

OVERVIEW OF THE OPERATING, MAINTENANCE AND ADMINISTRATION (OM&A) EXPENDITURES

The purpose of this schedule is to provide a brief summary of Toronto Hydro's Operations, Maintenance and Administration (OM&A) evidence that describes the utility's OM&A expenditures as well as the analytical work, activities and obligations underlying them. The schedule also details the top-down and bottom-up budgetary considerations driving the preparation of the 2015 Test Year OM&A forecasts.

1. CONCORDANCE WITH CHAPTER 2 FILING REQUIREMENTS

As discussed in Exhibit 1B, Tab 2, Schedule 2 ("Alignment with The Renewed Regulatory Framework"), in preparing its 2015-2019 Custom IR OM&A evidence, Toronto Hydro consulted the OEB's filing requirements with respect to the OM&A guidance provided in Chapter 2 of the Ontario Energy Board's (OEB's) Filing Requirements for Electricity Distribution Rate Applications, as updated on July 17, 2013. A key evolution in the OEB's guidance concerns the manner of presentation and the subsequent review of the OM&A evidence on the basis of output / program-based expenditure presentation – a departure from the previous approach which focused on discrete OM&A cost inputs.²

Consistent with the OEB guidance, Toronto Hydro presents its Historical, Bridge and Test Year OM&A expenditures as a sum of 19 discrete programs, and a grouping of utility-wide costs and adjustments that cannot be readily assigned to a single program and/or presented as a standalone program. The descriptions and variance analysis for these programs and associated expenditures and adjustments can be found in Exhibit 4A, Tab 2, Schedules 1 through 21. In an effort to balance the OEB's guidance on program-based OM&A cost review with the objective of providing a thorough cost analysis,

² Ontario Energy Board, Application Filing Requirements, Chapter 2, S 2.7 p. 27, 17 July, 2013

1 Toronto Hydro has further broken down a number of OM&A Programs into Segments –
2 i.e., discrete activity-based areas that address different facets of a single program. Each
3 segment description includes an overview of the activities comprising the segment, the
4 requirements driving the work, and a variance analysis.

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6 As noted by the OEB in the July 2013 update of Chapter 2 Filing Requirements, adopting
7 a program-based approach to presenting the OM&A activities entails a transition period
8 for the utility. While Toronto Hydro submits that the manner of presentation of its 2015
9 OM&A activities is consistent with the OEB guidance, the utility notes that its work in
10 developing a meaningful program/Segment OM&A presentation involved a significant
11 amount of assumptions and complex analytic work, given that Toronto Hydro internal
12 OM&A tracking procedures do not fully lend themselves to the approach contemplated
13 by the OEB.

14
15 At Toronto Hydro, OM&A plans are generally presented on a operating department or
16 “Responsibility Centre” (RC) basis, whereby each RC is tied to the operational
17 management of broad, but discrete functional areas such as customer care, finance,
18 regulatory, safety, IT, HR or legal. That is, on the basis of the areas of discrete
19 responsibility and type of departmental expenditures, rather than the (often cross-
20 functional) activities or programs that the utility at large undertakes. In this way, for
21 areas with multiple activities, financial plans are presented at their highest level on the
22 basis of the type of the expenditure (e.g., payroll), rather than the program that those
23 expenditures correlate to (e.g., work program execution). In a number of cases, although
24 a department tracks its financial plan on an RC basis, they may also break down and track
25 certain line items on the basis of files or activities. For example, maintenance programs
26 that may require resources from several departments to complete the activities have
27 separate work orders that field employees use to charge their time. This approach helps

1 to track and manage the costs associated with the maintenance programs consistently
2 across the utility and track year-over-year variances.

3
4 This transition from RC to activity-based presentation is particularly salient with respect
5 to the OM&A evidence contained within Exhibit 4A, Tab 2, Schedules 6 through 9,
6 describing the programs that in previous filings (e.g., EB-2011-0144) were presented as a
7 single cost item described as Operations Support. Given a number of important and
8 functionally distinct activities captured within the previous Operations Support definition,
9 Toronto Hydro has made best efforts to provide dedicated descriptions and variance
10 analysis for each of the four ensuing programs and the associated segments. However,
11 for the reasons noted above, the utility employed estimates to determine the particular
12 program/segment expenditures for the Historical and Bridge years.

13
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15 **2. OVERVIEW OF THE OM&A PROGRAMS AND EXPENDITURES**

16 Toronto Hydro's total 2015 forecasted OM&A expenditures are \$269.5 million – 13.2%
17 or \$31.5 million above the 2011 expenditures approved by the OEB (\$238 million) in
18 Toronto Hydro's latest rebasing application (EB-2010-0142), and \$30.9 million or 13%
19 above the 2011 actual expenditures (\$238.6 million).² Overall, the cost increase from
20 2011 to 2015 represent an average of 3.3% a year. Toronto Hydro notes that Section 3
21 of this schedule details the process and considerations informing Toronto Hydro's
22 budgeting of the 2015 Test Year OM&A budget, including the constraint and restraint
23 exercised with deference to several inter-related factors including ratepayer impact, and
24 the utility's operational needs and obligations.

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² Because OM&A was settled on an envelope basis in the utility's last rebasing application (EB-2010-0142), and because 2011 OEB-Approved and 2011 actual expenditures were very similar (\$238 OEB-Approved vs. \$238.6 actuals expenditures), Toronto Hydro has only reported 2011 actual expenditures in the OEB appendices filed at Exhibit 4A, Tab 1, Schedules 2-5.

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1 Table 1 below provides a breakdown of Toronto Hydro's Historical (2011-2013), Bridge
2 and Test Year OM&A expenditures, broken down by program.

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4 **Table 1: Historical, Bridge and Test Year OM&A Expenditures by Program³**

(\$M)	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Preventative & Predictive Maintenance	13.7	16.0	12.8	16.1	20.1
Corrective Maintenance	25.8	21.5	17.0	19.0	22.2
Emergency Response	13.3	13.9	26.3	16.2	15.3
Disaster Preparedness Management	0.9	-	-	-	2.4
Control Centre	8.4	8.3	8.9	8.2	8.4
Customer-Driven Work	6.0	5.9	7.0	8.2	10.1
Planning	9.0	9.0	11.5	10.3	12.9
Work Program Execution Management and Support	5.0	5.5	5.6	5.8	6.1
Work Program Execution	14.9	13.8	13.0	14.3	15.2
Fleet and Equipment Services	8.7	8.5	8.7	8.4	8.9
Facilities Management	24.6	23.5	24.2	27.2	27.5
Supply Chain Services	7.1	6.6	9.0	10.3	9.9
Customer Care	41.9	37.5	39.7	42.2	46.1
Human Resources and Safety	13.7	13.2	15.3	15.3	16.1
Finance	16.1	14.7	15.7	17.0	17.9
Information Technology	30.3	28.5	31.0	33.4	34.9
Rates and Regulatory Affairs	7.2	7.8	8.4	6.4	8.4
Legal Services	5.5	4.3	4.5	5.3	5.5
Charitable Donations (LEAP)	0.7	0.7	0.7	0.7	0.8
Common Costs and Adjustments	5.7	(6.0)	0.5	2.3	1.0
Allocations and Recoveries	(19.9)	(17.4)	(13.3)	(19.9)	(20.2)
Restructuring Costs	-	27.7	-	-	-
Total OM&A	238.6	243.5	246.4	246.6	269.5

³ Numbers may not add up due to rounding.

As noted above, description and variance analysis of each the above programs can be found in Exhibit 4A, Tab 2, Schedules 1 – 21. For additional context of the planning and budgeting activities underlying Toronto Hydro’s 2015 Test Year OM&A ask, please refer to the following section of this schedule.

3. OM&A PLANNING AND BUDGETING

Toronto Hydro approached this rate application from the perspective of seeking to build an OM&A plan that facilitates the utility operating within an IRM framework for non-capital expenditures.⁴ Accordingly, it structured a financial planning process for 2015-2019 around the principles of the 4th Generation Incentive Rate Making regime (4GIRM). In particular, the utility approached its 2015 proposed OM&A expenditures from the perspective of savings it has achieved over the 3GIRM period together with resource requirements for 2015 and forward. Further, Toronto Hydro viewed 2016-2019 as years where its funding request would be consistent with the IRM framework – i.e., less than inflation and determined on the basis of a Price Cap Index-based formulaic adjustment.

An outcome of the Financial Planning process as described in Exhibit 1C, Tab 3, Schedule 2 is the operating, maintenance and administration (“OM&A”) plan. In developing the funding request for OM&A, Toronto Hydro’s plans were informed by a number of factors including operational needs such as asset investment requirements, maintenance requirements, staffing requirements, reliability, safety and legislative and

⁴ Subject to special considerations for capital, and reasonable off-ramps for potential expenditures that are unanticipated or unknown at the time of bringing this application. See Exhibit 1B, Tab 2, Schedule 3 for a discussion of Toronto Hydro’s proposed off-ramp or Z-factor adjustments. Also see Exhibit 1B, Tab 2, Schedule 3 for discussion of Toronto Hydro’s approach to building capital expenditures into a formulaic approach to ratemaking (which represents a modified IRM approach).

1 regulatory obligations. The plans are also informed by other important considerations
2 such as customer needs (including service levels and consumption-management tools),
3 rate impacts, value-for-money, productivity, and maintaining the financial health and
4 viability of the utility, etc. These considerations roll up to the four pillars discussed at
5 Exhibit 1C, Tab 3, Schedule 1 and Schedule 2.

6
7 No one of these considerations is determinative of the utility's ultimate financial plan, but
8 they all inform ultimate funding requests. For example, Toronto Hydro believes that
9 staffing levels beyond the operating costs proposed in this application are optimal based
10 on the utility's assessment of its operating requirements, its retirement projections for the
11 next five to 15 years, and the significant lead time for training certified and skilled trades
12 (four to six years). However, the utility has moderated its funding request in light of
13 other considerations, such as rate impacts.

14
15 Informed by the considerations described above, Toronto Hydro developed the OM&A
16 plan on the basis of both a top-down and bottom-up approach as described in Exhibit 1C,
17 Tab 3, Schedule 2. In general, Toronto Hydro's objective was to put forward a plan that
18 largely maintained functional requirements such as safe and reliable grid operations and
19 system performance, service levels and legal, regulatory and statutory compliance in an
20 efficient manner.

21
22 Toronto Hydro used both general and specific cost and economic assumptions in its 2015
23 forecast of the operating costs. Labour costs have been adjusted to reflect the annual rate
24 adjustments that Toronto hydro has committed to in its collective agreements. The labour
25 cost forecast was also adjusted to reflect market-competitive pay increases for non-
26 unionized employees. For more information, refer to Exhibit 4A, Tab 4, Schedule 5.
27 Otherwise, a general inflation factor of 1.7% was applied, consistent with the OEB's
28 current inflation factor.

1 **4. APPROACH**

2 The planning approach is predicated on the concept of a top-down, bottom-up process.
3 Senior Management establishes the top-down constraints. Based on those top-down
4 constraints, the business units exercised discipline and restraint in developing their
5 bottom-up requests for OM&A funding.

6
7 The planning approach started as a top-down exercise in which, as noted above, the
8 utility decided that it would seek to operate within the incentive-based environment
9 underlying the IRM framework for OM&A for the five-year plan term. In this way, an
10 objective of building the financial plan was to exercise constraint (top-down) on the
11 overall plan, and restraint (bottom-up) in developing funding requests. Toronto Hydro
12 was also mindful that any constraint and restraint also needed to be situated in the context
13 of Toronto Hydro's ability to comply with its obligations/conditions of licence, its
14 strategic pillars (Exhibit 1C, Tab 3, Schedule 1), as well as to respond to the resourcing
15 needs driven by new or modified activities that have arisen since the utility's last rebasing
16 in 2011.

17
18 To this end, Toronto Hydro's financial planning process for operating expenditures was
19 informed by a business planning approach that examined underlying elements of existing
20 budgets, as well as incremental requests for budget increases. In other words,
21 departments were asked to outline the allocation of current expenditures, as well as
22 justifying additional requests for 2015. Part of obtaining the full picture involved
23 generally considering expenditures that were incremental since Toronto Hydro's last
24 rebasement year (2011).

25
26 The practical application of Toronto Hydro's approach of integrating the top-down and
27 bottom-up needs identification into its OM&A planning process entailed the utility's
28 departments coming forward with plans and requests for ongoing and incremental

activities, which were then examined on a top-down basis for alignment with key considerations, such as the potential rate impact of the aggregate OM&A request for 2015.

5. RESULTS

In the result, while Toronto Hydro is putting forward in this application a 2015 rebasing plan that includes a number new or materially-expanded OM&A activities that it expects will be sustained over the period of the plan, these requests are largely driven by functional requirements. Examples of these new or materially-expanded programs include:

- The Disaster Preparedness Management Program aimed at enhancing the utility's capabilities to plan for and operate during major contingency events;
- Increased Billing, Remittance and Meter Data Management expenditures to enable deployment and maintenance of technology upgrade projects to support meter reading infrastructure renewal, and accommodate significant Canada Post service fee increases; and
- Increased Preventative and Predictive Maintenance expenditures to optimize the asset maintenance cycles, driven, among other factors, by the results of the Reliability Centered Maintenance (RCM) analysis.

For additional details on the evolution of Toronto Hydro's OM&A cost drivers and business environment changes, please refer to Exhibit 4A, Tab 2, Schedules 1 through 21, as well as financial schedules provided in Exhibit 4A, Tab 1.

By contrast, this also means that Toronto Hydro did not put forward other possible sustained and reasonable OM&A requests that would represent what the utility may believe is operationally optimal or required. As noted above, and in line with the

1 Strategic Pillars, the utility made these decisions on the basis of the spectrum of input
2 considerations, such as rate impacts.

3
4 An example of an area in which Toronto Hydro did not put forward the full possible
5 sustained and reasonable OM&A request is Toronto Hydro's proposed staffing plan. To
6 constrain compensation costs over the rate period, Toronto Hydro has limited its
7 proposed workforce hiring and replacement strategy, despite the increasing wave of
8 retirements that the utility projects to experience in the next five to ten years (25% of the
9 workforce is eligible to retire by 2019) and notwithstanding apprenticeship and training
10 period required for a Certified and Skilled Trades or Designated Technical Professionals
11 (four to six years). Instead of ramping up its hiring plan, Toronto Hydro has
12 implemented a multi-faceted staffing strategy to maintain quality service and value to rate
13 payers, and to plan for upcoming retirements. For example, Toronto Hydro constrained
14 its compensation costs by approximately \$3 million by employing contingent resources
15 rather than full-time employees to deliver a variety of administrative and support
16 functions. Although the utility would prefer to have the continuity of knowledge and
17 experience, and the security of full-time resources, it has opted for a different staffing
18 model in this respect, in an effort to constrain costs.⁵

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19
20 In building its five-year OM&A plan, while Toronto Hydro endeavoured to consider
21 foundational expenditure requirements, including potential emerging requirements (e.g.,
22 extreme weather preparedness) that can be reasonably anticipated, it did not engage in a
23 detailed five-year financial planning exercise. However, it did consider two important
24 factors in assessing its ability to "live within" IRM for OM&A over the term of the CIR
25 plan.

26

⁵ Exhibit 4A, Tab 2, Schedule 3

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1 As discussed in further detail above, the first factor is the importance of sufficient Test
2 Year funding in light of the anticipated resourcing needs, driven by both ongoing and
3 incremental requirements. Absent a sufficient level of funding in the test/rebasing year,
4 an IRM plan for the successive four years would not be sustainable. As discussed above,
5 Toronto Hydro engaged in a detailed financial planning exercise, based on functional
6 requirements, informed by the four pillars, and designed to provide the utility sufficient
7 funding levels for the next five years.

8
9 Second, a corollary of Toronto Hydro's OM&A proposal - and a consideration in how it
10 engaged in financial planning - is its proposal regarding the Z-Factor (Exhibit 1B, Tab 2,
11 Schedule 3). While Toronto Hydro has endeavoured to consider foundational
12 expenditure requirements, including potential emerging requirements as can be known
13 today, for any regulated utility that operates in a dynamic environment such as Toronto
14 Hydro, there will inevitably be material events over a five year time horizon that are
15 outside the known, anticipated and quantifiable scope of requirements. Examples of
16 activities covered under these include changes in legal instruments or government/OEB
17 policy and unforeseen weather events. This aspect of Toronto Hydro's CIR plan and
18 request is discussed in further detail at Exhibit 1B, Tab 2, Schedule 3. By proposing the
19 Z-Factor approach to be used if and when determined to be appropriate, Toronto Hydro
20 attempts to balance the considerations of customer impacts with the necessity of
21 maintaining safe and efficient system operation under a variety of potential conditions.

22
23 As a result of the process and considerations discussed above, Toronto Hydro believes
24 that it has put forward an OM&A (and capital) plan that enables it to manage within
25 funding levels it has proposed, subject to the Z-Factor events. In addition, the plan also
26 pushes the utility to find additional efficiencies and savings throughout the term because
27 Toronto Hydro's ordinary annual course cost increases well exceed the funding that the
28 IRM formula provides. Toronto Hydro projects that in the ordinary course, its OM&A

1 costs would increase at an approximate average of 2-3% year-over-year during the term
2 of the CIR plan. By proposing that the OM&A component of rates increase only by a
3 standard IRM-adjustment from 2016 to 2019 that is materially lower than this amount,
4 Toronto Hydro is providing an up-front sharing of productivity/stretch (or “X-factor”)
5 benefits to ratepayers, consistent with the tenets of incentive rate regulation. The utility
6 then bears the risk of finding the delta between what is funded in rates and ordinary
7 course cost increases - through identifying and implementing productivity and efficiency
8 initiatives over the term of the plan. While Toronto Hydro sees this as a stretch goal in
9 light of past productivity improvements and a restrained OM&A test year amount, it also
10 appreciates the importance of fulfilling OEB policy objectives and seeking innovative
11 ways to create value-for-money for ratepayers.

OEB Appendix 2-JA
Summary of Recoverable OM&A Expenses

(in \$ Millions)

	Last Rebasing Year (2011 Actuals)	2012 Actuals	2013 Actuals	2014 Bridge Year	2014 Bridge Year	2015 Test Year	
Reporting Basis	CGAAP	USGAAP	USGAAP	USGAAP	MIFRS	MIFRS	IC
Operations	\$ 59.7	\$ 55.9	\$ 59.5	\$ 58.5	\$ 58.5	\$ 70.3	
Maintenance	\$ 56.1	\$ 54.8	\$ 66.8	\$ 59.3	\$ 59.3	\$ 61.2	
SubTotal	\$ 115.8	\$ 110.7	\$ 126.4	\$ 117.8	\$ 117.8	\$ 131.5	
%Change (year over year)		-4.4%	14.1%	-6.8%	0.0%	11.6%	
%Change (Test Year vs Last Rebasing Year - Actual)						13.6%	
Billing and Collecting	\$ 40.6	\$ 36.0	\$ 35.2	\$ 37.9	\$ 37.9	\$ 41.5	
Community Relations	\$ 2.9	\$ 2.9	\$ 2.9	\$ 2.7	\$ 2.7	\$ 2.7	
Administrative and General	\$ 72.6	\$ 67.8	\$ 75.0	\$ 81.2	\$ 79.9	\$ 86.5	IC
Taxes Other Than Income Taxes	\$ 5.9	\$ (2.3)	\$ 6.4	\$ 6.5	\$ 6.5	\$ 6.5	
Donations	\$ 0.7	\$ 0.7	\$ 0.7	\$ 0.7	\$ 0.7	\$ 0.8	
SubTotal	\$ 122.7	\$ 105.1	\$ 120.1	\$ 128.8	\$ 127.5	\$ 138.0	IC
%Change (year over year)		-14.4%	14.3%	7.3%	-1.0%	8.2%	IC
%Change (Test Year vs Last Rebasing Year - Actual)						12.4%	
Total	\$ 238.6	\$ 215.8	\$ 246.4	\$ 246.6	\$ 245.3	\$ 269.5	IC
Restructuring Costs (OEB Account 6310 - Extraordinary Deduction)		\$ 27.7					
Total - Including Restructuring Costs	\$ 238.6	\$ 243.5	\$ 246.4	\$ 246.6	\$ 245.3	\$ 269.5	IC
%Change (year over year)		2.1%	1.2%	0.1%	-0.5%	9.9%	IC

	Last Rebasing Year (2011 Actuals)	2012 Actuals	2013 Actuals	2014 Bridge Year	2014 Bridge Year	2015 Test Year	
Operations	\$ 59.7	\$ 55.9	\$ 59.5	\$ 58.5	\$ 58.5	\$ 70.3	
Maintenance	\$ 56.1	\$ 54.8	\$ 66.8	\$ 59.3	\$ 59.3	\$ 61.2	
Billing and Collecting	\$ 40.6	\$ 36.0	\$ 35.2	\$ 37.9	\$ 37.9	\$ 41.5	
Community Relations	\$ 2.9	\$ 2.9	\$ 2.9	\$ 2.7	\$ 2.7	\$ 2.7	
Administrative and General	\$ 72.6	\$ 67.8	\$ 75.0	\$ 81.2	\$ 79.9	\$ 86.5	IC
Taxes Other Than Income Taxes	\$ 5.9	\$ (2.3)	\$ 6.4	\$ 6.5	\$ 6.5	\$ 6.5	
Donations	\$ 0.7	\$ 0.7	\$ 0.7	\$ 0.7	\$ 0.7	\$ 0.8	
Restructuring Costs (OEB Account 6310 - Extraordinary Deduction)	-	\$ 27.7	-	-	-	-	
Total	\$ 238.6	\$ 243.5	\$ 246.4	\$ 246.6	\$ 245.3	\$ 269.5	IC
%Change (year over year)		2.1%	1.2%	0.1%	-0.5%	9.9%	IC

	Last Rebasings Year (2011 Actuals)	Variance 2011 BA 2011 Actuals	2012 Actuals	Variance 2012 Actuals vs. 2011 Actuals	2013 Actuals	Variance 2013 Actuals vs. 2012 Actuals	2014 Bridge Year	Variance 2014 Bridge vs. 2013 Actuals	2015 Test Year	Variance 2015 Test vs. 2014 Bridge
Operations	\$ 59.7	-	\$ 55.9	\$ (3.7)	\$ 59.5	\$ 3.6	\$ 58.5	\$ (1.0)	\$ 70.3	\$ 11.8
Maintenance	\$ 56.1	-	\$ 54.8	\$ (1.4)	\$ 66.8	\$ 12.0	\$ 59.3	\$ (7.5)	\$ 61.2	\$ 1.9
Billing and Collecting	\$ 40.6	-	\$ 36.0	\$ (4.7)	\$ 35.2	\$ (0.7)	\$ 37.9	\$ 2.6	\$ 41.5	\$ 3.6
Community Relations	\$ 2.9	-	\$ 2.9	\$ 0.0	\$ 2.9	\$ (0.1)	\$ 2.7	\$ (0.2)	\$ 2.7	\$ 0.1
Administrative and General	\$ 72.6	-	\$ 67.8	\$ (4.8)	\$ 75.0	\$ 7.2	\$ 81.2	\$ 6.2	\$ 86.5	\$ 5.3
Taxes Other Than Income Taxes	\$ 5.9	-	\$ (2.3)	\$ (8.2)	\$ 6.4	\$ 8.7	\$ 6.5	\$ 0.1	\$ 6.5	\$ 0.0
Donations	\$ 0.7	-	\$ 0.7	\$ (0.1)	\$ 0.7	\$ (0.0)	\$ 0.7	-	\$ 0.8	\$ 0.2
Restructuring Costs (OEB Account 6310 - Extraordinary Deduction)			\$ 27.7							
Total OM&A Expenses	\$ 238.6	-	\$ 243.5	\$ (22.8)	\$ 246.4	\$ 30.7	\$ 246.6	\$ 0.2	\$ 269.5	\$ 22.9
Adjustments for Total non-recoverable items (from Appendices 2-JA and 2-JB)			\$ 27.7							
Total Recoverable OM&A Expenses	\$ 238.6	-	\$ 215.8	\$ (22.8)	\$ 246.4	\$ 30.7	\$ 246.6	\$ 0.2	\$ 269.5	\$ 22.9
Variance from previous year			\$ (22.8)		\$ 30.7		\$ 0.2		\$ 22.9	
Percent change (year over year)			-9.6%		14.2%		0.1%		9.3%	
Percent Change: Test year vs. Most Current Actual					9.37%					
Simple average of % variance for all years										3.5%
Compound Annual Growth Rate for all years										2.5%
Compound Growth Rate 2013 Actuals vs. 2011 Actuals					1.1%					

Note:

- "BA" = Board-Approved
- If it has been more than three years since the applicant last filed a cost of service application, additional years of historical actuals should be incorporated into the table, as necessary, to go back to the last cost of service application. If the applicant last filed a cost of service application less than three years ago, a minimum of three years of actual information is required.
- Recoverable OM&A that is included on these tables should be identical to the recoverable OM&A that is shown for the corresponding periods on Appendix 2-JB.

Recoverable OM&A Cost Driver Table

OM&A	Last Rebasing Year (2011 Board- Approved)	2012 Actuals	2013 Actuals	2014 Bridge Year	2015 Test Year
<i>Reporting Basis</i>	CGAAP	USGAAP	USGAAP	USGAAP	MIFRS
Opening Balance	\$238.0	\$238.6	\$215.8	\$246.4	\$246.6
Workforce Compensation (net)					
Salary, Wages and Benefits		(\$19.0)	\$7.4	(\$1.7)	\$4.9
Program execution - Capitalized Labour		\$14.2	(\$8.6)	\$2.4	(\$0.6)
Program execution - O&M Labour Recovery		(\$7.1)	\$4.2	\$13.8	(\$2.9)
Distribution Operations Programs					
Preventative and Predictive Maintenance		\$2.6	(\$3.0)	\$3.3	\$3.7
Corrective Maintenance		(\$2.2)	(\$4.0)	\$0.8	\$3.2
Emergency Maintenance - 'Sandy' Storm Restoration		\$1.5	(\$1.5)	-	-
Emergency Maintenance - 'Ice' Storm Restoration		-	\$10.2	(\$6.8)	(\$3.4)
Emergency Maintenance - Other		\$1.0	\$3.8	(\$3.3)	\$2.5
Planning		\$1.5	\$0.9	(\$4.6)	\$3.0
Program Delivery		\$0.8	\$0.1	(\$4.3)	\$0.0
Work Program Execution		(\$1.0)	(\$1.1)	\$0.1	\$2.4
Customer Driven Work		\$0.4	\$0.3	\$1.2	\$2.0
Customer Service and Communications					
Billing, Remittance & Meter Data Management		(\$0.4)	\$1.1	\$0.1	\$1.1
Collection Services		\$0.2	\$1.3	\$1.5	\$0.3
Customer Communications and Relationship Management		\$1.1	(\$0.7)	(\$0.4)	\$0.8
Bad Debt Expenses	\$0.7	(\$2.5)	\$0.0	(\$0.2)	\$0.7
Low-Income Energy Assistance Program (LEAP)		-	-	-	\$0.2
Printing and Postage Costs		\$0.2	(\$0.2)	\$0.5	\$0.7
Human Resources					
Legal Fees		\$0.1	\$0.6	(\$0.5)	\$0.0
Talent Management and Acquisition		(\$0.7)	\$0.4	\$0.0	\$0.6
Information Technology services					
Information Technology services		(\$0.0)	\$0.8	\$2.2	\$0.8
Telecommunications One Time Loyalty Bonus		(\$1.1)	\$1.1	-	-
Common Corporate Costs					
Disallowed recovery of deferred IFRS conversion costs	\$3.1	(\$3.1)	-	-	-
Scientific Research and Educational Development credits	(\$1.4)	\$1.4	-	-	-
Property Taxes reassessment and change in regulation completed by the Ministry of Finance of Ontario		(\$8.7)	\$8.7	-	-
Decrease in legal provision from Late Payment charges class action settlement		(\$1.6)	\$1.6	-	-
Refundable and Non-Refundable Tax Credits (ITC)	(\$1.7)	\$0.9	\$0.1	\$0.0	(\$1.3)
Financing Costs		(\$0.3)	(\$0.4)	(\$0.3)	\$0.0
Facilities Maintenance					

OM&A	Last Rebasing Year (2011 Board- Approved)	2012 Actuals	2013 Actuals	2014 Bridge Year	2015 Test Year	
Reporting Basis	CGAAP	USGAAP	USGAAP	USGAAP	MIFRS	/C
Building & Stations Maintenance		(\$1.2)	\$0.8	\$2.8	\$0.5	
Property Taxes		\$0.5	(\$0.2)	\$0.1	(\$0.2)	
Rentals & Leases		\$0.6	\$0.0	\$0.2	\$0.1	
Utilities & Communications		(\$0.1)	\$0.3	\$0.2	(\$0.1)	
Other Various						
Control Centre Operations		(\$1.4)	(\$1.2)	(\$1.7)	(\$0.1)	
Disaster Preparedness Management		\$0.9	-	-	\$2.4	
Fleet and Equipment Services		(\$0.2)	\$0.2	\$0.0	\$0.3	
Regulatory Costs		\$0.4	\$0.6	(\$2.3)	\$1.9	
Procurement Costs		\$0.5	\$2.2	\$2.2	(\$0.3)	
Legal Services Costs		(\$0.7)	\$0.2	\$0.4	\$0.0	
Finance Consulting and Auditing Fees		(\$0.3)	\$0.3	\$1.0	\$0.1	
Smart Meter Clearance		-	\$7.1	(\$7.1)	-	
Allocations and Recoveries		\$2.5	(\$3.1)	\$0.6	(\$0.3)	
Special Purpose Charges		(\$3.1)	-	-	-	
Miscellaneous	(\$0.1)	\$0.6	\$0.3	(\$0.1)	\$0.0	
Closing Balance	\$238.6	\$215.8	\$246.4	\$246.6	\$269.5	
Restructuring Costs ¹		\$27.7				
Closing Balance - Including Restructuring Costs	\$238.6	\$243.5	\$246.4	\$246.6	\$269.5	

¹ OEB Account 6310 - Extraordinary Deduction

Notes:

- 1 For each year, a detailed explanation for each cost driver and associated amount is required in Exhibit 4.
- 2 For purposes of assessing incremental cost drivers, the closing balance for each year becomes the opening balance for the next year.
- 3 If it has been more than three years since the applicant last filed a cost of service application, additional years of historical actuals should be incorporated into the table, as necessary, to go back to the last cost of service application. If the applicant last filed a cost of service application less than three years ago, a minimum of three years of actual information is required.
- 4 Opening Balance for "Last Rebasing Year" (cell B15) should be equal to the Board-Approved amount.

OEB Appendix 2-JC OM&A Programs Table

(in \$ Millions)

Programs	Last Rebasing Year (2011 Actuals)	2012 Actuals	2013 Actuals	2014 Bridge Year	2014 Bridge Year	2015 Test Year	Variance (Test Year vs. 2013 Actuals)	Variance (Test Year vs. Last Rebasing Year (2011 Board- Approved))	
Reporting Basis	CGAAP	USGAAP	USGAAP	USGAAP	MIFRS	MIFRS			IC
Common Corporate Costs and Adjustments									
Common Corporate Costs and Adjustments	2.1	(9.6)	(2.7)	(0.7)	(2.0)	(2.0)	0.7	(4.1)	IC
Governance	1.2	1.5	1.5	1.5	1.5	1.6	0.1	0.4	
Short-Term Interest Expenses on Line of Credit and Customer Deposits	2.4	2.1	1.7	1.4	1.4	1.4	(0.3)	(1.0)	
							-	-	
							-	-	
Sub-Total	5.7	(6.0)	0.5	2.3	1.0	1.0	0.5	(4.7)	IC
HR&Safety Program Expenses									
Labour Relations & Human Resources	4.7	5.2	6.2	5.7	5.7	5.8	(0.4)	1.2	
Employee Health & Safety	2.3	2.2	2.4	2.7	2.7	2.8	0.3	0.5	
Talent Acquisition & Organizational Development	6.7	5.9	6.6	6.9	6.9	7.5	0.9	0.8	
							-	-	
							-	-	
Sub-Total	13.7	13.2	15.3	15.3	15.3	16.1	0.8	2.4	
Customer Care Program Expenses									
Billing, Remittance & Meter Data Management	14.5	13.7	14.6	16.4	16.4	18.7	4.1	4.2	
Collections	12.3	8.9	11.1	12.2	12.2	13.1	2.0	0.8	
Customer Relationship Management	12.1	11.5	10.1	10.4	10.4	11.3	1.3	(0.8)	
Communications & Public Affairs	3.0	3.3	4.0	3.1	3.1	3.0	(1.0)	0.0	
							-	-	
Sub-Total	41.9	37.5	39.7	42.2	42.2	46.1	6.4	4.2	
LEAP Program Expenses									
LEAP	0.7	0.7	0.7	0.7	0.7	0.8	0.2	0.1	
							-	-	
							-	-	
							-	-	
							-	-	
Sub-Total	0.7	0.7	0.7	0.7	0.7	0.8	0.2	0.1	

(in \$ Millions)

	Last Rebasing Year (2011 Actuals)	2012 Actuals	2013 Actuals	2014 Bridge Year	2014 Bridge Year	2015 Test Year	Variance (Test Year vs. 2013 Actuals)	Variance (Test Year vs. Last Rebasing Year (2011 Board- Approved))
Programs								
Reporting Basis	CGAAP	USGAAP	USGAAP	USGAAP	MIFRS	MIFRS		
IT Program Expenses								
IT Governance	1.3	1.2	1.1	1.5	1.5	1.5	0.4	0.1
IT Operations	25.6	24.5	28.0	29.7	29.7	30.9	3.0	5.3
Project Execution	1.3	0.9	0.5	0.8	0.8	1.1	0.6	(0.3)
Security & Enterprise Architecture	2.0	2.0	1.4	1.4	1.4	1.4	0.0	(0.6)
							-	-
Sub-Total	30.3	28.5	31.0	33.4	33.4	34.9	3.9	4.6
Legal Program Expenses								
Corporate, Commercial & Real Property	3.2	2.5	2.1	2.9	2.9	3.1	1.0	(0.1)
Litigation & Claims	2.3	1.8	2.4	2.4	2.4	2.5	0.1	0.2
							-	-
							-	-
							-	-
Sub-Total	5.5	4.3	4.5	5.3	5.3	5.5	1.0	0.1
Finance Program Expenses								
Controllership	5.3	5.4	6.4	6.7	6.7	7.3	0.9	2.1
External Reporting	2.9	2.6	2.6	3.1	3.1	3.2	0.6	0.3
Financial Services	7.9	6.7	6.7	7.2	7.2	7.4	0.7	(0.5)
							-	-
							-	-
Sub-Total	16.1	14.7	15.7	17.0	17.0	17.9	2.2	1.8
Rates & Regulatory Program Expenses								
Rates & Regulatory Program Expenses	7.2	7.8	8.4	6.4	6.4	8.4	0.1	1.2
							-	-
							-	-
							-	-
							-	-
Sub-Total	7.2	7.8	8.4	6.4	6.4	8.4	0.1	1.2

/C

(in \$ Millions)

Programs	Last Rebasing Year (2011 Actuals)	2012 Actuals	2013 Actuals	2014 Bridge Year	2014 Bridge Year	2015 Test Year	Variance (Test Year vs. 2013 Actuals)	Variance (Test Year vs. Last Rebasing Year (2011 Board- Approved))
Reporting Basis	CGAAP	USGAAP	USGAAP	USGAAP	MIFRS	MIFRS		
Control Centre Operations Program Expenses								
Control Centre Operations Program Expenses	8.4	8.3	8.9	8.2	8.2	8.4	(0.4)	0.0
							-	-
							-	-
							-	-
Sub-Total	8.4	8.3	8.9	8.2	8.2	8.4	(0.4)	0.0
Disaster Preparedness Management Program Expenses								
Disaster Preparedness Management Program Expenses	0.9	-	-	-	-	2.4	2.4	1.5
							-	-
							-	-
							-	-
Sub-Total	0.9	-	-	-	-	2.4	2.4	1.5
Facilities Management Program Expenses								
Facilities Maintenance Services	11.9	10.0	10.4	13.0	13.0	13.5	3.1	1.6
Rentals & Leases	4.4	5.0	5.0	5.2	5.2	5.2	0.2	0.8
Utilities & Communications	2.2	2.1	2.4	2.6	2.6	2.4	0.1	0.2
Property Taxes	6.1	6.5	6.4	6.5	6.5	6.2	(0.1)	0.2
							-	-
Sub-Total	24.6	23.5	24.2	27.2	27.2	27.5	3.3	2.8
Fleet and Equipment Services Program Expenses								
Equipment and Lab Services	8.7	8.5	8.7	8.4	8.4	8.9	0.2	0.2
							-	-
							-	-
							-	-
Sub-Total	8.7	8.5	8.7	8.4	8.4	8.9	0.2	0.2

IC

(in \$ Millions)

Programs	Last Rebasing Year (2011 Actuals)	2012 Actuals	2013 Actuals	2014 Bridge Year	2014 Bridge Year	2015 Test Year	Variance (Test Year vs. 2013 Actuals)	Variance (Test Year vs. Last Rebasing Year (2011 Board- Approved))	IC
Reporting Basis	CGAAP	USGAAP	USGAAP	USGAAP	MIFRS	MIFRS			
Supply Chain Services Program Expenses									
Supply Chain Services Program Expenses	7.1	6.6	9.0	10.3	10.3	9.9	0.9	2.8	
							-	-	
							-	-	
							-	-	
Sub-Total	7.1	6.6	9.0	10.3	10.3	9.9	0.9	2.8	
Operations Support Program Expenses									
Corrective Maintenance	25.8	21.5	17.0	19.0	19.0	22.2	5.2	(3.6)	
Customer Driven Work	6.0	5.9	7.0	8.2	8.2	10.1	3.0	4.1	
Emergency Response	13.3	13.9	26.3	16.2	16.2	15.3	(11.0)	1.9	
Planning	9.0	9.0	11.5	10.3	10.3	12.9	1.4	4.0	
Preventative & Predictive Maintenance	13.7	16.0	12.8	16.1	16.1	20.1	7.3	6.4	
Program Delivery	5.0	5.5	5.6	5.8	5.8	6.1	0.5	1.0	
Work Program Execution	14.9	13.8	13.0	14.3	14.3	15.2	2.1	0.2	
							-	-	
Sub-Total	87.7	85.6	93.3	89.9	89.9	101.8	8.5	14.1	
Allocations & Recoveries Program Expenses									
On-cost recovery	(9.3)	(7.8)	(10.7)	(11.0)	(11.0)	(10.7)	(0.0)	(1.4)	
Fleet Recovery Offset	(10.8)	(10.7)	(10.3)	(12.4)	(12.4)	(13.2)	(3.0)	(2.4)	
(IT, Occupancy Charges)	(0.6)	(0.5)	(0.5)	(0.6)	(0.6)	(0.5)	0.0	0.1	
Shared Services	1.2	1.6	1.0	4.1	4.1	4.2	3.2	2.9	
Other Allocated Costs (Smart Meter Recognition, miscellaneous etc.)	(0.4)	(0.0)	7.1	-	-	-	(7.1)	0.4	
							-	-	
Sub-Total	(19.9)	(17.4)	(13.3)	(19.9)	(19.9)	(20.2)	(6.9)	(0.3)	
Miscellaneous							-	-	
Total	238.6	215.8	246.4	246.6	245.3	269.5	23.2	30.9	IC

Notes:

- 1 Please provide a breakdown of the major components of each OM&A Program undertaken in each year. Please ensure that all Programs below the materiality threshold are included in the miscellaneous line. Add more Programs as required.
- 2 The applicant should group projects appropriately and avoid presentations that result in classification of significant components of the OM&A budget in the miscellaneous category

OEB Appendix 2-L

Recoverable OM&A Cost per Customer and per FTE

	Last Rebasing Year (2011 Actuals)	2012 Actuals	2013 Actuals	2014 Bridge Year	2014 Bridge Year	2015 Test Year	
Reporting Basis	CGAAP	USGAAP	USGAAP	USGAAP	MIFRS	MIFRS	/C
Number of Customers (mid-year)	705,756.00	713,093.00	724,144.00	736,974.00	736,974.00	749,679.00	
Total Recoverable OM&A from Appendix 2-JB	\$238.6	\$215.8	\$246.4	\$246.6	\$245.3	\$269.5	/C
OM&A cost per customer	\$ 338.08	\$ 302.63	\$ 340.26	\$ 334.68	\$ 332.91	\$ 359.51	/C
Number of FTEs	1,737	1,601	1,527	1,537	1,537	1,564	/C
Customers/FTEs	406.30	445.46	474.10	479.62	479.62	479.49	/C
OM&A Cost per FTE	137,360.81	134,806.50	161,319.54	160,517.12	159,671.09	172,378.66	/C

Notes:

- 1 If it has been more than three years since the applicant last filed a cost of service application, additional years of historical actuals should be incorporated into the table, as necessary, to go back to the last cost of service application. If the applicant last filed a cost of service application less than three years ago, a minimum of three years of actual information is required.
- 2 The method of calculating the number of customers must be identified.
- 3 The method of calculating the number of FTEs must be identified. See also Appendix 2-K
- 4 The number of customers and the number of FTEs should correspond to mid-year or average of January 1 and December 31 figures.
- 5 Toronto Hydro notes that its OM&A per customer metrics do not account for an estimated 300,000 behind-the-bulk-meter multi-unit dwelling customers.

PREVENTATIVE & PREDICTIVE MAINTENANCE PROGRAM

1. SUMMARY

Table 1: Preventative & Predictive Program Expenditures (\$ Millions)

	2011	2012	2013	2014	2015
Preventative and Predictive Maintenance	\$13.7	\$16.0	\$12.8	\$16.1	\$20.1

This schedule details Toronto Hydro's Preventative and Predictive Maintenance Program. The program maintains both distribution and stations assets. The key program components can be summarized as follows:

- Preventative Maintenance** involves inspections and maintenance tasks that are typically conducted on a fixed cycle. These activities emphasize preserving asset performance over the expected life of the asset, and maintaining public and employee safety. Maintenance cycles are defined based on the mean time between failures of a given asset class, and are intended to maintain the asset before it is statistically likely to experience a failure. An example of a preventive maintenance task is the inspection of wood poles, which is carried out on a ten-year cycle.
- Predictive Maintenance** entails testing and inspection of equipment for predetermined conditions that are indicative of a potential failure. These activities are effective on assets that exhibit conditions that can be identified, practically monitored and corrected prior to failure. An example of a predictive maintenance task is Dissolved Gas Analysis of power transformer mineral oil. The presence of dissolved gases and other chemical compounds in the oil will indicate potential

failure modes such as overheating, excessive moisture, or breakdown of the insulating paper.

The Preventative and Predictive Maintenance Program is complimented by the Corrective Maintenance Program (Exhibit 4A, Tab 2, Schedule 2), which corrects the deficiencies and addresses substandard conditions that are identified by preventative and predictive maintenance activities. By proactively identifying deficiencies and substandard conditions, the Preventative and Predictive Maintenance Program aims to minimize the expenditures in the Emergency Response Program (Exhibit 4A, Tab 2, Schedule 3).

2. PROGRAM DESCRIPTION

The Preventative and Predictive Maintenance Program is divided into ten segments. The table below contains Toronto Hydro's Historical (2011-2013), Bridge (2014) and Test Year (2015) expenditures for each of these segments.

Table 2: Summary of Predictive & Preventative Maintenance Program Expenditures (\$ Millions)

Segment	Historical			Bridge	Test
	2011	2012	2013	2014	2015
1. Overhead Line Patrols and Pole Inspections	0.3	0.4	0.4	0.5	0.7
2. Overhead Switch Maintenance and Insulator Washing	0.8	1.2	1.0	1.5	2.0
3. Vegetation Management	2.5	2.5	2.8	2.6	4.4
4. Below-Grade Equipment Maintenance	1.7	2.2	2.2	2.1	2.8
5. Pad-mounted Equipment Maintenance	0.2	0.4	0.4	0.4	1.1
6. Customer Location Maintenance	0.9	1.9	1.2	3.2	3.2

Segment	Historical			Bridge	Test
	2011	2012	2013	2014	2015
7. Metering Services	4.5	4.9	1.9	2.3	2.2
8. Station Inspections and Auxiliary Equipment Maintenance	1.0	0.9	1.0	1.2	1.2
9. Station Switchgear Maintenance	1.2	0.9	1.3	1.3	1.4
10. Station Equipment Maintenance	0.6	0.5	0.7	0.8	0.9
Total	\$13.7	\$16.0	\$12.8	\$16.1	\$20.1

Expenditures between 2011 and 2014 have fluctuated as a result of the following:

- From 2011 to 2012, the increase is predominantly driven by increases of \$0.5 million in Overhead Switch Maintenance, \$0.4 million in Below-Grade Equipment Maintenance, and \$1.0 million in Customer Location Maintenance;
- From 2012 to 2013, the decrease is predominantly driven by a decrease of \$3.0 million in Metering Services;
- From 2013 to 2014, the increase is predominantly driven by increases of \$2.0 million in Customer Location Maintenance and \$0.3 million in Overhead Switch Maintenance.

Planned expenditures in 2015 are \$4.0 million greater than forecasted 2014 expenditures.

As described in greater detail in the segment discussions that follow, the predominant drivers for these increases are:

- \$1.8 million increase in Vegetation Management to improve reliability and harden the distribution system against storm events;
- \$0.5 million to conduct cable testing as part of Pad-Mounted Equipment Maintenance;

- 1 • \$0.5 million to conduct PCB testing on Below-Grade Equipment, Pad-mounted
- 2 Equipment, and at Customer Locations; and
- 3 • \$0.5 million in Overhead Switch Maintenance and Insulator Washing.

4

5 The activities comprising the individual segments within the Preventative and Predictive

6 Maintenance Program are designed to maintain asset performance and to mitigate a wide

7 variety of risks. The philosophy that is at the core of many of the segments is Reliability-

8 Centered Maintenance (“RCM”). RCM defines maintenance tasks and frequencies for a

9 particular asset class to maximize reliability based on the asset’s function and its

10 criticality to the distribution system. Tasks are also designed to minimize overall costs

11 and to account for risks and other factors such as the safety of Toronto Hydro work crews

12 and the public, environmental stewardship and obligations, statutory and regulatory

13 requirements, manufacturers’ recommendations, and industry best practices.

14

15 In addition to RCM, Toronto Hydro’s Preventative and Predictive Maintenance program

16 is influenced by “Condition-based Maintenance” principles and an emphasis on

17 maximizing productivity. Condition-based Maintenance promotes the adjustment of

18 maintenance frequencies based on the condition of a particular asset as opposed to a

19 strictly frequency-based approach. Toronto Hydro is currently developing data sets and

20 analytics to enable greater usage of Condition-based Maintenance, particularly in the

21 stations environment. For example, the emphasis on transformer oil testing at Stations

22 and Customer Substations is partially motivated by the desire to implement more

23 Condition-based Maintenance. By utilizing condition data, analytics tools such as Asset

24 Condition Assessments (“ACA”) and Health Indices, Toronto Hydro is striving to

25 establish key parameters for assets such as: (i) which assets are in need of either

26 enhanced maintenance or replacement based on their health; (ii) a list of assets where it is

27 more cost effective to replace as opposed to maintain; and (iii) a list of assets that require

28 maintenance on a higher priority than the rest of the asset base.

Toronto Hydro has placed significant emphasis on achieving greater output for the same or reduced input in each of the segments within the Preventative and Predictive Maintenance Program. In an effort to achieve greater productivity, Toronto Hydro has adjusted maintenance tasks and frequencies that are based in RCM and Condition-based Maintenance principles. Examples of these adjustments include:

- standardizing station maintenance cycles at four years wherever possible to minimize the need for multiple equipment outages (and significant switching resources), enable bundling of maintenance work, and minimize the need for multiple trips to particular sites;
- implementing “find and fix” protocols in which crews that identify minor deficiencies with assets are expected to address the deficiencies, which include lubricating components, replacing nomenclature, replacing faulted circuit indicators, replacing sump pumps, clearing drains, caulking ducts and roof slabs, and addressing missing or defective guy guards, pole ground wire, locks, hinges or handles by replacing them onsite as opposed to only logging the deficiencies for the Corrective Maintenance Program;
- issuing longer-term inspection maintenance contracts to third party service providers that result in reductions to unit costs and increase service quality levels over time; and
- introducing new tools or making greater use of technology such as Cable Diagnostic Testing, Infrared Thermography, Electronic Maintenance Sheets, Furan Sampling, Doble Testing, Dissolved Gas Testing, Online Partial Discharge Testing, Ultrasonic Testing and Enhanced Battery Testing.

The following sections describe and justify each of the ten segments that make up the Preventative and Predictive Maintenance program.

1 **3. OVERHEAD LINE PATROLS AND POLE INSPECTIONS SEGMENT**

2 Toronto Hydro conducts Overhead Line Patrols to inspect the more than 4,100 kilometres
3 of primary and 10,900 kilometres of secondary lines that make up the overhead
4 distribution system. The inspections cover all overhead distribution equipment including
5 pole-mounted transformers, conductors, lightning arrestors, insulators, poles, switches,
6 and other peripheral attachments. Approximately 8,400 overhead switches, 31,000
7 overhead transformers, and 135,000 poles are currently being inspected annually through
8 Line Patrols.

9
10 In addition to Line Patrols, Toronto Hydro also conducts dedicated Pole Inspections and
11 treatments on wood poles. Wood poles installed in the distribution system range in size
12 from 30 to 55 feet, with a typical height of 40 feet. The most widely used wood species
13 in the distribution system are Red Pine, Jack Pine and Western Red Cedar. All
14 distribution poles are either butt or full length treated against rot.

15
16 As illustrated in Figure 1 below, Overhead Line Patrols are designed to identify
17 deficiencies that are visible to the naked eye, such as leaking transformers, loose or
18 broken attachments (e.g., cross-arms, insulator brackets), and damaged poles, as well as
19 those that can be identified through infrared thermography. This technology identifies
20 thermal anomalies, such as the 60°C increase in temperature at the secondary connection
21 point of the pole-mounted transformer in Figure 1. If undetected and not addressed, such
22 a deficiency can lead to a failure of the connection over time and result in safety and
23 environmental risks due to arcing, which can lead to a transformer fire and rupture of the
24 oil tank. The Institute of Electrical and Electronics Engineers (“IEEE”), American
25 National Standards Institute (“ANSI”) and the International Electrotechnical Commission
26 (“IEC”) all publish standard temperature ratings for assets which are used to determine if
27 an electrical component has a temperature above the recommended value. Thermography

1 is an accepted and an encouraged practice in the utility industry as evidenced by the
2 National Fire Protection Association's *NFPA 70B: Recommended Practice for Electrical*
3 *Equipment Maintenance*.¹



4 **Figure 1: Secondary connection on pole-mounted transformer (Left) with an**
5 **infrared thermography image of the same asset denoting a hot spot at A1 (Right)**

6 Line Patrols are conducted annually on primary conductors and equipment, and every
7 three years on secondary lines, in compliance with the Ontario Energy Board's ("OEB")
8 Distribution System Code's Minimum Inspection Requirements (Appendix C).²
9 Beginning in 2015, Line Patrols will also visually inspect assets that were formerly
10 considered to be part of the streetlighting system.³

11

¹ National Fire Protection Association, *NFPA 70B: Recommended Practice for Electrical Equipment Maintenance*, (2013 Edition) (Simcoe: National Fire Protection Association, 2013).

² Ontario Energy Board, *Distribution System Code*, (Toronto: Ontario Energy Board, 2013), at Appendix C ["DSC"].

³ As discussed in Exhibit 2A, Tab 5, Schedule 1, Toronto Hydro proposes to allocate a portion of the revenue received by TH Energy from the City of Toronto for street lighting maintenance and operation to exactly offset the revenue requirement impacts arising from the transfer. Consequently, there is no overall change to the Base Revenue requirement for 2015 as a result of these assets being transferred into the utility's rate base.

1 The dedicated Wood Pole Inspection activity is conducted on a ten-year cycle and
2 involves a visual assessment of each pole, and a sounding test using a hammer to check
3 for internal cavities, which are an indication of an infested or internally decayed pole.
4 Based upon the results from this assessment, additional steps may be taken, which
5 include one or more of the following:

- 6 • a bore test, using a 12mm diameter bit to drill into the pole, and assess the
7 condition of the shavings from the interior;
- 8 • a resistograph test, using a 2mm diameter needle drill bit and an electronic
9 resistance measurement device to drill into the pole to determine: the presence of
10 wood decay, stages of rot, and hollow areas;
- 11 • treatment using a boron glass rod or copper-boron glass rod wood preservative;
- 12 • treatment using an external copper naphthenate wrap; and
- 13 • treatment using an internal fumigant.

14
15 Many of Toronto Hydro's wood poles and other assets that make up the overhead
16 distribution system are approaching their end-of-life. For example the expected useful
17 life of a:

- 18 • wood pole is 45 years and approximately 31% of poles will exceed 45 years by
19 2015;
- 20 • overhead switch is 45 years and approximately 33% of switches will exceed 45
21 years by 2015; and
- 22 • pole-mounted transformer is 40 years and approximately 24% will exceed 40
23 years by 2015.

24
25 For wood poles, the primary indicator of health and remaining life is mechanical strength,
26 given that the main function of poles is to act as support structures. As a natural material,
27 a wood pole undergoes a different degradation process than most other distribution
28 assets. The degradation processes are primarily biological and accumulate with age.

They consist of insect infestation, moisture ingress, and bird or fungi attacks, which result in wood decay. Decay causes a wood pole to lose its strength and functionality, which increases the risk of a structural failure. Poles, which often support and withstand significant static loads such as transformer banks and conductors, and dynamic loads such as high winds, typically fail with the onset of age and the loss of structural strength.

Toronto Hydro utilizes the information gathered from pole inspections to assess the overall condition of its wood poles. Asset Condition Assessment (“ACA”) results indicate that approximately 11% of the wood pole population are in poor or very poor condition and require replacement. Figure 2 illustrates the ACA results.⁴

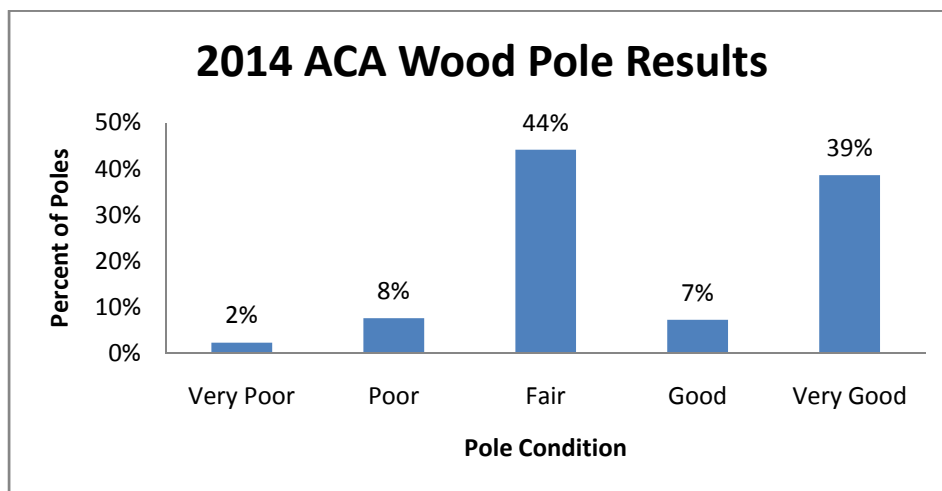


Figure 2: 2014 ACA for Wood Poles

Overhead Line Patrols and Pole Inspections serve to assess system conditions and identify deficiencies that can arise on overhead lines as a result of aging assets, exposure to weather, animals, trees, or other elements. Condition and deficiency information that is gathered during these activities is utilized to prioritize capital and corrective

⁴ For more information about the ACA, refer to Exhibit 2B, Section D, Appendix A.

1 maintenance work such that public and employee safety, environmental, system
2 reliability, and financial risks can be mitigated. In the case of pole treatments, activities
3 are undertaken to extend the life of the pole and mitigate the risk of decay.

4
5 In 2013, Toronto Hydro identified over 2,400 deficiencies during Line Patrols.
6 Deficiencies identified include loose or deteriorated connections, missing guy guards,
7 tracking insulators, rusted equipment, oil leaks, vegetation interference, damaged
8 conductors and conductor splices. Identifying these conditions and addressing them
9 reduces the likelihood of a component failure and the associated risks. For example, an
10 aging conductor splice that fails could result in a live conductor falling to the ground,
11 creating a safety risk to the public and Toronto Hydro employees, and causing a power
12 interruption that may impact hundreds of customers. Thermography mitigates this risk as
13 it enables Toronto Hydro to identify deficiencies in splices.

14
15 Dedicated Wood Pole Inspections identify poles that have lost their mechanical strength
16 and are likely to fail, and possibly collapse to the ground, if they remain on the system.
17 As noted above, and further illustrated in Figures 3-7 below, deficiencies such as internal
18 and external rot, excessive cracking, and infestation are common causes of failure.
19 During the 2011-2013 period, Toronto Hydro identified on average over 80 danger poles
20 annually.



Figure 3: Internal rot at base of a pole



Figure 4: External rot at base of a pole



Figure 5 : Large crack along pole length



Figure 6: Woodpecker hole on a pole



1 **Figure 7: Infestation**

2 Wood poles are found predominantly along sidewalks, roadways, and other areas of high
3 pedestrian and vehicular traffic. Without routine inspection, there is an unacceptable risk
4 that poles and their attachments could collapse onto sidewalks, roadways, and even
5 residences as shown in Figure 8 below. The collapse of a pole can also cause oil spills
6 from ruptured transformer tanks, electrical arcs, flashovers, and fires, which can result in
7 environmental risks and safety risks to the public and Toronto Hydro employees.
8 Minimizing the likelihood of a pole failure is expected to mitigate these unacceptable
9 risks.



1 **Figure 8: Fallen pole due to rotten base**

2 In 2013, there were a total of 252 incidents of overhead asset failures (excluding major
3 event days) that impacted the system. These failures were primarily attributed to
4 overhead switches, transformers, conductors, insulators, and poles. These incidents
5 resulted in over 131,000 customer interruptions and over 102,000 customer hours of
6 interruption. In 2011 and 2012, Toronto Hydro experienced 299 and 218 outage
7 incidents respectively from overhead assets. Line Patrols and Pole Inspection activities
8 are in place to identify deficiencies that if left unaddressed may lead to incidents that
9 impact system reliability.

10

11 In addition to mitigating public safety, environmental, and system reliability risks, the
12 Pole Inspection activity, and in particular pole treatments such as the application of boron
13 rods, copper naphthenate wraps, and internal fumigant, extend the life of poles and allow

for a more efficient and structured capital pole replacement program. During the 2011-2013 period, Toronto Hydro treated approximately 29% of all poles inspected.

3.1. Segment Costs

The following table contains the historic and planned expenditures for this segment.

Table 3: Historical and Forecasted Segment Spending (\$ Millions)

Total Spending	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
	0.3	0.4	0.4	0.5	0.7

Historic expenditures during the 2011-2013 period for Overhead Line Patrols and Pole Inspections were relatively consistent from one year to the next. An average of 9,000 poles were inspected annually during this period. In 2014, expenditures are forecasted to rise as a result of: (1) an increase in wood pole inspections to 10,000 to maintain a ten-year cycle; and (2) expanded usage of infrared thermography as part of the Line Patrol program.

3.2. Test Year Segment Costs

In 2015, expenditures for Overhead Line Patrols and Pole Inspections are expected to increase from \$0.5 to \$0.7 million due to the addition of patrols and inspections of assets that were formerly serving the street lighting system in Toronto.⁵ The expenditures are expected to enable Toronto Hydro to identify deficiencies on overhead lines assets and address the deficiencies through capital and corrective maintenance activities. Currently, approximately 44% of wood poles have been assessed to be in “fair” condition and these poles are expected to deteriorate to “poor” condition in the coming years. As a result of this and the fact that 31% of Toronto Hydro’s poles will have surpassed their expected

⁵ As discussed in Exhibit 2A, Tab 5, Schedule 1, Toronto Hydro proposes to allocate a portion of the revenue received by TH Energy from the City of Toronto for street lighting maintenance and operation to exactly offset the revenue requirement impacts arising from the transfer. Consequently, there is no overall change to the Base Revenue requirement for 2015 as a result of these assets being transferred into the utility’s rate base.

1 life spans by 2015, Line Patrol and Pole Inspection expenditures are critical to mitigating
2 the risk of asset failures and associated public safety, system, reliability, environmental,
3 and financial risks.

4 5 6 **4. OVERHEAD SWITCH MAINTENANCE AND INSULATOR WASHING**

7 This segment entails two general sets of maintenance activities on the overhead
8 distribution system:

- 9 (1) maintenance of overhead switches; and
10 (2) washing of porcelain insulators.

11 12 **4.1. Overhead Switches**

13 Overhead switches are typically installed on the main (or trunk) portion of feeders and
14 subdivide feeders into smaller portions, known as line sections. Switches are also used
15 for interconnections, or tie points, between different feeders. The practice of breaking
16 feeders into sections, which is referred to as “sectionalizing” a feeder, and tying feeders
17 together, serves two main purposes. First, in an outage situation, where the station
18 breaker has opened due to a fault on a distribution line emanating from the station, the
19 faulted line section can be isolated by opening and closing appropriate switches. This
20 isolates the faulted line section from the system, allowing re-energization of the feeder
21 and restoration of power to customers that are not directly fed by the faulted line section.
22 Second, in situations where load needs to be removed from a particular feeder due to
23 maintenance or capital work, switches at tie points can be opened or closed to supply
24 power to customers from an alternate feeder.

25
26 Toronto Hydro maintains overhead switches on a three-year cycle. There are three main
27 types of switches that are maintained in Toronto Hydro’s distribution system:

- **Supervisory Control and Data Acquisition (SCADA) Switches (or SCADA-Mate Switches):** These switches are motorized, and can be operated remotely by the Control Room via wireless communication, or operated locally by field crews. To enable communication and remote operation during a system failure, the switches and related equipment utilize a battery system that is capable of providing power for switch operation and communication. This switch's insulators are made of polymer, and the insulation and arc quenching medium is Sulphur Hexafluoride ("SF₆") gas in a sealed unit. Maintenance of SCADA switches involves verifying the switch's remote and local operation along with lubrication of the pivot points on the visible air-gap isolation mechanism. It also includes battery replacements for the switch and repeater radio (in accordance with manufacturer's recommendations), and Remote Terminal Unit ("RTU") testing to verify proper communication with the Control Room. Figure 9 below shows a typical SCADA switch.

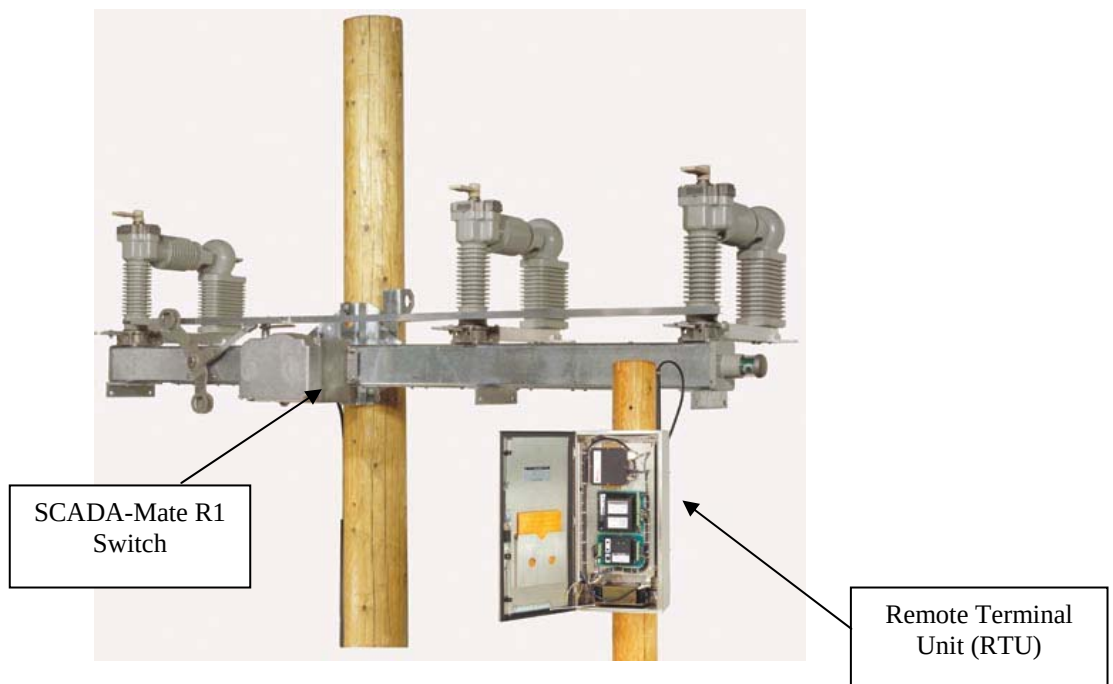


Figure 9: SCADA-Mate R1 Switch

- **Three Phase Gang-Operated Switches:** These switches are found throughout Toronto Hydro's overhead system and unlike the SCADA switches, are not capable of remote operation. The vast majority are manually operable at the physical switch location, while some have motorized controls. The insulation medium for these switches is air, and the insulators are made of porcelain. The scope of work to maintain these switches involves verifying correct blade alignment, blade penetration, travel stops, arc interrupter operation, and mechanical operation. The contacts are cleaned and greased and the switch is tested for correct operation. Figure 10 below shows a Gang-Operated switch.



Figure 10: Manual Gang-Operated Switch

- **Single Phase Porcelain In-Line Disconnect Switches:** Single Phase 600 amp (A) Porcelain Switches are found on the trunk portion of 27.6kV feeders where they were previously installed as a more cost-effective alternative to manual

1 ganged switches. While sometimes installed on all three phases at a given
2 location, they are only operable one phase (or switch) at a time, using a live line
3 tool such as a hot stick. Maintenance involves a visual inspection of the switch
4 for any corrosion on the switch blades, and any cracks on the porcelain insulators.
5

6 In total, Toronto Hydro maintains approximately 2,400 overhead switches made up of
7 800 SCADA switches, 1,300 Three-Phase Gang Operated Switches; and 300 Single
8 Phase 600A Porcelain Switches. Beginning in 2015, Toronto Hydro plans to also verify
9 the integrity and function of surge arresters connected to overhead switches, and to
10 replace units as required.
11

12 **4.2. Insulator Washing**

13 Conductors and switches that are used on the overhead distribution system have
14 historically been attached to poles and structural infrastructure using porcelain insulators.
15 Porcelain insulators possess a high dielectric strength and good mechanical properties,
16 including hardness and resistance to chemical erosion and thermal shock. However,
17 porcelain has a poor ability to resist contamination build-up, which causes tracking (i.e.,
18 leakage of electricity across the insulator). The accumulation of dirt and salt, combined
19 with moisture (during misty or foggy days), reduces the effective insulation levels and
20 can lead to insulator tracking, flashover and potential pole fires.
21

22 More than half of Toronto Hydro's overhead distribution system utilizes porcelain
23 insulators. This equates to approximately 70,000 pole locations that are vulnerable to
24 contamination building up on insulators. Thousands of these locations are at an increased
25 risk as they are close to industrial areas, adjacent to busy arterial roads and highways
26 such as the 401, 400, 427, and the Don Valley, Allen, and Gardner Expressways, where
27 salt that has been used to melt snow or ice in the winter months becomes airborne
28 through "salt spray" and deposits on the insulators. To mitigate the risk of contamination

- 1 and insulator tracking, insulators at the highest risk locations are washed twice a year.
2 Insulator washing utilizes a high-pressure intermittent water jet to remove contaminants.
3 Washing is performed while lines are energized. Figure 11 shows an example of a
4 porcelain insulator being washed.



5 **Figure 11: Porcelain Insulator Washed using a High Pressure Water Jet**

- 6 As Toronto Hydro's capital program replaces porcelain insulators with polymer
7 insulators,⁶ the need for insulator washing is expected to diminish, as polymer insulators
8 are hydrophobic, and are not susceptible to the same failure mode due to contamination.
9 However, given the high proportion of insulators on the system that are still porcelain, the
10 need will not diminish appreciably in the short-term and continued insulator washing is
11 expected to be required over the next five years.

⁶ Exhibit 2B, E7.6

Overhead Switch Maintenance and Insulator Washing serve to mitigate a wide variety of public and employee safety, system reliability, and financial risks. Beginning with Switch Maintenance and employee safety, manual switching is a common and high risk activity undertaken by Toronto Hydro crews. Switches that are not regularly maintained can be difficult to operate and can lead to strains and injuries for crew members. Regular maintenance enables the detection and prediction of common failure modes. One such mode is the failure of switch's porcelain insulators. Figure 12 illustrates a Porcelain (In-Line Disconnect) Switch where part of the porcelain insulator has broken off. Porcelain switches pose high safety risks due to their susceptibility to contamination build-up and electrical tracking, which can lead to cracking and result in broken shards falling from installations mounted as high as 50 feet (i.e., over 15 metres), posing a safety risk to employees or members of the public below.

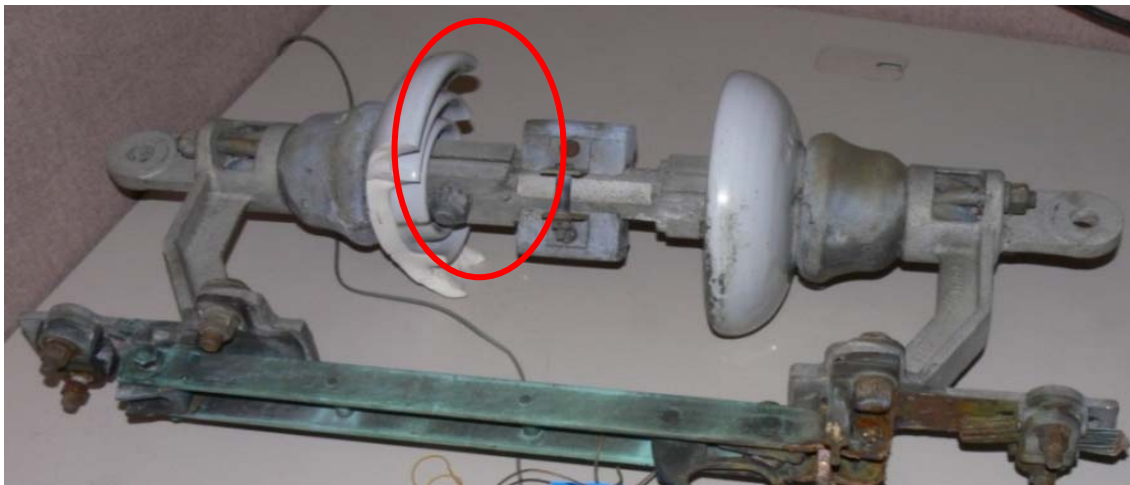
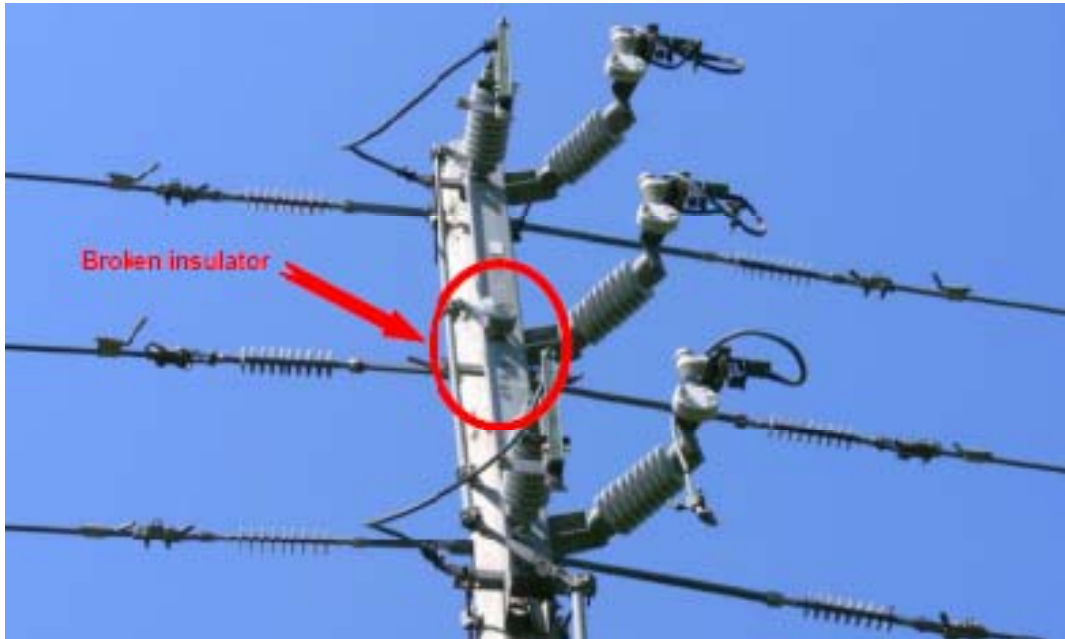


Figure 12: Porcelain Insulation Failure on a Switch

Figure 13 below shows a picture of a switch installation where the center-phase insulator broke off entirely and fell to the ground.



1 **Figure 13: Insulator Failure on a Gang-Operated Switch**

2 A second common failure mode, which is illustrated in Figure 14 below, is corrosion of
3 the metal blades. This naturally occurs from contaminants such as road salt and water
4 settling on the switch blades. It can result in excessive heating of the blade and over
5 time, can lead to the blade failing to conduct electricity. Contaminants and corrosion
6 present on a switch blade during a load break operation may also cause the electrical arc
7 to elongate, which causes additional damage to the blade and can lead to blade failure.
8 Associated safety risks caused by corrosion include burns from an arc-flash and
9 overexertion injuries to an employee, if a switch requires a significant amount of force to
10 operate.

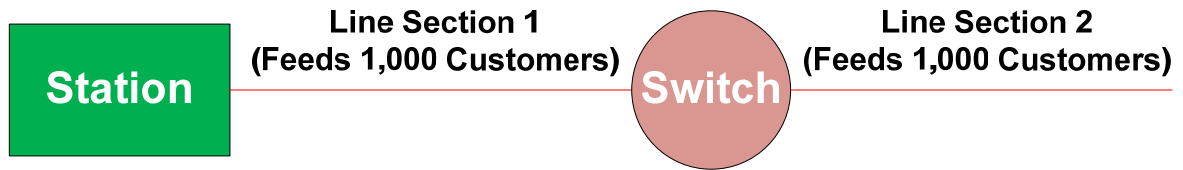


1 **Figure 14: Corrosion of Switch Blade**

2 Other common failure modes include switch seizure – due to the drying out of
3 lubrication, excessive arcing due to the misalignment of blades, and in the case of
4 SCADA switches, failure of batteries – all of which can lead to switch malfunction, and
5 pose a risk of injury to Toronto Hydro employees. These deficiencies are addressed by
6 Overhead Switch Maintenance activities such as identifying and correcting deteriorated
7 insulators and corroded switch blades, ensuring blades are properly aligned, lubricating
8 switches, and replacing batteries proactively.

9
10 From a system reliability perspective, reducing the likelihood of switch failures can
11 reduce the number of customer interruptions and customer hours of interruptions.
12 Switches are designed to allow line sections to be isolated from the distribution system
13 when a fault occurs. They can also be used to isolate a line section for the purposes of
14 undertaking planned work. Their function and their impact on system reliability can be
15 illustrated using the example in Figure 15 below.

16



1 **Figure 15: Example of Overhead Switch Impact on System Reliability**

2 Assume a feeder that serves 2,000 customers is divided into two line sections using a
3 switch, with each section serving 1,000 customers. When a fault occurs on Line Section
4 2, the switch can be operated to isolate that line section such that the station can continue
5 to supply the customers on Line Section 1. Without an operable switch, 2,000 customer
6 interruptions would result as the feeder would be isolated in its entirety from the station.
7 The presence of the switch has the potential to reduce that number to 1,000 customer
8 interruptions as only Line Section 2 would be isolated. Assuming that in this theoretical
9 example a fault is equally likely to occur on Line Section 1 or Line Section 2, an operable
10 switch would improve system reliability by 33%.

11
12 Over the 2011-2013 period, the distribution system averaged 58 power interruptions due
13 to switch failures annually, which resulted in an average of 44,300 customer interruptions
14 and 22,700 customer hours of interruption annually.

15
16 Removing contamination through insulator washing reduces the risk of electrical
17 tracking, pole fires and insulator failures. From a safety perspective, pole fires and
18 insulator failures in Toronto's dense urban areas can cause injury to individuals at ground
19 level. The primary failure mode for porcelain equipment is cracking, which may start as
20 a hairline crack, but has the potential to lead to a catastrophic failure with shards of debris
21 falling to the ground that could strike anyone in the vicinity. Figure 16 below shows a

- 1 close-up view of damage to a porcelain insulator that has been caused by electrical
2 tracking over time along the surface.



3 **Figure 16: Close-up of Damaged Porcelain Insulator showing tracking**

4 From a system reliability perspective, insulator failures, depending on where they occur
5 on a feeder, will cause a power interruption for tens to possibly thousands of customers.
6 During the 2011-2013 period, Toronto Hydro experienced a high of 16 pole fires in 2011
7 and a low of 3 pole fires in 2013. A pole fire on September 5, 2012, caused by a
8 defective porcelain insulator resulted in 4,030 customers impacted and 2,506 customer
9 hours interrupted. More recently, a contaminated porcelain insulator caused a pole fire
10 on July 20, 2013; this incident resulted in 6,979 customers impacted and 7,199 customer
11 hours interrupted.

12

13 From a financial perspective, pole fires due to insulator tracking necessitate emergency
14 response, equipment replacement costs, and in some instances, the payment of damage
15 claims. Emergency response and equipment replacement costs can exceed \$10,000,
16 especially when transformers and switches must be replaced in addition to poles.

1 Damage claims associated with pole fires can add thousands of dollars more to the cost of
2 the failure.

3
4 Given the public and employee safety, system reliability, and financial risks associated
5 with contaminated porcelain insulators, routine Insulator Washing is a necessary and
6 prudent means of reducing the likelihood of contingencies resulting from debris build-up
7 on insulators. Reductions in the amount of insulator washing could result in increased
8 incidents of insulator tracking and poles fires. In the first half of 2014 alone, 14 pole
9 fires resulted in 25,463 customer interruptions and 19,358 customer hours of interruption.
10 A contributing factor to these events was the particularly harsh winter and the quantity of
11 salt that was used during the winter months by road authorities. Nevertheless, these
12 incidents followed 2013, a year in which Insulator Washing accomplishments were below
13 historic levels.

14 15 **4.3. Segment Costs**

16 The following table contains the historic and planned expenditures for this segment.

17
18 **Table 4: Historical and Forecasted Segment Spending (\$ Millions)**

Total Spending	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
	0.8	1.2	1.0	1.5	2.0

19 Historic expenditures during the 2011-2013 period fluctuated as a result of fluctuations in
20 the number switches maintained and insulators washed, and fluctuations in unit costs.

21 The number of switches maintained has increased from a low of 484 units in 2011 to a
22 high of 799 units in 2013. The number of pole locations that received insulator washing
23 decreased from a high of approximately 8,400 locations in 2011 to a low of
24 approximately 1,450 locations in 2013. Expenditures in 2014 are planned to increase

1 driven by the re-introduction of switch maintenance on 600 A Porcelain Switches and the
2 need to maintain a greater number of Three-Phase Gang-Operated Switches to achieve a
3 three-year maintenance cycle.

4 5 **4.4. Test Year Segment Costs**

6 Planned expenditures in 2015 are \$2.0 million, which is \$0.5 million greater than 2014
7 expenditures. This increase is driven predominantly by two factors. The first is an
8 increase in Insulator Washing from 3,000 planned units in 2014 to 9,500 in 2015 to
9 mitigate the risks posed by insulator contamination. The second is the addition of
10 lightning arrestor replacement to switch maintenance activities. Overall, the \$2.0 million
11 budget allows Toronto Hydro to maintain 2,400 switches on a three-year cycle and to
12 wash 4,750 of Toronto Hydro's 70,000 pole locations. These maintenance activities are
13 designed to address conditions that lead to common failure modes among overhead
14 switches and porcelain insulators, and to mitigate public and employee safety, financial
15 and system reliability risks.

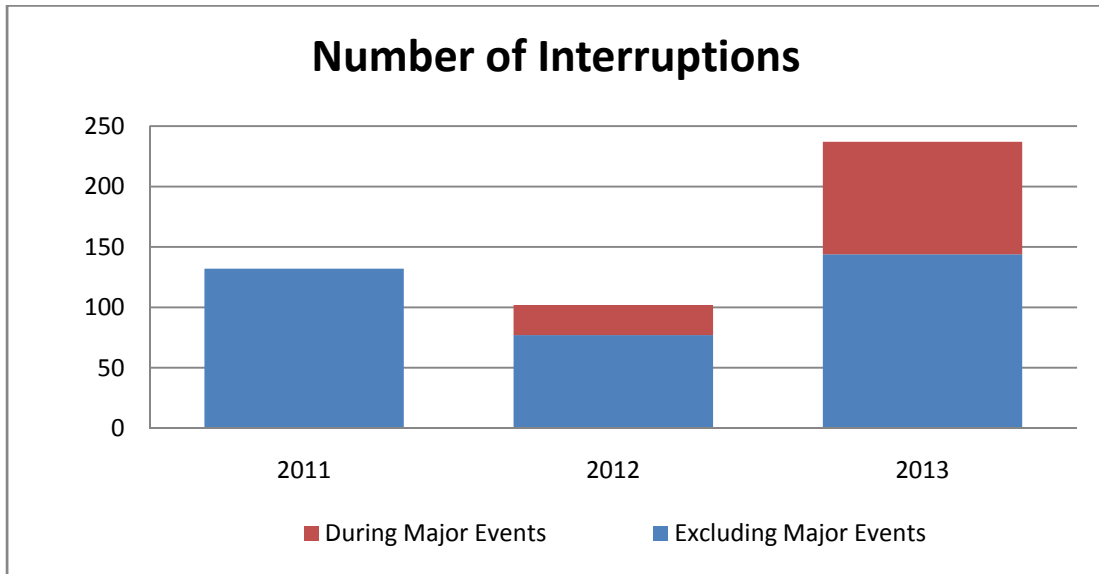
16 17 18 **5. VEGETATION MANAGEMENT SEGMENT**

19 Toronto Hydro's system contains 927 overhead primary feeders that extend for almost
20 4,200 circuit kilometres along Toronto's arterial thoroughfares, rights-of-way, and
21 residential streets. These feeders co-exist with the City of Toronto's mature and
22 abundant tree canopy, which includes 600,000 City-owned "street trees" and thousands
23 of trees located on customer properties. (In total, there are over 10 million trees in the
24 City of Toronto.) Over 125,000 of these street trees are immediately adjacent to primary
25 overhead feeders, and can potentially interfere with the safe and reliable distribution of
26 electricity.

1 Vegetation interference is one of the most common causes of power interruptions, as
2 overhead feeders are prone to tree branch contacts. Trees may make contact with
3 distribution feeders as a result of natural growth, or when severe weather causes branches
4 to break and fall into lines, or causes branches to bend and make intermittent contact.
5 Conductors on feeders can also naturally stretch and sag due to ice and snow build-up,
6 heavy loading or warm weather, bringing the lines closer to tree limbs. Branch contacts
7 with lines result in the tree creating a new path for current to travel, causing it to become
8 energized and posing a safety risk.

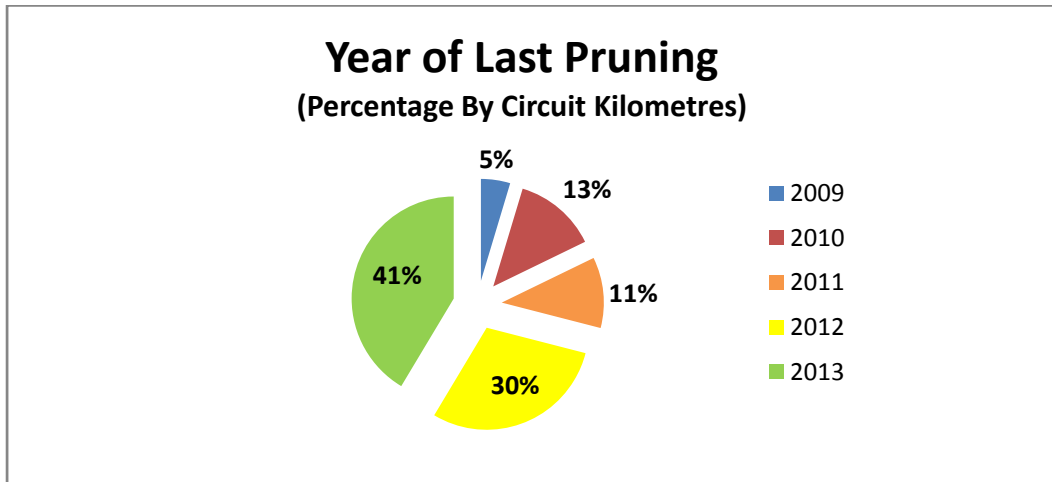
9
10 Tree-caused power interruptions have a significant impact on system reliability and are
11 second only to defective equipment as the leading cause of system outages. Statistics
12 from 2011-2013 show that tree contacts are responsible for approximately 120 power
13 interruptions a year, as shown in Figure 17 below, and cause approximately 125,000
14 customer interruptions and 150,000 customer hours of interruption annually. These
15 statistics exclude interruptions that occurred on major event days. During such days, the
16 distribution system is particularly vulnerable to tree contacts and costly tree damage.
17 When all interruptions are considered, trees account for 14% of all customer interruptions
18 and 21% of all customer hours of interruption.

19



1 **Figure 17: Number of power interruptions involving tree contacts**

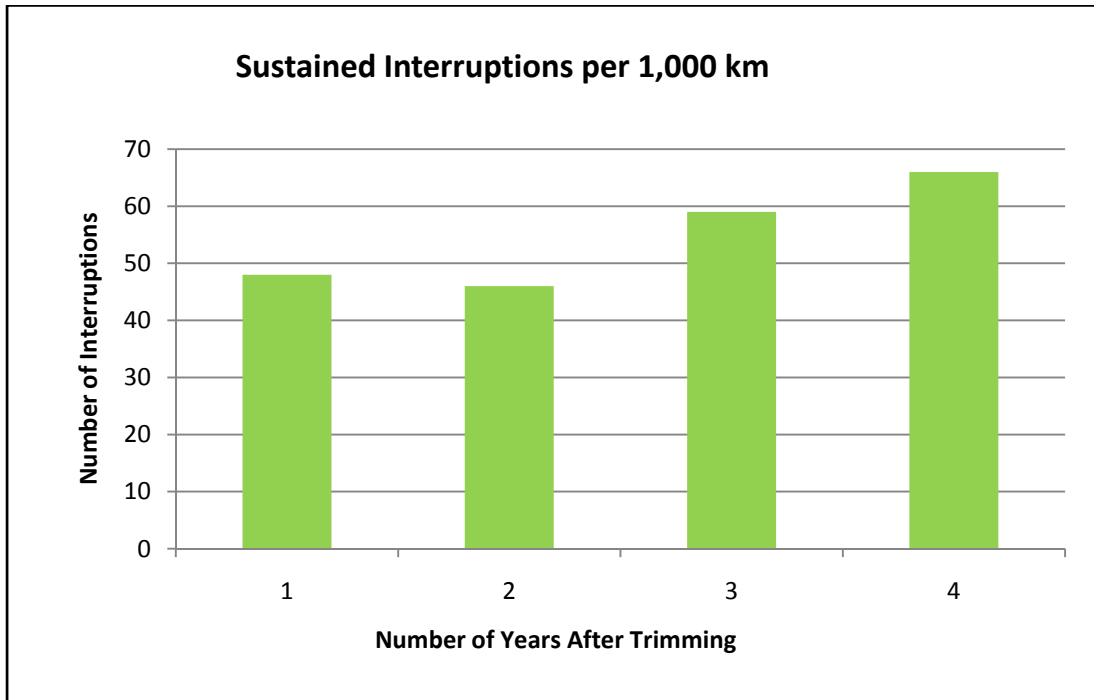
2 Vegetation Management mitigates the risk of vegetation interference by pruning trees
3 that are near Toronto Hydro's overhead feeders. Each year, Toronto Hydro identifies the
4 feeders that are in greatest need of tree pruning based on prioritization criteria that
5 include feeder reliability history, the number of customers supplied by each feeder, and
6 the amount of time that has elapsed since the trees surrounding the feeder were last
7 pruned. The prioritization results in trees surrounding feeders being pruned once every
8 two to five years, with the system average being approximately three years. On average,
9 Toronto Hydro pruned 1,565 circuit kilometres and almost 47,000 trees annually during
10 the 2011-2013 period. As a result, the state of Toronto Hydro's overhead distribution
11 system with respect to Vegetation Management is illustrated below.



