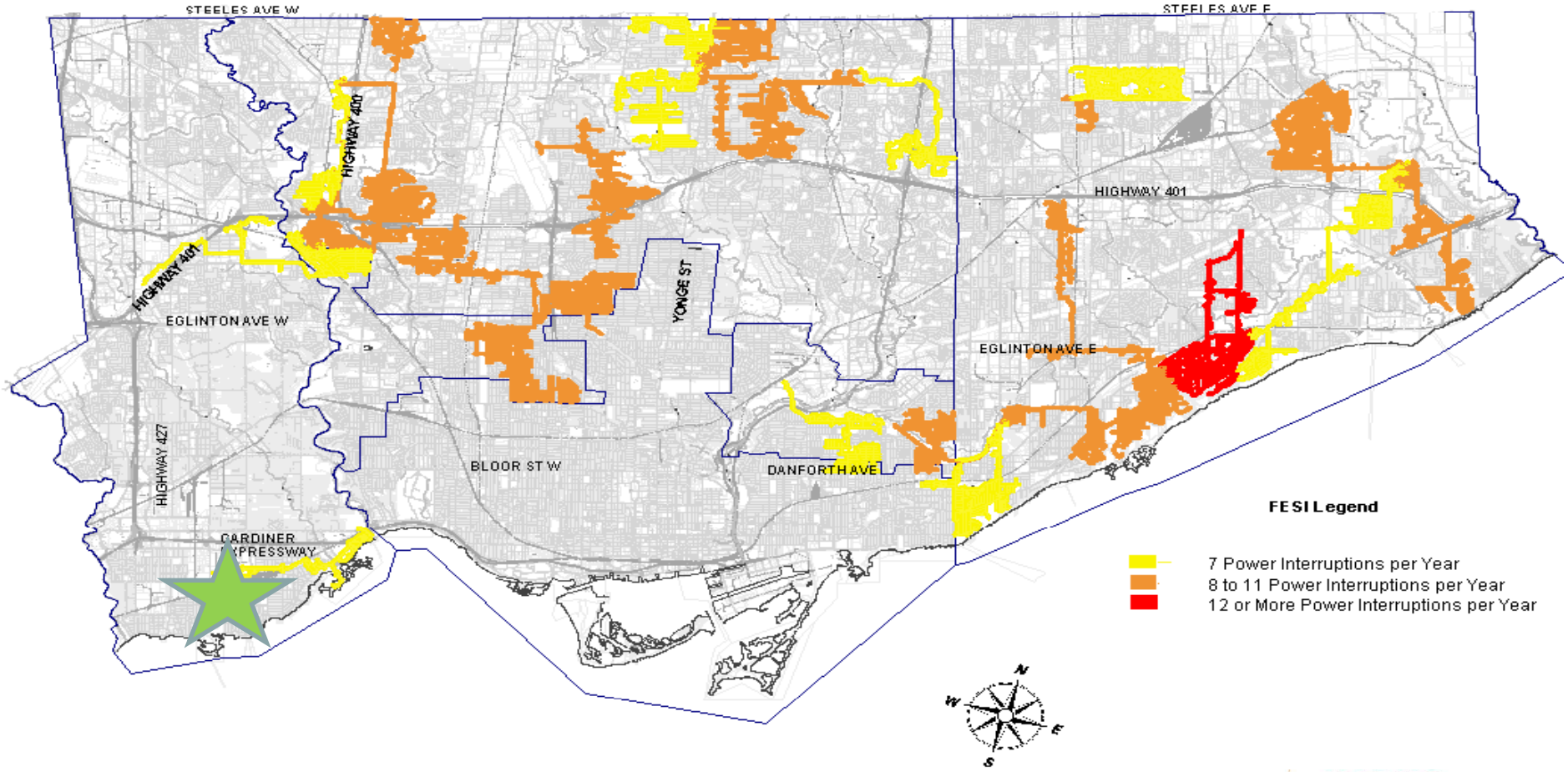


- ***System Average Interruption Frequency Index (SAIFI)***
- ***System Average Interruption Duration Index (SAIDI)***

Note: Momentary interruptions, those less than 1 minute, are not included

DO YOU LIVE/WORK/TRAVEL HERE?

Toronto Hydro's Grid: Areas of In Need of Attention

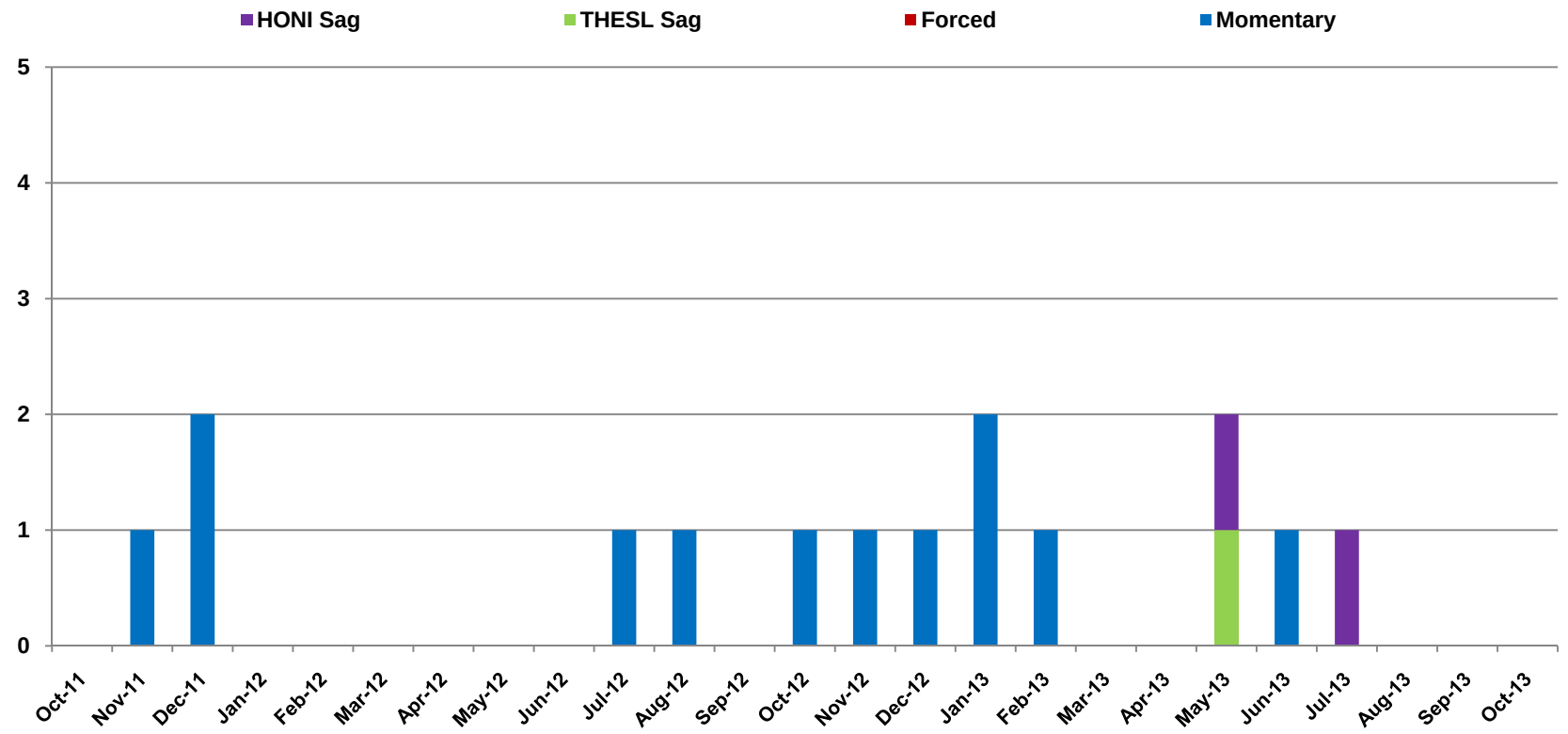


Your Outage Experience

Note: If applicable, this slide includes customer-specific outage information for each of the customer's facilities.