1 **Figure 18: Historical Pruning (2009-2013)**

2 Although 41% of the system was pruned in 2013, 29% has not been pruned since 2011.
3 As discussed in more detail below, as more time passes since the last tree pruning
4 activities on a particular feeder, it becomes more likely that tree contacts will occur and
5 associated risks will arise. This increased likelihood raises a wide variety of risks
6 including system reliability, financial, and safety risks. These risks can be effectively
7 mitigated through tree trimming.

8
9 From a reliability standpoint, Figure 19 illustrates the number of vegetation-related
10 interruptions that can be expected relative to time elapsing since pruning and trimming
11 activities. An average feeder that is cleared after having experienced three to four years
12 of growth is expected to exhibit a reduction of approximately 20% to 40% in the number
13 of tree-caused interruptions.



1 **Figure 19: Expected number of tree-related interruptions.**

2 Vegetation Management is also a widely accepted means of effectively “storm-
3 hardening” a system and thus proactively mitigating storm damage and system reliability
4 risks. Storm hardening involves selectively removing portions of the tree canopy to
5 reduce the “sail effect” of branches during high winds and to reduce the likelihood that
6 broken branches will contact lines. More frequent tree pruning further reduces risks
7 posed by severe weather.

8

9 Toronto Hydro’s system is susceptible to severe weather and storm damage, as evidenced
10 by the three major events experienced between 2011 and 2013: (1) Hurricane Sandy on
11 October 29 and 30, 2012; (2) a major thunderstorm on July 8, 2013; and (3) a major ice
12 storm on December 21, 2013. In many cases, the effects of these storms continue well
13 after the storm has passed, as broken and weakened trees and tree limbs continue to pose
14 a threat to overhead lines until the next tree pruning date.

1
2 Given the increasing frequency of storms, and climate change studies that indicate
3 warmer year-round temperatures,⁷ Toronto Hydro plans to increase expenditures on
4 Vegetation Management activities to mitigate storm damage and system reliability risks.
5 From a financial perspective, increases in planned Vegetation Management are expected
6 to reduce reactive (e.g., corrective and emergency) expenditures. Toronto Hydro's
7 reactive expenditures during the 2011-2013 period included:

- 8 • an average of \$1.8 million per year on major event and storm damage restoration
9 expenditures (excluding the 2013 ice storm);
- 10 • an additional \$13 million for emergency response and reactive capital during the
11 aforementioned 2013 ice storm event; and
- 12 • \$1.6 million on customer demand and reactive tree pruning activities.

13
14 In total, over \$20 million was spent on reactive expenditures over the 2011-2013 period.
15 These expenditures, which largely relate to tree contacts and tree-caused damage,
16 illustrate the significance of the financial risks associated with tree growth and trees
17 located close to overhead distribution lines.

18
19 In addition to system reliability and financial risks, Vegetation Management serves to
20 mitigate safety risks. One set of safety risks is attributed to trees and vegetation that
21 grows or is blown into power lines. This vegetation can become energized, and in rare
22 situations, can cause fires or step and touch potential (flow of current through an
23 individual) risks to the general public. Another set of safety risks is caused by falling
24 branches or trees that bring energized conductors to the ground when they fall, which can
25 result in safety hazards to the public. Vegetation Management is expected to mitigate
26 these risks.

27

⁷ Refer to the report, entitled Future Impacts of Climate Change on Toronto Hydro's Distribution System,
at Exhibit 2B, E8.8, Appendix A.

1 Within Toronto, vegetation risks have been increasing in recent years due to invasive
2 species infestation such as the Emerald Ash Borer and the Asian Long-Horned Beetle.
3 Both these species compromise a tree's structural integrity and greatly increase the risk of
4 a branch or tree falling into overhead feeders. It is estimated that Toronto will lose
5 approximately 860,000 of its ash trees to the Emerald Ash Borer,⁸ while the Asian Long-
6 Horned Beetle poses a risk to 42% of all street trees.⁹ More frequent tree pruning is
7 expected to enable Toronto Hydro to mitigate the risks associated with invasive species
8 by removing the dead and dying tree limbs that they cause.

9
10 Planned Vegetation Management activities are executed by contractors with support from
11 Toronto Hydro's internal resources. Trees and branches are pruned according to
12 minimum clearance standards based on American National Standards Institute (ANSI)
13 A300 – Standard Practices for Trees, Shrubs and other Woody Plant Maintenance,¹⁰ and
14 the City of Toronto Forestry Pruning Guidelines. In addition to the minimum clearance
15 standards, Toronto Hydro considers other factors including but not limited to:

- 16 • species and growth patterns of a tree: fast-growing trees are trimmed more and
17 slow-growing trees are trimmed less;
- 18 • natural trimming practices: branches are pruned back to a natural point of growth
19 in the crown of the tree and leaders are “trained” (shaped) to grow away from the
20 lines;
- 21 • distance of major limbs that exhibit minimal growth, versus minor branches that
22 can exhibit aggressive growth;
- 23 • directional pruning practices: maintenance of tree shape and branch patterning;

⁸ City of Toronto, *Emerald Ash Borer in Toronto: Managing Public and Private Trees*, (Toronto: City of Toronto, 2013).

⁹ City of Toronto, *Trees Under Threat: The Asian Long-horned Beetle in Greater Toronto*, (Toronto: City of Toronto, 2014), online: City of Toronto
<<http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=f26fdada600f0410VgnVCM10000071d60f89RCRD&vgnextchannel=17f4cacb759e0410VgnVCM10000071d60f89RCRD>>.

¹⁰ American National Standards Institute, *American National Standard for Tree Care Operations — Tree, Shrub, and Other Woody Plant Maintenance — Standard Practices (Pruning)*, (A300 (Part 1)-2001) (Washington: American National Standards Institute, 2001).

- overall aesthetics and balance of the tree;
- removal of dead limbs; and
- storm hardening: select removal of branches within the canopy to minimize the possible effects of wind and severe weather, but maintain the overall tree appearance.

Toronto Hydro avoids the practice of “tree topping”, which is the indiscriminate removal of branches to reduce the size of the tree crown. As a result of this and the various aforementioned factors considered during trimming, Toronto Hydro mandates the use of trained Arborists for Vegetation Management activities. The personnel involved in tree pruning are certified Utility Arborists, with training, knowledge and certification in the practice of arboriculture.



Figure 20: Tree Trimming of an Overhead Feeder

5.1. Segment Costs

The following table contains the historic and planned expenditures for this segment.

1 **Table 5: Historical and Forecasted Segment Spending (\$ Millions)**

Total Spending	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
	2.5	2.5	2.8	2.6	4.4

/C

2 Historical spending for Vegetation Management has been relatively consistent between
3 2011 and 2014. The slight increase in 2013 is attributed to an increase in the number of
4 kilometres of line where trees were pruned.

5
6 **5.2. Test Year Segment Costs**

7 The increase in expenditures in 2015 is attributed to two factors: (1) an increase in
8 market prices provided by contractors; and (2) a need to increase accomplishments to
9 mitigate safety, system reliability and financial risks, especially during severe weather.

10
11 During the 2011-2013 period, Toronto Hydro had entered into an agreement with one
12 contractor to provide tree pruning services and this agreement expired in 2014.
13 Following a competitive tendering process, Toronto Hydro expects to award a new
14 contract in 2014 and forecasts a 16% increase in average unit costs (i.e., the cost to prune
15 trees on one circuit kilometre of line) as a result of increases in market prices. This
16 increase is reflected in the 2015 forecast.

17
18 Aside from an increase in unit costs described above, the 2015 expenditures are greater
19 than those in prior years due to plans to increase tree pruning accomplishments by
20 approximately 30% over historic averages and to “storm harden” the system. (During
21 2011 to 2013, Toronto Hydro pruned 46,726 trees on 1,565 circuit kilometres of line on
22 average each year.) More frequent vegetation management and storm-hardening
23 activities are expected to improve system reliability and reduce the damage sustained
24 during severe weather events.

25

1 **6. BELOW-GRADE EQUIPMENT MAINTENANCE SEGMENT**

2 This segment entails inspections and maintenance of underground vaults, cable chambers,
3 and the equipment that is housed within them. These structures, which are located
4 below-grade, are constructed out of reinforced or un-reinforced concrete, and house
5 transformers, switches, cables, and other electrical distribution equipment. Inspections
6 and maintenance activities are conducted on various types of below-grade structures
7 including network vaults, compact radial distribution (“CRD”) vaults, underground
8 residential distribution (“URD”) vaults, submersible vaults, and cable chambers.

9
10 Network vaults are primarily located in the downtown core of Toronto and were
11 constructed in the 1950s and 1960s. These vaults are the largest of the below-grade
12 structures, and house interconnected electrical equipment used for the secondary network
13 system that provides reliable supply to large and critical customers in the city’s dense
14 downtown core. There are four main electrical components that are housed within
15 network vaults: (1) the primary switch, which isolates the feed to the transformer; (2) the
16 transformer itself; (3) a network protector, which protects the transformer and the
17 primary side of the system from faults on the secondary side; and (4) a fuse panel, which
18 protects the cables feeding the secondary grid. The transformer and the network
19 protector are referred to as a network unit, an example of which is illustrated in Figure
20 21. Toronto Hydro owns 1,067 network vaults and 1,892 network units; approximately
21 7% of the network units are of the fibertop type, which is a very high-risk legacy asset.
22 The civil structure of network vaults is inspected on a six-month cycle and the electrical
23 assets are inspected annually; network protectors are also overhauled on a three-year
24 cycle.

/C



1 **Figure 21: A Network Unit**

2 The CRD and URD systems were constructed in the early 1990s and 2000s respectively.
3 CRD vaults were designed to be a less expensive alternative to network vaults due to a
4 simpler design, which lacks the supply redundancy that a network system provides. CRD
5 vaults typically supply small retail, apartment, and commercial office buildings. URD
6 vaults were used for 4kV to 13.8kV conversion projects and primarily power small
7 residential or commercial buildings. Toronto Hydro owns 690 CRD and URD vaults,
8 which are inspected annually.

9
10 Submersible vaults are small civil structures installed on the public road allowance, or
11 private property, and are used for residential electricity distribution. These vaults contain
12 transformers, switches, loop-through primary conductors, and secondary circuits. The

1 vaults are sized to accommodate a transformer and secondary connections only. They are
2 not sized for personnel to enter into. There are 9,990 submersible transformer vaults in
3 Toronto Hydro's distribution system. They are inspected on a three-year cycle. Figure
4 22 illustrates a submersible vault.



5 **Figure 22: A Network Unit**

6 Cable chambers are civil structures typically installed on the public road allowance, and
7 contain primary and secondary cables and cable splices, and in many cases, third party
8 installations such as Toronto Transit Commission ("TTC") power cables, television
9 cable, and phone lines. Cable chambers facilitate cable installation in underground ducts
10 and are found along the route length of underground feeders. Toronto Hydro owns
11 10,900 cable chambers, to be inspected on an eight-year maintenance cycle.

12

1 Below-Grade Equipment Maintenance, regardless of the type of vault or chamber,
2 includes visual inspections of the civil infrastructure and electrical equipment,
3 thermographic scans, and drainage and sump pump tests. Any oil testing that is required
4 to enable Toronto Hydro to comply with *PCB Regulations*¹¹ under the *Canadian*
5 *Environmental Protection Act, 1999*¹² is also undertaken as part of Below-Grade
6 Equipment Maintenance.

7
8 The average life of below-grade structures including network vaults, CRD and URD
9 vaults and submersible vaults is 60 years. The roofs of those structures however are
10 expected to last for only 25 years, due to greater exposure to the environment and
11 dynamic loads such as pedestrian and vehicular traffic. The equipment that is housed
12 within below-grade structures is expected to have an average life between 30 and 45
13 years depending on the type of equipment. Network protectors, in particular fibertop
14 types, have been linked to the cause of network vault fires in the past and have an average
15 useful life of 30 years. Approximately 74% of all fibertop units have already reached the
16 end of their expected-lives.

17
18 The ages of Toronto Hydro's vaults vary from the relatively new URD and CRD vaults to
19 the older network vaults in the downtown areas of the city. Approximately 60% of all
20 network vaults will reach their expected life within the next ten years, and approximately
21 80% of network vault roofs and 60% of all cable chamber roofs are already beyond their
22 useful life. The majority of URD vaults are less than 25 years old and all CRD vaults are
23 less than 15 years old. These vaults are less of a concern than the significantly older
24 network vault and cable chamber populations.

25
26 As below-grade structures age, the greatest concern becomes structural strength.
27 Structural deficiencies affecting vaults include degradation of concrete and corrosion of

¹¹ Canada SOR/2008-273. [*PCB Regulations*]

¹² S.C. 1999, c. 33. [*Environmental Protection Act*]

1 supports such as beams and rebar. Once degradation and corrosion sets in, conditions can
2 deteriorate rapidly and in many cases from one season to the next. Of particular concern
3 is the winter season when moisture and water enter in below-grade structures, freezes and
4 thaws, and carries with it salt that has been used at grade to melt ice and snow. Figures
5 23 to 27 depict structural deficiencies that are common in older vaults.



Figure 23: Vault Roof Exposed Rebar



Figure 24: Vault Wall Exposed Rebar



Figure 25: Corroded I-Beams

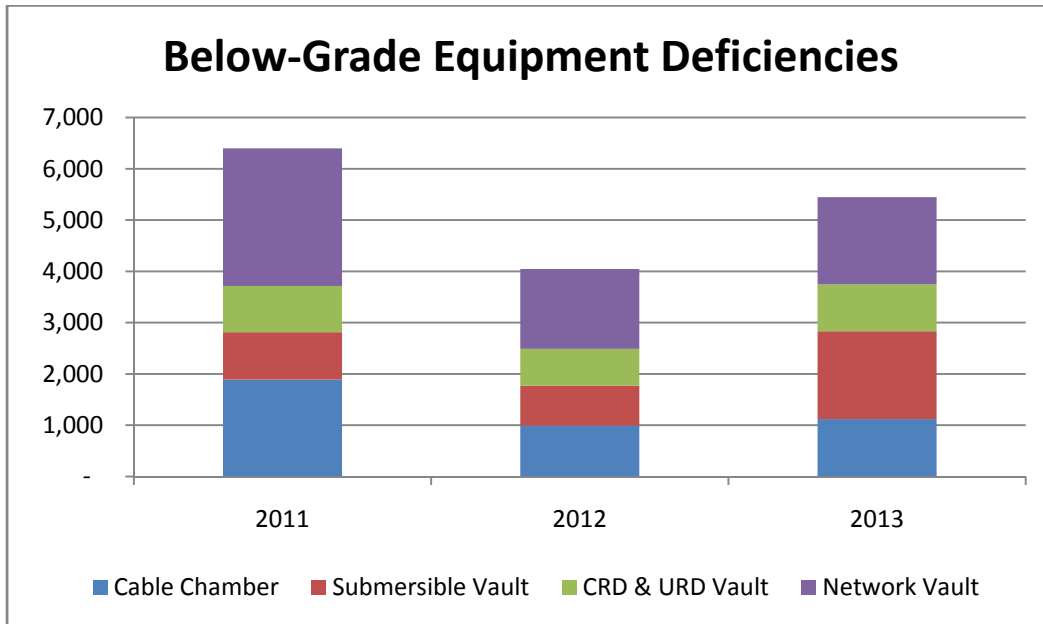


Figure 26: Cracked Vault Roof



1 **Figure 27: Cracked Vault Wall**

2 Below-Grade Equipment Maintenance mitigates the risks that deterioration of civil and
3 electrical assets pose, including public and employee safety, financial, environmental,
4 and system reliability risks. Toronto Hydro mitigates these risks by identifying
5 deficiencies in below-grade structures before they cause a failure and associated
6 consequences. As illustrated in Figure 28 below, Toronto Hydro has identified on
7 average over 5,000 deficiencies each year since 2011. Of those, 37% on average are in
8 network vaults and 25% in cable chambers.



1 **Figure 28: Below-Grade Equipment deficiencies identified between 2011 and 2013**

2 If not identified, and allowed to remain unaddressed, deficiencies can pose significant
3 public and employee safety risks. Below-grade structures are typically installed
4 underneath roadways, pedestrian walkways or in residential neighbourhoods. The
5 collapse of the vault roof exposes the public and employees to a fall hazard, or injury
6 from exposure to energized equipment. Furthermore, fires can occur at network vaults
7 with fibertop units; these can pose health risks to firefighters and other personnel that
8 would be involved in extinguishing the fire and restoring power, as fibertop units are
9 often connected to the secondary grid using asbestos-insulated lead covered (“AIRC”) secondary cables.

11
12 In addition to being structurally sound, vaults must be relatively clean, and must contain
13 appropriate nomenclature, functional lighting and drainage systems. If neglected, vaults
14 can result in safety risks to employees such as slipping and tripping hazards. Reductions
15 in inspections and maintenance can result in deficiencies such as exposed rebar, cracked

walls and roofs, corroded I-beams, excessive dirt and debris, and flooding existing undetected within structures. These deficiencies can increase the public and employee safety risks from the failure of the vault civil structure.

From a financial risk perspective, inspections and maintenance mitigate the risk of costly failures. For example, identifying a vault with significant dirt and debris, such as the one depicted in Figure 29, enables corrective action and reduces the risk that the debris will act as a catalyst for corrosion on assets (Figure 30), potentially resulting in an arc flash or fire.



Figure 29: Vault full of Dirt and Debris



Figure 30: Corrosion on top of a Transformer

When equipment failures occur, emergency response together with equipment replacements can result in expenditures that exceed tens of thousands of dollars. For example, an underground transformer replacement can approach \$100,000 and a structural rebuild of a vault can exceed \$100,000 and even approach \$1 million. These expenditures can often be mitigated through proactive maintenance activities.

In addition to safety and financial risks, Below-Grade Equipment Maintenance mitigates environmental risks. For example, inspections enable the early identification of corroded

1 equipment before the corrosion can cause an oil leak to develop, potentially washing into
2 a drainage system and causing an adverse effect on the environment. Figure 31 below
3 depicts an oil leak within a vault. This deficiency is addressed by cleaning activities as
4 shown in Figure 32.



Figure 31: Oil Leak at the bottom of the Transformer



Figure 32: Crews Cleaning a Network Vault after a Network Transformer Leaked Oil

5 Maintenance also includes transformer oil sampling and testing to identify transformers
6 that are contaminated with PCBs. Environment Canada's *PCB Regulations* require
7 Toronto Hydro to identify and dispose of transformer oil that is PCB contaminated.
8 Below-Grade Equipment Maintenance enables Toronto Hydro to test these units, mitigate
9 environmental risks, and comply with regulations.

10

11 In addition to the value provided by mitigating the aforementioned safety, financial, and
12 environmental risks, Below-Grade Equipment Maintenance provides value to customers
13 by mitigating system reliability risks associated with civil infrastructure or electrical

1 equipment failures. In the past, failures on aging network protector units, particularly
2 legacy fibertop units, have resulted in significant system reliability impacts. A network
3 protector failure and subsequent fire at a network vault requires power system controllers
4 to interrupt between two and six feeders, which can leave several city blocks without
5 power for up to four hours. This procedure is necessary to enable fire fighters to safely
6 extinguish a fire. After the fire is extinguished, service may continue to be affected to
7 customers supplied from the vault for more than 12 additional hours. Once service is
8 restored, the process of replacing equipment and possibly rebuilding the vault proceeds at
9 a significant incremental cost.

10
11 An example of a recent vault fire attributed to a network protector failure occurred on
12 January 28, 2013 at 95 St. Clair Avenue West, which resulted in a 49-hour outage for
13 customers in the building. The damage from that failure, depicted in Figure 33, resulted
14 in outages to 16 high rise buildings ranging from one to 16 hours in length as two feeders
15 needed to be interrupted to enable fire fighters to put out the fire. Following the fire, all
16 equipment inside the vault was replaced and the entire civil structure rebuilt. The process
17 of designing and rebuilding the vault took just over one year.



18 **Figure 33: Damage from the 95 St. Clair Network Vault Fire**

1 Other examples include failures and subsequent fires on March 24, 2007 at Richmond
2 and Bay Streets and on June 21, 2010 at Erskine Avenue. The 2007 incident interrupted
3 over 70 MVA of load in the heart of downtown Toronto for eight hours. The 2010
4 incident interrupted over 30 MVA for over four hours. Figures 34 to 38 contain pictures
5 from those events.



Figure 34: Extinguishing the fire.



Figure 35: Asbestos clean after the fire.



Figure 36: Damaged network unit and burned AILC cables. (March 24, 2007)



Figure 37: (Left) Vault 4557 with roof slabs off, signs of heavy smoke apparent in vault. (Right) damaged Fibertop Network Unit. (June 1, 2010)



Figure 38: Vault fire on Erskine Avenue, near Yonge and Eglinton (June 1, 2010)

2 Since increasing the frequency and scope of maintenance on network protectors (e.g.,
3 protector overhauls) in 2011 and 2012, Toronto Hydro has experienced a reduction in the
4 number of catastrophic failures. However, the recent failure in January of 2013 serves as
5 evidence of the risks that remain and the importance of continuing to execute
6 maintenance on a regular basis.

7

In addition to network vaults, failures can occur in other below grade structures. For example, in September of 2013, a faulted cable inside a cable chamber caused the chamber's lid to blow off, exposing nearby members of the public to a safety risk. This incident resulted in 3,121 customers being interrupted and 10,096 customer hours of interruption. Failures also occur on CRD, URD, and submersible vaults and these failures can increase public safety risks and system reliability risks (e.g., interruptions to tens and even hundreds of customers).

The risk of equipment failure and the related system reliability risks are not only mitigated by the visual inspections, but also by thermographic scanning. Thermographic, or infrared scanning, identifies thermal anomalies in the equipment being scanned, and is an effective predictor of equipment failure. Figure 39 below shows an example of a thermographic photograph of cable splices inside a cable chamber. The deficiency, evidenced by a 36°C increase in temperature on one of the splices, is not visually evident (left); however, this defect is easily identified using the infrared image (right), and can be corrected before leading to a failure.



Figure 39: Cables inside a cable chamber (left) with a with a thermographic image of the same (right)

6.1. Segment Costs

The following table contains the historic and planned expenditures for this segment.

Table 6: Historical and Forecasted Segment Spending (\$ Millions)

Total Spending	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
	1.7	2.2	2.2	2.1	2.8

Aside from the 2011 figure, historic expenditures have been relatively consistent. The increase in 2012 over 2011 is attributed to two factors. The first factor is an increase in the number of cable chambers inspected. Only 341 cable chambers were inspected in 2011 as compared to 962 in 2012. (At the time, approximately 1,100 cable chamber inspections were needed annually to achieve the maintenance cycle.) The second factor was an increase in maintenance of network protectors to mitigate the risk of failure and vault fires. In 2012, an annual fibertop protector cleaning activity was introduced. In addition, the number of protector overhauls increased from 346 in 2011 to 490 in 2012. (At the time, in excess of 500 network protectors needed to be overhauled annually to achieve the maintenance cycle.)

6.2. Test Year Segment Costs

In 2015, planned expenditures are \$2.8 million, which is \$0.7 million greater than the 2014 forecast. This increase is attributed to three drivers. One driver is an increasing number of cable chamber inspections. The inspection cycle is moving from a ten-year cycle to an eight-year cycle, resulting in the need to execute 1,350 cable chamber inspections in 2015 as opposed to 1,100 in 2014. The second driver is additional oil testing to identify transformers that exceed allowable PCB concentrations pursuant to Environment Canada's *PCB Regulations*. A third driver is increases in the number of submersible vaults inspected. Transformers in these vaults have shown increasing rates of corrosion and oil leaks and Toronto Hydro has supplemented cyclical inspections with

1 condition-based inspection frequencies for units that may be approaching the end of their
2 lives.

3
4 Overall, the 2015 expenditure level allows Toronto Hydro to conduct various
5 maintenance activities on cycles that range from six months to eight years on over 21,000
6 below-grade structures and the equipment that they house. These activities are expected
7 to identify over 5,000 deficiencies in 2015. Identifying deficiencies proactively helps to
8 enable Toronto Hydro to prevent catastrophic failures at below-grade structure locations
9 and to mitigate public and employee safety, financial, environmental, and system
10 reliability risks.

13 **7. 2.5 PAD-MOUNTED EQUIPMENT MAINTENANCE SEGMENT**

14 Pad-mounted transformers and switches (collectively “pad-mounted equipment”), are
15 metal-clad enclosures with lockable cabinet doors located above grade atop of a concrete
16 pad within road allowances or on private properties. These assets are found on the
17 underground distribution system where cables enter the equipment from underground,
18 through the pad. Pad-mounted transformers (Figure 40) supply residential areas or
19 commercial buildings, and pad-mounted switches (Figure 41) allow for sectionalizing of
20 underground feeders.



Figure 40: Pad-mounted Transformer in Residential Neighbourhood



Figure 41: Pad-mounted SF6-Insulated Switch

- 1 Pad-mounted Equipment Maintenance entails a visual inspection of the pad and
- 2 protective bollards for damage or deterioration; a visual inspection of the elevation of the
- 3 pad in relation to the grade; removal of overgrown vegetation that may be encroaching on
- 4 the pad; and a visual inspection and verification of equipment labels and danger signs.
- 5 Visual inspections focus on both the mechanical components (e.g., doors, locks, hinges,
- 6 handles, latches, and paint) and electrical components (e.g., terminations, bushings,
- 7 elbow connectors, transformer tank, primary and secondary switches, fuses, disconnects,
- 8 barriers, fault indicators, relays, oil levels). In addition, maintenance includes
- 9 thermographic scans of electrical connections and any oil testing that may be required to
- 10 enable Toronto Hydro to comply with *PCB Regulations* under Canada's *Environmental*
- 11 *Protection Act*.
- 12
- 13 For pad-mounted switches, which are similar in functionality to overhead switches used
- 14 for sectionalizing and fault protection, maintenance includes a number of additional

1 activities. Batteries in SCADA switches are replaced once every three years. Gas levels
2 are verified on units that are filled with SF₆ gas. Cable duct entries are inspected to
3 ensure they are sealed, and ultrasonic testing is conducted to identify any partial
4 discharge. Air-insulated switches with exposed electrical terminations (live front type)
5 that are found to have significant dirt build-up on the insulators, or show evidence of
6 tracking, are scheduled for CO₂ cleaning at a later time. CO₂ cleaning is performed as
7 part of the Corrective Maintenance Program¹³ and is performed with the equipment
8 energized. This activity removes dirt and other contaminants from the switch, which
9 could cause tracking and result in an arc flash and equipment failure.

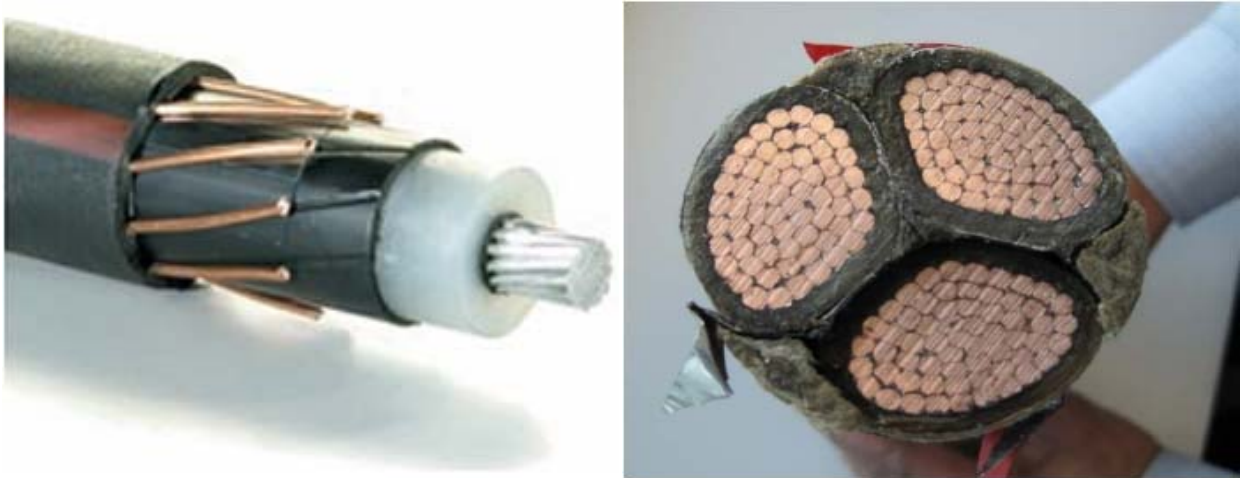
10
11 Toronto Hydro carries out the above activities on a three-year cycle for pad-mounted
12 transformers and an annual cycle for pad-mounted switches. Regular maintenance cycles
13 help Toronto Hydro maintain properly functioning pad-mounted equipment and meet the
14 Minimum Inspection Requirements.¹⁴

15
16 In addition to the aforementioned maintenance activities on pad-mounted equipment, in
17 2015 Toronto Hydro plans to begin performing diagnostic testing on underground
18 primary cables. The two most common types of cables installed on Toronto Hydro's
19 underground system are Paper Insulated Lead Covered (PILC) and Cross-Linked
20 Polyethylene ("TR-XLPE" and XLPE) as shown in Figure 42. There are many PILC and
21 XLPE cables on the system that have surpassed their expected service lives. It is neither
22 prudent nor feasible to replace all cables that are beyond their expected useful lives as
23 age does not necessarily correlate to poor cable condition. Up to 2014, Toronto Hydro
24 planned replacements on the basis of failure trends. Cable diagnostic testing is now
25 being introduced to enable more predictive analysis of cables and to allow planners and
26 engineers to determine more clearly which cable segments on the system are or will be at
27 high risk of failure prior to failure occurring. Cable diagnostic testing provides a more

¹³ Exhibit 4A, Tab 2, Schedule 2.

¹⁴ DSC, *supra* note 2.

- 1 accurate assessment of the condition of underground cables, splices, joints, and
2 terminations.



3 **Figure 42: Example of XLPE Cable (Left) and PILC Cable (Right)**

4 Cable diagnostic testing is an accepted practice industry-wide and used in numerous other
5 electrical utilities in Canada and the United States. IEEE 400-2012, IEC 60060, IEC
6 60085 and IEC 60502 are some of the standards that support and provide guidelines for
7 cable testing in the field. Diagnostic testing is expected to provide more reliable service
8 to customers, and to allow for more effective use of limited capital funds as it provides a
9 stronger basis for informed underground project planning and prioritization. Toronto
10 Hydro plans to focus initial testing on direct buried XLPE cable, which has the highest
11 rate of failure amongst underground cable installations.

12

13 Toronto Hydro owns 5,993 pad-mounted transformers, 873 pad-mounted switches, 1,300
14 kilometres of PILC cables, and 727 kilometres of XLPE cable. The average useful life of
15 pad-mounted transformers and switches are 35 and 30 years respectively. The expected
16 life of underground cable varies by type and construction; the expected life of XLPE

1 cable is 25 years for direct buried installations, and 40 years for concrete duct
2 installations; the expected life of PILC cable is 75 years. Approximately 18% of pad-
3 mounted transformers have reached or surpassed their expected service life, while the
4 pad-mounted switch population is significantly younger and none of the units have
5 exceeded 30 years. Approximately 95% of the PILC and XLPE cable populations being
6 targeted for cable testing have reached their expected useful lives as PILC cable
7 installations began in the early 1900s and XLPE installations in the 1950s.

8
9 As pad-mounted transformers, switches, and cables age, the likelihood of failure
10 increases as a result of:

- 11 • for equipment, current surges, ingress of moisture, dirt, and salt leading to
12 excessive corrosion, mechanical damage, and the degradation of insulating
13 barriers; and
- 14 • for cables, moisture ingress, water treeing, electrical treeing, and insulation
15 breakdown.

16
17 For XLPE cables, a shorter life cycle can be expected when the direct burial installation
18 method was used as opposed to installation inside concrete duct structures. The direct
19 burial method was a common practice in the districts of North York, East York, York,
20 Scarborough and Etobicoke up until the 1990s. In addition, cables will experience aging
21 differently depending on various factors which include, but are not limited to:

- 22 • manufacturing quality;
- 23 • damage during installation and workmanship issues;
- 24 • installation environment (e.g., areas with high moisture levels result in water
25 penetration of the insulation (water treeing) and cause insulation failure);
- 26 • operating temperature and loading (e.g., higher loading and resultant temperatures
27 accelerate the aging process); and

- ambient temperature of the installation environment (e.g., higher temperatures accelerate the aging process).

Maintenance of pad-mounted transformers and switches, and diagnostic testing of cables is designed to locate and rectify advanced stages of degradation and deficiencies prior to the units failing and posing unacceptable risks as discussed below. As illustrated in Figure 43 below, Toronto Hydro's maintenance activities identify between 1,500 and in excess of 3,000 deficiencies on pad-mounted equipment each year. Identifying and subsequently addressing these deficiencies serves to mitigate a wide variety of safety, environmental and system reliability risks. Mitigating these risks is particularly important given that much of this equipment is located in residential areas.

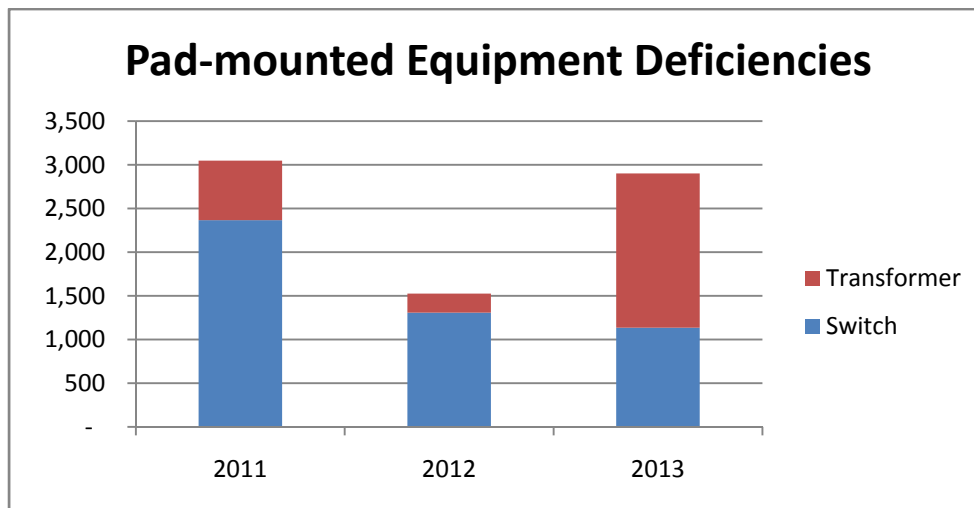


Figure 43: Pad-mounted equipment deficiencies identified between 2011 and 2013

One example of risk mitigation is the identification of an enclosure that is corroding, as illustrated in Figure 44 below. (Corrosion may also be present on internal components.) If not identified and addressed, extreme corrosion can lead to environmental, safety and reliability risks.. Maintenance activities also rectify the instances of switches with broken

- 1 springs, which prevent the switch from opening and closing as shown in Figure 45 below.
2 This condition, if undetected, can result in an arc flash from the failure of the switch to
3 clear a fault when an employee attempts to operate the switch, possibly resulting in injury
4 or equipment failure.



Figure 44: Pad-mounted Transformer with surface corrosion

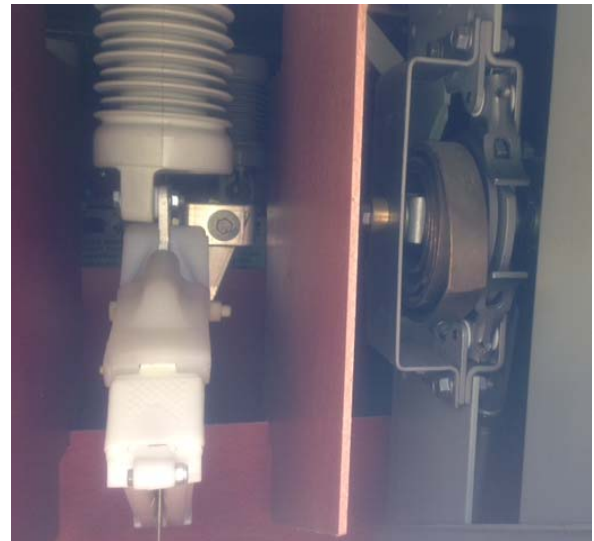


Figure 45: Pad-mounted Switch with broken coil spring

- 5 Another example is the identification of excessive vegetation growth, or the planting of
6 vegetation near equipment. If unaddressed, vegetation can not only hinder access to the
7 transformer during an emergency, but can also pose a safety and fire risk; electricity can
8 arc or flashover to nearby vegetation, even without physical contact. Figure 46 below
9 illustrates an extreme example of excessive vegetation.

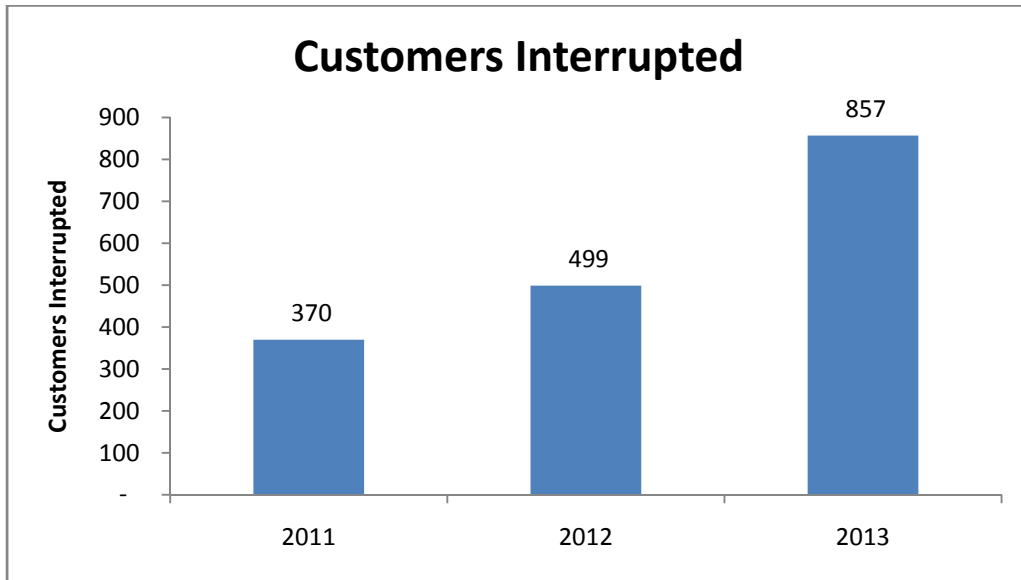


1 **Figure 46: Pad-mounted Transformer requiring vegetation removal**

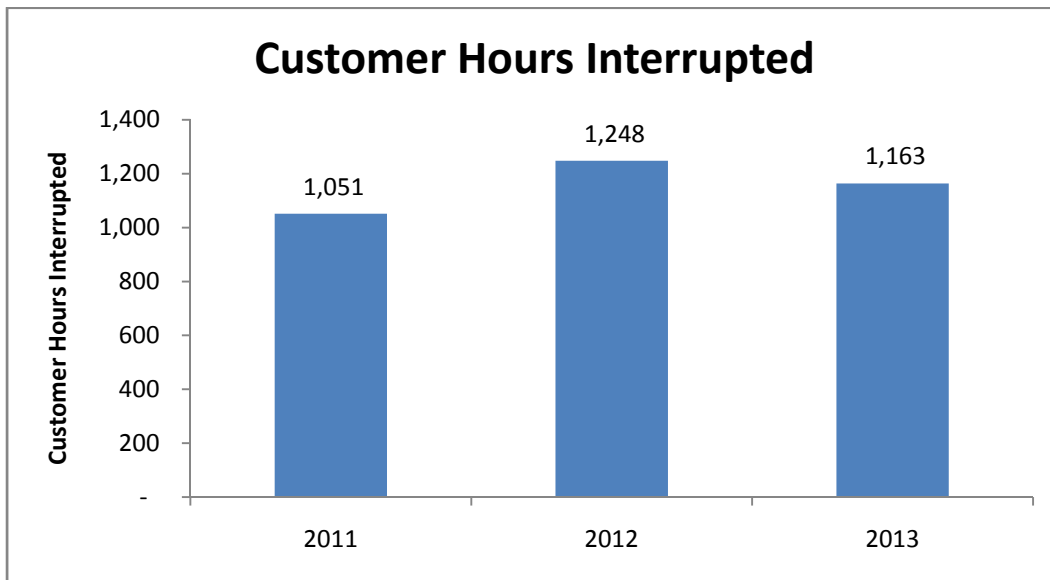
2 On occasion, transformers also require maintenance where the locks, hinges, or warning
3 signage have been vandalized, broken, or removed. If unaddressed, these conditions can
4 lead to safety incidents if someone inadvertently comes into contact with pad-mounted
5 equipment.

6
7 Pad-mounted unit failures also impact Toronto Hydro's system reliability, affecting
8 anywhere from several residential and commercial customers (when a transformer fails),
9 to hundreds of customers in the case of a switch failure. In the event of a total failure of
10 the switch unit, multiple feeders can experience a power interruption, as switches often
11 act as a tie point for multiple feeders. Maintenance activities are designed to mitigate the
12 risk of such failures and also ensure that SCADA switches do not contain failed batteries
13 that render switches inoperable remotely. As illustrated in Figures 47 and 48 below, the
14 distribution system experiences in excess of 300 customer interruptions and 1,000
15 customer hours of interruption each year due to failures of pad-mounted equipment.

16



1 **Figure 47: Total Customers Interrupted (CI)**



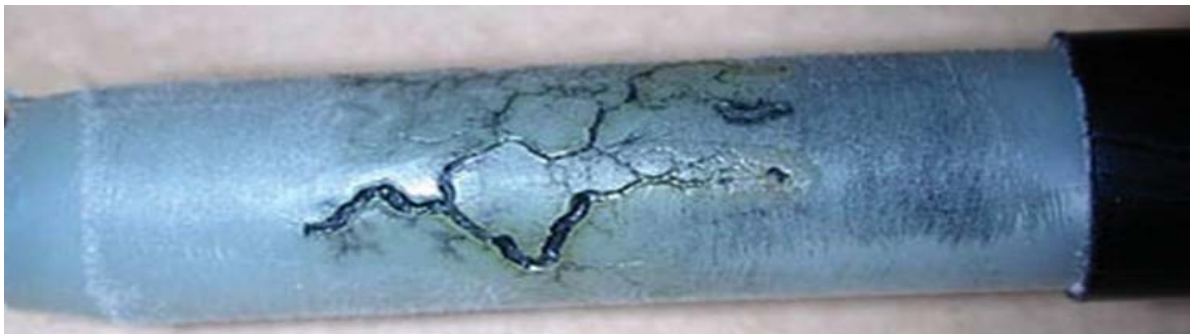
2 **Figure 48: Total Customer Hours Interrupted (CHI)**

3 In addition to the reliability figures in Figures 47 and 48 above, Toronto Hydro
4 experienced 606 interruptions related to defective underground primary cables between
5 2011 and 2013. These interruptions resulted in 187,000 customers losing power for a

1 total of 149,000 customer hours of interruption. When a cable fails once, field
2 experience shows that repeated failures are very likely. For example, in 2012, a cable
3 segment on feeder NYSS3M7 in North York had four repeated failures despite multiple
4 repairs. When cables are prone to failure they not only impact system reliability, but also
5 raise safety and environmental risks. For example, in December 2011, a PILC cable
6 faulted and resulted in a near-miss arc flash while crews were working. Upon
7 investigation of the incident, crews discovered numerous PILC cables leaking oil in the
8 cable chambers along the feeder route. Figures 49 to 51 depict failed and leaking cables.



9 **Figure 49: Oil Leakage from PILC Cable**



10 **Figure 50: Electrical Treeing on Cable**



1 **Figure 51: Aftermath of a cable failure resulting in a fire**

2 **7.1. Segment Costs**

3 The following table contains the historic and planned expenditures for this segment.

4

5 **Table 7: Historical and Forecasted Segment Spending (\$ Millions)**

Total Spending	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
	0.2	0.4	0.4	0.4	1.1

6 Although maintenance cycles have remained consistent, expenditures increased between
7 2011 and 2012 predominantly due to expanded usage of thermography to enable the
8 detection of deficiencies that are not visible to the naked eye. Since 2012, expenditures
9 have remained consistent at \$0.4 million.

10

11 **7.2. Test Year Segment Costs**

12 Pad-mounted Equipment Maintenance expenditures for 2015 are forecasted to be \$1.1
13 million. This increase of \$0.7 million is mainly required to fund diagnostic testing on
14 primary underground cables and oil testing for the purpose of complying with *PCB*

/C

1 *Regulations* under the *Canadian Environmental Protection Act*. Overall, the 2015
2 expenditures are expected to enable Toronto Hydro to: maintain its approximately 6,000
3 pad-mounted transformers and 873 pad-mounted switches on three and one-year cycles
4 respectively; to test underground cables; and to mitigate public safety and employee risks
5 associated with deteriorated and damaged equipment enclosures in residential
6 neighbourhoods, environmental risks associated with oil leaks and PCBs, and system
7 reliability and financial risks associated with equipment failures.

/C

8 **8. CUSTOMER LOCATION MAINTENANCE SEGMENT**

11 A subset of Toronto Hydro's customers is supplied by electrical equipment such as
12 transformers and switches, that are located within customer-owned buildings (vaults) or
13 dedicated areas on customer premises. These vaults and areas are found in or adjacent to
14 industrial or commercial buildings, hospitals, schools, apartments and condominiums,
15 and are secured to prevent unauthorized access to energized equipment.

17 The equipment contained in these vaults and areas is typically owned by Toronto Hydro
18 and requires regular inspection and maintenance. In cases where the equipment is not
19 owned by Toronto Hydro, it is nevertheless necessary to conduct switching operations at
20 the location; as a result, inspections of the location are required to ensure operability and
21 safety. There are approximately 7,500 customer-owned locations that Toronto Hydro
22 must either maintain equipment at or inspect.

24 Of the 7,500 customer-owned locations, 5,300 contain Toronto Hydro-owned equipment,
25 including 13,000 transformers. For maintenance purposes, these 5,300 locations are
26 divided into two subsets based on customer load requirements. One subset is locations
27 where the transformation capacity is less than 1000 kVA. These locations are referred to
28 as Customer Building Vaults. The second subset is locations that have transformers with

1 a capacity that exceeds 1000 kVA. These locations are referred to as Customer
2 Substations.

3
4 Toronto Hydro maintains Customer Building Vaults on a three-year cycle, in compliance
5 with the DSC's Minimum Inspection Requirements (Appendix C).¹⁵ Maintenance of
6 Customer Building Vaults includes a visual inspection of the vault and equipment,
7 thermographic scans of all electrical equipment and connections to detect thermal
8 anomalies, and general cleaning to reduce contamination build-up and electrical tracking
9 risks. Maintenance may also include taking oil samples from transformers to test for
10 PCB levels to comply with *PCB Regulations*. Deficiencies that are noted during
11 inspections are either addressed immediately or identified and subsequently addressed
12 through corrective maintenance. The condition of the customer's civil structure is also
13 assessed and any identified deficiencies are communicated to the customer for
14 remediation.

15
16 Customer Substations are inspected every six months and maintained every four years.
17 Inspections ensure that ventilation, access, and drainage systems are operating as required
18 and that equipment is not leaking, defective, or corroded. Maintenance includes visual
19 inspection, thermographic scans, functional tests, oil testing, and general cleaning. The
20 typical layout of a Customer Substation consists of two incoming feeders connected to
21 respective load break switches, with one switch normally open (standby) and the other
22 normally closed (supply). Toronto Hydro maintains 850 Customer Substations.

23
24 Customer Location Maintenance identifies deficiencies in electrical equipment and
25 verifies the integrity and security of the structures that house the equipment at Customer
26 Building Vaults and Customer Substations. Identifying deficiencies and subsequently

¹⁵ *Supra* note 2.

addressing them minimizes the likelihood that equipment will fail, and mitigates public safety, environmental, financial, and system reliability risks.

As illustrated in Figure 52 below, Toronto Hydro identifies on average over 1,500 deficiencies at Customer Locations each year.

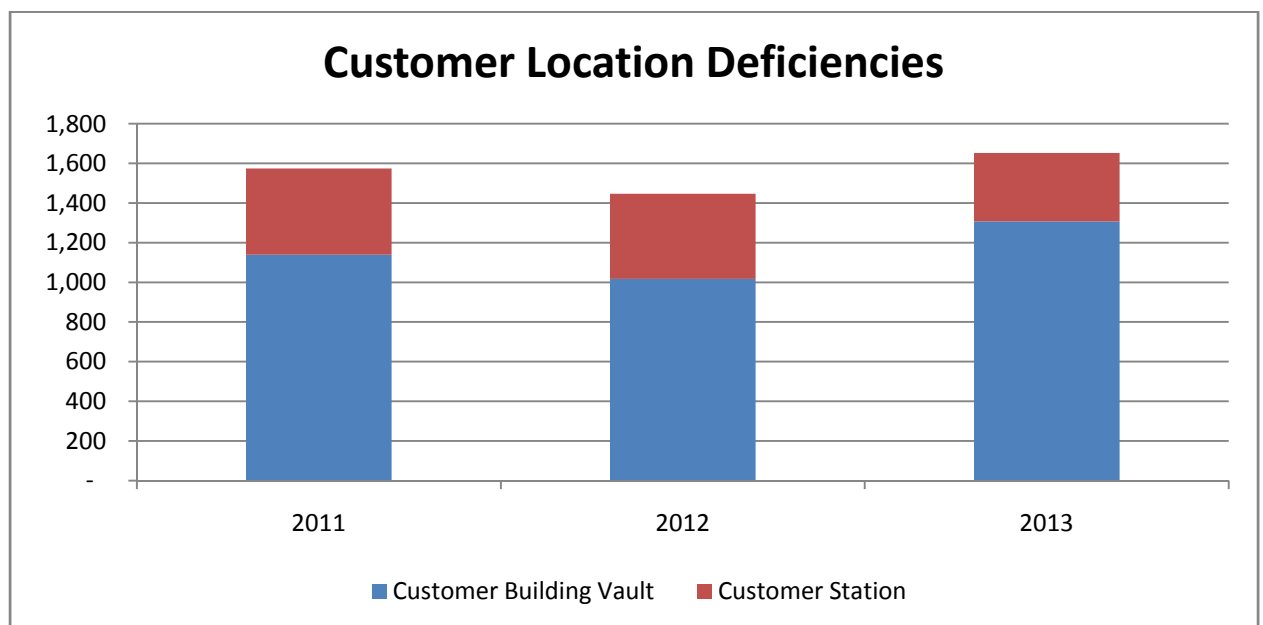


Figure 52: Customer Location deficiencies identified between 2011 and 2013

If not identified and addressed, these deficiencies can raise significant public safety, environmental, financial, and system reliability risks.

Specific examples of deficiencies identified and their associated risks include:

- dirty vaults that require cleaning to reduce the risk of flashover caused by contamination build-up and equipment failing prematurely, which can result in risk of injury to employees and customers near these vaults, and property damage;

- 1 • corrosion of equipment, locks and doors (as illustrated in Figure 53 below), which
2 can result in unauthorized entry, posing a safety risk to individuals making /C
3 contact with live components;
- 4 • oil leaking from cables or transformers (as illustrated in Figure 54 below) that can
5 be addressed prior to oil entering the drainage system, which poses the risk of oil
6 spilling into environmentally sensitive areas;
- 7 • “hot spots” on equipment and components identified using a thermographic scan
8 before they burn insulation and cause electrical faults, potentially resulting in a
9 vault fire and associated safety risks.
- 10 • degradation of a transformer’s insulating oil properties (e.g., the presence of
11 concentrations of certain gases such as Hydrogen, Carbon Monoxide, Methane,
12 and Acetylene) identified using transformer oil testing, which can indicate an
13 elevated risk of transformer failure.

14
15 Beyond the electrical equipment, Customer Location Maintenance activities include the
16 inspections of the civil infrastructure housing the equipment. Although the civil
17 infrastructure is owned by Toronto Hydro’s customers, it is not uncommon for structural
18 elements to be in poor condition and neglected to the point that walls (as illustrated in
19 Figure 55 below) and roofs are at risk of collapsing in on Toronto Hydro’s equipment.

20
21 Apart from the civil structure, unmaintained landscaping and vegetation growth for
22 outdoor customer locations can pose safety risks (e.g., vegetation becoming energized
23 and possibly catching fire) and prevent Toronto Hydro crews from entering the sites to
24 operate equipment (as illustrated in Figure 56 below). Very serious deficiencies such as
25 these are communicated to customers so that they can be addressed.



Figure 53: Rusty Door



Figure 54: Transformer Leaking Oil



Figure 55: Cracked Walls



Figure 56: Vegetation Overgrowth

- 1 By preventing equipment failures and non-electrical deficiencies, Customer Location
- 2 Maintenance also prevents power interruptions. A failure at a Customer Building Vault
- 3 will typically impact one or more customers for a period of time that can exceed three

hours depending on the type of failure. Failures at Customer Substations have a greater impact as greater than 1000 kVA of load may be interrupted for similar durations.

Toronto Hydro also mitigates the risk of equipment failure at customer locations where the customer owns all civil and electrical equipment, by conducting a safety inspection of the premises and the equipment. Even though the assets are not owned by Toronto Hydro, an equipment failure at this location will still have an impact on the reliability of the system, especially if the customer's protection equipment is not coordinated with the distribution system's protection devices or if the equipment fails to operate.

Toronto Hydro crews may also be required to perform switching operations at these locations in contingency situations, to protect the customer's equipment and provide an alternate source of power. Manual switching can pose significant risks to employees and as a result, it is important that Customer Locations remain safe and accessible for crews to respond to during emergency situations.

8.1. Segment Costs

The following table contains the historic and planned expenditures for this segment.

Table 8: Historical and Forecasted Segment Spending (\$ Millions)

Total Spending	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
	0.9	1.9	1.2	3.2	3.2

The fluctuations and increasing expenditures during the 2011 to 2014 period are attributed to the number of Customer Substations being inspected and maintained annually. During 2011-2013, Toronto Hydro conducted an average of approximately 1,200 Customer Substation inspections annually and maintained 51, 155, and 61 Customer Substations in 2011, 2012, and 2013 respectively. During this time, labour

resources that were capable and available to conduct this work were constrained due to competing demands from other station maintenance and capital work. Beginning in 2014, increasing efforts to engage contractor resources are expected to enable Toronto Hydro to achieve the targeted cycles (i.e., six-month inspection cycle and four-year maintenance cycle) at Customer Substations. To accomplish this, Toronto Hydro must conduct 1,700 inspections and maintain 215 Customer Substations annually. These numbers of inspections and maintenance represent increases over historic accomplishments and are the primary drivers for increases in expenditures for the 2014 Bridge Year.

8.2. Test Year Segment Costs

Toronto Hydro's planned 2015 expenditures equal those of 2014. These expenditures represent increases over the annual expenditures during the 2011-2013 period to enable Toronto Hydro to achieve targeted six-month and four-year inspection and maintenance cycles. In addition, the 2015 expenditures also include a provision for oil testing at Customer Building Vaults to enable Toronto Hydro to comply with the *PCB Regulations*.

Aside from ensuring compliance with legislative and regulatory requirements, regular maintenance of electrical and civil equipment at customer locations allows Toronto Hydro to mitigate public and employee safety, environmental, financial, and system reliability risks.

9. METERING SERVICES SEGMENT

Toronto Hydro and its customers rely on metering equipment to track accurate and timely electricity consumption information for customer billing and market settlement purposes. The Metering Services segment is responsible for maintaining this equipment to ensure

1 proper functionality and compliance with applicable legislative and regulatory
2 requirements.

3
4 Toronto Hydro's metering assets include both meters and the communication systems
5 that enable meter data collection and tracking. The maintenance of metering equipment
6 is critical to ensuring the ongoing accuracy of meter reads and the associated billing and
7 settlement data. Moreover, meter testing is a requirement under the *Electricity and Gas*
8 *Inspection Act*,¹⁶ administered by Measurement Canada. Metering Services maintains
9 Toronto Hydro's 734,000 smart and suite meters and 92 wholesale meter installations (as
10 of December 31, 2013 see Figure 59), examples of which are illustrated in Figures 57 and
11 58 below.



Figure 57: Smart meter installation at customer location.



Figure 58: Wholesale meter installation at Transformer Station.

¹⁶ R.S.C., 1985, c. E-4. ["*Electricity and Gas Inspection Act*"]

1 The activities conducted by Toronto Hydro as part of Metering Services can be grouped
2 into three major functional categories:

- 3 (1) Meter Testing;
4 (2) Wholesale Meter Maintenance; and
5 (3) Field Response.
6

7 **9.1. Meter Testing**

8 Meter Testing verifies the accuracy of meters and includes audits undertaken on large
9 customer meters. This work helps ensure that Toronto Hydro remains in compliance with
10 Measurement Canada regulations under the *Electricity and Gas Inspection Act* and the
11 *Weights and Measures Act*.¹⁷ These regulations permit the use of meters for a set period
12 of time, also referred to as a “seal period”, before they must be either tested (i.e., re-
13 verified) or replaced. For smart meters, this time span is typically ten years. When
14 meters are tested and re-verified for accuracy, the seal period is extended, which allows
15 Toronto Hydro to continue utilizing the meters legally for billing purposes.
16

17 For meter testing purposes, Measurement Canada permits utilities to form isolation lots
18 (groups of meters with homogeneous meter characteristics), and test only a small number
19 called the sample group from the isolation lot. Typically 3% of randomly selected meters
20 from each isolation lot form the sample group. This sampling is allowed given the large
21 number of meters that are in-service. The number of meters that are to be tested is
22 determined in accordance with Measurement Canada’s specification S-S-06, *Sampling*
23 *Plans for the Inspection of Isolated Lots of Meters in Service, Annex C, Table 2, Limiting*
24 *Quality 3.15*.¹⁸ The seal period of the isolation lot of meters can be extended if the
25 accuracy statistics for the sample group meet tolerances stipulated in Measurement
26 Canada’s specification. It should be noted that some unique meters do not belong to any

¹⁷ R.S.C., 1985, c. W-6. [“*Weights and Measures Act*”]

¹⁸ Measurement Canada, S-S-06—*Sampling Plans for the Inspection of Isolated Lots of Meters in Service*, (Markham: Measurement Canada, 2010).

isolation lot and must be removed from service and tested individually before their seal periods expire. Table 9 lists the number of meters with a seal period that will expire during the 2015-2019 period. It also lists the number of meters that will need to form the sample groups for Meter Testing based on the sample size for each isolation lot, to enable Toronto Hydro to comply with Measurement Canada's regulations.

Table 9: Number of Seal Expiring Meters in 2015-2019 and Sampling Units

Year	Seal-Expiring Meters	Sample Group Meters
2015	14,527	436
2016	194,000	5,820
2017	214,652	6,440
2018	146,498	4,395
2019	55,563	1,667
Total	625,240	18,758

To conduct Meter Testing, Toronto Hydro relies on field crews to remove meters that are part of a sample group and return them to Toronto Hydro's accredited service provider for testing. Test results are forwarded to Toronto Hydro for record updating and any other actions based on the test results. A pass will result in an update to the meter records and the extension of seal periods, based on the tested accuracy levels. When it comes to the utility's smart meters with a ten-year initial seal period, providing the meters pass, the seals will be extended for all of the meters within the group by an additional eight years.

9.2. Wholesale Meter Maintenance

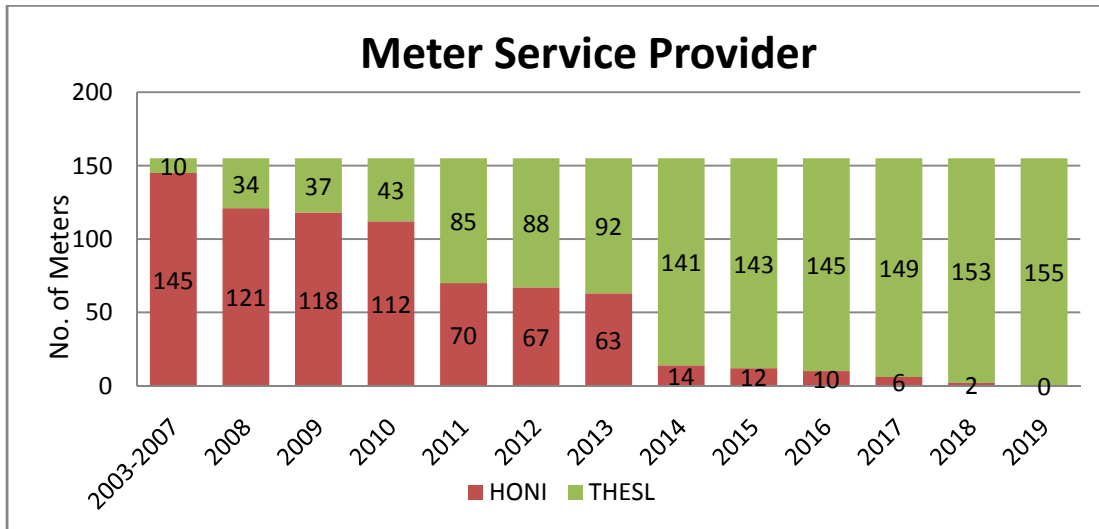
Wholesale meters, including instrument transformers, are installed at transmission grid supply points to measure electricity supplied from Hydro One Networks Inc. ("HONI") to Toronto Hydro. Wholesale Meter Maintenance involves re-verifying (i.e., testing every six years) and troubleshooting wholesale meters, and ensuring compliance with all

1 applicable regulations, such as the requirement to notify the Independent Electricity
2 System Operator (“IESO”) of Meter Trouble Reports within 48 hours pursuant to the
3 IESO’s *Market Rules*¹⁹ and *Market Manual*.²⁰ Meter Trouble Reports are issued if there is
4 any failure in data communication or if the data is suspected to contain errors. Data
5 communication failures can arise from issues with the Sonnet network, network
6 infrastructure, Bell phone lines, or either the meter itself or the modem. If such a failure
7 occurs, Toronto Hydro attempts to resolve the issue remotely. If the remote resolution is
8 unsuccessful, Toronto Hydro deploys field crews to the site of the particular wholesale
9 meter to address the issue directly.

10
11 Prior to market opening in 2002, HONI was the Meter Service Provider (“MSP”) for all
12 wholesale meters. As the MSP, HONI was the owner of the wholesale meter installations
13 and was responsible for the meters, their communications, maintenance, troubleshooting,
14 and replacement. Beginning in 2002, Local Distribution Companies (“LDCs”) in
15 Ontario, such as Toronto Hydro, began taking ownership of the installations. Since that
16 time, Toronto Hydro has upgraded wholesale metering points and taken over ownership
17 of 92 installations from HONI as of the end of 2013. The number of installations owned
18 by Toronto Hydro is expected to grow to 155. Figure 59 illustrates the number of
19 installations that have been transferred and the meters subject to transfer in the coming
20 years.

¹⁹ Independent Electricity System Operator, *Market Rules for the Ontario Electricity Market*, (Issue 54.0) (Toronto: Independent Electricity System Operator, 2014). [“*Market Rules*”]

²⁰ Independent Electricity System Operator, *Meter Trouble Report: A Guide for Market Participants*, (Issue 6.0) (Toronto: Independent Electricity System Operator, 2005). [“*Market Manual*”]



1 **Figure 59: Summary of Wholesale Meter Ownership Transfer from Hydro One to**
2 **Toronto Hydro**

3 **9.3. Field Response**

4 The third category of activities within Metering Services is Field Response, which
5 includes activities such as investigating communication issues, troubleshooting metering
6 issues, converting legacy flat rate services (e.g., water heaters) into metered activities,
7 and installing reused meters following accuracy testing. Toronto Hydro's 650,000 smart
8 meters have a failure rate of 1.5% (i.e., approximately 10,000 units annually). The
9 majority of the failures are related to the use of radio frequency mesh technology to
10 deliver the meter reading data back to Toronto Hydro's centralized meter reading
11 software. As failures occur, staff and field crews must investigate failure causes and
12 restore communications in a timely manner. Where economically viable, Toronto Hydro
13 reuses meters with active seals, which is expected to save the utility an estimated \$1.4
14 million over the 2015-2019 period.

15
16 Overall, a significant portion of the work undertaken by Metering Services is not
17 discretionary because it is either driven by statutory or regulatory obligations, or a need

to resolve a meter issue in the field on a reactive basis. Consequences of non-compliance can include: (1) fines of \$1,000 per violation when meters are not tested and re-verified upon their seal periods expiring; and (2) fines ranging from \$2,000 to \$1 million if IESO *Market Rules* are breached with respect to wholesale meter functionality.

9.4. Segment Costs

The following table contains the historic and planned expenditures for Metering Services.

Table 10: Historical and Forecasted Spending (\$ Millions)

Total Spending	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
	4.5	4.9	1.9	2.3	2.2

/C

From 2011 and 2012 to 2013, expenditures decreased significantly predominantly due to the transfer of Metering Customer Service Requests from Metering Services (within Field Services) to Billing, Remittance, and Meter Data Management segment of the Customer Care program.²¹ Forecasted expenditures in 2014 are expected to rise slightly from \$1.9 million in 2013 to \$2.3 million due to additional Metering Testing and Wholesale Meter Maintenance that is required.

9.5. Test Year Segment Costs

The Test Year costs for Metering Services are planned to be \$2.2 million. This is a slight \$0.1 reduction from forecasted 2014 expenditures. The reduction is attributed to reduced expenditures in Field Response as a result of reductions in Flat Rate Water Heater Conversions as these types of legacy installations will have been almost entirely replaced. The \$2.2 million budget in 2015 is expected to enable Toronto Hydro to maintain its 734,000 meters and to comply with non-discretionary legal requirements

/C

/C

²¹ Exhibit 4A, Tab 2, Schedule 13.

under the *Electricity and Gas Inspection Act*, administered by Measurement Canada, and the IESO *Market Rules*.

10. STATION INSPECTIONS AND AUXILIARY EQUIPMENT MAINTENANCE SEGMENT

Toronto Hydro owns equipment at 35 Transformer (or Terminal) Stations (TS) and 164 Municipal Stations (MS) throughout the city. Equipment is either located inside buildings, or outside in fenced yards. The Station Inspections and Auxiliary Equipment Maintenance segment funds the following two sets of work:

- 1) Periodic inspections of all TSs and MSs and their housed equipment; and
- 2) Maintenance of auxiliary equipment housed or used at stations including station batteries, cranes, fire alarm systems, air compressors, and testing equipment.

Figures 60 to 62 below show a typical MS found in a residential neighbourhood and a TS yard.



Figure 60: Residential area MS (front view)



Figure 61: Residential area MS (rear view)



1 **Figure 62: The station yard at Cavanagh TS**

2 Periodic inspections of stations are conducted on two sets of cycles: monthly and semi-
3 annually (i.e., in the spring and fall). During monthly inspections, crews look for any
4 signs of transformer oil leaks, confirm transformer cooling fan operation, check battery
5 electrolyte levels, verify the condition of equipment alarms, and look for any visual signs
6 of equipment deterioration or imminent failure. During these inspections, crews will also
7 look for deficiencies in station fences, gates, doors, building walls, roofs, danger signs,
8 and lighting. During semi-annual inspections which occur in the spring and fall,
9 adjustments to heating and ventilation systems are performed to ensure assets are
10 protected from damage due to temperature (e.g., turning on or turning off control cabinet
11 heaters) and in the fall, oil samples are collected from power transformers and sent for
12 testing.

13
14 In addition to inspections, maintenance of station auxiliary equipment is performed. This
15 equipment provides a support or service function and can be described as being
16 peripheral to station power and protection and control equipment. Station auxiliary
17 equipment includes: (1) Battery Banks; (2) Station Fire Alarm and Protection Systems;
18 (3) Station Cranes; (4) Station Compressed Air Systems; and (5) other miscellaneous

station apparatus including specialized environmental protection systems and testing equipment. This equipment is described as follows:

- 1) **Battery Banks:** The protection and control equipment in stations is powered by a DC supply from battery banks that are similar to those depicted in Figure 63 below, and are charged by station rectifiers (chargers). Stations typically have lead-acid batteries or nickel cadmium (“Ni-Cd”) batteries. Specialized inspections and tests on these battery banks are conducted every six months and include cleaning, measurements of specific gravity, voltage, electrolyte level, and temperature, inspection for corrosion on terminals, connections, battery racks and cabinets, and load cycle testing. /C
- 2) **Fire Alarm Systems:** Toronto Hydro has 32 stations equipped with a Cerberus Pyrotronic System 3 fire alarm system consisting of a control panel, remote annunciator panel, manual pull stations, smoke detector devices and horn strobe alarm signalling devices. Fire alarm systems require periodic inspection and testing in accordance with the *Ontario Fire Code*²² under the *Fire Protection and Prevention Act, 1997*.²³ Inspections and tests are conducted either once or twice a year depending on the type of equipment. /C
- 3) **Station Cranes:** Nine of Toronto Hydro’s station buildings are equipped with overhead cranes or hoists that are required for servicing equipment. Crane inspection and maintenance is conducted annually in accordance the *Occupational Health and Safety Act*,²⁴ and the *Industrial Establishments Regulation*²⁵ made under that Act. /C
- 4) **Compressed Air Systems:** These systems are required to supply dry compressed air for the operation of air blast circuit breakers. Air blast circuit breakers use compressed air to open their arcing contacts, and to extinguish the electrical arc /C

²² Ontario Regulation 213/07 made under the *Fire Protection and Prevention Act, 1997*, S.O. 1997, C. 4 [“*Ontario Fire Code*”].

²³ S.O. 1997, c. 4. [“*Fire Protection and Prevention Act*”]

²⁴ R.S.O. 1990, c. O.1. [“*Occupational Health and Safety Act*”]

²⁵ RRO 1990, Reg. 851. [“*Industrial Establishments Regulation*”]

1 that forms during breaker operation. There are 18 air compressors used in
2 Toronto Hydro's 4.16kV and 13.8kV stations. These assets are inspected and
3 maintained twice a year.

4

5 Figures 63 to 66 depict examples of the aforementioned auxiliary equipment.



**Figure 63: Station Battery System at
George and Duke MS**



Figure 64: Fire Alarm Control Panel



Figure 65: Air Compressor System

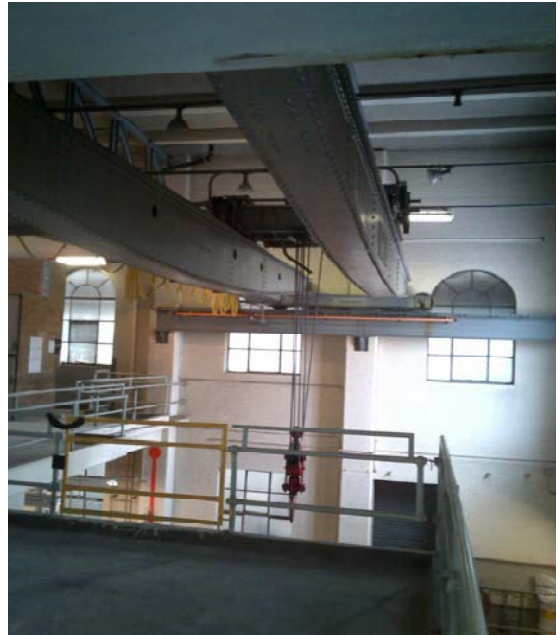


Figure 66: Station Crane

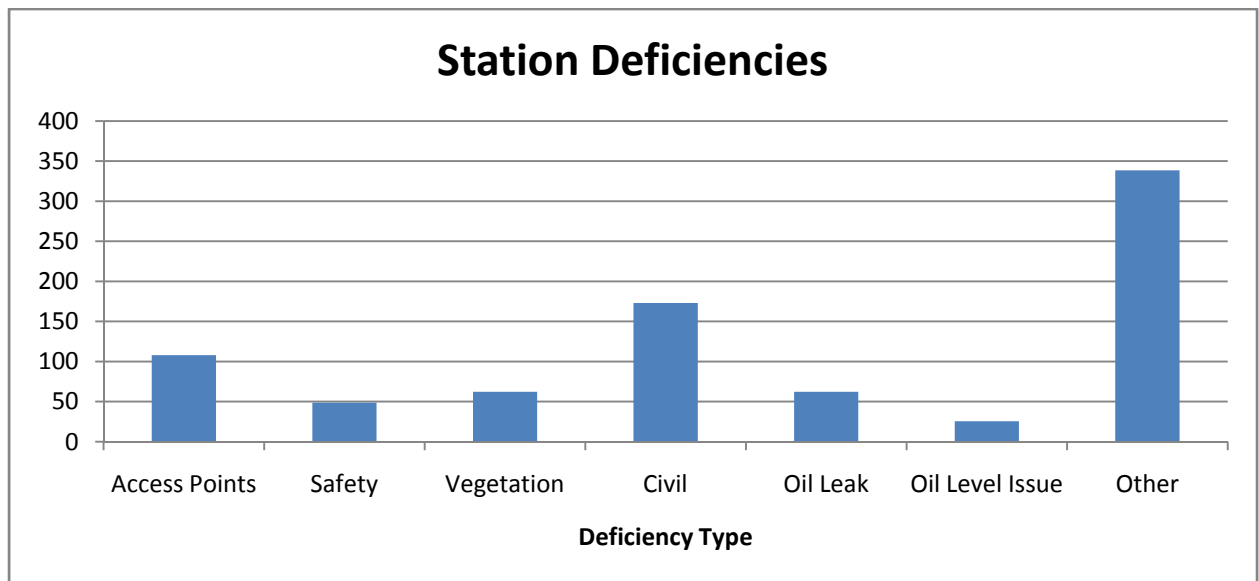
1 Station Inspections and Auxiliary Equipment Maintenance are undertaken to address two
2 broad sets of needs. The first set is the need to mitigate the risks posed by deficient or
3 failed equipment and components including public and employee safety, environmental,
4 financial, and system reliability risks. The second set is the need to remain in compliance
5 with the *Ontario Fire Code*.²⁶ and the *Occupational Health and Safety Act*. The
6 following paragraphs provide further details for both of these sets of needs.

10.1. Station Inspections

9 Each year, Station Inspections identify approximately over 800 deficiencies on average.
10 As illustrated in Figure 67, these deficiencies are of various types, and once identified,

²⁶ Ontario Regulation 213/07 made under the *Fire Protection and Prevention Act*, 199, S.O. 1997, C. 4 [“*Ontario Fire Code*”].

1 are addressed through the Corrective Maintenance program,²⁷ or equipment replacement
2 programs as discussed in the Distribution System Plan.²⁸



3 **Figure 67: Average Number of Deficiencies Found Annually**

4 From a safety perspective, deficiencies at stations within urban and often residential
5 settings can pose significant risks. For example, deficiencies at access points such as
6 gates, doors, fences, signs, and other security infrastructure can result in a station
7 becoming accessible to the general public. These deficiencies, which can arise at any
8 time due to degradation or other common causes including vandalism and wildlife, can
9 become a contributing factor to risk of injury to the general public. Frequent inspections
10 are critical to maintaining secure station sites in a densely populated environment.

11
12 From an employee safety perspective, inspections identify deficiencies with station safety
13 features such as alarms, emergency lightning, burn kits, eyewash stations, first aid kits,

²⁷ Exhibit 4A, Tab 2, Schedule 2.

²⁸ Exhibit 2B, E6.

1 and fire extinguishers. This equipment is critical in protecting employees during
2 emergency situations such as station fires. Inspections also enable Toronto Hydro to
3 remain compliant with the Ontario *Fire Protection and Prevention Act* which requires
4 fire extinguishers to be inspected monthly.

5
6 From an environmental perspective, inspections identify pieces of equipment that are
7 leaking oil as depicted in Figure 68 below. Leaking transformers or cables pose
8 environmental risks, where oil can enter waterways, ground water and potentially
9 sensitive ecological areas. In addition, frequent inspections can identify signs of leaking
10 oil, which indicates that assets that are at risk of failing. Once indentified, Toronto Hydro
11 can address the leak and prevent equipment failures.



12 **Figure 68: Oil Leak on a Station Transformer**

1 Inspections also identify vegetation concerns and damage to grading and landscaping as
2 depicted in Figure 69. Failure to address these deficiencies can result in damage to
3 stations because of poor drainage, customer complaints and safety risks for employees
4 including accessibility risks from vegetation overgrowth and slipping and falling risks
5 from poor landscaping.



6 **Figure 69: Damaged Landscaping**

7 In addition to identifying deficiencies that mitigate safety and environmental risks,
8 Station Inspection work obtains oil samples from power transformers and conduct oil
9 testing that is used to mitigate financial and system reliability risks. Industry-standard oil
10 tests are performed to identify poor conditions and abnormalities that cannot otherwise be
11 detected without a complete disassembly of the transformer. The oil analysis tests
12 include: Dissolved Gas Analysis (“DGA”), Furan analysis, acid levels, moisture levels,
13 and other oil quality tests.

14

/C

1 DGA testing allows Toronto Hydro to monitor trends in the gas levels of transformer oil
2 and helps to predict failures. The rate of decomposition and the type of gases generated
3 during the natural aging process of the oil and insulating parts, especially in the case of
4 thermal or electrical failures due to thermal overloading or electrical faults, are effective
5 and accurate predictors of transformer health. Furan analysis shows the condition of the
6 cellulose paper insulation within the transformer core. Over time, the cellulose insulating
7 material will experience degradation. The presence and level of furanic compounds in
8 the oil are used to determine an average expected degree of polymerization for the paper
9 in the equipment. The calculated degree of polymerization is used to estimate the
10 percentage of solid insulation life remaining inside the transformer. Oil quality tests
11 indicate the moisture levels, particle count, interfacial tension, and acidity of the oil,
12 which are all factors in the accelerated degradation of the transformer.

13
14 Oil testing is particularly valuable because it allows Toronto Hydro to identify
15 transformers that may be at a high risk of failure and to schedule corrective action such as
16 oil reclamation or replacement before a catastrophic event can occur. Consequences of
17 such an event can include oil spills, fire, emergency response and equipment replacement
18 costs exceeding hundreds of thousands of dollars, or a power interruption affecting
19 hundreds if not thousands of customers for possibly three to eight hours.

21 **10.2. Auxiliary Equipment Maintenance**

22 In addition to Stations Inspections, Auxiliary Equipment Maintenance is performed to
23 mitigate a variety of risks. Maintenance of station backup battery systems reduces the
24 risk that a station's protection and control system will not operate as required during a
25 power interruption. During such an event, the system's DC power source allows all
26 station protection and control equipment to function and communicate normally. Loss of
27 the backup power supply can have consequences ranging from loss of communication

1 and remote operation capability, to failure of a protecting device to function posing both
2 safety and system reliability risks.

3
4 Maintenance of fire alarm systems is designed to ensure that the systems are fully
5 functional at all times and in particular when they are called upon to operate. The failure
6 of a fire alarm system in the event of a station fire could delay the communication of the
7 event to employees inside the station and the Toronto Hydro control centre until damage
8 to the station is so great that either the equipment faults and triggers an alarm to the
9 control center, or it becomes noticeable to a member of the public, who in turn notifies
10 emergency authorities. The sooner Toronto Hydro is notified of a fire, the more likely
11 that damage and associated safety and environmental risks can be minimized. These
12 risks include employees receiving severe burns and the release of harmful contaminants
13 and greenhouse gases into the environment such as oil, fire fumes and SF₆ gas.
14 Experience with station fires over the past number of years (e.g., at Lesmil MS in North
15 York area, and at Station J, in the East York area) indicates that the cost to repair the
16 damage can easily reach millions of dollars.

17
18 Maintenance of station cranes is designed to ensure that cranes are capable of lifting and
19 positioning their rated load (which can be as high as 35 tons) and are fully functional to
20 enable other station capital and maintenance work to proceed. The failure of a station
21 crane (hoist or cables breaking) during operation can lead to safety risks to crews when
22 lifting and moving heavy loads, such as transformers and switchgear cabinets, and can
23 cause damage to the station itself if loads were to fall as a result of the failure.

24
25 Maintenance of compressed air systems are designed to ensure that air blast circuit
26 breakers are available to operate as designed when called upon to do so. These breakers
27 require compressed air and without a certain pressure and volume of air available, the
28 circuit breakers will not close or trip, which will result in their failure to operate during

fault conditions, exposing employees to severe burns from arc flashes. When this occurs, protection devices upstream of the circuit breaker would need to operate resulting in outages to a far greater number of customers than would otherwise occur. For example, the failure of an air blast circuit breaker to clear a fault in July 2012 at George and Duke MS resulted in interruptions to 6,500 customers for nearly eight hours. Replacement costs for an air blast circuit breaker can range from \$60,000 to \$200,000 depending on various factors including type, voltage rating, and location. Maintenance tasks that mitigate the risks described above include inspections of all components for deficiencies, cleaning of filters, replacement of pressure relief valves and pump-up time testing which is used to determine their correct operation.

10.3. Segment Costs

The following table contains the historic and planned expenditures for this segment.

Table 11: Historical and Forecasted Segment Spending (\$ Millions)

Total Spending	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
	1.0	0.9	1.0	1.2	1.2

During the 2011-2013 period, expenditures remained stable due to the cyclical nature of inspections and maintenance. Beginning in 2013, oil sampling was standardized for all power transformers and the suite of tests was expanded to include Furan analysis. The costs associated with additional oil sampling and testing are the predominant drivers for the increasing costs in 2013 and 2014.

10.4. Test Year Segment Costs

Planned expenditures for 2015 are \$1.2 million and are constant relative to 2014. These expenditures are planned for funding the inspections of equipment at Toronto Hydro's 35 TS's and 164 MS's and the maintenance of auxiliary equipment such as battery banks,

1 fire alarm systems, cranes, and compressed air systems. These expenditures are expected
2 to enable Toronto Hydro to identify and address deficiencies at stations and to mitigate
3 the risk of equipment failures and associated safety, environmental, financial and system
4 reliability risks such as injury to Toronto Hydro personnel, extensive collateral damage to
5 station equipment and system outages. In addition, the expenditures would allow
6 Toronto Hydro to comply with non-discretionary statutory requirements in the *Ontario*
7 *Fire Code* and *Occupational Health and Safety Act*.

10 **11. STATION SWITCHGEAR MAINTENANCE SEGMENT**

11 Station Switchgear Maintenance includes testing and maintenance of Toronto Hydro's
12 switchgear units and circuit breakers that are located at Transformer and Municipal
13 Stations ("TSs" and "MSs", respectively) across the utility's service territory. A
14 switchgear unit is a combination of switching devices and their associated controls,
15 measuring, protection, and regulating equipment. Assemblies of these devices and
16 equipment, with associated interconnections, accessories, enclosures and supporting
17 structures, are found at Toronto Hydro's distribution stations. There are 252 switchgears /C
18 installed within the distribution system and they collectively contain approximately 1,880
19 circuit breakers.

20
21 Switchgears and circuit breakers must operate quickly and reliably when an electrical
22 interference or equipment failure causes a fault on the distribution system. Switchgear
23 maintenance activities mitigate the risk that the equipment will malfunction during a
24 contingency, failing to protect the downstream feeders and equipment and possibly
25 leading to a safety incident involving the public or Toronto Hydro employees.

26 Maintenance is particularly critical for the fleet of switchgear owned by Toronto Hydro,
27 as many circuit breakers have surpassed their expected lives and rely on obsolete
28 technology such as brick and mortar enclosures, non-arc resistant interrupting devices

(e.g., air blast or air magnetic circuit breakers), and electromechanical relays with no supervisory feedback or control.

Toronto Hydro owns and maintains two types of switchgears:

- the exposed bus type, used mainly for outdoor installations; and
- the enclosed type, further subdivided into metal clad, metal-enclosed, and brick structures, which are mainly used for indoor installations.

Examples switchgears are illustrated in Figure 70 below.



Figure 70: (Left) Outdoor Enclosure Housing Metalclad Switchgear. (Right) Indoor Metalclad Switchgear

Station Switchgear Maintenance includes three sets of activities.

- **Circuit Breaker Maintenance** – Circuit breaker maintenance work includes a visual inspection and verification of the integrity of the mechanical and electrical components in circuit breakers, functional testing of the unit, and replacement of worn components. Circuit breakers (Figure 71) use various mediums to extinguish the electric arc that forms during an interruption operation. Toronto

Hydro owns and maintains the following types of circuit breakers: air magnetic, air blast, Sulphur Hexafluoride (SF₆), oil, and vacuum units. Maintenance frequencies, which are based on reliability-centred maintenance (RCM) principles, are: (1) every four years for air-magnetic and oil circuit breakers; every three years for air blast circuit breakers; and (3) every eight years for vacuum and SF₆ circuit breakers.

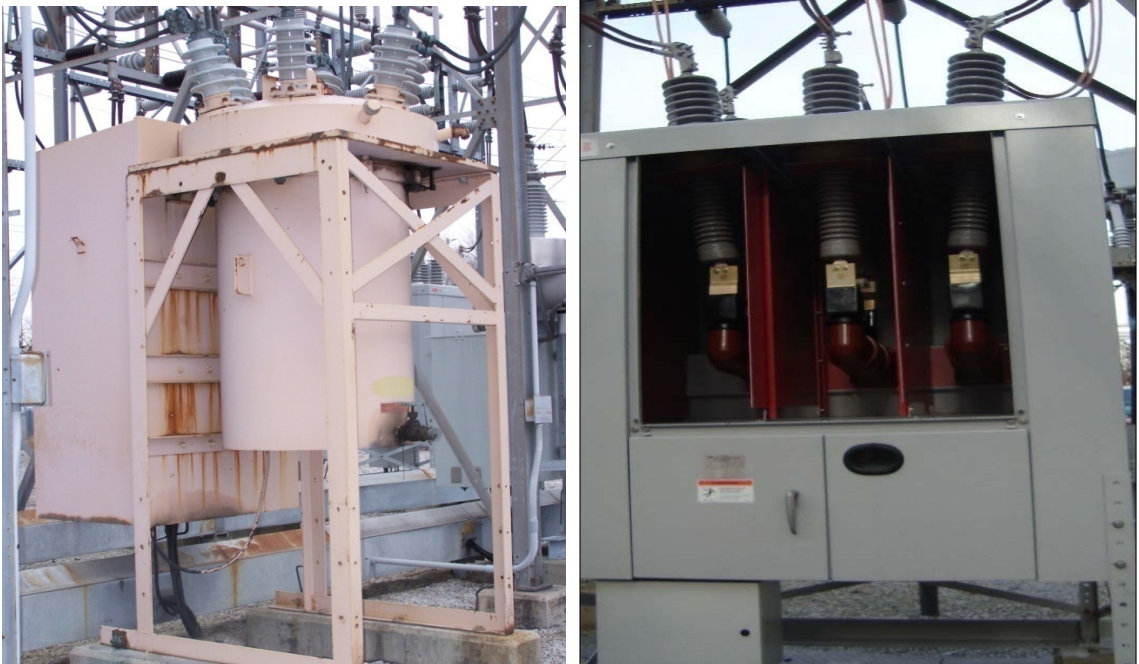


Figure 71: (Left) Oil KSO Circuit Breaker, (Right) Vacuum Circuit Breaker

- Protection & Control (P&C) Maintenance** – The P&C equipment maintenance includes inspection and testing of sensing devices and relays that monitor the magnitude and flow of electrical power. In the event of a fault on the distribution system, the protective relays detect the fault and trigger interrupting devices, such as circuit breakers, to operate and isolate the circuit, protecting the system from further damage. A protective relay system has to be periodically tested and

1 verified to ensure the system remains protected, the settings are appropriate for
2 the current state and loads, and that a failure event does not result in cascading
3 outage events. More specifically, maintenance activities involve verifying the AC
4 voltage and current to the fault detecting relay, testing the operating
5 characteristics of the relay, validating relay settings, verifying the operation of
6 auxiliary relays, and verifying output functions such as alarms and annunciations.
7 This equipment is maintained every four years.

- 8
9 • **Thermography and Ultrasonic Testing** – A thermographic scan of a switchgear
10 unit provides Toronto Hydro with an advanced warning of developing electrical
11 faults by identifying thermal anomalies on the equipment. Ultrasonic testing
12 identifies high-frequency noise associated with surface tracking and corona,
13 which are also indicators of impending failure. All load break switches,
14 disconnect switches, and bolted electrical connections undergo thermographic
15 scans and ultrasonic tests every eight years.

16
17 These three sets of activities are designed to reduce the likelihood of switchgear or
18 breaker failure and to mitigate the associated risks. One way that this is accomplished is
19 by identifying deficiencies that can lead to common switchgear failure modes. These
20 deficiencies include worn components, loose connections, degradation, corrosion, and
21 contamination. Examples of these are shown in Figures 72 and 73, which illustrate a
22 corroded switchgear enclosure and pest infestation inside an outdoor switchgear.



Figure 72: Rusty Switchgear Enclosure



Figure 73: Pests inside Outdoor Switchgear

- 1 Figure 74 below shows an example of an internal arc fault, which can be destructive and
- 2 pose a risk of injury because of the energy levels reached within the confined
- 3 compartment.

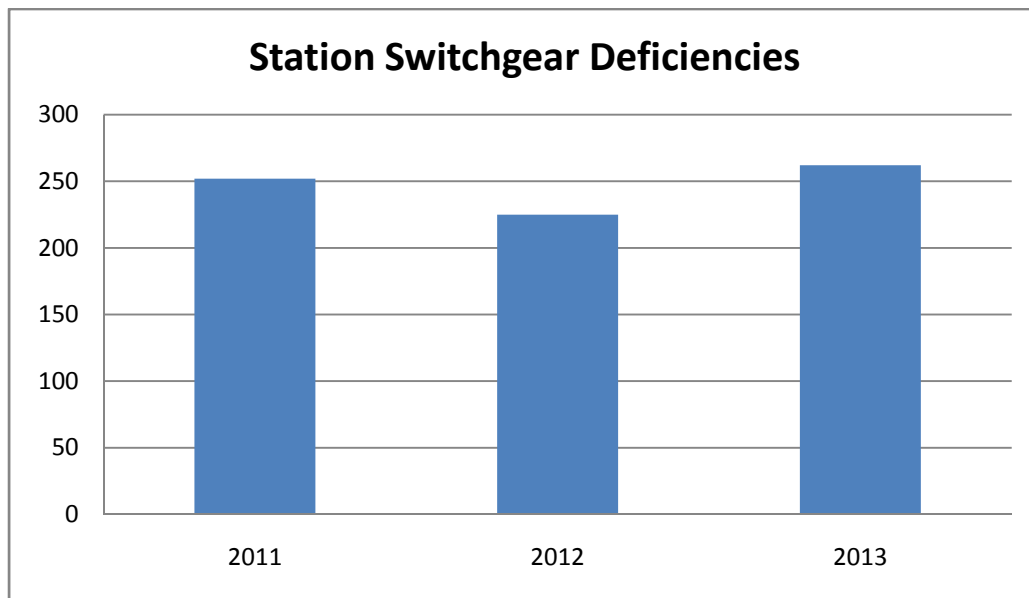
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- 4 **Figure 74: Impact of Internal Arc Fault in a Switchgear**

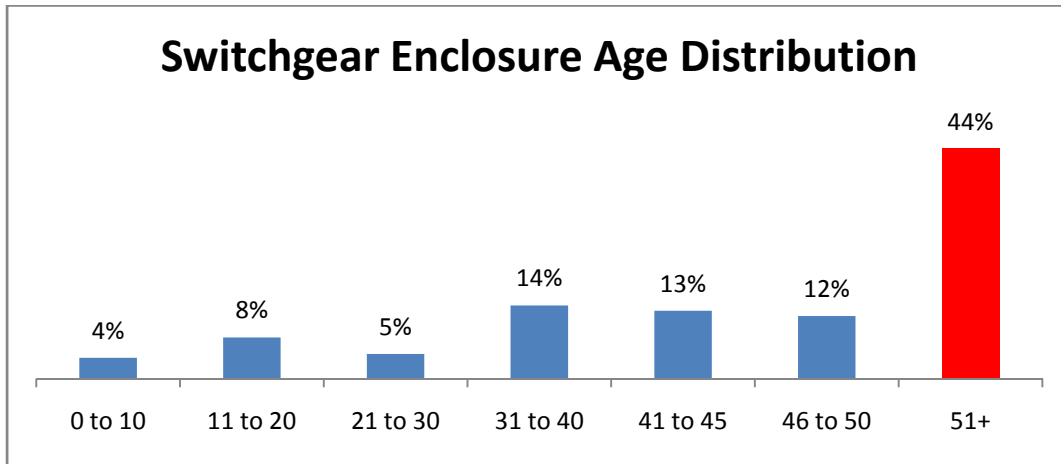
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- 1 As illustrated in Figure 75 below, Toronto Hydro has identified more than 200
2 deficiencies on switchgear assets each year since 2011.

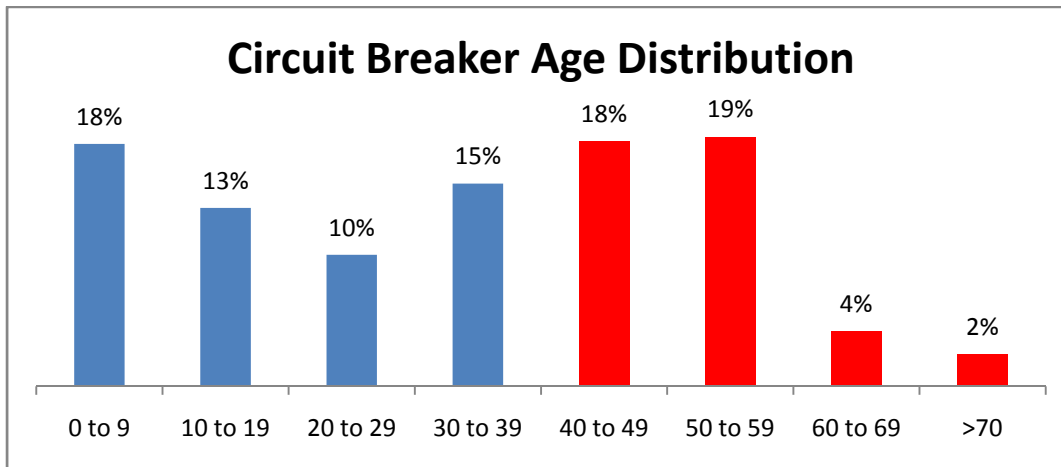


3 **Figure 75: Switchgear deficiencies identified between 2011 and 2013**

- 4 The likelihood of deficiencies existing and leading to a failure increases as switchgear
5 and breakers age and approach their end-of-lives. The average expected lives of
6 switchgear enclosures and circuit breakers are 50 and 45 years respectively. Figures 76
7 and 77 illustrate (in red) the percentage of Toronto Hydro's switchgears and circuit
8 breakers that are beyond their expected useful life.



1 **Figure 76: Age Distribution of Metalclad Switchgear Enclosure as of 2013**



2 **Figure 77: Age Distribution of Circuit Breakers as of 2013**

3 As shown from the above figures, approximately 44% of Toronto Hydro's switchgear
4 enclosures and 43% of the circuit breakers that they house have surpassed their expected
5 useful life. Of particular concern are the high numbers of air magnetic, air blast and oil
6 breakers that have exceeded their expected life. The likelihood of failure increases for
7 these assets due to wear and tear that has been caused by high numbers of operations,
8 contamination, loose connections, and corrosion. Toronto Hydro's ACA tool shows that

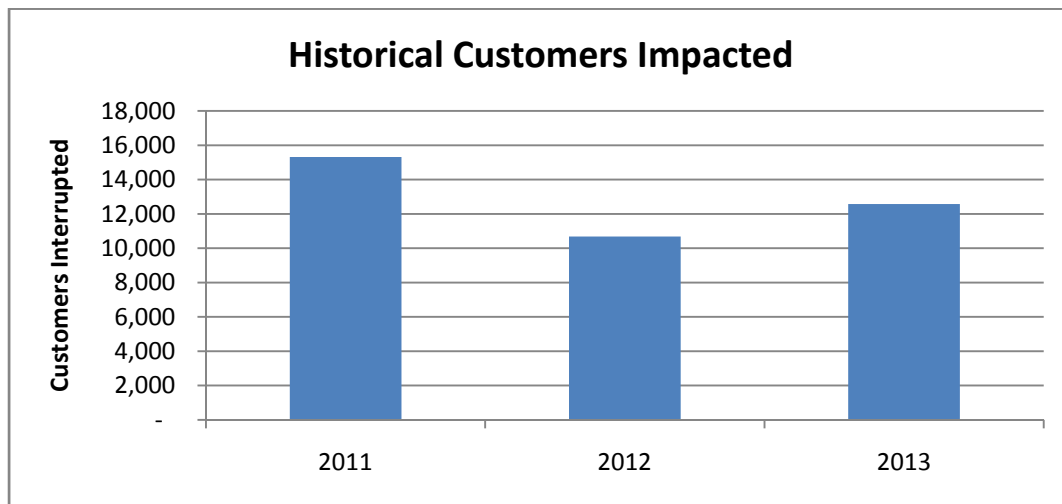
1 42% of the population of switchgear are in poor or very poor condition²⁹ and are at an
2 increased likelihood of failure. A failure of one of these assets has the potential to lead to
3 a catastrophic fire, the release of harmful contaminants into the environment (e.g., oil
4 spills, combustion by-products), and safety risks in the form of debris or arc-flashes that
5 can cause injury and property damage. The replacement of worn and corroded
6 components, the alignment of switch blades, the lubrication of switches, and the removal
7 of dirt and other contamination during maintenance mitigates the risk of failures and
8 associated employee safety, financial, environmental, and system reliability risks that are
9 associated with switchgear failure.

10
11 An example of a catastrophic station failure occurred at Station J in East York in 2009.
12 The station was over 50 years old, and a fire ensued following a switchgear failure and
13 subsequent fault. The switchgear had surpassed its expected life and the fault resulted in
14 the destruction of Station J. Maintenance, including thermographic scans and ultrasonic
15 tests, serves to prevent similar occurrences by detecting defective components (closing
16 coil, pallet switch, closing spring and relay systems) and incipient faults in loose
17 connections, contacts, and insulators that could develop into a catastrophic failure from
18 the failure of a protection and control asset to operate and clear a fault.

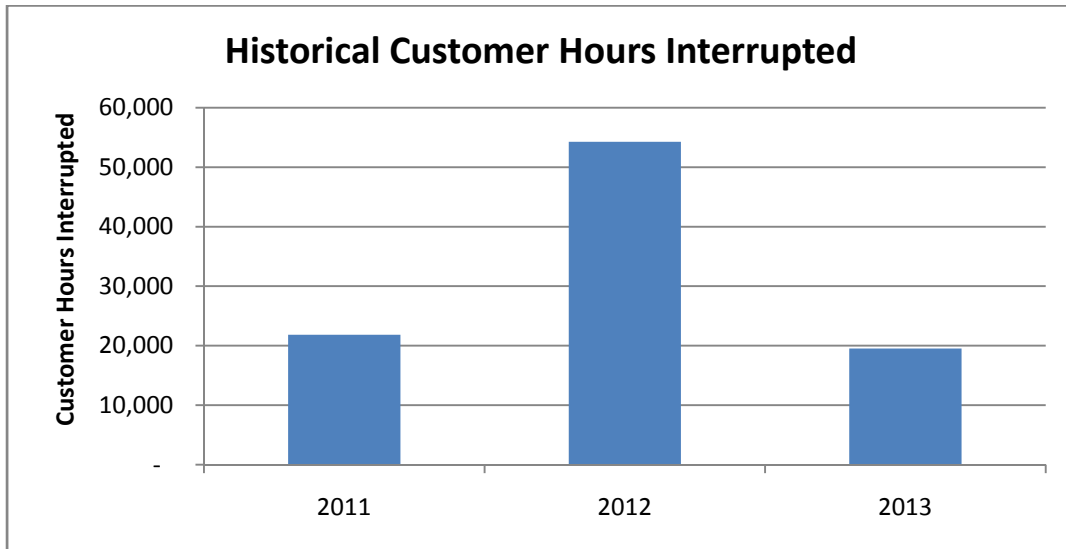
19
20 The financial consequences of failures of switchgear and circuit breakers are also
21 significant. The replacement of a circuit breaker can exceed \$100,000 and approach \$1
22 million depending on various factors including type, voltage rating, and location. The
23 total replacement cost of transformer station switchgear, including the costs of the
24 enclosure and circuit breakers is approximately \$6 million. These costs significantly
25 exceed the annual cost of switchgear maintenance activities and the prevention of even
26 one catastrophic failure over a multi-year period will offset the planned maintenance
27 expenditures during the period.

²⁹ For more information about the ACA, refer to Exhibit 2B, Section D, Appendix A.

1
2 In addition to safety, environmental, and financial risks, Switchgear Maintenance
3 provides customer value by mitigating system reliability risks. A failure of station
4 switchgear or a circuit breaker can result in a large number of customer interruptions and
5 long interruption durations. The specific impact will vary depending on the configuration
6 of equipment within the distribution system. During the 2011 and 2013 period, Toronto
7 Hydro experienced between five and nine incidents annually that were related to
8 switchgear failures. Figures 78 and 79 illustrate the system reliability impacts that these
9 incidents caused, which averaged 12,858 customers impacted and 31,874 customer hours
10 interrupted during the three-year period.



11 **Figure 78: Total Customers Interrupted (CI)**



1 **Figure 79: Total Customer Hours Interrupted (CHI)**

2 Not all switchgear failures are catastrophic in nature and some are as small as the failure
3 of a breaker to open and close. Nevertheless, these failures impact system reliability, as
4 protection systems are designed to coordinate with each other, with the intent of isolating
5 the fault or failure to the smallest possible area within the distribution system. If a
6 protection device were to fail to function, a protection device located further upstream
7 would operate. Such a scenario results in outages impacting greater numbers of
8 customers and system assets as well as increasing the safety risks to employees and
9 bystanders near stations. Failure of protection devices on the distribution system could
10 also result in the fault migrating to the transmission system, resulting in even larger
11 outages. Maintenance tasks are designed to ensure protection devices operate as
12 designed. During maintenance, crews verify and correct improper settings onsite such as
13 (1) verifying that the voltage and current settings on the fault detecting relays are correct
14 for the system element being protected; (2) verifying that the operating characteristics of
15 the fault detecting relays are correct for the applied setting; and (3) verifying that the
16 operation of auxiliary relays and output functions, such as circuit breaker tripping and
17 annunciation, are correct.

11.1. Segment Costs

The following table contains the historic and planned expenditures for this segment.

Table 12: Historical and Forecasted Segment Spending (\$ Millions)

Total Spending	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
	1.2	0.9	1.3	1.3	1.4

With the exception of a decrease in 2012, expenditures have increased gradually. Toronto Hydro maintained 205 circuit breakers in 2012, as compared to 303 and 358 in 2011 and 2013, respectively. However, this level of accomplishment has lagged behind the number of breakers that require maintenance. In accordance with reliability-centred maintenance principles, Toronto Hydro needs to maintain approximately 440 breakers annually, but has only averaged 290 over the 2011-2013 period. The reason for this deficit is the need to take significant numbers of planned equipment outages at stations to accommodate the varying maintenance cycles (i.e., three years, four years, and eight years). This need has posed a work execution risk to maintenance activities, as it can be difficult to align the outage availability times (due to system loading restrictions) with the availability of labour resources (switching crews and distribution system technologists) to complete the work.

11.2. Test Year Segment Costs

2015 expenditures are planned to be \$1.4 million, which is \$0.1 million greater than the 2014 planned expenditure. The increase is driven by a need to increase the number of circuit breakers maintained annually to align with prescribed maintenance cycle frequencies. To facilitate this effort, Toronto Hydro is taking steps to mitigate the work execution risks by better coordinating station equipment maintenance activities, and in particular Station Switchgear Maintenance and Station Equipment Maintenance to reduce the number of planned station equipment outages that are required. Where possible,

entire station outages are now coordinated to allow work crews to maintain station equipment units at once, without the need for multiple planned outages. This is expected to result in reduced safety risks for employees from reductions in manual switching operations to perform maintenance. Toronto Hydro coordinates these activities on a four-year cycle. For transmission stations and stations in downtown Toronto, where entire station outages are not possible, planned outages continue to be taken for subsets of station equipment as necessary. In addition to mitigating work execution risks and enabling Toronto Hydro to accomplish maintenance on a greater number of circuit breakers, this approach has resulted in productivity savings.

12. STATION EQUIPMENT MAINTENANCE SEGMENT

The Station Equipment Maintenance segment oversees equipment that is located at all of Toronto Hydro's 35 TS and 164 MS locations, including 248 station transformers. Transformer stations are points of power supply from HONI's transmission system to Toronto Hydro's distribution system, which step down supply voltages from 230 kV or 115 kV to 27.6 kV or 13.8 kV, utilizing transformers that, with one exception, are owned by HONI. Municipal stations are stations within Toronto Hydro's distribution system and are supplied by Toronto Hydro feeders, at 27.6 kV or 13.8 kV, and step down voltage to 13.8 kV or 4.16 kV. Toronto Hydro owns and maintains all equipment at MSs, including the transformers, and a large number of equipment at TSs. At TSs, Toronto Hydro does not own the power transformers.

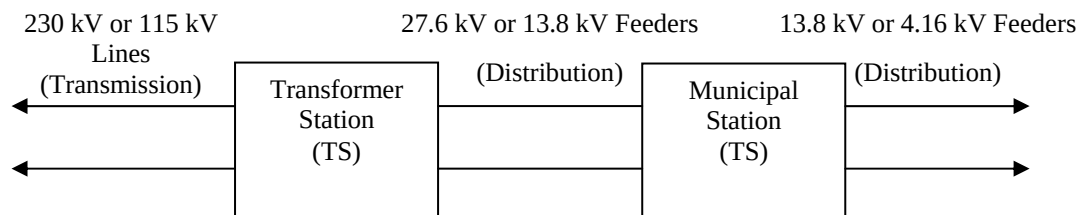


Figure 80: System Configuration

- 1 Figures 81 and 82 below depict station power transformers at Toronto Hydro's stations.



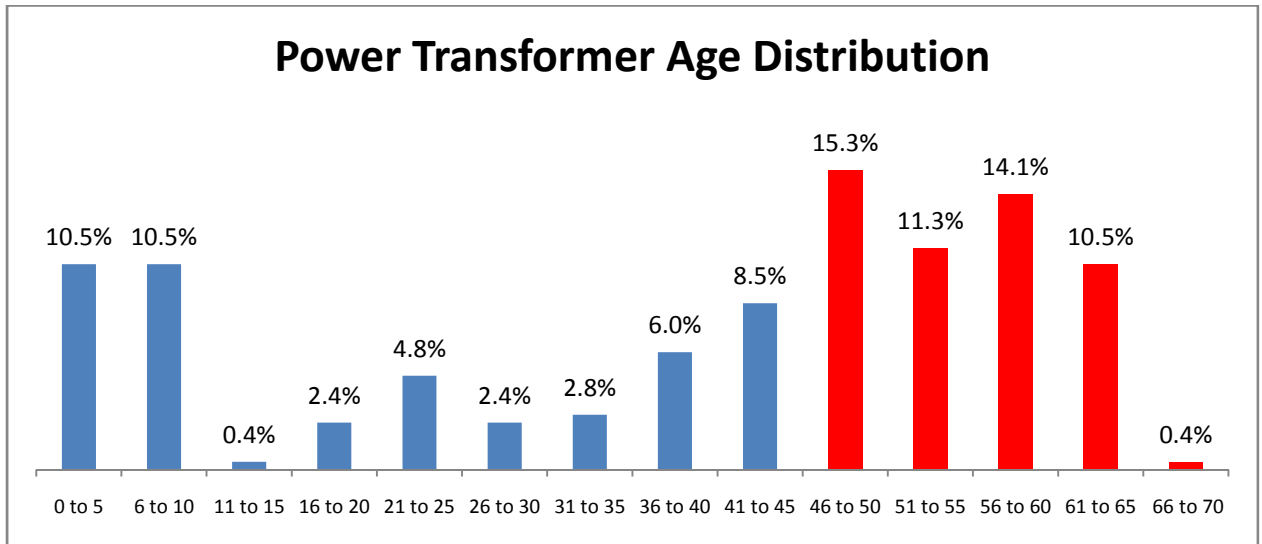
Figure 81: Power Transformer at Cavanagh TS



Figure 82: Power Transformer at Neilson Dr. MS

- 2 Toronto Hydro's station equipment is aging and much of it has surpassed its expected
3 useful life. The best indicator of this is the age demographics for power transformers,
4 which are essential components of every station. Approximately two-thirds of Toronto
5 Hydro's transformers were installed in the 1950s through the 1970s. The average useful
6 life of these units is 45 years and a significant percentage of them have surpassed this
7 age. Approximately 52% of the entire population will exceed 45 years of age by 2015 as
8 shown in Figure 83. In addition, Toronto Hydro's ACA tool shows that 15% of power
9 transformers are in poor or very poor condition.³⁰

³⁰ For more information about the ACA, refer to Exhibit 2B, Section D, Appendix A.



1 **Figure 83: Age Distribution of Power Transformers as of 2015**

2 As transformers age, maintenance becomes increasingly important to ensure that the core
3 and windings continue to function within acceptable parameters, insulating properties do
4 not deteriorate excessively, and that auxiliary equipment such as gauges and alarms are
5 functioning properly to detect and provide early warnings of problems such as oil
6 leakage, gases in the oil, and overheating.

7
8 Maintenance activities are focused on inspecting, testing, and cleaning of assets,
9 including power transformers and their auxiliary equipment, current transformers,
10 potential transformers, station service transformers, DC batteries, chargers, disconnect
11 switches, load break switches, fuses, interconnect cables and remote terminal units.
12 Failures of this equipment, and in particular, failures of power transformers, can result in
13 station fires, oil leaks, significant emergency response and equipment replacement costs,
14 and power interruptions impacting in excess of 5,000 customers. Maintenance activities
15 are vital for mitigating the risk of such failures and associated consequences, and
16 extending the useful life of equipment as they identify failing insulation, deterioration of

1 insulating oil, and transformer winding irregularities such as shorted turns, all of which
2 can lead to catastrophic equipment failure if not addressed.

3
4 The Station Equipment Maintenance segment does not include maintenance of station
5 switchgear, which is captured in the dedicated Station Switchgear Maintenance segment.
6 Examples of activities that are undertaken as part of Station Equipment Maintenance are:

- 7 • comprehensive transformer testing including winding resistance and power factor
8 testing to evaluate the insulation integrity of the core and windings;
- 9 • cleaning of power transformer bushings to remove contamination that can lead to
10 tracking and flashovers;
- 11 • inspections and calibrations of transformer auxiliary equipment such as relays,
12 temperature and oil gauges, and alarms;
- 13 • verifying the integrity of all clamped and bolted connections on primary feeders,
14 insulators, bushings, secondary feeders and buses;
- 15 • cleaning and testing of on-load tap changers, which are devices used to regulate
16 voltage; and
- 17 • testing of transfer trip relays between a MS transformer (at 4 kV) and the
18 upstream 13.8kV or 27.6kV supply feeder.

19
20 Station Equipment Maintenance, including the aforementioned activities, requires
21 planned outages and is scheduled on a four-year cycle. These activities are critical to
22 preventing an equipment failure within a station as the preventative and predictive tools
23 and tests that are employed during maintenance enable Toronto Hydro to prevent and
24 identify deterioration on equipment that can lead to failures and associated consequences.

25
26 When equipment failures do occur, for example on a power transformer, they pose
27 significant safety, environmental, financial, and system reliability risks. An example of a
28 transformer failure occurred at Dupont MS in 2003. The 49-year old transformer failed

1 and resulted in a fire that caused damage to two other power transformers at the station
2 and caused oil and fluids to spill into the station. This event interrupted 5,675 customers,
3 resulting in over 23,341 customer hours interrupted. The entire outage lasted for 6.6
4 hours. Figures 84 to 86 show the damage caused by this incident.



5 **Figure 84: Failed Power Transformer**



Figure 85: Damages to the MS wall on the Left



Figure 86: Leaking fluids from failed transformer

1 The safety risks associated with a failure of this nature include station fires and flashovers
2 which can cause injury to employees in a station; environmental risks include the spillage
3 of oil from ruptured transformer oil tanks which can contaminate ground water and
4 environmentally sensitive locations and the release of hazardous combustion by-products.

5
6 During 2011-2013, Toronto Hydro experienced nine outage incidents cause by failed
7 station transformer equipment. Fortunately, none of these incidents were of the
8 magnitude of the failure at Dupont MS in 2003; however, they did cause 8,680 customer
9 interruptions and 9,915 customer hours of interruption over the three-year period and
10 thousands of dollars in emergency response. From a financial perspective, transformer
11 failures can result in emergency response and equipment replacement expenditures that
12 range between \$0.2 million and \$4 million. Given these figures, the mitigation of even
13 one costly failure in a year or period of time can result in savings that substantially offset
14 the cost of Station Equipment Maintenance.

Although power transformer failures pose the greatest risk within stations, it is important to note that Station Equipment Maintenance mitigates failures on various other types of station equipment which can also cause significant safety, environmental, financial and system reliability risks. One example is load break switches, which are used to supply and isolate the primary voltage feed to a power transformer at municipal stations. These switches are installed in outdoor enclosures at 27.6 kV. A failure of such a switch can cause a station outage and significant safety risks as these switches are often operated manually. Maintenance activities ensure the successful operation of a switch during fault conditions and include cleaning insulators, lubricating contacts and gears, checking blade alignment, and conducting electrical tests such as contact resistance, insulation resistance and fuse resistance tests. Another example is station service equipment, which supplies batteries, ventilating systems, lighting, and cranes. A failure of this equipment can result in the loss of power to station protection equipment, the loss of remote communication and control functions, overheating of switchgear, and various other risks. Maintenance mitigates the risk of these failures occurring.

12.1. Segment Costs

The following table contains the historic and planned expenditures for this segment.

Table 13: Historical and Forecasted Segment Spending (\$ Millions)

Total Spending	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
	0.6	0.5	0.7	0.8	0.9

Expenditures have been increasing to enable Toronto Hydro to achieve a four-year maintenance cycle. Similar to work undertaken as part of Station Switchgear Maintenance, accomplishments in Station Equipment Maintenance have lagged behind the number required as a result of the need to take a large number of planned outages on critical and at times difficult to take out-of-service assets due to system constraints. As

1 described in the Station Switchgear Maintenance segment, Toronto Hydro has addressed
2 this issue by harmonizing maintenance cycles and plans to continue the gradual increases
3 in 2015 to fully achieve a four-year maintenance cycle.

4
5 **12.2. Test Year Segment Costs**

6 The proposed 2015 test year costs are \$0.9 million, which is \$0.1 million greater than
7 forecasted costs in 2014. The increase is attributed to the planned increase in
8 maintenance activities to achieve the four-year maintenance cycle and nominal
9 inflationary pressures.

10
11 Maintenance activities are becoming increasingly important as Toronto Hydro's station
12 assets are aging, as evidenced by the fact that 52% have reached or surpassed their
13 expected life and are at an increased risk of failure. The preventative and predictive tools
14 and activities employed during maintenance serve to reduce the risk of equipment failures
15 and their associated safety, environmental financial and system reliability risks. The
16 mitigation of even one catastrophic transformer failure could possibly save \$1 million in
17 expenditures, prevent an outage impacting thousands of customers, and prevent a spill of
18 5,000 to 55,000 litres of oil at a station.

CORRECTIVE MAINTENANCE PROGRAM

1. SUMMARY

Table 1: Corrective Maintenance Program Expenditures (\$ Millions)

	2011	2012	2013	2014	2015
Corrective Maintenance	25.8	21.5	17.0	19.0	22.2

This schedule provides information about Toronto Hydro’s Corrective Maintenance program. The program undertakes actions to address the deficiencies or substandard conditions on the distribution system that have been identified during the normal course of operations. This typically includes the deficiencies or substandard conditions identified through activities undertaken by the Preventative and Predictive Maintenance program,¹ or through the Emergency Response program.²

2. PROGRAM DESCRIPTION

Corrective Maintenance activities typically involve short planning horizons given the risks that deficiencies and substandard conditions can pose if left unaddressed. Examples of corrective activities include investigating the thermal anomalies, also referred to as “hot spots” that have been identified on equipment by overhead line patrols, or conducting transformer oil reclamation following the findings of high concentrations of particular gases in transformer oil during station inspections.

The Corrective Maintenance program as a whole has been experiencing a general downward trend in expenditures as a result of increases in some capital and maintenance

¹ Exhibit 4A, Tab 2, Schedule 1.

² Exhibit 4A, Tab 2, Schedule 3.

activities as discussed in the Distribution System Plan³ and the Preventative and Predictive Maintenance program.⁴

The work comprising the distribution and stations corrective maintenance activities includes repairs of deficiencies found on distribution and stations assets that must be addressed within a short planning horizon (typically less than one year). The scope of the corrective maintenance work includes overhead and underground assets, primary and secondary lines, and Toronto Hydro's 164 Municipal Stations ("MS") and 35 Transformer Stations ("TS"). The scope of work does not include emergency repairs, which are managed and discussed in the Emergency Response Program.⁵ It does, however, include permanent repairs to assets that have been temporarily repaired during an emergency event.

A significant portion of distribution and stations corrective maintenance is driven by deficiencies identified through the execution of Preventative and Predictive Maintenance activities.⁶ Corrective maintenance tasks typically involve restoring assets to their normal operating conditions by undertaking maintenance, refurbishment, or component replacements. Toronto Hydro performs all corrective activities using a prioritization system, through which it responds first to deficiencies and situations posing the greatest risk to public or employee safety, the environment, and system reliability.

The Corrective Maintenance program consists of the following activities:

- **Distribution Overhead Maintenance:** Corrective repairs of defective or failed equipment and replacement of components that are part of the overhead distribution system, including conductor, conductor splices, insulators, brackets, lightning arresters, pole-mounted transformers, and overhead switches.

³ Exhibit 2B.

⁴ Exhibit 4A, Tab 2, Schedule 1.

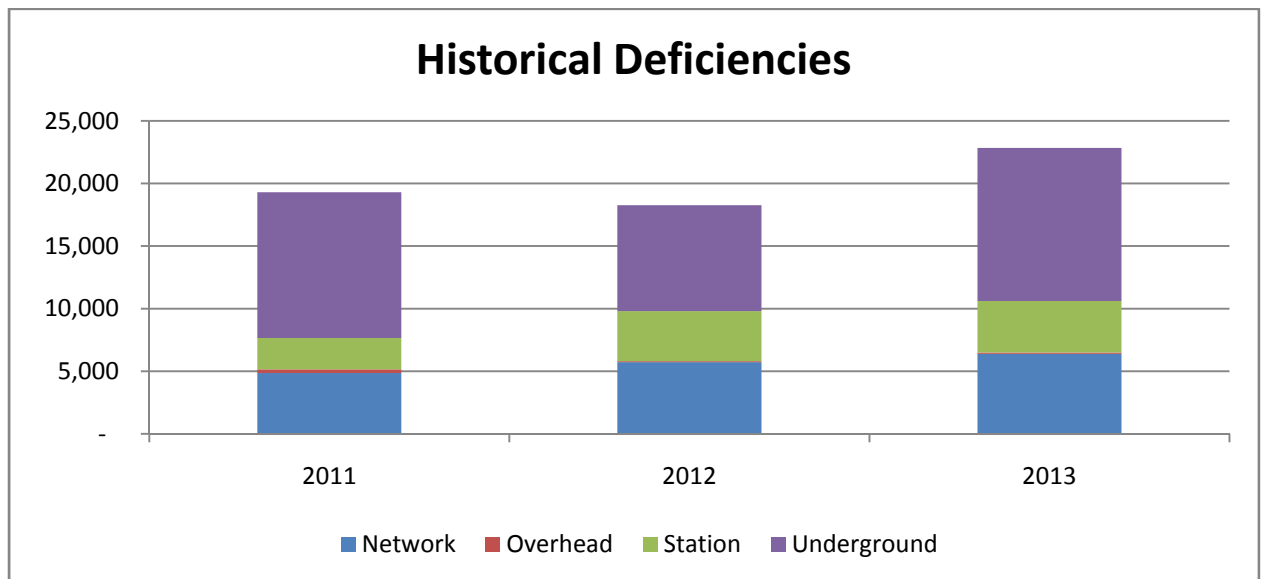
⁵ Exhibit 4A, Tab 2, Schedule 3.

⁶ Exhibit 4A, Tab 2, Schedule 1.

- 1 • **Distribution Underground Maintenance:** Repairs of defective or failed
2 equipment and replacement of components that are part of the underground and
3 network distribution system, including cables, cable splices, vaults, ducts, vents,
4 hatchways, sump pumps, network transformers and protectors, underground
5 switches, vault transformers, pad-mounted transformers, and pad-mounted
6 switches.
- 7 • **Stations Maintenance:** Corrective repairs to station equipment such as
8 transformers, tap changers, cooling systems, switchgear, bus-bars, air
9 compressors, circuit breakers, station auxiliary and DC power supplies, current
10 transformers, potential transformers, relays, meters, fire alarms, remote terminal
11 units and SCADA systems.
- 12 • **Vegetation Management:** Responses to off-cycle requests and spot trimming
13 needs identified by Toronto Hydro crews or direct customer feedback, including
14 dying or damaged tree limbs and branches, storm damage, or excessive tree
15 growth that threatens overhead distribution lines or has created system reliability
16 issues.
- 17 • **Equipment CO₂ Washing:** Cleaning excessive dirt, debris, and contamination
18 from energized equipment in below-grade and pad-mounted installations to
19 prevent arcing and flashover risks.
- 20 • **Worst Performing Feeder Maintenance:** This work targets feeders that are at
21 risk of experiencing seven or more power outages in a single year and may consist
22 of tree trimming, switch maintenance, line patrols, and insulator washing
23 depending on the needs of particular feeders.
- 24 • **Oil Reclamation:** Filtering of transformer oil that has been found to contain
25 excessive levels of moisture or contaminants and the restoration of the oil's
26 properties to near new condition.

27
28 These activities are critical to maintaining lines and stations assets. These assets are
29 exposed to normal degradation processes (e.g., corrosion, water ingress, heavy loading)

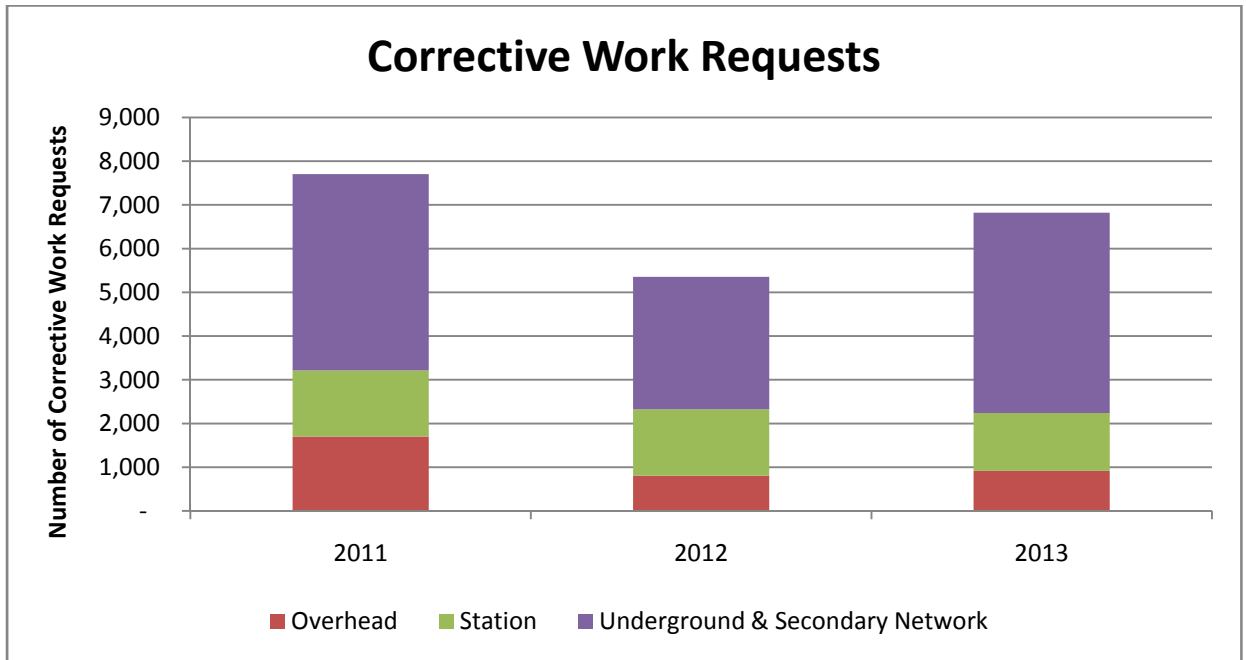
1 and external forces (e.g., adverse weather, tree contacts, foreign interference) that cause
2 deficiencies and at times accelerate the ageing of the assets. The Preventative and
3 Predictive Maintenance program,⁷ illustrates the number of deficiencies that Toronto
4 Hydro identifies annually for a variety of assets. Figure 1 below provides this number in
5 the aggregate, which ranges between 15,000 and 25,000 deficiencies on lines and stations
6 assets combined.



7 **Figure 1: Historical Deficiencies**

8 When deficiencies or substandard conditions are identified, they can be addressed
9 through a variety of programs. As mentioned above, some are addressed immediately
10 when found as part of the Preventative and Predictive Maintenance program. Others are
11 addressed through capital programs. The vast majority however, are addressed through
12 corrective maintenance work requests. Figure 2 below shows a breakdown of the number
13 and types of corrective work requests that were made during the 2011 to 2013 period.

⁷ Exhibit 4A, Tab 2, Schedule 1.



1 **Figure 2: Historical Corrective Work Requests**

2 During this three-year period, approximately 5,500 to 8,000 corrective work requests
3 were issued each year, with the majority targeting underground system assets such as
4 vaults, cable chambers, pad-mounted equipment, and cables. As is evident from Figures
5 1 and 2 above, the number and type of work requests vary from one year to the next, and
6 do not exhibit a one-to-one relationship with the number of deficiencies found. For
7 example, over 19,000 deficiencies were found in 2011 and almost 8,000 corrective work
8 requests were issued. This equates to less than one work request for every two
9 deficiencies found. In 2013, this figure was one for every three deficiencies found. In
10 general, corrective maintenance needs are volatile and vary both in number and in type
11 from one year to the next.

12
13 Distribution and stations corrective maintenance, and the thousands of work requests that
14 are addressed each year, serve to mitigate a wide variety of risks including public and
15 employee safety, environmental, system reliability, and financial risks.

1 From a safety perspective, corrective maintenance addresses deficiencies that if ignored,
2 could expose members of the public and Toronto Hydro employees to safety risks. For
3 example, a deficiency that is routinely found during Overhead Line Patrols, using
4 infrared thermography, is a thermal anomaly, or “hot spot”, on a conductor splice. The
5 hot spot is evidence of an issue with the splice and, if not addressed in a timely manner,
6 the splice may fail resulting in a live conductor falling to the ground and energizing the
7 surrounding area. Such a condition presents an unacceptable risk that must be mitigated
8 through corrective maintenance in a timely manner.

9
10 The “hot spot” example on a conductor splice also raises system reliability risks. The
11 failure of the splice, depending on the specific location of the conductor, may result in a
12 power interruption to hundreds of customers for an hour or more. Other deficiencies that
13 pose similar system reliability risks include deteriorated components such as insulators,
14 mounting brackets and cross-arms, broken ground wire or guy wires, overgrown
15 vegetation and dying branches, faulted circuit indicators with depleted batteries, failed
16 surge arresters, conductor clearance issues (e.g., excessive conductor sag), transformer oil
17 with high moisture or acid levels, and excessively dirty installations (e.g., vaults, pad-
18 mounted transformers and switches). In aggregate, these individual deficiencies pose
19 significant reliability risks. For example, over the 2011-2013 period, Toronto Hydro
20 tallied 660 pieces of defective assets annually (on average). During this same period,
21 defective equipment caused approximately one-third of all interruptions on overhead
22 feeders and over 90% of all interruptions on underground feeders.

23
24 From an environmental standpoint, corrective maintenance mitigates the risk of oil leaks
25 and of premature equipment failures. For example, cables that are leaking oil must be
26 repaired in a timely manner to prevent oil from entering soil, drains, and waterways. Oil-
27 filled equipment that is at risk of corroding should be maintained in a clean state, free of
28 contaminants that can act as catalysts for corrosion. Corrective maintenance cleans dirty

vaults and pad-mounted installations and applies corrosion inhibiting coatings to equipment to prevent excessive corrosion and the possibility of subsequent oil leaks.

Corrective maintenance (such as the above-noted activities) directed at preventing corrosion, also serves to mitigate financial risks. Maintenance work extends the life of assets and defers capital equipment replacement expenditures. An example of this is caulking that is applied to civil infrastructure such as vaults and ducts. Caulking seals cracks in concrete and minimizes damage from moisture ingress. If caulking is not applied, cracks can grow to threaten the structural integrity of civil infrastructure and result in expensive vault rebuilds that cost hundreds of thousands of dollars. Water ingress can also accelerate corrosion of equipment, leading to premature failure and associated costs.

2.1. Program Costs

The following table contains the historic and planned expenditures for this segment.

Table 2: Historical and Forecasted Segment Spending (\$ Millions)

Corrective	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Maintenance	25.8	21.5	17.0	19.0	22.2

Historic expenditures have shown a downward trend due to an increasing emphasis in recent years on planned capital and preventative maintenance activities, particularly on distribution assets, and more efficient corrective work execution practices. Specific areas that have experienced reduced levels of expenditure since 2011 are work requests on overhead distribution lines, activities to address contact and stray voltage issues and the worst performing feeders. These areas account for an approximately \$6 million reduction between 2011 and 2013. In addition, Toronto Hydro further emphasized “find and fix” practices (in 2013) in the Preventative and Predictive Maintenance program,⁸ which promote the on-site repair of minor deficiencies as they are identified. Examples of

⁸ Exhibit 4A, Tab 2, Schedule 1.

1 minor deficiencies and associated corrective actions include lubricating components,
2 replacing nomenclature, replacing faulted circuit indicators, replacing sump pumps,
3 clearing drains, caulking ducts and roof slabs, installing missing guy guards, repairing or
4 replacing locks, hinges, and handles. Addressing these deficiencies while on site during
5 Preventative and Predictive Maintenance eliminates the need to dispatch a Corrective
6 Maintenance crew and reduces expenditures.

7
8 Despite the above, reductions in expenditures to the level experienced in 2013 are not
9 sustainable in the short term. As described in the Preventative & Predictive Maintenance
10 program, Toronto Hydro continues to identify a large number of deficiencies on both
11 distribution and stations assets. Furthermore, significant proportions of these assets have
12 surpassed their expected lives and are at an increasing risk of failure. As a result of this
13 combination of factors, Toronto Hydro is forecasting that corrective expenditures will
14 exceed 2013 levels in 2014 and 2015.

15 16 **2.2. Test Year Segment Costs**

17 For 2015, Toronto Hydro is forecasting a Corrective Maintenance expenditure of \$22.2
18 million. This figure is based on 19,000 deficiencies on distribution and stations assets
19 and the issuance of 6,700 work requests. The increase over the 2014 forecast of \$19.0
20 million is primarily attributed to the inclusion of \$1.6 million for corrective maintenance
21 of assets that were formerly part of the street lighting system.⁹ Excluding this \$1.6
22 million, Corrective Maintenance expenditures are well below the levels experienced in
23 2011 and 2012. Further reductions to the expenditure level will adversely affect Toronto
24 Hydro's efforts to mitigate public and employee safety, environmental, system reliability,
25 and financial risks.

⁹ As discussed Exhibit 2A, Tab 5, Schedule 1 Toronto Hydro proposes to allocate a portion of the revenue received by TH Energy from the City of Toronto for street lighting maintenance and operation to exactly offset the revenue requirement impacts arising from the transfer. Consequently, there is no overall change to the Base Revenue requirement for 2015 as a result of these assets being transferred into the utility's rate base.

EMERGENCY RESPONSE

1. SUMMARY

Table 1: Emergency Response Program Costs (\$ Millions)

	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Emergency Response	13.3	13.9	26.3	16.2	15.3

/C

The Emergency Response program funds the 24 hour, 7 days a week, 365 days a year, response to unplanned and urgent events involving Toronto Hydro's distribution system assets. Toronto Hydro operates within a dynamic, dense, urban environment where emergency response is required for a wide variety of reasons including but not limited to equipment failure, severe weather, power quality issues, motor vehicle accidents (as shown in Figure 1), equipment isolations, and Toronto emergency services needs (i.e., police, fire, ambulance). The demands on the Emergency Response Program can vary considerably from one year to the next due to impacts from significant system events and extreme weather.



1 **Figure 1: Motor Vehicle Accident with Distribution Pole**

2 The Emergency Response Program is comprised of three segments:

- 3 1) Dispatch Logistics;
- 4 2) Grid Response; and
- 5 3) Significant System Disturbance Response

6

7 Dispatch Logistics involves the intake of communications (e.g., telephone calls) from
8 external parties (customers, authorities), collecting information about incidents and
9 events that have occurred on the distribution system, and assigning the appropriate field
10 resources to attend to situations that arise. The Grid Response segment covers the
11 resources that Toronto Hydro dispatches to address the emergency events. Significant
12 System Disturbance Response involves efforts to restore power after major events such as
13 the 2013 ice storm and flood, extended loss of transmission supply, and damage arising
14 from severe but increasingly common weather related events.

The following table summarizes the Historical (2011-2013), Bridge (2014) and Test Year (2015) expenditures for the Emergency Response program and its segments.

Table 2: Emergency Response Program and Segment Costs (\$ Millions)

Program Segments	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Dispatch Logistics	1.6	2.3	2.2	1.7	1.7
Grid Response	10.5	9.4	11.7	12.7	11.9
Significant System Disturbances	1.2	2.2	12.4	1.7	1.6
Total	13.3	13.9	26.3	16.2	15.3

/C

/C

Expenditures in 2013 were significantly greater than previous years due to \$10.2 million expended during the 2013 Ice Storm. Excluding the Ice Storm, expenditures in 2015 are projected to be \$0.9 million greater than the average annual expenditure during the 2011 to 2013 period. This increase is attributed to an increasing trend in the number of calls and events that must be responded to and additional funds required for Grid Response related to assets that were formerly part of the street lighting system in Toronto.¹

2. DISPATCH LOGISTICS SEGMENT DESCRIPTION

The Dispatch Logistics segment funds the intake of trouble calls (inbound) and the coordination and dispatch (outbound) of crews responding to trouble call events. This function is performed 24 hours a day, 7 days a week by a complement of communications personnel (“dispatchers”).

¹ As discussed in the Exhibit 2A, Tab 5, Schedule 1, Toronto Hydro proposes to allocate a portion of the revenue received by TH Energy from the City of Toronto for street lighting maintenance and operation to exactly offset the revenue requirement impacts arising from the transfer. Consequently, there is no overall change to the Base Revenue requirement for 2015 as a result of these assets being transferred into the utility’s rate base.

1

2 Dispatchers receive inbound communications that alert Toronto Hydro of particular
3 events involving, or occurring in the vicinity to Toronto Hydro's distribution assets that
4 require immediate or time-sensitive responses. These calls are placed by customers,
5 members of the public, emergency authorities, Toronto Hydro's internal crews, and
6 external contractors.

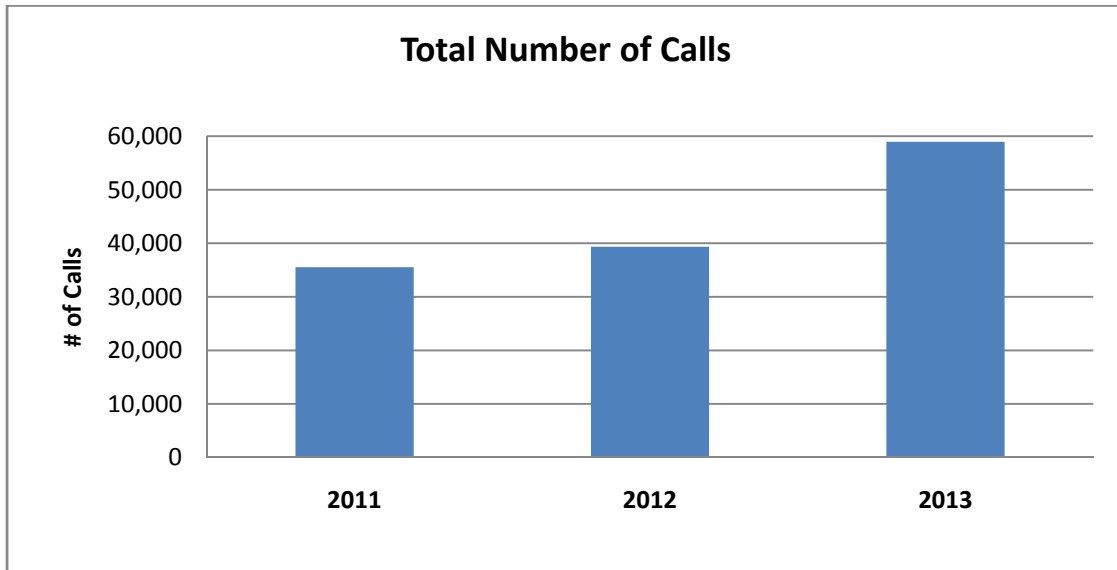
7

8 For each call, dispatchers must interpret the nature of the event that has occurred,
9 prioritize the event, and then dispatch (outbound) the appropriate resources to the event.
10 To accomplish this, dispatchers gather information and interact with various systems
11 including Toronto Hydro's Outage Management System ("OMS"), the Distribution
12 Management System ("DMS"), the Geospatial Information System ("GIS"), and the
13 Customer Information System ("CIS").

14

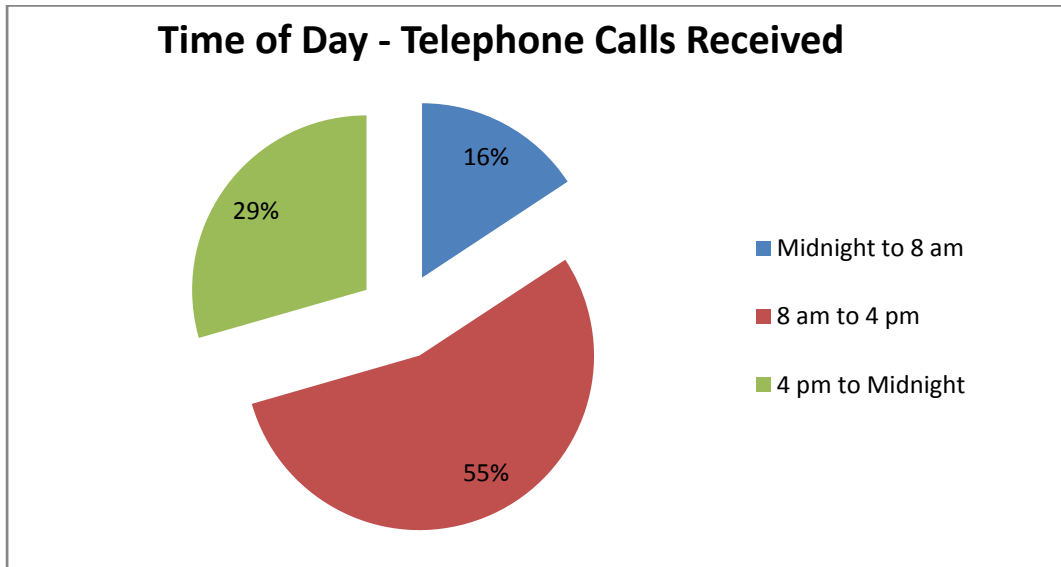
15 During the 2011 to 2013 period, dispatchers attended to between 35,000 and 59,000
16 telephone calls annually as illustrated in Figure 2 below. The number of event calls has
17 increased steadily in recent years and peaked during the 2013 Ice Storm. When major
18 events such as the 2013 Ice Storm are excluded, Toronto Hydro anticipates attending to
19 40,000 event-related telephone calls annually.

20



1 **Figure 2: Total Number of Calls Received**

2 Given Toronto Hydro's dense, urban environment, which is characterized by large
3 numbers of critical loads (e.g., major hospitals, pumping stations, Toronto Transit
4 Commission), dispatchers attend to telephone calls twenty-four hours per day. As
5 illustrated in Figure 3 below, the company receives the greatest number of calls between
6 8:00 am and 4:00 pm, while the lowest portion of events occurs between midnight and
7 8:00 am. The volume of calls received between midnight and 8:00 am is significant and
8 amounts to an average of 7,000 calls per year.

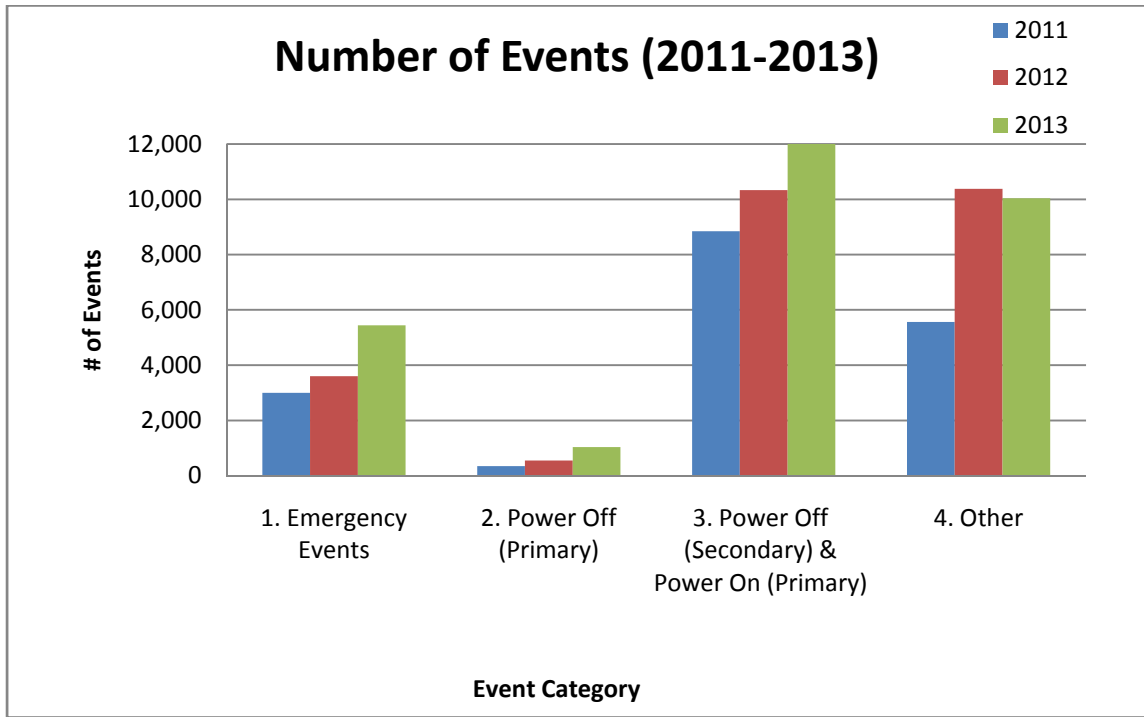


1 **Figure 3: Time of day that telephone calls are received**

2 The telephone calls that Toronto Hydro receives relate to an average of 24,000 events
3 each year. Toronto Hydro classifies these events into four main categories:

- 4 1) Emergency calls, including calls made by Toronto EMS (i.e., police, fire, and
5 ambulance);
- 6 2) “Power Off” calls attributed to power interruptions on primary facilities (i.e., on
7 the primary side of the distribution transformer);
- 8 3) “Power Off” calls attributed to interruptions on secondary facilities (i.e., the
9 distribution transformer or equipment on the secondary side of transformer) and
10 “Power On” events where power has not been interrupted but an issue has been
11 identified on primary facilities; and
- 12 4) Other situations such as sagging wires, objects on wires, feeder patrol findings,
13 and planned outages.

14
15 Figure 4 below illustrates the number of events that occurred under each category during
16 the 2011 to 2013 period.



1 **Figure 4: Time of day that telephone calls are received**

2 Categories 1 and 2 (i.e., emergency and primary “power off” events) are the highest
3 priority events for dispatchers to attend to as: (1) emergency calls reported by Toronto
4 police, fire or ambulance services (or members of the public) may involve public health
5 and safety risks; and (2) primary “power off” events involve power disruption to sizeable
6 loads and large numbers of customers. In the case of emergency calls, Toronto Hydro is
7 required to have a crew arrive at the locations of the event within one hour of being
8 notified of the event 80% of the time.² Categories 3 and 4 are of lower priority, but still
9 important, as they typically involve power interruptions to small numbers of customers or
10 lower risk situations.

11

² Ontario Energy Board, *Distribution System Code*, (Toronto: Ontario Energy Board, 2013), at section 7.9.1 and 7.9.2 [“DSC”].

1 Toronto Hydro's complement of dispatch staff is critical to effecting timely field
2 response and mitigating public and employee safety, system reliability, productivity, and
3 regulatory compliance risks. Beginning with public and employee safety, any reductions
4 in dispatch staff will raise the risk of incidents occurring on the system. For example, an
5 emergency situation involving a motor vehicle accident that has damaged a pole line can
6 lead to a live conductor falling to the ground if dispatch delays occur. Other examples
7 relate to the need for field crews to coordinate actions and communicate developments
8 with dispatchers. When crews must enter an underground installation (e.g., cable
9 chamber or a vault), they must obtain a confined space "hold-off", which is a notification
10 to the control centre that they are entering the location. This is necessary to ensure that
11 the control centre is aware of the employees' presence such that it can take the necessary
12 precautions should a system disturbance threatening crew safety occur at that location.
13 Dispatchers assist with coordinating the hold-off and also confirm if there are controlled
14 or designated substances (e.g., asbestos) or any other serious deficiencies that the crews
15 should be aware of before entering the confined space. In addition, dispatchers assist
16 field crews when they encounter issues that require additional resources (e.g., more
17 crews), or coordination with other emergency services such as the police or the fire
18 department. As a result, dispatchers are not only necessary to initially dispatch a crew,
19 but are also crucial for ongoing communications throughout the event.

20
21 Any time delays caused during the outbound dispatch process may also adversely affect
22 system reliability and resource productivity. Power interruptions that are not restored in a
23 timely manner as a result of delays in crew dispatch, or communications between crews
24 and dispatchers, increase the duration of outages (i.e., SAIDI) causing prolonged
25 inconvenience or safety risks to the affected customers. These delays can also result in
26 crews being unable to move on to other work, thereby eroding resource productivity.

Finally, delays caused during outbound dispatch can challenge Toronto Hydro's ability to meet regulatory service quality requirements as set out in the Distribution System Code. Within its urban service territory, Toronto Hydro is required to respond to emergency calls within 60 minutes at least 80% of the time on a yearly basis.³ Given that a response is defined as the arrival of a qualified service person on site, delays during dispatch can raise regulatory compliance risks. Within Toronto's dense environment, Toronto Hydro received approximately 1,300 police, fire, and ambulance calls on average during the 2011 to 2013 period.

2.1. Segment Costs

The following table contains the historic and planned expenditures for the Trouble Call Dispatch segment.

Table 3: Historical and Forecasted Segment Costs (\$ Millions)

Total	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
	1.6	2.3	2.2	1.7	1.7

In mid-2011, the Trouble Call Dispatch function was re-organized to improve customer service and increase productivity. The re-organization combined separate Customer Service Dispatchers and Trouble Dispatchers. Customer Service Dispatchers were previously part of the Customer Relationship Management program⁴ and as a result, the above costs for 2011 do not fully capture the Trouble Call Dispatch segment costs in that year. After the re-organization, costs in 2012 and 2013 were stable at \$2.3 and \$2.4 million respectively, despite increasing demands associated with greater call volumes and major events. Although call volumes have been increasing, Toronto Hydro expects that the peak number of calls received in 2013 (i.e., 59,000 calls) will not repeat in 2014 and

³ *Supra* note 2.

⁴ Exhibit 4A, Tab 2, Schedule 13.

2015. As a result of this and productivity initiatives that are underway, costs for 2014 and 2015 are expected to be lower at \$1.7 million annually.

2.2. Test Year Segment Costs

As shown in the above table, Trouble Call Dispatch segment costs for the 2015 Test Year are expected to be \$1.7 million. This amount is required to fund the intake and dispatch of approximately 40,000 calls and 24,000 events each year. Reductions to these amounts could increase safety and regulatory compliance risks, and may adversely affect system reliability and productivity.

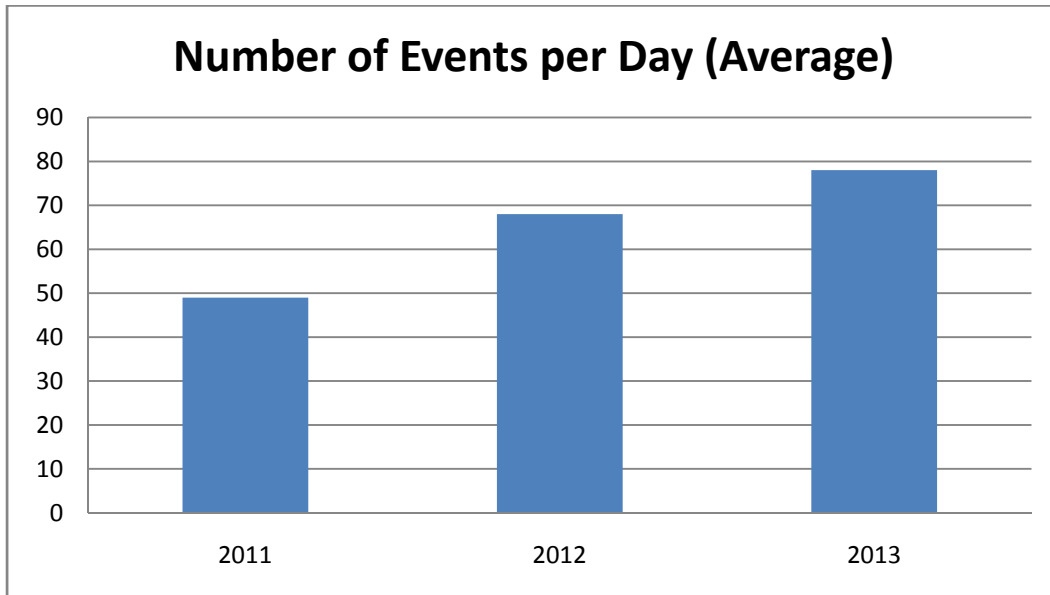
3. GRID RESPONSE SEGMENT DESCRIPTION

The Grid Response segment funds the crew response to the wide variety of emergency events that occur within Toronto Hydro's service territory.

As discussed in the Dispatch Logistics segment, approximately 24,000 events occur annually that each require a crew to attend to one or more locations typically involving:

- power interruptions,
- deficiencies found during inspections that present an immediate risk to the public, employees or system reliability, and
- police, fire or ambulance needs.

These events, which as illustrated by Figure 5 occur daily and are part of the utility's routine operations, necessitate timely response by crews that are properly equipped and trained to address situations that arise. Due to the frequency with which these events occur, Toronto Hydro must assign dedicated staff to Grid Response.



1 **Figure 5: Number of events per day requiring Grid Response.**

2 One set of events that Grid Response attends to is power interruptions. Toronto Hydro
3 experiences approximately 1,900 power interruptions annually. (The average customer
4 on Toronto Hydro's system between 2011 and 2013, experienced approximately 1.5
5 interruptions totalling an hour and a half without power annually). This number does not
6 include interruptions that occur on major event days such as days with significant storm
7 damage. Grid Response in these situations typically results in:

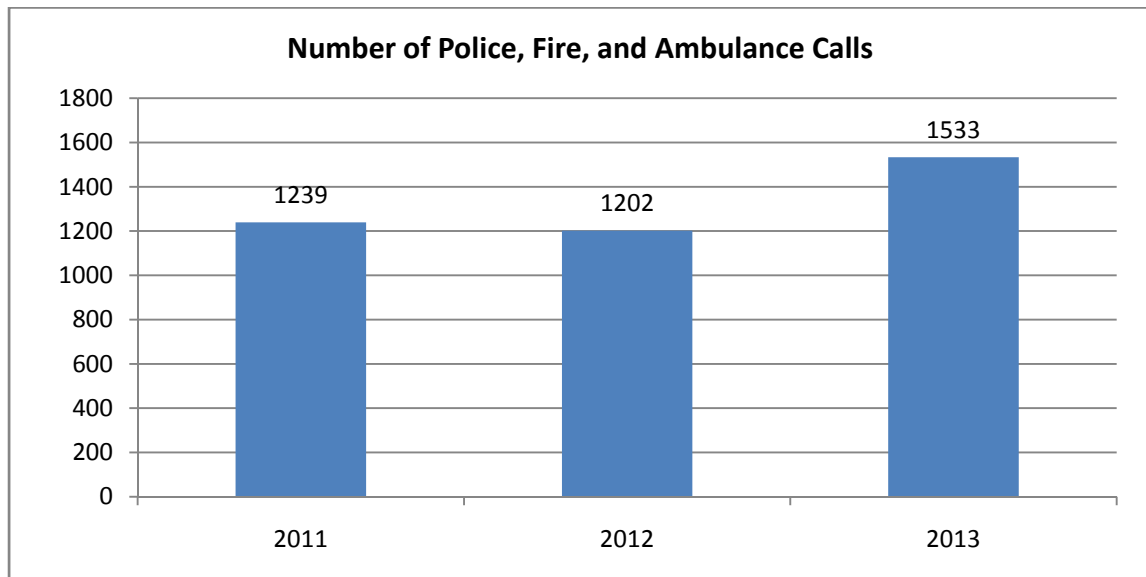
- 8 • an emergency crew restoring power to all customers and making all necessary
9 permanent repairs (e.g., when current-limiting fuses have ruptured, primary or
10 secondary conductors are down, or insulators or arrestors have failed);
- 11 • an emergency crew restoring power to all customers but only making temporary
12 repairs or isolating the deficiency;⁵ or
- 13 • an emergency crew arriving on site and, after assessing the situation and making
14 the area safe for the public and employees, determining that the scope of the

⁵ Such actions typically necessitate follow-up repairs, usually commencing the next day.

1 repair is beyond that crew's capabilities and that construction or civil crews are
2 required to fully address the situation.⁶

3
4 Another set of events that Grid Response addresses are deficiencies with equipment or
5 components that are identified in the course of planned activities and that require
6 immediate attention. For example, Toronto Hydro's Preventative and Predictive
7 Maintenance program⁷ identifies approximately 20,000 deficiencies each year. A subset
8 of these deficiencies raise the need for immediate action on an emergency basis to
9 address unacceptable safety, environmental, and system reliability risks.

10
11 A third set of events that Grid Response attends to is calls from emergency services
12 (police, fire, and ambulance) and members of the public reporting emergency events. On
13 average, Toronto Hydro receives approximately 1,300 calls a year where crews must
14 attend a location, as requested by emergency services personnel. Figure 6 illustrates the
15 call volumes between 2011 and 2013.



16 **Figure 6: Call Volumes from 2011 to 2013**

⁶ When needed as part of Grid Response, construction or civil crew costs are funded from this segment.

⁷ Exhibit 4A, Tab 2, Schedule 1.

1 Given the nature of the events that Grid Response attends to, the vast majority of the
2 work is non-discretionary. For example, restoration efforts after power interruptions
3 must be expedient to minimize the duration of time that customers experience without
4 power, maintain system reliability, and meet customer expectations. Timely responses to
5 police, fire, and ambulance calls are a requirement of the Distribution System Code,
6 which mandates that emergency calls be responded to within 60 minutes at least 80% of
7 the time in Toronto's urban environment.⁸ Responses to serious equipment deficiencies
8 (e.g., damaged cable chamber roofs as illustrated in Figure 7, which is likely to collapse
9 and could result in significant harm to members of the public; oil leaking from a
10 transformer as illustrated in Figure 8, which can contaminate residential and
11 environmentally sensitive areas) are necessary to mitigate potential public safety,
12 environmental, and system reliability risks.



13 **Figure 7: Cable Chamber roof damaged by road work**

⁸ *Supra* note 2.



1 **Figure 8: Response to a leaking transformer in a residential area. Response**
2 **pictures are before, during, and after remediation work undertaken by a Grid**
3 **Response crew.**

4 **3.1. Segment Costs**

5 The following table presents the historic and planned expenditures for the Grid Response
6 segment.

7
8 **Table 4: Historical and Forecasted Segment Costs (\$ Millions)**

Total	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
	10.5	9.4	11.7	12.7	11.9

/C

9 Given that the number and nature of specific Grid Response activities can fluctuate from
10 one year to the next, historic expenditures have varied slightly during the 2011 to 2013.
11 The increase in forecasted expenditures in 2014 is a result of incremental Grid Response
12 resources to improve response times, including performance related to the Distribution
13 System Code's Emergency Response measure.⁹

14

⁹ *Supra* note 2.

1 In recent years, Toronto Hydro has taken steps to maximize the efficiency of dedicated
2 Grid Response resources. For example, when not responding to emergency events, Grid
3 Response resources perform corrective maintenance work that is small in scope (e.g.,
4 missing guy guards, broken grounds) such that crews can be fully utilized without
5 reducing crew capacity and the ability to redirect crews quickly when emergency events
6 arise. In 2014, Toronto Hydro is piloting a number of small-scale corrective maintenance
7 tasks that will lead to productivity improvements and greater utilization of available
8 resources. These improvements are expected to result in cost savings beginning in 2014
9 and fully realized in 2015.

11 **3.2. Test Year Segment Costs**

12 Expenditures for 2015 are forecasted to be \$11.9 million. This amount is required to /C
13 fund the response to an increasing number of events (an average of 24,000 events during
14 the 2011 to 2013 period, approximately 1,900 of which were power interruptions) within
15 Toronto's dense, urban environment.

16
17 Out of the total budget of \$11.9 million, \$0.2 million is forecasted for emergency /C
18 expenditures on assets that were formerly part of the street lighting system in Toronto.¹⁰

19
20 Grid Response is a non-discretionary activity that mitigates public safety, system
21 reliability, and regulatory compliance risks. The importance of the activity is particularly
22 pronounced within Toronto Hydro's dense, urban service territory where customers and
23 the public expect service 24 hours a day, 7 days a week as evidenced by the more than
24 6,000 telephone calls that are received annually between the hours of 12 midnight and 8
25 am.

¹⁰ As discussed in the Exhibit 2A, Tab 5, Schedule 1, Toronto Hydro proposes to allocate a portion of the revenue received by TH Energy from the City of Toronto for street lighting maintenance and operation to exactly offset the revenue requirement impacts arising from the transfer. Consequently, there is no overall change to the Base Revenue requirement for 2015 as a result of these assets being transferred into the utility's rate base.

4. SIGNIFICANT SYSTEM DISTURBANCE RESPONSE SEGMENT

Severe weather systems and large events (e.g., events involving loss of upstream supply from Hydro One Networks Inc.) can necessitate significant crew effort on a number of days each year. The effort is typically in response to widespread damage on the distribution system and power interruptions to customers. The largest of these events are referred to as “Major Events”. During the 2011-2013 period, Toronto Hydro experienced three major events as listed in Table 5 below.

Table 5: List of Major Events from 2011 to 2013

Dates	Major Event Description
October 29-30, 2012	Hurricane Sandy
July 8-9, 2013	Significant Thunderstorm
December 21, 2013 to January 3, 2014	Ice Storm

Irrespective of storm events achieving the status of a major event, the damage that they inflict on the distribution system can require significant crew effort and resources to repair. The Significant System Disturbance Response segment funds the necessary maintenance expenditures to return the distribution system to normal condition following storm and major events. The following figures illustrate examples of damage that has been repaired in recent years.



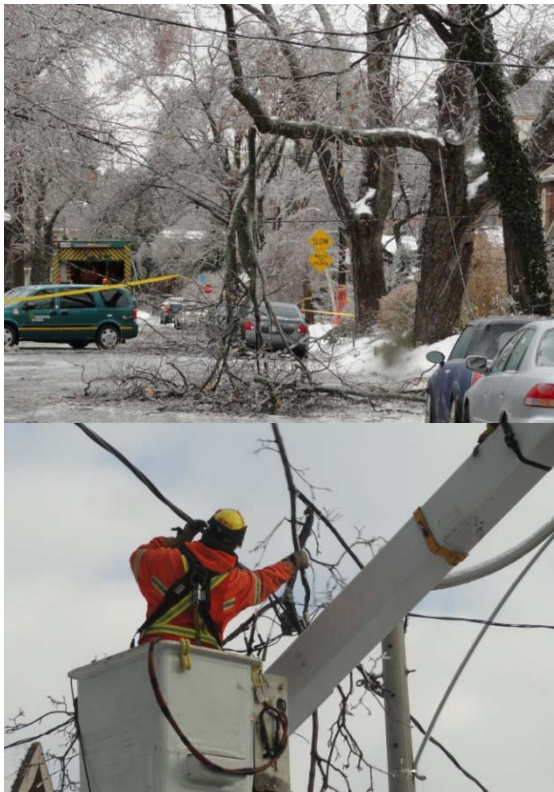
Figure 9: Damage caused during a storm on February 19, 2011.



Figure 10: Damage caused during Hurricane Sandy on October 30, 2012.



Figure 11: Damage caused during a severe thunderstorm on July 19, 2013.



1 **Figure 12: Tree branches and damage to overhead conductors caused during the**
2 **2013 Ice Storm.**



When major events and storm damage occurs, Toronto Hydro directs requisite resources to repair the damage and restore power. For events such as the 2013 Ice Storm, which caused tremendous and widespread damage, any and all available resources, including internal resources (e.g., crews on planned projects) or external resources (e.g., contractors, mutual aid crews from other utilities) are utilized and funded through the Significant System Disturbance Response segment. This approach is necessitated by customer expectations, the need to ensure that critical infrastructure and services such as transit, hospitals and water pumping stations are functional, and to generally meet the needs of the dynamic, urban environment in Toronto. The approach is also necessitated by a need to mitigate public and employee safety (e.g., downed conductors, damaged poles), system reliability (e.g., long durations of customer interruptions), and environmental risks (e.g., failed transformers leaking oil) that storm damage and major events raise.

4.1. Segment Costs

The following table contains the historic and planned expenditures for Major Event and Storm Damage Restoration segment.

Table 6: Historical and Forecasted Segment Costs (\$ Millions)

Total	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
	1.2	2.2	12.4	1.7	1.6

Expenditures can be particularly volatile given the unpredictable nature of major events and storms. Historic expenditures have ranged from a low of \$1.2 million in 2011, which was a year with no major event days, to over \$12 million in 2013, which was a year with 12 major event days.

1 **4.2. Test Year Segment Costs**

2 Expenditures for 2015 are forecasted to be \$1.6 million. This amount is based on the
3 average annual expenditures incurred during the 2011 to 2013 period (after excluding
4 expenditures associated with the 2013 Ice Storm event)¹¹ and has been adjusted for
5 savings that are expected to result from increased Vegetation Management
6 accomplishments (i.e., storm-hardening activity) as discussed in the Preventative and
7 Predictive Maintenance program.¹²

¹¹ Ice storm restoration expenditures were excluded due to the extent of the damage that was caused and the fact that such an event is not expected to occur frequently.

¹² Exhibit 4A, Tab 2, Schedule 1.

DISASTER PREPAREDNESS MANAGEMENT (DPM) PROGRAM

1. SUMMARY

Table 1: Disaster Preparedness Management Program Costs (\$ Millions)

	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Total	0.9	-	-	-	2.4

Events such as the October 2012 Hurricane Sandy, July 2013 flash flood and December 2013 ice storm have places an emphasis on Toronto Hydro’s capability for timely and effective response to major contingency events affecting a large proportion of the utility’s customer base and the major urban environment it serves. While the utility has responded to these events in a timely and effective manner reflective of its capabilities and the combination of external constraints characterising each event, subsequent analysis, industry comparisons and feedback from customers and partner organizations indicate that Toronto Hydro and its customers would benefit from a more comprehensive and robust framework for disaster preparedness planning, management and operation under major contingencies.

Toronto Hydro has been, and remains compliant with all the applicable Ontario Energy Board (“OEB”) and Independent Electricity System Operator (“IESO”) emergency preparedness requirements. However, recent experience indicates that the utility needs to direct additional efforts towards entrenching and enhancing the existing emergency operating procedures, and conducting regular training and simulation activities to ensure that these frameworks are fully understood by the utility’s employees and can be put into action when required on short notice. The need for the proposed program is driven by the increasing frequency of major weather events affecting the City in recent years, driven,

1 among other factors, by climate change,¹ the insights gained from responding to such
2 events, and the critical nature of the load served by Toronto Hydro in Ontario's and
3 Canada's context.

4
5 The proposed program includes the following components:

- 6 • Enhancement of the existing Incident Management System ("IMS") and Incident
7 Command System ("ICS") frameworks;
- 8 • Development of Toronto Hydro's grid scenario analysis and contingency planning
9 capabilities;
- 10 • Preparation for and execution of targeted Mutual Assistance Agreements and
11 plans with utilities serving systems similar to Toronto Hydro's; and
- 12 • Implementation of comprehensive training and exercise programs to ensure staff
13 understanding of and proficiency with the new disaster preparedness and
14 management frameworks.

15
16 The elements of the proposed program align with the recommendations of the recently
17 released report by an Independent Review Panel entitled "The Response of Toronto
18 Hydro-Electric System Limited to the December 2013 Ice Storm" discussed in more
19 detail in Table 1 and filed as Appendix A to this schedule. Toronto Hydro's current
20 funding levels allocated to emergency management and corporate disaster preparedness
21 do not permit it to undertake the required scope of program development and
22 implementation. Accordingly, the expenditures proposed within this schedule are not
23 currently reflected in Toronto Hydro's rates.

¹ Tiffany Finley and Ryan Schuchard, Adapting to Climate Change: A Guide for the Energy and Utility Industry, online: Business for Social Responsibility <<http://bsr.org>>.

2. PROGRAM DESCRIPTION

Toronto is a largest city in Canada, and is a home to Canada's major financial services institutions and a host of a number of critical organizations that directly affect the well being of Ontarians and Canadians beyond the City's municipal boundaries. These include:

- Ontario provincial government and its agencies;
- Major hospital networks;
- Major transportation hubs and links;
- Media outlet headquarters;
- Water distribution and treatment facilities.

Moreover, the City frequently hosts major events of provincial, national and global significance, such as the 2010 G20 Summit, 2014 World Pride and the upcoming 2015 Pan American and Parapan Games. While serving the City of Toronto's magnitude and strategic significance presents operating challenges under normal circumstances, the situation is significantly complicated during major contingency events such as natural disasters (Ice Storm), health epidemics (SARS), or major civil unrest (G20 riots). The unique characteristics of each emergency event challenge a utility's ability to effectively respond to and facilitate the event's timely resolution in different ways, but also often help the utility identify certain gaps or vulnerabilities that warrant subsequent improvement. To effectively identify and correct for such gaps, utilities require a comprehensive emergency preparedness framework and dedicated resources and processes to research, identify, evaluate and implement the requisite adjustments and enhancements to the existing practices.

While storms and other emergencies require a concerted response from across the utility's staff, these events put an equal strain on the utility's operating structures themselves, as the nature of the response activities and the decision-making underlying

1 their execution are inherently different from the decision-making that occurs under
2 normal circumstances. To be effective under emergency conditions, the utility requires a
3 fundamentally different set of operating procedures that accord the employees with
4 requisite flexibility. These operating procedures must empower responders at all levels
5 to make critical decisions, to facilitate fast and efficient event resolution. At the same
6 time, customer expectations as to the nature and range of utility services remain
7 unchanged, or are even heightened during major emergency events. To enhance the
8 utility's ability to effectively operate during major events, Toronto Hydro needs to invest
9 in development, implementation and training of industry-leading emergency operating
10 procedures now to satisfy customer expectations, maintain adequate service levels and
11 ensure public safety during the major events.

12
13 Finally, while much research and emphasis has gone into studying the effects of disasters
14 on communities, often overlooked is the impact of the disasters on emergency responders
15 themselves. For example, the December 2013 Ice Storm affected Toronto Hydro staff
16 and their families in the same way as it did all Torontonians, by exposing them to
17 obstructed roads, icy driving conditions and grid lock owing to de-energized street lights.
18 Notable employee health and safety risks due to falling branches, traffic accidents, cold
19 temperatures and icy conditions added to the complexity of power restoration efforts
20 during the 2013 Ice Storm. To improve employees' abilities to cope with prolonged
21 contingency events while ensuring operational health and safety, Toronto Hydro would
22 benefit from enhancements and broader scope of major contingency response training
23 and exercises.

24
25 The proposed Disaster Preparedness Management ("DPM") program addresses the
26 above-noted considerations by seeking to enhance the utility's planning, communication
27 and coordination work prior to, during and after the major events that result in significant

1 and widespread interruptions of electricity supply and/or significant threats to public
2 safety. The proposed program would enable:

- 3 • enhanced scenario analysis and disaster planning;
- 4 • enhanced communication and coordination with key partner agencies such as
5 Emergency Management Ontario and the City of Toronto's Office of Emergency
6 Management;
- 7 • improved access to mutual aid assistance provided by partner utilities;
- 8 • more comprehensive emergency response training for Toronto Hydro employees;
- 9 • frequent exercise and testing of disaster response roles and systems; and
- 10 • continuous improvement of the disaster preparedness management.

11 More specifically, the proposed program consists of three discrete but inter-related
12 program areas, subdivided into further components, namely: Corporate Disaster
13 Preparedness; Distribution System Disaster Planning; and Training, Exercising and
14 Testing.

16 **2.1. Corporate Disaster Preparedness**

17 Corporate Disaster Preparedness refers to the enhancement of the existing framework,
18 and implementation of an overarching management system, and corporate standards for
19 the development, implementation and continuous improvement of all disaster
20 preparedness functions (emergency management, business continuity, contingency
21 planning). This program area consists of two components:

- 22 (a) Enhancements of the Incident Management System ("IMS"); and
- 23 (b) Incident Command System ("ICS").

25 **2.2. Distribution System Disaster Planning**

26 Implementation of ongoing grid-specific scenario building, analysis, planning and
27 response processes and procedures to ensure the sustainment and effective restoration of
28 the electrical service, along with implementation of detailed agreements and plans to

1 access additional crews via mutual aid assistance. This program area also consists of two
2 components:

- 3 (a) Grid Scenario Analysis and Contingency Planning; and
4 (b) Mutual Aid Planning.

5
6 **2.3. Training, Exercise and Testing**

7 Development and delivery of all requisite theoretical training and practical training
8 programs, scenario-based exercises and maintenance of emergency response skills
9 underlying the implementation of the first two program components. This program
10 consists of two streams:

- 11 (a) Disaster preparedness training; and
12 (b) Disaster preparedness exercise and testing.

13
14 The elements of the proposed program are aligned with the recommendations of the
15 report prepared by the Independent Review Panel (the “Panel”) which was established to
16 evaluate Toronto Hydro’s response to the 2013 Ice Storm. The report, which is filed at
17 Appendix A to this schedule, provides a number of recommendations to Toronto Hydro,
18 including:

- 19 • Update emergency response plans to align with vision and strategy, incorporate
20 the documentation of key processes and procedures, and train response roles and
21 structure;
22 • Improve situational awareness capabilities to enable development of accurate
23 estimated time of restoration and facilitate focus on critical priorities;
24 • Develop capacity to provide customers timely access to report and obtain critical
25 information related to their outages, during day-to-day, as well as large-scale
26 outages;
27 • Educate customers and stakeholders to ensure that they understand their
28 responsibilities and are better prepared and more fully informed when incidents

occur (e.g., impacts requiring repair of damaged equipment on customer property);

- Codify the process for rapid access to and deployment of trained, certified, and equipped resources;
- Pre-define restoration approaches that are scaled to outage levels and can be executed efficiently and safely; and
- Enhance collaboration between Toronto Hydro and the City to integrate outreach, messaging, and education to improve citizen preparedness and awareness of major events.

The following chart shows the manner in which the components of the Disaster Preparedness Management program, discussed in more detail below, align with the Panel's recommendations.

Table 2: Program Alignment with Panel Recommendations

IRP Recommendations	Program Area 1		Program Area 2		Program Area 3	
	Program Components					
	IMS	ICS	Grid Prep	Mutual Aid	Training	Testing
Update emergency response plans to align with vision.	X	X	X		X	
Improve situational awareness capabilities.		X	X		X	X
Develop capacity to provide customers access to outage info.	X					
Educate stakeholders to ensure understanding & preparedness	X	X	X		X	X
Codify the process for rapid access to resource deployment.			X	X		
Pre-define restoration approaches that are scaled to outages.			X		X	X

IRP Recommendations	Program Area 1		Program Area 2		Program Area 3	
	Program Components					
	IMS	ICS	Grid Prep	Mutual Aid	Training	Testing
Enhance collaboration between Toronto Hydro and the City.	X				X	

3. CORPORATE DISASTER PREPAREDNESS

3.1. Incident Management System (“IMS”)

A fundamental challenge of disaster preparedness activities for a utility is to accomplish the maximum amount of work in a constrained timeframe with limited resources available, working in an inherently dangerous environment. To meet this challenge, utilities require a management system that is distinct from a normal operating management model to effectively absorb the impact of disasters on their operations. The proposed enhancements / implementation of the Incident Management System (“IMS”) and Incident Command System (“ICS”) are proven approaches of managing emergency situations of any scale, adopted by a number of utilities in the United States (Florida Power & Light, ConEd, ComEd, Southern California, NiSource etc),² as well as the U.S. Department of Homeland Security and other U.S. government agencies involved in managing natural disasters and other emergency events.

Toronto Hydro is aligned to best practices with respect to the current IMS and corresponding ICS. Toronto Hydro has developed a crisis management command structure used by the executive team and senior management. However, personnel who are relied upon to support that command structure typically follow normal operating procedures, and need to be trained on the ICS/IMS frameworks to enable effective

² John Kullmann, *Utilities and the Incident Command System*, online: Electric Energy Online <http://www.electricenergyonline.com/show_article.php?mag=97&article=773>.

1 coordination of work execution. The expansion of the IMS framework across the
2 organization is expected to enable the utility to manage emergencies more effectively. A
3 comprehensive IMS framework also aligns with Toronto Hydro's continuous
4 improvement cycle of Plan, Do, Check, Act³ which responds to established emergency
5 management standards and guidelines such as CSA Z1600, Emergency Management and
6 Business Continuity and ISO 22301, Business Continuity Management.