Your Power Reliability/Quality Summary

Note: If applicable, this slide includes customer-specific power reliability information, which may be presented as follows:



Root Cause Analysis

Note: If applicable, this slide includes a root cause analysis of a particular power reliability/quality issue (i.e. momentary outages) that the customer is experiencing, and provides an explanation of the mitigation measures that Toronto Hydro has taken or proposes to undertake to address the issue.

Inspection Programs and Status

Note: If applicable, this slide includes a description of the inspection programs that apply to the specific customer, and an update with respect to the status of those program for the given year. For example:

1. **Infrared Audit Program**

   Infrared inspection of both primary and secondary overhead line components is performed. This identifies potential “hot spots” and allows corrective measures to be taken before they have an impact on system reliability.

2. **Cable Chamber Inspection Program**

   Cable chambers for underground feeders are inspected for electrical and civil deficiencies.

3. **Other Feeder Asset Inspections**

   Inspections performed on assets which are attached to the same feeder that supplies the Molson plant. Insulators are pressure washed to reduce the possibility of flashovers.

2013 Rate Impact

General Service, 50 kW to 1MW

(150,000 kWh/month 349 kW, 90% PF)

Year	Distribution	Transmission	Regulatory	Commodity	Total
Change	3.4%	12.5%	-5.4%	10.2%	7.7%

3.7%

General Service, 1 MW – 5 MW

(800,000 kWh/month, 1,600 kW, 90% PF)

Year	Distribution	Transmission	Regulatory	Commodity	Total
Change	3.0%	12.4%	-5.4%	10.2%	7.7%

2.4%

Large User, > 5MW

(4,500,000 kWh/month, 8,491 kW, 90% PF)

Year	Distribution	Transmission	Regulatory	Commodity	Total
Change	3.2%	12.5%	-5.3%	10.2%	7.7%

2.4%

- *Rates reflect current best estimates and are subject to change*
- *Rate Order approved by the OEB on May 9, 2013, file EB-2012-0064; rate increases effective June 1.*
- *Commodity cost based on HOEP+GA rates*

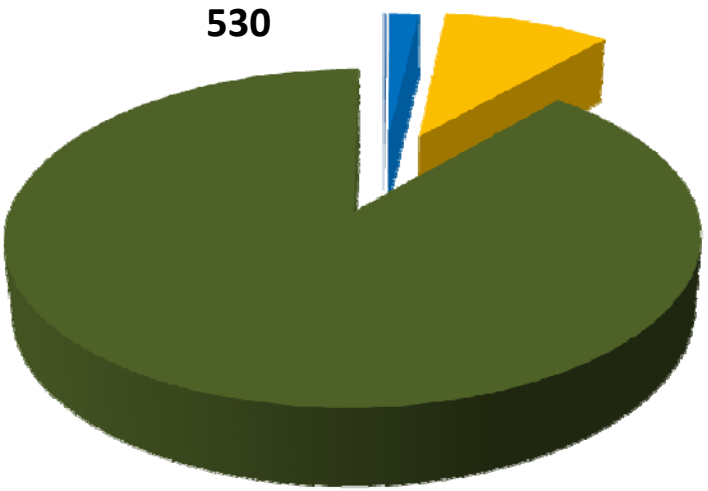
Toronto Hydro's Key Account Management Service

The Importance of Toronto Hydro's Business Customers

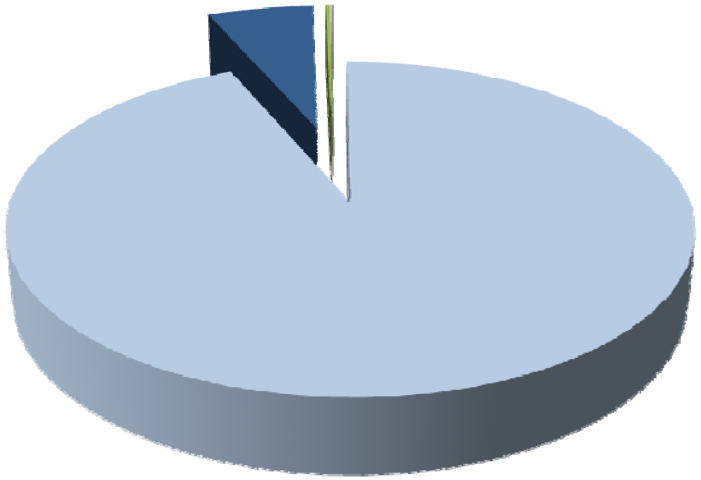
- Toronto Hydro has over 80,000 business customers
  - Representing all sectors – Municipal, Academic, Healthcare, Commercial, Industrial
  - 530 of these customers have a demand of over 1,000 kW – the Key Accounts
  - Customers with multiple sites, such as larger property management or institutional customers are also aggregated as a Key Account
- We recognize these customers as distinct from our residential customers:
  - Businesses support the economic development of the City and provide employment
  - You are important to THESL and the City - Substantial electricity revenue comes from THESL business sector – 12% of our customer base provides 80% of our revenue
  - We recognize that Business customers can be significantly affected by outages in lost productivity of goods and services produced and delivered, and human resource management to name a few
  - Business customers have sensitive technology. Power quality is essential to uninterrupted operations.
  - Communications is vital to outage management.

Key Account Customer Profile

Total Customers



Revenue per Customer

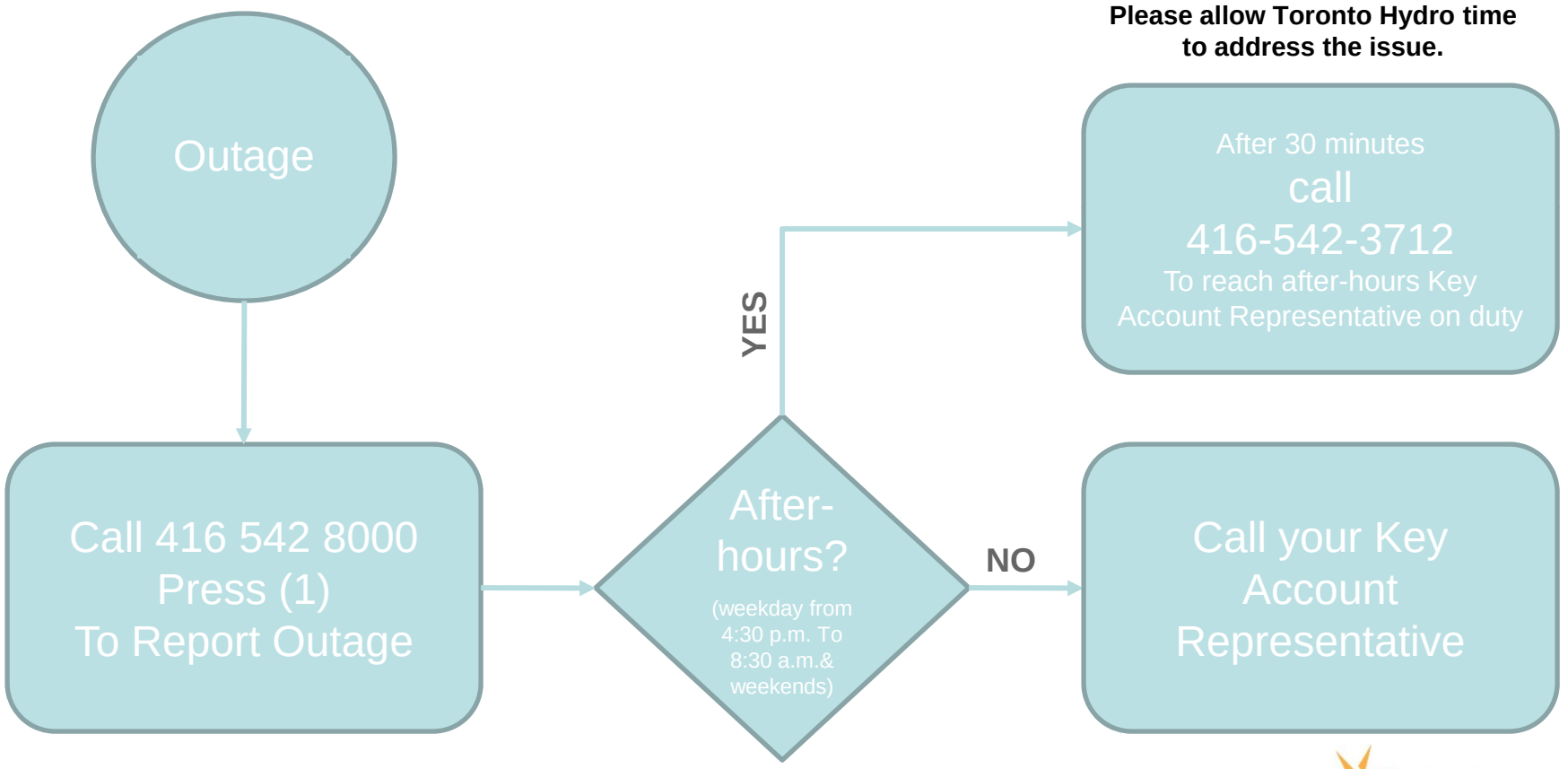


Customer Segment	Total Revenue	Total Customers	Revenue Per Customer
Large Business >1,000 kW	$728 million	530	$1,373,280
Medium Business 50-1,000 kW	$1,089 million	12,129	$89,762
Small Business <50 kW	$273 million	68,431	$3,989
Residential <50 kW	$709 million	637,910	$1,111
	$2,799 million	719,000	

Key Account Management Services

- Account Management
  - Single point of contact for all aspects of the relationship with Toronto Hydro
  - To manage issues and ensure customer needs are met
  - Work with internal Departments to improve levels of customer service
    - Distribution System, Customer Information System, Conditions of Service, Metering Systems, Billing, Collections, Rates, Power Quality & Reliability, CDM programs, Ministry of Energy, Ontario Energy Board and Independent Electricity System Operator, Regulatory Information
- Outage Management
  - 24/7 After hours outage response service
- Data Management
  - MV90 online energy consumption data
  - Special energy consumption data requests
- Billing Services
  - eBills
  - Pre-authorized payment

Power Outage -
Key Account Call-in Process



New Proactive Outage Management

- Severe weather during the month of July impacted Toronto Hydro service and caused several prolonged outages throughout the city.
- The outages generated significant amounts of feedback from customers, including more frequent outage status updates are needed for businesses.
  - Key contacts have a need for ongoing updates related to outages at their facilities in order to shift business operations accordingly.
- We are developing a commercial customer outage communication program whereby commercial customers will receive customized outage alerts during severe weather emergencies via the communication channel of their choice (email, phone, text).

Continuously Improving Our Service…

Communications

- Power outage email notification – 2014 launch
- Quarterly Newsletters – "eConnect for Biz"

Metering

- Power quality, data access, analytics

Self Service

- Enhanced energy data management (MV Web Replacement)
- On line transactions

CDM

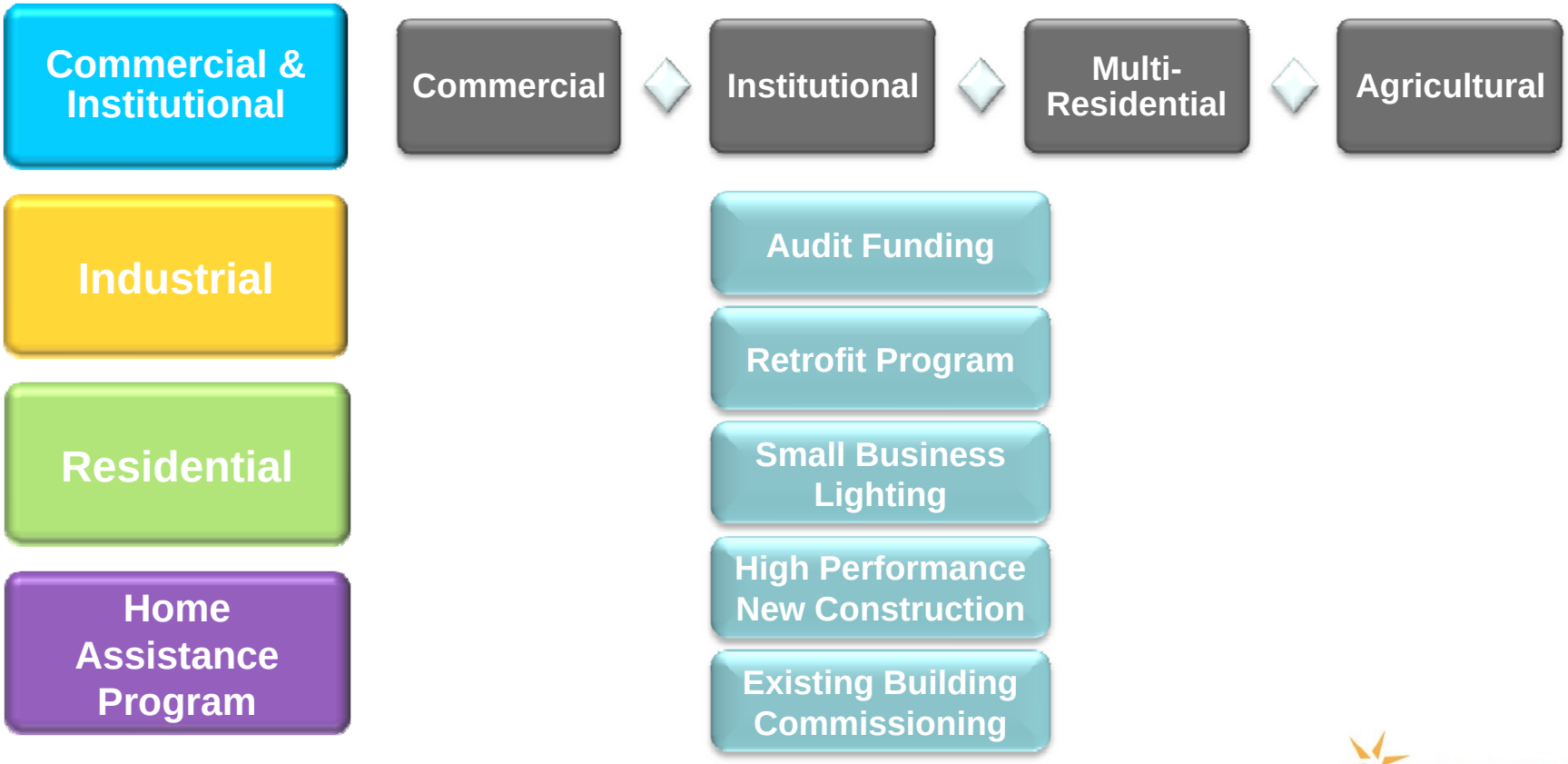
- Incentives, training and support
- Post 2015 program development