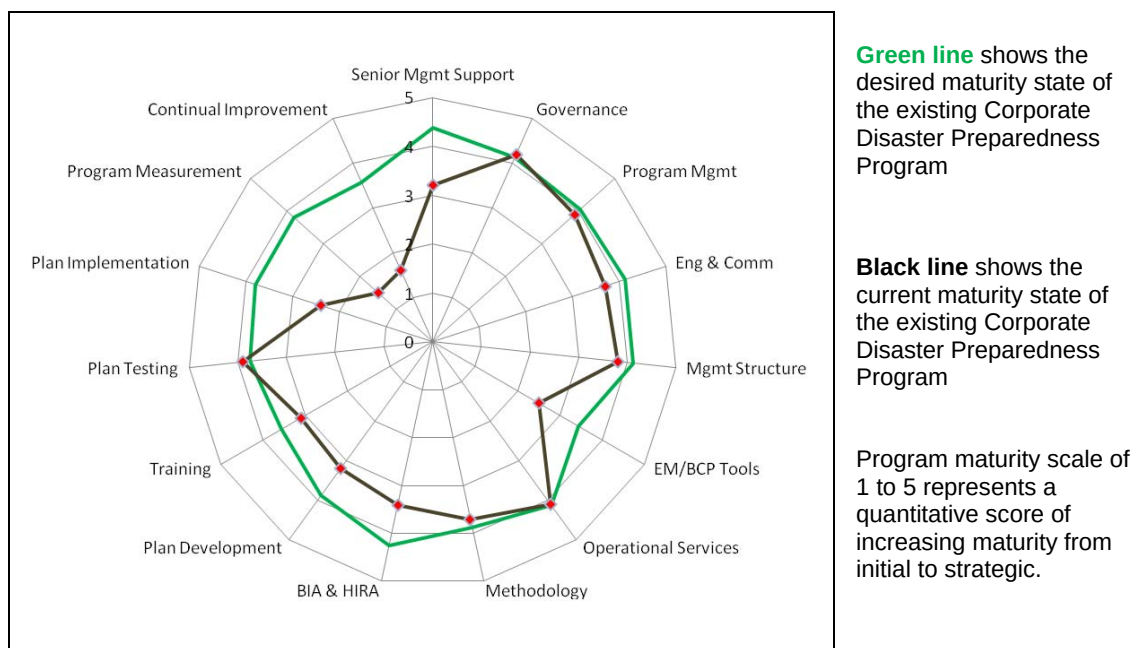
7
8 Toronto Hydro currently has in place an overall framework for its existing Corporate
9 Disaster Preparedness portfolio (as illustrated in Figure 3), which ensures compliance
10 with the terms of its distribution license, but is primarily governance centric in its nature.
11 This framework has been instrumental in establishing Toronto Hydro's Disaster
12 Preparedness Steering Committee and a forum which oversees the development and
13 progress of the utility's disaster preparedness activities.

14
15 Pending approval of the requested funding, Toronto Hydro seeks to fully develop its IMS
16 by expanding the current framework into a management system specific to grid impacts.
17 This entails identifying all the necessary grid operation-related elements of a disaster
18 preparedness management system, as well as the necessary methodologies and processes
19 for planning, implementing, executing and taking corrective action as described in the
20 CSA and ISO standards. The contemplated migration will move the IMS away from the
21 broad corporate view by developing the management framework elements specific to
22 addressing grid-related issues. As noted in the Panel's findings, the current function of
23 the corporate disaster framework enables visibility, but not the granular level of detail
24 required to affect the optimal response to grid events. Figure 1 showcases the current
25 state of IMS implementation at Toronto Hydro and identifies the areas of improvement
26 for accomplishing more comprehensive IMS implementation.

27

³ To learn more about this framework, refer to the Human Resources and Safety program at Exhibit 4B, Tab 2, Schedule 14.

1 The graph below (Figure 1) depicts the methodology and level of measure adoption
2 currently developed at Toronto Hydro, showing the 2014 plan line in green along with
3 the current state in black. As this is only depicting the Tier 1 functions (Figure 2) the
4 corresponding graphs for Tier 2 and 3 would be currently at zero. Table 2 on the
5 following page provides a high-level definition for each maturity level (1-5).



6 **Figure 1: Current Corporate Disaster Preparedness Maturity**

1 **Table 2: Current Corporate Disaster Preparedness Maturity**

1	2	3	4	5
Initial	Fragmented	Comprehensive	Integrated	Strategic
- Objectives, policies, a strategy and processes are absent - Disaster Preparedness is performed on an 'as needed basis' - Little to no accountability for preparing for disasters	- Objectives and policies are somewhat undefined - No coordination between business units - Activities are focused on reaction and response planning and actions	- Some objectives, governance and oversight is defined - Disaster Preparedness is hazard-specific and silo-ed in its coordination - Activities are focused on functional recovery after the fact	- Most relevant aspects have been defined - An 'all-hazards' approach has been adopted for Disaster Preparedness - Disaster Preparedness is integrated across business units - Activities are focused on continuity	- Strong culture of Disaster Preparedness - Disaster Preparedness is strategically 'all hazards' and complimented with hazard-specific plans - Enterprise Risk and Disaster Preparedness is aligned - Activities are focused on building a resilient Toronto Hydro

2 3.2. Incident Command System

3 Once a disaster is triggered, the critical components of IMS framework (processes, plans,
4 personnel) are activated to manage the incident. To ensure effective management of a
5 crisis at hand, Toronto Hydro requires an appropriate management structure to oversee
6 the effective and proper use personnel and resources. This structured is referred to as the
7 Incident Command System ("ICS").

8
9 The ICS establishes a clear, yet flexible management hierarchy for the entity-wide
10 approach to resolving disaster situations and managing its dedicated system and resources
11 as illustrated in Figure 2 below. It is an intentional departure from a utility's normal

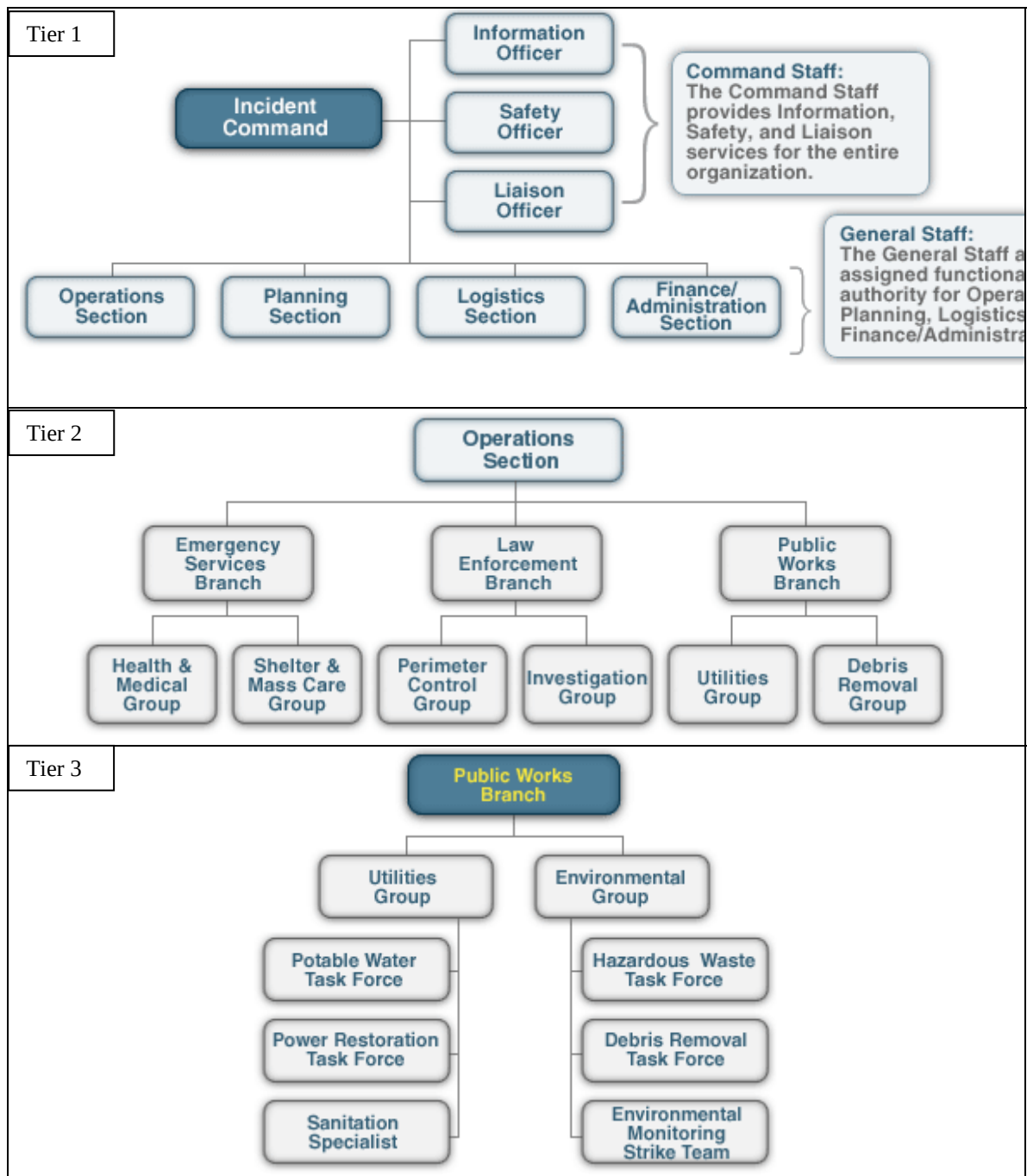
1 operating organizational hierarchy, which typically involves a vertical reporting chain of
2 command not suited to making decisions under emergency circumstances. The ICS is an
3 established best practice in the U.S.,⁴ and has also recently adopted by Ontario's
4 emergency management coordinating body, the Office of the Fire Marshal and
5 Emergency Management.

6
7 The ICS is an objective-based command structure which prescribes different roles and
8 responsibilities for disaster responders to fulfill. The key benefit of ICS is once
9 deployed, the organization shifts from operating as separate divisions to specific
10 functions that strive to achieve a common objective set by the Incident Commander.
11 Ultimately, this structure ensures all of the key "pieces" (functions) required to fix the
12 problem are activated and working in synergy toward a common goal.

13
14 Operating under the ICS model empowers decision makers (Section Leads) to take the
15 actions required to respond to the emergency; the Incident Commander, who is charge of
16 emergency response, oversee these actions. Operating under normal conditions (as
17 separate divisions using regular reporting structures and responsibility) can cause delays
18 in response and decision making.

19

⁴ Grant Davies, Miki Deric, and Brooke Davies, "Emergency Response - Incident Command System"
(2005) November/December *Electric Perspectives* at page 60, online: Electric Perspectives
<<http://daviescon.com/wp-content/uploads/2012/05/2005-11-EP-Emergency-Response-The-Incident-Command-System.pdf>>.



1 **Figure 2: Example of Incident Command System. Source: FEMA**

2 The implementation of this flexible management structure is expected to allow Toronto

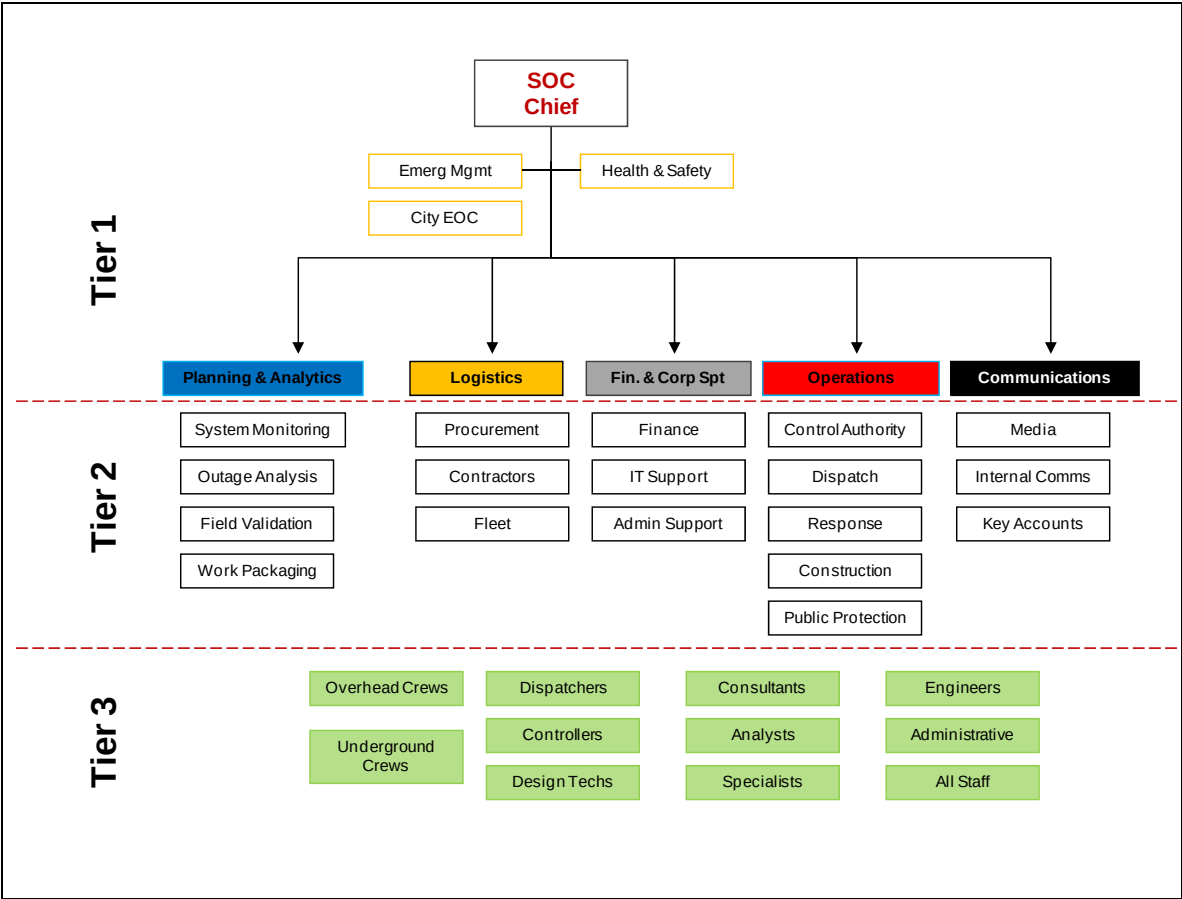
3 Hydro to commence resolution of contingencies faster and more effectively, by

1 empowering assigned decision makers to make critical decisions upon arrival on event
2 site. This is done by prescribing specific roles and responsibilities that are required to
3 manage any type of emergency event. ICS eliminates hierarchy-based structure, allowing
4 the Incident Commander and Section Leads to respond to the incident as needed.
5 Reporting hierarchies applicable under normal conditions are not designed to manage
6 disasters and may slow down the restoration efforts.

7
8 Beyond enabling Toronto Hydro to enhance decision making during an emergency, the
9 ICS framework establishes clear accountability lines and defines standard
10 communications protocols and common terminology between field crews and the control
11 authority, and across the first responder teams themselves. This significantly improves
12 work coordination across the affected area(s) and streamlines the process of obtaining
13 and communicating interim status updates and decisions between the control centre and
14 crews deployed in the field. As with the incident organizational structure itself, the
15 normal communication protocols are not suitable under the ICS model, given the
16 effectively different organizational structure and signoff/reporting relationships that are
17 used under the normal circumstances. These communications protocols and special
18 procedures apply to all parts of the utility's contingency response, including the control
19 centre-field interface, and the sections/employees taking charge of the funds, facilities,
20 equipment, human resources and customer communications. All issue-specific rules and
21 operating procedures require extensive testing under simulated conditions as well as a
22 sign-off from authorities that control each area under normal circumstances.

23
24 The concept of managing an emergency using the Incident Command System is not new
25 to Toronto Hydro. At the executive level, the utility has developed the ICS framework
26 for all command staff and section leads ("Tier 1" in Figure 3 below). At present, the
27 second tier of ICS management, which covers the roles and responsibilities of those
28 supporting the Section Leads, have not been developed or implemented. The same is true

1 for the third tier of ICS management, where the specific emergency roles and
2 responsibilities of staff in the field, or office staff who could be given alternate roles
3 during contingency events have not yet been developed.



4 **Figure 3: Toronto Hydro's Incident Command System**

5 Accordingly, Toronto Hydro seeks funding for the development, detailing and
6 implementation of its second and third tiers of the ICS framework. This development
7 work entails defining roles and responsibilities, building processes, tools and systems,
8 and enhancing methodologies to assist in improved response. Toronto Hydro envisions
9 that at the completion of Tier 2 and 3 implementation, all employees will be assigned an

1 emergency role in Toronto Hydro's Incident Command System to ensure they are
2 properly trained to competently fulfill their duties in the event of a disaster.

3
4 Once completed, Toronto Hydro expects to have readily available internal resources to
5 fulfill emergency duties in the event of a disaster, thereby reducing the risk of resource
6 shortages. Ultimately, Toronto Hydro plans to fully staff its incident command system to
7 provide two resources for every position in the system, and three mutually exclusive
8 shifts when around-the-clock disaster preparedness activation is necessary.

9 10 11 **4. 2.2 DISTRIBUTION SYSTEM DISASTER PLANNING**

12 13 **4.1. Grid Scenario Analysis and Contingency Planning**

14 At an operational (grid response) level, the utility has traditionally maintained three
15 levels of grid emergencies which outline grid impact triggers and respective actions that
16 the utility is allowed to take in order to restore power. While Toronto Hydro has
17 experienced many level 1 and level 2 emergencies which it has managed effectively, the
18 utility's response to the less frequent level 3 emergencies (owing in part to their
19 infrequent nature and the utility's limited experience in addressing them), has shown
20 areas for improvement, as highlighted by Independent Review Panel (the "Panel") for the
21 December 2013 Ice Storm.

22
23 A key finding of the Panel was that Toronto Hydro does not have sufficient experience
24 with significant grid disturbances, and lacks Level 3 emergency scenario development
25 and preparation. For instance, larger U.S. utilities, with more experience in handling
26 significant system contingencies, were found to have four or five levels of grid
27 emergencies corresponding and the respective level of response. In order to correctly
28 identify and develop plans for the appropriate level of response to severe disasters

1 impacting its grid, Toronto Hydro needs to undertake continual stress testing and scenario
2 analysis on the impacts of events of varying nature and magnitude. At present, the utility
3 does not possess the adequate funding or expertise to undertake such scenario analysis,
4 simulation and response framework development.

5
6 Apart from the onset of disaster events, Toronto Hydro is continually approached by
7 municipal and provincial authorities as well as individual organizations hosting events in
8 the City, to provide a level of assurance in the form of contingency plans for specific
9 events such as the G20 in 2010 or PanAm Games and many others smaller-scale events
10 that bring together thousands of participants. Each of these events is unique in nature,
11 making their scope difficult to adapt to Toronto Hydro's existing grid emergency plans.
12 At present, utility grid emergency plans are focused on sustaining large critical loads
13 impacting the preservation of the provincial grid. However, when Toronto hosted the
14 G20 meeting in 2010, it was obliged by the provincial and federal government to prepare
15 plans and provide coordination in the event of power disruption. The same level of
16 commitment is being required by provincial entities in preparation for the upcoming 2015
17 PanAm Games, along with similar requests for special preparedness for smaller events,
18 such as major conventions hosted by the city.

19
20 Accordingly, Toronto Hydro seeks funding for the enhancement of event-specific grid
21 emergency planning. This entails the improvement of emergency levels 2 and 3, and the
22 development of additional levels of emergency response for significant system
23 disturbances through simulating stress testing scenarios on Toronto Hydro's grid
24 emergency plans and protocols. Resources dedicated to this program area could be
25 leveraged to oversee the number of event specific contingency planning requests received
26 on an annual basis. Improvements and enhancements towards increasing Toronto
27 Hydro's grid emergency preparedness would yield a stronger assurance for the IESO and
28 government interests that Toronto Hydro is prepared to respond to major grid disasters.

4.2. Mutual Aid Planning

The scale and impact of emergency and disaster events faced by utilities may exceed the complement of resources available to respond to the disaster in a timely and effective manner, requiring utilities to seek external support from their peers. The exchange of crews, equipment, supplies or expertise between neighbouring utilities in times of emergency need is commonly referred to as mutual aid assistance.

Mutual aid assistance is highly beneficial for utilities for a number of reasons. First, understanding that large-scale emergencies can affect any utility, mutual aid is a common understanding of goodwill between neighbouring utilities, which facilitates a cooperative spirit in determining arrangements that benefit all parties entering into the agreement. Second, from a financial perspective, mutual aid partners agree to provide all necessary sustenance, accommodation and appropriate compensation for visiting crews, with the understanding that the utility furnishing mutual aid is not doing so for profit. Third, a mutual aid arrangement between utilities allows ready access to the complete complement of expertise, vehicles, equipment and supplies needed to restore power. However, as further described below, mutual aid assistance can carry operational challenges and requires a significant amount of planning and coordination to be leveraged safely and efficiently.

To ensure the safety of crews coming to assist Toronto Hydro during disasters, the utility needs to undertake significant research, negotiation and planning to facilitate mutual aid assistance and derive the maximum benefits of such arrangements. Jurisdiction-specific legislative and regulatory regimes, and different operating standards and system configurations, can significantly limit the host utility's ability to take full advantage of the mutual aid assistance in a short timeframe. Operational complications associated with differences in safety practices, work protection code, construction standards and restoration practices, and lack of familiarity with the requesting utility's system often

1 results in mutual aid crews being assigned simpler, non-critical tasks, which ultimately
2 leads to longer restoration timelines and prevents the full utilization of highly qualified
3 resources. While still providing critical relief, the difficulties that are often encountered
4 with respect to the effective deployment of mutual aid assistance crews can lead to an
5 increase in overall remediation costs.

6
7 There is no utility in Ontario that is sufficiently similar to Toronto Hydro, in large part
8 because of the downtown underground secondary network which requires highly
9 specialized utility workers, and the number of assets used on the system that are not
10 widely deployed elsewhere in the province (i.e., Overhead Box Construction, PILC cable
11 etc). In the event of a disaster requiring additional underground network expertise,
12 Toronto Hydro must look towards utilities such as Con Ed in New York or Com Ed in
13 Chicago (just as Con Ed approached Toronto Hydro during Hurricane Sandy in October
14 2012).

15
16 At present, the mutual aid arrangement in Ontario is informally led by Hydro One who
17 groups local distribution companies into the proximity-based zones and facilitates the
18 annual upkeep of contacts and a high-level estimate of available resources. Toronto
19 Hydro is currently grouped into a zone with utilities such as Orangeville and Guelph
20 Hydro, which are not comparable to Toronto Hydro's operations in either size or
21 distribution system complexity. This system also does not account for large scale events
22 (like the ice storm) that affect significant areas of Ontario beyond Toronto, further
23 reducing the availability of mutual aid resources.

24
25 Accordingly, Toronto Hydro seeks funding for the development and implementation of a
26 mutual aid program which better suits its needs and would explore targeted bi-lateral or
27 multi-lateral mutual aid agreements with other utilities that can effectively respond to
28 contingencies on its system. This includes developing a framework, negotiating

agreements, and developing plans and processes that would be scalable for the safe and efficient movement of crews and resources between Canadian and American utilities depending on the specific resource requirements during an emergency.

At present, Toronto Hydro's mutual aid program is in its nascent stages (specifically at Stage 1 as showcased in Figure 4). With appropriate funding, Toronto Hydro plans to further enhance its mutual aid program (initiated in partnership with ComEd in October 2013) to Stage 2. This would include all facets of Toronto Hydro requesting (intake) and furnishing (outbound) mutual aid assistance and would align the program with the recommendation of the Panel.

Key areas of mutual aid planning include: developing contracts, administrative planning, development and facilitation of safety training, establishing a standardized needs assessment, allocation and staging, logistics and resource plans, administrative reporting, stand down and release processes.

Criteria	Initiate	Interim	Vision
Mutual Aid Stage	1	2	3
Level of Commitment	Voluntary	Obligated*	Preparation Indicators*
Resource Requests	A la carte	Combo	Packages
Resource Output	Limited scope of work for responding resources	Moderate use of responding resources' full potential	Full utilization of responding resources full potential
Formality	Letter of Intent	Memorandum of Understanding	Mutual Aid Agreement

Figure 3: Toronto Hydro's Mutual Aid Stage Description and Criteria Used to Enable Functional Enablement without Completed Detailed Program.

On January 23, 2014, Toronto Hydro was appointed co-chair of the Canadian Electricity Association's ("CEA") National Mutual Aid Working Group, tasked with developing a

1 national standard for mutual aid assistance. This standard will entail common tools,
2 agreements and plan formats to standardize and facilitate enhanced mutual aid assistance
3 and planning across Canada. Collaboration with the CEA and partnering utilities on this
4 project demonstrates Toronto Hydro's commitment to be more efficient by building on
5 the existing national experience and expertise. Along with the CEA efforts, Toronto
6 Hydro endeavours to join the Northeast Atlantic Mutual Aid Group, alongside Hydro
7 One and Hydro Quebec, adding further strength to this program.

10 **5. TRAINING, EXERCISE AND TESTING**

12 **5.1. Training**

13 Once the previously mentioned frameworks, systems and arrangements are developed,
14 Toronto Hydro will need to develop specific training modules, schedules and sessions to
15 impart these new frameworks onto the utility's workforce. This is required to ensure that
16 employees understand the emergency roles and communication protocols outlined in the
17 management system and plans, and develop the appropriate competencies for meeting
18 these new roles effectively.

20 At present, the training program is in its nascent stage and focuses mainly on the
21 management level (Tier 1 of Figure 3) of the Incident Command System. Currently,
22 efforts remain focused on the executive team as the resources required to develop and
23 facilitate training are fully engaged by other projects. In addition, many of those filling
24 the ICS roles do not work together under normal operations, making coordination more
25 challenging during a real event.

27 Continual training and exercising of disaster roles and responsibilities is crucial for
28 effective response during contingency events, as without repetition and continuous
29 improvement of special skills and tasks they are often forgotten or not fully internalized.

1 To meet the sudden impacts caused by disasters, Toronto Hydro requires a workforce
2 sufficiently competent in both their primary responsibilities and their mandates under the
3 disaster conditions and the alternate roles they may play if an emergency event
4 materializes.

5
6 Larger multi-day emergencies such as the December 2013 ice storm require three rotating
7 shifts to ensure responders are sufficiently rested to work safely and effectively and
8 prevent burn-out. In order to facilitate smooth transitions between three shift rotations
9 and an effective, continuous 24/7 operation, the ICS model needs to be fully staffed with
10 three shifts that must all be equally competent in the ICS framework and the associated
11 procedures.

12
13 Toronto Hydro seeks funding to provide training sessions on a pro-active, continual basis
14 for all staff identified as having a role in the proposed ICS framework. Since the ICS
15 model entails a holistic command structure, each rotating shift is comprised of different
16 levels of staff, fulfilling distinct functions. For example, each rotating shift may be
17 comprised of strategic senior management, tactical supervisors and operational field
18 crews. Accordingly, emergency training needs to be tailored for each level of response
19 necessary in an emergency response, and needs to be repeated with a periodic frequency
20 to ensure retention and competence.

21 22 **5.2. Exercising and Testing**

23 At present, due to the lack of dedicated Disaster Preparedness Management resources,
24 exercise, testing and auditing of current plans, procedures and work instructions is limited
25 to several occurrences of limited scope each year. Exercising and testing is commonly
26 reserved to scenario analysis or discussion based exercises, which provides an
27 exploratory platform for participants, but does not go into the depth required to fully train
28 personnel in an alternate role.

1
2 Mature exercise and testing programs are action-based, requiring participants to
3 demonstrate their training and facilitates a benchmarking platform which is more
4 advantageous in identifying strengths and weaknesses of tested systems and plans. To
5 provide the assurance to the utility and its customers that disaster preparedness initiatives
6 are working as envisioned, plans and systems need to be rigorously tested on a
7 continuous basis, while personnel undergo regular exercising to identify areas for
8 improvement.

9
10 In addition to testing the Incident Command System, training and exercises will need to
11 be developed around Grid Scenario Analysis and Contingency Planning. All issue-
12 specific rules and operating procedures require extensive testing under simulated
13 conditions.

14
15 Toronto Hydro seeks funding to develop a sound exercise and testing program within its
16 disaster preparedness management system based on a framework of performance criteria
17 as the indicator of its training success or failure. Since exercise and testing are intricately
18 linked to training, all staff and systems receiving training must be exercised and tested
19 with the same frequency. Funding is required to develop exercises and tests for all three
20 tiers of Toronto Hydro's proposed ICS framework and the three rotating shifts.

21 Complimenting these exercises and tests are requirements for facilitation, auditing and
22 reporting tools, templates and expert evaluations. Once exercise or test reports are
23 submitted, amendments to plans, procedures and systems need to be taken to close
24 identified gaps, while more intricate exercises are required for the next round of testing to
25 ensure the requisite rigour.

26
27 Another key component to providing quality assurance is the need to contract third party
28 assessors to ensure that Toronto Hydro's processes are robust effective. The discipline of

1 disaster preparedness or emergency management is relatively new and Toronto Hydro
2 would benefit from periodical assessments by external experts to provide an unbiased
3 perspective, recommendations and new ideas for continuous improvement. Accordingly,
4 in addition to training program development and facilitation, Toronto Hydro requires
5 funding to source auditors and emergency management consultants to periodically
6 evaluate and provide recommendations as the disaster preparedness management
7 program evolves.
8
9

10 **6. PROGRAM COSTS**

11 Toronto Hydro's proposed 2015 expenditure for this new and sustained program is \$2.4
12 million.⁵ The scope of work comprising the program involves program development,
13 implementation, testing, internal control and audit work, and other functions associated
14 with full-scale implementation of a new corporate-wide initiative. Given the scope of
15 work and Toronto Hydro's plans to sufficiently implement this framework by the end of
16 2015, the internal resources currently available to the utility are insufficient to undertake
17 the project of this magnitude. Comparisons to other utilities indicate that a utility of
18 Toronto Hydro's size should have at least eight dedicated full time employees to manage
19 all facets of a disaster and emergency management program. Con Edison of New York is
20 the closest electric utility comparator in terms of system configuration for both overhead
21 and underground system, and the nature of its service territory which provides power to
22 key national, state and private enterprise customers within a densely urban populated
23 area. Toronto Hydro is seeking to duplicate Con Edison's emergency management
24 success on a scaled basis, by borrowing elements of its emergency management
25 department's reporting hierarchy, such as dedicating emergency management
26 professionals to developing contingency planning and operating frameworks across

⁵ Toronto Hydro notes that it has incurred \$0.9 million in related expenditures in 2011, but these costs have not been sustained throughout the period due to the funds being reallocated towards other areas of priority.

overhead, underground, sub-stations, preparedness, coordination, strategic emergency planning and business continuity management.

To the extent of its knowledge, Toronto Hydro is one of only four local distribution companies in Ontario who have a dedicated full time position for disaster preparedness/ emergency management/ business continuity (others being Hydro One, Hydro Ottawa and PowerStream). Owing to the limited number of these professionals in the Ontario distribution utilities sector, candidates who specialize in local power distribution may be difficult to identify and retain. In addition to regular program management and administrative activities, Toronto Hydro requires external auditing and expert advice to institute, proliferate, and monitor the implementation of the program.

Being a new program, there are no sustained historical expenditures associated with this operating area.

The following table provides a breakdown of proposed expenditures by main driver:

Table 3: Proposed Expenditures by Main Driver

Expenditure Area	2015
Full time staff	1.55
Contractors (part time staff)	0.2
Consulting	0.25
Training & Exercise cost	0.15
Audit	0.2
Total Program Cost	2.4

6.1. Expected Results

Once implemented and completed, the delivery of the Incident Management and Command System, Grid Scenario Plans, Mutual Aid Planning and its subsequent training and testing should result in a higher acceptance and skills retention across the

1 organization of employees' alternate (emergency) roles and responsibilities and the
2 overall corporate emergency management strategy and protocols. More specifically, as
3 the program matures, the utility expects to see the following results over the rate period:

- 4 • an enhanced Incident Management Program to ensure all critical pieces of an
5 effective disaster preparedness program are developed and implemented;
- 6 • a stronger Incident Command System to manage emergencies efficiently,
7 effectively using a standard approach for all management levels to enhance
8 emergency response
- 9 • grid System emergency planning and scenario analysis to stress test the electrical
10 grid and develop appropriate plans;
- 11 • a more rigorous system and plan to accommodate and utilize mutual aid
12 resources, thus facilitating the reduction of power restoration times and its
13 associated costs; and
- 14 • a rigorous training and exercise program to ensure all required personnel are
15 regularly trained and exercised on their roles and responsibilities during
16 emergency activation

17
18 The objective of enhancing the DPM Program is for Toronto Hydro to have a more
19 extensive and rigorous emergency preparedness program. This is expected to result in
20 improved planning in relation to extreme events and better coordination with partners and
21 peers, and to overall, enhance Toronto Hydro's resiliency. An effective DPM program
22 provides customer value by reducing the duration of power outages, and the associated
23 risks and vulnerability during emergencies. To remain competitive in the global market,
24 and to continue to attract businesses which are increasingly reliant on reliable electricity
25 service under all circumstances, Canada, Ontario and Toronto need a disaster-resilient
26 City.



STRATEGIES FOR COMPLEX ORGANIZATIONS

Final Report

The Response of Toronto Hydro-Electric System Limited to the December 2013 Ice Storm

June 19, 2014

Prepared for:
The Toronto Hydro Independent Review Panel
David J. McFadden, Chair
Sean Conway
Joseph Pennachetti
Carlos D. Torres

Prepared By:



MESSAGE FROM THE INDEPENDENT REVIEW PANEL

June, 2014

The ice storm which hit Toronto in late December 2013 caused widespread electricity outages and disrupted the lives of hundreds of thousands of Torontonians. Many people experienced the Christmas season without heat or light.

Our panel was appointed by Toronto Hydro in January, 2014 to oversee the work undertaken by Davies Consulting, LLC, to review and evaluate Toronto Hydro's preparedness for and response to an outage of this scale and to recommend steps which could be taken to prevent future outages or to speed up recovery efforts.

We are pleased to provide our Report to Toronto Hydro and, more generally, to the people of Toronto. The panel worked closely with Davies Consulting on the design and approach of the review and then on the identification of findings and the development of the recommendations contained in the Report.

We were impressed by the almost universal praise of the hard work and dedication displayed by Toronto Hydro's team during the outage often under very adverse working conditions. However, our Report offers a number of recommendations to improve the safety and reliability of the electricity system and future recovery efforts. Also, we identify steps which the City, the Ontario Government and community organizations should consider to protect vulnerable members of our community in the event of future outages.

We wish to thank the Davies Consulting team for their excellent work in developing this Report. We would also like to thank the management and staff of Toronto Hydro and the many citizens of Toronto who provided valuable information and insight which was essential to the preparation of the Report.

We hope that the Report will have a positive role in making Toronto's electricity distribution system more reliable and safe in the years to come.

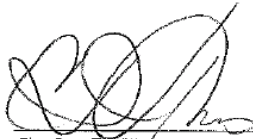

David J. McFallen, Q.C.
Chair
Sean Conway
Member
Joseph Pennachetti
Member
Carlos D. Torres
Member

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1. Executive Summary

In early January 2014, Toronto Hydro System Limited (Toronto Hydro or the Company) executive management commissioned an Independent Review Panel (IRP) to review the Company's response to the 2013 Ice Storm. The intention of the review was to confirm emergency management practices that are working well and areas in need of improvement. Toronto Hydro retained Davies Consulting LLC, a leading management consulting firm with extensive experience in utility emergency response throughout North America, to conduct the assessment under the direction of the IRP. This Executive Summary to the IRP Final Report includes: a brief overview of the 2013 Ice Storm and Toronto Hydro's response; a description of the scope of the review; and highlights of the findings and recommendations of the Panel.

1.1. *Synopsis of the 2013 Storm and Toronto Hydro's Response*

On December 21 and 22, 2013, the Greater Toronto Area (GTA) was at the epicentre of a freezing rain event that brought between 20 and 30 millimetres of freezing precipitation – more than two-year's worth – in two days. This severe ice storm resulted in 313,000 service interruptions (at peak) to Toronto Hydro customers. Approximately 57% (416,000) of the customers served by Toronto Hydro lost power at one point during the event, which ultimately affected more than one million City residents. Most of the damage was caused by tree limbs falling on power lines, either creating faults or breaking the lines. In addition to widespread power outages, the event caused extensive property damage and economic losses.

Toronto Hydro quickly mobilized its management team and called in available resources, which began restoration work by 8 a.m. on December 22, 2013, before the storm system departed the Company's service area. Power was restored to all customers who could receive service by the morning of January 2, 2014, 11 days after the restoration began. Toronto Hydro resumed normal operations on January 3, 2014. Approximately 98% of Toronto Hydro's core trade workers supported the restoration effort, aided by another 450 field workers (line and forestry) from contractors and ten other utilities, as well as the company management and

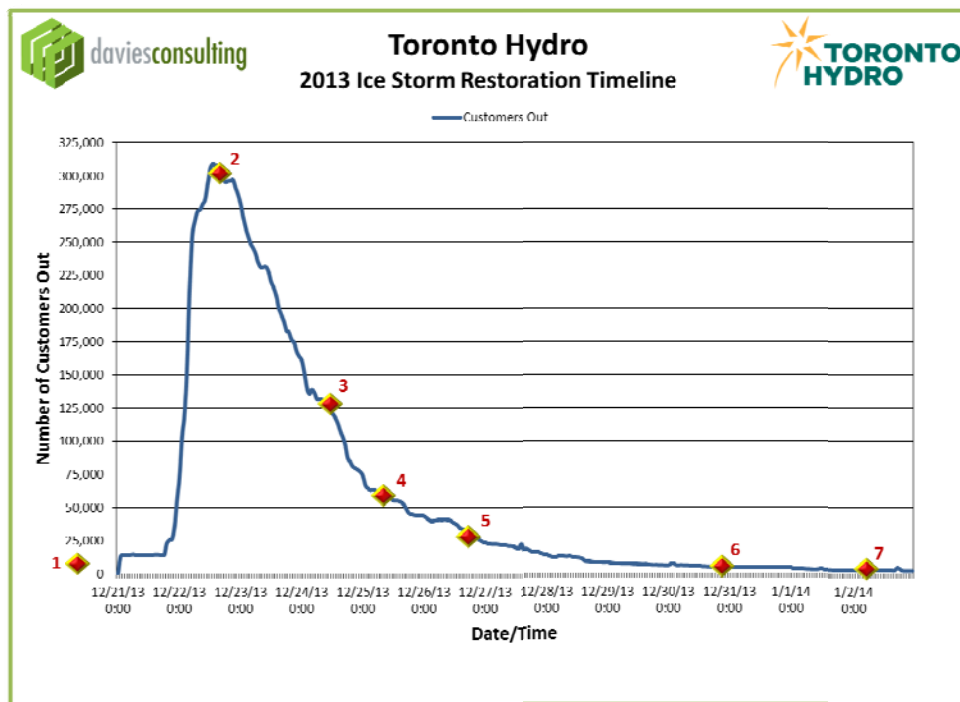


professional office staff. Notably there was only one recordable safety incident at Toronto Hydro over the course of the restoration and no deaths attributed to the storm.

Figure 1 shows the progress of Toronto Hydro's restoration after the 2013 Ice Storm, noting the following milestones:

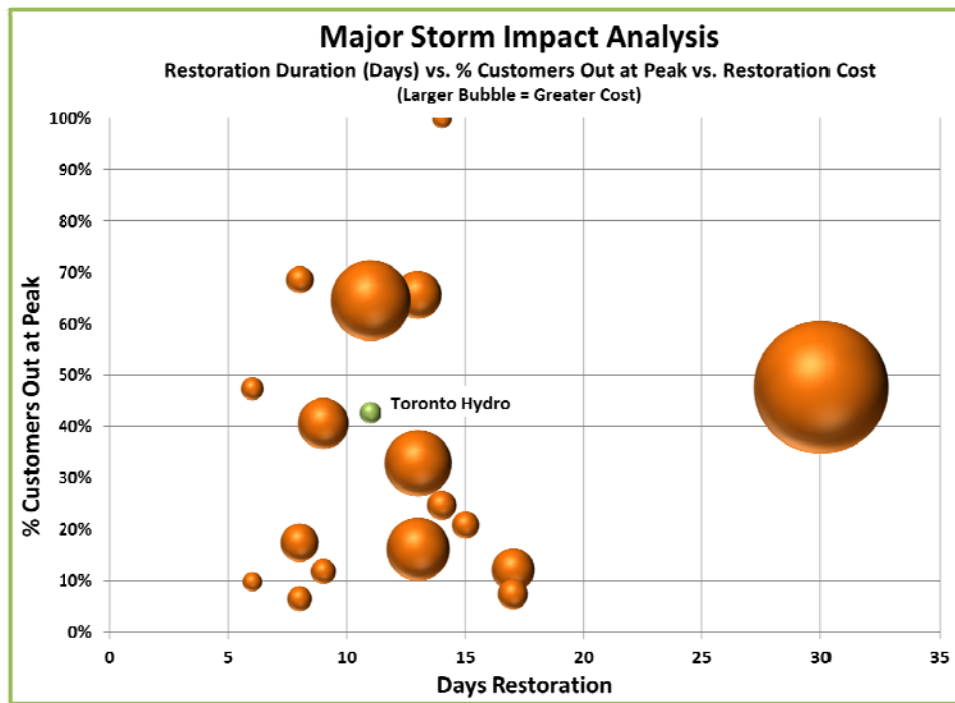
1. Initial weather statements warning of a potential ice event;
2. Initial request for mutual assistance issued by Toronto Hydro;
3. Power restored to all critical facilities designated by the City Emergency Operations Centre (EOC);
4. Approximately 86% of all customers affected restored (72 hours from the start of restoration);
5. Approximately 90% of customers out at peak restored;
6. Approximately 99% of customers out at peak restored; and
7. All customers who can accept service restored.

Figure 1: 2013 Ice Storm Restoration Timeline with Key Milestones



When compared to the performance of other utilities conducting ice and snow storm restorations, Toronto Hydro's overall performance is well within the industry norm as shown in Figure 2.

Figure 2: Event Benchmark Comparison



Source: Davies Consulting Storm Response Benchmark Database, 2014

1.2. Review Scope and Approach

The organizing framework for the Toronto Hydro review is the widely-used emergency management (EM) life cycle, as adapted to the utility environment. Figure 3 depicts this four-phase cycle, anchored by a comprehensive incident communications strategy.

Figure 3: Utility Emergency Management Life Cycle



The review addressed nine areas of Toronto Hydro's response. Table 1 shows how they align to the utility emergency management life cycle.

Table 1: Alignment of Toronto Hydro Assessment Scope to Emergency Management Lifecycle

Emergency Management Life Cycle	Toronto Hydro Review Scope
Prepare	Emergency Planning and Preparedness
Respond and Recover (Restore)	- Resource Acquisition and Allocation - Damage Assessment and Restoration Planning - Restoration Execution - Information Systems and Technologies - Toronto Hydro – City Coordination
Mitigate	Vegetation Management and System Hardening/Resilience
Incident Communications	- Communications – Customer Contact - Communications – Other Stakeholders

The Davies Consulting team used a structured, comprehensive, principles-based approach to conduct the 2013 Ice Storm Review. They interviewed nearly 80 stakeholders, received close to 100 public comments through Town Halls and email, reviewed relevant internal plans, reports and documentation, and considered pertinent City and Provincial regulations, policies, and emergency management practices. The approach taken by the team preserved the confidentiality of information provided by stakeholders and lead to findings and recommendations that were objective, data-centered, and informed by leading practice.

1.3. Summary of Findings and Recommendations

The review of Toronto Hydro’s response to the 2013 Ice Storm revealed both well-executed emergency management practices and areas in need of improvement. The summary findings for each area evaluated, are:

- Toronto Hydro followed an Incident Command System-based approach at the management level, but had not fully developed, trained, and exercised the approach across the Company;
- Customers could not obtain timely and accurate information about their outage status (including estimated time of restoration, or ETR) during the event;
- The Company’s incident communication performance, with a defined media strategy and unity of message, met or exceeded industry best practices;
- The Company secured and deployed mutual assistance resources early in the restoration and executed the overall mutual assistance process generally well;

- The process for determining restoration priorities was in line with industry leading practices; however, the damage assessment process was not fully executed;
- While the restoration approach varied among the Local Command Centres, the overall restoration duration was similar to that of comparable events in the industry;
- Toronto Hydro has implemented some advanced operational and information technology systems, but has not fully integrated them to provide adequate restoration support and situational awareness; and
- The circuit-based vegetation management preventive program is on a three-year cycle which meets or exceeds industry best practice and follows industry pruning standards and City of Toronto by-laws.

The IRP identified 25 recommendations for consideration by Toronto Hydro management. The following list is a summary of these recommendations by area evaluated:

- Update emergency response plans to align with vision and strategy, incorporate the documentation of key processes and procedures, and train response roles and structure;
- Improve situational awareness capabilities to enable development of accurate ETRs and facilitate focus on critical priorities;
- Develop capacity to provide customers timely access to report and obtain critical information related to their outages, during day-to-day, as well as large-scale outages;
- Work with key stakeholders to identify, agree upon, and fund cost-beneficial system hardening and resilience initiatives, including vegetation management and targeted conversion of line segments to underground construction;
- Educate customers and stakeholders to ensure that they understand their responsibilities and are better prepared and more fully informed when incidents occur (e.g., impacts requiring repair of damaged equipment on customer property);
- Codify the process for rapid access to and deployment of trained, certified, and equipped resources;
- Pre-define restoration approaches that are scaled to outage levels and can be executed efficiently and safely;
- Update and further integrate key information and operational systems to provide real or near-real time intelligence during major events; and

- Enhance collaboration between Toronto Hydro and the City to integrate outreach, messaging, and education to improve citizen preparedness and awareness of major events.

1.4. Moving Forward

The 2013 Ice Storm was an unprecedented event that disrupted the lives of most Toronto residents and tested the mettle of the first responders, as well as the City and Toronto Hydro personnel involved in the recovery effort. Through a dedicated, coordinated, and intensive response, the community was safely restored to normalcy within a reasonable timeframe given the amount and type of damage suffered. Toronto Hydro performed the restoration in a manner consistent with industry norms. The Company's management and approach to the restoration was prudent, diligent, and safe. As expected with any large incident, the recovery from this ice storm also exposed several aspects of the emergency response that can be further improved.

In accordance with the commissioned scope of the Panel review, the recommendations presented in this report focus mainly on the improvements that Toronto Hydro can make to further enhance its ability to respond to future events that cause widespread power outages. Additionally, and notably, several of the recommended improvements call for closer cooperation among Toronto Hydro, the City of Toronto and the Province of Ontario to prepare the community for future major outage events. This report should serve as the starting point for a more sustained, coordinated effort among all of these parties.

2. Introduction

On December 21 and 22, 2013, a severe ice storm struck the greater Toronto area, resulting in approximately 313,000 service interruptions (at peak) to Toronto Hydro customers¹. Approximately 57% (416,000) of the customers served by Toronto Hydro lost power at one point during the event, which ultimately affected more than one million city residents. In addition to widespread power outages, the event caused extensive property damage and economic losses. Toronto Hydro deployed approximately 1,250 field resources, including more than 400 from other utilities and contractors (i.e., off-system), restored service to 75% of customers within 48 hours from the time the restoration began. Crews completed restoration of all customers who could accept power by January 2, 2014. Notably, there was only one recordable safety incident at Toronto Hydro over the course of the restoration and no deaths attributed to the storm.

2.1. Purpose, Governance, Scope

On January 9, 2014, Toronto Hydro executives held a press conference to brief the public on the Company's emergency preparedness planning, restoration approach and priorities, and communications strategy during the incident. Anthony Haines, President and CEO of Toronto Hydro, remarked that the 2013 Ice Storm was "the most disruptive incident we have faced." At that time, the Company announced its establishment of an independent panel to oversee a review of its response to the 2013 Ice Storm. The intention of the review was to confirm practices that are working well and to identify areas in need of improvement. The role of the Independent Review Panel (IRP) was to ensure the objectivity of the review and provide guidance and subject matter expertise. IRP members are:

- David J. McFadden, Panel Chair and Partner, Gowling Lafleur Henderson LLP;
- Joseph Pennachetti, City Manager, City of Toronto;
- Sean Conway, Visiting Fellow, Centre for Urban Energy – Ryerson University; and
- Carlos D. Torres, Vice President of Emergency Management, Consolidated Edison of New York, Inc.

Toronto Hydro retained Davies Consulting LLC, a leading management consulting firm with extensive experience in utility emergency response throughout North America, to conduct the review under the direction of the IRP. The effort began in late January 2014.

¹ The peak number of customer interruptions represents the highest number of customers who were interrupted *at the same time*. Since the event lasted for several days, additional customers lost power at different points in time, ultimately resulting in 416,000 customers experiencing an interruption during the Ice Storm.

The scope of the assessment included all aspects of the widely-used emergency management (EM) life cycle, as adapted to the utility environment. Figure 3 depicts this four-phase cycle, centered by a comprehensive incident communications strategy.

The main components assessed within each phase of the utility emergency management life cycle are:

- **Preparedness**
 - Organization and responsibility for emergency management
 - Emergency Response Plan structure and completeness
 - Emergency (or second) roles process
 - Emergency management training program
 - Exercises (table top and functional)
- **Response and Recovery (Restoration)**
 - Mobilization and level declaration
 - Resource acquisition and allocation
 - Response structure and roles/responsibilities
 - Logistics
 - Restoration strategy and execution efficiency
 - Situational awareness and damage assessment
 - Wires down and cut, clear and make safe process
 - Work planning and prioritization
 - Demobilization
- **Incident Communication**
 - Communication strategy
 - Estimated Time of Restoration (ETR) development, dissemination, and tracking
 - Key message development
 - One-voice communication
 - Social media
 - Liaison program
 - Customer call centre
- **Mitigation (Distribution Infrastructure Maintenance and Improvement)**
 - Vegetation management
 - Pole inspection
 - Storm hardening
- **Use of Supporting Technology Systems (Operational and Information)**

2.2. Approach and Methodology

The Davies Consulting team conducting the assessment used a structured, comprehensive, principles-based approach to evaluate Toronto Hydro's response to the

2013 Ice Storm. They interviewed nearly 80 stakeholders, received close to 100 public comments through Town Halls and email, reviewed relevant internal plans, reports, and documentations, and considered pertinent City and Provincial regulations, policies, and emergency management practices. Throughout the assessment process, the following core principles guided the work of the Davies Consulting team:

- Transparency – consultants conducting fact-finding and analysis have full access to Company information and personnel;
- Inclusiveness – representatives of stakeholder groups have an opportunity to contribute through interviews, public town halls, and email feedback;
- Data-centered analysis– findings and recommendations are substantiated by quantitative and qualitative data and original sources of data are used to the extent possible;
- Informed by leading practice – knowledge of industry leading practices is used to develop interview questions and to guide analysis; this knowledge is drawn from Davies Consulting’s project work with more than 35 investor-owned and municipal utilities, participation in industry associations, and proprietary research; and
- Confidentiality – source information provided by individual interviewees and interested parties is not shared outside Davies Consulting and findings are not attributable to individuals or groups.

Davies Consulting used the following methodology to conduct the assessment of Toronto Hydro:

1. *Understand the impact of the storm on Toronto Hydro’s system.* Characterized the magnitude of the 2013 Ice Storm’s impact on Toronto Hydro’s distribution system, using weather reports, Toronto Hydro-provided documentation, and interviews.
2. *Collect pertinent data about Toronto Hydro’s performance.* In collaboration with Toronto Hydro management and the IRP, identified participants and other stakeholders in the 2013 Ice Storm emergency management and restoration process. Conducted interviews with a representative cross-section including: Toronto Hydro management and front-line personnel; Union leadership; City of Toronto employees; and City of Toronto elected leaders. Collected public feedback through three town hall meetings and via public email address (torontoicestorm@daviescon.com) for those who were not able to attend. Submitted approximately 50 data requests for operational, call centre, system, and other program data. Review documentation provided along with pertinent City and Provincial policies and regulations (e.g., electric safety code, building code, tree trimming standards).

3. *Analyze data to develop findings and recommendations.* Evaluated each aspect of Toronto Hydro's response, comparing Company performance against its plans and standards, industry standards, and leading practices. Compared aspects of Toronto Hydro's performance (e.g., restoration duration, cost) to those of other utilities using Davies Consulting proprietary Storm Response Benchmark Database, which is described later in this report. Formulated findings of strengths and opportunities for improvement. Developed actionable recommendations to address areas in need of improvement.
4. *Develop final report.* Prepared a comprehensive written report that described Toronto Hydro's emergency management and restoration performance, summarized leading or expected practice in each of the nine areas addressed within the scope of the review, and detailed the findings and recommendations for Toronto Hydro management consideration.

2.3. Evaluation Areas

The Davies Consulting review addressed nine areas of Toronto Hydro's emergency planning, preparedness, and response practices. The first eight of these areas relate to the emergency response life cycle as shown on Table 2. The ninth addresses the numerous and significant areas of overlap and integration that occur between Toronto Hydro and City responders when supporting the recovery of the community after an event like the 2013 Ice Storm.

Table 2: Alignment of Toronto Hydro Assessment Scope to Emergency Management Lifecycle

Emergency Management Life Cycle	Toronto Hydro Review Scope
Prepare	▪ Emergency Planning and Preparedness
Respond and Recover (Restore)	▪ Resource Acquisition and Allocation ▪ Damage Assessment and Restoration Planning ▪ Restoration Execution ▪ Information Systems and Technologies ▪ Toronto Hydro – City Coordination
Mitigate	▪ Vegetation Management and System Hardening/Resilience
Incident Communications	▪ Communications – Customer Contact ▪ Communications – Other Stakeholders

3. Overview of Toronto Hydro System

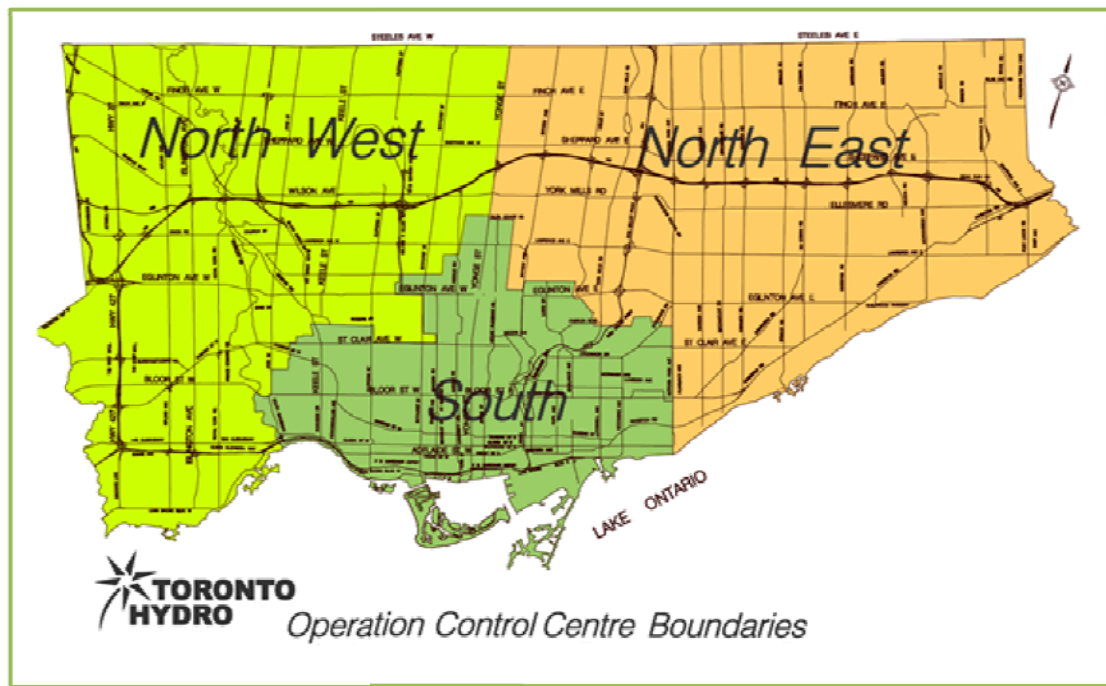
Toronto Hydro began operation on May 2, 1911. Today, more than 100 years later, Toronto Hydro owns and operates \$2.6 billion of capital assets comprised primarily of an electricity distribution system which delivers electricity to more than 730,000 customers located in the City of Toronto. It is the largest municipal electricity distribution company in Canada and distributes approximately 18% of the electricity consumed in the Province of Ontario.

Toronto Hydro is wholly-owned by Toronto Hydro Corporation, a holding company incorporated under the Ontario Business Corporations Act in 1999 by the City of Toronto (the “Corporation”), its sole shareholder. In 1998, Bill 103 amalgamated six municipal electric utilities into one, nearly tripling Toronto Hydro’s customer base to approximately 650,000 customers. Table 3 provides a snapshot of Toronto Hydro’s distribution system characteristics and Figure 4 is a map of Toronto Hydro’s service territory.

Table 3: Toronto Hydro System Statistics

Population	2.8 million
Customers	733,800
Service Territory Size	630 square kilometers (240 square miles)
Employees	1,570
Distribution	
▪ Distribution circuits (number)	1,710
▪ Overhead (miles)	15,000 km (9,321 miles)
▪ Underground (miles)	11,200 km (6,959 miles)
▪ Overhead transformers	60,650
▪ Poles	175,400
▪ Switches	16,000
Substations	169 municipal stations/35 transmission stations (shared)
Meters (12/31/13)	648,000 distribution and 85,800 industrial/commercial

Figure 4: Toronto Hydro Service Territory

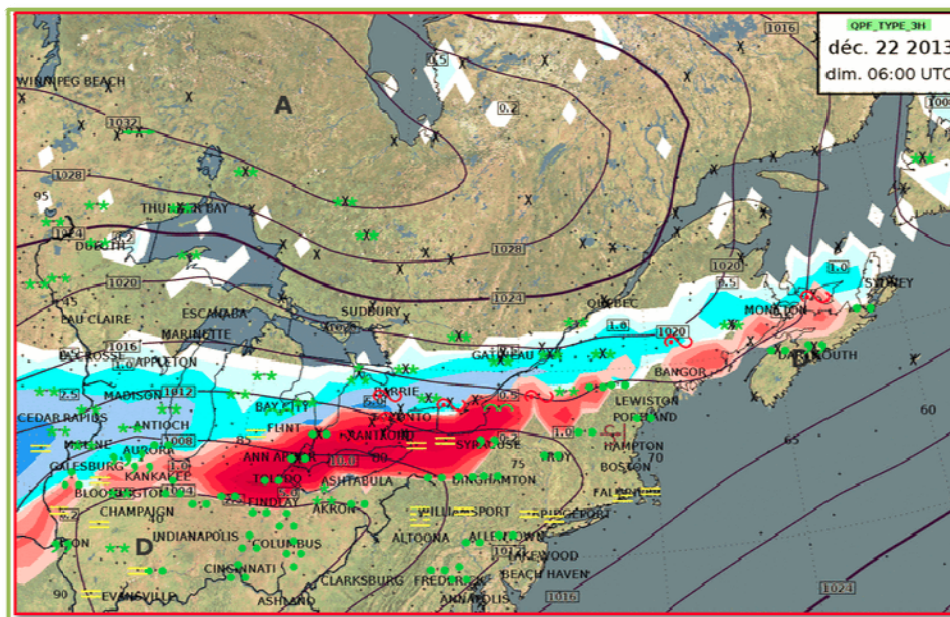


4. The December 2013 Ice Storm and Toronto Hydro's Response

On Thursday, December 19, 2013, Toronto Hydro began to track weather warnings from Environment Canada, indicating the probability of an ice event. Starting around 3:00 p.m. on Saturday, December 21, 2013, and into Sunday December 22, 2013, the Toronto Hydro service territory was at the epicentre of a freezing rain event that brought between 20 and 30 millimetres of freezing precipitation (more than two-year's worth in two days),² resulting in significant ice accumulation on trees and power lines. The ice accumulation left roads and sidewalks slick and dangerous and knocked down trees and tree limbs across the region causing widespread power outages. In addition to wreaking havoc across the Greater Toronto Area, the storm crippled North American transportation at one of the busiest travel times of the year.

The surface map of the storm-affected area, in Figure 5 below, shows the concentration of freezing rain over the Greater Toronto Area at the peak of the storm on Sunday December 22, 2013, at 6:00 a.m. (red color represents the freezing rain, while white/blue areas are snowfall). The freezing rain stopped around 9:00 p.m., on Sunday, December 22, 2013.

Figure 5: Surface Map of 2013 Ice Storm at Peak Intensity



Power outages started shortly after 8 p.m. on Saturday and peaked early on Sunday morning when 313,000 customers were without power. The remnants of the weather system continued through the morning of Monday, December 23, 2013, and the

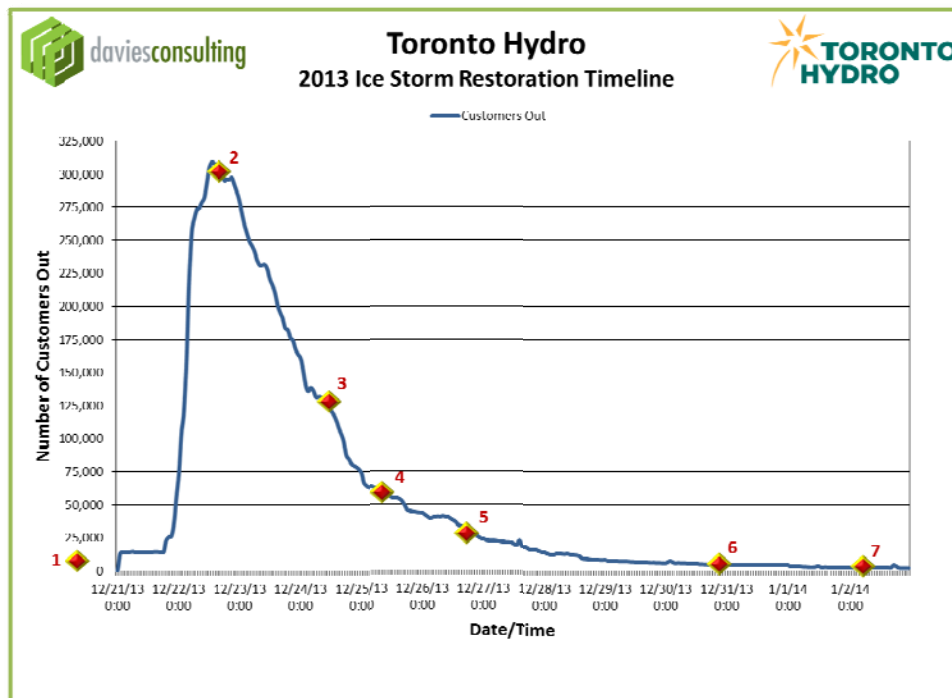
² Source: Environment Canada

Company continued to experience additional outages as it began initial restoration. Ultimately, approximately 416,000 customers, or 57% of all Toronto Hydro customers, experienced service interruptions as a result of the Ice Storm, affecting more than one million Toronto residents. The majority of the damage was caused by tree limbs falling on power lines, either creating faults or breaking the lines.

Toronto Hydro quickly mobilized its management team and called in available resources, which began restoration work by 8 a.m. on December 22, 2013, when it was safe to work. Service was restored to all customers who could receive power by January 2, 2014, 11 days after the restoration began. Toronto Hydro resumed normal operations on January 3, 2014, after restoring the remaining customers who experienced damage on their property and required permits from the Electrical Safety Authority (ESA) to be reconnected to the grid. Approximately 98% of Toronto Hydro's core trade workers supported the restoration effort, aided by another 450 field workers (line and forestry) from contractors and 10 other utilities. Figure 6 below shows the restoration progress timeline with the following key milestones:

1. Initial weather statements warning of ice event;
2. Initial request for Mutual Assistance issued by Toronto Hydro;
3. Power restored to all critical facilities designated by the City Emergency Operations Centre (EOC);
4. Approximately 86% of all customers affected restored (72 hours from the start of restoration);
5. Approximately 90% of customers out at peak restored;
6. Approximately 99% of customers out at peak restored; and
7. All customers who can accept service restored.

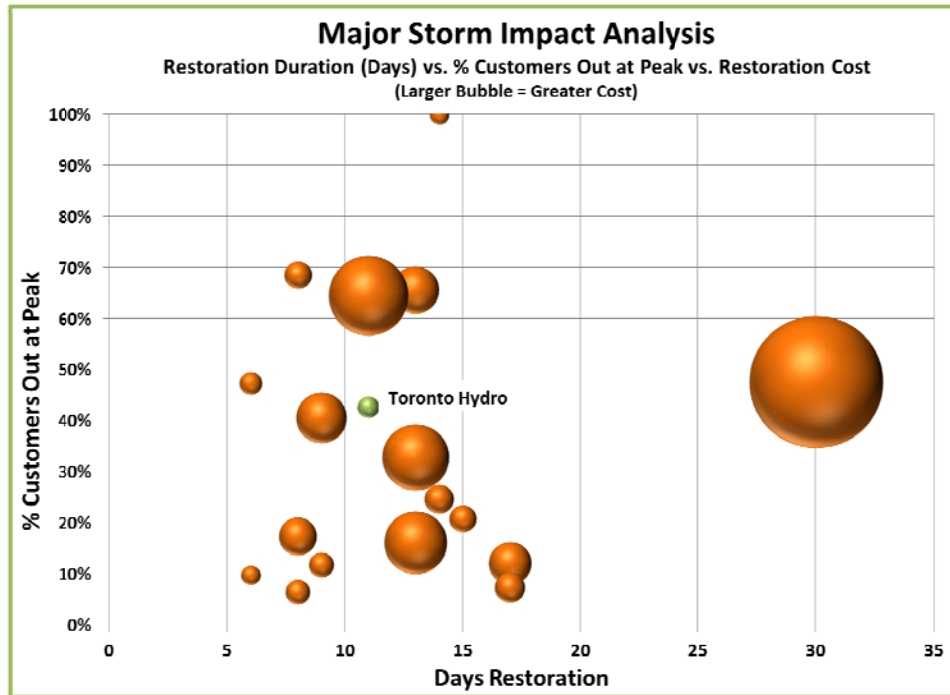
Figure 6: 2013 Ice Storm Restoration Timeline with Key Milestones



As part of the review of Toronto Hydro's restoration effort during the 2013 Ice Storm, Davies Consulting compared the Company's response to other ice and snow storm restorations, using information from its confidential and proprietary Storm Response Benchmark Database.³ Figure 7 depicts the restoration duration (on the X-axis), percent of customers affected at peak (on the Y-axis) and the total cost of restoration (indicated by the size of the bubble). When compared to other similar events, according to these metrics, Toronto Hydro's overall performance during the 2013 Ice Storm was within the industry norm.

³ Davies Consulting began to develop its confidential and proprietary Storm Benchmark Database in 2003. The database currently contains key statistics from more than 95 major event responses by over 42 electric utilities across North America. While each event is unique and the comparisons among utilities have to be carefully evaluated, benchmarking can be valuable to identify areas where potential improvement opportunities exist.

Figure 7: Event Benchmark Comparison



5. Findings and Recommendations

5.1. Overview

The following sections describe the findings from the review and provide 25 recommendations to address opportunities for improvement. The findings and recommendations are grouped within the nine evaluation areas described in Section 2.3 of this report. The areas are presented in the following order: Emergency Planning and Preparedness; Resource Acquisition and Allocation; Damage Assessment and Planning; Restoration Execution; Communications – Customer Contact; Communications – Other Stakeholders; Information Systems and Technologies; Vegetation Management and System Hardening/Resiliency; and Toronto Hydro-City Coordination.

Each finding of a strength and area of improvement is addressed in detail within each evaluation area. The following statements distill the key findings:

- Toronto Hydro followed an Incident Command System-based approach at the management level, but had not fully developed, trained, and exercised the approach across the Company;
- Customers could not obtain timely and accurate information about their outage status (including estimated time of restoration or ETR) during the event;
- The incident communication process, with a defined media strategy and unity of message, was in line with industry leading practices;
- The Company secured and deployed mutual assistance resources early in the restoration and executed the overall mutual assistance process generally well;
- Restoration priorities were in line with industry practices; however, the damage assessment process was not fully executed;
- While the restoration approach varied among the Local Command Centres, the overall restoration duration was in line with similar events in the industry;
- Toronto Hydro has implemented some advanced operational and information technology systems, but has not fully integrated them to provide adequate restoration support and situational awareness; and
- The circuit-based vegetation management preventive program is on a three-year cycle which is in line with industry practices and follows industry pruning standards and City of Toronto by-laws.

Likewise, each recommendation is detailed within each evaluation area. The following list is a top line summary of the recommendations by area evaluated:

- Update emergency response plans to align with vision and strategy, incorporate the documentation of key processes and procedures, and train response roles and structure;
- Improve situational awareness capabilities to enable development of accurate ETRs and facilitate focus on critical priorities;
- Develop capacity to provide customers timely access to report and obtain critical information related to their outage, including blue-sky and full-scale major events ;
- Work with key stakeholders to identify, agree upon, and fund cost-beneficial system hardening and resilience initiatives, including vegetation management and targeted conversion of line segments to underground construction;
- Educate customers and stakeholders to ensure that they understand their responsibilities and are better prepared and more fully informed when incidents occur (e.g., impacts requiring repair of damaged equipment on customer premise);
- Codify the process for rapid access to and deployment of trained, certified, and equipped resources;
- Pre-define restoration approaches that are scaled to outage levels and can be executed efficiently and safely;
- Update and further integrate key information and operational systems to provide real or near-real time intelligence during major events; and
- Enhance collaboration between Toronto Hydro and the City to Integrate outreach, messaging, and education to improve citizen preparedness and awareness of major events.

Appendix C provides a summary table of all of the findings (including strengths and opportunities for improvement) and recommendations organized by evaluation area.

For easy reference, each recommendation has an alpha-numeric key associating it to one of the evaluation areas (e.g., EPP-1, EPP-2). The following table lists the reference key for each evaluation area.

Table 4: Recommendations Reference Keys

Reference Key	Evaluation Area
EPP	Emergency Planning and Preparedness
RA	Resource Acquisition and Allocation
DAP	Damage Assessment and Restoration Planning
RE	Restoration Execution
CCC	Communications – Customer Contact
COS	Communications – Other Stakeholders
IT	Information Systems and Technologies
VMSH	Vegetation Management and System Hardening/Resiliency
TH – C	Toronto Hydro – City Coordination

5.2. Emergency Planning and Preparedness

Across the electric utility industry in North America, emergency management is receiving heightened attention. Over the last 10 years, weather-related events have grown in frequency and magnitude, as illustrated by a number of recent catastrophic-level storms (e.g., Hurricane Katrina, Hurricane Sandy, Hurricane Irene, the Alberta and Ontario floods of 2013, and the arctic blasts of early 2014). In addition to the weather events, there are growing concerns about and significant efforts to address other types of emergencies/hazards, such as cyber-attacks, physical attacks, and pandemics. Recognizing that utilities play an essential role in community recovery once a major event occurs, utility leaders are making emergency management a core corporate competency, as illustrated in the Canadian Electrical Association 2013 Annual Report:

“CEA member companies understand how important electricity is to virtually every aspect of the lives of Canadians, making emergency preparedness a critical business priority.”

Leading practice utilities are strengthening emergency management by:

- Establishing an emergency management vision, guiding principles, and strategy;
- Incorporating the Incident Command System (ICS)⁴;

⁴ Incident Command System (ICS) is a standardized on-site management system designed to enable effective, efficient incident management by integrating a combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure.

The ICS is used to manage an incident or a non-emergency event, and can be used equally well for both small and large situations (Source: ICS Canada).

The Province of Ontario has developed the Incident Management System (IMS) that provides standardized organizational structures, functions, processes, and terminology for use at all levels of emergency response in Ontario. IMS addresses the need for coordinated responses to all types of incidents and is closely related to the Incident Command System (ICS). ICS is used by some first responders in Ontario and many first responders (wild land fire, search and rescue, etc.) across Canada.

- Developing a set of emergency response plans that are comprehensive, useable, scalable, and address all-hazards;
- Designating formal emergency response roles and responsibilities, ideally managed within a central emergency management organization;
- Conducting annual system-wide exercises designed to stress response processes and enable the Company to identify improvement opportunities prior to an actual event;
- Coordinating with local and state/provincial governments in planning and exercising efforts;
- Partnering with regulatory stakeholders to ensure that the emergency management organization and program is appropriately staffed and resourced; and
- Tying emergency management and preparedness to key performance indicators for staff.

The infusion of emergency management knowledge, skills, and discipline across an organization takes persistent leadership attention, significant investment, and dedicated time. It may take five or more years to fully develop plans, train staff, and exercise capabilities.

This assessment of Toronto Hydro's emergency management planning and preparedness capabilities in advance of the 2013 Ice Storm addressed the following:

- Adherence to ICS principles and practices;
- Emergency management planning;
- Emergency management organization and resourcing;
- Resourcing emergency roles;
- Emergency training and exercises; and
- Liaison/Coordination with external stakeholders (e.g., City of Toronto staff, elected officials, Provincial agencies, first responders).

5.2.1. Emergency Planning and Preparedness Findings

Since 2008, Toronto Hydro has had dedicated emergency planning staff, ranging between one and four full-time equivalents (FTEs). Notably, Toronto Hydro centralized the corporate emergency management function in 2012, placing it within the Strategy and Risk Management Group. This group is responsible for the overall corporate

emergency preparedness (all hazards), including developing emergency response plans, facilitating table top simulations and functional exercises, training staff, benchmarking, and coordinating emergency management activities across the Company. The Grid Response Plan provides the framework for responding to major events; however, it does not include sufficient description of all key processes and procedures. Additionally, the Grid Response Plan defines three levels of emergencies which may not be sufficient to address a larger-scale event.

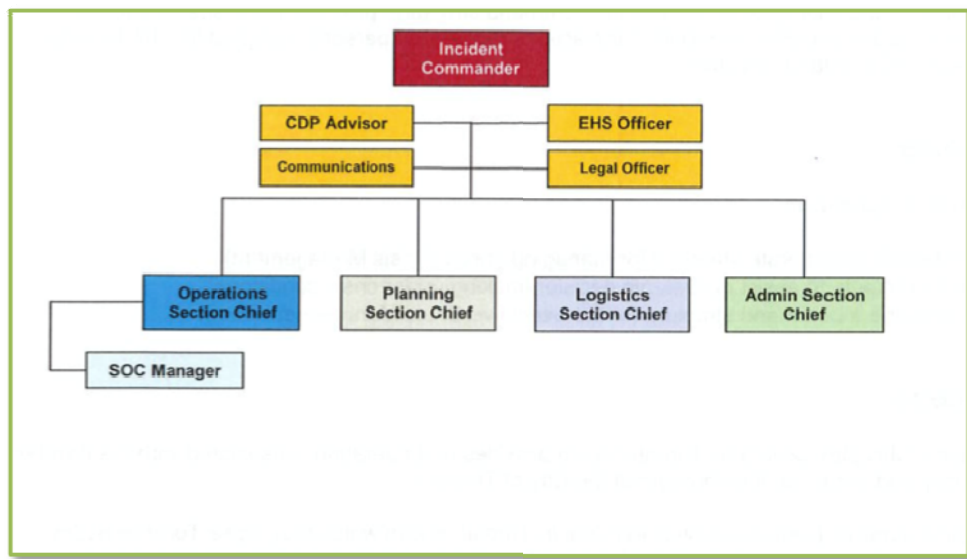
Emergency Planning and Preparedness Strengths

1. Emergency response structure largely aligns with the Incident Command System, which is considered to be the industry leading practice in emergency response.

Toronto Hydro uses ICS⁵ to manage all types of emergencies. The initial focus of Toronto Hydro's ICS implementation was to establish the Crisis Management Team and Incident Management Team roles and structure and train executives and managers who fill those roles in the Emergency Operations Centre (EOC) and System Operations Centre (SOC). This approach is consistent with comparably-mature ICS programs at other utilities.

Toronto Hydro's ICS structure is described in the Company's Crisis Management Plan and Grid Disruption Plan. It closely aligns to the Canadian and Provincial ICS models (See Figure 8 and Figure 9).

Figure 8: Toronto Hydro Incident Command System Structure



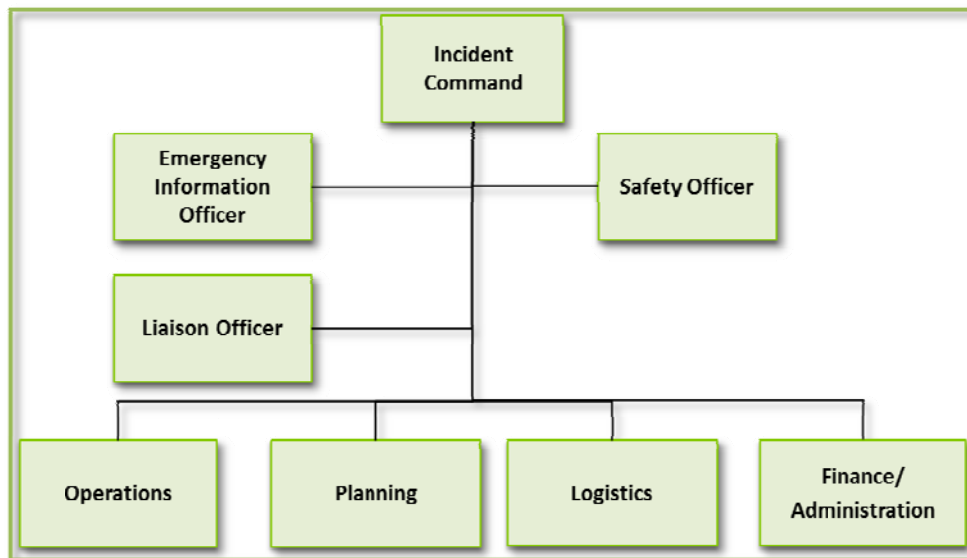
⁵ The Province of Ontario has developed the Incident Management System (IMS) that provides standardized organizational structures, functions, processes and terminology for use at all levels of emergency response in Ontario. IMS addresses the need for coordinated responses to all types of incidents and is closely related to the Incident Command System (ICS). ICS is used by some first responders in Ontario and many first responders (wild land fire, search and rescue, etc.) across Canada.

The Company's ICS structure includes most of the command staff roles such as Incident Commander, Communications (Public Information Officer), Environmental, Health and Safety Officer (Safety), and general staff roles (Operations, Planning, Logistics, and Administration Section Chiefs). There are two notable differences between the Toronto Hydro structure and the Canada/Ontario structure:

1. Toronto Hydro's Crisis Management Team includes a legal officer, a role common within a private company ICS; and
2. Omission of the liaison officer role.

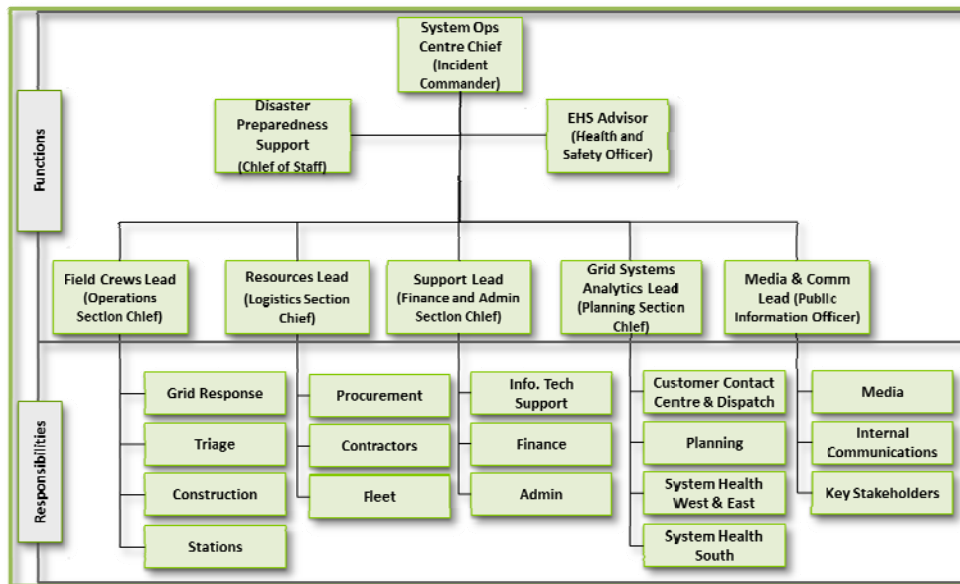
At Toronto Hydro, the Corporate Disaster Preparedness (CDP) Advisor serves as the liaison officer, acting as the primary interface with the City of Toronto Office of Emergency Management. Lastly, the SOC Manager oversees system operations including all the work protection activities on the distribution system.

Figure 9: Canada and Ontario EM Incident Management System Structure



The Grid Disruption Plan, which governs the restoration of major electric distribution outages, also uses an ICS-based response structure. Toronto Hydro used this plan to guide the 2013 Ice Storm restoration. While the roles in this plan have different titles than those defined by ICS, they address the same general staff functions (See Figure 10).

Figure 10: Toronto Hydro Grid Disruption Response Organization



2. Corporate Emergency Management organization is centralized and addresses all hazards.

Toronto Hydro has a standalone emergency management organization that addresses all-hazards. Following an unfavorable rate case that resulted in management restructure in 2011-2012, Toronto Hydro downsized its group of full-time emergency management professionals from four to one, centralized the function, and placed it within the Strategy and Enterprise Risk Management group. Previously, the organization with responsibility for emergency response was within the Electric Grid Operations group and its primary focus was on grid disruption events.

This move to establish a discrete emergency management function (managed outside of operations) is in line with practices of leading utilities. The separation of the traditional “storm response” group from operations helps to ensure that the focus is all-hazards. In addition, this structure enables the group to better engage the entire corporation in a response, versus just the operations group.

Increasingly across the utility industry, the leader of this emergency management organization has the role of Director or Vice President, denoting the corporate importance of this function. The emergency management responsibilities typically include: maintenance and integration of emergency plans; risk management; weather tracking; training and exercises; modeling and analytics; business continuity planning; benchmarking with utilities and other industries and ICS implementation. Since the electric grid is the key asset of a utility, central emergency management groups often include a grid operations expert. Alternatively, they work closely with the grid emergency management lead in the electric delivery business unit.

3. Trained and exercised System Operations Centre (Command Centre) roles and responsibilities prior to the event.

Toronto Hydro has a training and exercise program for Senior Management Stand-by (SMS) – a group of on-call leaders, SOC staff and the Crisis Management Team (CMT). Toronto Hydro conducted the following training and exercises in 2013:

- Two CMT training sessions;
- Six Grid Disruption Plan training sessions with the SMS; and
- Six exercises:
 - Executives only;
 - Communications team only;
 - Executives and the support team;
 - Executives, support team, and the Independent Electricity Systems Operator (IESO) and North American Electric Reliability Council (NERC) Grid Exercise II (GridEx II);
 - Executives, SMS, and the City of Toronto OEM; and
 - The City of Toronto OEM only.

4. Pre-event weather monitoring process in place and used to support activation decisions.

Building accurate situational awareness is critical when preparing for or responding to emergencies. An important component is the weather forecast. In preparation for the December 2013, Toronto Hydro monitored weather information provided by Environment Canada, the government source of weather and meteorological information. This effort began early in the week of December 16 and continued throughout the restoration.

On December 19, Toronto Hydro issued the following press release (See Figure 11) in which it warned of severe weather and noted the risk of potential and extended power outages.

Figure 11: December 19, 2013 Press Release

Toronto Hydro-Lert: Bad weather approaching

December 19, 2013 3:24 p.m.
Pre Ice Storm Release #1

TORONTO, Dec. 19, 2013 /CNW/ - Environment Canada is predicting everything from snow and ice pellets to freezing rain and rain, beginning this evening and over the next few days. Toronto Hydro-Electric System Limited (Toronto Hydro) is anticipating this storm and organizing its emergency operations to respond to potential and extended power interruptions. Toronto Hydro will be providing updates via the online newsroom, as well as Twitter (@torontohydro).

This approach to weather monitoring is in line with standard practices of utilities that do not have an in-house meteorologist.

Emergency Planning and Preparedness Opportunities for Improvement**1. Emergency response plans provided an overall structure for response, but did not include detailed descriptions of key processes and all roles.**

Toronto Hydro has two emergency response plans: a Crisis Management Plan and a Grid Disruption Plan (GDP).

The Crisis Management Plan describes how the senior executives work in a crisis. The Crisis Management Plan serves as a “core” plan overlaying the GDP, which many utilities describe as an “annex”. The GDP “outlines the way in which decision makers use the additional powers and authority accessed through the declaration of a grid emergency.”⁶ It includes such information as emergency declaration procedures, emergency triggers and levels, coordination between the Crisis Management Team and System Operations Centre, and guidance for plan maintenance, along with checklists for SOC roles, and forms for high-level damage assessment, objective setting, tactical planning, and stand down assessment. Toronto Hydro emergency response staff used the GDP during the 2013 Ice Storm.

The overall format of the GDP (core plan plus annexes) is reasonable for a newly constructed plan, but currently it does not include:

- Definition of key response processes (e.g., damage assessment, cut and clear, mutual assistance deployment);
- Different response strategies for varying incident levels;
- Sufficient detail about the response organization and roles below the SOC level (e.g., the Local Information Command Centres, or LICCs);

⁶ Grid Disruption Plan, Toronto Hydro, October 28, 2013

- Checklists, forms, and job aids for response staff; and
- Communications protocols and processes, including stakeholder outreach/liaison.

2. Toronto Hydro characterizes grid incidents on a three-level scale, which may not adequately address full-scale events.

Toronto Hydro currently designates three levels of grid emergency in the GDP. As shown on Figure 12, the criteria used to establish the severity of an incident include: expected restoration duration, impact to customers and key accounts, the potential threat to public and employee safety, the expectation of environmental damage, and reputational impact. These emergency levels do not adequately address the complexity and potential impact of incidents where restoration times will exceed 72 hours.

Figure 12: Toronto Hydro Grid Emergency Levels

Emergency Level	Duration	Impact Severity on Customers	Key Accounts	Public Safety	Employee Safety	Environment	Reputation	Reg/ Gov Involvement
1	> 3hrs	Limited impact		No threat to broader public	Employee injury	Some impact	Limited impact	Report to be filled with government regulator
2	3 hrs – 48 hrs or incident is escalating	Broader customer impact	Key accounts impacted	Threat to public safety	Fatality	Moderate impact	Major impact/ Significant local news coverage	
3	72 + hrs outage or regional/ provincial outage	Major impact on customers		Public safety is jeopardized		Significant and on-going	Critical damage/ intensive nation new coverage	

At the federal level in Canada, there are three emergency levels. In the United States, the standard in public sector emergency management is a five-level scale. The U.S. utility sector is migrating to the five-level standard as well. The City of Toronto uses a four-level scale (0-3).

Many utilities have adopted a wider range of levels in order to better understand and communicate the scale and complexity of an incident. A more extensive scale is useful when trying to understand and communicate the implications of emergencies that last up to three days (as planned for at Toronto Hydro), incidents that last up to 10 days (as experienced in the 2013 Ice Storm), and incidents that last up to 30 days, as experienced by some Canadians in the aftermath of a 1998 ice storm.

3. Key restoration strategies and processes were not defined or understood at all levels of the Company with roles in the response.

The restoration strategy touches on all aspects of the response, including the restoration approach (circuit-based, area-based, order based)⁷, call volume management, work order management, and the process to develop estimated time of restoration (ETR). The absence of a commonly-known restoration strategy during the Ice Storm response caused the LICC managers to create their own strategies and processes. For example, managers in one LICC did not have sufficient training or experience in managing an incident of this scale and continued to apply an order-based approach, while another LICC implemented circuit-based restoration based on lessons learned from work in Long Island during Hurricane Sandy.

4. Many Toronto Hydro employees did not have a pre-assigned and trained role for major incidents.

Utilities that use ICS typically assign and provide training on a second set of duties to many employees who are not operationally qualified. These secondary duties, increasingly called emergency response roles, are activated when the magnitude of an incident requires a level of support that exceeds the capacity of the day-to-day operations staff. A person filling an emergency response role (or “storm role”) often performs tasks during emergency conditions that are different from their “normal” work activities. Some examples of emergency roles are damage assessor, wires down guard, customer service representative, materials handler, and staging site manager.

Toronto Hydro did not have in place a systematic, comprehensive process for assigning and managing emergency response roles. Many employees didn’t have a pre-assigned role, while some, who were pre-assigned roles such as LICC management and support, were unfamiliar or ill-suited to the job tasks – or didn’t have access to necessary systems and locations.

A few areas that would have benefitted from more effective response role support during the 2013 Ice Storm were:

- Incident management;
- Damage assessment;
- Logistics support;
- Wires down guards;
- Work order management; and
- Crew support, including clearing debris in the field and supporting certified power line persons.

⁷ Different restoration approaches are described under the section 5.5.1. of this report.

5. Toronto Hydro conducted exercises and training at the Command Centre level, but did not perform sufficient training and exercise in the Local Incident Command Centres.

Prior to the 2013 Ice Storm, the roles and responsibilities as well as processes at the LICCs were not widely trained and exercised. The approach to focus emergency response training at the central command level first is consistent with that of many other utilities that are implementing ICS and emergency management programs. It can, however, lead to some breakdown in execution if the company has not adequately trained personnel responsible for managing the decentralized operations being managed by the LICCs.