Other…

CDM Programs

- Government
- Industrial
- Small Business
- Agricultural
- Commercial
- Institutional

Conservation and Demand Management Business Incentive Programs



Commercial & Institutional Programs

SMALL BUSINESS LIGHTING

- Up to $1,500 of free lighting upgrades (increase from $1,000)

New!

AUDIT FUNDING

- Funding of up to 50% of the cost to conduct an energy audit
- Building Systems audit to promote systems balancing (hydronic, air)

New!

RETROFIT PROGRAM

- Funding to install high-efficiency equipment and new control systems
- Cover up to 50% of the cost; $400/kW (or $0.05/kWh) for **lighting** and $800/kW (or $0.10/kWh) for **non-lighting**
- Monitoring and Targeting measure now eligible
- Property Managers and Facility Managers now eligible participants

New!

EXISTING BUILDING COMMISSIONING (EBCx)

- Paid for evaluating and implementing retro-commissioning strategies of systems with chilled water plants
- Up to $30,000 of incentives available for investigation

New!

TORONTO HYDRO

New Program Opportunities

APPLICANT REPRESENTATIVE INITIATIVE

- Applicant representative receive incentive payments for successful projects - we pay you or your contractor
  - $20/KW for the first 300kW
  - $40/kW beyond 300kW

PILOT PROGRAMS UNDERWAY

- Multi-unit Residential Building Demand Response (“Suitesaver")
- Commercial Energy Management and Load Control (“Gridsaver")

Training and Support

- Energy into Action conference held spring and fall
- Dollars to $ense Workshops with NRCan
- Industry specific events: Compressed Air Workshop, Refrigeration
- Staff support on projects and process - to help identify CDM opportunities, develop business cases and file CDM applications
- eConnect for Biz Newsletter for program updates

CDM Projects Summary

Note: If applicable, this slide contains information about customer-specific CDM projects.

CDM Beyond 2014

- OPA working with LDCs to extend current programs in to 2015 based on Minister's Directive in December 2012
- Provincial Long Term Energy Plan
  - Released December 3
  - Commits to 6 years of stable funding
  - Framework is under development between distributors, Ministry and OPA
  - Recognizes Conservation First as a way to mitigate new investments in supply, transmission and distribution
    - A necessary component of regional and distributor planning processes
  - IESO will evolve existing Demand Response programs
    - Development of a capacity market

Summary

- Investments to improve reliability
- Key Account Management Services
  - Outage communications
  - Issue resolution
- Support available from Toronto Hydro to help identify CDM opportunities, develop business cases and file CDM applications
- Information and Training opportunities
  - Energy into Action conference held spring and fall
  - Dollars to $ense Workshops with NRCan

Disclaimer

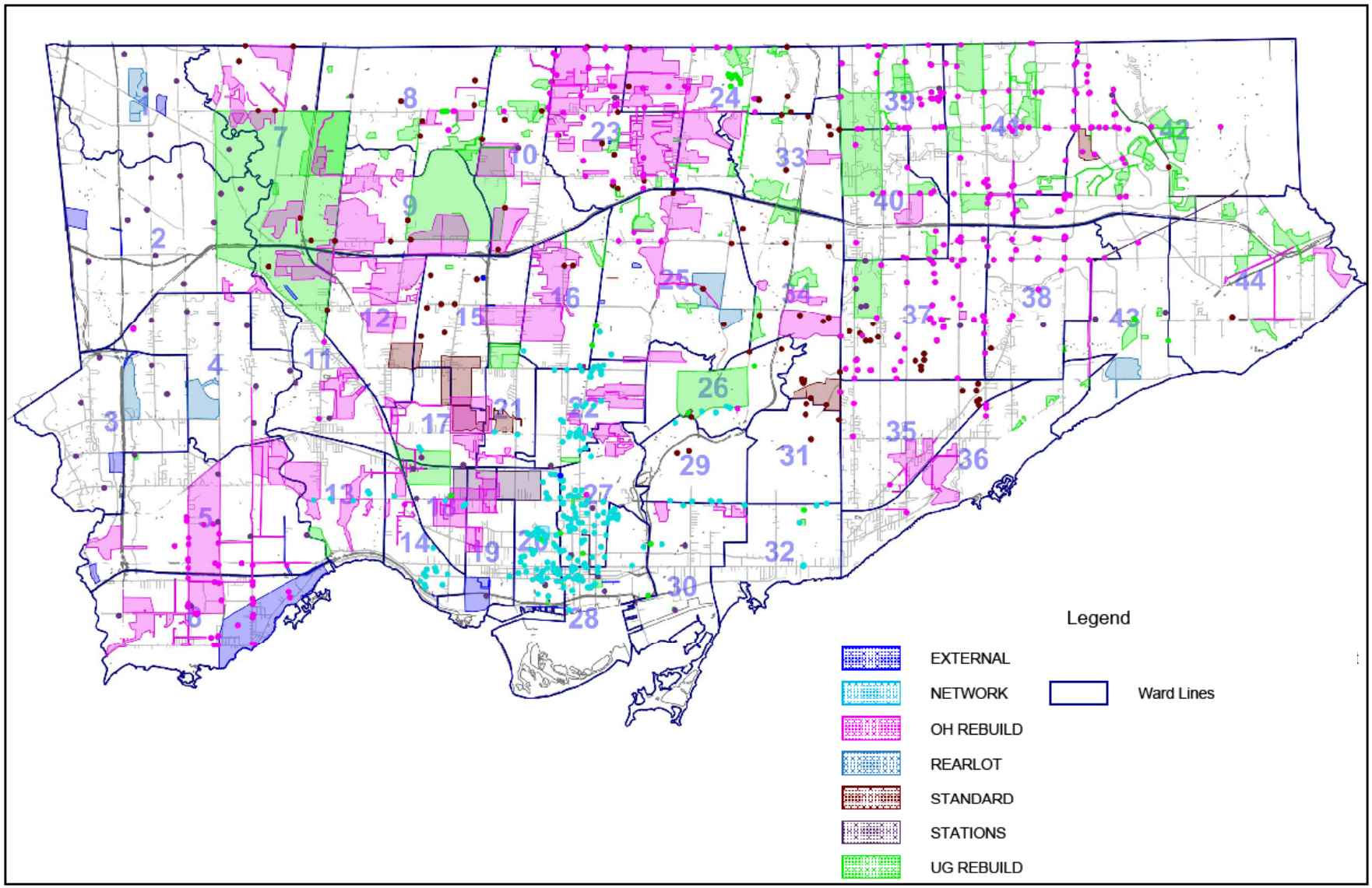
The information in these materials is based on information currently available to Toronto Hydro Corporation and its affiliates (together hereinafter referred to as “Toronto Hydro”), and is provided for information purposes only. Toronto Hydro does not warrant the accuracy, reliability, completeness or timeliness of the information and undertakes no obligation to revise or update these materials. Toronto Hydro (including its directors, officers, employees, agents and subcontractors) hereby waives any and all liability for damages of whatever kind and nature which may occur or be suffered as a result of the use of these materials or reliance on the information therein. These materials may also contain forward-looking information within the meaning of applicable securities laws in Canada ("Forward-Looking Information"). The purpose of the Forward-Looking Information is to provide Toronto Hydro’s expectations about future results of operations, performance, business prospects and opportunities and may not be appropriate for other purposes. All Forward-Looking Information is given pursuant to the "safe harbour" provisions of applicable Canadian securities legislation. The words "anticipates", "believes", "budgets", "could", "estimates", "expects", "forecasts", "intends", "may", "might", "plans", "projects", "schedule", "should", "will", "would" and similar expressions are often intended to identify Forward-Looking Information, although not all Forward-Looking Information contains these identifying words. The Forward-Looking Information reflects the current beliefs of, and is based on information currently available to, Toronto Hydro’s management. The Forward-Looking Information in these materials includes, but is not limited to, statements regarding Toronto Hydro’s future results of operations, performance, business prospects and opportunities. The statements that make up the Forward-Looking Information are based on assumptions that include, but are not limited to, the future course of the economy and financial markets, the receipt of applicable regulatory approvals and requested rate orders, the receipt of favourable judgments, the level of interest rates, Toronto Hydro’s ability to borrow, and the fair market value of Toronto Hydro’s investments. The Forward-Looking Information is subject to risks, uncertainties and other factors that could cause actual results to differ materially from historical results or results anticipated by the Forward-Looking Information. The factors which could cause results or events to differ from current expectations include, but are not limited to, the timing and amount of future cash flows generated by Toronto Hydro's investments, market liquidity and the quality of the underlying assets and financial instruments, the timing and extent of changes in prevailing interest rates, inflation levels, legislative, judicial and regulatory developments that could affect revenues, and the results of borrowing efforts. Toronto Hydro cautions that this list of factors is not exclusive. All Forward-Looking Information in these materials is qualified in its entirety by the above cautionary statements and, except as required by law, Toronto Hydro undertakes no obligation to revise or update any Forward-Looking Information as a result of new information, future events or otherwise after the date hereof.