5.2.2. Emergency Planning and Preparedness Recommendations

EPP-1 Reaffirm and communicate emergency management vision and strategy throughout all of Toronto Hydro.

Toronto Hydro executive leadership should affirm its belief that emergency management is a core competency of the Company. This can be achieved through a compelling vision statement and set of guiding principles that will drive the Company's response in the future. Executives should communicate these to the entire organization and incorporate them into the corporate emergency management plan. Nearly every Toronto Hydro staff member interviewed in this effort wanted to participate in improving the process. The emergency management vision and guiding principles should capture and "unify" this interest.

EPP-2 Continue to inculcate the ICS-based approach to emergency response.

- Expand the use of emergency response roles (i.e., second roles);
- Formalize the pre-event activation and communication process;
- Update the emergency levels to include worst-case planning assumptions; and
- Expand the training and exercise program to the service centres.

The adoption of ICS is a cultural shift for any organization. It can take years for a company to move from espousing the principles of ICS to having front line personnel use it on a daily basis. Learning from the public sector's adoption of ICS over the course of several decades and the experiences of other utilities, the deployment of ICS is deemed successful only when the senior management, middle management, and front line personnel use it on a regular basis. In order to achieve the frequent, more "routine" use of ICS, Toronto Hydro should focus on formalizing the second roles process and broadening training and exercises to include more front-line response staff.

Second Roles

A comprehensive second (or emergency response) roles process should include:

- Assigning an alternate set of duties to employees;
- Training and/or certifying employees to conduct those duties; and
- Providing them the opportunity to demonstrate competency through periodic exercises.

The effort should be conducted via collaboration between the emergency management organization, human resources, and Company operating groups.

Toronto Hydro should establish an “inventory” of second roles, documentation of the desired competencies (knowledge, skills, and abilities) or certifications desired for each, and a list of one or more staff members who fit the requirements. New employees should receive a second roles assignment upon hire, and current staff could receive assignments during the annual review process. Individual development plans should include metrics related to second roles. To start, Toronto Hydro could review current rosters to determine:

- Missing roles that should be added immediately (e.g., damage assessors, customer service representatives);
- How well the competencies of those currently assigned match with second role requirements; and
- Other internal sources of staff to fill roles (e.g., Finance, Human Resources).

Event Levels

Toronto Hydro should expand the emergency levels on the grid emergency scale it uses to address full-scale incidents (e.g., Level 4 or greater). When determining the associated triggers to use, Toronto Hydro should consider developing several planning scenarios (bounding scenarios) including one that details a “worst case” incident. This “worst case” would likely exceed the 2013 Ice Storm in terms of damage, employee and customer impact, and public safety risk. Toronto Hydro should develop the hazard scenarios in consultation with the City and Provincial emergency managers to support closer integration of planning and response.

Training and Exercises

Toronto Hydro should extend its ICS roles and process training to staff in the Local Incident Command Centres at a minimum. This would include classroom or on-line courses and periodic, planned exercises (table tops and functional) to reinforce and test capabilities. The training program should be put in place to support staff assigned to second roles, with refresher training offered annually. Additionally, the Company should require all employees who could be engaged in emergency response to complete basic

ICS training (on line or classroom) and require staff filling key command roles to be ICS-certified.

EPP-3 Enhance centralized emergency management group resources to support full implementation and sustainment of ICS and ongoing relationships with key stakeholders.

Toronto Hydro should maintain a centralized emergency management organization and continue to support on an all-hazards approach to emergency management. The assignment of a Director or higher-level executive to lead the group would indicate executive support of this role in driving emergency management discipline and capabilities across Toronto Hydro. The Company also should seek to increase the size of the organization. Ideally, it should include full-time, dedicated staff responsible for such functions as grid operations emergency response, training and exercise, plan management, ICS implementation and sustainment, emergency management coordination with the City and regulators, and possibly strategy and analysis.

EPP-4 Add dedicated grid operations emergency management resources.

In order to support the expansion and implementation of the Grid Disruption Plan, Toronto Hydro should seek adequate funding to increase the number of resources dedicated to its centralized emergency management organization as well as a specific grid operations emergency management group. This grid operations emergency management group would be responsible for updating the Grid Response Plan, developing specific restoration processes, and designing training curriculum. It could report directly to the centralized organization and reside within the grid operations organization, or report to the Senior VP of grid operations with a dotted line reporting relationship to the centralized emergency management group. This dotted line relationship will ensure alignment between grid operations and emergency management vision, principles, and strategy.

EPP-5 Update the Emergency Response Plan to improve comprehensiveness and usability.

The Emergency Response Plan should retain the current, all-hazards focus and should be enhanced to include roles and responsibilities of LICC and field response staff, especially during the grid disruption response. This effort will be substantial since it will include aligning key preparedness and response functions across the organization, documenting the processes (flow charts, forms, checklists) in the Emergency Response Plan, and identifying the roles and responsibilities of all who are responsible for executing them.

Toronto Hydro should focus first on updating function-specific process descriptions for overhead and underground outages, and other related documentation in the Grid Disruption Plan. Eventually, the Emergency Response Plan should include other function-specific and hazard-specific annexes (e.g., pandemic, physical security attacks, and flooding).

5.3. Resource Acquisition and Allocation

When a major incident occurs, the readiness of a utility to secure and deploy sufficient resources (i.e., personnel and equipment) directly affects the safety, speed, and efficiency of restoration. Addressing a number of outages that is orders of magnitude higher than experienced day-to-day, is a complex task requiring significantly more skilled workers, proficient supervisors, specialized tools, gear, and materials. Some staffing needs may be met through redeployment of internal resources, for example, using engineers to conduct damage assessments. Current vendors may be able to expedite delivery of equipment and services, such as standard gauge wire, poles, and meals.

Responses to larger events, however, typically necessitate the use of mutual assistance to secure people and equipment. As noted by the Edison Electric Institute, the association that represents all United States (U.S.) shareholder-owned electric companies, “Mutual assistance is an essential part of the electric power industry’s service restoration process and contingency planning.” The recent series of widespread, devastating weather events bear this out:

- Tens of thousands of utility workers representing 80 utilities from across the U.S. and Canada were deployed during the response to Hurricane Sandy and Nor’easter Athena in October/November 2012;
- 30,000 utility workers responded to the June 2012 Derecho that hit the mid-Atlantic west to Ohio, including crews from Canada; and
- Nearly 50,000 line workers and crews, including crews from Canada, assisted in the restoration efforts in response to Hurricane Irene in August 2011⁸.

The mutual assistance network is a voluntary partnership of electric utilities across North America that is committed to helping restore power whenever and wherever assistance is needed. Electric utilities impacted by a major outage event are able to increase the size of their workforce by ‘borrowing’ crews from other utilities.

In the U.S., the mutual assistance network, initiated decades ago, is organized into Regional Mutual Assistance Groups (RMAGs) that manage the voluntary agreements among electric utilities within the same region. Members initiate requests for restoration assistance through the RMAG, which then facilitates the process of identifying available crews, coordinates logistics, and locates specialized resources as needed (e.g., tree trimmers, call centre support). In addition to belonging to one or more RMAGs, most U.S. utilities also participate in a nationwide mutual assistance agreement through the Edison Electric Institute.

⁸ Source: Edison Electric Institute

Members of the Canadian Electricity Association (CEA), the national forum and authoritative voice of the electrical industry in Canada, have been active in RMAGs within Canada and the U.S. A number of Canadian utilities are members of RMAGs, primarily the North Atlantic Mutual Assistance Group (NAMAG) which was formed in 2013 through a merger of three smaller RMAGs. In response to increasingly frequent and severe weather events that tax RMAG capabilities, the CEA convened a National Mutual Assistance Working Group (NMAWG) in February 2013. This group will serve as a forum for sharing leading practices and improving all aspects of coordinating cross-border mutual assistance.⁹

Other sources of personnel to meet outage restoration demands are organizations that supply contract personnel. Often utilities use contractors to fill blue sky roles (e.g., line crews, tree trimmers, call centre representatives), and may have agreements in place to draw upon additional resources in the event of an emergency. These kinds of agreements tend to be tailored to reflect the particular needs of the utility and capabilities of the contractor, whereas mutual assistance agreements are more standardized.

As resource procurement gears up, utilities need to have in place the essential infrastructure to support more personnel, such as equipment, materials, fuel, transportation, personal care (lodging, food, laundry, etc.), along with crew mobilization, supervision, and demobilization processes, and alternate work and crew staging sites. Leading practice is to pre-establish agreements with multiple vendors, or have “turn-key” contracts (i.e., where a vendor handles significant portions of logistical support). Pre-established plans and agreements provide for the “scaling” and specialization of resources needed to support response to all incident levels and hazards. It is important to note that contractor resources that are released by one utility to support restoration at another utility are considered a part of the mutual assistance process. They are allocated according to the agreements between or among the relevant RMAGs.

The assessment of Toronto Hydro’s resource acquisition proficiency addressed the following:

- Resource acquisition strategy;
- Determination of types and quantities of resources needed for an efficient restoration;
- Procurement of off-system support, including mobilization criteria, process, and agreements;

⁹ Canadian Electricity Association, *Electricity Matters*, January 2013.

- Procurement of equipment, materials, transportation and fuel, housing, feeding and care of crews, and all other logistical needs;
- On-boarding process and procedures, including safety training;
- Deployment of off-system resources such as work assignment, supervision, and coordination with internal crews; and
- Demobilization of resources, including criteria and processes.

5.3.1. Resource Acquisition and Allocation Findings

Nearly all of Toronto Hydro's core trade workers (98%), management and professional office staff, along with 450 mutual assistance field resources supported restoration following the 2013 Ice Storm. A wide range of crew types was used, including overhead line, underground line, forestry, construction, and trouble shooters. The Company sourced the supplemental crews through sustained contractors (who have agreements in place to provide support), other contractors, the City of Toronto, and mutual assistance from other utilities. Notably, this was the first time that Toronto Hydro had used mutual assistance. Ten utilities from within and outside the Province of Ontario supplied approximately 250 linemen.

The Company called upon existing relationships with its third-party warehouse provider, an expediter, and corporate food service provider to quickly source and make available the equipment, materials, and meals to support the incoming and Toronto Hydro crews. The arrangements for people and the resources needed to support them were in place within 48 hours. These included the provision of flight transportation, trucks, equipment, lodging, and food for mutual assistance crews from Manitoba Hydro.

While the mutual assistance process worked well and accelerated the restoration process, most of the procedures were developed just-in-time. The current plan does not detail the mutual assistance process and procedures or include contracts with third-party vendors to accommodate a large influx of resources. Also, at the time of the event, Toronto Hydro did not belong to any of the U.S. RMAGs. The Company has since applied to join the Northern Atlantic Mutual Assistance Group (NAMAG).

Resource Acquisition and Allocation Strengths

1. Safely deployed the largest number of resources for any response in Toronto Hydro history.

Toronto Hydro management began to reach out to off-system resources immediately, starting with an email to other utilities on December 22, 2013, at 3:40 p.m. In total, 10 utilities provided approximately 250 lineman and forestry workers. See Appendix B for a list of utilities that supplied mutual assistance. The total number of resources supporting restoration following the 2013 Ice Storm, including internal staff and field personnel, contractors, and mutual assistance, was nearly 1,400 – the largest number of any response conducted by Toronto Hydro.

During the course of the restoration, only one recordable safety incident occurred. A recordable is defined as an incident that causes a worker to miss work time. This statistic is noteworthy as the persistent ice and freezing temperatures following the storm made work locations (uneven surfaces, back yards, heavily canopied areas, locations requiring ladders to access) hazardous.

2. Developed and applied mutual assistance processes in real time that generally worked.

Toronto Hydro crews have provided mutual assistance to other utilities several times in recent years including restorations following Hurricane Irene (August 2011), the Derecho (June 2012), and Hurricane Sandy (October 2012). Many linemen also supported the lengthy restoration effort following the 1998 Quebec ice storm. While Toronto Hydro has experience *offering* mutual assistance, the first time the Company *requested* mutual assistance, was for the response to the 2013 Ice Storm.

Toronto Hydro executives and the Logistics Resource lead, who was responsible for mutual assistance intake and support processes, relied upon established relationships with other utility executives and agreements, practices, and processes in place to support daily operations to bring on and support mutual assistance providers. They were able to call upon current vendors to expedite materials and equipment deliveries, expand food services, and provide fuel. The logistics group also was able to quickly procure other services, such as lodging, when pre-existing agreements or processes did not exist.

Beginning on Sunday afternoon December 22, 2013, approximately 12 hours after the outages started and after the Company declared the Level 3 emergency, the Toronto Hydro Planning Section Chief initiated calls to other utilities within the Province of Ontario and in the neighbouring Province of Manitoba, to request line and forestry crews. This decision was based on the number of customers affected and the conditions in the field. The sustained contractor (a company with an agreement in place for daily construction work) was contacted at 4:00 a.m. on Sunday, December 22. It is important to note that some of the neighbouring utilities were impacted by the same event and were restoring their own systems and therefore not in the position to provide assistance to Toronto Hydro. Some of these companies eventually sent resources after they restored outages to their customers.

Mutual assistance crews (including some forestry crews) began to arrive on Tuesday, December 24. Contractor crews (ranging from 2-4 crews, with 3-6 members each) were on site by Sunday, December 22. Contractor-provided forestry crews began work on Sunday, December 22, and forestry crews provided by the City of Toronto engaged on Tuesday, December 24.

After securing mutual assistance crews from external sources, Toronto Hydro staff from the Human Resources and Safety, Power Systems, and Operation Support Services

Divisions drew upon experiences from responding to other Level 3 incidents (e.g., Hurricane Sandy) to quickly develop the content for onboarding briefings to off-system mutual assistance and forestry crews.

Also, Toronto Hydro provided “bird-dog” supervisory support to all but a few (later arriving) mutual assistance crews. Supervisors identified to fill these roles (approximately 60) were experienced in responding to emergency situations. They knew the number of resources needed and processes required to keep crews fully engaged in restoration (e.g., work protection clearances, access to tools and equipment, coordination with other crews, etc.).

3. Flew in, equipped, and deployed mutual assistance resources from Manitoba within 48 hours.

When feasible, mutual assistance crews arrive with their own equipment (e.g., trucks, specialized tools, clothing, etc.). In order to expedite their arrival, the 42-member contingent from Manitoba Hydro was flown to Toronto. This was the second largest number sent by a responding utility. Crew members arrived with their own personal protective equipment and tailboards. Toronto Hydro supplied everything else they needed to support the restoration. This included bucket and passenger trucks (for crews and supervisors), equipment, tools, materials, supplemental clothing, and additional safety equipment requested.

Toronto Hydro transported, outfitted, and deployed all Manitoba crews and supervisors within two days of placing the call for assistance to Manitoba Hydro management. Toronto Hydro resource leads began to prepare on Monday, December 23, for the intake of the Manitoba Hydro workers. Crews were out and working by mid-day on December 25. This was a unique feat. By contrast, a number of utilities attempted to fly in crews from the West Coast during the Hurricane Sandy restoration, but ran into significant barriers and delays.

4. Conducted thorough mutual assistance on-boarding process and safety briefings.

Upon arrival, mutual assistance crews were transported and checked-in to their respective hotels, conveyed to the LICC from which they would be dispatched, and given an extensive orientation briefing that addressed local safety rules and conditions, high-level work protection code information, and what to expect on the streets. Trades training staff from the Human Resources and Safety Division conducted 14 training sessions. The Manager of the Mutual Assistance LICC conducted 2 training sessions. In addition, each day, mutual assistance crews would receive safety briefings prior to being dispatched to work locations.

5. Strong collaboration between City and Toronto Hydro tree crews on restoration activities.

The City of Toronto Urban Forestry’s top priority during the aftermath of the 2013 Ice Storm was to provide resources to Toronto Hydro to restore power. The City Director of

Forestry participated in daily planning conference calls that included Toronto Hydro executives, to review progress and identify needs. The City provided forestry crews directly to the LICCs, or to work locations, as directed by Toronto Hydro.

Resource Acquisition and Allocation Opportunities for Improvement

1. Mutual assistance processes and agreements with other utilities across Canada and North America were not formalized.

As a member of the CEA-sponsored National Mutual Assistance Working Group (NMAWG), Toronto Hydro is engaged in discussions with other utilities across Canada, to establish a national mutual assistance agreement, share leading practices, and improve cross-border mutual assistance. Toronto Hydro also is awaiting approval of its application to join NAMAG. Going into the 2013 Ice Storm, the Company did not have written mutual assistance agreements in place with other utilities, nor did it belong to regional or national mutual assistance groups. For the 2013 Ice Storm response, Toronto Hydro obtained mutual assistance from other Canadian utilities through personal, peer-to-peer contacts.

This less formal approach worked in large part because other utilities were experienced in providing mutual assistance, could quickly agree to terms (e.g., right to leave if needed, billing for just expenses incurred), and had crews available. If the 2013 Ice Storm had been more widespread, it likely would have taken longer to secure the additional line and forestry resources to restore in a reasonable amount of time. Most North American utilities participate in one or more regional mutual assistance groups, and/or a nationwide mutual assistance agreement to mitigate the risk of not having inadequate numbers or types resources to execute a restoration safely and reasonably.

2. The process to acquire and coordinate the deployment of City forestry crews was not defined in advance.

The 2013 Ice Storm affected large portions of the tree canopy of the City of Toronto, in turn causing significant and prolonged outages for Toronto Hydro customers. The nature of the damage called for deployment of a significant number of forestry crews. On a blue-sky day, Toronto Hydro typically uses between seven and eight contractor forestry crews and one Company forestry crew. In addition to the company contractors and crew, and the City forestry resources, approximately 200 forestry resources obtained through mutual assistance, executed tree cutting and clearing work, in support of the restoration.

Urban Forestry Operations of the City of Toronto was a logical source for this assistance. In the course of their work, City forestry crews communicate with Toronto Hydro every day, are familiar with the territory, and are local. Although Toronto Hydro and City Urban Forestry were participating in periodic discussions about emergency and work planning, they did not mutually define and document processes and guidelines for communicating strategic priorities, establishing work hours, assigning supervisory roles,

or sharing contractor-supplied crews. The initial contact to “get crews on the road,” along with the daily SOC calls worked well, but communication became less effective among the middle and field ranks.

3. Toronto Hydro has limited ability to accommodate a large influx of mutual assistance resources.

Ten utilities sent approximately 250 line personnel to support Toronto Hydro’s Ice Storm restoration. As one manager interviewed observed, “This is the size of a small company.” Utilities experienced in managing large numbers of mutual assistance workers typically have in place comprehensive plans, processes, and roles to support all aspects of crew management, including onboarding, lodging, food, laundry and other personal care, equipping, transporting, work assignment, supervision, and demobilization. During a response to a larger event, a significant number of host utility resources are needed for orientation/training, off-system crew supervision, and logistical support.

Toronto Hydro’s Grid Disruption Plan does not address mutual assistance specifically. In the absence of defined and trained procedures and roles, Toronto Hydro accommodated incoming mutual assistance crews through “just in time” assignment of internal staff who were able to draw upon personal experience and lessons learned providing mutual assistance to other utilities (e.g., during Hurricane Sandy and the 1998 Quebec ice storm). They were able to put together training and safety briefings, roster enough experienced trades people to serve as “bird-dogs” for most mutual assistance crews, secure adequate lodging, and equip crews who arrived without trucks or other equipment.

While interviews with mutual assistance providers indicate that Toronto Hydro handled the additional resources well, the approach used may not scale to an even larger event. Virtually all available internal supervisory resources were used and there would have been a shortage of bucket and commercial vehicles had crews been flown in (in addition to the Manitoba Hydro crews).

4. The demobilization process for mutual assistance crews was not clearly defined.

Leading mutual assistance practices address the full lifecycle of off-system resource management, from acquisition through release. Determining when to wind down the use of mutual assistance crews can be difficult, especially when there are lasting effects (ongoing outages) from a storm, like Toronto Hydro experienced after this storm. The mutual assistance portion of an Emergency Response Plan should describe the process and criteria for releasing crews along with procedures, checklists, and forms for collecting equipment and conducting a formal check-out. Mutual assistance agreements address demobilization guidelines and authorities as well.

Toronto Hydro management did not have a shared understanding of how and when to release mutual assistance crews. In the absence of clear direction, the utilities providing

mutual assistance resources determined when they would be leaving. In one case, the crews from one utility decided to leave, with Toronto Hydro's concurrence, and then were brought back from the airport to work another day.

5.3.2. Resource Acquisition Recommendations

RA-1 Adopt a resource management strategy that provides for deployment of all available resources, seamless integration and coordination of crews, and optimal supervisory span of control.

Building on the informal processes and relationships used to access mutual assistance during the 2013 Ice Storm, Toronto Hydro should formulate a resource strategy to support emergency response that addresses:

- All likely sources of mutual assistance;
- Numbers and types of resources needed for all incident levels; and
- Criteria for triggering mutual assistance requests.

As part of the emergency plan documentation, agreements should be put in place with utilities, contractors, and City agencies. The companion mutual assistance plan would:

- Detail the mutual assistance processes, (i.e., mobilization, onboarding, care and feeding, equipping, deployment, supervision, demobilization);
- Establish roles and responsibilities and authorities;
- Provide criteria for demobilization and policies; and
- Include template and job aids (e.g., standard expense forms).

Also, the plan would specify the number of supervisors needed for "bird-dog" and other oversight support to mutual assistance crews, along with a roster of qualified and trained internal and contractor staff.

- **Establish mutual assistance process and agreements that encompass all potential sources of crews: regional, national, cross-border utilities, contractors, and City.**

The mutual assistance strategy will distinguish types and sources of mutual assistance desired to support all levels and types of likely hazardous incidents. Primarily, this assistance will be limited to line and forestry crews, but could include other roles, like damage assessors and underground crews. Toronto Hydro should put in place written agreements with identified primary and backup providers.

With utilities, this may be done through joining one or more RMAGs (within Canada or including U.S. RMAGs), participating in the national mutual assistance agreement, or creating individual agreements. Toronto Hydro should continue to pursue membership

in NAMAG and explore joining other RMAGs in the United States, including the Great Lakes Mutual Assistance Group (GLMAG).

With City departments, Toronto Hydro should accelerate current discussions and include terms and expectations in the respective Company and City emergency response plans (or in a joint emergency response plan). With sustained and other contractors, Toronto Hydro should review current terms and add “scaling” requirements to ensure availability of resources when significantly more crews are needed.

- **Document the process, with pre-defined decision criteria, to mobilize and demobilize mutual assistance**

Toronto Hydro’s Emergency Response Plan should include documentation of all activities, decisions, roles, and infrastructure needed to support incoming mutual assistance. Since activating mutual assistance can be costly (i.e., as soon as the utility orders crews, and the crews start mobilizing and traveling, all the costs are borne by the requesting utility), it’s important that Toronto Hydro establish specific, comprehensible criteria to guide the responsible parties to make timely, appropriate decisions. Criteria could include:

- Number of outage spots;
 - Number of customers affected;
 - Projected level of damage;
 - Capacity to effectively deploy off-system resources;
 - Availability of internal crews and supervision;
 - Skills needed (e.g., forestry); and
 - Public perception (e.g., Why are crews leaving when my power is off still?).
- **Source and prepare supplemental supervisors to accommodate maximum crew scale-up.**

As a corollary process to instituting second roles, Toronto Hydro should identify and train internal staff that are qualified to serve as mutual assistance crew “bird-dogs” and/or supervisors. These additional supervisors may be needed if utilities providing mutual assistance are unable to send a suitable number. The size of the internal pool should be large enough to provide adequate span of control (1-2 crews for bird-dogs; each with 5-7 bird dogs per supervisor). Sources of qualified personnel could be former crew supervisors currently employed in other positions, retirees, former trades people on modified assignments (due to medically-documented reasons), and sustained contractors.

RA-2 Create a comprehensive, scalable logistics plan as part of the Emergency Response Plan.

A logistics plan describes the infrastructure and services needed to support restoration, particularly with regard to mutual assistance resources. The processes, agreements, and roles detailed in the plan should scale in accordance with the incident level. For example, a staging site may be needed in the wake of a large hurricane, or super storm, but not for a Level 3 ice storm.

Agreements with vendors should be negotiated in advance (at least in part) to ensure that vendors can plan accordingly. These discussions will provide valuable planning information to vendors, help Toronto Hydro assess vendor capability to support a large-scale response, ensure that priority is given to Toronto Hydro, and uncover any issues or risks (e.g., potential materials shortages). Some utilities contract with vendors that provide “turnkey” support, taking care of virtually all logistical needs related to mutual assistance.

5.4. *Damage Assessment and Restoration Planning*

Effective planning and damage assessment are essential for a rapid and effective restoration. The information gathered through a damage assessment process provides the planning team with the insights necessary to:

- Determine the type and number of resources required to support the restoration;
- Create the most efficient restoration plan based on the extent and type of damage and available resources;
- Develop accurate restoration estimates (ETRs);
- Support daily work plan development and customer communications; and
- Identify safety issues/dangerous conditions.

The objective is to perform damage assessment as early as possible, often within the first two to three days after it is safe to begin work in the field. Assessments are usually conducted by feeder (circuit) according to a pre-established priority.

The information captured in the field is entered into the outage management system (OMS) and used by the Planning Section in the SOC to prioritize restoration work and develop ETRs. A large incident may necessitate more than one cycle of damage assessment:

- First, a quick, higher-level scan to understand the amount and type of damage; and
- Second, a more thorough assessment to capture detailed damage information on each circuit, including the number of poles, wire spans, and equipment to be replaced at each specific location.

During major events, utilities use damage assessment teams, often referred to as patrollers, to evaluate damage before a line crew is dispatched to perform repairs. Damage assessors patrol circuits to identify trouble locations and assess the extent of the damage. They document what they find on a pre-developed form or a circuit map. Some of the more advanced utilities have implemented tools, such as tablets, that allow damage assessors to enter the information directly into a system linked to the GIS and OMS systems.

During day-to-day operations or minor events, line crews or “trouble crews” typically handle damage assessment, but additional resources are usually needed to conduct this process when a major event occurs. Other pre-qualified resources, such as engineers, designers, or retired linemen or supervisors may perform this role. Using other suitable personnel to conduct damage assessment allows trouble and line crews to focus exclusively on repairing the damage and restoring power.

In addition to conducting damage assessment, leading utilities have implemented a forensic analysis process to collect detailed information on specific equipment and structure failures. They use this data in statistical analyses to determine causes of outages during major events, which then supports subsequent analysis of different options to harden the distribution system for future events.

The review of Toronto Hydro’s damage assessment and restoration planning competency addressed the following:

- Definition and execution of a damage assessment process;
- Capture and use of damage assessment data;
- Development of ETRs;
- Establishment and adherence to restoration priorities;
- Work planning practices; and
- Use of standard planning tools.

5.4.1. Damage Assessment and Restoration Planning Findings

Following the industry leading practice, Toronto Hydro established priorities early in the restoration and restored customer service in accordance with those priorities. The Company maintained focus through frequent Command Centre conference calls and communicating the specific priorities for the subsequent planning period. The overnight planning activities, however, were not conducted consistently by all of the LICCs.

Toronto Hydro used its “triage”¹⁰ process to gather damage information. This process served other needs, apart from damage assessment, including evaluating the wire down locations being reported by the customers, crews and first responders, and making them safe for public and utility employees participating in the response. Toronto Hydro used underground crews, service crews, and designers (who are not directly involved in the physical restoration of the electric system) to conduct the triage process.

Toronto Hydro established restoration priorities early and restored customer service in accordance with those priorities. Response leads at the SOC and LCCs maintained focus on priorities through frequent Command Centre conference calls and communicating the specific priorities for the subsequent planning period.

Damage Assessment and Restoration Planning Strengths

1. Overall restoration priorities were in line with industry practices.

Toronto Hydro established and followed restoration priorities during the 2013 Ice Storm response that followed typical industry practices. These priorities were:

- Public safety (911 calls and live down wires);
- Critical customers (e.g., hospitals, water pumping stations, 911 call centres);
- Substation and feeder backbone restoration (i.e., portions of the system that provide service to large blocks of customers);
- Lateral sections of the circuits (i.e., branches of the circuit that are typically single phase lines that serve several streets in a neighbourhood); and
- Customer service drops (i.e., lines that connect the house to the overhead transformer and typically service one or two customers).

Since Toronto Hydro serves a densely populated urban area, its electric distribution system has a number of connection points between different circuits (i.e., circuit ties) that allow them to quickly restore service to a portion of customers by switching load from one feeder to another. The initial focus of restoration was to secure any known locations that could compromise public safety. The second priority was to restore customers designated as critical by the City of Toronto. The City identified this group by the morning of December 24, 2013.

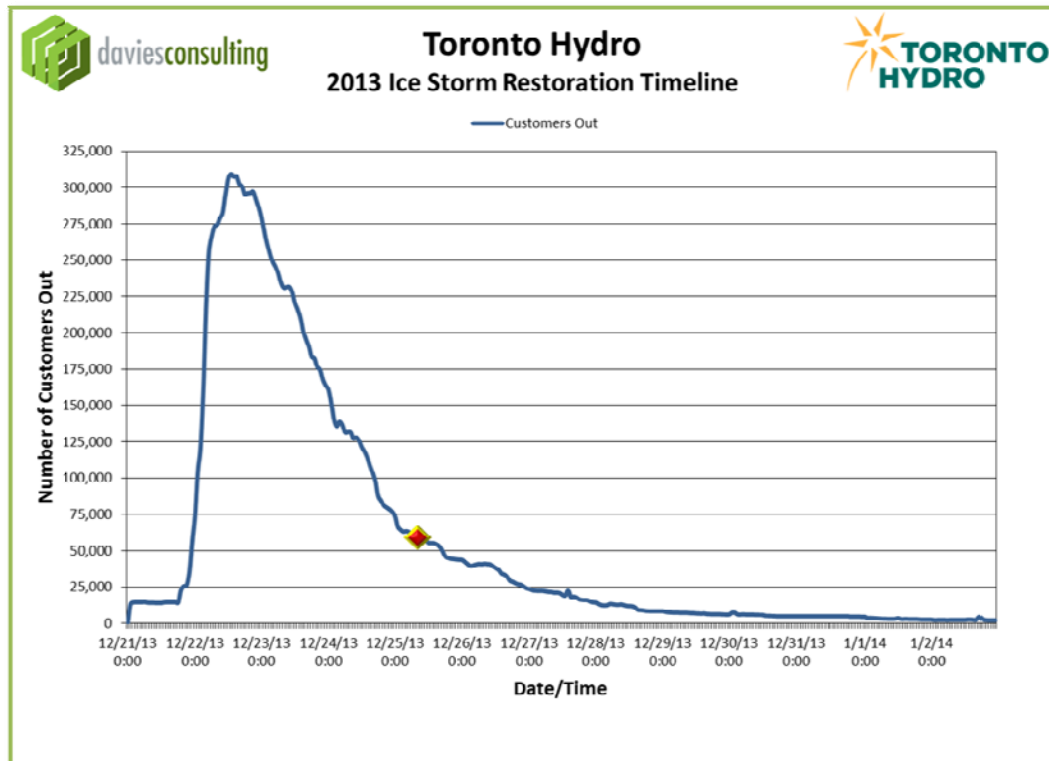
The restoration continued by restoring feeder backbones, then laterals, and lastly, individual customer connections. It is important to understand that in order to keep

¹⁰ “Triage” refers to the process developed by Toronto Hydro to conduct field evaluation of downed wire reports received from customers and either make the location safe or escalate it to a more appropriate resource. As a part of the process, the resources dispatched to the location gather data on the specific damage (e.g., pole, transformer, wire) to ensure that, subsequently, the right resources and the required equipment are dispatched to repair the damage.

crews productive during a large restoration, some priorities are addressed in parallel. This is especially true during periods of transition between categories of priorities.

By following these priorities, which addressed larger blocks of customers first, Toronto Hydro was able to restore power to 86% of the customers who were out at peak within the 72 hours from the start of the field restoration (See Figure 13).

Figure 13: December 2013 Ice Storm Restoration



2. The Command Centre coordination calls (every three hours) provided useful information and maintained alignment of Local Incident Command Centres to restoration priorities.

Once the Command Centre (System Operations Centre) was activated on Sunday morning, December 22, 2014, the Incident Commander held coordination calls every three hours. The standard industry practice is to conduct these calls twice a day. Toronto Hydro chose to hold them more often given the degree of damage caused by the ice storm.

These calls were essential to maintaining response organization alignment to restoration priorities. They provided a platform for participants to share restoration progress updates and readjust plans for the subsequent planning period. The participants on the calls included the general staff within the Command Centre as well as the leads from the LICCs.

3. Some Local Incident Command Centres conducted planning activities overnight to facilitate work assignments and crew deployments for the subsequent shift.

A utility industry leading practice is to use the overnight shift to plan and organize assignments for the subsequent day shift. Conducting work planning at night affords the day shift managers and supervisors more time for crew support and for the extensive coordination with external stakeholders that typically occurs during the day. In addition, the restoration data from completed jobs is updated at the end of the day shift to provide the overnight shift planners with the most accurate job status information.

In some of the LICC at Toronto Hydro, the leads established a process for planning the specific work for the next day, making crew assignments and creating job packets overnight. This practice aided the deployment of the day crews.

Damage Assessment and Restoration Planning Opportunities for Improvement

1. Lack of real, or near real-time situational awareness of outages and work progress below the feeder level.

A critical element of a major event restoration process is maintaining an understanding of the current state of the system. This includes having real or near-real time knowledge of the restoration status and field conditions, as well as any other information that can support decision making around priorities and resources. While Toronto Hydro could assess the outage status at the feeder level, primarily through its SCADA (remote control and dispatch analysis) system, the outage status below that level (e.g., street) and associated damage assessment information were not readily available throughout the event.

2. Damage Assessment process was not defined, documented, or consistently applied across the Local Incident Command Centres.

Toronto Hydro's triage process addresses portions of the damage assessment process but does not provide for the systematic evaluation of the system condition in the field, capture of infrastructure damage information, or timely provision of that information to other stakeholders (e.g., Planning Section, ETR developers, and Communications). The Grid Disruption Plan does not include a comprehensive, detailed damage assessment process. Lacking information about the process flow, roles and responsibilities, forms, checklists, and other job aids, some LICCs addressed elements of damage assessment as part of the triage process, or developed ad hoc guidance in real time.

3. Restoration estimates were not developed at various levels of specificity.

During an incident, the Restoration Planning section within the Central Command Centre is responsible for developing estimated times of restoration (ETRs) throughout the incident response. At the start of a restoration, while the damage assessment is in progress, utilities can provide this information at a high-level only – a global ETR. As the restoration progresses, planners can refine estimates, providing information at a

Findings and Recommendations Damage Assessment and Restoration Planning

substation, circuit, or individual customer level. An ETR usually is the most critical piece of information to a customer. The Company did not have in place a systematic and documented process for creating accurate and timely ETRs at multiple levels of specificity (e.g., circuit, customer).

4. Work planning practices varied across Local Incident Command Centres.

The planning activities that took place at the LICCs included developing the work plan for the next period and creating associated work packets. These packets typically include print-outs of the OMS outage record, a circuit map, and any damage information collected by the assessors. At Toronto Hydro, each LICC manager used an “individually-developed” work planning process. Some generated assignments overnight and planned multiple jobs for the crews in advance, while others assigned new jobs to the crews as they completed their work.

5. The Central Command Centre and Local Incident Command Centres did not use standard planning tools.

A leading practice in the utility industry is to use standard forms to capture and consolidate planning information throughout an event. Using a common template accelerates information exchange and ensures that the same level of detail is captured and made available to all restoration participants. Toronto Hydro’s Grid Disruption Plan does not reference specific tools and forms (e.g., Incident Action Plan) that the Planning Section should use to collect, consolidate, and share commonly-used planning information.

5.4.2. Damage Assessment and Restoration Planning Recommendations

DAP-1 Institute a damage assessment process that defines the required approach, procedures, and competencies to establish situational awareness and planning inputs within the specified timeframe (e.g., within 48 hours).

Toronto Hydro should set objectives for establishing overall situational awareness and conducting the initial damage assessment in major events. These objectives should include the timeframe within which the initial damage assessment will be completed and the level of information required to support key decisions. For example, for a Level 2 event, the global ETR should be made available within 24 hours and for a full-scale event within 48 hours. Once it has established these objectives, the Company should work with selected stakeholders, such as the City, to identify the information required for each key decision throughout the event, then create a process and assign responsibilities for capturing that information in a timely and accurate manner.

Specific to damage assessment, within the current triage process, the Company should separate the wires down investigation component from the damage information gathering process. There should be a clearly defined, end-to-end processes for addressing both wires down and damage assessment with pre-assigned responsibilities, data collection specifications, and required competencies and training. Also, the Company should determine the number of assessors required to complete the assessment within the pre-defined timeframes and identify potential sources of qualified personnel, which can include third-party contractors and mutual assistance.

- **Build a stronger damage data reporting interface with OMS and alternate data capture processes and tools.**

In addition to instituting the process for conducting damage assessment, Toronto Hydro should evaluate different options for automating the capture and integration of damage assessment field data. One example is providing tablets with GPS capabilities to assessors to use to identify specific equipment in the Company's GIS system.

DAP-2 Develop a process to establish (calculate) timely and accurate ETRs.

Most customers experiencing an extended outage want to be able to develop a coping plan. They need to have a reasonably accurate sense of how long they may be without refrigeration, heat, or air conditioning. This information is especially critical for vulnerable populations.

Toronto Hydro should develop a more rigorous process for developing ETRs throughout the course of an event. The Company should first understand stakeholder needs and then develop realistic goals for creating ETRs. Customers generally understand that in the aftermath of a particularly damaging event, like the 2013 Ice Storm or a major hurricane, a utility has to spend some time assessing the situation in order to provide reasonable restoration estimates. So, for example, the earliest time by which Toronto Hydro could provide an initial ETR may be within 48 hours in a full-scale event.

Toronto Hydro should set specific thresholds for issuing the initial ETR (usually at the global level) as well as the timeframes for refining that estimate to more detailed levels (e.g., neighbourhood/sub-station, circuit, individual customer) at different points of restoration and for different levels of events. Table 5 below provides an example of a tool the Company could develop to support the ETR process.

Table 5: Example of an ETR Timing Matrix

Storm Level	Level 1	Level 2	Level 3	Level 4 or Greater
Definition	Estimated restorations of 8 hours or less	Estimated restorations of more than 8 & less than 24 hours	Estimated restorations of more than 24 hours & less than 3 days	Estimated restorations greater than 3 days
ETR Communication Guidelines	Individual specific ETR available at first call	Individual specific ETR available at first call	Post Assessment 12 hrs. – global 24 hrs. – county 36 hrs. – circuit 48 hrs. – individual	Post Assessment 24 hrs. – global 48 hrs. – county 72 hrs. – circuit 96 hrs. – individual
Coping Information	Specific information about local damage	Specific information about local damage	General information to begin with increasing granularity	General information to begin with increasing granularity

Also, the Company should assign responsibilities for developing and monitoring the ETRs, so that any potentially expiring estimates are evaluated ahead of time and either addressed or adjusted in advance.

DAP-3 Establish standard work planning processes and procedures; train and exercise response personnel to drive consistency across central and local commands.

Toronto Hydro should develop, document, and communicate the process to be used for work planning during major events. This would include activities such as: identifying priorities, developing incident action plans, assigning work to the available field crews, and creating work packets. A set of standard forms and tools should accompany this process.

Also, the Company should detail the roles and responsibilities for this process, specify the requisite competencies, and pre-assign personnel to fill these roles during an incident. The Grid Disruption Plan should include process and role documentation along with the standard forms and other job aids. In order to ensure compliance with the new process, the emergency management group should develop and execute a training program, including a table top exercise, to provide adequate opportunities for staff to understand and practice their roles.

5.5. Restoration Execution

The keys to successful restoration are persistent attention to employee and public safety, sustained focus on restoration priorities, ability to decentralize restoration and avoid bottlenecks, and effectiveness of crew deployment throughout the event.

Preserving the safety of public and utility workers is the most important aspect of the restoration execution. Methods that utilities use to conduct restoration efforts safely include safety orientations for incoming crews, daily safety briefings at the start of each shift, and daily safety bulletins. Some utilities also have developed handbooks that provide an overview of their system configuration and typical hazards, which are used by off-system crews to familiarize themselves with the potential field conditions.

Effective restoration of large outage events often requires the use of off-system resources. This influx can create a workforce that is far larger in size than the one that carries out the day-to-day work. Efficient and safe deployment of such a large number of resources requires careful coordination, effective field management, and adequate pre-planning of the work.

In large events that affect significant portions of the system, utilities decentralize the restoration function and manage the work locally. The intention is to reduce bottlenecks, such as processing switching orders or dispatching crews. Since utilities have different switching procedures, it is important to carefully manage the transition to a decentralized model in order to ensure the safety of public and utility workers.

A restoration typically follows a set of agreed upon priorities, starting with the critical infrastructure first. In some cases, however, in order to re-energize certain essential facilities, utilities may have to restore less critical parts of the system first. For example, when restoring a hospital that is at the end of a circuit, crews may need to restore the substation, and main sections of the distribution circuits (i.e., feeders). As a result, a number of other customers who are not deemed to be part of the critical infrastructure would be restored along with the hospital.

As mentioned earlier, public safety is the number one priority during restoration, with handling downed wires and making the system safe a high priority that presents several challenges. Fallen overhead wires that are energized pose a public safety threat. It is difficult to differentiate electric wires from telecommunications wires, or evaluate if downed electric wires are energized. Therefore, a large number of downed wire locations throughout the service territory creates an urgent demand for restoration resources.

Since downed wire locations can often number in the thousands, utilities typically focus first on those locations that are reported through 911 emergency calls and where wires are visibly arcing, smoking, or on fire. At these locations, crews cut, clear, and make safe locations so that restoration crews can repair the damage according to the restoration priorities. The utilities use public campaigns and communications channels to educate the public on the dangers of approaching downed wires during major events.

Service lines that serve single residences or small groups of customers are frequently restored at the end of the event, resulting in a long “tail” on the restoration curve, with multiple days at the end spent restoring very small enclaves of customers. Some utilities

have service crews and electricians who are not qualified to work on primary voltage lines and an effective restoration practice is to deploy these resources early to begin restoration of the service drops, which are typically handled last, while line crews work on restoring primary lines.

The assessment of Toronto Hydro's restoration execution addressed the following:

- Safety performance;
- Restoration strategy and execution efficiency;
- Cut, clear, and make safe process;
- Wires down;
- Dispatch; and
- Coordination with external stakeholders (e.g., City, Province)

5.5.1. Restoration Execution Findings

When compared with similar events in the past, the overall customer restoration curve during the 2013 Ice Storm was in line with industry experience. The restoration curve shows the number of customers out over time throughout the restoration period and depicts the rate of restoration (See Figure 13). Since public and worker safety is paramount, it is important to note that Toronto Hydro safety performance during the 2013 Ice Storm restoration was excellent. There was only one recordable incident during the event.

In addition, the Company worked with the ESA to introduce flexibility depending on situation based on safety risk for reconnecting services to reduce the hardship by the customers. It also managed the work protection and special requests well to ensure that there were no unusual delays in restoring the customers. The single largest area of opportunity in the restoration process is the inconsistent coordination of the work across the Local Incident Command Centres, including adherence to restoration approach and use of standard dispatching practices.

Restoration Execution Strengths

1. Safety performance was excellent.

Among the approximately 1,250 field resources involved in the restoration over an 11-day period, there was only one recordable incident. Typically, safety performance during major events is better than day-to-day safety performance. When compared to the performance of other utilities during similar events, however, Toronto Hydro's results rank among the best.

In order to ensure safe restoration, Toronto Hydro created an on-boarding curriculum for the off-system crews that included a comprehensive safety orientation. The supervisors held safety briefings at the start of each shift to update crews on safety

hazards and emphasize the need to follow safety procedures. In addition to the exceptional worker safety record during the restoration, there were no deaths in the greater Toronto area that were directly attributed to the 2013 Ice Storm. This is a notable outcome for all the City staff and first responders who came together to restore normalcy to the residents.

2. Dispatch functions were decentralized to Local Incident Command Centres early in the restoration process.

In line with leading industry practices, during major events Toronto Hydro separates its service territory into local areas that are managed through Local Incident Command Centres (LICCs). This provides the Company with the ability to decentralize the dispatch function, thereby reducing the potential for bottlenecks at the central dispatch location. Through decentralization, Toronto Hydro doubled the number of dispatchers during the 2013 Ice Storm. Most of these dispatchers were located in the LICCs and had access to the outage management system (OMS) and could perform dispatch functions in accordance with local restoration priorities at the time.

3. Coordination with the Electrical Safety Authority (ESA) to reconnect customer premises was adjusted during the event to reduce hardship.

Standard ESA guidelines for restoring service connections require the equipment on the customer premise to be safe in order to reconnect power. During major events, the mast with the meter head may be damaged (See Figure 14), requiring the customer to perform repairs before service can be restored. The work is typically performed by a qualified electrician hired directly by the customer.

Figure 14: Example of Mast Damage



When utility workers attempt to restore a service where they deem equipment on the customer premise to not be in proper condition, they are directed by ESA regulation to disconnect the customer service. In the initial days of the 2013 Ice Storm response, Toronto Hydro crews found some instances where the customers had power but their equipment was not in proper condition and they were forced to disconnect customer services. The Company quickly realized that this would create an unnecessary burden on customers who didn't lose power. Toronto Hydro worked with the ESA to amend the process, creating a form for customers to sign acknowledging that they would repair their equipment within a certain period of time, so their service would not be disconnected. The new process worked well for the majority of customers, but has not been fully adopted for future events.

4. Special requests were handled within the pre-defined priority order.

During major restorations, utilities often receive requests from elected officials and other influential stakeholders to restore a specific customer or commercial premise sooner than the restoration strategy would dictate. As a result, responding to a special request could cause a utility to deviate from focusing on the priorities in the restoration plan. During the 2013 Ice Storm, members of the Toronto City Council and local government for the most part allowed Toronto Hydro to restore according to the pre-established priorities and only intervened when there were truly life-threatening emergencies. In those occasions when a special request was made that did not seem to

be warranted, Toronto Hydro executives stayed firm and did not deviate from the restoration strategy.

5. The work protection process did not cause unusually long delays in restoration.

According to interviews with the field crews from Toronto Hydro, there were some normal and expected delays in performing the work protection. The practice of work protection (i.e., “switching and tagging”) provides clear guidelines under which a line crew can operate different devices that allow it to reconfigure the circuit and restore power to portions of customers more quickly as they repair the damage. This is an area of restoration where utilities typically encounter delays because a substantially larger number of switching requests from the field arrive at the central location (i.e., system control centre) at the same time. Sometimes, these delays can exceed one hour depending on the number of orders simultaneously requested which are handled by a relatively small group of qualified system operators. Toronto Hydro operators were able to issue switching orders within a reasonable amount of time without causing any delays beyond those that are typical for a restoration effort of this magnitude.

6. “Bird-dogging” of mutual assistance crews worked well.

Off-system crews that are brought in through mutual assistance often are not familiar with the local electric distribution system. A leading practice is for the host utility to provide them with a local resource to help with daily work needs (e.g., navigating the territory, coordinating work with other crews, ensuring the safety of the work site, accessing food). These resources, referred to as “bird dogs,” are typically local company line workers and recent retirees who are familiar with the system and are trained to operate the switching devices in the field. Bird dogs may support one or more crews.

Toronto Hydro adopted the practice of providing bird dogs to many of the mutual assistance crews, particularly those arriving during the first few days of the restoration. They dealt with system control for work protection, completed customer-premise paperwork, and facilitated work assignment, in coordination with dispatchers. Interviews with utilities providing mutual assistance indicate that Toronto Hydro executed the bird dog role proficiently.

Restoration Execution Opportunities for Improvement

1. Restoration approach was not consistent, varying between “order-based” and “feeder-based.”

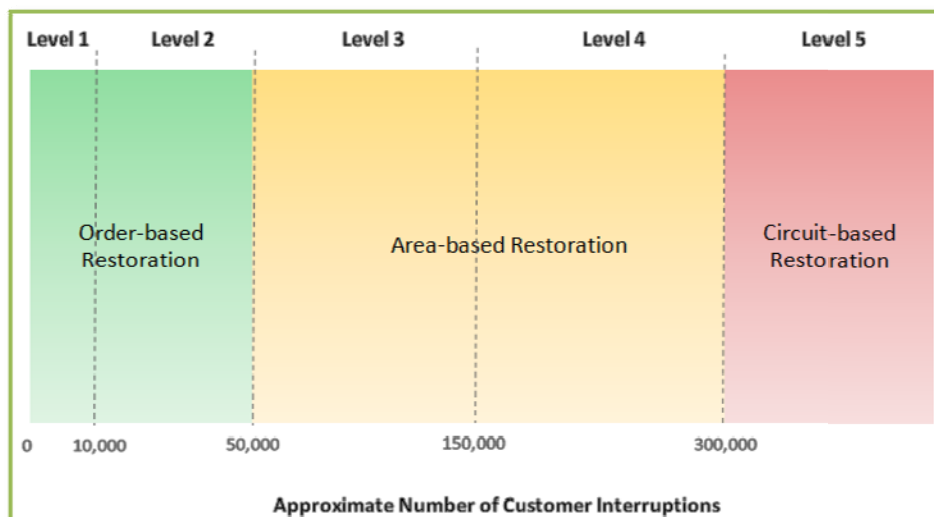
During major events utilities typically can use one of three restoration approaches: order-based, area-based, or circuit-based. The choice of approach corresponds to the severity and amount of damage across the service territory. Figure 15 illustrates how a utility could apply these approaches across a range of incident levels.

Order-based restorations are typically limited to small events, where the utility manages resources and work based on individual outage management system (OMS) orders. In

area-based responses, a utility will decentralize crew and work management to regions or divisions. A central system operations group retains control over crews restoring feeder lockouts and responding to 911 calls, but all major restoration work is referred to the decentralized region. The regions prioritize work, identify resource needs, manage resources, and develop ETRs.

A circuit-based approach is typically used in the highest level events (Level 3 and greater), where the widespread devastation requires complete rebuilding of the electric delivery infrastructure. In circuit-based restorations, crews are assigned to rebuild an entire circuit or portions of a circuit. The circuit is usually isolated from the rest of the system to ensure that it does not become energized during the work. The field crews energize portions of the circuit as work is completed.

Figure 15: Restoration Approaches



Toronto Hydro does not have a formally-defined process to transition among different restoration approaches. During the 2013 Ice Storm restoration, the Company used a circuit-based approach to start, restoring the feeder sections of the circuits, and then used an order-based approach once it moved into restoring lateral sections instead of restoring all of the remaining damage on that circuit. In this storm response it might have been more appropriate to use an area-based approach and repair the damage in an entire area (i.e., substation). This might have minimized the travel time by multiple crews and enabled better coordination of work assignments. Lastly, the restoration approach varied slightly across the LICCs.

2. Lack of full coordination among decentralized dispatch functions led to some inefficiency in crew deployment.

Restoration following a large, unplanned event, like the 2013 Ice Storm, requires a significant amount of ad-hoc coordination. The reason for this is that initially, while the necessary resources are being mobilized, the amount and location of damage is largely

unknown. This caused the planning phase and the execution phase of the restoration to be carried out in parallel with some level of inefficient work execution. Emergency plans help to reduce these inefficiencies, but cannot completely eliminate them.

At the start of restoration, Toronto Hydro quickly decentralized its dispatch functions into the LICCs, which is in line with leading industry practice. It appears, however, that the dispatch process was not fully synchronized among the LICC dispatchers, central dispatch, and the supervisors who were working with mutual assistance and contractor crews. This resulted in some actual and perceived inefficiencies such as:

- Crews were dispatched to a location that had been restored already;
- Different types of crews would be dispatched to the same location to perform different aspects of the necessary repairs with a significant time lag in between;
- Customers didn't understand why crews left before restoring power; and
- Crews had to wait after completing a job to receive their next assignment from the dispatcher.

One challenge to the dispatch process was a delay in closing trouble tickets in the outage management system once crews completed the work. Most utilities experience this problem during an event the size of the 2013 Ice Storm. Field crews focus on restoring power as quickly as possible and tend to turn in their completed tickets at the end of the day instead of calling them in as repairs are completed.

3. Local Incident Command Centre structure (three geographic and two functional locations) added complexity to crew deployment and work coordination.

During the 2013 Ice Storm response, Toronto Hydro activated five LICCs. Three of the centres were responsible for Toronto Hydro crews restoring distinct geographic areas of the service territory:

- Monogram – western part of the service territory;
- Milner – eastern part of the territory; and
- Commissioners – the downtown area.

Two LICCs handled externally-provided crews, with one for the mutual assistance crews and the other for contractor crews. The off-system resources (both contractors and mutual assistance crews) worked across the service territory, but dispatchers in each of the three geographically-based LICCs did not have full visibility into all the off-system resource assignments and availability. This lessened their ability to fully coordinate the dispatch process.

4. Restoration execution approaches were not followed consistently by all Local Incident Command Centres.

The SOC established the overall restoration strategy and monitored progress against priorities, but the LICCs applied different approaches to implement the strategy. For example, some of the LICCs used a feeder-based restoration approach, while others applied an order-based approach when responding to similar conditions. Since the level and type of damage may vary across a service territory, LICCs should have some flexibility to determine what approach best meets restoration objectives. The damage from the 2013 Ice Storm, however, was similar across the affected areas within Toronto Hydro's territory. This suggests that the LICCs should have been following the same restoration approach.

5. Toronto Hydro has different work protection processes than other utilities in the Province of Ontario, limiting the type of work that mutual assistance crews can perform.

Toronto Hydro's electric distribution system includes a large underground network that feeds most of the downtown area. This network provides reliable service to customers through redundancy of power sources (i.e., if one feeder is interrupted, the network will continue to operate without causing customer outages because other feeders will pick up the lost load). It also requires a unique set of skills to operate -- demanding proficiencies that are different from those required to operate an overhead system. In addition, during amalgamation of the utilities operating in Toronto, the decision was made to adopt the switching and tagging (i.e., system protection) practices that were in place at that time on the legacy Toronto Hydro system, to provide continuity for the network system operation. As a result, Toronto Hydro's system protection practices are different from those of other utilities in the province.

The key differences are in the coding and coloring of signage that is used to mark the devices controlled by field personnel. These differences can be addressed during an emergency restoration through the provision of guidelines that allow external utility crews to isolate a section of the system and then use their own switching and tagging processes to restore that section. As Toronto Hydro did not have guidelines like these in place, it was not able to use the full capabilities of off-system resources.

5.5.2. Restoration Execution Recommendations

RE-1 Pre-determine best restoration approach for each emergency Level (e.g., 1-4).

Toronto Hydro should reassess the emergency level scale it currently uses to categorize major distribution outages and consider adding a Level 4 or greater event definition. The Company should then refine or establish criteria (with ranges) for activating the different levels of response. Activation criteria could include number of customers affected, number of trouble spots, and expected duration of restoration.

This refined definition and characterization of events should provide a clearer indication of the preferred restoration approach for each event level (e.g., order-based, circuit-based, or area-based). The pre-determined approaches should be used to drive consistency in restoration execution, but provide enough flexibility to accommodate meaningful differences in field conditions among the Local Incident Control Centres.

- **Amend work protection and restoration guidelines to enable off-system crews to “take over” and restore portions of the system in a catastrophic outage.**

The Company should consider amending its switching and tagging rules during major events to allow off-system crews to take over the control of portions of the system. While it is unreasonable to expect outside crews to learn local company procedures, a number of utilities have created processes to isolate parts of the system during major events, so mutual assistance resources can support more aspects of the restoration and control sections of the circuits without compromising safety.

- **For each restoration approach, provide standard processes and procedures, and secure adequate resources to expedite dispatch work.**

For each pre-established restoration approach, Toronto Hydro should identify the commensurate number of qualified dispatchers needed. The Grid Disruption Plan should include a description of the process procedures and associated forms for assigning, tracking, and closing work during major events. The processes should address both centralized and decentralized dispatch functions.

RE-2 Eliminate centralized mutual assistance and contractor Local Incident Command Centres and encompass those resources within the three geographic LICCs.

Toronto Hydro should eliminate the centralized LICCs for mutual assistance and contractors to facilitate coordination of dispatch across the geographic LICCs. Once the restoration process is decentralized to LICCs, the off-system resources (mutual assistance and contractors) should be assigned to one of the three geographic LICCs based on the need (capabilities and numbers). At that point, the geographic LICCs would take control of the off-system resources and use them as required to restore outages within their portion of the system.

After a LICC has completed restoration or no longer needs certain types of crews (e.g., forestry), it can release them to another LICC. The process, criteria, and responsibility for assigning off-system resources should be clearly defined in the Grid Disruption Plan.

5.6. Communications – Customer Contact

The ability of a utility to handle a significantly larger volume of customer calls during a major outage is essential to a successful restoration. During the first few days of a major storm, or other event causing widespread outages, incoming calls increase dramatically as compared to the expected daily volume. Although the Internet has provided

additional channels for customers to communicate with utilities during outages (e.g., email or website), many still want to talk to a representative, particularly during an extended outage.

It is critical that the utility have plans in place to satisfactorily address this spike in customer calls. These emergency response plans must be executed swiftly to minimize customer frustration, reduce the likelihood of repeat calls to resolve problems, and avoid complaints to regulators. Actions to handle the anticipated increase in calls could include:

- Training in-house resources from outside the call centre, who have system access, to take outage calls;
- Contracting in advance with vendors to supply trained customer service representatives; and
- Establishing mutual assistance arrangements with other utility call centres.

Successful plans are usually anchored by effective interactive voice response (IVR) applications. These allow customers to self-report outages and receive restoration information. Overflow telecommunications capacity for these systems can be provided through contracts with technology companies that specialize in providing utilities with IVR capacity, including interfaces to outage management systems.

An emergency plan for customer communication might also include a strategy to *proactively* reduce incoming calls. For example, outbound messaging (i.e., robo calls, texts, or emails) to individual customers about expected or actual outage status can eliminate numerous incoming calls. Providing additional channels of communication for customers can reduce call volume as well. Website, email, mobile, and texting applications allow customers to report outages and track outage status. Also, social media avenues (e.g., Twitter, Facebook) provide ways for customers to obtain information in lieu of calling.

Utilities use a few different organizational models to conduct the function of answering outage calls from customers. For example, some utilities place the responsibility in the call centre which also handles business calls related to customer billing and other general inquiries. Others route customer calls related to outages to their dispatch function within field operations. Many use third-party call centres for primary or supplemental support.

The assessment of Toronto Hydro's management of customer contact throughout the 2013 Ice Storm addressed the following:

- Availability of a plan to address the increased volume of calls from customers;
- Plan effectiveness and thoroughness of implementation;

- Availability of alternatives to speaking with a representative by which customers can report an outage or receive information about restoration;
- Process for reporting outages, including ease of use and clarity of navigation scripts; and
- Process for providing accurate and timely messages on all customer-facing systems and applications.

5.6.1. Communications – Customer Contact Findings

The day-to-day responsibility for handling outage calls at Toronto Hydro resides in the Distribution Grid Management Division, specifically in the dispatch section of the Power System Planning & Logistics organization. All customer calls to the main customer number to report a power outage, wire down, or power quality problem are handled through the IVR. It directs them to “select 1,” which allows a caller to self-report an outage in the IVR, or enter the queue to speak with a dispatcher. A wire down or power quality call goes into the queue for the caller to speak directly to a dispatcher, as do calls that are not successfully completed in the outage application. The dispatch volume averages 135 calls per day during blue sky conditions.

When a major outage occurs, however, dispatch requests a specific number of resources from Customer Care to augment the dispatch team and help respond to incoming calls. This allows some of the dispatchers to be reassigned from handling incoming outage calls to dispatching field crews. Customer service representatives from the call centre and, as needed, from other areas of Customer Care, are assigned to answer emergency calls in 8- or 12-hour shifts, 24-hours-a-day.

Toronto Hydro experienced an unprecedented call volume during the 2013 Ice Storm. A total of 397,500 calls entered the IVR from the main customer phone number from December 21, 2013, through January 2, 2014. Of those, it is estimated that 374,200¹¹ were storm calls and 23,300 were non-storm calls (i.e., 14,300 calls were directed to the residential and commercial queues and an estimated 9,000 calls were non-storm calls to all other business functions within the Company). Just over one-third of the total storm calls (127,800) were received the first full day of the storm on Sunday, December 22, 2013.

On December 22, 2013, the number of calls entering the dispatch queue was 947 times greater than the average of 135 received during normal operations. For the following

¹¹ Calls to areas of the Company other than dispatch and the residential/commercial queues were significantly higher than during normal operations. Toronto Hydro categorized the number of higher than expected calls as storm calls. The estimated number of storm calls likely is conservative because it doesn't include storm calls answered in the residential and commercial queues (other than those which were reported as being transferred from those queues to the dispatch queue).

five days the incoming storm calls averaged 40,800 (302 times the average number of calls handled in the dispatch queue during non-crisis times).

Communications – Customer Contact Strengths

1. The ability to use an external contract call centre as a back-up call centre site.

Since 2007, the Toronto Hydro Customer Care organization has contracted with a local call centre outsourcer, to provide call handling and clerical services. The outsourcer agents answer calls to the residential queues weekdays between 8:00 a.m. and 4:30 p.m. The outsourcer's staff is trained to take all non-outage residential calls, which represent the majority of calls to Toronto Hydro. The Toronto Hydro in-house call centre handles the more complex commercial calls.

Call volumes vary depending on the day of the week, time of the month, and holiday schedules. The highest call volumes typically occur on Mondays, at the beginning and end of each month, and the day following holidays. On a typical Monday near the beginning or end of the month, the outsourced call centre answers about 2,500 Toronto Hydro calls.

The contract with the outsourcer provides a potentially reliable source of additional staff to answer calls during times of major outages. Equipment is in place to route calls easily from the Company to outsourced call centre and some call centre staff are familiar with Toronto Hydro procedures. From the perspective of emergency management, there is another major advantage: geographic diversity. If an incident renders the Toronto Hydro call centre inaccessible, calls can be readily directed to a contractor site at another location.

2. The Key Accounts organization within Customer Care implemented an effective process to inform key and commercial accounts of outage status.

There is a group within Toronto Hydro responsible for managing the relationships with its "key" accounts. Key accounts are customers with consumption of 1 megawatt hours or higher annually (at one site or in aggregate). There are approximately 550 such accounts.

The key account managers serve as an access point into Toronto Hydro to help answer customer questions and facilitate solutions. The key accounts program includes a group of about 15 employees (the key accounts staff plus a group of employees and contractors from the Conservation Demand Management team), who provide on-call service to their key accounts during normal business hours. Each week, on a rotating basis, one person from the group is assigned to take calls outside of normal business hours.

During the 2013 Ice Storm, key account representatives worked 12-hour shifts to keep their customers advised of restoration efforts. This continued until January 2, 2014, when power was restored to all key accounts. In addition to providing extended call

coverage, key accounts sent daily group emails to customers with general information about Toronto Hydro's plans and progress. Key customers gave positive feedback about receiving this additional information.

Recognizing that other commercial customers (with usage below the key account threshold) had a similar need for restoration information during an outage, Customer Care had been developing a proactive commercial customer outage communications program in the months prior to the 2013 Ice Storm. Commercial customers received letters asking them to enroll in the program and provide an email address for outage communications. On December 20, 2013, the day before the storm, an email was sent to 4,500 customers who had enrolled, thanking them for registering and informing them the program would start in the spring.

When the ice storm hit the next day, Customer Care was able to initiate a "light" version of the planned program. It communicated general restoration information to the enrollees via group emails. Also, Customer Care set up an email inbox to allow two-way communication with these customers.

3. The control room, dispatch, call centre, and key accounts staff are co-located, enabling more effective information exchange.

At the time of the 2013 Ice Storm, the control room, dispatch, call centre, and key accounts functions were all located at the same facility. The proximity of controllers, dispatchers, customer service, and key accounts personnel provided for easier, quicker face-to-face communication. In-person communication is especially important during an emergency response, when key staff is focused on completing assigned tasks and may not have as much time to monitor the channels of communication they use during non-emergency times. The nearness to control and dispatch allowed key account managers more timely access to updates on restoration status, improving their responsiveness to customers. Likewise, Customer Care supervisors had access to dispatch to discuss individual customer situations.

Communications – Customer Contact Opportunities for Improvement

1. There was insufficient overflow capacity (system and staffing) to take outage calls, so that the majority of callers were not able to report or get information on outage status.

Telephony Capacity

The telephone system associated with the main customer phone number has eight T1 lines which are limited to 152 channels to match the number of IVR Integrated Voice Recognition ports. Thus 152 customers can be served concurrently. Some of the ports are dedicated to the IVR and others to the queues to be answered by representatives. If the number of calls into the main number exceeds this threshold (i.e., when all ports are in use) the customer will hear a fast busy signal. Toronto Hydro does not get

information regarding the number of customers who get fast busy signals, so the number of customers who heard busy signals during the 2013 Ice Storm is unknown.

To address the issue of telephone port constraints during high call volume periods, Toronto Hydro adjusts system parameters to play a message, referred to as the “initial high call volume message.” Callers hear this message when volumes are greater than can be handled by the capacity of the system. This message is played as soon as customers enter the IVR system to inform them that the telephone system has reached its maximum usage. For example: “Thank you for calling Toronto Hydro. Please be advised that due to the large volume of outages across the city we cannot accept any non-emergency or power outage calls at this time.” The intent is to reduce the number of customers getting a busy signal and inform callers Toronto Hydro is aware of the outage. This message varies depending on the situation and is updated as a restoration progresses.

Toronto Hydro did not have a plan in place to add telephone lines to accommodate the significant increase in call volume. So, during the 2013 Ice Storm, 117,800 customers (31% of storm callers) heard this initial high call volume message. The inability to complete a call to report an outage was one of the most common problems customers raised at the town halls and through email feedback.

IVR Outage Self-Service Application

When Toronto Hydro customers call to report outages, the initial IVR menu instructs them to select “1”, which takes them down a path to report one of three things: an outage; wire down; or other power quality issue. The second menu instructs the caller to select “1” to report an outage and that selection puts the customer into the outage self-service application. (If the customer selects “2” for a wire down or selects “3” for a power quality issue, the call is put into the queue for a dispatcher.) The outage self-service IVR leads the caller through a process to provide the account number or address associated with the outage. Because the IVR outage application interfaces with the outage management system (OMS), when the customer successfully finishes providing the information required, a trouble ticket is automatically created in OMS.

If the IVR system cannot understand a customer’s answers or there are other problems in the interaction, the call is transferred to the queue to speak to a representative. Of the 374,200 total storm calls, 13,800 (4%) were completed in the Company’s self-serve outage application without the assistance of a representative. The Davies Consulting storm database contains company-reported self-service IVR outage statistics for eight major storms. Across all the storms, at least 50% of incoming calls were handled in self-service IVR outage applications. The completion rate in three of the storms exceeded 70%.

Comments from employees and customers pointed out features of the Toronto Hydro IVR that could be improved to improve its containment rate (i.e., the percentage of calls

successfully completed in the IVR without the assistance of a representative). For example, providing an account number is cumbersome and discourages some from trying to complete their outage in the automated system. Another is that the IVR voice recognition system does not distinguish accents well.

Staffing to Answer Calls

The Customer Care organization can draw from approximately 80 representatives to answer calls during periods of high volume. This number includes approximately 30 Toronto Hydro employees (those working in the in-house call centre and those who have rotated from the call centre into customer billing and collections functions) and 50 call centre staff. The full complement of available representatives (both internal and from outsourcer) was fully deployed until December 27, 2013.

Lack of prior training on handling outage calls caused some of the delay in deploying resources to answer calls. It precluded the use of a few Toronto Hydro employees during the 2013 Ice Storm because of union rules which restrict offering overtime to an employee who has no experience in the specific role. And, as noted previously, the outsourced call centre employees had not been trained to answer outage calls prior to this storm.

A few days into the 2013 Ice Storm, Toronto Hydro contacted the outsourced call centre for back-up support to handle storm calls. The outsourcer provided 66 additional agents to take calls in the dispatch queue, including the pool of 50 noted above. Toronto Hydro staff provided training to the outsourced agents on how to answer customer questions and about which information to pass to their supervisors to enter tickets for new outages. The supervisors were given more detailed training and access to OMS Web Entry. Toronto Hydro did not have other agreements in place to access additional staff to handle the sharp increase in customer calls.

Of the total storm calls, 21,000 (5%) were handled by company representatives. By comparison, the Davies Consulting Storm Benchmark Database shows that in one major storm, 24% of the 1.1 million storm calls were answered by a pool of 350 employees from the affected company and its sister company. In another case, 31% of the 194,000 storm calls were answered by a pool of over 500 employees from the company's in-house and contracted call centres.

Dispatch Queue High Call Volume Message

A large number of customers who called when there was an available telephone port still heard a message that the Company could not receive any more calls at that time. Those callers experienced a high call volume message after their calls had been accepted by the IVR and they made a selection within the outage menu which put them into the dispatch queue. (If they selected "1" to report an outage and were not able to successfully complete the report in the self-service IVR, they were transferred to the

dispatch queue. Callers who selected “2” or “3” to report a wire down or other issue also were placed in the dispatch queue.)

During normal operations when there are not many outages, the system is set to allow approximately 30 calls in the queue to dispatchers during business hours and 10 calls outside of business hours. Adjustments are made depending on the number of incoming calls and staff available to handle calls. After the maximum number of callers has entered the queue, the next customer hears a message that “no additional calls can be accepted at this time.” Of the total callers that entered the dispatch queue during the 2013 Ice Storm, 136,000 (84% of callers entering the dispatch queue or 36% of all storm callers) received this message.

Abandoned Calls

During the 2013 Ice Storm, 20% of callers who were able to enter the outage queue to talk with a representative abandoned their calls while waiting. An abandoned call is one when the caller, after entering the queue to speak to a representative, hangs up before the call is answered. At Toronto Hydro, the percentage of abandoned calls is this number compared to the total calls entering the queue that do not receive a high call volume message.

Although abandoned call goals vary among companies, a range of up to 5% or 6% is considered acceptable within the call centre industry, with a tolerance of up to 8% or even 10%. The Toronto Hydro call centre, for example, has a scorecard goal of 3% abandoned calls during non-emergency periods. The Davies Consulting Storm Benchmark Database includes data on abandoned calls for eight storms. For these storms, the percentage of abandoned calls is 12% or less.

Average Speed of Answer

Average Speed of Answer (ASA) is a call centre measure of the average number of seconds from the time a customer requests to be transferred to a representative to the time the representative answers the call. The overall average ASA for customers in the dispatch queue during the 2013 Ice Storm period was 7 minutes and 14 seconds.

Many different companies across a variety of industries use call centres. This variation makes it difficult to establish a “standard” ASA goal. A frequently seen company ASA goal is at or about 40 seconds, but this goal normally would not apply during an emergency. Davies Consulting has evaluated call centre performance for major storms at two utilities which accomplished 43 second and 62 second ASAs during major outages. At both those utilities, 50% or more of the incoming calls were successfully handled in the self-service outage IVR application and their in-house and outsource call centres provided a significantly larger pool of representatives to handle calls.

2. The Integrated Voice Recognition system was difficult to navigate, not intuitive, and did not effectively support customers who are non-native English speakers.

As noted above, 14,000 (4%) of the total incoming outage calls were completed in the Company's self-service outage application, as compared to other utilities with completion rates of 50% or more. Comparisons to other utilities and information gleaned from interviews with employees familiar with the IVR system indicate the following gaps:

- The outage IVR provided inaccurate information to many customers regarding the status of their outages. Large numbers of customers received false messages that their power had been restored causing confusion and frustration, as well as an increase in call volumes. Contributing factors were delays in closing outage tickets in the OMS and inadequate interface between the IVR and OMS.);
- The IVR's voice recognition system does not distinguish many of the accents associated with languages commonly spoken in the Toronto area causing callers to be bumped out of the self-service outage application;
- The outage IVR initially asks for a customer's account number, which, if in hand, is cumbersome to enter. Often this discourages customers from trying to complete their outage reports in the automated system;
- The IVR does not provide a service order ("ticket") number to customers to confirm that an outage is recorded; and
- Once a customer selects the path to report an outage, there is no option to return to the previous menu if, for example, a mistake is made when entering an address. When something like this occurs, the customer must hang up and call back to start over.

3. Outage status information was inadequate and often inaccurate.

Dispatchers and customer service representatives answering outage calls often encountered weary, impatient, sometimes angry, customers. Many were frustrated from the necessity of calling multiple times before reaching a representative. As discussed above, large numbers received information from the IVR that power had been restored to their homes when, in fact, it was not.

In addition, customers received inaccurate information from the outage map on the Toronto Hydro website. This map is created using postal codes and is not fully integrated with OMS. As a result, it displayed erroneous information, driving customers to call the Company.

During any outage, and particularly during extended outages, customers may have to make decisions regarding their living arrangements and businesses. Fundamentally, they need to know when their power will be restored. When Toronto Hydro representatives answered customer calls, they had minimal information to satisfy customers' needs. Information regarding estimated restoration times was not available. For the most part,

dispatchers and customer service representatives had to use the Company's messaging from press releases and general communications to employees when speaking with customers.

When calls were escalated to supervisors, they could access dispatch to try to get more specific information. Although ETR information was not usually available, other information about what was happening in the field could be garnered to put together enough information to respond to the customer inquiries. Some of the representatives were physically located at workstations in dispatch and could also glean some additional information to use in conversations with customers.

4. Alternate paths to contact Toronto Hydro (e.g., email, web) were in place, but all were not monitored frequently enough.

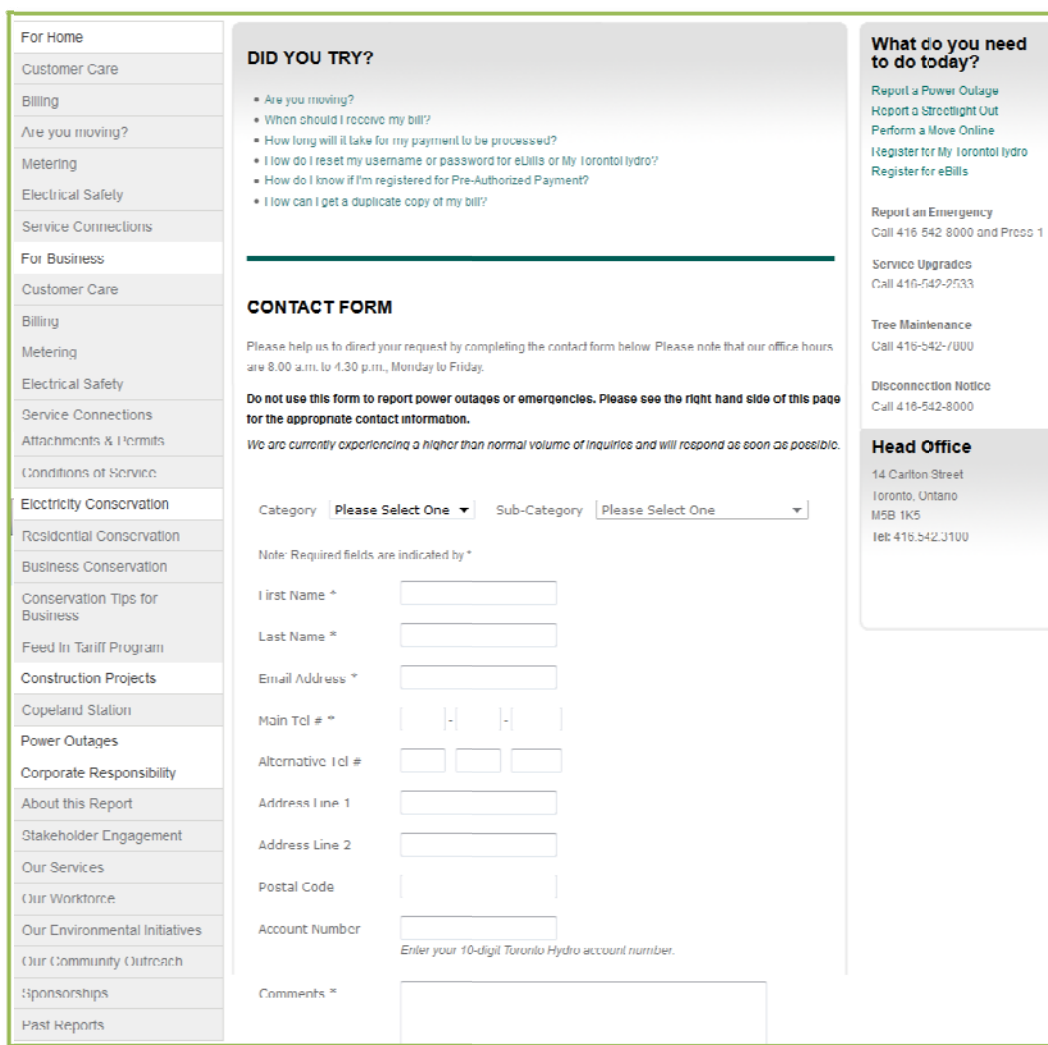
In addition to calling, Toronto Hydro customers used three web-based options to contact the Company during the 2013 Ice Storm:

- Free-form email;
- Website contact form; and
- Website power outage reporting form.

Customers sent comments or inquiries using an unstructured format to the Company via contactus@torontohydro.com or a contact form provided on the corporate website (See Figure 16). The intended use of the contact form is for customer inquiries related to billing, other account information, and general questions. During the 2013 Ice Storm, however, the majority of contact forms (and free-form emails) submitted were related to outages. Day-to-day, a dedicated team of three customer service representatives and/or student interns from the Toronto Hydro call centre respond to these inquiries.

During this storm, student interns responded to the emails and contact forms by scanning them for wire down or other safety concerns which merited priority reporting and outages not previously reported. They would create an outage ticket as indicated. The interns monitored the emails and contact forms only during normal business hours on non-holiday workdays.

Figure 16: Web-based Contact Form



For Home

- Customer Care
- Billing
- Are you moving?
- Metering
- Electrical Safety
- Service Connections

For Business

- Customer Care
- Billing
- Metering
- Electrical Safety
- Service Connections
- Attachments & Permits
- Conditions of Service
- Electricity Conservation
- Residential Conservation
- Business Conservation
- Conservation Tips for Business
- Feed In Tariff Program
- Construction Projects
- Copeland Station
- Power Outages
- Corporate Responsibility
- About this Report
- Stakeholder Engagement
- Our Services
- Our Workforce
- Our Environmental Initiatives
- Our Community Outreach
- Sponsorships
- Past Reports

DID YOU TRY?

- Are you moving?
- When should I receive my bill?
- How long will it take for my payment to be processed?
- How do I reset my username or password for eBills or My Toronto Hydro?
- How do I know if I'm registered for Pre-Authorized Payment?
- How can I get a duplicate copy of my bill?

CONTACT FORM

Please help us to direct your request by completing the contact form below. Please note that our office hours are 8:00 a.m. to 4:30 p.m., Monday to Friday.

Do not use this form to report power outages or emergencies. Please see the right hand side of this page for the appropriate contact information.

We are currently experiencing a higher than normal volume of inquiries and will respond as soon as possible.

Category: **Please Select One** Sub-Category: **Please Select One**

Note: Required fields are indicated by *

First Name *

Last Name *

Email Address *

Main Tel # *

Alternative Tel #

Address Line 1

Address Line 2

Postal Code

Account Number

Enter your 10-digit Toronto Hydro account number.

Comments *

What do you need to do today?

- Report a Power Outage
- Report a Streetlight Out
- Perform a Move Online
- Register for My Toronto Hydro
- Register for eBills

Report an Emergency

Call 416-542-8000 and Press 1

Service Upgrades

Call 416-542-2533

Tree Maintenance

Call 416-542-7000

Disconnection Notice

Call 416-542-8000

Head Office

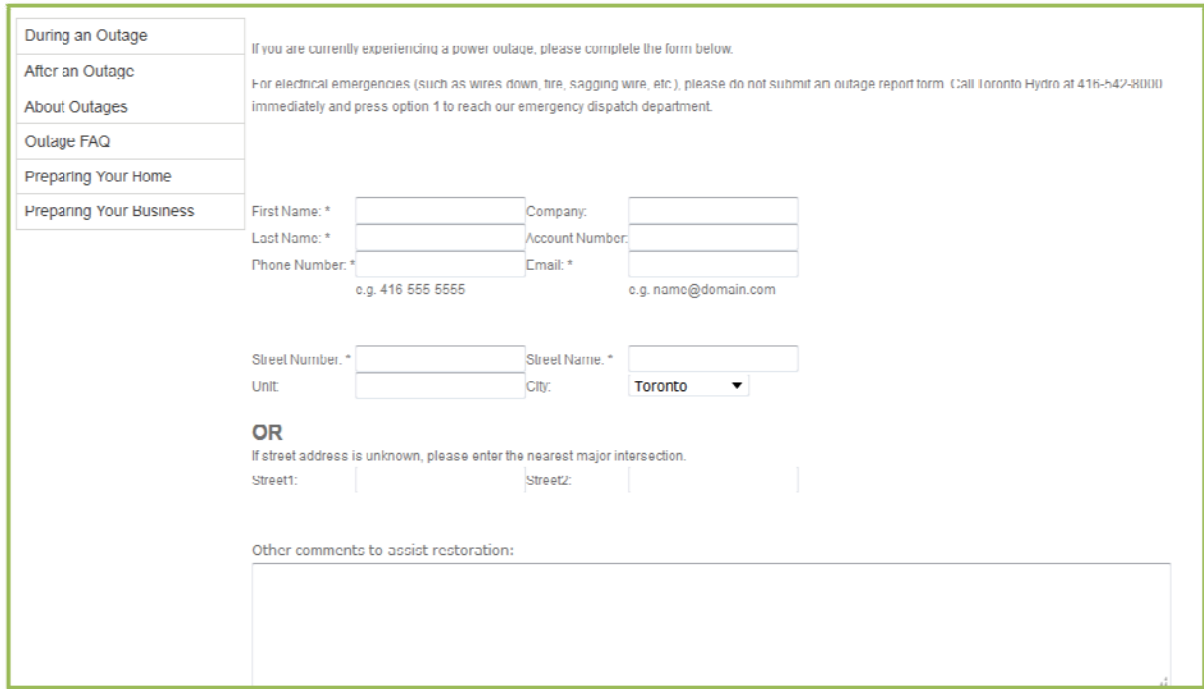
14 Carlton Street
Toronto, Ontario
M5B 1K5
Tel: 416-542-3100

The number of emails and contact forms forwarded to the Toronto Hydro call centre team for response from December 22, 2013, through January 2, 2014, was 2,028. Daily totals for those dates ranged from a low of 42 on January 1, to a peak of 392 on December 24. Normally, the team receives 80 to 120 account related emails per day on weekdays and 50 or fewer per day on weekends.

Customers also used the Toronto Hydro corporate website to report an outage using the form shown in Figure 17. The dispatch group is responsible for following up on the power outage reporting forms, which involves manually entering each form into OMS. Unlike many utilities today, Toronto Hydro has not developed an automatic interface from the form to OMS. During the 2013 Ice Storm, customers forwarded 106,000 outage reports using this form.

During the storm response, from time-to-time, dispatch supervisors would request a few representatives to review these forms and input outages not already reported to OMS. Resources were not assigned to regularly review the power outage reporting forms throughout the restoration.

Figure 17: Power Outage Reporting Form



The screenshot shows a web form titled "Power Outage Reporting Form". On the left is a navigation menu with links: "During an Outage", "After an Outage", "About Outages", "Outage FAQ", "Preparing Your Home", and "Preparing Your Business". The main content area has a heading "During an Outage" and a sub-heading "If you are currently experiencing a power outage, please complete the form below." Below this is a note: "For electrical emergencies (such as wires down, fire, sagging wire, etc.), please do not submit an outage report form. Call Toronto Hydro at 416-547-3800 immediately and press option 1 to reach our emergency dispatch department." The form contains several input fields: "First Name: *" (with example "e.g. 416 555 5555"), "Last Name: *" (with example "e.g. name@domain.com"), "Phone Number: *" (with example "e.g. 416 555 5555"), "Company:", "Account Number:", "Email: *" (with example "e.g. name@domain.com"), "Street Number: *" (with example "e.g. 416 555 5555"), "Street Name: *" (with example "e.g. name@domain.com"), "Unit:", "City:" (with a dropdown menu showing "Toronto"), "Street1:", "Street2:", and a large text area for "Other comments to assist restoration:". The form is framed by a green border.

5. Toronto Hydro does not provide mobile capability to report or track outages.

As the penetration of smart devices increases, so do customer expectations to receive information they need and want, at any time, and through the communication channel they prefer. In response, many companies have developed applications to allow their customers to do business with them more easily on cell phones and tablets. Many utilities (including Hydro One) offer free mobile applications that allow customers to report and check the status of power outages. Toronto Hydro does not have a mobile application and did not provide customers with the ability to report their outages through text messaging.

6. There was no capability to transfer Toronto Hydro-related calls from the 311 call centre.

During the 2013 Ice Storm, some Toronto Hydro customers called the City of Toronto 311 call centre to report their outage or get restoration information. The call centre representatives had no information or procedures to use in order to help these customers. They had not been trained on the restoration process for widespread electricity outages, nor had they been made aware of the outage reporting form

available on the Toronto Hydro website. No technological interfaces (such as the capability to transfer calls to the Toronto Hydro call centre) were available between the two entities.

5.6.2. Communications – Customer Contact Recommendations

The volume of customer inquiries and the sustained need for outage status information resulting from the 2013 Ice Storm revealed gaps in emergency preparedness, insufficient scalability of telephony and staffing, and the need for additional and broader training. During widespread outages Toronto Hydro must be able to rely on technological solutions (self-service IVR and web-based applications) to accurately handle the vast majority of customer contacts without the intervention of a representative. Specific recommendations to improve customer contact communications are:

CCC-1 Secure capacity (people and technology) to support timely customer contact during an incident:

- **Enhance the customer self-service IVR outage application to handle significantly more calls.**

Toronto Hydro should invest in improving its self-service IVR outage application so that its performance during emergencies is in line with peer utilities. If Toronto Hydro customers had successfully completed 50% of incoming storm calls in the IVR, an additional 172,100 calls would have been satisfactorily completed.

In redesigning or replacing the application, Toronto Hydro should consider surveying other utilities with high containment-rate systems to determine what changes and new features would be most effective. These could include:

- Upgrading the voice recognition technology to enable more customers to complete their transactions in the IVR;
- Deleting the request for an account number to identify the outage location;
- Providing options for a customer to return to the front of the outage IVR menu and/or other points in the interaction;
- Providing the customer a ticket or reference number to confirm that the outage has been recorded and to allow quicker, easier access to outage status information; and
- Correcting issues in the current interface to the OMS.

In concert with the technological enhancements, Toronto Hydro should adopt procedures to more frequently (in near real time) update restoration information in the OMS. With system improvements and implementation of those procedures, customers

calling for outage status could receive accurate information without the assistance of a representative.

- **Secure sufficient capacity and surge capability during periods of extremely high call volume to eliminate busy signals.**

Toronto Hydro should explore alternatives through either expanding the capacity of its IVR, or contracting with a third-party high-volume call processing company to ensure that the customers do not receive busy signals during full-scale events. Call processing companies can provide a cost-effective alternative to purchasing telephony capacity adequate to handle infrequent high call volumes. There are a number of services available from these companies, but most frequently utilities contract for additional capacity, so more customers can be handled concurrently through self-service outage IVR. Utilities contracting with these companies have reduced or completely eliminated fast busy signals during full-scale events.

For example, a third-party company specifically set up for outage communications provided additional telephone ports and using the client utility's IVR application, successfully handled over 233,000 of the 1.1 million calls the utility received during a recent major storm. On the peak call volume day in another storm, customers completed 19,800 calls in another utility's self-service IVR using 21st Century Communications ports. In both cases, the outage reports were successfully interfaced to the utilities' OMS systems, providing customers with accurate outage status information.

The call transfer to the third-party call processor is seamless for customers. Customers needing to report a wire down or talk to a representative for other purposes are transferred to the dispatch queue in the same way that they would be if their call was answered by telephony at the utility rather than at the third-party call processor.