Appendix

Customer Account Profile

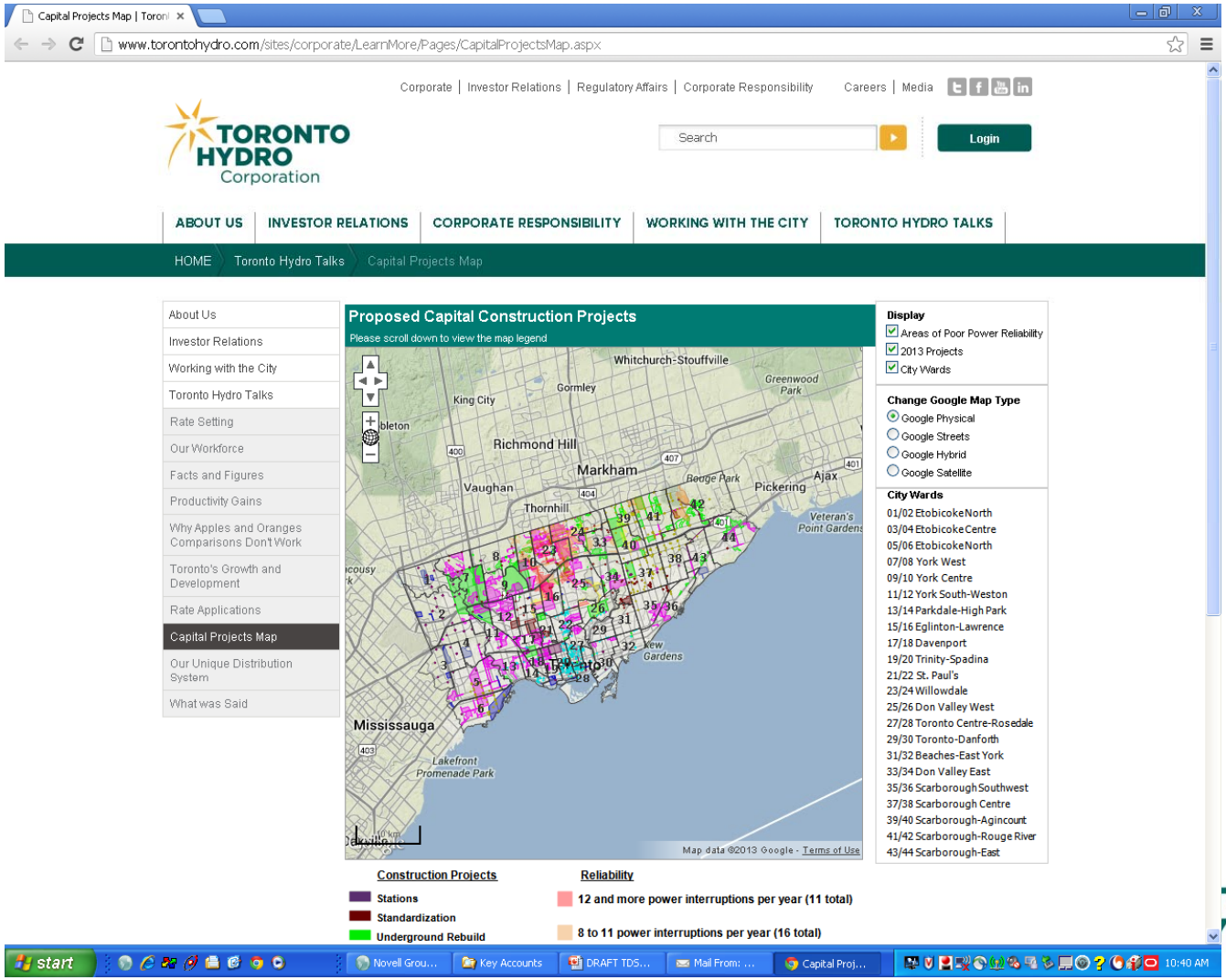
Note: This slide contains customer-specific account information such as consumption profiles for the customer's facilities and a breakdown and explanation of the customer's invoice.

Investments to Improve Reliability



Investments to Improve Reliability

http://www.torontohydro.com/sites/corporate/LearnMore/Pages/CapitalProjectsMap.aspx



New Proactive Outage Management

- Letter sent to business customers
- Website registration

Toronto Hydro-Electric System Limited
5800 Yonge Street
Toronto, Ontario M2M 3T3

August 6, 2013

<<NAME>>
<<MAILING_ADDRESS1>>
<<MAILING_ADDRESS2>>
<<MAILING_CITY>>, <<MAILING_STATE>>
<<MAILING_POSTAL>>

PERTAINING TO:
Account: <<ACCOUNT>>
<<PREMISE_ADDRESS1>>
<<PREMISE_ADDRESS2>>
<<PREMISE_CITY>>, <<PREMISE_STATE>>
<<PREMISE_POSTAL>>

Dear <<NAME>>,

In an effort to continuously improve our power outage communications and help you better manage your business operations, we are in the early stages of developing a new outage communication program for our commercial customers. This program would be activated during power outages caused by severe weather and storm situations and provide you with timely updates related to the progress of restoring outages affecting your business.

To gauge your interest in joining this new program and how you would prefer to receive future communications, we invite you, or the appropriate contact at your company, to complete the short registration form.

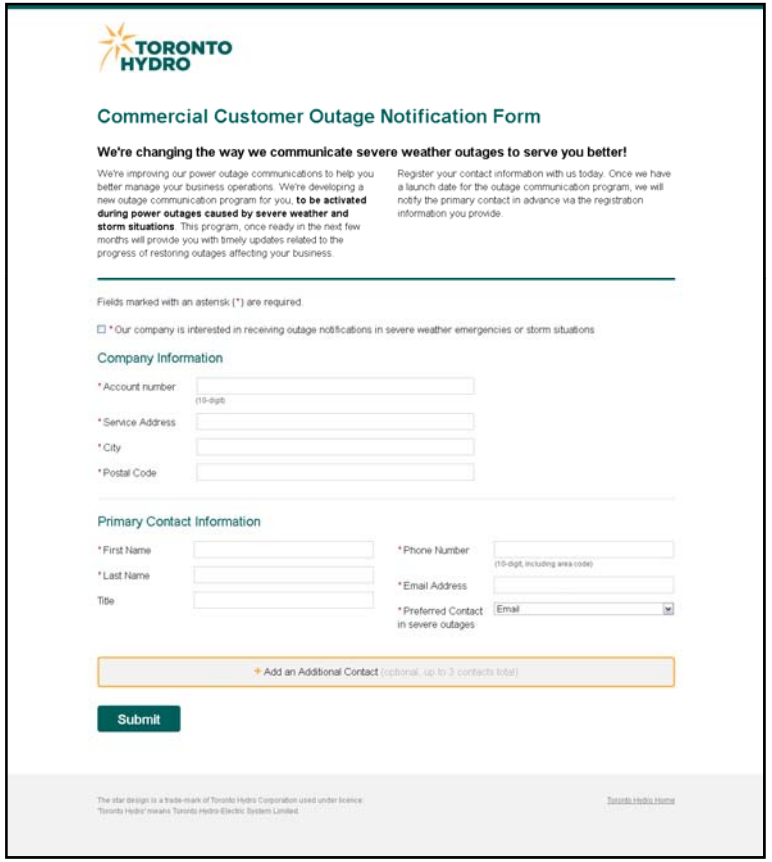
Simply visit www.bizoutageinfo.com today to provide us with your feedback. As we continue to develop this program over the next few months, we will provide you with updates related to our progress.

The registration form will be available until Thursday, October 31.

Once we have a launch date for the outage communication program, we will notify you in advance via the registration information you provide.

Sincerely,

Lauren Kirk
Manager, Customer Care



TORONTO HYDRO

Commercial Customer Outage Notification Form

We're changing the way we communicate severe weather outages to serve you better!

We're improving our power outage communications to help you better manage your business operations. We're developing a new outage communication program for you, **to be activated during power outages caused by severe weather and storm situations**. This program, once ready in the next few months will provide you with timely updates related to the progress of restoring outages affecting your business.

Register your contact information with us today. Once we have a launch date for the outage communication program, we will notify the primary contact in advance via the registration information you provide.

Fields marked with an asterisk (*) are required.

* Our company is interested in receiving outage notifications in severe weather emergencies or storm situations

Company Information

* Account number (10-digit)
* Service Address
* City
* Postal Code

Primary Contact Information

* First Name
* Last Name
Title
* Phone Number (10-digit, including area code)
* Email Address
* Preferred Contact in severe outages: Email

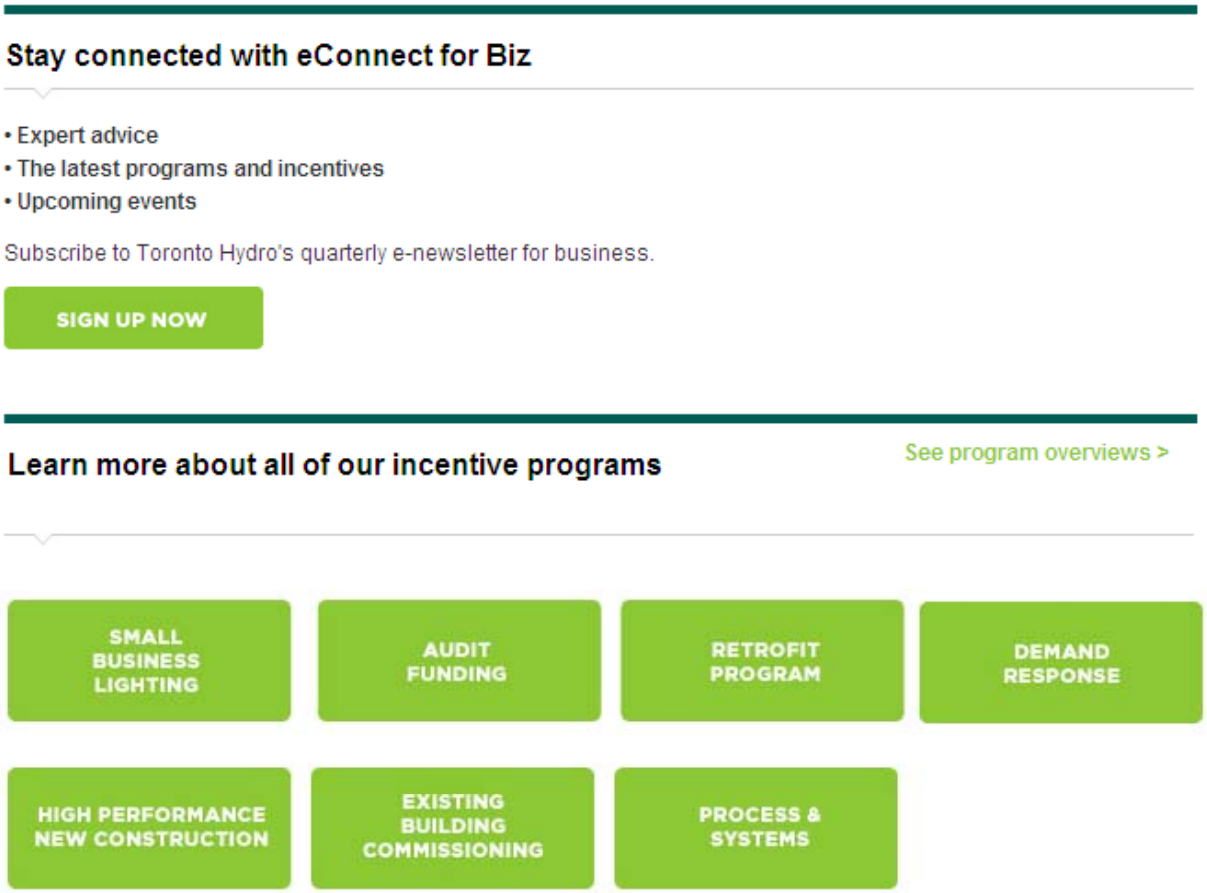
+ Add an Additional Contact (optional, up to 3 contacts total)