The use of a third-party call processor to handle overflow calls, when paired with an improved Toronto Hydro self-service outage IVR, could potentially eliminate the need for the initial high call volume message which was heard by 31% of storm callers during the ice storm.

- **Identify and train customer representatives within Toronto Hydro and at outsourcer to service outage calls and website contacts during major incidents.**

The Dispatch Group should analyze how many customer contact resources would be needed under various emergency scenarios and develop a plan in collaboration with Customer Care that would allow them to deploy the amount of resources needed to satisfactorily handle the maximum number of estimated calls and website contacts. The analysis should consider factors such as: how the crisis impacts the use of either the in-house or contract call centre facilities, telephony capacity, IVR containment rates for customers reporting outages and seeking outage status information, estimates of how

many customers will report outages using the website outage form and whether or not the outage form is interfaced to OMS.

Using this evaluation as a base, Toronto Hydro can determine how many trained resources will be needed at all times, and implement a training program and schedule to ensure this level of readiness. Training topics should include:

- The use of all automated systems involved in outage reporting at Toronto Hydro (self-service outage IVR, OMS, Web Access, the website outage form, the website outage map, and any other systems that may be developed in the future to allow customers to report outages or receive restoration information);
- Communicating ETRs to customers;
- Handling of difficult customers. (Toronto Hydro training staff might identify representatives who are able to better handle customers during a storm and ask them to role-play handling calls.);
- Refresher courses; and
- Implement web-based and mobile outage applications to support high volume self-service.

The outage information that customers report on the corporate power outage reporting forms does not automatically feed into the OMS. Each form completed by a customer must be manually entered to OMS. An on-line interface would reduce or eliminate the need for staff to input outage information during an emergency (and day-to-day). When an interface is developed, consideration should be given to providing a service order or ticket number to customers when they successfully submit a form, to assure them the outage had been recorded and provides a reference number.

The Company should also develop and implement mobile outage applications to provide customers the ability to report outages and track restoration status from their smart phones and tablets. This should reduce calls to representatives. Various utilities offer free applications that allow customers to report outages and find outage status. Some provide outage maps, searchable by address, which are updated with OMS information, as often as every 15 minutes. In a few cases, these applications provide cause, crew status, and estimated time of restoration (when it is known).

CCC-2 Improve the process for ensuring accurate and uniform outage status messages across every mode of communication to customers (e.g., IVR, web, mobile application, low tech channels).

The previous recommendation suggests methods to improve outage status accuracy when customers use the self-service outage IVR. Many of the same programming and procedural changes for outage status accuracy should be applied to the outage form on www.torontohydro.com and to any mobile applications implemented in the future. The

keys to consistent accuracy are enhancing the automated interface with OMS and entering restoration information to OMS on a near real-time basis.

A process also, should be put in place to provide field status information to dispatch and call centre staff. Implementation of recommendations elsewhere in this report to improve the ETR process are essential to providing representatives the information they need to properly serve customers during outages. Until those recommendations can be successfully implemented, dispatch and Customer Care need to develop a method by which more granular information regarding field activities can be communicated to all representatives answering calls and Internet inquiries.

CCC-3 Employ outbound calling/texting to inform customers of outage status and other pertinent information.

Toronto Hydro uses outbound calling software to support the collection of Accounts Receivable. A leading practice employed by some utilities is to use this software to provide messaging to customers during storms. This application can push telephone calls to customers, with or without a representative attending the call. Outbound calling campaigns designed for outage purposes normally do not require interface with a representative.

The use of outbound calling before and during incidents could enhance the Company's effectiveness in meeting communications objectives. For example, some utilities use outbound calling to give customers pertinent information to better prepare for a forecasted major storm. Another common use is to message customers served by feeders that have been restored, telling them the Company has restored service in their area, and asking them to confirm if they have or have not been restored.

Customer Care and Corporate Communications staff should develop plans for the proactive use of outbound calling and texting during extended outages. Surveying other utilities regarding their use of outbound calling and texting technology might be useful in planning and designing campaigns. Those selected for implementation should be designed and tested to ensure timely execution when needed.

CCC-4 Work with City of Toronto to evaluate options for using 311 capabilities.

The Toronto City 311 call centre and Toronto Hydro Customer Care staff have begun to discuss ways to improve the handling of outage-related calls during an incident. Some ideas being discussed include providing outage communications updates to the 311 representatives on a regular basis during extended outages and training 311 representatives to complete website outage forms for customers who may not have access to the Internet during the outage. The evaluation should address:

- The capacity needed to meet anticipated call volumes at all incident levels;
- The knowledge and skills needed to support single call resolution;

- The potential impact on service levels to other City agencies and organizations that the 311 call centre serves; and
- Ways to automate communication between Toronto Hydro and the City during large-scale incidents.

5.7. Communications – Other Stakeholders

A utility's ability to effectively communicate to internal and external stakeholders during a major incident is equally as important as the efficiency of the physical restoration. In order to return the community back to "normalcy" in the shortest time possible, and maintain customer and stakeholder satisfaction during major power outages, a utility must:

- Demonstrate that it knows the customer is without power;
- Convey a sense of urgency about restoring power;
- Provide consistent and accurate information on restoration progress; and
- Provide customers with accurate and reasonable estimated times of restoration.

While the first and fourth points are addressed in the previous section of this report, this area of review focuses on the broader aspects of crisis communications during the 2013 Ice Storm, specifically answering the following questions:

- Have processes been put in place to ensure "one voice" communication during major events and are these processes followed?
- Was Toronto Hydro able to maintain a sense of control - continually apprising its stakeholders of the restoration approach and progress?

During an event, the utility should designate a single individual who is responsible for communicating with the media and public, leaving the rest of the staff free to focus on the restoration. The content of the messages delivered during the restoration should be confined to helping stakeholders understand the prioritization and restoration process, issuing safety advisories, delivering progress updates, and providing ETRs. Introducing additional "voices" during a major restoration effort can lead to inconsistent, disjointed messaging. This can create confusion among customers and other stakeholders, which then must be addressed in a "clarification" effort which can draw resources away from restoration.

When incidents occur, leading utilities ensure that messages:

- Are consistent and effective across all communications channels;
- Reach the proper audiences; and
- Are understood by spokespersons and compliment overall communications objectives.

Toronto Hydro had the process in place to ensure that messages were consistent with the communications strategy (evaluated daily) and performed well in several channels of communication.

The review of Toronto Hydro's communications to other stakeholders throughout the 2013 Ice Storm restoration addressed the following:

- Communications strategy and roles;
- Execution of “one voice” communication;
- ETR process;
- Methods and modes of communication, including social media;
- Alignment of internal and external communications;
- Synchronization of messaging and communications processes with the City and Province; and
- Outreach to vulnerable populations.

5.7.1. Communications – Other Stakeholders Findings

Throughout the event, Toronto Hydro was able to maintain unity of message, demonstrate the level of understanding and control over the incident, and provide stakeholders with a clear understanding of the restoration priorities and progress. It is important to recognize that the strengths in the communication process to stakeholders were somewhat muted by the Company's shortcomings in providing customers with the ability to report their outages and receive updates on their status. See Section 5.6 for more details.

Toronto Hydro worked closely with City and Provincial officials to coordinate the messaging to the public and used social media to distribute the message. Some customers did not have access to radio, TV, and social media, and the officials did not provide alternative sources of information such as town meetings, loudspeakers, or door hangers to reach these populations.

Communications – Other Stakeholders Strengths

1. As the face of the Company and the executive spokesperson, the CEO performed his role well.

When used, the executive spokesperson is the most visible and important role in incident and crisis communication. During the 2013 Ice Storm, the President and Chief Executive Officer (CEO) served as the primary spokesperson for the Company. As the face of the Company, he was present, on-message, empathetic, transparent, and consistent in his external communication. Conducting upwards of 25 interviews between, December 19, 2013, and January 2, 2014, his messages were aligned with press release content, maintaining a sense of consistency that was received well by the stakeholders. The frequency and quality of communication provided by the executive spokesperson, given the information available about restoration status, was comparable to leading practice within the industry.

2. Proactive media campaign and consistent messaging (use of “one voice”), including coordination with the Systems Operations Centre, worked well.

Toronto Hydro presented a consistent message across all of its communication channels, aligning with the “one voice” concept, which is considered a leading practice. The Company also used a sound communication methodology, delivering messages crafted by the media and communications lead and approved by the incident commander. Toronto Hydro’s communication department ensured that all communications channels disseminated consistent message content.

On the whole, messages were coordinated with and ultimately approved by the incident commander and were part of the daily discussion in the SOC and the Grid Emergency Report, a form of an incident action plan (IAP). This was accomplished through a communications meeting that occurred at 6 a.m. every day. During this meeting, the messages of the day were created in preparation for the 7 a.m. news cycle. The messages were updated throughout the day.

All internal and external communication stemmed from approved press releases that were distributed to the media. Once press releases were issued, communications staff used them to craft messages for different communications channels (e.g., press conferences, interviews, e-mails to key stakeholders) and employees were sent approved messages to ensure the entire Company was in alignment with respect to its response. The spokesperson was consistent in conveying the messages of the day throughout the event.

One area of criticism was that messaging on the first day of restoration created an expectation that the restoration would take 72 hours. An in-depth analysis of all the communication issued at the time, including the press conference footage, the media reports, and internal messaging and plans, has not revealed the source of this information. The Grid Emergency Report noted the key message on the first day was

that the restoration would take “at least 72 hours.” Given that the Toronto Hydro emergency levels used 72 hours as the lower threshold for the largest events, it is understandable why the Company would consider messaging the 72-hour timeframe in the early stages of the response, before the damage assessment was completed.

3. Toronto Hydro was viewed as an effective partner in City and Provincial communications.

Toronto Hydro continuously communicated with the City of Toronto and made the Company spokesperson available for City press conferences. The level of effort to communicate jointly is a leading practice for a utility during major events and enabled Toronto Hydro to be seen as an effective partner with the City and Provincial governments. There were at least 15 press conferences between City Hall and Queen’s Park that the CEO attended with City leaders. While the City and Toronto Hydro spoke about different aspects of the emergency, their messages were consistent and complementary.

Many citizens turned to the City Council for answers when Toronto Hydro could not provide them information through its own Call Centre. When the City Councillors became overwhelmed with inquiries, they turned to one of a few Toronto Hydro staff members. They were prolific communicators with the City Council, answering questions for the Councillors about the restoration. Throughout the interviews, participants repeatedly noted that Toronto Hydro was a strong and committed partner in communication to the public throughout the event.

4. Toronto Hydro used a variety of methods to reach the public, including social media.

Toronto Hydro used various communication channels to reach external stakeholder groups. These channels include broadcast media, print media, radio, social media, and the corporate website, as well as phone and email for some stakeholder groups. Social media proved to be the channel with the biggest growth and stakeholder engagement. Toronto Hydro’s Facebook fan page garnered 3,000 new fans and over 6,000 unique comments while the Company’s Twitter account accumulated approximately 24,000 new followers and 20,633 retweets during the 2013 Ice Storm. The number of retweets is a valuable metric as it indicates the value of the message to the subscriber as well as indicates the potential number of ultimate views. Figure 18 shows samples of Twitter messages posted during this storm.

Figure 18: Sample Twitter Messages



Communications – Other Stakeholders Opportunities for Improvement

1. Process for developing and issuing timely and accurate ETRs (estimated times of restoration) was not clearly defined.

Toronto Hydro did not have an effective process or the technology in place to provide estimated times of restoration consistently and automatically for the magnitude of outage that occurred as a result of the 2013 Ice Storm. Across the industry, ETRs are by far the most sought after piece of information when a utility experiences widespread outages. The processes at Toronto Hydro do not currently support the provision of ETRs outside of normal or blue-sky day outages. While this is not uncommon in many other utilities, providing customers with an accurate and timely restoration estimate is becoming an expectation during major events.

On December 22, 2013 (the first day of restoration), one of the key messages from the System Operations Centre was that the restoration would last at least 72 hours. This estimate was translated into a restoration time of 72 hours, essentially omitting the 'at-least' reference from the 72-hour restoration message. It was soon apparent that this ETR was not aligned with the key message of the day and it did not accurately reflect the level of damage or the effort that would be required to restore the damage. From that point on, Toronto Hydro wisely did not issue any other projections for restoration, because it did not have a strong process for developing and validating restoration estimates at the time of the event. As a result of this decision, customers were not provided any specific estimates of their outage durations.

2. Liaison roles with some stakeholder groups were not clearly defined.

Overall, Toronto Hydro's liaison presence was seen in a favorable light, but there was a slight disconnect in the expectations between the Company and the City Office of Emergency Management. Additionally, there were no clearly defined expectations and guidelines to address information and other assistance needed by the City Council members. Toronto Hydro did, however, manage critical restoration requests from the public sector very well. It responded promptly to building fires at Toronto Fire's request and was responsive to the Office of Emergency Management's critical infrastructure and public safety requests. Additionally, Toronto Hydro avoided 'special' requests for preferential restoration. The Company also provided Council members with three dedicated contact people who were very responsive, according to the interviews.

Toronto Hydro staffed liaison positions at the Office of Emergency Management, but the type of information that stakeholders needed and the level of interaction that they wanted from Toronto Hydro were not defined in advance. The operational liaison at the City Office of Emergency Management effectively maintained operational communication and solved emerging restoration priorities including City critical facilities that lost primary and back-up generation. As the event progressed and Toronto Hydro was unable to provide its liaison to the OEM with actionable, operational information, the need for an executive presence increased. Because of that, the City OEM had to engage Toronto Hydro executives to resolve issues.

Due to shortcomings in Toronto Hydro's call centre, City of Toronto Councillors received an unexpected numbers of requests from citizens. Toronto Hydro corresponded with Councillors and their staff in approximately 7,000 emails and over 100 direct phone calls.

3. Messages were not always accessible to all stakeholders (e.g., customers with no access to TV, radio, or social media).

During an extended power outage, many customers lost access to habitually-used information channels, such as radio, television, and social media. In addition, Toronto's population includes a significant portion of people who are not technology savvy and this, along with the inaccessibility of the call centre, left them with little or no information on outage status. During the 2013 Ice Storm, the Company did not provide sufficiently for alternative ways to communicate with the customers, such as town hall meetings, neighbourhood updates, loudspeaker messaging or door hangers.

5.7.2. Communications – Other Stakeholders Recommendations

COS-1 Develop a process to communicate timely and accurate ETRs at different levels of specificity.

Toronto Hydro should update its entire estimated time of restoration (ETR) process to enable the automatic provision of estimates to customers. This process will require

Toronto Hydro to provide a realistic timeframe for restoration for varying levels or sizes of incidents to set expectations with its stakeholders. It should advise customers about the unavoidable limitations in ETR delivery immediately following a complex outage and create communication strategies around these limitations.

The Company should identify all potential channels for providing the ETR updates to various stakeholders and develop a process to ensure that the messaging is consistent and accurate across all venues. These channels should include non-traditional ways of communicating to address the needs of those populations that are not technically savvy or do not have access to traditional media due to an extended outage.

COS-2 In collaboration with the City of Toronto, develop an education program to improve stakeholder literacy of: restoration process, customer responsibility, and preparedness.

Toronto Hydro should work with the City of Toronto to develop a program and execute an education campaign about the power restoration process to the citizens of Toronto. Educating the population on personal preparedness and resiliency is the responsibility of the public emergency managers. Providing educational information on electric (and gas) utility restoration is the responsibility of the utility. Working together, Toronto's Office of Emergency Management and Toronto Hydro should determine how best to conduct joint or complementary personal preparedness education.

Toronto Hydro, in partnership with the City and Provincial Emergency Management organizations, should develop a public education program for external customer and stakeholder groups. The Canadian Electric Association may consider bringing together Hydro companies across Canada to create an education e in conjunction with national emergency management organizations. The annual program should educate customers on the following:

- Delivering electricity from the power plant to the meter in order to provide a general understanding of how the system works;
- Specifying what stakeholders are responsible for and what they should do before and during a Toronto Hydro response to an incident, including special needs customers, use of electricians to restore the damage on customer property, etc.;
- Responding to outages during blue sky days versus during an incident to illustrate the complexity of responding to a single outage and how the complexity changes when multiple outages occur;
- Understanding priorities and how they play a role in the manner in which Toronto Hydro responds to incidents; and
- Ensuring stakeholders are aware of what they need in order for their residence to accept service from Toronto Hydro.

A program like this would equip stakeholders with information that will help them set realistic expectations, so they can make informed decisions to protect their health, safety, and comfort during an outage.

COS-3 Expand liaison role to address education, communication, and coordination with key community stakeholders (e.g., elected leaders, public safety) during major incidents.

One of the most critical responsibilities of the utility emergency manager is to create relationships with public and private sector emergency partners *prior to* an emergency. According to public safety professionals in the Toronto government, Toronto Hydro has recently improved its capabilities in the liaison role. This effort started at the beginning of 2013 and markedly improved during and after the July 2013 floods. Toronto Hydro should further improve its capability to provide the following:

- Operational information to City of Toronto (OEM, police and fire, transportation);
- An avenue to review restoration priorities in real time;
- Executive level interface in the most demanding responses;
- An ability to embed and coordinate Toronto Hydro assets with City public safety and public works assets, and vice versa, during a response;
- A process for coordinating public communication and leveraging each other's communication channels;
- Pre-established guidelines for handling special requests; and
- Appropriate interface/liaison to City Councillors to arm them with the unified message and support other specific information and outreach needs.

COS-4 Formalize process for developing, approving, and disseminating key messages.

Toronto Hydro's communications team was deliberate in ensuring that the press releases issued to the media were the basis of information used to develop all other external and employee communications. Some of the processes used to support the messaging process were developed "just in time." Toronto Hydro should document the process for developing key messages, and potentially enhance it further, based on any lessons learned. This documentation should become a part of the Emergency Management Plan going forward. For example, the process should capture the following:

- All of the internal and external stakeholder touch points;
- The most appropriate channels to disseminate information to those internal and external stakeholders;
- Commonly requested information for each touch point;

- Specific roles for the message development team, including responsibilities for message development and approval;
- Process map depicting a step-by-step message development and approval process; and
- Pre-scripted messages in the key languages used by the residents of the Greater Toronto Area.

Documenting these processes and procedures will ensure the consistent use of messaging during major events and consistency in the training of new team members in preparation for an event.

5.8. Information Systems and Technologies

The role of the information and operational technologies in major events is two-fold. They provide incident managers with the ability to identify, process, and comprehend critical restoration information (e.g., customers out, location of outages, devices that have operated, location of crews) in order to establish “situational awareness” and provide data and intelligence to inform restoration decision making. The level of deployment and integration of these systems and tools can directly affect the incident response team’s ability to make timely and informed command and control decisions at the strategic, operational, and tactical level.

The operational and information technology systems commonly used by utilities during major events are:

- Outage management system (OMS);
- Geographic Information System (GIS);
- Customer Information System (CIS);
- Supervisory Control and Data Acquisition system (SCADA);
- Integrated voice response system (IVR);
- Mobile Data System (MDS);
- Automated metering infrastructure (AMI, smart meters); and
- Radio communications, web sites and web-enabled applications.

The integration of the different systems provides the utility with an end-to-end ability to manage outages. For example, when a customer calls a customer service representative (CSR) or the IVR to report a power outage, a trouble ticket is produced in OMS that represents that individual customer’s outage. As additional notifications are received from the IVR or other CSRs indicating more customer outages in the same area as the initial call, OMS will use algorithms to determine what upstream device (e.g., fuse, recloser, or breaker) operated to interrupt service to the entire group of customers.

OMS will then create an outage ticket for that specific device. In companies with MDS, dispatchers send the trouble tickets to trouble or line crews' MDS terminal. In utilities without MDS, a dispatcher will typically radio the ticket information to the crew and the crew will then initiate a paper ticket process to provide the required information to clear the ticket from OMS.

The OMS plays a critical role in the end-to-end process. It captures, evaluates, and tracks the status of outages across the service territory. It integrates with the IVR system and CIS to generate outage records for individual customers tracks group calls related to outages, and generates outage tickets for repair. It links to the GIS system provides information about electric distribution system connectivity, and generates reports on the status of outages across the system for further analysis.

During major events, there is an exponential increase in the number of people interfacing with the OMS and the number of transactions that OMS has to handle. This level of activity often creates the risk of a system slow-down or shut-down when the number of transactions approach or exceed the capacity of the system.

GIS is used to enhance a utility's ability to track assets, develop circuit maps, and, in some cases, view tree canopy in relation to the system's equipment and assets.

MDS aids the development of situational awareness and operational decision making. MDS terminals installed in line trucks provide GPS and trouble spot information and enable restoration crews to interface directly with work management systems, OMS, and dispatchers to streamline execution of operational decisions. MDS can be used to capture damage assessment information, or as a tool to better communicate ETRs from crews in the field to customers. A drawback is the cost to outfit an entire vehicle fleet. Currently, all of the grid response vehicles and supervisors at Toronto Hydro have installed MDS terminals on their vehicles. In addition, meter technicians and inspectors use handheld mobile units.

SCADA systems provide an understanding of the scope of the outages and allow operators to remotely open and close devices in the field. This improves reliability on a day-to-day basis and can be used early in a large event response to re-energize those circuits that have ties to other feeders that have not been affected by the outage. This remote restoration can result in faster restoration of some customers. SCADA also provides support throughout a restoration by allowing the system operators to remotely switch circuits as repairs are made.

Since the early 21st century, utilities have been adopting and implementing advanced metering infrastructure (AMI), also known as smart meters. These systems provide utilities with the ability to carry out two-way communication with meters, and can be used to "ping" a meter (i.e., send a signal) to determine whether there is power at the premise. While this is a functionality that the smart meters provide, the primary objective in installing AMI was to support energy efficiency initiatives and enable

customers to manage their energy usage. As a result, most of the AMI systems are not capable of conducting mass surveys (“pings”) of customer meters to provide immediate status of the outages.

The IVR and CIS are described in Section 5.6 Communications – Customer Contact.

The assessment of the Toronto Hydro information systems and technologies used to support the 2013 Ice Storm restoration encompassed the following:

- Systems scalability;
- Systems integration;
- Availability of critical data (e.g., for accurate situational awareness, ETRs);
- Accommodation of new users;
- Use of mobile-based technologies; and
- Alternatives when technology is down/unavailable.

5.8.1. Information Systems and Technology Findings

Like most other utilities, Toronto Hydro has implemented and integrated each of the systems described above, to support day-to-day operations. Generally, they support blue sky day operations and smaller outage events (i.e., Level 1 or 2) with great proficiency. The volume of transactions and interfaces generated by the 2013 Ice Storm, stressed the capacity of the system, pushing some portions of the technology infrastructure to their limits.

Information Systems and Technology Strengths

1. One of the early adopters of smart meter technology.

In 2006, Toronto Hydro was one of the first utilities in North America to deploy smart meter technology, called Automated Metering Infrastructure (AMI). As a part of an Ontario Energy Board (OEB) initiative to improve energy efficiency, regulators provided funding for the Company to install the AMI infrastructure. Today, there are 648,000 retail customer and 85,800 industrial/commercial smart meters on Toronto Hydro’s system. This extensive smart meter network provides Toronto Hydro with the ability to remotely outages. Since energy efficiency was the primary objective for AMI, the system is not set up to support a large-scale restoration. For example, the current system uses a manual process to ping each meter, requiring excessive time to determine the status of an outage for a group of customers (e.g., an entire circuit).

2. An extensive Supervisory Control and Data Acquisition (SCADA) system with 85,000 control points on more than 4,000 devices.

Over the years, Toronto Hydro has implemented an extensive SCADA system with connectivity to more than 90% of its distribution circuit breakers. Approximately 140

circuit breakers on the 4kV system do not have SCADA controls. As a result, Toronto Hydro's SCADA system provides relatively strong penetration of the devices for an overhead system of its size and construction.

This allows Toronto Hydro to perform remote sensing and control of devices on the electrical distribution system. During an event like the 2013 Ice Storm, the SCADA system was used to initially determine the number of feeder lock outs (i.e., circuits that were completely out of power) and perform remote switching and restoration operations. These resulted in some portion of customers being restored within the first 24 hours from when the event started. Since the SCADA system feeds information into the Outage Management System (OMS), the outage tickets associated with the circuit lockouts were created immediately for field review and restoration.

3. Mobile Data Terminals available in a portion of Toronto Hydro vehicles.

Approximately 20% of Toronto Hydro trucks used during the 2013 Ice Storm restoration and were equipped with full MDS terminals and another 30% had mobile connectivity. These mobile units, typically laptops located in each vehicle with cellular technology and automatic vehicle locating technology (AVL) or Global Positioning Satellite (GPS) Technology, allow the crews to receive, accept, update, and close outage tickets from their truck and provide a more timely status of each outage in the OMS. At the same time, GPS location provides the dispatchers with real-time visibility into crew locations so that they can assign work to the crews that are closest to the outage.

Information Systems and Technology Opportunities for Improvement

1. OMS hardware and interfaces were not scalable to handle the number of concurrent users during the 2013 Ice Storm.

Toronto Hydro's OMS license can accommodate 33 concurrent users, which provides enough bandwidth to operate the system on a blue sky day and during Level 1 and 2 outage events. Per the Emergency Response Plan, during the 2013 Ice Storm, Toronto Hydro decentralized the dispatch function to local incident command centres to more efficiently manage the restoration work. As a result, the volume of concurrent transactions exceeded the capacity of the system and caused a brief outage.

In addition, the version of the OMS system that was implemented does not include the web-interface for managing basic transactions. The current OMS was designed for use by "super users" – staff who need broader access to system functions to conduct their daily work. In addition to enabling basic OMS transactions, such as opening and closing outage tickets, assigning ETRs for individual customers, and running basic outage status reports, this "super-user" interface provides the ability to make changes to the connectivity model, 'un-nest' outages that the OMS has logically tied to a single device, and purge incorrectly created outage tickets. Super users access OMS through a more sophisticated interface that typically requires training and significant on-the-job experience to master. A more basic interface for managing the outage tickets and

running basic reports would require much less training and use less bandwidth than the “super user” version.

2. Groups of smart meters could not be pinged quickly to determine the outage status and a portion of them do not have “last gasp” technology.

As mentioned earlier, Toronto Hydro was one of the early adopters of AMI technology comprising the smart meter hardware, software, and communication network. At the time the AMI system was installed, the primary purpose was to support energy efficiency initiatives through the provision of highly reliable consumption usage readings, so that customers can better manage their energy usage. While smart meters can be used to identify or verify outages, the existing system allows for serial communication (one meter at a time) only, which is done through a highly manual process. This process does not support effective (near real-time) “pinging” of meters to assist in identifying “nested” outages.

In addition to this limited capability to provide outage status on a large scale, approximately two-thirds of Toronto Hydro’s smart meters do not have “last gasp technology.” This technology sends an automatic notification to the OMS the moment an outage occurs on the meter and enables the OMS to match premises with outages.

3. The GIS system does not have fully accurate connectivity at the meter level.

Similar to leading electric utilities, Toronto Hydro has an integrated GIS system that provides connectivity of its electric network from the substation breaker level through the customer meter. Currently, the accuracy of meter connectivity to the correct transformer is approximately 85% in the core of the City (legacy Toronto Hydro service territory) and 95% across the rest of the system. While maintaining 100% accuracy of meter connectivity may not be achievable, because of the frequent changes in system configuration, the current level of accuracy does not provide the Company with the ability to ensure accurate prediction of the outage levels and customer counts, especially during major events.

4. Lack of connectivity among different information technology systems caused inaccuracy of outage status information available to customers.

Leading utilities have integrated their main IT and OT systems to automatically collect key outage information, analyze the data, and provide status updates to customers through a variety of channels (e.g., web-site, text, mobile app, outage map, IVR). Toronto Hydro systems are integrated to a level that provides sufficient support for day-to-day operations. In a large-scale event, however, the level of manual intervention required to process information and transactions prevents Toronto Hydro from providing timely and accurate information to customers regarding their outage status.

5.8.2. Information Systems and Technology Recommendations

IT-1 Include IT/OT technologies that provide real or near real-time intelligence in the technology strategic roadmap.

As Toronto Hydro updates its strategic roadmap for IT/OT systems and invests in new technologies could support larger-scale restorations, it should:

- Identify what information is needed by Toronto Hydro decision makers, customers, and key stakeholders like the City of Toronto Office of Emergency Management, first responders, public safety agencies, and other public officials during an large scale, complex restoration;
- Update and automate, where indicated, the processes that support the delivery of this information to those groups; and
- Identify alternatives to support communication and information management when systems are down or unavailable.

Toronto Hydro should develop cost estimates for the priorities confirmed through the road mapping projects. There could be new systems or enhancements to current systems.

- **Expand mobile platforms for operational communication (e.g., mobile data terminals, mobile platforms for damage assessment).**

Toronto Hydro should expand the use of mobile technology to all crews to further automate the exchange of information between the field and command centres. Providing more smart devices supported by a back-end software system that is integrated with OMS and GIS would allow field personnel to enter damage information, receive work orders remotely, estimate restoration times, and close work orders in a timely manner, with minimal human intervention in the command and control centres.

- **Evaluate enhancements to smart meter technologies to improve situational awareness during large-scale outage.**

With the advancement of smart metering technology and the communications network, Toronto Hydro should continue with its plan to replace the data collectors, which will expedite the ability to “ping” groups of meters. Also the Company should investigate the costs of upgrading the meters that currently don’t have the “last gasp” technology.

- **Upgrade the outage management system (OMS) and create an OMS-lite (thin client or web-based) version to support decentralized command and control.**

The OMS at Toronto Hydro, including hardware, software, servers, and other associated infrastructure, should accommodate different types of users (super users, users with “read only” needs) and a larger number of concurrent users. Enhancements to consider include:

- Implementing a more current version of the OMS software;
- Arranging access to provisional licensing to support a short-term uptick of users; and
- Providing a scaled-down version of OMS for non-super users.

The access to this version could be through a terminal or it can be web-based.

- **Ensure that primary data systems (i.e., GIS, OMS, CIS, outage map) integrate to provide key data for customers and decision makers**

Toronto Hydro should assess the current system architecture, particularly integration points between key operational systems (e.g., OMS, GIS) and information systems (e.g., CIS, website). The Company should address the interface point between main systems where information links are slow, where needed information isn't available to provide an accurate portrayal of system or outage status, or where critical information isn't accessible at all. Once critical gaps are known, Toronto Hydro should identify and include needed enhancements on the technology roadmap.

5.9. Vegetation Management and System Hardening/Resilience

The increased frequency of severity of weather events, along with changing expectations and lower tolerance for long duration outages by customers, have spurred utilities to explore ways to improve storm performance of their distribution systems (durability and resilience). Durability¹² refers to the ability of the system to withstand the impacts of storms without damage and includes materials or equipment that resist damage, the arrangement of existing equipment to resist or avoid damage, and technologies that help protect the system from damage. Resilience¹³ is defined as the ability to continue to operate despite damage to some parts of the distribution system. It encompasses the configuration of system components to reduce the numbers of outages, reconfiguration of the system to maintain service, and application of system resources to continue service to customers while the electric system is restored. Some commonly used durability and resilience enhancement techniques include:

- Improving the strength of poles and structures;
- Burying overhead lines;

¹² Edison Electric Institute (EEI) defines hardening as those activities that: "improve the durability and stability of infrastructure to withstand the impacts of severe weather events with minimal damage," *Before and After the Storm*, March 2013.

¹³ The Edison Electric Institute also defines resilience as those "measures (that) do not prevent damage; rather they enable facilities to continue operating despite damage and/or promote a rapid return to normal operations," *Before and After the Storm*, March 2013.

- Enhancing flexibility of the electric system through circuit ties and system automation; and
- Increasing vegetation clearances around power lines.

System Hardening/Resilience

Most system hardening initiatives span multiple years, involving sequential cycles of investment to yield improvement. Leading utilities have worked with their key stakeholders (in particular, regulators) to identify the best options, evaluate the costs and benefits for each option, determine the optimal portfolio of projects to enhance the durability and resilience of their distribution systems, and ultimately secure funding for this work. There is no standard approach within the utility industry to evaluate the costs and benefits associated with hardening options, but the three most commonly-used methodologies are: probability based; relative comparison; and recent event baseline.

Each of these methods requires the use of a set of assumptions that can be supported by historical data if it is available. It's a challenge for utilities to have enough actual data to fully assess the benefits of each hardening option. There are not many major events, the impact of each event can vary substantially, and utilities have tended to focus resources on restoration activities, rather than data gathering.

Converting Overhead Lines to Underground

Over the past decade and immediately after a major event that causes extensive power outages, customers, regulators, legislators, and other external stakeholders tend to express interest in the conversion of overhead distribution facilities to underground construction. Underground facilities reduce, if not eliminate, the risk of failure due to high wind, falling trees, and ice accumulation. On the other hand, they are more exposed than overhead lines to other hazards such as heat and flooding. Damage related to heat and flooding often requires more time and higher cost to restore.

In addition to the potentially higher cost of underground restorations, all of the studies that have been commissioned by different regulators and state legislators across the U.S. have deemed widespread "undergrounding" to be cost prohibitive. Some of the preliminary estimates for converting the remaining overhead infrastructure (approximately 58% of circuit lines) at Toronto Hydro to underground range from \$11-\$16 billion dollars. Another concern is that the actual conversion process inconveniences property owners and creates aesthetic issues – yard excavation, driveway removal and replacement, damage to tree root systems, and padmount transformers placed on customers' property.

As an alternative to implementing large conversions, some utilities have converted selected overhead circuits or sections of circuits to improve the reliability of service to critical infrastructure facilities. These include hospitals, water filtration plants, 911 call centres, etc. Usually sections that are targeted for conversion to underground are

located in heavily-treed areas, in back-lots with difficult access, and areas that are not prone to flooding.

Vegetation Management

Vegetation is typically the single largest culprit of outages during major events. Trees and limbs tend to fall into distribution lines and take down wire and equipment, including poles, creating interruptions to customer service. Most utilities clear vegetation around lines, typically using a pre-defined cycle. Trees and limbs that cause outages in major events tend to fall in from outside the typical clearances or rights-of-way (ROW).

Some utilities have expanded their vegetation management programs to increase clearance specifications, remove overhangs, and take out hazard trees from outside the ROW. Aggressive VM programs can reduce damage during major events, but are difficult to execute since they require access and approvals by property owners. It is important to note that most of the utilities do not trim around service drops.¹⁴ This is usually the responsibility of a property owner. Most of the utility vegetation management work is outsourced to contractors who specialize in maintaining line clearance for utilities.

Also, VM programs often must comply with external regulations, particularly when utilities serve urban areas with denser tree canopy. The arboriculture industry pruning standard defines proper pruning techniques to ensure that any pruning does not negatively affect the health of the tree. Workers must follow these standards when maintaining vegetation around distribution lines. In addition, many municipalities, and some neighbourhoods, have specific requirements to protect their tree canopy. These may prescribe the amount of clearance around a line, how to remove dying or deceased trees, and sometimes even access to trees that are on private property.

Pole Maintenance

In addition to investing in vegetation management, most utilities conduct periodic wood pole inspection and replacement programs. The inspection cycles typically range from 8-to-15 years and include a combination of visual, sounding, ground line, and boring methods for assessing the integrity of wood poles. The poles which do not pass the test are stratified by priority (i.e., When do they need to be replaced based on their condition?) and replaced within a pre-defined target period.

Utility hardening programs usually must comply with externally-imposed policies and guidelines, too. For example, in order to ensure the safety of electric utility construction, utilities adhere to electric safety codes which establish guidelines for pole loading based on historic weather patterns by geographic area. They are expressed in terms of the

¹⁴ A service drop is an overhead electrical line running from a utility pole to a customer's building or other premises. It is the point where electric utilities provide power to their customers.

minimum wind speeds and ice loading that the structures are expected to withstand. Utilities are expected to follow these guidelines to ensure that their construction standards and structures, including wood poles, meet loading standards at the time of installation.

The review of Toronto Hydro's vegetation management and system hardening and resilience programs addressed the following:

- Program scope and management;
- Conformance to industry standards and performance as compared to leading practices;
- Adherence to local by-laws; and
- Resiliency-building approaches and methods.

5.9.1. Vegetation Management and System Hardening/Resilience Findings

The damage that Toronto Hydro experienced during the 2013 Ice Storm was mostly caused by tree limbs falling on distribution lines and breaking the conductors. During the entire storm, the Company had to replace only 17 out of approximately 101,000 wood poles on its distribution system. Given the small fraction of poles that were broken during the ice storm and the well-defined wood pole inspection and replacement program in place, it can be concluded that the strength and integrity of the Company's wood pole plant did not contribute to the number of outages experienced during this storm and may have actually prevented a larger amount of damage. As a part of the Company's asset management effort, Toronto Hydro conducts a Planned Wood Pole Inspection program (PWPI) on a 10-year cycle.

Throughout the Company's history, Toronto Hydro has maintained clearances around its power lines using different methods and programs. In 2008, Toronto Hydro renegotiated its vegetation management contract and established a three-year, circuit-based cycle for maintaining clearances across its system, which is an industry leading practice. The current VM program follows the CSA and ANSI standards as well as City of Toronto Line Clearance Guidelines¹⁵.

¹⁵ Canadian Standard Association (CSA) C22.3 No. 1-10

- Flashover distance for AC System Conductors to trees

ANSI A300 – Standard Practices for Tree Care Operations

- Recommended standard by the International Society of Arboriculture (ISA) and the Tree Care Industry Association (TCIA)

City By-Laws – City of Toronto Forestry Cycle Pruning Guidelines

- 15 cm (0.5 ft.) clearance from house service
- 30 cm (1 ft.) clearance from secondary conductors
- 90 cm (3 ft.) clearance from primary conductors

In 2008, Toronto Hydro conducted a study to explore different system hardening options. As a result of that study, the Company began to implement several hardening efforts including, but not limited to better pole guying,¹⁶ stronger insulators, and fiberglass brackets for pole line equipment support.¹⁷ It is important to note that over the past 30 years, Toronto Hydro has been installing underground systems in all new developments. This has been a standard industry practice, with developers bearing a portion of the cost.

Vegetation Management and System Hardening/Resilience Strengths

1. Toronto Hydro has been following a circuit-based trimming program since 2008 and adheres to accepted industry and City of Toronto pruning standards.

In 2008 the Company re-negotiated its VM program and implemented a circuit-based approach. The approach used until then was grid based, focused on clearing distribution lines by geographic areas (i.e., sections of the City) irrespective of the electric system configuration. The circuit-based approach focuses the yearly VM spending on circuits where it will provide the best reliability improvement while ensuring that the system is still maintained in adherence with the accepted industry and City of Toronto pruning standards. Similar to most utilities, the Company does not trim around service drops.

2. Vegetation management preventive maintenance program is in line with industry practices (i.e., three-year cycle).

The duration of the vegetation trim cycle for an electric distribution utility depends on a number of factors, such as tree species, local by-laws, customer priorities, and the electric system configuration. The cycle for line clearances typically ranges between three and seven years on the distribution system. Toronto Hydro maintains its circuit clearances on a three-year average cycle, meaning that circuits are pruned every two to five years, depending on their reliability performance. This VM preventive cycle is often considered a leading industry practice.

3. Over the past six years, Toronto Hydro has maintained a consistent scope of the vegetation management program (e.g., clearances, miles completed) while reducing the cost of the program.

As mentioned earlier, most utility vegetation management work is conducted by outside contractors that specialize in electric line clearance. Toronto Hydro uses an outside contractor for all preventive trimming. It has retained one vegetation management crew in-house that focuses on customer requests and corrective maintenance work. There is a certified arborist in-house.

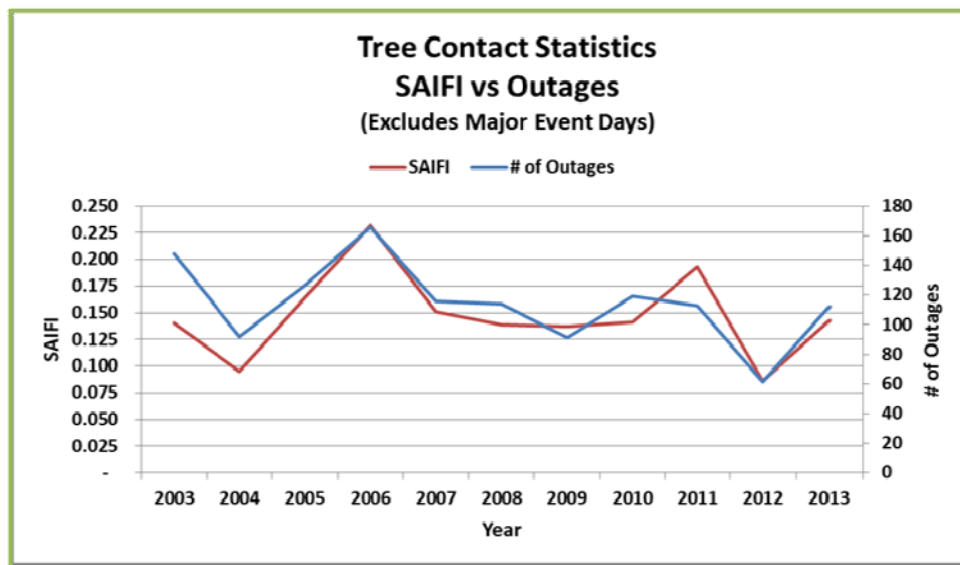
¹⁶ Includes installing a tensioned wire on poles, designed to add stability to a free-standing structure.

¹⁷ Fiberglass brackets are not subject to as much decay as the wood brackets.

When Toronto Hydro transitioned from the area-based to circuit-based approach in 2008, it requested bids from outside contractors. The Company was able to reduce the overall cost of the program while continuing to maintain the same clearances (in line with industry and City of Toronto standards) on a three-year average cycle. This strategy reduced the costs of the overall program while providing the same (or better) day-to-day reliability.

Figure 19 depicts Toronto Hydro's vegetation-related reliability on a blue sky day over the period 2003 through 2013. The red line represents the System Average Interruption Frequency Index (SAIFI) and the blue line shows the total number of outages caused by trees. SAIFI is a standard industry metric used to evaluate the reliability performance and it represents the number of interruptions that an average customer would have in a 12-month period. The calculations do not include major outage event days, but they do include outages related to annual weather patterns and smaller events, which cause the fluctuations in performance from year-to-year. Despite these fluctuations, statistics indicate that the vegetation-related reliability performance has remained constant or slightly improved for Toronto Hydro since the implementation of the changes to the contract in 2008.

Figure 19: Toronto Hydro Vegetation-Related Outages and SAIFI (2003-2013)



4. Toronto Hydro's wood pole program is in line with industry leading practice.

For more than 15 years, Toronto Hydro has been conducting a PWPI program on a 10-year cycle. The work is performed by contractors specializing in this field. The program

includes a two-step assessment (visual and sounding assessment and a bore test)¹⁸ with standard remediation alternatives for wood poles that do not pass the inspection. The Company has established timeframes within which the rejected poles have to be addressed. The cycle and scope of the Company's PWPI program are in line with industry leading practices.

Vegetation Management and System Hardening/Resilience Opportunities for Improvement

1. City of Toronto line clearance by-laws are defined for blue sky reliability, not for preventing outages during major incidents.

With the recent increase in frequency of major weather events across North America, the City of Toronto line clearance guidelines may not provide for an adequate balance between tree canopy objectives and the need for larger clearances to reduce the risk of widespread, prolonged power outages. The current clearance guidelines provide for a 3' clearance around primary lines and 1' around secondary wires. These are not sufficient to protect the lines during major weather incidents, whether they are related to ice, wind, heavy snow, or wind.

2. Coordination of clearing efforts with City vegetation management crews during an incident and day-to-day.

Toronto Hydro crews focus on power line clearance only, and City crews focus on parks and street-side tree maintenance. While the scope and primary objectives of their daily work differ, Company and City forestry crews often work together during major events to restore power to City residents. During the 2013 Ice Storm, Toronto Hydro and the City did not have a standard process to communicate the availability of City forestry resources and expected working hours each day, a procedure to transfer control of the crews to Toronto Hydro, or a consistent approach for requesting and assigning crews.

¹⁸ The first step always is a visual and sounding assessment of the pole. The pole is inspected for external signs of decay, feathering, through-checks, mechanical damage, insect infestation, etc. A hammer is also used to strike the pole from the ground level up to eight feet above; the sound characteristics of the hammer blow help determine if there are internal cavities caused by decay. This is done on all wood poles. For poles less than 20 years old, a visual and sounding inspection is adequate to confirm the integrity of the pole (barring observed defects).

The second step is a bore test or a resistograph test. This is performed on poles older than 20 years, and on any other poles that are suspected to have an internal defect, even if they are less than 20 years old. For the bore test, a 13mm diameter bit is used to bore into the pole on a 45-degree angle, at ground level. The resultant shavings are examined for signs of decay and then the hole is plugged. An alternate technology to the bore test is a resistograph test, in which a 2mm diameter drill bit connected to a measuring instrument is used to drill into the pole. The resultant graph showing drill position and power consumption can be analyzed to identify internal cavities. The advantage of the resistograph test is that it leaves only a very small hole in the pole that does not require plugging.

5.9.2. Vegetation Management and System Hardening/Resilience Recommendations

VMSH-1 Evaluate all viable options to improve distribution system resilience during major weather events, including converting lines to underground for sections of circuits where it will enhance the reliability of services to critical infrastructure and facilities.

Toronto Hydro should conduct an in-depth study to identify and evaluate options for enhancing the distribution system resilience during major weather events. The study should quantify the value and costs associated with each alternative and identify the best combination of projects to improve system performance during these incidents. The Company will need to work with the City of Toronto to identify mutually acceptable and cost-effective options related to increasing vegetation management clearances around power lines.

Initiatives that the Company should consider include, but are not limited to:

- Increase right-of-way width or removal of “overhang” (aggressive vegetation management);
- Install breakaway disconnects on the pole side of the service lines;
- Increase structure loading to withstand high wind and ice;
- Replace small conductors;
- Improve circuit sectionalization to provide more flexibility;
- Convert overhead back-lot to underground, or move to the front lot (street side);
- Upgrade overhead structures/circuits to heavy loading standard;
- Convert overhead lateral (tap) lines to underground;
- Convert entire overhead circuits to underground; and
- Develop micro-grids.

These measures, including the conversion of overhead lines to underground, can enhance the reliability of services during major weather events (e.g., ice, wind, hurricane) to critical infrastructure and facilities such as hospitals, water filtration plants, and 911 call centres.

VMSH-2 Gain support from key stakeholders on the level of resilience required and related funding.

The costs associated with improving distribution system resilience are significant. In order to implement the improvements identified in the study, Toronto Hydro should work with the Ontario Electricity Board, the City of Toronto, and other stakeholder groups to gain agreement on the level of resilience desired – and the amount of

investment required. Once there is a shared understanding of the target level of resiliency and the costs associated to achieve it, stakeholders will need to agree to a cost recovery mechanism.

5.10. Toronto Hydro-City Coordination

Over the course of the assessment, stakeholder interviews and public comments¹⁹ revealed various aspects of emergency management at the community level that could benefit from a closer collaboration between Toronto Hydro and the City of Toronto. The Independent Review Panel requested Davies Consulting to review and make recommendations for areas where joint efforts between Toronto Hydro and the City could improve emergency preparedness and response. These include:

- **Personal preparedness** – advance planning undertaken by individual citizens or groups of citizens to be able to meet basic living needs during an extended power outage. This could include having: a several-day supply of food, water, and household supplies; alternative living arrangements; an evacuation plan; clothing and blankets to withstand lack of heat; a battery-powered radio; a back-up supply of medication and other critical health supplies; and (possibly) a back-up generator.
- **Communication when technology is “down”** – disseminating coping information (e.g., restoration priorities and status, availability of city services, safety messages) when channels powered by electricity are not available (i.e., Internet, television, cell phone, radio).
- **Support for vulnerable populations** – availability of assistance for groups of residents who have limited ability to cope during an emergency, including the economically disadvantaged, the uninsured, low-income children, the elderly, the homeless, those with serious health conditions, and the mentally impaired.
- **Shelters/warming centres** – locations made available by the City that provide alternative housing, a place to re-charge devices, and access to heat.
- **Planning and communication of restoration priorities** – joint identification of critical facilities to re-energize first and messaging of priorities to the public throughout the restoration.
- **Explanation of customer responsibility** for electrical equipment repairs on their premise – clearer definition and communication of the obligation of the homeowner/dweller, as established by the Ontario Electrical Safety Authority, to fix equipment on his/her property, such as standpipes, so that customers can arrange for repairs early in the event.

¹⁹ See Appendix D for a summary of public comments.

- **Explanation of building codes** – standards maintained by Toronto Building that enable or hamper ingress or egress within high rise buildings and provide for emergency power supply.
- **Use of 311 call centre for back-up support** – feasibility of using the City of Toronto facility to handle overflow calls for Toronto Hydro during an emergency.
- **Coordination of urban forestation policies and plans** -- mindful of the needs for reliable and more resilient electricity distribution system, joint consideration of City, Toronto Hydro, and other key stakeholders when developing standards and procedures to manage the urban tree canopy and forestation efforts.
- **Emergency response coordination** (police, fire, other) – maintaining frequent, if not continuous, contact between Toronto Hydro and first responders during major power outages.

5.10.1. Toronto Hydro – City Coordination Findings

City of Toronto staff and public officials interviewed, uniformly noted how well Toronto Hydro responded to the 2013 Ice Storm given the extreme cold, hazardous working conditions, and extensive, tree-related damage. Both Toronto Hydro and the City of Toronto recognized that this was a community recovery, as well as customer restoration effort. They were able to accomplish both through an effective collaboration over the course of the event to coordinate restoration priorities, public communication, forestry, and outreach.

The ways in which Toronto Hydro was able to work effectively with the City include:

- **Identification of critical load priorities** – The City and Toronto Hydro had in place a pre-determined list of critical facilities to be restored first and Toronto Hydro's restoration plans aligned with these priorities. Toronto Hydro participated on daily planning calls with the City and other stakeholders where it provided updates on restoration process.
- **Sharing of vegetation management resources** – Toronto Hydro needed a number of additional forestry resources to address the tree-related damage to the system. In addition to the Company contractors who supplied additional resources, the City of Toronto provided many City forestry crews to support the effort.
- **Public communication** – Toronto Hydro executives and staff supported the communication efforts of the City of Toronto through participation in daily press conferences, attendance at Provincial meetings, and responding to the thousands of emails received by Councillors.

5.10.2. Toronto Hydro – City Coordination Recommendations

THC-1 Strengthen emergency management coordination between City of Toronto and Toronto Hydro.

- **Identify and monitor vulnerable and special medical needs populations.**

Public comments received at three town hall meetings and through emails to torontoicestorm@daviescon.com indicate that residents may not understand that outreach and support to vulnerable populations is a responsibility of the City of Toronto, not Toronto Hydro. Toronto Hydro does maintain a list of customers who, because of medical needs, would be in a life threatening situation in the event of a power outage. Customers voluntarily provide this information to the Company. The Company uses the information provided to alert effected customers of *planned* outages. In case of emergency, Toronto Hydro shares this information to the City for follow up.

As a central and visible participant in the community recovery after a major event, Toronto Hydro should consider offering additional communications and outreach support to the City. Balancing the requirement to maintain privacy of customer information with the need to ensure the safety and health of customers, Toronto Hydro should consider ways to use its customer database and knowledge of its external liaisons and other employees who routinely interface with the public, to assist the City in reaching those most in need.

Toronto Hydro could use its communication channels (e.g., website, social media) to support outreach to vulnerable groups during an event (i.e., “check in on your neighbour,” locations of shelters and warming centres). Prior to an event, Toronto Hydro could include reminders in personal preparedness communications directed to populations who need more support. Also, the City and elected officials should consider targeted outreach to high rise building owners and neighbourhood associations to encourage them to check in on neighbours and tenants during an emergency.

- **Educate customers/citizens about emergency preparedness.**

In areas where major events, are infrequent, it’s easy for people to have little knowledge of or have become complacent about emergency preparedness. The respective websites of both Toronto Hydro and the City of Toronto include tips and guidelines to help customers and citizens better cope when power is out. An example is a checklist for a 72-hour emergency kit. Both should consider supplementing this “passive” source of information with a more active outreach campaign, such as public service announcements on radio and television, bill inserts, announcements on community on-line bulletin boards, participation at town meetings, and providing mobile applications. Also, Councillors’ communications may be a useful channel to reinforce the importance of personal emergency readiness.

- **Conduct joint planning, training, and exercises.**

Leading practice utilities ensure that their emergency management strategy, plans, training programs and exercises are closely aligned with those of key, external stakeholders, especially local governments. During a major event, utility workers function as first responders, necessitating a seamless coordination with local emergency management organizations, police, and fire/rescue professionals. This requires cooperative planning, agreement on planning scenarios, and joint participation in functional exercises. The City of Toronto and Toronto Hydro should continue and consider increasing the frequency of current planning discussions. They should agree to planning scenarios (i.e., the type and severity of incident), share and vet emergency plans, and schedule joint exercises to test readiness.

THC-2 In collaboration with the City of Toronto (Urban Forestry), update related urban forestry plans to ensure adequate line clearances to withstand major events.

In urban areas with dense tree canopy, like the Greater Toronto area, there are often competing objectives between increasing the number of trees and decreasing the number of vegetation-related outages. Toronto Hydro forestry crews adhere to standards set forth by the CSA, ANSI, and the City of Toronto, which do not provide for sufficient clearances to reduce the likelihood of tree-related outages during incidents like the 2013 Ice Storm. The City of Toronto urban forestry team should work closely with the Toronto Hydro staff to update the Urban Forestry Plan to ensure that the reliability of customer service is incorporated in the plan.

THC-3 Request the Province to require all new and existing buildings to have adequate back-up generation within the next 10 years.

The Provincial building code that regulates emergency power supply for buildings is “intended to accommodate the safe evacuation of occupants within the building in case of a fire emergency and assist in firefighting operations in case of a fire emergency.”²⁰ The regulation does not address the provision of emergency power supply for essential needs (e.g., refrigeration, heat, phone service) during an extended outage. Many of the public comments expressed concern for the safety and health of family, friends, neighbours, and elderly people who had limited ability to leave their high rise residences. The IRP recommends that the Provincial government consider a requirement for all new and existing building to provide a means for back-up power for a longer period of time. This will allow for the safe evacuation of and access to vulnerable populations that live in high-rise buildings.

²⁰ Briefing Note, Chief Building Official, Toronto Building, July 11, 2013

6. Moving Forward

The 2013 Ice Storm was an unprecedented event that disrupted the lives of most Toronto residents and tested the mettle of the first responders, as well as the City and Toronto Hydro personnel involved in the recovery effort. Through a dedicated, coordinated, and intensive response, the community was safely restored to normalcy within a reasonable timeframe given the amount and type of damage suffered. Toronto Hydro executed the restoration in a manner consistent with industry practices. The Company's management and approach to the restoration was prudent, diligent, and safe. As expected with any large incident, the recovery from this ice storm also exposed several aspects of the emergency response that can be further improved.

In accordance with the commissioned scope of the panel review, the recommendations presented in this report focus mainly on the improvements that Toronto Hydro can make to further enhance its ability to respond to future events that cause widespread power outages. Additionally, and notably, there are several areas, primarily described in Section 5.10 Toronto Hydro-City Coordination, where heightened attention from and cooperation among Toronto Hydro, the City of Toronto, and the Province of Ontario can improve the community's capability to better cope with and manage the response to a large-scale event in the future. This report should serve as the starting point for a more sustained, coordinated effort among all of these parties, the outcome of which will be meaningful improvement in community preparedness for future major outage events.

Appendix A: Glossary of Terms

Term	Description
Bird Dog	A local utility resource dedicated to helping off-system/mutual assistance crews with daily work needs (e.g., navigating the territory, coordinating work with other crews, ensuring the safety of the work site, accessing food). These resources are typically local company line workers and recent retirees who are familiar with the system and are trained to operate the switching devices in the field. Bird dogs may support one or more crews.
Backbone	The main three phase portion of a distribution circuit that is connected directly to the substation circuit breaker. All load in a circuit is served either directly from the backbone or from three, two and single phase lines (laterals) tapped off the backbone.
Blue Sky	Refers to day-to-day, normal operations
Canadian Electric Association (CEA)	The industry association for Canadian electric utilities.
Circuit	A continuous flow of electricity from a source to a load or loads. In utility distribution, a circuit is the main (usually 3 phase) line and all three, two, and single phase sections (laterals) served by a single substation circuit breaker.
Circuit sectionalization	The practice used by utilities to break an electric circuit into sections that can be isolated from the rest of the circuit in case of an outage to protect all of the customers from getting an outage as a result. This also allows the utility to switch the source of power to the circuit from one feeder or substation to another during an outage, if another source is available.
Damage Assessment	The process for systematically collecting damage information in the field to support the restoration planning, resource acquisition, and development of restoration estimates.
EHS Officer	Environmental, Health, and Safety Officer
Estimated Time of	An estimate of the restoration time. The ETR can be

Appendix A: Glossary of Terms

Term	Description
Restoration (ETR)	provided at multiple levels, including global, regional, neighbourhood/substation, circuit, and individual customer.
Functional Exercise	A functional exercise simulates an emergency in the most realistic manner possible, short of moving real people and equipment to an actual site. As the name suggests, its goal is to test or evaluate the capability of one or more functions in the context of an emergency event.
Incident Command System (ICS)	A standardized, on-site management system designed to enable effective, efficient incident management by integrating a combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure. ICS is used to manage an incident or a non-emergency event, and can be used equally well for both small and large incidents.
Last Gasp Technology	When the smart meter loses power, it records state information to flash memory or sends out a wireless signal that it has lost power—the meter’s “last gasp.” Not all smart meters on Toronto Hydro’s system have this technology.
Lateral	A three, two or single phase section off the main line (backbone) of the circuit, constructed to extend to loads that are not directly in the path of the main line. Laterals are typically connected to the main line through fuses or reclosers.
Mutual Assistance	The process by which electric utilities provide resources to each other to support major restoration efforts. This process is unique to the industry and is crucial for responding to large emergencies since no single utility has adequate resources to quickly restore normalcy after full-scale events.
Off-System Resources/Crews	Individuals who do not work on Toronto Hydro system day-to-day but who are deployed by their company (a contractor or another utility) to support the restoration effort. Once the restoration is completed, these resources return to their home company.
Pole Guying	The practice of installing one or more tensioned wires on poles designed to add stability to a free-standing

Appendix A: Glossary of Terms

Term	Description
	structure so that it can withstand higher speed winds without blowing over.
Service Drop	An overhead electrical line running from a utility pole to a customer's building or other premises. It is the point where electric utilities provide power to their customers.
Smart Meter	Usually a digital device that records consumption of electric energy in intervals of an hour or less and communicates that information, at least daily, back to the utility for monitoring and billing purposes. Smart meters enable two-way communication between the meter and the central system.
Storm Hardening	Activities that a utility may undertake to improve the durability and stability of infrastructure to withstand the impacts of severe weather events with minimal damage.
System Operations Centre (SOC)	A facility that houses system operators and data management system, providing real-time status and the ability to remotely operate the distribution system. The Incident Management Team at Toronto Hydro uses an SOC during major events.
Tabletop Exercise	A tabletop exercise simulates an emergency situation in an informal, stress-free environment. The participants – usually the decision-makers during an emergency – gather around a table to discuss general problems and procedures in the context of an emergency scenario. The focus is on training and familiarization with roles, procedures, or responsibilities. An advantage of a tabletop exercise is that it can allow people to test a hypothetical situation without causing disruption in the community.
Triage Process	Process used by Toronto Hydro during storms to verify the downed wire reports received from customers. The “triage” crew determines if the wire is live, makes the location safe by grounding it if possible, or collects the data and refers the job to the appropriate resource to resolve.
Vegetation Management (VM)	Refers to the cyclical and reactive program for maintaining trees and tree limbs at a safe distance from the distribution power lines. A VM program is

Appendix A: Glossary of Terms

Term	Description
	guided by a set of industry standards and local City by-laws as well as the electric distribution company guidelines.

Appendix B: Utility Mutual Assistance Providers

The following 10 utilities provided mutual assistance to Toronto Hydro during the restoration of power outages caused by the 2013 Ice Storm:

- Brant Hydro;
- Entegrus;
- Enwin;
- Horizon;
- Hydro One;
- Manitoba Hydro;
- Norfolk Hydro;
- Ottawa Hydro;
- Sault Saint Marie PUC; and
- Sudbury Hydro.

Appendix C: Summary of Findings and Recommendations

Appendix C: Summary of Findings and Recommendations

Evaluation Areas	Findings		Recommendation
	Strengths	Opportunities for Improvement	
Emergency Planning and Preparedness	1. Emergency response structure largely aligns with the Incident Command System, which is considered to be the industry leading practice in emergency response.	1. Emergency response plans provided an overall structure for response, but did not include detailed descriptions of key processes and all roles.	EPP-1: Reaffirm and communicate emergency management vision and strategy throughout all of Toronto Hydro.
	2. Corporate Emergency Management organization is centralized and addresses all hazards.	2. Toronto Hydro characterizes grid incidents on a three-level scale, which may not address full-scale events adequately.	EPP-2: Continue to inculcate the ICS-based approach to emergency response.
	3. Trained and exercised System Operations Centre (Command Centre) roles and responsibilities prior to the event.	3. Key restoration strategies and processes were not defined or understood at all levels of the company with roles in the response.	EPP-3: Enhance centralized Emergency Management group resources to support full implementation and sustainment of ICS and ongoing relationships with key stakeholders.
	4. Pre-event weather monitoring process in place and used to support activation decisions.	4. Many Toronto Hydro employees did not have a pre-assigned and trained role for major incidents.	EPP-4: Add dedicated grid operations emergency management resources.
		5. Toronto Hydro conducted exercises and training at the Command Centre level, but did not perform sufficient training and exercise in the Local Incident Command Centres.	EPP-5: Update the Emergency Response Plan to improve comprehensiveness and usability.

Appendix C: Summary of Findings and Recommendations

Evaluation Areas	Findings		Recommendation
	Strengths	Opportunities for Improvement	
Resource Acquisition and Allocation	1. Safely deployed the largest number of resources for any response in Toronto Hydro history.	1. Mutual assistance processes and agreements with other utilities across Canada and North America were not formalized.	RA-1: Adopt a resource management strategy that provides for: deployment of all available resources, seamless integration and coordination of crews, and optimal supervisory span of control.
	2. Developed and applied mutual assistance processes in real-time that generally worked.	2. The process to acquire and coordinate the deployment of City forestry crews was not defined in advance.	RA-2: Create a comprehensive, scalable, logistics plan as part of the Emergency Response Plan.
	3. Flew in, equipped, and deployed mutual assistance resources from Manitoba within 48 hours.	3. Toronto Hydro has limited ability to accommodate a large influx of mutual assistance resources.	
	4. Conducted thorough mutual assistance on-boarding process and safety briefings.	4. The demobilization process for mutual assistance crews was not clearly defined.	
	5. Strong collaboration between City and Toronto Hydro tree crews on restoration activities.		
Damage Assessment and Restoration Planning	1. Overall restoration priorities were in line with industry practices.	1. Lack of real, or near real-time situational awareness of outages and work progress below the feeder level.	DAP-1: Institute a damage assessment process that defines the required approach, procedures, and competencies to establish situational awareness and planning inputs within the specified timeframe (e.g., within 48 hours).

Appendix C: Summary of Findings and Recommendations

Evaluation Areas	Findings		Recommendation
	Strengths	Opportunities for Improvement	
	2. The Command Centre coordination calls (every three hours) provided useful information and maintained alignment of Local Incident Command Centres to restoration priorities.	2. Damage Assessment process was not defined, documented, or consistently applied across the Local Incident Command Centres.	DAP-2: Develop a process to establish (calculate) timely and accurate ETRs.
	3. Some Local Incident Command Centres conducted planning activities overnight to facilitate work assignments and crew deployments for the subsequent shift.	3. Restoration estimates were not developed at various levels of specificity.	DAP-3: Establish standard work planning processes and procedures; train and exercise response personnel to drive consistency across central and local commands.
		4. Work planning practices varied across Local Incident Command Centres.	
		5. The Central Command Centre and Local Incident Command Centres did not use standard planning tools.	
Restoration Execution	1. Safety performance was excellent.	1. Restoration approach was not consistent, varying between “order-based” and “feeder-based.”	RE-1: Pre-determine best restoration approach for each emergency Level (e.g., 1-4).
	2. Dispatch functions were decentralized to Local Incident Command Centres early in the restoration process.	2. Lack of full coordination among decentralized dispatch functions led to some inefficiency in crew deployment.	RE-2: Eliminate centralized mutual assistance and contractor LICCs and encompass those resources within the three, geographic LICCs.
	3. Coordination with the Electrical Safety Authority (ESA) to reconnect customer premises was adjusted during the event to reduce hardship.	3. Local Command Centre structure (three geographic and two functional locations) added complexity to crew deployment and work coordination.	

Appendix C: Summary of Findings and Recommendations

Evaluation Areas	Findings		Recommendation
	Strengths	Opportunities for Improvement	
	4. Special requests were handled within the pre-defined priority order.	4. Restoration execution approaches were not followed consistently by all Local Incident Command Centres.	
	5. The work protection process did not cause unusually long delays in restoration.	5. Toronto Hydro has different work protection processes than other utilities in the Province of Ontario, limiting the type of work that mutual assistance crews can perform.	
	6. “Bird-dogging” of mutual assistance crews worked well.		
Communications - Customer Contact	1. The ability to use an external contract call centre as a back-up call centre site.	1. There was insufficient overflow capacity (system and staffing) to take outage calls, so that the majority of callers were not able to report or get information on outage status.	CCC-1: Secure capacity (people and technology) to support timely customer contact during an incident.
	2. The Key Accounts organization within Customer Care implemented an effective process to inform key and commercial accounts of outage status.	2. The Integrated Voice Recognition (IVR) system was difficult to navigate, not intuitive, and did not effectively support customers who are non-native English speakers.	CCC-2: Improve the process for ensuring accurate and uniform outage status messages across every mode of communication to customers (e.g., IVR, web, mobile application, low tech channels).
	3. The control room, dispatch, call centre, and key accounts staff are co-located, enabling more effective information exchange.	3. Outage status information was inadequate and often inaccurate.	CCC-3: Employ outbound calling/texting to inform customers of outage status and other pertinent information.

Appendix C: Summary of Findings and Recommendations

Evaluation Areas	Findings		Recommendation
	Strengths	Opportunities for Improvement	
		4. Alternate paths to contact Toronto Hydro (e.g., email, web) were in place, but all were not monitored frequently enough.	CCC-4: Work with City of Toronto to evaluate options for using 311 capabilities.
		5. Toronto Hydro does not provide mobile capability to report or track outages.	
		6. There was no capability to transfer Toronto Hydro-related calls from the 311 call centre.	
Communications - Other Stakeholders	1. As the face of the company and the executive spokesperson, the CEO performed his role well.	1. Process for developing and issuing timely and accurate ETRs was not clearly defined.	COS-1: Develop a process to communicate timely and accurate ETRs at different levels of specificity.
	2. Proactive media campaign and consistent messaging (use of “one voice”), including coordination with the Systems Operations Centre, worked well.	2. Liaison roles with some stakeholder groups were not clearly defined.	COS-2: In collaboration with the City of Toronto, develop an education program to improve stakeholder literacy of: restoration process, customer responsibility, and preparedness.
	3. Toronto Hydro was viewed as an effective partner in City and Provincial communications.	3. Messages were not always accessible to all stakeholders (e.g., customers with no access to TV, radio, or social media).	COS-3: Expand liaison role to address education, communication, and coordination with key community stakeholders (e.g., elected leaders, public safety) during major incidents.
	4. Toronto Hydro used a variety of methods to reach the public, including		COS-4: Formalize process for developing, approving, and

Appendix C: Summary of Findings and Recommendations

Evaluation Areas	Findings		Recommendation
	Strengths	Opportunities for Improvement	
	social media.		disseminating key messages.
Information Systems and Technologies	1. One of the early adopters of smart meter technology.	1. OMS hardware and interfaces were not scalable to handle the number of concurrent users during the 2013 Ice Storm.	IT-1: Include IT/OT technologies that provide real-time or near real-time intelligence in the technology strategic roadmap.
	2. An extensive Supervisory Control and Data Acquisition (SCADA) system with 85,000 control points on over 4,000 devices.	2. Groups of smart meters could not be pinged quickly to determine the outage status and a portion of them do not have “last gasp” technology.	
	3. Mobile Data Terminals available in a portion of Toronto Hydro vehicles.	3. The GIS system does not have fully accurate connectivity at the meter level.	
		4. Lack of connectivity among different information technology systems caused inaccuracy of outage status information available to customers.	
Vegetation Management and System Hardening/Resilience	1. Toronto Hydro has been following a circuit-based trimming program since 2008 and adheres to accepted industry and City of Toronto pruning standards.	1. City of Toronto line clearance by-laws are defined for blue sky reliability, not for preventing outages during major incidents.	VMSH-1: Evaluate all viable options to improve distribution system resilience during major weather events, including converting lines to underground for sections of circuits where it will enhance the reliability of services to critical infrastructure and facilities.

Appendix C: Summary of Findings and Recommendations

Evaluation Areas	Findings		Recommendation
	Strengths	Opportunities for Improvement	
	2. Vegetation management preventive maintenance program is in line with industry practices (i.e., three-year cycle).	2. Coordination of clearing efforts with City vegetation management crews during an incident and day-to-day.	VMSH-2: Gain support from key stakeholders on the level of resilience required and related funding.
	3. Over the past six years, Toronto Hydro has maintained a consistent scope of the vegetation management program (e.g., clearances, miles completed) while reducing the cost of the program.		
	4. Toronto Hydro's wood pole program is in line with industry leading practice.		
Toronto Hydro-City Coordination			THC-1: Strengthen emergency management coordination between City of Toronto and Toronto Hydro.
			THC-2: In collaboration with the City of Toronto (Urban Forestry), update related urban forestry plans to ensure adequate line clearances to withstand major events.
			THC-3: Request the Province to require all new and existing buildings to have adequate back-up generation within the next 10 years.

Appendix D: Summary of Public Comments

An objective of the Independent Review Panel (IRP or Panel) was to consider feedback, insights and suggestions from representatives of each stakeholder group affected by the Ice Storm. Along with collecting input from Toronto Hydro employees, City and Provincial staff, first responders, and other parties involved with the recovery, the Panel invited input from Toronto residents and business owners on Toronto Hydro's preparation for and response to the December 2013 Ice Storm. Citizens had an opportunity to provide verbal or written comments at a town hall meeting, or email feedback via a dedicated address monitored solely by Davies Consulting.

Approximately 50 people in total, attended the town hall meetings, coordinated by the City of Toronto and held on Thursday March 6, from 7:00 p.m. to 9:30 p.m. at the following locations:

- North York Civic Centre, 5100 Yonge Street, Council Chamber
- Etobicoke Civic Centre, 399 The West Mall, Council Chamber
- Scarborough Civic Centre, 150 Borough Drive, Council Chamber

IRP members moderated each meeting, with the assistance of a Davies Consulting team member. Each attendee who wished to address the Panel had the opportunity to do so either verbally, or by submitting written comments. Representatives from Toronto Hydro were not present at the meetings, so that Torontonians could speak freely.

Over 80 comments were submitted via torontoicestorm@daviescon.com, between February 27, 2013, and March 31, 2013, the period for public comment. Davies Consulting monitored this email address daily. Team members collated and reviewed these comments, along with those received at the Town Halls.

The prevalent themes from the public comments were:

- Praise about the efforts of the Toronto Hydro linemen, commending them for their performance under adverse conditions;
- Poor or inaccurate communication to the public, including: inaccurate or not available estimated times of restoration (ETRs); incorrect restoration information given by call centre representatives; inability to see outage information in general (e.g., maps); lack of information about restoration priorities; and limited access to messages when technology was down (e.g., no internet, radio or television);
- Limited-to-no access to call center, including prolonged inability to reach a representative by phone; long wait times if able to connect; lack of information on the website; and limited on-line alternatives to report outages and receive updates;

- Tree trimming and pruning, including the adequacy of clearances and vegetation management budget; and
- Communication and outreach to vulnerable populations, including: pre-identification of those with critical needs; direct outreach to vulnerable populations after an event; provisions for back-up power to high-rise buildings; and clearer communication of locations of warming centres and shelters.

The Panel considered the comments and suggestions offered by the public as it developed the findings and recommendations presented in this report.

CONTROL CENTRE OPERATIONS

1. SUMMARY

Table 1: Control Centre Operations Program Costs (\$ Millions)

	2011	2012	2013	2014	2015
Total	8.4	8.3	8.9	8.2	8.4

Toronto Hydro's Control Centre program helps to ensure the safe and reliable operation of the utility's distribution grid through real-time system control and monitoring activities carried out from a single location. The control centre coordinates the necessary system switching and restoration work needed to mitigate the impact of emergency outages, enables load transfers for capital and maintenance work, and monitors the flow of electricity across Toronto Hydro's distribution plant.

The control centre maintains Toronto Hydro's visibility into its distribution asset performance via a digital network enabled for both voice and data communication. Using radio and telecommunications mediums, the data network provides an uninterrupted flow of vital information that allows Toronto Hydro to perform real-time control activities and gain situational awareness if unexpected contingencies occur. Beyond the real-time utilization, Toronto Hydro stores the collected system condition data for future use in system planning activities and to maintain legal compliance.

The cornerstone of the control centre's monitoring and control capabilities is the Supervisory Control and Data Acquisition ("SCADA") technology, deployed extensively throughout Toronto Hydro's 27.6 kV, 13.8 kV, and 4kV stations & feeders. The SCADA system enables Toronto Hydro to remotely read asset condition, system status and receive other pertinent information such as status of equipment or loading on distribution feeders that allows it to make real-time operational decisions. The control centre also plays a

critical role in facilitating Toronto Hydro's crews and contractors conducting their work in a safe environment.

2. PROGRAM DESCRIPTION

Under normal operating conditions, the control centre plans for and coordinates execution of switching/load transfer work required to balance system loading, perform capital construction and maintenance work, and oversees the procedures that enable Toronto Hydro's crews to safely approach and work on the utility's distribution plant. These activities involve complex research and intricate planning work, and require up-to-date information on system performance in the affected areas, as well as constant communication with the field. During the times between contingency events, Toronto Hydro also investigates the causes of certain past outages to identify potential trends and devise the means of addressing any similar situations more effectively going forward.

During the major contingency events caused by adverse weather or extreme heat, Toronto Hydro's control centre prioritizes, oversees and enables the execution of service restoration work, coordinates the utility's response to the Police, Fire and Ambulance ("PFA") calls, and works with Hydro One and the Independent Electricity System Operator ("IESO") to ensure safe and reliable operation of the provincial electricity grid.



1 **Figure 1: Toronto Hydro Control Room display and operating area.**

2 The staffing complement of Toronto Hydro's control centre includes power system
3 controllers that monitor system performance and coordinate the switching work, and
4 engineers, technicians and clerical employees that analyze grid performance data and
5 ensure that control centre asset information records are up to date. Performing this work
6 requires competent 24/7 oversight of system operation and a broad range of technical
7 skills and experience, which are in high demand in today's labour marketplace.

8

9 In line with the main functional responsibilities noted above, the Control Centre program
10 consists of one segment, which is in turn, comprised of two primary areas described in
11 further detail below:

- 12
- Control Centre Operations; and
 - Grid Performance Analysis and Support.
- 13

2.1. Control Centre Operations

Control Centre operations activities include real-time system performance monitoring, system risk analysis and execution of switching and load transfer work as is required to enable service restoration during outages, and performance of scheduled and reactive capital and maintenance work. The control centre oversees all equipment related to the 35 Hydro One supply points, down to the street-level primary feeders normally energized at 4 kV, 13.8 kV, or 27.6 kV.

The scope and complexity of tasks performed by control centre operators have been significantly aided by the expansion and sophistication of the supporting technology over the past decade. The increase in SCADA capabilities (Feeder Automation and Intelligent Electronic Devices (“IEDs”)), along with the introduction of the Network Management Systems (Distribution Management System & Outage Management System) have broadened the scope and quality of information available to controllers and allowed for the streamlining and harmonization of the standard operating procedures. These process efficiencies have allowed the control room to meet the increasing level of demand without substantially expanding its staffing complement or lowering of its service levels.

Under normal operating conditions,¹ control centre operators work to prepare and execute “Orders to Operate” safety documents (“OTOs”), which enables planned capital and maintenance work for the utility’s crews. Each OTO is comprised of a list of switching instructions that enable operations crews to safely transfer customer load and/or establish suitable work protection over a specified range of system devices.

Depending on an area of the city, time of day, season and area system configuration, the scope of the OTOs instructions can range from 15 steps to over 150. Absent this centrally managed planning and execution process, individual crews would not have

¹“Normal Operations Conditions” is defined as any time when the utility is not experiencing an emergency event exceeding ordinary resourcing levels.

1 sufficient visibility of the system conditions and location of other crews, potentially
2 placing workers and the public at risk. The centralized management of the OTO
3 framework enables utility crews to work in accordance with applicable safety legislation
4 and protects the security of supply to Toronto Hydro customers. Crucial in this process is
5 the constant flow and analysis of incoming system data as the controllers relay on
6 accurate data in all forms to help direct and support decisions and actions for the field
7 crews.

8
9 Other regular work in the control room includes issuing “Hold Off’s”. These are safety
10 documents that modify protection systems and record the location of workers within the
11 direct proximity of electrical equipment (e.g., in a cable chamber) to ensure that no other
12 activities that may impact their safety or protection of equipment take place until their
13 work is completed. Inaccurately recorded and processed Hold Offs can place worker
14 safety and proper system operation at risk should an incident occur in the physical or
15 electrical proximity to the work site.

16
17 Accordingly, preparing the OTOs and processing each Hold-Off requires a significant
18 amount of training and experience that can only be obtained by operating a system of
19 Toronto Hydro’s scale and complexity.

20
21 Since both the Hold-Offs and the OTOs are necessary to enable safe and efficient
22 execution of the utility’s capital work program, their numbers have been increasing in
23 line with the capital work ramp-up. Toronto Hydro has managed this increase while
24 maintaining the control centre staffing levels by effectively leveraging its information
25 technology capabilities described above.

26
27 Table 2 depicts the numbers of Hold-Offs, OTOs and past outage event investigations
28 that Toronto Hydro completed over the 2011-2013 period. While the number of activities

has generally increased, Toronto Hydro has managed to process these requests with a generally declining staffing complement.

Table 2: Historical Control Centre Performance Statistics and Staffing Levels

	2011	2012	2013
OTOs	2,571	2,479	3,016
Hold Offs	27,265	19,370	25,200
Outage Investigations	12,394	12,319	18,641
Total Operating Activities	42,230	34,168	46,857
Control Centre FTEs	45	48	41
Activities per FTE	938	712	1,143

To ensure continuous improvement in service delivery under normal system conditions, Toronto Hydro tracks a number of additional performance statistics, including Idle Time, Time to Issue Hold-Offs, and Percentage of Work Deferred due to System Constraints. Over the Historical Period (2011-2013), Toronto Hydro has seen the improvement on each of these metrics.

During abnormal system events, typically caused by storm activity or heat stress to the distribution assets, the control centre coordinates Toronto Hydro's response to system contingencies. Given the size of Toronto Hydro's 1,700-feeder system, control centre oversight helps coordinate response to customer outages in a safe and efficient manner. Control room operators prioritize, coordinate and control outage restoration activities in accordance with pre-determined emergency procedures. All PFA calls related to accidents involving electrical plant are also routed directly through the control centre.

The information received and processed by the control centre during outages also helps Toronto Hydro inform their employees and customers about the nature and magnitude of adverse events and the progress of restoration work. This function is particularly

1 important in light of increased media interest in all outage events and growing customer
2 expectations for up-to-the-minute updates through a variety of social media channels.

3
4 Given that Toronto Hydro's load represents approximately 18% of Ontario's total
5 electricity demand, the control centre also plays a critical role in assisting Hydro One and
6 the IESO to manage the safe and reliable operation of the provincial electricity grid
7 during province-wide contingency events, by quickly and efficiently executing the orders
8 from the upstream network operators.

9 10 **2.1.1. Grid Performance Analysis and Support**

11 Supporting the work of system controllers are engineers, technicians and clerical support
12 workers analyse grid performance and support the upkeep and modification of system
13 information. Toronto Hydro's distribution grid is in the state of perpetual change, as new
14 customers regularly connect to the system and capital projects consistently change system
15 capacity or configuration. To ensure that the control centre can access the most current
16 information, the Grid Performance Analysis and Support function updates the system
17 records on a regular basis. This work helps to protect Toronto Hydro crews and
18 customers from exposure to unsafe conditions and ensures that switching and other
19 control centre-mandated activities achieve planned results without compromising system
20 integrity and reliability.

21
22 The Grid Performance Analysis function also reviews the Interruption Tracking
23 Information System ("ITIS") data to determine the causes of system failures and
24 aggregate related failures to spot trends. The results of this work enable Toronto Hydro
25 to conduct further engineering studies and develop mitigating strategies to improve
26 system safety and customer reliability. In addition to providing the inputs for asset
27 management planning processes, Toronto Hydro compiles system performance statistics

1 such as System Average Interruption Duration Index (“SAIDI”) and System Average
2 Interruption Frequency Index (“SAIFI”) for the regulatory and other reporting purposes.

3
4 The Grid Performance Analysis and Support function also oversees the activities related
5 to maintaining, improving and modifying Toronto Hydro’s SCADA system to maintain
6 cyber security and facilitate system operation efficiency. All SCADA employees are
7 trained engineers and technicians that possess specific skill sets in SCADA or Industrial
8 Control Systems work. Their efforts facilitate remote system monitoring and control, and
9 help ensure that decisions and orders from the control centre are executed quickly and
10 efficiently. When Toronto Hydro installs new system monitoring and control equipment,
11 it relies on SCADA engineers to configure and enable these devices to work seamlessly
12 with the existing equipment and applications.

13
14 The SCADA system consists of three distinct sections:

- 15 • **The Control Room Software and Hardware** collates and displays all the
16 information obtained from the field;
- 17 • **The Communications Mediums** such as fibre cable and wireless infrastructure
18 transfer the data from the field to the control room; and
- 19 • **The Field Monitoring Devices** attached to Toronto Hydro plant collect real-time
20 asset performance information.

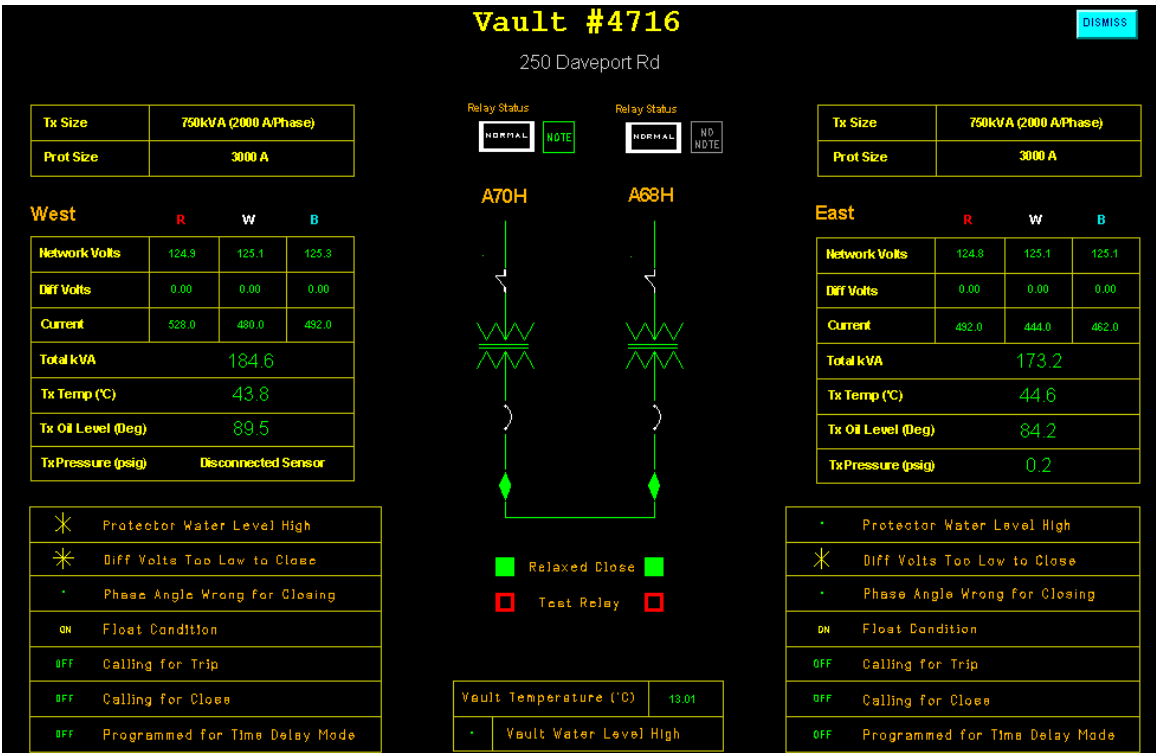


Figure 2: SCADA display of a typical Toronto Hydro network vault.

Another key responsibility that rests within the Grid Performance Analysis and Support function are continuous updates to the control centre’s live network model. This work is critical to ensure that system controllers are aware of the latest conditions affecting the sub-components of Toronto Hydro’s distribution system when they devise the plans for system restoration.

The Grid Performance Analysis group is also responsible for the operational planning and outage coordination with both the IESO and Hydro One to ensure that both can carry out their operating and capital activities without causing adverse effects on the Toronto Hydro system. The work load in this area is increasing with the work for the 2015 Pan Am & Parapan American Games along with a significant capital and maintenance activities planned by Hydro One.

1

2 As Toronto Hydro's system continues to grow and evolve, the Grid Performance
3 Analysis and Support function is becoming more complex and critical to system
4 operation both under the normal conditions and system contingencies. Recent
5 intensification of the utility's capital work program, along with increased scrutiny from
6 Toronto Hydro's customers and media means that Toronto Hydro increasingly performs
7 more support tasks without the corresponding increase in headcount. Similar to the
8 Control Centre function, Toronto Hydro has managed to avoid further staffing increases
9 by investing in technology that streamlines the operational processes and ensuring that
10 program employees are cross-trained in all control centre-related functions.

11

12 The density and complexity of Toronto Hydro's urban system place significant
13 expectations on the skills and experience of Toronto Hydro's Control Centre staff. New
14 recruits, irrespective of educational backgrounds and prior experience, require several
15 years to substantially familiarize themselves with Toronto Hydro's system. The
16 configuration of Toronto Hydro's distribution network, characterized by complex feeder
17 interaction and limited visibility into upstream Hydro One supply points and customer-
18 owned equipment, requires significant training. Accordingly, to facilitate the ongoing
19 generational turnover without exposing its system to additional operational and safety
20 risks, Toronto Hydro continues to invest in training programs that ensure that new system
21 controllers and data engineers and technicians can make optimal decisions under the
22 normal conditions and during severe weather events. To achieve the desired levels of
23 competence and experience, all new recruits participate in a comprehensive
24 apprenticeship program that gradually exposes them to increasingly complex operating
25 tasks that comprise the typical workload of Toronto Hydro's control centre.

2.1.2. Program Costs

Table 3: Control Center Operations Program Costs (\$ Millions)

	2011	2012	2013	2014	2015
Total	8.4	8.3	8.9	8.2	8.4

2.1.3. 2011-2012

2012 expenditures were \$0.1 million lower than 2011 levels due to a reduction in payroll costs. This decrease was partially offset by re-allocation of information technology expenditures associated with SCADA support function into the utility's IT program; the function, and associated costs, included the licensing of the software systems that support the SCADA and Power System Analysis employees. The offset was also based on an increase in associated costs driven by hiring of new apprentices to facilitate timely and efficient knowledge transfer due to anticipated retirements, along with normal inflationary increases.

2.1.4. 2012-2013

The \$0.6 million increase in 2013 relative to 2012 was driven by a further increase in apprentices and supervisory staff.

2.1.5. 2013-2014

The projected 2014 Bridge Year expenditures are \$0.7 million lower than 2013 levels due to staffing attrition through retirements, resulting in several unfilled positions.

Over the Historical and Bridge years (2011-2014), Toronto Hydro focused on the following activities to enhance the competence, flexibility and sustainability of its Control Centre program:

- 1 • conducting educational programs to increase staff cross-functional competence
- 2 and enable more flexible staffing arrangements, including knowledge retention
- 3 and documentation;
- 4 • increasing staff numbers on longer shifts to enable larger work throughput
- 5 without reducing safety;
- 6 • planning for future staff turnover due to retirements by ensuring that newly hired
- 7 employees undergoing the apprenticeship program overlap with those projected to
- 8 retire in the short- or medium-term, facilitating knowledge transfer.

10 **2.1.6. Test Year Costs**

11 The forecast costs for the 2015 Test Year are \$8.4 million, which represents an increase
12 of \$0.2 million above the 2014 Bridge year costs. This increase is associated with normal
13 inflationary pressures and the collective bargaining agreement provisions.

15 The proposed level of spending helps to ensure the safe and efficient operation of
16 Toronto Hydro's evolving electricity system, by improving control centre staffing
17 flexibility and increased system monitoring and re-configuration necessitated by the
18 volume of proposed capital and maintenance work programs. Any funding reductions
19 from the proposed levels could affect customer reliability, by limiting both the quality
20 and volume of maintenance or system improvements that could be enabled by the control
21 room processing capabilities.

23 The impact of expenditure reductions could also extend into reliability. Abnormal
24 system configurations, if not properly processed and supervised, can cause undue
25 restoration delays or overloads on remaining equipment. Any funding reductions could
26 also increase the exposure for Toronto Hydro's crews and customers to safety risks as
27 more work would be expected from the control room staff, with less time to ensure the
28 required double checks and safety records are kept up to date.

1

2 The continued 24/7 management of the system by Toronto Hydro as contemplated under
3 the current proposed budget facilitates safe and reliable system operation and quick
4 mitigation of any potential operating risks. Any service level reductions could also
5 extend the operating risk to the bulk electricity system, as Toronto Hydro controllers
6 work closely with their Hydro One and IESO counterparts to facilitate proper
7 management of the upstream transmission system. This work entails enabling control of
8 the system in emergency conditions, controlling Toronto Hydro crews to respond to the
9 IESO or Hydro One, and enabling system configurations that can facilitate restoration or
10 risk reduction to the bulk power system.

11

12 The Grid Analysis and Support expenditures contribute to the Control Room's flexibility
13 and ability to monitor and understand changing system conditions, which, among other
14 things, facilitate proper asset utilization by managing loading levels and other related
15 functions. Any funding reductions could affect the operating efficiency and safety of
16 Toronto Hydro customers and employees, through reduced ability to process and
17 integrate the data on changing system configuration in a timely manner, manage the
18 complexity of the dynamic system without impacting the controller time and
19 understanding the asset impact of actions based on engineering analysis.

20

21 The scope and volume of work for support function is in line with other utilities within
22 Ontario and North America that have large SCADA and Distribution and Outage
23 Management systems and rely on large datasets for accuracy and efficiency.

CUSTOMER-DRIVEN WORK PROGRAM

1. SUMMARY

Table 1: Customer-Driven Work Program Expenditures (\$ Millions)

	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Customer Driven Work	6.0	5.9	7.0	8.2	10.1

The Customer Driven Work program oversees the execution of activities driven by requests from existing and future customers relating to connection of premises and equipment to Toronto Hydro's system and maintenance of those assets. Specific activities encompassed within this program include planning, engineering and design, and field work required to safely and efficiently facilitate the following processes, each representing a discrete segment described in more detail below:

- design costs associated with customer connection requests related to unrealized new development or renovation projects;
- provision of plant locates to enable safe excavation and sub-surface exploration activities in the City of Toronto; and
- customer-owned equipment maintenance or modification work.

A subset of the activities captured within the Customer-Driven Work program and the resulting costs are driven by legislative and regulatory requirements.¹

While Toronto Hydro is obligated to undertake the work comprising the Customer-Driven Work program, the utility manages these costs through a number of initiatives,

¹ These include the *Electricity Act*, 1998, the Distribution System Code (DSC), the *Ontario Underground Infrastructure Notification System Act*, 2012 (One Call Act), the *Construction Projects Regulation O. Reg 213/91* and legislation governing the fire prevention and detection activities.

described below, in order to mitigate ratepayer impact. The following table provides an overview of the historical (2011-2013), bridge (2014) and test year (2015) costs of the program by individual segments:

Table 2: Historical, Bridge and Test Year Expenditures by Segment (\$Million)

	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Customer Connections	1.9	1.7	2.6	2.9	2.6
Damage Prevention	2.8	2.3	1.6	2.9	4.7
Vault Access, Customer Isolation, Deconstruction and Disconnection	1.2	1.9	2.8	2.4	2.8
Total Customer-Driven Work	6.0	5.9	7.0	8.2	10.1

2. PROGRAM DESCRIPTION

2.1. Customer Connections Segment

The Customer Connections segment is driven by customer requests for connections to Toronto Hydro's distribution system. Serving one of the fastest growing cities in North America, Toronto Hydro receives high volumes of requests to connect new residential developments or businesses each year. The requests vary in location, load requirements and the complexity of underlying planning or construction work.

1 Toronto Hydro is obligated to connect a customer to its system if that customer and the
2 associated connection complies with all requirements outlined in the Distribution System
3 Code (“DSC”) and the utility’s Conditions of Service, subject to any applicable
4 limitations. Customer connections can be in the form of a basic connection, or a
5 connection that requires expansion work, as outlined in the Offer to Connect. In order to
6 accommodate a new connection request, Toronto Hydro must undertake a number of
7 activities, further described below.

8
9 Following a formal receipt of a connection request, Toronto Hydro works with
10 prospective customers to develop an appropriate connection design, calculate the up-front
11 customer connection deposit (as required by the DSC) and establish a mutually
12 satisfactory construction schedule. In a number of cases, such as when an industrial
13 customer or a large residential development seeks connection in capacity-constrained
14 areas, Toronto Hydro must research and design the optimal means of system expansion to
15 accommodate customer requests. Given the high density of Toronto’s urban core,
16 capacity limitations at many of the utility’s Transformer and Municipal Stations
17 (“TS” and “MS”, respectively) and spatial restrictions of existing underground or
18 overhead easements exist. As a result, the highly skilled and experienced engineering
19 and design staff is required to complete the requisite expansion and design work.

20
21 Given the current pace of Toronto’s growth and the volume of large connection requests,
22 Toronto Hydro identifies and addresses areas where insufficient connection capacity
23 exists or is projected to materialize in the near or medium term. Accordingly, another
24 dimension of customer connection work involves the proactive identification of existing
25 and anticipated capacity constraints through analysis of development plans prepared by
26 provincial and municipal agencies and private development firms. Toronto Hydro
27 incorporates the results of this analytical work into its load forecasts and its system
28 upgrade and expansion plans.

1
2 In parallel with connection/expansion planning and design activities, Toronto Hydro is
3 required to integrate the anticipated work with the utility's planned construction activities
4 to ensure that the scope, nature and timing of connection work do not adversely affect the
5 utility's planned work program. To achieve this integration, Toronto Hydro takes into
6 account planned connection work and the availability of the utility's internal and external
7 labour resources, coordinates planned switching and outage schedules and secures the
8 necessary work permits. Where possible, Toronto Hydro also strives to identify and
9 leverage any potential synergies between the connection work and other planned
10 construction activities undertaken by the utility, other utilities or municipal and provincial
11 government agencies.

12
13 In accommodating new connections in high growth areas, Toronto Hydro must often
14 consider highly complex and expensive means of satisfying customer connection
15 requirements. An illustrative example of these challenges is the case of new
16 condominium developments at Bremner Boulevard and York St. In spite of their
17 physical proximity to Windsor TS, these buildings are being connected to Terauley TS
18 located near Bay and Dundas due to connection capacity limitations at Windsor TS. This
19 sub-optimal, but currently unavoidable connection arrangement, results in higher costs
20 from the planning, design and construction perspectives.

21
22 Throughout the duration of connection planning and design activities, Toronto Hydro
23 maintains frequent communication with prospective customers to effectively manage
24 their expectations and accommodate their evolving requirements or concerns where
25 possible. If planned or ongoing connection work may temporarily affect service quality,
26 reliability or otherwise disrupt existing Toronto Hydro customers, the utility endeavours
27 to ensure that affected customers receive timely notifications of such limitations and are
28 able to provide their input with respect to the scheduling of planned activities.

1
2 The utility recovers eligible costs associated with planning and execution of connection
3 work from the requesting customers in accordance with the DSC and other relevant
4 Ontario Energy Board (“OEB”) and internal policies. The remainder of the costs is either
5 capitalized or recovered through operating costs as described below.

6
7 A common source of a portion of connection-related operating costs is instances where
8 investigative or design work is stranded due to the customer failing to execute an offer to
9 connect with Toronto Hydro. In this instance, Toronto Hydro responds to customer
10 inquiries by providing preliminary cost estimates prior to the initiation of a detailed
11 design in accordance with the DSC. In the event that the customer does not execute the
12 offer to connect, Toronto Hydro is unable to recover its costs.

13
14 Operational work that supports customer connections also comes in the form of demand-
15 billable transactions, which are connections associated with temporary service requests.
16 Toronto Hydro provides firm quotations for these transactions, with any variance
17 between actual costs of completing the project and the terms of a firm connection offer
18 recovered through operating expenditures. Finally, operating costs related to customer
19 connection work also include program support costs such as tools and equipment,
20 uniforms, information technology, vehicle and occupancy costs.

21
22 Toronto Hydro measures the success of its customer connections function by tracking the
23 OEB-mandated connection timelines for customers above and below the 750V
24 connection threshold, the results of which are available on the utility’s Regulatory
25 Scorecard and the OEB Yearbooks of Distributors.

2.1.1. Segment Costs

The following table presents segment actual and bridge operating costs for the 2011-2014 period:

Table 3: Customer Connections Segment Expenditures (\$ Millions)

	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Customer Connections	1.9	1.7	2.6	2.9	2.6

From 2011 to 2013, operating expenditures increased by over 37%. Operating expenditures related to this segment are correlated to the number and complexity of service connections received, and can vary from year to year based on the volume and nature of requests in a given year. In preparing preliminary cost estimates, due to the current state of the system, complex planning and design work is often necessary, particularly in connection-constrained locations. These complexities lead to longer lead times, and high connection costs, which results in a higher likelihood of connection projects being stranded due to the circumstances outside of the utility's control.

2.1.2. Test Year Segment Costs

Operating expenditures are forecasted to decrease from \$2.9 million in 2014 to \$2.6 million in 2015. Accommodating customer connection requests is a condition of Toronto Hydro's distribution licence. Given that the work underlying customer connection-related operating expenditures is driven by prospective customer requests, Toronto Hydro attempts to address them as expediently as possible.

The proposed test year costs are driven by the volumes of accommodated and anticipated connection requests, and the complexity of the underlying planning and design work, performance of which is a condition of Toronto Hydro's distribution licence.

2.2. Damage Prevention Segment

The Damage Prevention segment consists of governance, oversight, and execution of work to ensure public safety and prevent potential damage to Toronto Hydro's equipment during work performed in the vicinity of the utility's overhead and underground assets.

The specific activities comprising the segment include work to identify the locations of Toronto Hydro's underground infrastructure prior to excavating activities (commonly referred to as "cable locates") and supply of rubberized line covers for customer work conducted in the vicinity of overhead lines.

2.2.1. Cable Locating

Prior to excavation, Ontario homeowners or contractors may use the Ontario One Call service to confirm that the work area does not contain any buried utility infrastructure. Toronto Hydro participates in the One Call program, and is responsible for the service costs associated with requests pertaining to its service territory.

Beyond leveraging the One Call contact centre capabilities, the utility outsources the cable locating function to a third party provider who processes incoming requests and identifies the location of Toronto Hydro's underground infrastructure on the properties in question. This process assists in preventing damage to the utility's civil and electrical plant, reduces the risk of unplanned outages, and facilitates the safety of Toronto Hydro's customers and of the parties performing the excavation work.

The public and contractors are not charged for the use of the Ontario One Call service in order to encourage the widespread adoption of this service, which benefits public safety and prevents costly damages to underground utility infrastructure. In contrast, as a registered user of the service, Toronto Hydro is obligated to pay Ontario One Call for the call centre services it provides. The following table outlines the number of requests

received by Ontario One Call in Toronto Hydro's territory and the associated costs of the service:

Table 4: Ontario One Call Customer Request Volumes & Costs

Year	Number of Requests	Cost	Average Cost per Request
2011	105,019	\$ 0.2M	\$ 1.85
2012	126,172	\$ 0.2M	\$ 1.81
2013	148,454	\$ 0.3M	\$ 1.81

Toronto Hydro expects that with the introduction of the *Ontario Underground Infrastructure Notification System Act, 2012*² and increased public awareness, the volumes of requests will continue to increase. The following table outlines the volumes of locate requests and the associated third party costs that Toronto Hydro incurred from 2011 to 2013:

Table 5: Third Party Locates Provider Volumes & Costs

Year	Number of Locates	Cost	Average Cost per Locate
2011	99,725	\$ 1.5M	\$ 15.20
2012	99,097	\$ 1.5M	\$ 15.41
2013	118,035	\$ 1.6M	\$ 13.26

The cost of an individual locate differs depending on the nature of work requested and the associated timeline for its execution. There are three types of locate requests, namely Regular Locates, Emergency Locates during business hours, and Emergency Locates outside of business hours.

Toronto Hydro has been using an external locates services provider for the past 15 years. However, prior to 2011, it also maintained dedicated internal resources to provide a

² S.O. 2012, c. 4. ["*Ontario Infrastructure Notification System Act*"]

1 portion of this service. These employees have now been either re-assigned to other
2 activities or have left the utility through attrition. Toronto Hydro estimates that the total
3 cost of an average locate performed by an internal employee prior to 2011 ranged from
4 \$50-\$75. Since the time when Toronto Hydro contracted out all locates in 2011, the
5 utility has realized significant cost efficiencies by implementing an externally executed
6 work program that the utility oversees and audits for quality control.

7
8 Using external locate service providers is now industry standard, as, to the utility's
9 knowledge, the City of Toronto, and most other utilities and telecommunications
10 companies have adopted this practice. Taking advantage of economies of scale, external
11 locates providers can perform the requisite work at significantly lower costs, while
12 having access to resources to perform emergency work as needed.

13
14 Segment activities also include planning and execution of Alternate Locate Agreements
15 ("ALAs"), which prevent delays of the receipt of Ontario One Call service by large
16 excavation companies. ALAs are primarily established for excavations that utilize
17 Hydrovac technology, or for shallow depth excavation (typically less than 0.35 meters
18 deep). With an established agreement, an excavation utility is assigned a blanket locate
19 and an excavator identification number. These agreements enable Toronto Hydro and
20 excavation companies to remain in compliance with applicable legislation.

21
22 Prior to excavating, the utility may call Ontario One Call service and provide this number
23 to obtain immediate approval to excavate. As such, customers are able to bypass the
24 standard five-day turnaround time for the receipt of the service, thereby resulting in more
25 productive and efficient use of time. In addition, Toronto Hydro is able to save the costs
26 associated with completing the locate. The ALAs result in fewer customer complaints,
27 require less coordination and oversight from Toronto Hydro, and lead to cost reductions
28 for Toronto Hydro and its customers.

Over the past few years the number of locates and damage investigations have substantially increased in parallel with the overall growth of Toronto Hydro's capital work and general construction activities in the utility's service territory. Increased construction activities generate additional work to update, expand or correct the utility's asset records.

2.2.2. Overhead Line Covers

The last component of the damage prevention segment is the oversight of the installation of protective power line covers. In accordance with the Construction Projects Regulation,³ it is a contractor's responsibility to ensure that people and equipment at work sites maintain a safe distance from all power lines. When requested, a Toronto Hydro authorized contractor safely installs and removes power line covers. Toronto Hydro audits the contractor practices and undertakes the inspections of covers themselves.

2.2.3. Segment Costs

The following table presents the Historical (2011-2013), Bridge (2014) and Test Year (2015) costs associated with the Damage Prevention segment :

Table 6: Damage Prevention Segment Expenditures (\$ Millions)

	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Damage Prevention	2.8	2.3	1.6	2.9	4.7

³ O. Reg 213/91, made under the *Occupational Health and Safety Act*, R.S.O. 1990, C. O.1 ["Construction Projects Regulation"].

From 2011 to 2013 there was a steady decrease in operating expenditures as a result of efficiencies and staff attrition. It should be noted that although the cost of the Ontario One Call Service and the Third Party Locate provider was \$1.9 million in 2013, the actual operating expenditure was \$1.6 million. This variance was as a result of a one-time credit issued by the third party locate provider to rectify administrative errors regarding services rendered in previous years. In 2014, Toronto Hydro anticipates that the trend of increased volume will continue, and thus forecasts that the 2014 costs will be \$2.9 million.

As discussed above, Toronto Hydro anticipates an increased volume of requests for locates as the contractor community and general public become more aware of the Ontario One Call process and due to increased development and construction in the City of Toronto. The increase is evident in the following table:

Table 7: Historical Locates Requests and Work Requirements (2011 – 2013)

Year	Number of Requests	% Change	Number of Locates	% of Requests resulting in Locates
2011	105,019	-	99,725	95%
2012	126,172	+20%	99,097	79%
2013	148,454	+18%	118,035	80%

As shown in the table above, during the 2011 to 2013 period, the percentage of requests resulting in locates has reduced by approximately 15%, which is attributed to the introduction of ALAs where individual locates are performed by requestors directly.

In the future, beyond continued utilization of the cost-effective external locates service, Toronto Hydro plans to increase the utilization of ALAs with parties that undertake large volume of construction activities in order to better manage its locate costs and the

1 resulting impact on ratepayers. To date, Toronto Hydro has implemented 23 such
2 agreements in place since the program's inception in 2011. The utility estimates that the
3 ALA framework saved Toronto Hydro and its ratepayers approximately \$0.5 million in
4 2013. Despite the increase in ALAs and the associated savings, the increased awareness
5 of Ontario One Call and the services they provide is expected to result in higher levels of
6 requests than historically seen, leading to the projected costs of \$2.9 million in 2014.

7 8 **2.2.4. Test Year Segment Costs**

9 Toronto Hydro anticipates that locate volumes will continue rising through 2014 and
10 2015. However, the majority of the Test Year increase (\$1.7 million) is associated with
11 the work related to assets that were formerly part of the City of Toronto's street lighting
12 system.⁴ The utility expects to continue seeking out opportunities for the additional ALA
13 establishment as a means of controlling costs. The expenditures associated with the
14 locate function are non-discretionary, as this service is mandated by provincial legislation
15 and the volume of work is directly linked to the number customer requests. In addition to
16 ensuring compliance with legislative requirements, locates provide value by helping
17 prevent Toronto Hydro's distribution plant from being damaged, mitigating the risk of
18 excavation-related outages and facilitating the safety of the utility's personnel and
19 general public.

20
21 Toronto Hydro manages the cost of this activity by using the services of a third-party
22 provider and by taking steps to proliferate the adoption of ALAs across the construction
23 community. Moreover, to help ensure the service adequacy and cost-effectiveness of the
24 external service provider arrangement, Toronto Hydro periodically audits its partners'
25 performance.

⁴ As discussed in Exhibit 2A, Tab 5, Schedule 1, Toronto Hydro proposes to allocate a portion of the revenue received by TH Energy from the City of Toronto for street lighting maintenance and operation to exactly offset the revenue requirement impacts arising from the transfer. Consequently, there is no overall change to the Base Revenue requirement for 2015 as a result of these assets being transferred into the utility's rate base.

Through other damage prevention functions (e.g., providing advice to system planners and external contractors on the location of active and idle underground assets), Toronto Hydro minimizes safety risks for its crews and reduces the number of work stoppages related to unexpected findings in the field. Finally, periodic updates of Toronto Hydro's underground plant records based on field findings facilitate effective future planning and reduce the likelihood of future excavation-related incidents.

2.3. Vault Access, Customer Isolations, Deconstructions and Disconnections Segment

The work comprising this segment enables Toronto Hydro's commercial, industrial and residential condominium customers to safely perform periodic maintenance activities on their (customer-owned) civil infrastructure and other equipment, and facilitates temporary or permanent disconnection of these facilities from the grid.

Toronto Hydro provides eligible customers with one complementary vault entry and a single isolation per year to promote regular maintenance of customer-owned facilities and equipment and to facilitate early identification of emerging issues. In certain cases, and as detailed below, Toronto Hydro will deconstruct a connection or disconnect a customer from the grid at the request of the customer.

2.3.1. Vault Access

Toronto Hydro's Conditions of Service stipulate that customers are responsible for supplying, maintaining, repairing and otherwise modifying all civil assets located on their property, and any civil infrastructure located on public road allowances that serves non-metered connections. The scope of applicable infrastructure includes poles, cable chambers, transformer rooms, transformer vaults, handwells, junction boxes and other equipment housing or supporting Toronto Hydro's connection assets. Most commonly,

1 however, customer equipment access activities involve transformer vaults located on
2 customer property. In the interest of public safety, Toronto Hydro places locks on
3 transformer vault doors, helping to ensure that only qualified personnel have access to
4 these rooms and the high-voltage electrical equipment they contain. From time to time,
5 Toronto Hydro customers require access to vaults for periodic maintenance and
6 inspections, or to perform repairs identified as necessary during prior site visits.

7
8 There are over 4,500 customer-owned vaults in the Toronto Hydro service territory that
9 contain electrical plant owned by the utility. Each vault is required to contain fire
10 detection equipment, which must be inspected annually in accordance with the applicable
11 legislative requirements. During vault inspections, qualified Toronto Hydro staff must be
12 on hand for safety purposes and to prevent damages to the utility's assets. When Toronto
13 Hydro identifies structural deficiencies with the vault or a problem with the access door,
14 it provides the customer with a completed Customer Advice Form ("CAF"), which
15 explains the nature of the deficiencies and recommends corrective steps.

16
17 As stated above, Toronto Hydro provides each qualifying customer with one transformer
18 vault entry per year at no cost to the customer. The costs of any subsequent entries inside
19 the vault are recovered from requesting customers.

20 21 **2.3.2. Customer Isolations**

22 Customer isolation work (i.e. temporary disconnection of customer equipment from
23 Toronto Hydro's distribution grid) allows customers to perform inspection, maintenance,
24 repairs or replacement to their electrical equipment. As with vault access, Toronto Hydro
25 provides eligible customers with a single isolation per year free of charge in order to
26 encourage the maintenance of equipment, including testing and maintenance of fire
27 detectors in the vaults. In addition to facilitating maintenance work, customer isolations

1 ensure the safety of customers, as work in the vicinity of energized assets puts them at
2 potential risk of contact with energized equipment.

3
4 During customer activities enabled through isolation, Toronto Hydro personnel must
5 remain on hand to ensure that all applicable safety procedures are followed and that
6 equipment integrity is preserved. To facilitate the execution of this work in a cost-
7 effective manner, Toronto Hydro typically assigns these tasks to certified lines personnel
8 that are performing accommodated duties due to a prior injury or other related
9 considerations. In this manner, Toronto Hydro is able to leverage the skills and
10 experience of accommodated workers while respecting their physical restrictions.

11 12 **2.3.3. Deconstruction and Disconnections**

13 Toronto Hydro typically carries out service disconnections and deconstruction of the
14 associated equipment in response to customer requests. Under certain circumstances,
15 such as in cases where the utility discovers an instance of an unauthorized use of power,
16 the utility carries out the disconnection work as described in Exhibit 4A, Tab 2, Schedule
17 13.

18
19 The utility recovers the costs of normal disconnection and deconstruction work for
20 Residential and small General Service (Class 1 and Class 2) customers through rates, as
21 these costs are assumed at the time of economic evaluation of customer connection
22 requests. An exception are the cases where existing Class 1 or 2 customer premises are
23 being re-developed or expanded, in which cases Toronto Hydro recovers the costs
24 directly from the requesting customers. For larger customers (Classes 3 and 4), Toronto
25 Hydro recovers the costs of disconnection and deconstruction work directly from the
26 requesting customers.

Irrespective of recovery methods, the costs of deconstruction and disconnection work vary significantly depending on service type and the specific scope of work. Toronto Hydro's practices with respect to the determination of disconnection/demolition costs are listed in the Conditions of Service document.

2.3.4. Segment Costs

The following table presents the historical (2011-2013), bridge (2014) and test year (2015) costs associated with this segment:

Table 8: Vault Access, Deconstruction & Disconnection Expenditures (\$ Millions)

	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Vault Access, Customer Isolations and Disconnections	1.2	1.9	2.8	2.4	2.8

Toronto Hydro's operating expenditures for this segment increased by almost \$1.0 million from 2012 to 2013. This increase is mainly attributable with the expansion of the Vault Access program, driven by Toronto Hydro's efforts to increase customer awareness of the importance of regular vault inspections. These activities resulted in a larger uptake of the complimentary vault access services, leading to incrementally higher expenditures.

2.3.5. Test Year Segment Costs

The 2015 Test Year operating expenditures are expected to increase from \$2.4 million in 2014 to \$2.8 million in 2015 due to an increase in volume of vault access and customer isolation requests. Toronto Hydro's vault access and customer isolation segment aims to promote regular maintenance of customer-owned equipment and helps to ensure personnel safety when performing this work. As previously mentioned, the cost of the

1 segment in a given year is directly linked to the number of customer requests that
2 Toronto Hydro receives for vault entry and isolation.

3
4 By providing customers periodic access to their transformer vaults under professional
5 supervision, Toronto Hydro facilitates the timely identification of any emerging structural
6 or safety risks, thereby reducing the likelihood and/or the potential effect of incidents that
7 could have otherwise materialized in the absence of such inspections.

8
9 Toronto Hydro manages vault access and customer isolation activities by assigning them,
10 to the degree possible, to field workers affected by injuries. The funds requested for this
11 segment are necessary because any reduction of funding could put public safety at risk
12 and could ultimately result in higher costs for both Toronto Hydro and its customers, if
13 the utility is required to remedy issues and incidences arising from insufficient or
14 irregular maintenance of customer-owned vaults.

OPERATIONS SUPPORT – PLANNING PROGRAM

1. PROGRAM SUMMARY

Table 1: Operations Support Planning Program Expenditures (\$ Millions)

Program	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Planning	9.0	9.0	11.5	10.3	12.9

/C

Toronto Hydro's Planning program encompasses a broad range of asset management work to support of reliable operation of the utility's electricity distribution system, performed by qualified and experienced engineers, technologists and support staff. The scope of work comprising the program includes materials and standards research, system planning and design, forecasting of customer and system needs, reliability planning, and enabling the integration of new technologies into the utility's system. The key outputs of the program are plans for capital and maintenance activities aimed at maintaining and/or improving performance of Toronto Hydro's distribution system. While an eligible portion of these costs is capitalized, the remaining costs are recovered through the operational expenditures.

As discussed throughout this application, the rigour and complexity of Toronto Hydro's asset planning and management processes have matured and gained sophistication over the time of Toronto Hydro's amalgamated existence. The enablers behind this continuous improvement are Toronto Hydro's staff, systems and processes funded through the Planning Program.

2. PROGRAM DESCRIPTION

The Planning program encompasses the full range of functions supporting Toronto Hydro's asset management work and coordination with other programs, most notably

1 Work Execution and Work Program Management and Support (Exhibit 4A, Tab 2,
2 Schedules 8 and 9, respectively). As noted above, the program is staffed predominantly
3 with experienced engineers and technologists possessing extensive knowledge of the
4 utility's diverse and evolving asset base and unique system configuration. With the
5 intensification of Toronto Hydro's capital program in the last several years, the Planning
6 program has been relied on heavily to investigate, analyze and produce an increasingly
7 complex and comprehensive capital and maintenance plans.

8
9 The Planning program consists of three segments:

- 10 • System Planning and Records Management
- 11 • Grid Solutions and Electric Vehicles; and
- 12 • Standards and Policies.

13
14 The System Planning and Records Management segment includes the functional areas
15 responsible for system capacity and generation planning, maintenance planning and
16 reliability and capital investment planning. Supporting the planning activities, and also
17 included in this segment, is the records management function responsible for supporting
18 the planners by maintaining and updating the utility's extensive asset records and related
19 applications.

20
21 The Grid Solutions and Electric Vehicles segment undertakes research and planning
22 aimed at modernization and enhancement of the utility's distribution system through
23 integration and proliferation of Smart Grid technologies.

24
25 Finally, the Standards and Policies segment includes the functions responsible for the
26 development and maintenance of Toronto Hydro's construction standards, and specific
27 technological and construction standards.

1 Table 2 provides a detailed breakdown of the Planning program expenditures by segment.

2

3 **Table 2: Operations Support – Planning Program Expenditures by Segment**

4 **(\$ Millions)**

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test	
Planning and Records Management	5.5	5.7	8.8	6.6	8.7	/C
Grid Solutions & EV's	0.8	0.7	0.5	1.2	1.5	
Standards & Policies	2.7	2.7	2.2	2.5	2.7	
Total	9.0	9.0	11.5	10.3	12.9	/C

5 The activities included in each of these segments are described in further detail below.

6

7

8 **3. SYSTEM PLANNING AND RECORDS MANAGEMENT SEGMENT**

9 The System Planning and Records Management segment is comprised of four functional
10 areas: Investment and Reliability Planning, Maintenance Planning, Capacity and
11 Generation Planning, and Records Management. These four functional areas work
12 together to coordinate the execution of analytical work underlying the utility's asset
13 management strategy, that underpins Toronto Hydro's Distribution System Plan ("DSP").¹

14

15 **3.1. Investment & Reliability Planning**

16 The Investment and Reliability Planning function monitors the utility's reliability
17 performance, develops of system-wide and targeted strategies to maintain and/or improve

¹ Exhibit 2B.

1 reliable performance of the utility's asset base, and prepares Toronto Hydro's
2 Distribution System Plan ("DSP").

3
4 Reliability planning involves the analysis of power outage data from the distribution
5 system to identify performance patterns and trends related to specific types of equipment
6 or geographical areas. In conducting this work, Toronto Hydro relies on a number of
7 applications, including the Interruption Tracking Information System ("ITIS") – an
8 internally developed application that analyses the data collected through the utility's
9 Outage Management System ("OMS"). The use of the ITIS tool enables Toronto Hydro
10 to conduct a detailed analysis of outage events, and identify the worst performing parts of
11 Toronto Hydro's system and the customers disproportionately affected by system
12 outages. The analytical work performed by the Reliability and Investment planning
13 function underlies capital programs such as the Worst Performing Feeder ("WPF")
14 program described in Exhibit 2B, E6.21.

15
16 In addition to analyzing the current state of system reliability, the Reliability and
17 Investment Planning function also develops reliability forecasts on the basis of planned
18 capital investments and maintenance activities, to enable Toronto Hydro to identify and
19 monitor the achievement of this crucial outcome of system planning and investment. The
20 results of Toronto Hydro's reliability forecast for the 2015-2019 period based on the
21 utility's Distribution System Plan are provided in Exhibit 2B, C2.1.3.

22
23 General Investment planning entails a feeder-by-feeder analysis and determination of
24 specific assets that require replacement, refurbishment or other forms of intervention, to
25 ensure continued system safety and reliability of the utility's distribution system. In
26 performing this work, Toronto Hydro relies on the reliability analysis described above,
27 taking further steps to localize the feeders and assets experiencing particular problems.
28 Using the insights obtained through detailed reliability analysis, Toronto Hydro explores

1 feasible mitigation options to determine the optimal solutions to specific issues. If the
2 preferred solution for a particular issue is a capital investment, Toronto Hydro creates a
3 scope of work that is added to the utility's investment plan. In performing this work, the
4 utility relies on a number of comprehensive asset management tools, including the
5 Geospatially Enable Asset Registry ("GEAR"), and the Feeder Investment Model
6 ("FIM").²

7
8 Finally, the Investment and Reliability Planning function is responsible for the
9 development of Toronto Hydro's evidence in support of its proposed capital investments
10 for the purposes of regulatory filings. The engineers and technologists comprising this
11 functional area have been instrumental in the development of Toronto Hydro's evidence
12 for the current application, the 2012-2014 Incremental Capital Module ("ICM") filing
13 and previous applications containing capital work plans.

14 15 **3.2. Maintenance Planning**

16 The Maintenance Planning functional area oversees the analysis and preparation of
17 Toronto Hydro's maintenance plans and schedules for all components of its distribution
18 system. This work entails performing Reliability Centred Maintenance ("RCM")
19 analysis for each asset class, analyzing historical failure data, and ensuring identified
20 deficiencies are remedied. In addition, the Maintenance Planning function assists
21 Toronto Hydro in preparing documentation for, and analysing the results of competitive
22 tenders for procurement of maintenance contractor services. The maintenance planning
23 work is critical to ensure the safe and reliable operation of system assets and optimize the
24 time at which operational and capital investment is needed.

² Exhibit 2B, Section D.

3.3. Capacity and Generation Planning

This functional area is responsible for planning both the future load requirements of the distribution system driven by customer growth, and requisite connection capacity to accommodate current and forecasted levels of distributed generation (“DG”) in Toronto Hydro’s service area. The integration of connection and generation demand planning into a single functional area allows Toronto Hydro to capitalize on key planning synergies, such as foregoing and/or deferring the need for load growth-enabling investments in the areas with forecasted DG connections, or facilitating cost-effective load transfers between the transformer stations.

The capacity planning work requires constant monitoring of changing system characteristics, such as feeder and transformer station loadings, short circuit levels and system performance measures. Combining this system performance data with past system demand trends and known requests for connection of load and generation facilities, Toronto Hydro produces a semi-annual system demand forecast on a rolling five-year basis. Given the nature of its mandate, the capacity and generation planning function is Toronto Hydro’s technical liaison with the Ontario Power Authority (“OPA”) on all matters related to the distributed generation programs (e.g., Feed-in-Tariff (“FIT”) and MicroFIT), and regional planning undertakings. When required, the capacity planning personnel also provide input in the area of load growth and short circuit forecasting requirements to Toronto Hydro other planning functions.

3.4. Records Management

The Records Management function is responsible for the maintenance and upkeep of digital records of Toronto Hydro’s distribution. Given that the system capacity and configuration is constantly evolving due to new customer connections, equipment failures, retirements and additions, maintaining an up-to-date system of records is crucial to enable efficient and effective system planning and operation. Toronto Hydro also

maintains records of its distribution asset inspections pursuant to the Electrical Distribution Safety Regulation.³ When Toronto Hydro installs new assets in its distribution system, either on a planned or a reactive basis, the records of installation and inspection are sent to the records management group, either in paper or electronic form, to verify that Toronto Hydro asset management processes have been followed with respect to that installation.

The records management function also plays a crucial role in ensuring the quality and accuracy of data used in Toronto Hydro's asset planning and management applications such as GEAR and the FIM, ensuring that the investment and operational decisions are based on the optimal information. Failure to verify the accuracy of information such as feeder and asset construction configurations could lead to safety risks for people working on Toronto Hydro's system.

3.5. Segment Costs

Table 3 displays Toronto Hydro's Historical (2011-2013), Bridge (2014) and Test Year (2015) costs for the Planning and Records Management Segment.

Table 3: Planning and Records Management Segment Expenditures (\$ Millions)

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Planning And Records Management	5.5	5.7	8.8	6.6	8.7

/C

Segment expenditures have generally increased year-over-year at a significantly lower pace than the volume of Toronto Hydro's capital expenditures, and at a pace similar to that of the maintenance work program that this segment supports.

³ Ontario Regulation 22/04, made under the *Electricity Act, 1998*, S.O. 1998, c. 15, Sched. A ["Electrical Distribution Safety Regulation"].

3.6. Test Year Segment Costs

The 2015 Test Year expenditures for the Planning segment are \$9.0 million, or \$0.3 million higher than the projected 2014 costs. Once baseline plans are developed for the 2015 to 2019 period, continuous refinements will be required as new system requirements emerge and work execution progresses.

To help manage planning expenditures, Toronto Hydro utilises a number of contract employees and students that assist the utility's engineers in performing their analytical tasks. The utility expects to continue this practice throughout the 2015-2019 rate period.

4. GRID SOLUTIONS AND ELECTRIC VEHICLES SEGMENT

This segment is responsible for the research and development of innovation projects within Toronto Hydro's distribution system, in response to the government policy requirements, the emerging system needs, and technological innovations that can enhance the effectiveness and cost efficiency of grid operation.

The work conducted under the Grid Solutions segment can be classified into the following categories:

- 1) Grid Monitoring;
- 2) Distributed Intelligence;
- 3) Electric Vehicles; and
- 4) Active Demand Response.

The Grid Monitoring work entails management, maintenance and enhancement of Toronto Hydro's existing system monitoring assets, support of data management tools, and investigation of solutions for monitoring the utility's underground distribution assets. The key benefit of this work for Toronto Hydro is the improved visibility into the

1 performance of its distribution assets, which enhances the utility's ability to make
2 operational and strategic decisions regarding its assets. This, in turn, facilitates further
3 reliability improvements (for both momentary and sustained outages), leading to
4 improvements in customer satisfaction.

5
6 The Distributed Intelligence work involves the collection and analysis of local data on
7 performance of distributed generation ("DG") assets, and investigation of potential means
8 of controlling distributed generation resources and implementation of micro-grids within
9 Toronto Hydro's service territory, which would be supplied in part by distributed energy
10 resources. A project that is currently underway is the analysis of potential
11 implementation of a micro grid at the Exhibition Place. Key benefits of this program are
12 improved visibility and control capability of feeders connected to DG resources, and
13 improved system reliability due to integration and control of distributed generation
14 resources. This research work is expected to provide Toronto Hydro with another tool
15 for the cost-effective management of system constraints.

16
17 Under the Electric Vehicle ("EV") program, Toronto Hydro is studying the effect of
18 potential proliferation of EVs throughout the utility's service territory. This work is
19 primarily accomplished through collection and analysis of customer vehicle charging
20 data. The insights obtained through this research work are expected to enable the utility
21 to make the optimal decisions in terms of the supply and control infrastructure that may
22 be required in the future to enable EV charging in different areas of Toronto.

23
24 The Active Demand Response work involves the investigation of advanced solutions for
25 local demand response programs. The ability to actively manage local demand is
26 expected to provide Toronto Hydro operating flexibility which may help defer costly
27 capital investments without compromising reliability.⁴

⁴ Exhibit 2B, E7.10

4.1. Segment Costs

Table 4 provides the Historical (2011), Bridge (2014) and Test Year (2015) expenditures for the Grid Solutions and Electric Vehicles segment.

Table 4: Grid Solutions and EVs Segment Expenditures (\$ Millions)

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Grid Solutions & EVs	0.8	0.7	0.5	1.2	1.5

Segment expenditures have increased due to the continue increase of renewable DG resources connecting to Toronto Hydro's system, and the evolution of the government's Smart Grid policy. While the majority of the work conducted under this segment is geared towards the future evolution of the utility's distribution system, Toronto Hydro submits that this work constitutes a prudent investment that is expected to allow the utility to keep pace with a rapidly evolving technological landscape of EVs, Smart Grid and renewable generation. Because Toronto Hydro's system was designed and constructed before these technologies became available, developments in these areas can have significant effect on the utility's system and must be monitored closely.

4.2. Test Year Costs

Toronto Hydro's test year forecast for the Grid Solutions and EV segment is \$1.5 million, which represents an increase of \$0.3 million above the 2014 projection. The increase is largely driven by the changing nature of the segment's activities over the recent years. Whereas a significant portion of the work performed in 2011-2013 historical years was directed at specific capital projects (and thus eligible for capitalization), the segment's work thus far in 2014 and anticipated for the 2015-2019 timeframe is more directed towards the research and development activities.

1 Analysis of performance data on items such as distributed generation interconnections
2 and electric vehicle charging stations is important to understand both the immediate
3 needs of and long term impacts on the distribution system. This analysis is also
4 important to understand the exact requirements and system impacts of new technologies,
5 such as the micro grid contemplated for installation at the Exhibition Place.

6
7 Absent the requested funding, Toronto Hydro's capability to research and investigate the
8 implementation of emerging technologies that support customer choice and control,
9 power system flexibility and adaptive infrastructure will be significantly challenged. In
10 addition, funding reductions from the proposed levels would threaten Toronto Hydro's
11 ability to support externally funded projects, such as those supported by the Ontario
12 Government's Smart Grid Fund and the ecoEnergy Innovation Initiative, which represent
13 cost effective means of achieving the key initiatives.

16 **5. STANDARDS AND POLICIES SEGMENT**

17 The Standards and Policies Segment is responsible for the development of all
18 construction standards and other specifications for the electrical and civil construction
19 work that occurs in Toronto Hydro's service territory. This work is driven in large part
20 by the specification of the Electrical Distribution Safety Regulation,⁵ which requires
21 distributors to create standard design drawings and specifications for all equipment
22 comprising the distribution system. The resulting drawings provide detailed
23 specifications as to the type and configuration of equipment installed in Toronto Hydro's
24 distribution system, to facilitate public and worker safety, as well as the reliable operation
25 of the utility's distribution system.

26

⁵ *Supra* note 3.

1 The work performed under the Standards and Policies segment is of particular importance
2 in light of the circumstances of Toronto Hydro's amalgamation in 1998, when six
3 neighbouring distributors with varying asset management practices, construction
4 standards and equipment types were merged into a single organization. Over the years
5 since the utility's amalgamation, the segment has standardized the construction standards
6 in a manner that balances the diversity of legacy assets with the objectives of safety and
7 operational efficiency. Certain aspects of this work continue to date, including the
8 finalization of Nomenclature Standardization work described in Toronto Hydro's Review
9 of Past Productivity⁶ and working with the Supply Chain program⁷ to coordinate the
10 retirement of certain legacy or non-standard materials or equipment in the manner that
11 maximizes the utility of remaining available stock.

12
13 The Standards and Policies segment also plays a key role in facilitating effective response
14 to contingency events, by identifying the type and quantities of certain materials and
15 equipment that are critical for the continuous operation of the company's distribution
16 system. As described in the Supply Chain program,⁸ the inventory items identified by the
17 Standards Segment are segregated from general stock for specific use in reactive
18 situations. The cooperation between the Standards and the Supply Chain programs also
19 involves providing the input into the strategic sourcing work to identify the optimal
20 suppliers of materials and equipment.

21 22 **5.1. Segment Costs**

23 Table 5 provides the Historical (2011), Bridge (2014) and Test Year (2015) expenditures
24 for the Standards and Policies segment.

⁶ Exhibit 1B, Tab 3 Schedule 5, Appendix A.

⁷ Exhibit 4A, Tab 2, Schedule 12.

⁸ Exhibit 4A, Tab 2, Schedule 12.

1 **Table 5: Standards and Policies Segment Expenditures (\$ Millions)**

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Standards & Policies	2.7	2.7	2.2	2.5	2.7

2 Segment expenditures have generally been stable throughout the period, with the 2015
3 Test Years forecasts matching the 2011 and 2012 historical actuals.

4

5 **5.2. Test Year Segment Costs**

6 As shown in the Table above, the Test Year segment costs for the Standards and Policies
7 Segment are forecast to be \$2.7 million, which represents an increase of \$0.2 million
8 above the 2014 projection. The incremental increase from the Bridge Year levels is
9 driven by the need to support development of new equipment specifications and
10 standards for equipment proposed in the CIR application, such as reclosers as described
11 in the Overhead Momentary Reductions program in the DSP.⁹

12

13 As Toronto Hydro continues to explore the use of new technologies in its distribution
14 system to achieve reliability improvement, gain operational efficiencies and reduce
15 overall operating costs, the Standards and Policies expenditures are necessary to ensure
16 that the utility's distribution system continues to grow and evolve in a consistent and
17 efficient manner, utilizing the uniform standards that reflect the best practices and
18 optimal materials.

⁹ Exhibit 2B, E7.4

WORK EXECUTION MANAGEMENT AND SUPPORT PROGRAM

1. SUMMARY

**Table 1: Work Execution Management and Support Program Expenditures
(\$ Millions)**

Program	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Work Execution Management and Support	5.0	5.5	5.6	5.8	6.1

The Work Execution Management and Support Program oversees the balancing of Toronto Hydro's planned capital and maintenance work programs with available labour resources, and manages changes that arise as a result of operational complexities faced by front line crews. The program also provides auxiliary support services to ensure successful delivery of the planned work, including:

- Securing City of Toronto work permits;
- Engaging and collecting input from customers in the vicinity of the projects;
- Tracking project progress and labour resource utilization;
- Facilitating consistency in project forecasting and management of related practices; and
- Providing general administrative support to project managers.

This centralized function enables Toronto Hydro to facilitate optimal utilization of available resources, proactively identify and mitigate emerging risks, keep its customers informed of planned and ongoing work in their neighbourhoods, as well as coordinate and track the multitude of projects across the utility's service territory. The work comprising this segment is distinct from activities captured in the Work Execution

program,¹ which is primarily focused on oversight, training and other expenditures incurred in the process of actual work execution that are not attributable to a specific capital or maintenance project or program.

The activities comprising this program are grouped into two general categories and are discussed in more detail below:

- Work Execution Management; and
- Work Execution Support.

2. PROGRAM DESCRIPTION

2.1. Work Execution Management

Each year, Toronto Hydro undertakes hundreds of discrete capital and maintenance projects to replace, refurbish or otherwise modify its aging asset base, address emerging safety issues, accommodate new customers, and ensure that equipment is in a proper working order. Prior to setting out to do this work, the utility undertakes extensive planning efforts to ensure that its work plans for the current and future years match the availability of physical resources required to complete the program. Beyond matching resources to projects, Toronto Hydro works to facilitate all available resources being optimally utilized to facilitate cost efficiency and eliminate avoidable costs or other redundancies. Coordination, execution and verification of this planning and management work is the responsibility of the Work Execution Management staff.

The program staff work with Toronto Hydro's asset managers, designers, crew leaders, control centre and human resources staff to produce a resource-balanced work program execution plan, grounded in forecasted volumes and types of capital and maintenance

¹ Exhibit 4A, Schedule 2, Tab 9.

1 projects. In developing this plan, Toronto Hydro analyzes the scale, scope and location
2 of each project, and estimates the requisite number of hours and type of resources (e.g.,
3 civil, electrical, other specialized skills) based on the past information from similar
4 projects, general trends, anticipated efficiencies and other available data. The utility then
5 checks the resulting project labour requirements against the available labour schedules
6 and makes the appropriate resource allocations to discrete projects. Once the individual
7 project-based analysis is complete, the combined program (i.e., a collection of individual
8 projects) is reviewed against the available resources and other relevant reference
9 information on an aggregate level, to identify any inconsistencies, deficiencies or
10 suboptimal resource utilization trends.

11

12 Toronto Hydro also works with other utilities and City of Toronto planners to coordinate
13 the planned Toronto Hydro work with the anticipated work of these entities. The
14 objective of this effort is to maximize available synergies, prevent potential conflicts and
15 reduce the potential disruption of construction projects on Toronto Hydro's customers.

16

17 Underlying each resource-balanced plan is a set data and assumptions, based on past
18 experience, forecasted resource availability, known risks and constraints, and other key
19 planning criteria. Toronto Hydro monitors the work program execution and makes
20 necessary adjustments to plans based on factors such as known complexities and
21 emerging external constraints faced by field crews. As such, the resource-balanced plans
22 undergo periodic amendments and re-forecasts to ensure that resource utilization matches
23 the reality of field conditions in the mature and complex urban setting that Toronto Hydro
24 operates in. The effect of each individual change requires assessment on the overall
25 program level to ensure that the utility meets its overall work program objectives by the
26 end of each year.

27

1 In addition to maintaining the program-wide resource balance, Toronto Hydro tracks the
2 status of each individual project comprising the work program. While tracking the
3 project execution progress, Toronto Hydro also seeks to proactively identify anticipated
4 or emerging risks that may impact the successful delivery of the work program, and then
5 develops the appropriate mitigation strategies. Performing this work requires
6 understanding of resource allocation management, schedule management, and
7 project/program management. Accordingly, the program predominantly employs
8 individuals with professional Project/Program Management designations and experience
9 in design/construction work delivery.

10
11 The centralized Work Program Management function facilitates a coordinated approach
12 to executing the projects and programs identified by engineering staff (i.e., Asset
13 Management), while ensuring that design/construction resources are kept optimally busy.
14 This allows Toronto Hydro to fulfill its program commitments to its customers, the
15 Ontario Energy Board (“OEB”) (as required), and other relevant stakeholders in a manner
16 that supports value-for-money regarding capital and maintenance activities.

17 18 **2.2. Work Execution Support**

19 Timely and cost-effective execution of capital and maintenance projects requires
20 comprehensive logistical support to anticipate and address the administrative
21 requirements, secure permits, manage stakeholder expectations and facilitate execution
22 efficiency. These, and other related functions comprise the mandate of Toronto Hydro’s
23 Work Execution Support program.

24
25 A subset of program staff works to facilitate timely issuance of City of Toronto permits
26 required to cut into or otherwise modify city sidewalks and roadways in order to enable
27 the execution of civil and electrical construction work. In a given year, Toronto Hydro
28 requires multiple and roadway work permits. Securing timely and accurate approvals for

1 this work involves coordination with Toronto Hydro engineers, designers and City
2 officials to ensure that all relevant documentation is prepared in accordance with
3 Municipal Consent Requirement for the Installation of Plant Within City of Toronto
4 Streets (“MCR”). At times, issues management activities such as planned municipal (or
5 other agency) work unknown to Toronto Hydro requires the original project scopes and
6 timing to be modified, thus necessitating further coordination efforts on the part of Work
7 Execution Support functional area.

8
9 Work Execution Support functional area also oversees the engagement of Toronto Hydro
10 customers affected by the planned and ongoing work in the vicinity of their residences or
11 places of business. Timely and effective communication with customers affected by the
12 utility’s work program assists Toronto Hydro in managing the expectations of local
13 residents, and to the degree possible, accommodating their requests regarding manner of
14 execution or final appearance of modified equipment and facilities.

15
16 Another critical function provided by the Work Execution Support program is
17 timekeeping and general administrative support services. The timekeeping work entails
18 monitoring and recording the labour efforts expended by crews and engineering/design
19 personnel on certain projects in order to facilitate tracking of project costs. The data
20 collected through the time-keeping function allows Toronto Hydro to gain additional
21 insights into the work execution patterns, identify trends and where necessary, adjust
22 future planning and resource-allocation assumptions to better reflect the reality of the
23 field conditions and drive further operational efficiencies. The administrative support
24 includes general back-office support to project/program management and construction
25 employees to facilitate project execution efficiency and effective use of staff’s time.

26
27 Finally, the Work Execution Support function provides oversight and governance over
28 the project and program management practices applicable to Toronto Hydro’s capital and

1 maintenance work programs. This function facilitates consistency of forecasting, risk
2 identification, and progress tracking for all applicable projects/programs. Given the
3 number and variety of projects and programs that comprise Toronto Hydro's capital and
4 maintenance work program, the governance function is critical to ensure the integrity and
5 accuracy of the utility's resource-balanced work plans, as well as the work plans and
6 financial forecasts Toronto Hydro submits to the OEB, its shareholder and other
7 neighbouring utilities. In addition to providing oversight, this function is also responsible
8 for designing and amending procedural documents and project management tools that
9 adhere to industry standards and best practices.

12 3. PROGRAM COSTS

13 Table 2 provides the Historical (2011-2013), Bridge (2014) and Test Year (2015) costs
14 for the Work Execution Management and Support Program.

16 **Table 2: Work Program Execution Management and Support Expenditures**
17 **(\$ Millions)**

Program	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Work Execution Management and Support	5.0	5.5	5.6	5.8	6.1

18 The 2012 operating expenditures were \$0.5 million higher than 2011 due to lower-than-
19 expected labour recovery as result of reduced capital spending from the previously
20 planned levels.

22 The 2013 expenditures were \$0.1million higher than 2012 due to inflationary adjustments
23 and mid-year establishment and consequent staffing of the:

- 1 • Maintenance Management Office (“MMO”) to ensure the maintenance program is
- 2 successfully forecasted, resource balanced, executed and reported, while delivery
- 3 risks are proactively identified and mitigated.
- 4 • Program Delivery Improvement & Governance (“PDIG”) to provide governance
- 5 through creation of new Program Management procedures, processes and tools
- 6 for monitoring compliance.

7

8 The 2014 expenditures are anticipated to be \$0.2 million higher than 2013 due to

9 inflationary adjustments and further development and staffing of MMO and PDIG to

10 meet the previously mentioned mandates.

11

12 As demonstrated in the Table 3 below, the Capital and Preventative and Predictive

13 Maintenance programs are expected to grow by about 31% and 18%, respectively, from

14 the Historical to the Bridge period. At the same time operating costs of the Work

15 Execution Management and Support program, which is directly proportional to the size

16 of the work program, are forecasted to grow by only 16% during the same period. This

17 demonstrates Toronto Hydro’s focus on continuous improvement and identifying

18 operational efficiencies.

19

20 **Table 3: Relationship between Program Costs and Capital and Preventative/**

21 **Predictive Maintenance Expenditures (\$ Millions)**

	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Total Capital Expenditures	445.5	288.0	445.7	582.7	523.6
Preventative and Predictive Maintenance	13.7	16.0	12.8	16.1	20.1
Work Execution Management and	5.0	5.5	5.6	5.8	6.1

	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Support Program (WESP)					
% WEMS of Capital and P&P Maintenance.	1.1%	1.8%	1.2%	1.0%	1.1%

3.1. Test Year Costs

2015 operating costs are forecast at \$6.1 million, which represents an increase of \$0.3 million over 2014 projections. This increase is primarily due to inflationary adjustments as well as filling in staffing vacancies to support the growth of the capital and maintenance work program.

The Work Execution Management and Support Program is a critical part of Toronto Hydro's operations. It allows the utility's work plans to be grounded in a balanced and optimal utilization of labour resources and up-to-date information about the utility's operating conditions. Through this program, Toronto Hydro is able to keep track of and manage the impact of daily changes that are inherent in operating a utility in a large, complex and mature urban environment.² Program monitoring and work plan modification activities that are part of this program are a component of the utility's continuous improvement efforts, as the underlying analytical work provides Toronto Hydro with insights that inform future approaches.

The day-to-day project tracking and management efforts enable Toronto Hydro to quickly and accurately track the status of the ongoing projects, thereby facilitating identification and mitigation of risks, leveraging of potential synergies, and supporting alignment with work program objectives.

² For more information about these challenges, refer to Exhibit 1B, Tab 2, Schedule 4, Appendix A.

1 A subset of program functions, most notably the permit facilitation and customer
2 communication activities, are mandated by the municipal and OEB requirements.
3 Beyond the external requirements to provide these services, Toronto Hydro derives
4 significant operational value from timely and accurate permit completion and proactive
5 project-specific communication with affected customers, as this work reduces the
6 possibility of unanticipated work stoppages due to permitting issues or customer
7 concerns.

8

9 Absent the program governance described above, Toronto Hydro's work plans would
10 face increased risks of inconsistencies, improper assumptions, and suboptimal workforce
11 allocation. These risks would in turn tend to undermine optimal resource allocation,
12 negatively affecting customer experience, and compromising the value of the work to
13 ratepayers and the utility.

14

15 Reductions to this program would also adversely affect Toronto Hydro's ability to
16 accurately forecast the execution of its work programs, and to accommodate on-going
17 changes to facilitate optimal utilization of resources. Similarly, reductions in this
18 program would negatively impact work execution support functions such as timely
19 availability of City permits and customer engagement/communication.

OPERATIONS SUPPORT – WORK PROGRAM EXECUTION

1. SUMMARY

Table 1: Work Program Execution Program Expenditures (\$ Millions)

Program	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Work Program Execution	14.9	13.8	13.0	14.3	15.2

The activities comprising the Work Program Execution program entail the oversight, administrative training, and other functions performed in the process of actual execution of Toronto Hydro's capital and maintenance work programs, which are not eligible for capitalization in accordance with Toronto Hydro's policies and applicable accounting standards, and are not attributable to any specific maintenance programs or projects. Other expenses captured in this program include the costs of coordinating the capital and maintenance work performed by external contractor crews.

2. PROGRAM DESCRIPTION

As stated above, the Work Execution program encompasses the costs of oversight, support, coordination and training activities related to the physical execution Toronto Hydro's capital and maintenance programs. This includes the functions related to coordination and support of external contractors executing a portion of Toronto Hydro's capital and maintenance programs, activities included in the work performed by the utility's internal construction crews, and the operation of transformer and municipal stations. Among the specific cost drivers captured within this program are expenditures related to Toronto Hydro's workplace safety training program, the costs of purchase and issuance of small tools and other day-to-day implements, supervisory time not allocated

to core projects or functions, as well as the cost of training the utility's skilled trades apprentices. Given their nature, the expenditures are distinct from those captured in Toronto Hydro's Work Program Execution Management and Support program,¹ which captures activities related to project management and logistical support of discrete projects performed by internal crews.

The program includes the following three segments:

- Contractor Administration;
- Internal Work Execution; and
- Stations.

Table 2 displays the Historical (2011-2013), Bridge (2014) and Test Year (2015) expenditures for each of the segments comprising the Work Execution Program.

Table 2: Work Program Execution Program Expenditures by Segment (\$ Millions)

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Contractor Administration	0.8	0.4	2.1	2.1	1.8
Internal Work Execution	11.6	10.4	7.9	8.8	10.3
Stations	2.4	3.0	3.0	3.4	3.0
Total	14.9	13.8	13.0	14.3	15.2

The remainder of this schedule provides further detail of the activities captured within each of the segments.

¹ Exhibit 4A, Tab 2, Schedule 8.

1 **3. CONTRACTOR ADMINISTRATION SEGMENT**

2 The segment comprises the administration of capital and maintenance work performed by
3 external contractors retained to provide flexible and cost-effective execution of Toronto
4 Hydro's annual work programs, which in recent years has amounted to about \$100
5 million. The contractor administration function represents the point of contact between
6 Toronto Hydro and the contractors, and includes the administration and evaluation of
7 competitive tenders for contractor services, execution and oversight of the ensuing
8 contracts and administrative support of the specific projects assigned to contractor crews,
9 including but not limited to:

- 10 • job package development and issuance;
- 11 • liaising with system planners to address specific design matters;
- 12 • field issues management;
- 13 • ordering of materials;
- 14 • facilitating changing of project scopes;
- 15 • monitoring contractor safety practices;
- 16 • invoicing and receipting; and
- 17 • inspection of newly constructed assets.

18
19 The work undertaken under this program entails internal coordination with Toronto
20 Hydro's Planning,² Legal³ and Work Execution Management⁴ programs to facilitate
21 efficient completion of requisite work, such as facilitation of change requests to project
22 scopes based on the field findings, or changes to the supplier delivery timelines
23 necessitated by the progress of contractor-executed work.

24
25 Beginning in 2013, the scope of the segment's oversight was expanded to include the
26 contracted maintenance activities, in addition to capital construction. The use of

² Exhibit 4A, Tab 2, Schedule 7.

³ Exhibit 4A, Tab 2, Schedule 18.

⁴ Exhibit 4A, Tab 2, Schedule 8.

contracted resources allows Toronto Hydro scalability, flexibility and cost effectiveness in work program execution, given the year-over-year fluctuations in the nature and volumes of the utility's work program.

3.1. Segment Costs

Table 3 below presents the Historical (2011-2013), Bridge (2014) and Test Year (2015) expenditures for the Contractor Administration segment.

Table 3: Contractor Administration Segment Expenditures (\$ Millions)

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Contractor Administration	0.8	0.4	2.1	2.1	1.8

Segment expenditures have fluctuated consistent with the volume of Toronto Hydro's capital work and the ensuing requirements. As noted above, the cost increases in 2013 are also partially attributable to the expansion of the segment's scope of responsibility to include the administration of the externally executed maintenance work.

3.2. Test Year Segment Costs

The 2015 Test Year costs for the Contractor Administration segment are \$1.8 million, which represents a decrease of \$0.3 million from 2014 bridge year forecast. As noted above, a significant cost increase in this program starting in 2013 was driven by the expansion of the segment's mandate to facilitate the externally executed maintenance work (e.g., underground vault, cable chamber and transformer inspections), leading to an increase in the associated support costs as well. The anticipated cost reduction in 2015 is driven by planned improvement in cost assignment, ensuring time spent working on specific jobs is fully charged to those jobs as opposed to the general operating expenditures.

1 **4. INTERNAL WORK EXECUTION SEGMENT**

2 This segment includes the administrative, support and training costs associated with
3 construction work performed by Toronto Hydro's internal construction crews. Among
4 the costs included in this segment are project-specific planning, logistics, tracking, small
5 tools issuance, administrative support of managers/supervisors, office-related
6 expenditures, as well as supervisory time not directly attributable to any specific capital
7 program or project.

8
9 Another major cost driver within the internal work execution segment are expenditures
10 related to the comprehensive and ongoing safety training for the utility's construction
11 crews. As described in more detail in the Human Resources and Safety program ("HR &
12 Safety"),⁵ employee health and safety are among the primary considerations at Toronto
13 Hydro, as evidenced by the utility's adoption of industry-leading environment, health and
14 safety ("EHS") standards, and reduction in Total Recordable Injury Frequency ("TRIF")
15 and other workplace health and safety indicators.

16
17 Underlying the utility's commitment to health and safety, is the extensive safety
18 awareness and training work conducted throughout the year for all Toronto Hydro
19 construction crews. Toronto Hydro certified tradespersons and apprentices participate in
20 between 4.5 to nine days of EHS training per year (depending on trade), the costs of
21 which are in part reflected in this segment. The extensive EHS training is geared towards
22 providing the employees with requisite tools and knowledge to perform their work safely
23 and efficiently, thereby maximizing the value of their work for the utility and its
24 customers.

25
26 Finally, the Internal Work execution segment also includes a portion of (non-capitalized)
27 expenditures associated with capital construction work performed by Toronto Hydro's

⁵ Exhibit 4A, Tab 2, Schedule 14.

skilled trades apprentices. As discussed in more detail in Exhibit 4A, Tab 4, Schedule 3, Toronto Hydro's apprenticeship program is key to addressing the aging workforce challenge that the utility faces in the next five to ten years, as 25 to 50% of the workforce is expected to be eligible for retirement.⁶ Due to the complexity of Toronto Hydro's system and the number of legacy assets that are largely unique to the utility in the Ontario context (e.g., Paper-Insulated Lead-Covered cable, Box Construction), apprentices are required to complete several years of theoretical and practical training to gain the requisite skills and knowledge that is required to work on Toronto Hydro's system safely and efficiently.

4.1. Segment Costs

Table 4 presents the Historical (2011-2013), Bridge (2014) and Test Year (2015) expenditures for the Internal Work Execution segment.

Table 4: Internal Work Execution Segment Expenditures (\$ Millions)

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Internal Work Execution	11.6	10.4	7.9	8.8	10.3

The significant decline in expenditures over the 2012 to 2014 years is attributable to two main factors:

- Transfer of resources from Internal Work Execution to the Contractor Administration segment described above, reducing the costs of this segment while simultaneously increasing the cost of the Contractor Administration portfolio.
- Significant reduction in apprentices training relative to the 2011 levels.

Certified and skilled trades are critical resource in the execution of Toronto Hydro's capital and maintenance programs, which are necessary to maintain the safety and reliability of the distribution system. To maintain a sufficient complement of these key

⁶ For more information, also refer to Exhibit 4A, Tab 2, Schedule 14.

1 positions, in light of the retirements that the utility expects to encounter over the 2015-
2 2019 rate period and thereafter, Toronto Hydro must invest in its apprenticeship training
3 programs.

4 5 **4.2. Test Year Segment Costs**

6 The 2015 Test Year costs for the Work Execution segment is \$10.3 million, which
7 represents an increase of \$1.5 million above the projected Bridge Year expenditures.
8 This increase is driven by the need for sustained investment in apprenticeship training
9 programs. As explained in Exhibit 4A, Tab 4, Schedule 3, apprenticeship programs are a
10 key aspect of Toronto Hydro's workforce renewal strategy. These programs are required
11 to ensure a stable complement of certified skilled trades to execute capital and
12 operational work programs during the 2015-2019 period and beyond, and to facilitate a
13 smooth generational turnover in light of the significant levels of retirement (25% to 50%)
14 that the utility anticipates over the next five to ten years.

15 16 17 **5. STATIONS SEGMENT**

18 The Stations segment includes the planning, training and supervisory costs associated
19 with maintenance and capital work on Toronto Hydro's 215 Transformer and Municipal
20 Stations, and the associated protection and control infrastructure that are not attributable
21 to any specific stations projects or programs. These expenditures arise in the process of
22 planning, design coordination and oversight of the variety of activities that encompass the
23 station-related work. This segment also includes costs associated with instructors' time
24 for stations apprentice training. Currently, over half of the total tradespersons within the
25 stations groups are apprentices.

1 **5.1. Segment Costs**

2 Table 5 presents the Historical (2011-2013), Bridge (2014) and Test Year (2015)
3 expenditures for the Stations segment.

4

5 **Table 5: Stations Segment Expenditures (\$ Millions)**

	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Stations	2.4	3.0	3.0	3.4	3.0

6 **5.2. Test Year Segment Costs**

7 The 2015 Test Year Stations segment costs are \$3.0 million, consistent with 2012 and
8 2013 levels, and \$0.4 million lower than 2014 Bridge Year projections.

FLEET AND EQUIPMENT SERVICES PROGRAM

1. SUMMARY

Table 1: Fleet and Equipment Services Program Costs (\$ Millions)

Program	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Fleet & Equipment	8.7	8.6	8.7	8.4	8.9

The Fleet and Equipment Services (“FES”) program encompasses the procurement, maintenance and disposal of Toronto Hydro vehicles, associated equipment, and employee personal protective gear/equipment. It is also responsible for ensuring that certain safety equipment and implements are tested and repaired in accordance with occupational health and safety requirements and other applicable standards. Comprehensive and timely delivery of these services facilitates Toronto Hydro’s ability to carry out its electricity distribution activities in a safe, reliable, and expedient manner.

2. PROGRAM DESCRIPTION

The program and the associated budget are subdivided into two segments, namely:

- Equipment Services; and
- Lab Services.

The Equipment Services segment is comprised of services that oversee that Toronto Hydro’s 660 vehicles and the associated equipment remain in good working order, are optimally utilized, and are safe for both the Toronto Hydro employees operating them and the general public they share roads with. This includes procurement, maintenance, and administration of vehicle use using a combination of internal and external resources to reduce safety risks and facilitate value-for-money. Over the 2011-2013 historical

1 period, Toronto Hydro implemented a number of fleet-related productivity and
2 efficiency-enhancing programs, which allowed the segment expenditures to remain
3 generally flat over the more recent years.

4
5 Toronto Hydro plans to continue implementing further productivity and efficiency-
6 enhancing initiatives to manage the maintenance costs, driven in large part by the planned
7 volumes of fleet-related capital expenditures.¹

8
9 The activities comprising the Lab Services segment are an important component of
10 Toronto Hydro's strong health and safety performance. This includes regular testing of
11 employee Personal Protective Equipment ("PPE"), and the repair of confined space gas
12 monitors which assist in protecting Toronto Hydro crews working in underground vaults
13 and cable chambers from being exposed to harmful gases. Lab Services segment
14 expenditures also include the cost of repairs and tests for transformer network protection
15 relays. The segment's expenditures have declined over the historical period due to the
16 2012 restructuring and outsourcing of some activities formerly performed in-house.

17
18
19 **3. EQUIPMENT SERVICES SEGMENT**

20 The Equipment Services segment covers all functions related to maintenance, repair and
21 management of Toronto Hydro's vehicles and related equipment. The nature and
22 frequency of vehicle maintenance activities are driven by the Ontario Ministry of
23 Transportation requirements, vehicle manufacturer standards and specifications, safety
24 testing requirements for vehicle-mounted equipment, Ministry of Labour standards, and
25 vehicle warranty specifications.

26

¹ Exhibit 2B, E8.1

1 As of April 30, 2014, Toronto Hydro's fleet is composed of 660 units including cars,
2 pickups, bucket trucks and other utility units such as sweepers, backhoes and forklifts.

3
4 All vehicles and equipment undergo periodic preventative maintenance, scheduled on the
5 basis of time elapsed or distance travelled since the last inspection. Toronto Hydro
6 performs the majority of this work in-house, typically inspecting each unit and the
7 equipment mounted on it at least once a year, or as provided by manufacturer
8 specifications or other relevant standards and regulations. In 2013, Toronto Hydro
9 completed over 2,500 preventative maintenance jobs, totalling 7,200 hours of labour.

10
11 Toronto Hydro generally employs the services of external vendors for certain types of
12 work, including:

- 13 • work that would expose Toronto Hydro employees to greater physical risk – such
14 as vehicle suspension work;
- 15 • work that does not require the technical expertise of a licensed mechanic such as
16 tire replacement;
- 17 • work requiring specific skills or credentials that Toronto Hydro Fleet employees
18 do not possess, such as aerial lift dielectric testing; and
- 19 • work using equipment not owned by, or not readily accessible by the utility such
20 as vehicle emissions testing.

21
22 Toronto Hydro also secures select services by way of competitive multi-year tenders,
23 with respect to a number of fleet-related activities including:

- 24 • parts procurement and management;
- 25 • fuel procurement and delivery;
- 26 • commercial gas station fuel card services;
- 27 • GPS system licensing and technical support;
- 28 • tire replacement and repair service; and

- vehicle towing services.

The Requests for Proposal (“RFPs”) to procure these services and the subsequent RFP evaluation frameworks are structured to minimize overall maintenance and administration costs, reduce vehicle downtime, and ensure predictable service levels over the length of the contract.

3.1. Segment Costs

Table 2 presents the Historical (2011-2013), Bridge (2014) and Test Year (2015) expenditures for the Equipment Services segment.

Table 2: Table 2: Equipment Services Costs (\$ Millions)

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015Test
Equipment Services	8.0	8.0	8.1	7.8	8.3

3.2. 2011-2014

Toronto Hydro’s 2012 and 2013 actual Equipment Services expenditures were essentially flat versus 2011 actuals, with minor cost increases resulting from normal inflationary pressures and the terms of the utility’s collective agreements, offset by efficiencies from the initiatives described below.

Toronto Hydro forecasts its 2014 Bridge Year expenditures to be \$0.3M lower than the 2013 actuals, due to lower payroll costs, and an anticipated reduction in parts purchases as vehicles are refreshed through 2013 and 2014.

Since 2011, Toronto Hydro has implemented several productivity and efficiency initiatives that helped the utility manage its fleet cost levels. These initiatives include:

- 1 • **Unit Reduction** – Toronto Hydro removed 79 vehicles from its fleet in 2011 to
2 2013, and expects to remove another seven by the end of 2014. This has been
3 enabled by operational efficiencies elsewhere in the utility that subsequently
4 reduced Toronto Hydro’s transportation requirements.
- 5 • **GPS Implementation** – In 2010, Toronto Hydro equipped all of its vehicles with
6 GPS telemetry units. Knowledge of each vehicle’s exact location and electronic
7 data query capabilities improved preventative maintenance attainment rates and
8 reduced labour requirements for performance tracking (kilometres, engine hours
9 etc).
- 10 • **Vehicle Sharing** – In 2011, Toronto Hydro undertook a small vehicle sharing
11 pilot study for a single division, leading to increased vehicle utilization and
12 reduction of dedicated vehicles by five units. The program is currently being
13 expanded to large vehicles used throughout the organization.
- 14 • **Maintenance Optimization** – Starting in 2014, the utility extended the regular
15 maintenance cycle for its light vehicles, thereby reducing requisite labour
16 requirements, and aligning maintenance cycles with manufacturer
17 recommendations.
- 18 • **External Service RFPs** – In 2013, Toronto Hydro held tenders for bulk fuel
19 purchases, truck-to-truck diesel fuel delivery, and fuel card services. The
20 resulting contracts are expected to generate additional savings in the above-noted
21 areas.
- 22 • **Activity Outsourcing** – Toronto Hydro engaged a number of external vendors to
23 support its fleet management functions, including consignment-based parts
24 management and distribution, vehicle decommissioning and vehicle licence
25 procurement and monitoring.

3.3. Test Year Segment Costs

Test Year expenditures are targeted to increase by \$0.5 million from the projected 2014 Bridge Year expenditures. In addition to normal inflationary pressures, this increase is primarily due to a \$0.2 million contractual labour cost increase and a \$0.1 million increase in re-allocation of carrying costs for vehicles being used in the vehicle sharing program.

Over the 2015 Test Year and beyond, Toronto Hydro expects to manage equipment services segment increases through several further productivity and efficiency initiatives described below:

- **Vehicle Replacement Times** – in 2013, Toronto Hydro commissioned a comprehensive vehicle Life Cycle Analysis (“LCA”) study, the findings of which are expected to allow the utility to realize operational efficiencies going forward.
- **Vehicle Sharing Expansion** – the utility expects that the planned expansion of the previously described program will result in further vehicle count reductions, leading to maintenance efficiencies and faster restoration of identified failures.
- **Incremental RFPs** – Toronto Hydro plans to issue competitive tenders for towing, tire supply and maintenance, and GPS services. The utility expects that these tenders will result in proposals offering service improvements and competitive pricing.

Fleet and Equipment Services activities are a foundational component of basic utility operations, as they facilitate Toronto Hydro vehicles being able to adequately support system maintenance and capital investment initiatives, and help to ensure that the utility’s vehicles are safe, reliable, and deliver consistent performance. The proposed Equipment Services Test Year expenditures supports the provision of labour, replacement parts, fuel, services, and administration required to execute these activities. To enhance the value of these services, Toronto Hydro has taken a number of steps to improve the efficiency of its

1 program delivery; these initiatives have had positive effect on constraining the utility's
2 Test Year forecasts in light of increasing cost pressures associated with supporting
3 Toronto Hydro's capital and maintenance programs.

4
5 Segment expenditures are generally driven by preventative maintenance and repair
6 requirements identified by field staff. A reduction from the proposed level of spending
7 may result in the following adverse consequences:

- 8
9 • **Safety Risks** – A reduction in segment expenditures could lead to reduction of
10 frequency or scope of maintenance activities. Longer intervals between
11 maintenance work could increase the possibility of defects going undetected, thus
12 increasing the safety risk to Toronto Hydro employees and the general public.
- 13 • **Reliability Risks** – Reduction in maintenance levels could lead to increased
14 vehicle downtime due to higher field failures, or an increase in the number of
15 reported vehicle defects requiring vehicles to be taken out of service. Ultimately,
16 fleet availability and vehicle or mounted equipment failure while on a reactive
17 call could adversely affect Toronto Hydro's ability to deliver timely service to the
18 public and result in prolonged outages.
- 19 • **Shop Productivity Impact** – Reduction in regular maintenance could result in
20 longer and more complex repairs thereby prolonging the time it takes for vehicles
21 to be returned to service when failures are identified.

22 23 24 **4. LAB SERVICES SEGMENT**

25 The Lab Services segment supports the acquisition, certification and testing of safety
26 tools, implements, and PPE worn by Toronto Hydro's field crews. The expenditures
27 comprising this segment include:

- 28 • cost of procurement, cleaning, inspection, and electrical testing of rubber gloves;

- repair and calibration of network system protection relays;
- repair, calibration and technical support of confined space gas monitors;
- collection of test data of all insulated material tested within the lab; and
- cost of testing equipment maintenance and membership fees to sustain the lab's North American Independent Laboratories ("NAIL") certification.

Services performed by the equipment testing laboratory are important to the safety of the utility field crews performing work on Toronto Hydro's distribution system.

Compromised insulating material or improperly functioning gas detectors while in use in Toronto Hydro's network vaults and cable chambers can expose these employees to significant potential safety risks. In addition, improperly functioning or untested and uncertified system protection relays could result in a protector failure or the disabling of power transformers, compromising grid integrity and overall system reliability.

As previously stated, rubber glove and gas monitor use are a legislative requirement for the utility's electrical distribution activities. The availability and the integrity of both types of implements are essential to facilitating the safety of Toronto Hydro employees. It is important that the employees performing the testing and certification work are appropriately skilled regarding both testing and repair procedures, as applicable.

Employees repairing and certifying gas monitors and relays possess specific training and certification pertinent to the products and equipment that they process. Experience performing these functions is a key element of the lab technician's role. The current lab staffing complement possesses aggregate combined experience of almost 70 years.

4.1. Segment Costs

Table 2 presents the Historical (2011-2013), Bridge (2014) and Test Year (2015) expenditures for the Lab Services segment.

1 **Table 3: Laboratory Services Expenditures (\$ Millions)**

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Lab Services	0.7	0.6	0.6	0.6	0.6

2 As shown in the Table 3, the segment costs have decreased since 2011 by approximately
3 \$0.1 million. The primary cost reductions between 2011 and 2012 were achieved
4 through reduction of the lab staffing complement and outsourcing of the following
5 services:

- 6 • Manufacturing, repair, and annual certification of portable grounding devices;
- 7 • Repairs and certification of manual equipment used by overhead linepersons; and
- 8 • Cleaning and certification of rubber electrical line covers.

9
10 Segment costs were largely flat 2012 through 2013, and are projected to remain flat
11 through both bridge and test years, primarily due to attrition and reduction in the scope of
12 work expected to offset the normal inflationary pressures and collective agreement
13 provisions.

14

15 **4.2. Test Year Segment Costs**

16 The 2015 segment expenditures are expected to remain in line with 2012 through 2014
17 bridge levels, with normal inflationary cost increases offset by the reduction in the scope
18 of work performed in-house.

19

20 The activities performed by the Lab Services program are non-discretionary for the
21 purposes of normal utility operations at Toronto Hydro. The use and periodic testing of
22 rubber gloves in the performance of live line electrical work is mandated by law. Rubber
23 gloves are considered personal protective equipment, and are worn to protect a worker
24 from potential exposure to live equipment. The lab must perform a periodic 30-60 day
25 washing, visual inspection and electrical testing of all in-service rubber gloves to
26 facilitate Toronto Hydro employees performing live line electrical work safely.

1

2 The use and periodic testing of gas monitors is also a legislative requirement. Toronto
3 Hydro's gas monitors are used to test air quality/toxicity both prior to entering and while
4 working in a confined space, such as an underground vault or a cable chamber. Toronto
5 Hydro performs repair work on the monitors as required to ensure that they function as
6 specified by the manufacturer, and completes all repairs and calibration of
7 malfunctioning units. Without access to functioning gas monitors when required,
8 Toronto Hydro employees would not be able to enter confined spaces as needed to carry
9 out their system maintenance and capital investment work.

10

11 Network protector relays are protective devices used to trigger a power transformer
12 network protector when power is detected to be flowing in the reverse direction. The
13 protector in turn disconnects the transformer from the secondary network to protect the
14 stability and reliability of the network, as well as to prevent backward flowing current
15 from moving from the secondary network towards the primary feeders. The electro-
16 mechanical relays used by Toronto Hydro and serviced by the lab are no longer in
17 production, and the Toronto Hydro Lab is currently the only Toronto Hydro-approved
18 provider of repair and certification services. Absent this service, Toronto Hydro power
19 transformer protectors requiring these relays would not function, compromising the
20 stability and reliability of the network. For this reason, the services provided in this
21 program are critical for ongoing, reliable, and continuous operation of some of Toronto
22 Hydro's network transformers, as well as the integrity of the grid connected to them.

23

24 Reductions to the proposed level of spending would affect the Laboratory's ability to
25 complete testing and procure materials for complete certification and repair of all PPE
26 and equipment serviced by the lab.

FACILITIES MANAGEMENT PROGRAM

1. SUMMARY

Table 1: Facilities Management Program Expenditures (\$ Millions)

	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Facilities Management Program	24.6	23.5	24.2	27.2	27.5

/C

Toronto Hydro's Facilities Management program delivers the workspace and property management services that enable the utility's employees to perform their work in optimally configured surroundings, and maintain the safety, operability and structural integrity of Toronto Hydro's station buildings. The program centralizes functions related to property management, including custodial services, security, utilities and communications, lease and rental agreement management, and other functions directed at maintaining and keeping the utility's facilities in good working order and in compliance with applicable legislation and regulations.

2. PROGRAM DESCRIPTION

Toronto Hydro's current building footprint consists of seven office buildings and 215 stations located throughout Toronto on more than 6,000,000 square-feet of property. All these buildings and stations are in various states of repair and range in age from historic sites built in the 19th century to new buildings built in the 1990s. Each property serves a unique purpose and needs to be maintained and serviced to meet standards mandated by legislative and regulatory requirements, to comply with Toronto Hydro's environment, health and safety policies, as well as facilitate Toronto Hydro's functions related to distributing electricity.

1 Operating and maintenance requirements for facilities reflect the results of evaluations
2 conducted by a combination of internal experts, independent architectural and
3 engineering firms, and original manufacturer equipment specifications. Toronto Hydro
4 works to ensure that this technical information is translated into actionable capital and
5 maintenance work plans and is ultimately executed within the appropriate timeframes.

6
7 A subset of facilities maintenance work is driven by local and provincial government
8 safety accessibility, emergency preparedness and environmental regulations. These
9 include:

- 10 • Emergency generator maintenance;
- 11 • Eye wash stations inspections;
- 12 • Fire suppression certifications and inspections;
- 13 • Lifting device inspections and certifications;
- 14 • Waste audits; and
- 15 • Designated substance surveys.

16
17 Failure to comply with government regulations can result in temporary equipment lock
18 out and/or fines, which may lead to costly interruptions to regular business activities that
19 can ultimately affect Toronto Hydro's customers.

20
21 In addition to the externally mandated work, Toronto Hydro's Facilities Program
22 oversees the provision of services for Toronto Hydro buildings and stations which
23 include the following:

- 24 • **Routine Maintenance** – ventilation unit and generator testing, grease trap
25 clearing;
- 26 • **Preventive Maintenance** – daily inspections of lights, elevators, emergency
27 exits;

- 1 • **Office Services** – custodial work, paper shredding, furniture moves and
- 2 alterations;
- 3 • **Property Maintenance** – snow removal, landscaping, storm sewer clearing;
- 4 • **Security** – guards, surveillance equipment maintenance, access card services; and
- 5 • **Environmental Services** – recycling services, regulated first aid kit disposal.
- 6

7 Starting in 2014, Toronto Hydro consolidated the management of the above and related
8 services under a single Facilities Management Operation (“FMO”) function, performed
9 by a third-party provider. This arrangement effectively creates a “one-window” approach
10 for all facilities-related enquiries from utility staff and facilitates effective coordination of
11 work. The implementation of a unified contract coordination function through the FMO
12 is an expenditure driver for the 2014 Bridge and 2015 Test Year, as discussed in more
13 detail below.

14
15 The remainder of the Facilities Management program expenditures cover administration
16 of Toronto Hydro’s lease and rental agreements, provision and inventory services of
17 building maintenance tools and equipment, cost of managing utility and communication
18 services, and property taxes.

19
20 In accordance with the above-noted activities, the Facilities Management program is
21 comprised of three segments; the Historical (2011-2013), Bridge (2014) and Test Year
22 (2015) expenditures of each segment are summarized in Table 2 below.

23
24 **Table 2: Facilities Management Program Expenditures by Segment (\$ Millions)**

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Facilities Maintenance Services	11.9	10.0	10.4	13.0	13.5
Rentals & Leases	4.4	5.0	5.0	5.2	5.2

/C

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Utilities & Communications	2.2	2.1	2.4	2.6	2.4
Property Taxes	6.1	6.5	6.4	6.5	6.2
Total Facilities	24.6	23.5	24.2	27.2	27.5

/C
/C
/C

3. FACILITIES MAINTENANCE SERVICES SEGMENT

Toronto Hydro's facilities maintenance segment relies on a combination of internal resources and more than 100 vendors to perform the necessary tasks and services to maintain its properties, including offices, work centres and buildings housing the utility's Transformer and Municipal stations ("TS" and "MS", respectively).

The building and property maintenance segment covers a broad range of daily, monthly and annual maintenance activities driven by internal health and safety policies, findings of internal and external engineering studies, stipulations of local and provincial legislation, and industry best practices. The focus of this program is to provide Toronto Hydro employees with a safe work environment that encourages effective and efficient execution of their duties, as well as to ensure that all owned and leased properties and buildings, including stations, are structurally sound and facility employee and public safety.

Facilities personnel possess a range of diverse skill sets and professional designations, including Building System Technicians, certified electricians, heating ventilating and air conditioning ("HVAC") technicians, welders and other similar trades certifications and training. This range of skills and expertise allows Toronto Hydro to ensure proactive and reactive identification and resolution of any issues that may affect the company's workforce and operation of its structures. Toronto Hydro's attention to regular

1 preventative maintenance of its office buildings and work centres contributes to the
2 utility's safety record.

3
4 Toronto Hydro utilizes internal resources to complete preventative, corrective and
5 reactive maintenance activities in the utility's office buildings and work centres. This
6 includes work related to lighting, plumbing, heating, ventilation and air conditioning
7 systems that require periodic inspections and repairs to ensure service quality and
8 continuity.

9
10 Preventative maintenance entails routine inspections and tasks to ensure that equipment,
11 systems and their respective components are fully operational. This includes activities
12 such as periodic inspections of magnetic locks on all of Toronto Hydro's emergency
13 exits, to prevent unauthorized entry and release when a fire alarm is activated. Through
14 routine preventative inspections Toronto identifies the systems and objects requiring
15 corrective work, ensuring that any malfunctions are proactively rectified. Toronto Hydro
16 performs over 1,600 preventative maintenance checks a month to ensure that all office
17 buildings and work centres are fully operable and safe.

18
19 Reactive facilities maintenance work involves responses to reports and requests to
20 address any specific problems that materialize from time to time. Examples of reactive
21 work include repairs of broken lights, adjustments of building temperatures to meet the
22 requirements of the *Occupational Health and Safety Act*,¹ and repairs to parking gates.
23 For large-scale reactive activities or tasks requiring specialized skills, Toronto Hydro
24 retains the services of external contractors.

25
26 Prior to 2014, Toronto Hydro managed over 100 individual contracts with providers of
27 external services, ranging from regular custodial work to specialized support such as

¹ R.S.O. 1990, c. O.1 [*"Occupational Health and Safety Act"*].

1 elevator maintenance, fire suppression systems inspection, or mechanized lifting and
2 crane device repairs. In 2014, Toronto Hydro took steps to consolidate the management
3 of its external contract services under a single contract with an external Facilities
4 Management Operator (“FMO”). The FMO provider is responsible for procuring,
5 scheduling, and tracking the contract services that Toronto Hydro formerly sourced on an
6 individual basis.

7
8 Through the FMO, Toronto Hydro now manages and administers a single external
9 facilities contract, passing the bulk of administrative work to the FMO, who sub-contracts
10 the individual services. This arrangement significantly streamlines the process for
11 Toronto Hydro’s procurement and accounts payable functions, by eliminating the need
12 for creation and processing of a large number of tenders, purchase orders, and invoices.
13 Beyond the administrative efficiencies, external contract consolidation allows Toronto
14 Hydro to leverage the size of the FMO tender to obtain more competitive prices and
15 increase the efficiency of responding to unforeseen work requirements.

16
17 Beyond the administrative efficiencies and volume-based savings, the FMO arrangement
18 offers Toronto Hydro a number of services that were not available internally prior to
19 external services consolidation. These include:

- 20 • a 24-hour one-window call center for all facility emergencies and requests;
- 21 • an asset database that links work orders to Toronto Hydro’s assets such as
22 generators, cranes and elevators. This facilitates asset management efficiency and
23 simplifies compliance with the requirements of the International Organization of
24 Standardization (“ISO”).
- 25 • a Central Maintenance Management System (“CMMS”) that automatically
26 schedules preventative work. System data can be queried to produce custom
27 reports that help Toronto Hydro plan capital projects more effectively.

These services provide Toronto Hydro with the means to react to issues sooner, track data on reoccurring problems in a systematic manner, and formulate improved facilities capital expenditure plans. This is a significant efficiency improvement over the previous arrangement, where building and equipment maintenance records were housed in separate paper-based binders located at each facility, requiring significant manual effort to consolidate information for the purpose of work planning and execution.

Moreover, prior to the introduction of a consolidated FMO, the Facilities program had to administer large volumes of individual purchase orders, contract tenders, and receipting and invoicing documents. Locating the appropriate contact for a particular service request and processing payments was significantly more resource-intensive, leading to service delays and occasional payment processing errors. These issues have now been addressed through introduction of a streamlined one-window facilities management approach.