Submit

TORONTO HYDRO

eConnect for Biz Newsletter

http://www.torontohydro.com/sites/electricsystem/electricityconservation/businessconservation/Pages/default.aspx



Web Links for Electricity Market Information

- Electricity system operation and regulation, IESO: http://www.ieso.ca/imoweb/siteShared/power_system.asp
- Electricity Planning:
  - Ministry of Energy: Long Term Energy Plan http://www.energy.gov.on.ca/en/ltep/
- Electricity Pricing:
  - Aegent Energy Advisors Inc.: www.aegent.ca/
  - AMPCO: www.ampco.org
  - E2Energy Inc. www.e2energyinc.com/index.php
  - IESO – Global Adjustment: www.ieso.ca/imoweb/siteShared/electricity_bill.asp?sid=bi
  - OPA – Global Adjustment: http://www.powerauthority.on.ca/about-us/electricity-pricing-ontario/understanding-electricity-system-costs/understanding-global-adjustment

STAKEHOLDER CONSULTATION

1. INTRODUCTION

This schedule details Toronto Hydro's approach to the stakeholder consultations held in preparing this application. This process is distinct from the customer engagement activities described in Exhibit 1B, Tab 2, Schedule 7.

2. PURPOSE

Toronto Hydro is committed to fostering and maintaining constructive relationships with its stakeholders and believes that active, two-way engagement is critical to achieving this objective.

As part of this commitment, Toronto Hydro undertook two stakeholder consultations with respect to this application prior to filing. This was the first time Toronto Hydro has formally consulted on a pending rate application.

Toronto Hydro viewed the consultations as a forum through which a number of positive outcomes for all parties could be achieved, including the opportunity for it to:

- share broad insight into Toronto Hydro's needs and business drivers, setting the basic context in which this application is being brought forward while allowing stakeholders access to subject matter experts;
- provide more specific details of, and approaches to, the structure and content of the application;
- receive helpful input and feedback on a range of related issues; and,
- address questions or concerns prior to filing the application.

Both sessions were, in Toronto Hydro's view, positive experiences. The utility firmly believes that the participation by all those involved will ultimately contribute to a more effective and efficient hearing process.

3. APPROACH

The remainder of this schedule outlines Toronto Hydro's approach to the stakeholder consultations.

3.1. Participants

Given the separate stream of customer engagement activities occurring concurrent to this process, the intended audience for the stakeholder consultation was the regulatory community. Invitations to participate were sent to intervenors of Toronto Hydro's previous rate filings and to Ontario Energy Board ("OEB") staff. City of Toronto officials were also invited to attend.

3.2. Format

Toronto Hydro held two stakeholder consultations prior to filing. Invitations and follow-up correspondence were sent out by email at least three weeks before both sessions. Efforts were made to ensure that dates and times for both sessions were chosen to maximize attendance. For those unable to attend in person, arrangements were made for remote participation.

The first consultation was held at the North Hearing Room of the OEB's offices on February 11, 2014. Seventeen participants representing seven stakeholder organizations attended this consultation. A complete list of attendees is included in Facilitator's Report in Appendix A. This session was primarily an opportunity for Toronto Hydro to receive input from stakeholders. This was achieved by:

- providing an overview of Toronto Hydro's primary business needs and drivers; and,
- actively engaging in a roundtable-style facilitated discussion on a range of policy and application-related issues.

Following the first consultation, Toronto Hydro invited all stakeholders to approach Toronto Hydro with any concerns, questions or other matters relevant to the rate application at any time during the process.

The second consultation was held at the North Hearing Room of the OEB's offices on July 3, 2014. Eighteen participants representing eight stakeholder organizations attended this consultation. This session was primarily an opportunity for Toronto Hydro to reply to the many ideas and questions shared during the discussion at the first session and to update stakeholders on the status of the rate application. This was achieved by:

- providing specific responses to inquiries heard at the February 11 consultation; and,
- presenting on specific elements that stakeholders could expect would form part of the application.

3.3. Principles

Toronto Hydro's participation in both stakeholder consultations was intended to seek early and substantive input on its rate application. To this end, Toronto Hydro held the first consultation nearly six months prior to the ultimate filing date and involved Toronto Hydro staff representing many of the utility's core functions as presenters or participants.

Toronto Hydro expressly sought to create an environment that supported open, candid and constructive dialogue with its stakeholders. Many actions were taken to achieve this result, including:

- retaining the services of a professional facilitator to aid in fostering discussion;
- building significant time into the consultation schedule for questions and answers; and,
- carrying out the discussion on a without prejudice basis.

In accordance with this approach, Toronto Hydro did not record formal notes from either session for the purpose of inclusion in this exhibit nor can it attribute any specific element of this application, be it of substance, structure or otherwise, to a particular stakeholder. Nevertheless, the mutual benefits of those collaborations are very much embedded throughout this application. Toronto Hydro thanks those who participated in one or both of those consultations for their helpful insights and contributions.

3.4. Appendices

Appended to this exhibit are two documents related to the consultations:

1) Appendix A, Facilitator's Report; and
2) Appendix B, Terms of Reference.

Facilitator's Report on Toronto Hydro-Electric System Limited Stakeholder Consultation

February 11, 2014

And

July 3, 2014

Reported By:

Bob Betts, P.Eng.
President & CEO
Regulatory Support Services
(A Division of R.J. Betts Enterprises Ltd.)
Cambridge, Ontario

Regulatory Support Services

Facilitator's Report –
Toronto Hydro-Electric System Limited
Stakeholder Consultation February 11, 2014.

I. Background:

This Stakeholder Consultation is the first of two established by Toronto Hydro-Electric System Limited ("THESL" or "Toronto Hydro") to gain input from interested stakeholders into the design of their Custom Incentive Regulation Mechanism ("CIR") application for the years 2015 to 2019.

In preparation for this consultation Toronto Hydro circulated correspondence to stakeholders indicating their interest to engage intervenors and OEB staff in a consultation on its CIR. They proposed to hold two consultation sessions. The first was designed to share information about THESL's current business needs and drivers, and to facilitate a dialogue about potential approaches to address them in the 2015 – 2019 CIR application. The second consultation session, which I was not able to attend for personal reasons, was held to allow THESL to reply to many of things it heard during the first session and to provide details on its pending CIR application.

Toronto Hydro indicated that it was explicitly seeking early, candid and substantive input on its CIR application in the hopes of achieving a more effective hearing process. In proposing this plan, THESL emphasized its commitment to foster and maintain constructive relationships with its stakeholders, believing that active two-way engagement is critical to achieving this objective.

The two consultations took place on February 11, 2014 and July 3, 2014. In an effort to support open and candid discussion they were established on a "without-prejudice" basis, with no attribution of comments to participating parties.

II. Facilitator's Summary:

Consultation 1 – February 11, 2014

This was a very effective stakeholder consultation.

The discussion was always on topic, yet free and open. Comments from all parties were constructive and well-received. Comments from all parties showed a reasonable balance, respecting the interests of the utility and all of its stakeholders.

Consultation 2 – July3, 2014

Unfortunately I was unable to attend this session as planned due to a grave family matter. Toronto Hydro proceeded with the session without a facilitator.

Attached as Appendices are:

A) February 11, 2014 Agenda
B) February 11, 2014 Participants
C) July 3, 2014 Agenda
D) July 3, 2014 Participants

III. Appendices:

A. February 11, 2014 Agenda

Toronto Hydro-Electric System Limited
Stakeholder Consultation
February 11, 2014
9:00 AM to 4:30 PM
North Hearing Room - Ontario Energy Board

Agenda

Discussion Area	Presenter(s)
Opening and Introductory Presentation	Paul Sommerville, EVP Regulatory Affairs & General Counsel Amanda Klein, Director of Rates and Regulatory Affairs
Grid Response – The Ice Storm Experience	Lucas Millmore, Director of Distribution Grid Operations
Capital	Mike Walker, General Manager of Engineering & Investment Planning
Workforce	Jennifer Stulberg, Manager of Talent Acquisition
Productivity	Kaleb Ruch, Senior Regulatory Policy Advisor
Customer Engagement	Rob Barrass, Lead Regulatory Counsel
Problem Statements and Discussion	Bob Betts, Facilitator

B. February 11, 2014 Participants

AMPCO	Shelley Grice
BOMA	Tom Brett
City of Toronto	Jeff Climans
City of Toronto	Ralph Frebold
Energy Probe	Larry Schwartz David MacIntosh
SEC	Jay Shepherd
VECC	Mark Garner
OEB	Ted Antonopoulos Lisa Brickenden Martin Davies Donna Kwan Michael Millar David Richmond Stephen Vetsis
Toronto Hydro	Paul Sommerville Amanda Klein Lucas Millmore Mike Walker Jennifer Stulberg Kaleb Ruch Rob Barrass Darryl Seal Daliana Coban
Facilitator	Bob Betts

C. July 3, 2014 Agenda

Toronto Hydro-Electric System Limited
Stakeholder Consultation
July 3, 2014
9:00 AM to 3:00 PM
North Hearing Room - Ontario Energy Board

Agenda

Discussion Area	Presenter(s)
Opening and Introductory Presentation	Paul Sommerville, EVP Regulatory Affairs & General Counsel Amanda Klein, Director of Rates and Regulatory Affairs
Feeder Investment Model: Seminar	Rob Otal, Supervisor, Projects, Long-term Strategy and Planning
Session 1 – Follow Up	Amanda Klein
2015-19 CIR Application	Amanda Klein Kaleb Ruch, Senior Regulatory Policy Advisor Darryl Seal, Manager, Rates
Q&A and Next Steps	Amanda Klein

D. July 3, 2014 Participants

AMPCO	Shelley Grice
BOMA	Tom Brett
City of Toronto	Ralph Frebold
CCC	Julie Girvan
Energy Probe	David MacIntosh Peter Faye
SEC	Jay Shepherd Mark Rubenstein
VECC	Bill Harper
OEB	Ted Antonopoulos Martin Davies Nabih Makhil Michael Millar David Richmond Duncan Skinner Georgette Vlahos
Toronto Hydro	Paul Sommerville Amanda Klein Kaleb Ruch Rob Barrass Darryl Seal Daliana Coban Matt Higgins Dmitry Balashov Brian Buchan Jack Lenartowicz
Torys'	Crawford Smith
Facilitator	

Stakeholder Consultation: 2015-2019 Custom Incentive Regulation Application Participant Terms of Reference

What is the Purpose of this Document?

This document is intended to set out principles and logistical details relevant to a pre-filing stakeholder consultation regarding Toronto Hydro-Electric System Limited's ("THESL") 2015-2019 Custom Incentive Regulation Mechanism ("CIR") application.

Why is THESL Engaging in this Consultation?

THESL is committed to fostering and maintaining constructive relationships with its stakeholders, and believes that active two-way engagement is critical to achieving this objective.

THESL views this consultation as an opportunity to achieve a number of positive outcomes regarding this regulatory application, including enhanced engagement with customers and other interested/affected parties, contributing to hearing efficiency, and incorporating stakeholder perspective and feedback into its ultimate filing.

THESL expects that this multi-session consultation will provide stakeholders with insight into the utility's needs/drivers, as well as its approaches and methodologies as they relate to this CIR application. Additionally, THESL believes that it is also important to receive, understand the perspectives, input and feedback of stakeholders and requests the assistance of consultation participants in this regard.

What are the Guiding Principles for this Consultation?

THESL is seeking early and substantive input on its CIR application. While THESL is ultimately responsible for putting forward its application, it believes that constructive dialogue with stakeholders regarding the structure and content of the CIR will lead to a better application and a more effective hearing process.

THESL seeks to create an environment that supports open and candid discussion. This consultation will be carried out on a without-prejudice basis. Information obtained or shared during this consultation will not be used for any other purpose, with the exception of the limited information referenced in the Consultation Report (discussed below). THESL makes this commitment to participating stakeholders, and in turn expects participating stakeholders to abide by the same commitment.

Who are the Invited Participants for this Consultation?

This consultation is focussed on those stakeholders who are actively involved in THESL's regulatory processes such as intervenors and OEB staff. THESL encourages the attendance and engagement of stakeholders directly, as well as through external legal or consultant representatives.

What is the Format of this Consultation?

THESL will host at least two sessions with those participants who are able to attend either in person or remotely by phone/Webex. These sessions will take place at the OEB offices (2300

Yonge Street), and each session will be scheduled for a full day. THESL has engaged a third-party facilitator to run and record minutes of the sessions – the details of these minutes will be held on a without prejudice basis and not be disclosed in the Consultation Report. Brief outlines of each session are set out below, and agendas for each day will be provided to participants one week in advance of the scheduled session. THESL seeks and encourages live dialogue during the sessions, however will also provide participants an opportunity to submit written questions and comments - which will be available to view by all participants - following each session.

Session #1: Designing THESL's CIR Plan: February 11, 2014

THESL views Session #1 as an opportunity to discuss principles, facts, concepts and perspectives relevant to its CIR application. General topics include THESL's business needs/drivers, regulatory concepts and models (as relevant) with a view towards developing potential approaches to THESL's CIR application. THESL proposes to consider input and feedback received from Session #1 as part of the process of designing its CIR plan.

Session #2: Refining THESL's CIR Plan: July 3, 2014

THESL views Session #2 as an opportunity to report back to participants regarding the status and evolution of its application, and in particular, discuss certain structural and methodological aspects of its CIR application plan. THESL proposes to consider input and feedback received from Session #2 as part of refining its CIR plan.

Additional Consultation Opportunities

THESL seeks to maintain open channels of dialogue and engagement. In addition to the two sessions outlined above, THESL invites participants to approach THESL with any concerns, questions or other matters relevant to this application.

What Will THESL File with the OEB Regarding this Consultation?

The third-party facilitator will prepare a final Consultation Report that may be submitted to the OEB. This report will include these Terms of Reference, identify attendees at each meeting, and include copies of agendas and generic correspondence sent to participants (e.g. covering emails that accompany agendas). No notes or characterizations of the actual consultations will form part of the Consultation Report, and stakeholders will be provided an opportunity to review and comment on the Consultation Report prior to its finalization.

How Do Participants Receive Funding for the Consultation?

THESL will fund intervenor participation at the OEB's approved tariff rates, on the basis of one attendee per stakeholder. To the extent that stakeholders are of the view that funding for additional participants is required, THESL will address these requests on a case-by-case basis.

Who is the Contact at THESL for this Consultation?

Please direct any questions or concerns of a general nature to:

regulatoryaffairs@torontohydro.com