3.1. Segment Costs

Toronto Hydro's Historical (2011-2013), Bridge (2014) and Test Year (2015) expenditures are summarized in Table 3. These costs include both internal and external work, vehicle cost and other related expenses. The main drivers for year-over-year cost variance included organizational restructuring activities, outsourcing expenses, and seasonal expenditures that vary depending on weather conditions.

Table 3: Facilities Maintenance Services Costs (\$ Millions)

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Facilities Maintenance Services	11.9	10.0	10.4	13.0	13.5

/C

3.2. 2011-2012

The \$1.9 million decrease in 2012 expenditures from the 2011 levels is primarily related to the 2012 restructuring program administered throughout the utility, lower snow removal expenditures due to a warmer winter, partially offset by normal inflationary increases.

3.3. 2012-2013

The \$0.4 million increase in expenditures from 2012 to 2013 was largely driven by normal inflationary pressures and higher variable seasonal expenditures such as snow removal.

3.4. 2013-2014

The \$2.6 million increase in costs from 2013 to the projected 2014 Bridge Year levels is related to normal inflationary pressures and the introduction of the Facilities Management Office outsourcing arrangement, which has significantly increased the scope of facilities services available at Toronto Hydro, while streamlining a number of internal processes and reducing the general administrative burden.

3.5. Test Year Segment Costs

The \$0.5 million increase in the maintenance service cost from the Bridge Year to the Test Year forecasted expenditures is driven by normal material and labour inflationary pressures (e.g., parts and supplies, labour, and vehicle costs), costs of incremental activities identified through FMO's analysis and the expenditures associated with the management of buildings housing Transformer and Municipal stations, and maintenance expenditures associated with Copeland Transformer Station (TS). These costs are partially offset by anticipated savings from the proposed Operational Centre Consolidation Program, discussed in Exhibit 2B, E8.2.

/C

/C

/C

Facilities maintenance activities facilitate safe and efficient operation and functional integrity of Toronto Hydro's buildings, work centres and station civil infrastructure. The work comprising this segment aids in Toronto Hydro employees performing their duties

1 in well-maintained and optimally configured surroundings, assisting productivity and
2 timely execution of day-to-day functions that comprise Toronto Hydro's mandate. A
3 subset of Toronto Hydro's maintenance work is required by the federal, provincial and
4 municipal laws.

5
6 Timely maintenance of key facilities equipment such as ventilation, fire suppression,
7 elevation and lifting devices facilitates service continuity by preventing equipment
8 outages or mandatory "lock-downs" as a result of unsuccessful inspections or audits.
9 This, in turn, enables Toronto Hydro to perform its key functions, thus maintaining
10 service availability and continuity relied upon by the utility's customers.

11
12 The recently implemented FMO model allows Toronto Hydro to drive further process
13 efficiencies while expanding the range of available services that benefit the utility and its
14 customers. Moreover, the maintenance management system underlying the FMO
15 arrangement allows Toronto Hydro to automatically generate up-to-date expenditure
16 reports at any point in time, enabling quick identification of any emerging trends in
17 expenditures or problem areas. Over the longer timeframe, the FMO arrangement
18 provides Toronto Hydro with flexibility with respect to future staffing levels.

19
20 Any reduction in funding levels would result in curtailments of the scope, frequency and
21 timeliness of maintenance activities. This could, in turn, create situations where safety
22 issues or equipment malfunctions are not identified and rectified in a timely manner, thus
23 imposing potential safety risks to Toronto Hydro's employees or compromising the
24 utility's ability to perform its key functions due to equipment malfunctions.

4. RENTALS AND LEASES SEGMENT

Toronto Hydro's rentals and leases costs are a function of the utility's existing or planned agreements with owners and/or managers of properties occupied by Toronto Hydro's office buildings and work centres.

4.1. Segment Costs

Table 4 details Historical (2011-2013), Bridge (2014) and Test Year (2015) costs of the Rentals and Leases segment.

Table 4: Rentals and Leases Costs (\$ Millions)

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Rentals and Leases	4.4	5.0	5.0	5.2	5.2

4.2. 2011-2012

The rentals and leases costs increased by 14% between 2011 and 2012 due to the termination of the lease inducement period for two of Toronto Hydro's office buildings that end in mid 2012. The inducement, which resulted in a reduction in monthly rental payments, accounts for approximately \$0.4 million increase in 2012. In addition, Toronto Hydro began to lease another property from January 2012 and renewed two existing lease agreements, in December 2011 and August 2012, respectively.

4.3. 2012-2013

Toronto Hydro's rentals and leases expenditures remained largely flat between 2012 and 2013. Although there was an increase in the overall cost of the lease, as stipulated by the contracts for the lease and rental agreements, these costs were offset by the credit received from one of Toronto Hydro's landlords due to discovery of overpayment over the 2010-2012 period.

4.4. 2013-2014

The \$0.2 million increase in rentals and leases costs between 2013 and 2014 is driven by cost increase contract provisions. Toronto Hydro does not project that there will be any termination of lease inducement period, credit to the cost due to over payment in previous years or any other variables impacting rentals and lease costs in 2014.

4.5. Test Year Segment Costs

Toronto Hydro's Test Year segment costs are projected to remain flat between the 2014 Bridge and 2015 Test Year, with the normal contractual cost increases partially offset by anticipated staffing attrition. The utility's rentals and leases expenditures are driven by needs for sufficient, properly configured and cost-effective office and work centre space. The utility attempts to minimize its rental and leasing expenditures by working with commercial property brokerage companies that assist Toronto Hydro in securing the appropriate space at fair market value and otherwise suitable contractual arrangements.²

5. UTILITIES AND TELECOMMUNICATIONS SEGMENT

The Utilities and Telecommunications segment encompasses the costs of providing water, electricity, natural gas and related services to Toronto Hydro's office buildings, work centres and transformer and municipal stations. The utility's costs for this segment are driven by the costs it is charged by service providers. Beyond service rate increases, the year-over-year cost variances are affected by fluctuations in weather, such as extremely hot summers that increase electricity consumption or cooler-than-normal winters that result in higher heating expenditures.

² Toronto Hydro acknowledges that as a part of its proposed Operational Centre Consolidation Strategy, (Exhibit 2B, E8.2), contemplates expiration of the lease arrangements on two of the existing buildings during the term of the CIR plan.

Toronto Hydro works to manage its utilities costs by progressively improving the energy efficiency of its facilities. To facilitate consistent implementation of energy efficiency standards, Toronto Hydro has developed standards that outline the relevant energy, water and gas efficiency criteria that the utility's new and renovated work spaces adhere to. Consistent with its standards, Toronto Hydro has upgraded a large portion of its shared spaces with energy efficient lights, where it is economical to do so. The utility is also working to gradually convert its bathrooms to low-flow technologies.

Similar to utilities, telecommunications are another key component of the Facilities program expenditures. Desk phones, cell phones, internet access and other wireless communication equipment and services are vital tools for the day-to-day operations at Toronto Hydro. Beyond the typical business enablers, communications services and infrastructure enable the utility's security systems to communicate with command posts via fibre-optics or wireless networks, and allow service vehicles to have constant communication with dispatchers and the control room.

5.1. Segment Costs

Table 5 presents the Historical (2011-2013), Bridge (2014) and Test Year (2015) costs relating to Utilities and Telecommunications.

Table 5: Utilities and Telecommunications Segment Costs (\$ Millions)

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Utilities & Telecommunications	2.2	2.1	2.4	2.6	2.4

Utilities and Telecommunications costs have increased during the 2011 to 2014 period by approximately eight percent, driven by utility rate increases and general increase in

1 aggregate utilities demand driven by employee needs, partially offset by the results of
2 work to improve Toronto Hydro's utilities consumption efficiency.

3
4 **5.2. Test Year Segment Costs**

5 Toronto Hydro's Utilities and Telecommunication segment expenditures for the 2015
6 Test Year are expected to decrease by \$0.2 million relative to the 2014 Bridge Year, due
7 to the anticipated savings from the Operational Centre Consolidation Program³, which are
8 projected to offset the normal inflationary pressures for the year, along with the
9 incremental expenditures associated with Copeland TS.

/C

10
11 Utilities and Telecommunications are essential business tools and commodities driven by
12 circumstances largely outside of Toronto Hydro's control. As noted above, Toronto
13 Hydro works to continuously improve its energy and efficiency performance by
14 progressively upgrading the equipment standards used across its facilities where it is
15 economic to do so. These improvements allow Toronto Hydro to partially control the
16 pace and scale of its utilities expenditures.

17
18
19 **6. PROPERTY TAXES SEGMENT**

20 Property taxes are imposed on the basis of the amount of property owned by Toronto
21 Hydro, the municipal tax rates and any applicable credits. With more than 6,000,000
22 square feet of property in Toronto, property taxes are a significant expense for Toronto
23 Hydro. Historically, the property taxes in Toronto have increased at a rate of three
24 percent per year. Toronto Hydro expects a similar trend to continue through the Test
25 Year and beyond, which is reflected in the utility's forecasts.

³ Exhibit 2B, E8.2

6.1. Segment Costs

Table 6 presents the Historical (2011-2013), Bridge (2014) and Test Year (2015) costs relating to Property Taxes.

Table 6: Property Taxes Segment Costs (\$ Millions)

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Property Taxes	6.1	6.5	6.4	6.5	6.2

6.2. 2011-2012

In determining property tax for the year, Toronto Hydro estimates the cost and accrues it for the year. At year end, an adjustment is done in order to show the actual cost of property tax. In 2012, the Municipal Property Assessment Corporation (“MPAC”) conducted their four year assessment cycle, where all Ontario properties were assessed to determine the true value of the properties for calculating property tax. On average, the value of the properties increased by 22 percent, which will be phased in over a four-year period. This helps explain the sudden 7 percent increase from 2011 - 2012.

6.3. 2012-2013

The 2013 decrease relative to 2012 reflects the sale of some of Toronto Hydro’s properties and a property tax rate deduction, which further reduced the segment costs.

6.4. 2013-2014

The projected 2014 increase reflects the historical property tax rate increase of three percent Toronto has experienced over the past several years.

6.5. Test Year Segment Costs

Despite the anticipated three percent annual increase of property tax, property tax cost for the Test year is forecasted to be \$0.3 million lower than in the Bridge year, due to the fact

1 that Toronto Hydro intends to sell two office buildings as a part of the proposed
2 Operational Centre Consolidation Program.⁴ The anticipated savings are expected to
3 offset the incremental costs associated with Copeland TS As Toronto Hydro continues to
4 renew and otherwise improve its existing infrastructure, the utility's property taxes are
5 expected to increase over the 2015-2019 rate period. Where relevant, Toronto Hydro
6 plans to continue working with MPAC to ensure that property valuations properly reflect
7 the state and fair market value of Toronto Hydro's real estate asset base, thereby
8 managing this cost component for the benefit of the utility's ratepayers.

} /C

⁴ Refer to the Operational Centers Consolidation Program at Exhibit 2B, E8.3

SUPPLY CHAIN SERVICES

1. SUMMARY

Table 1: Supply Chain Services Program Expenditures (\$ Millions)

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Supply Chain Services Program	7.1	6.6	9.0	10.3	9.9

The Supply Chain Services program supports the execution of Toronto Hydro's asset management plans and other operating programs that rely on procurement and warehousing activities. The overarching goal of the program is to facilitate timely and cost-effective acquisition of services, materials and equipment at requisite quality, while also maintaining an amount of inventory to support uninterrupted work execution and manage materials handling costs. Each year the program facilitates the procurement, warehousing and distribution of \$80-\$90 million in assets, as well as execution of an average of 145 contracts with a total value of about \$230 million.

The Supply Chain Services program consists of one segment comprised of two interrelated functional areas, namely:

- Demand and Acquisition Services; and
- Warehouse and Logistics.

The Demand and Acquisition Services function facilitates the requisite equipment, materials and services being available to Toronto Hydro within the specified timelines and at the optimal cost. This is enabled through strategic sourcing of materials, market trend analysis and benchmarking, proactive inventory management, and performance-based collaboration with vendors. In performing these functions, the Demand and

1 Acquisition Services monitors efficiency and effectiveness of the existing processes, and
2 introduce process-based or technological innovations where warranted.

3
4 The Warehouse and Logistics function facilitates coordinated, cost-effective and timely
5 receiving, stocking and distribution of materials and equipment required to implement
6 Toronto Hydro's capital and maintenance work programs. In 2012, Toronto Hydro
7 implemented a new Warehouse Management System ("WMS") which utilizes barcode
8 technology, allowing more accurate and efficient performance of receiving, picking and
9 staging activities than prior to the system's introduction. The WMS system has also
10 enabled Toronto Hydro to perform its warehousing functions effectively in spite of the
11 20% reduction in staff following the 2012 restructuring program.

12
13 In an effort to enable the current scale of Toronto Hydro's capital program in a flexible
14 and sustainable manner, in 2013 the utility engaged a Third Party Logistics ("3PL")
15 warehousing services provider. The 3PL provider uses Toronto Hydro's WMS software
16 and provides services at competitive market rates. Since the contractual arrangement is
17 based on the actual volumes of work performed by the 3PL supplier, it provides Toronto
18 Hydro with desired scalability in the face of uncertain work program levels and/or any
19 emerging work requirements such as government policy changes or other unforeseen
20 events. The 3PL arrangement is also a key lever in Toronto Hydro's plans to reduce its
21 internal warehouse space over the 2015-2019 timeframe. Further details regarding this
22 service model are provided below.

23
24 Table 1 above provides the total Historical (2011-2013), Bridge (2014) and Test Year
25 (2015) costs of Toronto Hydro's Supply Chain Services program. Overall, the cost
26 variance is explained by utility reorganization activities, warehouse efficiency and
27 sustainability initiatives, and normal changes in operational circumstances. A more
28 detailed discussion of program cost variance is provided in the sections that follow.

For the purposes of internal cost recovery, Toronto Hydro allocates the applicable portions of these costs across its operating programs and specific capital projects using the inventory on-cost rate. The utility calculates the annual rate by dividing the applicable Supply Chain program costs over the anticipated cost of materials supplying that year's capital and maintenance work program. The resulting rate (%) is then added to the materials charged to the capital and maintenance projects. Over the 2011-2014 timeframe, Toronto Hydro's on-cost rate has remained relatively flat, fluctuating between 12% and 14%.

The remainder of this schedule describes in further detail the two functions comprising the Supply Chain Services program, and details the key drivers behind the changes in the Historical, Bridge and Test Year expenditures.

2. PROGRAM DESCRIPTION

2.1. Demand and Acquisition Services

The Demand and Acquisition Services function provides delivery of goods and services to support Toronto Hydro's capital and maintenance work programs, and enables the utility's day-to-day operations. Work in Toronto Hydro's Demand and Acquisition Services function demands an extensive set of supply chain and electricity industry-specific skills, including understanding of the competitive bid process, in-depth knowledge of quantitative analysis and inventory management tools, familiarity with changing electricity system equipment standards, as well as advanced negotiation and communication skills. All current employees possess over a decade of supply chain-related work experience, with 40% having attained, or being in the process of completing the Supply Chain Management Professional ("SCMP") designation.

1
2 The scope of Acquisition Services activities entails sourcing of reputable and reliable
3 suppliers, monitoring their performance to ensure that they meet their contractual
4 obligations, and generating the Purchase Orders that underlie each agreement. Working
5 with the various parts of the utility's operations, Acquisition Services leads the
6 competitive bid generation and evaluation processes, and conducts market benchmarking
7 to identify emerging industry trends and locate suitable suppliers.

8
9 Toronto Hydro bases competitive bid selection decisions on pre-established selection
10 criteria that balance the quantitative and qualitative aspects of each desired proposal
11 developed in collaboration with client business units. Once a supplier is identified,
12 Toronto Hydro develops the contract terms and conditions relevant to the goods or
13 services provided. Acquisition Services monitors supplier performance through
14 collaboration with departments, and/or regular meetings and performance reporting with
15 suppliers themselves.

16
17 To formalize vendor performance monitoring, in 2011 Toronto Hydro launched a
18 Supplier Alliance vendor relationship management program with key providers of wire,
19 cable, transformers and switches, and other products that account for about 80% of the
20 utility's equipment and materials spend. The cornerstone of the program is the Vendor
21 Scorecard, which is closely monitored and discussed at periodic vendor meetings.
22 Commencing 2015, Toronto Hydro plans to expand the vendor relationship program to
23 suppliers providing other forms of goods and services, for example providers of
24 software/hardware..

25
26 Toronto Hydro operates in a dynamic environment, where supplier or manufacturer
27 mergers, acquisitions and closures can affect market segment competition, or minimize
28 the availability of some products. These natural market fluctuations can complicate the

1 utility's ability to procure the requisite materials, and require constant market activities
2 monitoring and proactive vendor relationship management. An illustrative example of
3 this issue is the Paper-Insulated Lead-Covered ("PILC") cable, which makes up about
4 1,300 kilometres of Toronto Hydro's aging underground distribution system. Today,
5 PILC cable is only available from one supplier in North America, which necessitates
6 close collaboration with the supplier and strategically negotiated contractual terms to
7 ensure continuation of supply.

8
9 Beyond the supplier identification, management and materials procurement, the Supply
10 and Acquisition function manages inventory levels in Toronto Hydro's warehouses in
11 support of the utility's capital and maintenance programs. This involves reviewing
12 historic use trends and known work projects to develop planned work requirement
13 forecasts and supplier orders.

14
15 In addition to facilitating the planned work execution, the Demand and Acquisition
16 program oversees materials and equipment stock coverage for the potential reactive work
17 driven by adverse weather, system contingencies and other unforeseen events. To
18 facilitate efficient and expedient execution of reactive work, Toronto Hydro establishes
19 minimum and maximum inventory settings for each warehouse location and determines
20 appropriate material re-order points and quantities that trigger purchase order generation
21 as inventories are gradually depleted. Any late shipments that can affect stock
22 availability for either planned or reactive requirements are expedited with suppliers, and
23 best delivery dates are ascertained and communicated to warehouses and requesting areas
24 of the utility.

25
26 A significant challenge to execution of the Supply Chain program is presented by storm
27 response activities, the nature and magnitude of which are difficult to predict and plan
28 for. The volumes of certain materials, such as overhead wire and associated hardware

1 required in the aftermath of major storms often exceed all normal inventory levels,
2 contingency stocks held by vendors, and forecasted reactive work requirements.

3
4 When major weather events occur, Toronto Hydro works with suppliers to immediately
5 acquire all materials necessary to support power restoration activities. During the recent
6 December 2013 ice storm, for example, the utility worked with its key vendors to
7 expedite significant amounts of additional equipment, tools, and safety supplies from
8 vendors. Toronto Hydro is not aware of any material delays in restoration caused by lack
9 of required materials and equipment.

10
11 Acquisition Services also works with the Standards and Policies segment of the
12 Operations Support – Planning program¹ at Toronto Hydro to identify certain materials
13 and equipment that are crucial to the ongoing operation of the distribution network. Once
14 identified, agreed-upon inventory items are flagged as critical spares and segregated from
15 general stock for specific use in reactive situations. Examples of such equipment include
16 various models and vintages of pad mounted switchgear and transformers. Where
17 materials and equipment at the end of their useful lives are replaced with alternatives
18 built to newer technical standards, Toronto Hydro times the inventory replacement so that
19 the existing stock of the obsolete parts may be used up to minimize any residual
20 inventory. In certain cases, Toronto Hydro may also return remaining quantities of the
21 obsolete equipment to the supplier, or sell them for scrap.

22
23 Since 2008, the Demand and Acquisition Services segment has seen a 10% personnel
24 reduction, while improving the customer service it offers to the user programs. Areas of
25 improvement include better alignment of planning assumptions through assignment of
26 dedicated team members to each user department. Through these processes, Toronto
27 Hydro has, among other things, improved its quality of competitive bid documents, and

¹ Exhibit 4A, Tab 2, Schedule 7.

1 reduction of the completion timelines for the competitive bid process. Process and
2 coordination improvements have generally reduced the timelines for competitive bid
3 preparation activities, with some recent processes taking up to 40% less time than in the
4 past. The efficiencies gained as result of faster project completion allow for timely start
5 to new projects and earlier transition to suppliers that offer potentially lower pricing, or
6 otherwise provide a better value proposition.

7 8 **2.2. Warehouse and Logistics**

9 The Warehousing and Logistics function entails receiving, stocking, and issuance of all
10 inventory materials for Toronto Hydro's capital construction and maintenance
11 requirements. Field crews receive the requisite equipment and materials from one of four
12 warehouse locations strategically situated across the city, including a recently added
13 location managed by a third-party supplier, described in more detail below. The typical
14 activities of the Warehousing and Logistics function include:

- 15 • unloading, visually inspecting, receiving, and storing materials and supplies from
16 vendor vehicles for earliest availability for issuance to crews;
- 17 • picking, staging, and loading electric distribution material onto crew vehicles to
18 allow them speedy exit from the work centres at the beginning of each work day;
- 19 • delivering and distributing requisite materials to and from job sites and between
20 warehouses to facilitate faster and more efficient materials distribution;
- 21 • issuing miscellaneous (over-the-counter) items such as tools, clothing and safety
22 equipment to crews so they continue to have the mandatory safety equipment and
23 necessary tools to perform work;
- 24 • handling excess materials returned from the field upon work completion, such as
25 partial cable reels which can be re-entered into inventory and issued to other jobs;
- 26 • arranging for field equipment slated for repairs or replacement to be returned to
27 vendors and suppliers;

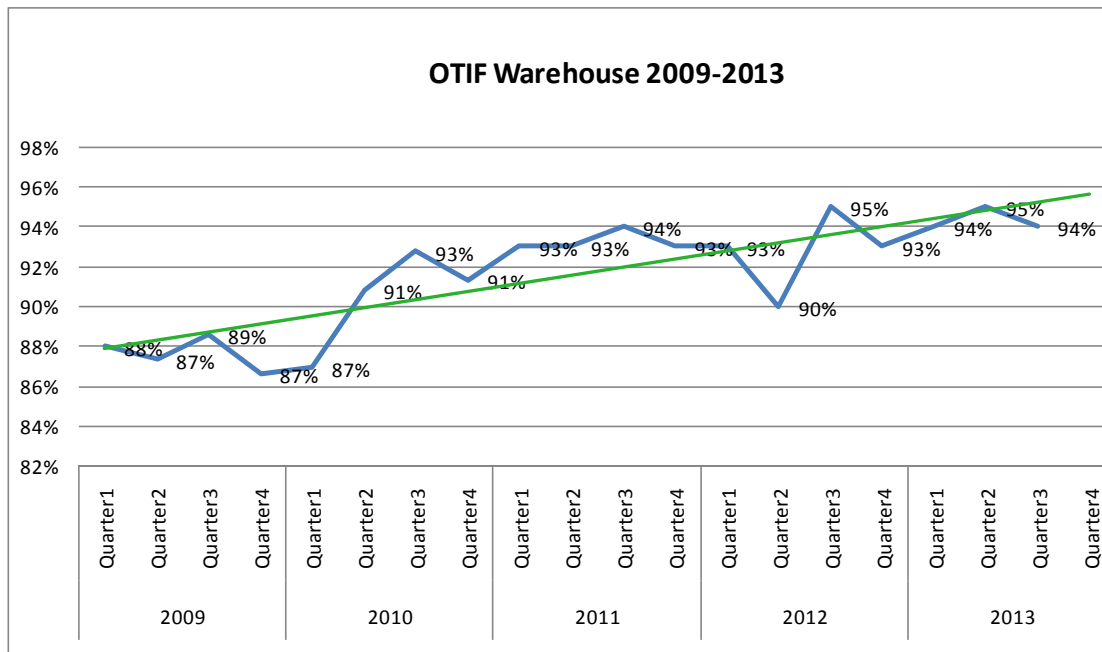
- 1 • establishing and maintaining appropriate minimum and maximum inventory
2 levels at each warehouse to assure appropriate product mix is available to support
3 the type of work being conducted by the crews serviced by each work centre; and
- 4 • performing daily inventory cycle count activities to facilitate the accuracy of
5 Toronto Hydro's financial reporting, and reconcile physical inventory on the shelf
6 with the Acquisition Services records.

7

8 In recent years, Toronto Hydro has worked to improve the service provided by the
9 warehousing function to Toronto Hydro crews and contractors, through initiatives that
10 optimize the staffing levels and warehouse space. These initiatives and their benefits are
11 outlined below.

12

13 In May 2012, Toronto Hydro implemented a new WMS. This software and hardware
14 solution utilizes barcode technology and provides real-time visibility of inventory
15 position, adding efficiency to the receiving and picking functions. Warehouse
16 transactions can be centrally prioritized and assigned to warehouse staff by queuing tasks
17 to the employees' hand-held barcode guns. Tasks such as receiving, picking, and cycle
18 counting can be carried out by the scan of the product bar coding now affixed to all
19 incoming materials. This technological improvement significantly speeds up the
20 previously manual tasks of keying in the entries for every incoming packing slip,
21 outgoing picking slip, or cycle count entry. The use of this technology allows the
22 warehouse to continue to provide and improve on expected service levels to Toronto
23 Hydro crews despite the 20% staff reduction through the 2012 restructuring program. As
24 shown in Figure 1, Toronto Hydro has substantially improved its rate of fulfillment of
25 crew materials and equipment orders on time and in full ("OTIF").



1 **Figure 1: Warehouse Fulfillment Improvement**

2 Commencing April 2013, Toronto Hydro also contracted a Third Party Logistics (“3PL”)
3 provider to operate a fourth warehouse located just north of the city, as an addition to the
4 three existing work centres. Using the same WMS software as Toronto Hydro’s
5 warehouses, the 3PL provider handles incoming supplier deliveries, issues all materials
6 for the planned work program, and distributes all materials used by Toronto Hydro’s
7 electrical contractors. The 3PL provider also replenishes stock to the three Toronto
8 Hydro warehouse locations.

9
10 The three internal warehouses stage the goods for crew pick-up and focus on emergency
11 reactive demand, replenishment of tools and safety items, and administration of the
12 previously described critical spares program. They also receive and process the
13 equipment returned from the field slated for inventory re-entry or repairs. The internal
14 warehouses no longer handle equipment transfers across the work centres, which frees up

1 warehouse vehicles to replenish materials directly to job sites. This allows the crews to
2 remain at the site instead of returning to the warehouse to pick up any materials needed to
3 complete the work.

4
5 While the 3PL provider has assumed a significant portion of Toronto Hydro's
6 warehousing duties, the internal work centres continue to play a key operational role by
7 facilitating prompt materials issuance to the crews departing from the three work centres,
8 and facilitating timely response to reactive requirements. By being able to pick up
9 materials at the warehouses located in three different areas of the city, Toronto Hydro
10 crews are able to get to their job sites much faster, thus enabling more efficient execution
11 of planned work and faster power restoration timelines during reactive assignments.

12
13 In 2011 and 2012, Toronto Hydro assessed that additional space was needed. Given the
14 fact that additional space was needed, Toronto Hydro considered three options:

- 15 • Option 1 – Maximize use of existing warehouse space and hire any needed
16 additional staff to handle the higher inventory throughput;
- 17 • Option 2 – Lease a fourth Toronto Hydro-operated warehouse and hire additional
18 staff as necessary;
- 19 • Option 3 – Outsource the additional space and labour to a 3PL provider.

20
21 Analysis of the three options led to the conclusions summarized below.

- 22 • **Option 1** ("status quo") did not provide adequate space for the projected volumes
23 of materials and supplies.
- 24 • **Option 2** (incremental expansion of in-house warehousing capabilities) would
25 support the additional throughput requirements, but would result in the
26 incremental lease costs, and added equipment handling and labour costs. The
27 option did not allow for scalability of labour costs in the event of material capital

1 and maintenance work program changes, particularly if they fluctuated based on
2 funding levels, or the mix between electrical and civil projects.

- 3 • **Option 3** (outsource the incremental work to a 3PL provider) allowed Toronto
4 Hydro to reap the benefits of additional storage space at lower labour costs.
5 Importantly, the throughput-based pricing model of the contemplated 3PL
6 arrangement represented a scalable solution that could be expanded or reduced
7 based on changing capital and maintenance plan requirements.

8
9 Based on these considerations, Toronto Hydro decided to pursue Option 3. The
10 outsourcing arrangement allowed Toronto Hydro the flexibility in striking a balance
11 between 3PL and Toronto Hydro resources to support the expected throughput levels.

12
13 The total value of materials and equipment throughput is expected to increase by 27%
14 from 2011 to 2015. For the same period, the aggregate 3PL and internal labour costs has
15 or is expected to rise by 28%, as compared to an increase of 31% if the 3PL approach
16 was not pursued and Toronto Hydro procured additional warehousing facilities internally
17 and hired additional staff.

18
19 Toronto Hydro closely manages its 3PL relationship through tools that include statistics
20 on the number and timing adherence of picks, receipts, and transfers. Moreover, the 3PL
21 provider is also expected to maintain the cycle counting of stock at its location, which is
22 subject to periodic and random audits by Toronto Hydro.

23
24 The cost of Warehouse and Logistics function and a portion of the Acquisition and
25 Demand Services function are recovered internally through the materials on-cost rate,
26 applied to the value of the goods issued to crews for specific projects, and ultimately

reflected in the projects' overall capital costs.² Despite increased operating costs associated with the engagement of a 3PL provider, which was necessary to accommodate the increased materials requirements, the overall operating costs have grown at a pace similar to that of materials/commodities issued through the four warehouses. Consequently, the on-cost rates over the historic period have remained relatively flat, as depicted in Table 2, thereby managing the effect of supply chain costs on the utility's capital work program.

Table 2: On-Cost Rate (2011-2015)

Year	2011Actual	2012Actual	2013Actual	2014Bridge	2015Test
On-Cost Rate	12%	13%	12%	14%	12%

3. PROGRAM COSTS

Toronto Hydro's Supply Chain expenditures since 2011 have been predominantly affected by four drivers: 1) labour costs, 2) fluctuations of transformer rebates, 3) inventory write-off levels and 4) the introduction of a third party logistics provider.

Table 3: Supply Chain Program Costs (\$ Millions)

(\$M)	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Total	7.1	6.6	9.0	10.3	9.9

3.1. 2011-2012

The \$0.5 million reduction in expenditures between the 2011 and 2012 was primarily driven by a 20% reduction of warehouse staff following restructuring in 2012. The effect of the restructuring was partially offset by an increase in inventory write offs and

² As previously described, Toronto Hydro calculates the annual rate by dividing the applicable Supply Chain program costs over the anticipated cost of materials supplying that year's capital and maintenance work program. The resulting rate (%) is then added to the materials charged to the capital and maintenance projects.

1 reduction of transformer rebates received in 2012 compared to 2011. Transformer
2 rebates are earned based on the volume of transformers purchased each year.

3
4 There were fewer transformers purchased in 2012, resulting in the reduction of rebates
5 earned. The increased level of obsolete equipment write-offs was a result of a one-time
6 inventory cleanup as the final stage of warehouse reorganization following the
7 implementation of the WMS capability.

8
9 **3.2. 2012-2013**

10 The \$2.4 million increase in 2013 over the 2012 expenditures is due to the increase in
11 external contracting costs driven by the engagement of a 3PL in April 2013, necessitated
12 by incremental warehousing capacity requirements, which was more cost-effectively
13 secured through an outsourcing arrangement. This increase is partially offset by the
14 normalization of the inventory write-off levels relative to the one-time increase
15 experienced in 2012, and the increase in the transformer rebates compared to the year
16 prior.

17
18 **3.3. 2013-2014**

19 The 2014 projected expenditures reflect an increase of \$1.3 million versus 2013 due to
20 the difference between the expected 2014 full year charges associated with 3PL services,
21 as compared to only three quarters of its activities in 2013. This is partially offset by
22 decreased labour costs following partial year recognition of retirements and
23 organizational restructuring activities.

24
25 Since 2011, Toronto Hydro implemented a number of initiatives to enhance the
26 efficiency and productivity of its Supply Chain program, thus improving service levels
27 and managing the pace and scale of cost increases. For example, the utility took steps to
28 reduce the time and resources spent on non-value added activities. This includes the

1 recent automation of low-value inventory purchase orders for items such as pole line
2 hardware, small tools and consumable implements. Instead of requiring human
3 intervention, the inventory replenishment system now features an automated functionality
4 that generates new purchase orders when stock levels reach a pre-determined threshold.
5 This and other similar process improvements allow Toronto Hydro to devote more time
6 to strategically significant activities such as vendor management and market analysis for
7 competitive bid opportunities, while keeping expenditure levels flat or driving net
8 reductions.

9
10 In order to drive service improvements from its inventory suppliers, in 2010 Toronto
11 Hydro set out to formalize the monitoring of supplier performance by measuring the
12 adherence of supplier deliveries to terms of their respective contracts. The measurement
13 looked at whether deliveries of specific items were made in full (100% of expected
14 product shipped), and arrived within three days of expected due date. For an order
15 segment to be considered on time and full, both the quantity and timing of the delivery
16 have to meet their respective threshold stipulations.

17
18 Since the supplier performance management program's inception, Toronto Hydro
19 narrowed the number of days in which deliveries were allowed to arrive early. Suppliers
20 are now permitted to deliver no more than five days earlier than expected due date. This
21 prevents suppliers from shipping materials at month- or year-end without prior approval
22 from Toronto Hydro. The restriction helps Toronto Hydro keep its inventory values and
23 associated carrying costs in check. Despite the narrower delivery window, the percentage
24 of orders arriving orders on time and in full ("OTIF") continues to improve, as shown in
25 Table 4.

1 **Table 4: Supplier Delivery Performance**

Year	2009	2010	2011	2012	2013	2014YTD
OTIF	80%	85%	92%	93%	94%	94%

2 Throughout the remainder of 2014, Acquisition Services plans to continue to look for
3 opportunities to improve processes and act on opportunities to reduce costs. Among
4 these process improvements is the new e-Procurement application available starting July
5 2014, which offers three inter-connected modules.

- 6 • **Spend Analytics:** The tool's reporting functionality will automatically analyze
7 total goods and services spend data, allowing for easier identification of spend
8 trends and subsequent development of competitive bid strategies to pursue further
9 savings.
- 10 • **Competitive Bid Generation and Repository:** The tool provides a work flow for
11 competitive bid event creation and a repository for the documents generated, as
12 well as a reference for supplier contact information, reducing the time taken to
13 prepare and issue competitive bid activity.
- 14 • **Contract Generation Repository:** The tool simplifies the management of
15 supplier contracts by providing a single point of reference. It also provides
16 contract expiry alerts which will allow appropriate time to formulate future
17 sourcing strategies.

18
19 The goal of using the tool is to generate savings and other value propositions from
20 competitive bid activity where synergies had not been previously identified. For
21 example, the tool will allow for easy identification of vendors used across multiple
22 departments for similar work, creating opportunities for cross-functional work and
23 ensuing savings and process efficiencies.

1 Similar to the Acquisitions and Demand process improvements, Toronto Hydro has
2 implemented initiatives to improve service efficiency and cost effectiveness in the
3 Warehouse and Logistics area that will continue to provide benefits to the utility and
4 customers in the form of productivity improvements created by the optimization of
5 resources.

6 7 **3.4. Test Year Program Costs**

8 The projected \$0.4 million decrease between 2014 Bridge and the 2015 Test Year is
9 driven by the reduction of labour costs and 3PL cost reductions. Toronto Hydro
10 anticipates the decrease in labour costs as a result of projected 2015 attrition of several
11 positions through retirements that Toronto Hydro does not intend to replace as part of this
12 program. Moreover, the 3PL costs are expected to decrease due to the costing model that
13 provides for lower service rates as the throughput value increases.

14
15 There are no anticipated increases expected for Demand and Acquisitions Services in
16 2015, other than inflationary increases and labour costs.

17
18 The services provided by the Supply Chain program are at the core of any electric
19 utility's operation. The strategic sourcing, market trend analysis and warehousing and
20 logistics work comprising the program provides Toronto Hydro with materials, tools,
21 services and implements required to perform day-to-date operating activities and
22 efficiently execute the utility's capital and maintenance work programs.

23
24 Toronto Hydro's operating model balances the use of internal resources and outsourcing
25 arrangements to deliver high service level at an optimal cost for the benefit of ratepayers.
26 As detailed in the previous sections, the utility's Supply Chain expenditures have
27 increased at a pace similar to the cost increases of materials that the program procures,
28 stores and distributes.

1
2 Moreover, and as evidenced throughout this schedule, a number of technological and
3 process efficiencies implemented over the past four years allow Toronto Hydro to
4 perform its supply chain functions at higher service rates while at the same time reducing
5 its staffing complement. The scalable nature of the utility's 3PL model further assists
6 Toronto Hydro in reasonably accommodating fluctuations in its work program without
7 incurring sustained incremental capital and operating costs.

8
9 Any material reductions of Supply Chain program funding from the proposed 2015 levels
10 could mean that Toronto Hydro is not able to execute its capital and maintenance work
11 programs as planned. Absent a proper and adequately supported warehouse function,
12 stock could be misplaced, issued incorrectly, or damaged. The availability of approved
13 products, upon demand, is essential to the operations of an electrical distributing utility.

14
15 Fundamental to the requirement for a centralized Supply Chain department is the need to
16 retain a staffing complement that can execute the activities supporting the
17 implementation of the utility's Procurement Policy³ in an accurate and expedient manner.
18 The level of required due diligence would be lost without this centralized function which
19 could affect the quality of vendor selection. Toronto Hydro could also be exposed to sub-
20 par vendor performance and risk availability of stock for both planned and reactive
21 requirements without an ongoing vendor management program.

³ Exhibit 4A, Tab 3, Schedule 2.

CUSTOMER CARE PROGRAM

1. SUMMARY

Table 1: Customer Care Program Expenditures (\$ Millions)

Program	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Customer Care	41.9	37.5	39.7	42.2	46.1

The Customer Care program entails the activities and services directed at facilitating the needs of Toronto Hydro's 730,000 customers, including customer communications and relationship management, billing, metering and collections activities. Providing excellence in customer service is at the core of Toronto Hydro's corporate philosophy, and the utility is consistently seeking new ways to foster meaningful two-way communication, expand the range of service offerings to meet unique customer needs, and improve service convenience, and integrate new technological advancements to drive service level improvements and capitalize on available efficiencies.

2. PROGRAM DESCRIPTION

The Customer Care program is comprised of four segments covering most dimensions of direct interaction between the utility and its customers and/or work required to support this interaction. The segments are:

- **Billing, Remittance and Meter Data Management** segment which covers activities such as the reading of customer meters, upkeep and upgrades of the associated infrastructure, management of data, and preparation and processing of customer bills;

- 1 • **Collections** segment which entails the complete cycle of activities related to
- 2 Toronto Hydro's efforts to collect the funds associated with unpaid customer
- 3 accounts;
- 4 • **Customer Relationship Management** segment which oversees the utility's
- 5 interaction with its current and future customers; and
- 6 • **Communications and Public Affairs** segment which captures activities related
- 7 to the utility's community outreach, media relations, municipal government
- 8 interaction and other aspects of public communications work performed by
- 9 Toronto Hydro.

10

11 Table 2 provides the Historical (2011-2013), Bridge (2014) and Test Year (2015)

12 expenditures for each of the four segments. Descriptions of the activities comprising

13 each segment and details about the associated costs are provided in the sections that

14 follow.

15

16 **Table 2: Customer Care Program Expenditures by Segment (\$ Millions)**

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Billing, Remittance & Meter Data Management	14.5	13.7	14.6	16.4	18.7
Collections	12.3	8.9	11.1	12.2	13.1
Customer Relationship Management	12.1	11.5	10.1	10.4	11.3
Communications & Public Affairs	3.0	3.3	4.0	3.1	3.0
Total	41.9	37.5	39.7	42.2	46.1

1 **3. BILLING, REMITTANCE AND METER DATA MANAGEMENT**
2 **SEGMENT**

3 The Billing, Remittance, and Meter Data Management segment oversees the reading of
4 electricity meters, validation and management of meter data, preparation of customer
5 bills, and processing of payments. Toronto Hydro's customers receive their bills in
6 regular intervals (either monthly or bi-monthly), based on accurate metering data and in
7 compliance with applicable legislative and regulatory requirements for metering, billing,
8 payment processing and retailer settlement activities.

9
10 Over the historical period, Toronto Hydro has enhanced its automatic meter data
11 collection and verification capabilities, broadened the scope of available bill delivery and
12 payment options, and devised a number of customized processes to enable the billing and
13 administration of payments for customer-owned micro-generation facilities. To manage
14 segment cost increases and facilitate the introduction of new technological and
15 procedural improvements, the utility outsources a number of its information processing
16 functions and continues expanding its offerings of online and self-serve tools.

17
18 The Billing, Remittance, and Meter Data Management segment is at the core of Toronto
19 Hydro's "meter-to-cash" process that oversees conversion and verification of customer
20 consumption data and other billable activities into customer bills, facilitating the accuracy
21 of bills, and processing of the ensuing customer payments. Every year, Toronto Hydro
22 issues about 5.1 million bills to approximately 730,000 customers. Over 600,000 of the
23 utility's customers are billed on a bi-monthly basis, with the balance receiving their bills
24 every month. In performing this work, Toronto Hydro attempts to provide its customers
25 with a variety of billing and payment options that respond to their particular needs and
26 preferences, while also supporting the utility in realizing processing efficiencies and
27 facilitating faster receipt of customer payments. The automated nature of the majority of

1 the utility's data collection and verification processes facilitates bills issued to customers
2 being both timely and accurate.

3 4 **3.1. Metering and Data Management**

5 As of December 31, 2013, Toronto Hydro had approximately 734,000 installed meters, of
6 which approximately 696,000 are read remotely on a daily basis. The remaining 37,000
7 meters are manually read. The automated meter data is retrieved by one of the three
8 major data collection systems and is then validated, estimated and edited for billing
9 purposes. Each major data collection system serves different meter types/customer
10 classes and requires specialized skills to maintain acceptable data collection hardware
11 and standards.

12
13 The expansion of automated meter data collection and verification has reduced the
14 number of residential and small commercial bills issued with estimated readings to less
15 than 1%. Prior to system automation (2002-2006), manual meter reading resulted in
16 estimation of 7.6% of customer bills, a combined four-year average of all residential and
17 commercial customers. Automating the data collection of residential meters also allows
18 customers to view and extract their hourly electricity consumption on Toronto Hydro's
19 Time of Use ("TOU") web portal and use a customized energy management tool to
20 control their costs. An online application is also available to larger industrial and
21 commercial customers to allow for the download of interval data from the electricity
22 meters at their facility.

23
24 As the practice of remote meter reading is now entrenched, Toronto Hydro is working to
25 further maximize the efficiency of data collection by modernizing collection systems,
26 enhancing the communication networks and improving system processing capabilities to
27 increase the amount of meter data that is retrieved automatically.

1 Throughout 2014, Toronto Hydro expects to further reduce the number of manual
2 readings to 20,000 meters, primarily through enhancements of data collection and
3 processing capabilities for the commercial customers.

4
5 In addition to metered customers, Toronto Hydro has approximately 11,700 Unmetered
6 Scattered Load (“USL”) connections, which includes service to telephone booths, bus
7 shelters, cable television boosters, traffic and park lighting, and signs. These unmetered
8 devices consume a consistent amount of electricity from month to month and the ensuing
9 bills are based on mutually agreed-upon load assumptions. The Billing, Remittance and
10 Meter Data Management segment is responsible for keeping an up-to-date list of all
11 service locations and updating usage calculations when customers make changes. To
12 ensure USL billing accuracy, Toronto Hydro periodically conducts random field audits
13 and reconciliation exercises with its customers.

14 15 **3.2. Billing and Payment Services**

16 The utility offers its customers several options for billing delivery method, including
17 standard paper-based bills, e-bills and ePost billing services. For customers with specific
18 accessibility needs, Toronto Hydro facilitates additional accommodation options,
19 including bills with an option to increase font size, and audio playback options. To date,
20 approximately 73,000 of Toronto Hydro customers receive their bills on line using e-
21 billing options, which facilitates cost savings for the utility and provides convenience and
22 accessibility for customers. Given the recent increase of Canada Post rates, Toronto
23 Hydro is undertaking a proactive outreach campaign encouraging customers to adopt the
24 electronic modes of receiving their bills as a means of controlling costs.

25
26 In addition to issuing electricity bills, the segment facilitates preparation and issuance of
27 other customer bills for non-electricity services, such as customer-driven projects and
28 costs resulting from certain claims proceeding.

1
2 The on-going implementation of the *Green Energy and Green Economy Act, 2009*,¹
3 created additional complexity for Toronto Hydro by requiring a configurable and
4 adaptable process to manage unique billing configurations for customers with embedded
5 renewable electricity generators. To successfully provide appropriate levels of service to
6 these customers, Toronto Hydro devised a number of new tools and processes to manage
7 non-standard set-ups, process billing and credit/refund calculations, and resolve any
8 associated customer issues or concerns.

9
10 The utility tracks and processes customer-move information so that correct meter data
11 can be obtained, account holders are identified, first bills and final bills are addressed
12 correctly and issued without delay. In 2013 alone Toronto Hydro processed over 130,000
13 customer moves, which amounts to almost 20% of the utility's total customer base. To
14 streamline the administration of customer moves Toronto Hydro offers an online move
15 portal, where customers can quickly provide the pertinent information which is
16 subsequently processed by the utility's Customer Care and Billing ("CC&B") system.

17
18 Toronto Hydro provides its customers with multiple bill payment options, including:

- 19 • Remittance via mailed cheque;
 - 20 • Bank teller payment;
 - 21 • Pre-authorized debit;
 - 22 • Online and Telephone banking;
 - 23 • Electronic funds transfer;
 - 24 • Western Union;
 - 25 • Moneygram; and
 - 26 • Credit cards for customers facing disconnection.
- 27

¹ S.O. 2009, C.12. ["GEGEA"]

To maximize cash flow and minimize bad debt, Toronto Hydro encourages customers to adopt a pre-authorized payment plan. Approximately 160,000 Toronto Hydro customers pay their bills using a pre-authorized payment plan. Enabling this option requires the utility to monitor and update customer bank account information, and keep this information secure, as customers enrol, de-enrol, or make changes to their respective plan. Customers may also choose to smooth out their payments through a budget billing process that allows for equal payments on a monthly basis with an annual reconciliation.

Another key dimension of the segment's activities is the ongoing communication and coordination with electricity retailers to ensure that necessary legal agreements are in place prior to customer account set-up, and that day-to-day retailer transactions and regular payments are processed quickly and efficiently.

To ensure proper functionality and compliance to relevant legislative and regulatory requirements of all elements of the meter-to-cash process, Toronto Hydro maintains a system of internal controls for both the existing and new systems and processes. Toronto Hydro reviews all key processes on an annual basis to ensure that adequate controls are in place and the procedures in use remain valid and comply with applicable financial, legislative and regulatory requirements.

3.3. Segment Costs

Table 3 provides Toronto Hydro's Historical (2011-2013), Bridge (2014) and Test Year (2015) expenditures for the Billing, Remittance and Meter Data Management segment.

Table 3: Billing, Remittance and Meter Data Management Costs (\$ Millions)

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Billing, Remittance and Meter Data Management	14.5	13.7	14.6	16.4	18.7

3.4. 2011-2012

Segment costs decreased by \$0.8 million between 2011 and 2012 primarily owing to:

- \$0.8 million decrease in labour cost as the additional resources needed for implementing the Customer Information System (“CIS”) project in 2011 was no longer required in 2012; a reduction in full-time clerical staff was achieved due to increased outsourcing;
- \$0.3 million increase in postage, bill printing, paper stock and envelopes;
- \$0.4 million decrease in manual meter reading costs as additional meters became remotely read;
- \$0.2 million decrease in costs associated with the installation and remote meter reading of Suite Meters; and
- \$0.3 million increase in the accounting provision for bad debt costs for non-electricity service due to an increased risk of collecting.

3.5. 2012-2013

The \$0.9 million increase in operating costs from 2012 to 2013 is primarily driven by:

- \$1.2 million increase for labour due to normal internal inflationary pressures, and for Meter Data Management to accommodate increasing clerical labour requirements resulting from new smart meters, and an increase in field staff requirements to service meters and communication networks;
- \$0.5 million increase due to a re-allocation of outsourcing expenditure management from the Customer Relationship Management segment;
- \$0.2 million increase to cover postage rate increases, bill printing, paper stock and envelopes and payment processing services; and,
- \$1.0 million decrease in the accounting provision for bad debt costs for non-electricity services due to an improvement in billing and collection processes.

3.6. 2013-2014

The 2014 Bridge Year costs are projected to increase by \$1.8 million relative to the 2013.

The cost increase is attributable to the following factors:

- \$0.6 million increase in labour costs due to normal internal inflationary labour cost increases and reallocation of staff from other segments to accommodate the increase in the volume of fieldwork activities to support remote meter data collection activities;
- \$0.5 million increase to cover increased Canada Post rates , bill printing, paper stock and envelopes and payment processing;
- \$0.3 million increase in clerical work outsourcing costs; and
- \$0.4 million increase resulting from an accounting provision adjustment for bad debt costs in 2013.

To manage its billing costs over the Historical period, Toronto Hydro outsourced several clerical tasks associated with Billing, Remittance and Meter Data Management to a third party in 2012. The activities include pre-authorized payment enrolments, credit transfers, billing adjustments, meter reading and billing exceptions, and meter and account set up for suite meters.

3.7. Test Year Segment Costs

The projected increase in operating costs from 2014 to 2015 is \$2.3 million, is driven by the following anticipated factors:

- \$1.1 million driven by normal inflationary labour cost increases and the need to support the deployment and maintenance of additional technology upgrade projects to support meter reading infrastructure renewal;
- \$0.7 million increase to address a significant Canada Post rate increase;

- 1 • \$0.3 million for an increase in the provision for bad debt for non-electricity
- 2 services; and
- 3 • \$0.2 million increase in outsourced meter reading costs.

4

5 Meter Data Management, Billing and Remittance segment costs are expected to continue

6 to experience upward pressure due to the anticipated volumes of customer base increases

7 and changing customer demands. To alleviate these anticipated cost pressures, Toronto

8 Hydro plans to continue controlling operational expenses by seeking to optimize the use

9 of outsourced labour and encouraging customers to use the convenience and lower cost of

10 online, self-serve and paperless channels to view their billing information and make

11 payments. Toronto Hydro intends to continue enhancing the current suite of payment

12 channel offerings to ensure timely customer payments and provide appropriate levels of

13 customer choice.

14

15 Meter data management, billing, and remittance is a core function of an electricity utility

16 as it includes the elements of the meter to cash process. Significant changes in metering

17 technology and pricing structures over the last several years required Toronto Hydro to

18 implement a number of changes to its metering and billing infrastructure along with the

19 processes underlying the segment. Given that Toronto Hydro was an early adopter of

20 emerging technology, ongoing work to optimize the utility's operations needs to continue

21 throughout the 2015-2019 rate period as the technology and communications

22 infrastructure becomes increasingly complex and sophisticated, and maintenance

23 requirements increase with further technological proliferation.

24

25 Accurate capturing of revenue and an optimized cash flow are dependent on the accuracy

26 and timeliness of bills issuance and payment processing. Any limitations to the utility's

27 ability to effectively manage key technology systems, optimize business processes and

1 retain skilled resources owing to budget reductions could result in significant corporate
2 financial risk, and negatively impact customer satisfaction levels.

3 4 5 **4. COLLECTIONS SEGMENT**

6 The Collections segment is responsible for tracking, contacting and collection of unpaid
7 customer accounts. The segment's functions are based on regulatory requirements, as
8 well as Toronto Hydro's objectives, industry best practices and guidelines for managing
9 overdue accounts. Toronto Hydro's collections guidelines procedures meet all Ontario
10 Energy Board ("OEB") and other relevant requirements pertaining to revenue collection
11 and are designed to minimize the amount of bad debt expenses incurred by the utility,
12 while providing customers with multiple options to rectify outstanding accounts.

13
14 For a utility with approximately 730,000 customers and over 130,000 customer moves
15 annually, the collections function plays a key role in enabling Toronto Hydro to receive
16 required revenue while minimizing bad debt expenditures. Effective collections help
17 minimize the effect that bad debts have on other customers. To support collection
18 activities, Toronto Hydro has dedicated collections customer service representatives
19 ("CSRs") during business hours, and provides 24/7 access to collections information
20 through an Interactive Voice Response ("IVR") system and an online portal. The IVR
21 and online technology assists customers with their account management enquiries by
22 providing updated account balances, payment option information, bill amount predictors
23 and other related tools.

24
25 Toronto Hydro's collections CSRs are additionally trained in collections-specific
26 legislation, regulations and municipal by-laws, outstanding arrears repayment strategies,
27 commercial disconnect processes, and the *Companies' Creditors Arrangement Act*,² and

² R.S.C., 1985, c. C-36. ["CCAA"]

1 Bankruptcy procedures. Collections staff also possess all information related to Toronto
2 Hydro's Low Income Energy Assistance Program ("LEAP")³ and liaise as needed with
3 the utility's social services partners to oversee program administration.

4
5 To facilitate stable and predictable cash flows and manage emerging arrears, Toronto
6 Hydro proactively mails overdue payment reminder letters and places reminder phone
7 calls to its customers, with an average of 350,000 letters and 173,000 phone calls placed
8 each year. To manage the costs of these high-volume activities while maintaining the
9 efficiency and timeliness of reminders, Toronto Hydro deploys automated systems for
10 both letter writing and phone call placement.

11
12 In the event that regular reminders are unsuccessful, Toronto Hydro initiates a series of
13 severance activities. This involves annually creating over 98,000 service orders to the
14 utility's field collection contractor and internal field staff that deliver ten-day
15 disconnection notices, making approximately 27,000 disconnection notice calls, and
16 ultimately disconnecting about 9,000 accounts each year for non-payment. In many
17 cases, the disconnection work requires the assistance of a bailiff. Toronto Hydro's field
18 collections agents collect approximately \$6.1 million in outstanding payments per year
19 while delivering ten-day disconnection notices or when attending the premise to perform
20 the disconnection.

21
22 To encourage timely payments, proactively identify at-risk accounts and otherwise
23 facilitate the collection of outstanding payments, Toronto Hydro undertakes a range of
24 specific activities, including:

- 25 • applying late payment fees to encourage on-time payments;
- 26 • managing and monitoring about 20,000 commercial accounts with security
- 27 deposits and overseeing the annual process of deposit refunds;

³ Exhibit 4A, Tab 2, Schedule 19.

- preparing and sending over 18,000 inactive unpaid accounts per year to external collection agencies for follow up and collection;
- implementing arrears payment arrangements to assist customers with rectifying their outstanding balances;
- overseeing administration of low income programs (e.g., LEAP); and
- performing write-off activities.

In addition to work with individual customer accounts, Toronto Hydro aggregates all outstanding payment/arrears information in a single financial report to reconcile the information with the accounting bad debt provision. Through this process Toronto Hydro reviews all aged accounts receivable balances, bankrupt accounts and accounts that are considered to be “at risk” to determine the utility’s estimated bad debt exposure. The utility carefully monitors the bad debt trends so that corrective action can be taken as appropriate.

To allow regulatory compliance and to promote the procedural efficiency of new and existing collections activities, Toronto Hydro maintains a framework of internal controls. These controls are designed to ensure that major processes like the collection of accounts and bad debt write-offs follow well-defined steps. Toronto Hydro reviews existing key processes and proposed new processes on an annual basis to help ensure that adequate controls are in place and procedures in use remain valid.

4.1. Segment Costs

Table 4 presents Toronto Hydro’s Historical (2011-2013), Bridge (2014) and Test Year (2015) costs relating to the Collections segment.

Table 4: Collections Segment Costs (\$ Millions)

	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Collections	12.3	8.9	11.1	12.2	13.1

1 Year-over-year collections segment expenditures can be substantially influenced by the
2 accounting provisions rules for bad debt provision, based on the applicable forecast
3 methodology.

4
5 Between 2011 and 2014, actual operating costs remained fairly flat, with large year-over-
6 year variances due to accounting adjustments to reduce or increase the provision for bad
7 debt allowance. Operating cost increases that were attributable to normal inflationary
8 labour cost increases and an increased ratio of field collections work performed in-house
9 were offset by operating cost decreases accomplished by altering the ratio of in-house
10 clerical resources versus a third-party service provider. Ratios between in-house and
11 third party providers for both field and clerical work were adjusted to optimize service
12 quality while controlling costs.

13
14 **4.2. 2011-2012**

15 The operating costs decreased by \$3.4 million from 2011 to 2012 due to the following:

- 16 • \$0.8 million reduction in labour cost associated with substantial completion of
17 Toronto Hydro's Customer Information System ("CIS") project in 2011, as well
18 as a reduction in full-time clerical staff due to increased outsourcing;
- 19 • \$2.9 million decrease in bad debt costs due to an accounting adjustment to reduce
20 an over provision in the bad debt allowance; and
- 21 • \$0.3 million increase in collection agency costs offsetting the above decrease due
22 to a temporary interruption in certain business processes during the CIS
23 conversion in 2011, which led to two years' worth of delinquent accounts being
24 sent to collection agencies in 2012.

25
26 **4.3. 2012-2013**

27 The \$2.2 million increase in operating costs from 2012 to 2013 was driven by :

- 1 • \$0.2 million increase in labour costs for normal internal inflationary labour cost
- 2 increases, and an increase in the use of internal field resources for severance
- 3 activities;
- 4 • \$1 million for an increase in the accounting provision for bad debt costs due to
- 5 growth in customer base, average bill amounts, and other formulaic impacts;
- 6 • \$0.7 million increase through allocation of outsourced clerical resource costs from
- 7 the Customer Relationship budget to the Collections budget; and
- 8 • \$0.3 million increase to cover the expansion of outsourced collection activities to
- 9 control bad debt expenses.

10

11 **4.4. 2013-2014**

12 The increase in operating costs between 2013 and 2014 is projected to be \$1.1 million,
13 which includes the following components:

- 14 • \$1.8 million increase in labour costs for normal internal inflationary cost
- 15 increases, contracted services driven by new billing rules and applicable code
- 16 amendments, and allocation of internal field staff to severance activities;
- 17 • \$0.2 million decrease in the use of third party field service providers to perform
- 18 severance activities; and
- 19 • \$0.5 million decrease in the provision for bad debt cost anticipated from improved
- 20 collection processes and the associated accounting adjustment.

21

22 **4.5. Test Year Segment Costs**

23 Toronto Hydro's forecast 2015 Test Year collections expenditures of \$13.1 million, are
24 \$0.9 million above the Bridge Year expenditures. The projected increase is primarily
25 driven by the following factors:

- 26 • \$0.5 million increase in the accounting provision for bad debt costs due to growth
- 27 in customer base and average bill amounts, along with other inflationary impacts;

- \$0.4 million increase for normal internal inflationary labour costs, fulfillment of staffing complement, and an increase in costs associated with collections field work.

The Collections segment is intended to exert control over what could, if left unchecked, result in substantial customer account arrears and uncollectable billed amounts which would ultimately create upward pressure on rates. While enabling the utility to prudently manage the collection of revenue, the Collections segment also is also designed to minimize financial hardship and avoid disruption of power to Toronto Hydro's most vulnerable customers, using both OEB regulated programs and Toronto Hydro internal processes.

To contain costs related to these activities, Toronto Hydro leverages technology and automation to efficiently manage high-volume activities, engages cost effective third-party providers, implements quality programs, identifies and manages short interval controls to measure and manage results, and makes adjustments to collections strategies to leverage new technologies or support changing economic, regulatory, legislative or business conditions.

5. CUSTOMER RELATIONSHIP MANAGEMENT SEGMENT

The Customer Relationship Management segment oversees Toronto Hydro's interactions with current and future customers, and builds trusted relationships by engaging customers at the right time, with the right information, and through the right channel to better meet their needs. The segment's main objectives are to deliver customer value by providing efficient and timely response to all inquiries, building awareness of available programs, and educating customers on how to better manage their electricity usage.

1 The segment encompasses key facets of Toronto Hydro's interaction with its customer
2 base, including the following functional areas: Contact Centre; Request Escalations; Key
3 Accounts; Customer Experience; and Quality Assurance.

4
5 Toronto Hydro's specific procedures and program offerings in each of the functional
6 areas comprising the Customer Relationship Management segment are designed to meet
7 customer needs and improve operational efficiencies identified through the tracking and
8 analysis of inbound customer enquiries, transactional surveys, focus groups, and other
9 means of soliciting customer feedback.

10
11 In addition to providing customer-facing services, the segment also includes a project
12 development function, tasked with designing and overseeing the work of critical
13 technology projects, process optimization and performance management developed
14 through ongoing process analysis, optimization and measurement activities.

15 16 **5.1. Customer Contact Centre**

17 The contact centre is the primary functional area of the Customer Relationship
18 Management segment. The contact centre receives and responds to approximately
19 100,000 written inquiries and 596,000 telephone calls per year. Toronto Hydro's
20 customers approach the contact centre to inquire about a broad spectrum of topics
21 involving most aspects of Toronto Hydro's business. Common subjects include:

- 22 • updating and confirming customer records to reflect changes in customer
23 information, such as move-ins and move-outs;
- 24 • verifying information and providing explanations about account management,
25 billing, payment options, consumption, power quality, and collections;
- 26 • responding to inquiries regarding Time-of-Use ("TOU") billing, and assisting
27 customers with the TOU web tool that provides load profile information and
28 energy management advice; and

- directing customer calls to the appropriate department or employee through Toronto Hydro's main switchboard.

In performing this work, Toronto Hydro closely monitors the quality and efficiency of its customer contact activities using a combination of OEB-mandated and internally developed measures and metrics. Overall, Toronto Hydro performs well against the OEB's performance targets in the areas of telephone and written response, consistently exceeding the required service standards.⁴ On average, over the 2011-2013 timeframe, the contact centre answered 77 percent of calls within 30 seconds, and responded to 92 percent of written inquiries within ten days.

5.2. Escalations and Special Investigations

The Escalations and Special Investigations area supports the contact centre. Escalations receives and resolves specific customer concerns that require additional review. The most frequently occurring issues relate to billing and collections, including those related to rate changes and energy consumption. The Escalations and Special Investigations function receives its requests through a variety of channels:

- approximately 440 customer issues annually are escalated through the call centre during daily operations;
- another 220 are received each year through Toronto Hydro's Office of the President; and
- about 75 requests are received annually directly from the OEB.

The Escalations and Special Investigations function is responsible for managing these volumes, and can deploy field resources to investigate power quality or billing issues that require a site visit. In 2013, the area resolved 98% of escalated customer inquiries within ten business days or less.

⁴ Exhibit 2A, Tab 10, Schedule 1.

The Customer Relationship Management segment also investigates of potential instances of unauthorized use of power. When Toronto Hydro suspects an instance of unauthorized power use it deploys field resources to conduct a site visit. If the site visit confirms unauthorized use of power, Toronto Hydro advises the affected customers to correct the issue within a prescribed period. A subsequent site visit is conducted to confirm that the unauthorized use of power no longer exists and, if required, a corrected bill is issued. This process minimizes the costs associated with potential revenue losses that are otherwise borne by all ratepayers.

From 2011 to 2013, Toronto Hydro uncovered 311 instances of unauthorized use of power, including 52 marijuana grow house operations. In all instances Toronto Hydro took steps to stop the unauthorized use of power and to collect the lost revenue.

5.3. Key Accounts

Another crucial activity area in the Customer Relationship Management segment is the Key Accounts function, which works proactively with large business customers in the Commercial and Industrial (“C&I”) sector on matters such as planned outage notification and coordination, Global Adjustment settlement notification, load profile and rates analysis, and power quality and energy management.

The Key Accounts function also responds to issues raised by C&I customers and acts as a liaison to move customer issues forward with other segments within Toronto Hydro.

Some of Key Accounts’ functions include:

- meeting with customers to resolve billing issues, coordinate planned outages and connect customers with Toronto Hydro’s Conservation and Demand Management (CDM) program offerings to explore opportunities for potential consumption efficiencies;
- providing business-specific updates during unplanned outages;

- 1 • communicating through channels such as direct mail, newsletters, and association
- 2 outreach, educational and sector specific information;
- 3 • acting as a single point of contact within Toronto Hydro to facilitate and
- 4 coordinate work related to large C&I customers; and
- 5 • building and maintaining positive relationships with Toronto's business
- 6 community.

7

8 **5.4. Customer Experience**

9 To deliver timely, effective and comprehensive customer-facing activities and internal
10 service practices, the Customer Experience area manages customer research, traditional
11 and digital outreach efforts, through media, collateral (brochures, bill inserts and
12 newsletters), direct mail, website, social media, mobile and e-mail outreach for
13 residential and business customers. Customer research activities allow Toronto Hydro to
14 gain insights into how current services, processes and communications align with
15 customer views and experiences, and identify opportunities for improvement.

16

17 Using the feedback received through customer research and outreach, Toronto Hydro
18 launched a customized self-service portal (MyTorontoHydro) in 2012, which offers an
19 automated move-in/move-out processing capability, pre-authorized payment enrolment,
20 the ability to view bill and payment history, and individual unit consumption information
21 for landlords. The adoption of this service was promoted through traditional and digital
22 outreach campaigns, with approximately 76,000 customers registered as of May 2014.

23

24 Toronto Hydro's on-line services were further enhanced in 2013 through the introduction
25 of a mobile web application that provides customers with energy management
26 information, a bill comparison function, and alerts to help manage electricity costs.

27

1 By the end of 2014, Toronto Hydro plans to consolidate all of its on-line service offerings
2 (ebills, MyTorontoHydro, TOU portal) into one interface, to provide customers a single
3 sign-on experience, thereby improving usability and uptake. Additional offerings will
4 continue to be incorporated based on customer research and identified opportunities to
5 increase efficiency. This includes offering MyTorontoHydro account management
6 services to commercial customers and a fully automated new customer move-in process.

7
8 Over time, direct-to-customer communication efforts have increased due to the on-going
9 changes in the government and regulatory policy affecting Ontario's electricity market,
10 including new rate structures, technologies and service offerings. In a similar manner,
11 the scope and volume of customer communications has grown to increase the adoption of
12 Toronto Hydro's online and paperless service offerings, thereby decreasing expenditures
13 associated with customer call handling and increasing customer choice and convenience.
14 Proactive communications through bill inserts newsletters and digital messaging helps
15 build customer awareness and understanding of key aspects of the sector, increases the
16 uptake of on-line services, and reduces the volume of interactions with the Contact
17 Centre. This improves the efficiency and the effectiveness of maintaining customer
18 relationships while also delivering operational gains.

19
20 Finally, the Quality Assurance function manages the development and distribution of
21 issue-specific training materials for internal and external resources. It is also engaged in
22 knowledge and service quality management, analyzing first call resolution ("FCR")
23 results, conducting post-call customer surveys, and identifying training gaps as well as
24 process and technology improvement opportunities. The function is also responsible for
25 maintaining an intranet tool that provides staff with information on current policies,
26 procedures, and regulatory changes to better service customers.

5.5. Segment Costs

Table 5 presents Toronto Hydro's Historical (2011-2013), Bridge (2014) and Test Year (2015) costs relating to the Customer Relationship Management Segment.

Table 5: Customer Relationship Management Segment Costs (\$ Millions)

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Customer Relationship Management	12.1	11.5	10.1	10.4	11.3

5.6. 2011-2013

Toronto Hydro's Customer Relationship Management costs have declined over the 2011 to 2013 period as a result of process improvements and the implementation of a new business model in 2012. Leveraging the utility's customer feedback and research, the new model includes the expansion of self-service online tools, outsourcing of routine customer contact and clerical tasks, and provision of segmented customer class-specific services, such as Key Accounts. A portion of the 2012-2013 decrease is attributed to a re-allocation of outsourcing expenditure management of billing related clerical tasks to the Billing segment. The resulting outsourcing arrangement is more cost effective and allows Toronto Hydro to maintain service quality standards during periods of elevated call volumes.

5.7. 2013-2014

The projected increase in operating costs from 2013 actuals to the 2014 Bridge Year is \$0.3 million, driven by the renegotiation of the outsourcing contract's terms and fee structure, along with the normal inflationary labour cost increase. The resulting increase is partially offset by the further outsourcing of clerical tasks.

5.8. Test Year Segment Costs

The projected increase in operating costs from 2014 to 2015 is \$0.9 million. The following factors have been identified as the likely primary drivers of this projected increase:

- \$0.2 million for additional customer communications work related to new electricity rates, emergency preparedness and power outage information, new energy management tools and increasing awareness of the available self-service tools;
- \$0.5 million for resources required to support technology projects related to system updates necessary to meet regulated obligations, deploy new on-line service offerings based on customer feedback, including those related to power outage communications, and manage the pace of customer growth-driven expenditures, and the expansion of fully automated customer transactions;
- \$0.1 million due to the normal inflationary labour cost increase;
- \$0.1 million to engage customers on opportunities to improve Toronto Hydro's service delivery options, and fulfill regulatory requirements.

Customer Relationship Management expenditures enable Toronto Hydro to maintain an ongoing dialogue and collaborative relationships with its customer base, responding to emerging needs and facilitating continuous improvement. Toronto Hydro has achieved significant cost efficiency gains since 2011, by combining customer class-based targeted services delivered by internal staff with third-party outsourcing activities and the expansion of online self-service tools. Importantly, the utility achieved these cost efficiencies while maintaining and/or improving its internally instituted, and externally mandated, service quality standards.

Any reduction in segment expenditures below the proposed levels would likely result in negative consequences, such as customers experiencing longer wait times to resolve their

1 inquiries, potentially leading to erosion of service level standards. Segment cost
2 reductions would also negatively affect customer experience and satisfaction, as Toronto
3 Hydro would need to reduce service delivery options to meet budgetary constraints.

6. COMMUNICATIONS AND PUBLIC AFFAIRS SEGMENT

4
5
6
7
8 The Communications and Public Affairs segment delivers high-quality, practical and
9 timely information about Toronto Hydro's operations and programs to the general public
10 and other interested parties. The segment scope includes public and stakeholder
11 relations, community outreach, media relations, concerns directed to the Office of the
12 President, emergency communications, municipal government relations and annual
13 reporting.

14
15 During the 2015-2019 period, Toronto Hydro aims to strengthen its collaborative
16 relationships with various parties and stakeholders through the Communications and
17 Public Affairs segment.

18
19 To perform the activities comprising the segment, Toronto Hydro utilizes a number of
20 communication channels, including:

- 21 • engagements with local media;
- 22 • contact with local business improvement organizations, community groups and
- 23 ratepayer associations;
- 24 • Toronto Hydro owned channels such as the utility's website,
- 25 • social media, including Twitter and Facebook;
- 26 • proactive outreach to City Councillors, the Mayor's office and City staff; and
- 27 • community events.

1 Effective and timely communication provides a valuable service to customers and other
2 stakeholders, by increasing their awareness about various matters of interest such as the
3 location and the anticipated restoration of outages, capital projects, and emergency
4 preparedness. By communicating key information proactively, stakeholders and
5 customers may also have fewer reasons to contact Toronto Hydro, which avoids
6 operating costs elsewhere.

7 8 **6.1. Community Relations**

9 Toronto Hydro maintains productive relationships with public interest groups and
10 agencies involved in commerce, social services, environmental protection and education.

11
12 The utility strives to provide timely and topical updates and seek feedback on a range of
13 planned and ongoing capital construction projects, environmental assessment
14 proceedings, maintenance activities, and other related matters. Providing continuous
15 updates and responding to emerging issues allows Toronto Hydro to increase stakeholder
16 awareness and manage expectations regarding the impacts of the utility's activities on
17 local communities and commerce.

18
19 Stakeholder outreach commonly takes the form of one-on-one contact with customers,
20 community town hall meetings, special information sessions and a variety of online
21 content. Using a variety of communication channels allows Toronto Hydro to engage
22 customers with varying needs, concerns and preferences, with the goal of giving
23 appropriate attention to all customer segments.

24
25 The community relations function also supports the utility's most vulnerable customers
26 through the administration of the Low Income Energy Assistance Program ("LEAP")⁵
27 which helps eligible customers manage their bill payments and re-payment of arrears.

⁵ Exhibit 4A, Tab 2, Schedule 19.

1 Toronto Hydro actively promotes the program using various communications' channels
2 such as posters, e-newsletters to United Way agencies, face-to-face at community
3 outreach events, and through news releases.
4

5 **6.2. Media Relations**

6 The media are an important conduit between Toronto Hydro and its customers and other
7 stakeholders. The segment's media relations function proactively communicates accurate
8 and timely information about power outages, electrical safety, consumer issues and local
9 investments in the distribution system. Throughout the duration of major outages,
10 communications staff remains in contact with media outlets until the service is restored.
11 Media representatives receive up-to-date information on suspected outage causes, likely
12 duration, and if necessary, appropriate measures to be taken for public safety and
13 protection of Toronto Hydro's and customer-owned equipment. These efforts help
14 disseminate key information to customers at the time when they are most likely to be
15 looking for it.
16

17 Dedicated media relations personnel engage the reporters directly on all matters, which
18 allows the dispatched crews and other employees to proceed with their work without
19 interruption. Media Relations officers and government relations staff provide timely
20 information to local and provincial emergency management personnel, city councillors
21 and social service agencies that may require such information in order to take appropriate
22 action in the interests of public safety. During the December 2013 ice storm Toronto
23 Hydro staff issued 28 news releases, posted more than 1,000 tweets, and conducted
24 approximately 1,500 interviews with mainstream media.
25

26 **6.3. Municipal Government Relations**

27 Building, maintaining and enhancing relationships with municipal government is critical
28 to Toronto Hydro's ability to serve its customers and stakeholders. To facilitate this

function, Toronto Hydro routinely meets with City councillors and City staff on a range of ongoing and emerging issues, and oversees a proactive councillor engagement process to disseminate project information on a ward-by-ward basis.

The media relations function also handles constituent correspondence and concerns relayed by city councillors to the Office of the President. The most frequent concerns involve customers' inquiries regarding street lighting and power outage-related issues. During the December 2013 ice storm, Toronto Hydro staff responded to approximately 7,000 information enquiries from city councillors.

6.4. Segment Costs

Table 6 presents Toronto Hydro's Historical (2011-2013), Bridge (2014) and Test Year (2015) costs relating to the Communications and Public Affairs segment.

Table 6: Communications and Public Affairs Segment Costs (\$ Millions)

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Communications and Public Affairs	3.0	3.3	4.0	3.1	3.0

6.5. 2011-2013

Between 2011 and 2013 Communications and Public Affairs segment costs increased due to one-time restructuring costs and normal inflationary pressures.

6.6. 2013-2014

The reduction in the 2014 Bridge Year relative to 2013 is due to one-time costs associated with organizational restructuring activities within the Public Affairs segment, as well as Toronto Hydro's efforts to find efficiencies in delivering this segment. To contain its costs over the historical period the utility reduced the use of outside consultants, opting to "in-source" a larger portion of communications-related work. An

1 example of in-sourcing activities includes the design, production and publication of
2 annual reports, which are now fully produced in-house. Further cost efficiencies were
3 achieved by limiting the amount of paper-based documentation in favour of online modes
4 of content delivery.

5
6 **6.7. Test Year Segment Costs**

7 The proposed 2015 Test Year costs are consistent with the projected 2014 expenditures,
8 with a minor reduction driven by the increased realization of efficiencies such as in-
9 sourcing and limiting paper-based document distribution noted above. As described
10 above, the utility took steps to manage the costs of delivering this segment; the outcome
11 of these initiatives is that the proposed 2015 Test Year expenditures are equal to or lower
12 than the 2011-2013 actuals, despite inflationary pressures and other related factors.

13
14 The proposed Test Year expenditures allow Toronto Hydro to effectively communicate
15 with its diverse customer base about complex electricity sector issues and developments.
16 They are also necessary to enable Toronto Hydro to maintain a productive dialogue with
17 its customers and other affected stakeholders on all matters related to the utility's
18 operations in the community. Building and maintaining strong relationships with its key
19 stakeholders is important because it allows Toronto Hydro to effectively plan and
20 coordinate the execution of its work program, and to reduce the likelihood of
21 unanticipated developments that can affect project timelines and costs.

HUMAN RESOURCES & SAFETY

1. SUMMARY

Table 1: Human Resource and Safety Program Costs (\$ Millions)

Program	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
HR & Safety	13.7	13.2	15.3	15.3	16.1

The primary objectives of the Human Resources and Safety (“HR & Safety”) program are to ensure that:

- Toronto Hydro’s current and future human resource complement meets the utility’s evolving needs in a cost-effective and sustainable manner;
- employees possess the tools, skills, resources and support to execute the utility’s capital plans and operational programs safely, responsibly and efficiently; and
- the utility consistently achieves its operational, financial and other key performance results.

The HR & Safety program meets these objectives through the provision of broad human resource management services to Toronto Hydro, including: environment, health and safety management; employee and labour relations; compensation and benefits management; performance and change management; employee communications; organization design and job design; recruitment; employee orientation; and training and development.

Toronto Hydro’s HR & Safety program delivers these outcomes within the utility’s complex operating environment which is characterized by unique and highly specialized operating requirements, organized labour dynamics, and aging workforce.

2. PROGRAM DESCRIPTION

The HR & Safety program consists of the following three segments:

- 1) Environment, Health & Safety
- 2) Human Resources Services and Employee Relations
- 3) Talent Management and Organizational Development

Toronto Hydro operates in a mature and dense urban environment, many aspects of which are unique or substantially different in scale and nature from other Ontario electricity distributors. Some of these factors include the following:

- a complex and rapidly evolving 1,600-feeder distribution system that includes an asset-intensive downtown distribution network;
- a mature and diverse grid infrastructure featuring legacy assets requiring specialized skills (e.g., box construction and Paper Insulated Led-Covered (“PILC”) cable);
- unique safety challenges associated with high motor vehicle incident frequency, and widespread presence of designated substances in buildings and infrastructure; and
- large volumes of third-party initiated work in an urban environment characterized by spatial limitations and municipal ordinances restricting available work hours.

These factors, and other related conditions, characterize Toronto Hydro’s service territory, and present significant challenges to the utility’s HR & Safety program. The conditions in which the utility operates demand the development and maintenance of unique health and safety rules, provision of comprehensive training and apprenticeship programs to new and existing employees, and execution of targeted talent identification, succession planning and recruitment activities. Proactive, timely and cost-effective execution of these and related functions, influenced by unique considerations affecting the utility, represent the mandate of Toronto Hydro’s HR & Safety program.

1
2 At the core of the HR & Safety program is a fundamental commitment to maintaining
3 and continuously improving a robust and effective environment, health and safety
4 management system (“EHSMS”). This focus manifests itself in a wide variety of
5 programs, projects and resources deployed throughout the organization that prioritize and
6 promote employee safety and wellness in every aspect of their lives, foster optimal
7 working conditions to increase job satisfaction, facilitate productivity, and promote
8 innovation, while also accommodating any specific needs or quickly responding to
9 emerging trends.

10
11 Toronto Hydro’s emphasis on health, safety and environment is best understood in light
12 of the utility’s history when the health, safety and environment-centered management
13 systems were either absent or sub-optimally deployed. The summary below illustrates
14 the key differences in outcomes between the past approaches, and the current systems
15 that Toronto Hydro has adopted since 2007. These systems include the EHSMS
16 framework that Toronto Hydro adopted in 2007; OHSAS 18001¹ and ISO 14001², which
17 the utility adopted in 2010; and formal certification of an operational management
18 system in February 2013.

- 19 • Between 1942 and 1992, Toronto Hydro’s legacy companies (pre-amalgamation)
20 experienced a workplace fatality approximately every two-and-a-half years.
21 There has not been a fatality at Toronto Hydro since 1992.
- 22 • In the last 14 years, the Workplace Safety and Insurance Board (“WSIB”) allowed
23 seven claims for premature death related to occupational asbestos exposure at
24 Toronto Hydro. In each case, the instances of exposure occurred many years ago,
25 prior to proper management systems being put in place. Asbestos management
26 systems were put into place starting in 1990 with the introduction of the Asbestos

¹ Occupational Health and Safety Assessment Series (“OHSAS”) 18001.

² International Organization for Standardization (“ISO”) 14001.

1 Regulation³ coming into effect. Toronto Hydro now has effective controls in
2 place to protect its workers from asbestos and other designated substances.

- 3 • Between 1999 and 2005 Toronto Hydro workers experienced 22 permanent
4 shoulder injuries; the lifetime cost of each is conservatively estimated to be \$1
5 million. Professional ergonomic analysis of these injuries and implementation of
6 effective controls has reduced shoulder injuries by 70% since 2005. The last
7 shoulder injury resulting in a permanent disability occurred in 2011.

8
9 As a result of occupational health and safety programs and services that it has put in
10 place, the utility benefits from having some of the lowest WSIB rates in the relevant
11 industry sector. Toronto Hydro is currently in the WSIB rate group 835 (Oil, Power, and
12 Water Distribution) and pays a premium of \$1.07 per \$100 of payroll. This is one of the
13 lowest rates that the WSIB charges employers, and given the variety and magnitude of
14 potential risks faced by Toronto Hydro's employees, the rate is a testament to the
15 effectiveness of the utility's safety management programs.

16
17 For comparison purposes, utilities included in the rate 830 (power and telecommunication
18 lines) pay a rate of \$4.45 per \$100 payroll. If Toronto Hydro and its peers in the rate 835
19 group had a similar injury and illness history as those in the rate 830 group, Toronto
20 Hydro's annual premium to the WSIB would increase from \$1.483 million (2013) to
21 \$6.167 million. The difference of \$4.7 million in avoided operating expenditures is
22 driven entirely by the comprehensiveness and proactive nature of the safety programs
23 managed by the industry sector which belongs to the 835 rate group.

24
25 Beyond the avoided WSIB payment premiums, the HR & Safety program has, and
26 continues to achieve, tangible results in a number of areas. For example, since 2008

³ Ontario Regulation 278/05, made under the *Occupational Health and Safety Act* R.S.O. 1990, c. O.1 [the "Asbestos Regulation"]

Toronto Hydro achieved notable improvements with respect to the following key safety indicators:

- an 89% decrease (10.95 vs. 1.16) in Lost Time Injury Severity (LTIS);
- a 56% decrease (5.19 vs. 2.26) in Total Recordable Injury Frequency (TRIF);
- a 57% decrease (86 to 37) in the number of WSIB claims;
- a 79% (4,813 to 1,004) decrease in Restricted Work Days; and
- an 88% (\$0.4 million to \$0.05 million) decrease in WSIB New Experimental Experience Rating (“NEER”) costs, and an ensuing WSIB rebate of almost \$0.3 million in recognition of substantially lower NEER costs over the last four years than expected by the program.

Toronto Hydro has also achieved significant reductions in employee absenteeism levels, specifically a 45% reduction in the rate of absenteeism from 2008 to 2013, resulting in a lower than the average rate in the according to Statistics Canada.⁴

The HR & Safety program has also been instrumental to the achievement of notable results with respect to the restructuring and reorganization of the utility’s job functions. For example, since 2007, Toronto Hydro consolidated 41 job classifications into ten, and in 2012, the utility undertook eight major reorganizations and reviewed approximately 40 jobs. These activities enable Toronto Hydro to consider and introduce methods to adapt and modify job functions in order to facilitate performance level and productivity improvements, succession planning, and career development.

These and other accomplishments detailed throughout the remainder of this schedule are attributable to the ongoing collaboration between the HR & Safety program and the utility’s other programs, aimed at establishing or refining processes and initiatives and

⁴ Statistics Canada, *Absence rates of full-time employees, by sex and North American Industry Classification System (NAICS), Canada, annual*, online: Statistics Canada <<http://www5.statcan.gc.ca/cansim/a26?lang=eng&id=2790030&p2=17>>.

1 adopting international standards and best practices. As a cornerstone of Toronto Hydro's
2 HR & Safety program, continuous improvement is supported by regular self-assessment
3 efforts through external reviews and performance measurement.

4
5 Absent the effective administration and implementation of the HR & Safety programs,
6 projects and services comprising the program's mandate, it is more likely that Toronto
7 Hydro's employees would be exposed to unacceptable levels of risk of injuries and
8 illness, reduced productivity levels, and operating decisions of reactive nature. These and
9 other related risks could, in turn, increase the utility's costs and negatively impact the
10 achievement of key operating objectives.

11
12 The remainder of this schedule will provide further details as to the scope, nature and
13 value propositions of the functions and activities in each of the three segments.

16 **3. ENVIRONMENT, HEALTH, AND SAFETY SEGMENT**

17 Toronto Hydro's functions comprising the environment, health and safety ("EHS")
18 segment are integrated with the utility's strategic planning and execution of operational
19 and capital work programs. The segment's overarching objective is to ensure that
20 Toronto Hydro adheres to legislative and regulatory requirements and best practices
21 relating to occupational health and safety, workers compensation, environmental
22 protection, and sustainability. The segment oversees execution of operational activities,
23 preparation of plans and delivery of targeted initiatives, while adhering to the applicable
24 internal and external reporting requirements.

25
26 Continuous monitoring and analysis of the utility's performance in environment, health,
27 safety, and sustainability matters allows Toronto Hydro to proactively identify and

1 manage related risks, evaluate the effectiveness of existing practices, and facilitates
2 compliance with statutory requirements and industry best practices.

3
4 Toronto Hydro has an obligation, pursuant to s. 4.6.1 of the Distribution System Code⁵
5 (“DSC”), to follow good utility practices in operating and maintaining the distribution
6 system and to abide by safety rules and regulations that apply to routine utility work,
7 including but not limited to the *Occupational Health & Safety Act* (“OHSA”).⁶ The
8 EHSMS and related activities performed as part of this segment are instrumental to
9 ensuring that the utility complies with this critical obligation. Consistent with Toronto
10 Hydro’s service obligations, the work performed within this segment is carried out 24
11 hours a day, 7 days a week.

12
13 In addition to the utility’s focus on health and safety, Toronto Hydro promotes
14 sustainable development to integrate social and environmental responsibility into the
15 utility’s core values, culture and practices. The key functions and activities that comprise
16 the EHS segment are summarized below.

17 18 **3.1. Environmental Health and Safety Management System (EHSMS)**

19 Toronto Hydro operates an integrated EHSMS, as opposed to having two separate
20 environmental and safety functions, or distinguishing between these responsibilities by
21 job design and any associated regulations.

22
23 The integrated EHSMS framework improves the efficiency and effectiveness of this
24 segment through the joint delivery of common activities such as inspections, audits,
25 reporting, investigations, annual planning, training, and management review meetings. It
26 also facilitates Toronto Hydro’s compliance with sections 4.6.3 to 4.6.5 of the DSC
27 which require distributors to:

⁵ Ontario Energy Board, *Distribution System Code*, (Toronto: Ontario Energy Board, 2013).

⁶ R.S.O. 1990, c. O.1. [“OHSA”]

- 1 • implement an industry recognized health and safety program that includes training
2 and regularly conducted audits (s. 4.6.3),
- 3 • remedy any problems that a distributor identifies as part of the audit as soon as
4 possible or in accordance with the distributor's health and safety program (s.
5 4.6.4); and,
- 6 • put in place documented program supporting procedures and appropriate training
7 to ensure compliance with environmental regulations and indicate a proactive
8 approach to environmental damage avoidance (s. 4.6.5).

9
10 Toronto Hydro's decision to adopt an integrated EHSMS model was based on the results
11 of a benchmarking study of EHS management systems conducted in 2010. The study
12 concluded that organizations with the most effective EHS programs and best EHS results
13 deployed integrated environmental, health and safety programs. Further research
14 indicated that the most rigorous, demanding and effective governing EHS standards are
15 the International Organization for Standardization ("ISO") 14001 and the Occupational
16 Health and Safety Assessment Series ("OHSAS") 18001.⁷

17
18 Toronto Hydro found these standards to be the most comprehensive in the industry for
19 the following reasons:

- 20 • they are the most widely recognized international standards;
- 21 • they form the basis for other crucial safety management standards (e.g., CSA
22 Z1000, ANSI Z10)
- 23 • they were written to complement each other and to facilitate integration under a
24 single management system; and
- 25 • compliance is verified by auditors governed by the Standards Council of Canada.

⁷ ISO 14000 standards relate to environmental management. They help organizations (i) minimize the ways in which their operations negatively affect the environment, (ii) comply with legal, regulatory, and other environment-related requirements, and (iii) continually improve in the above. OHSAS 18001 is a standard for occupational health and safety management systems that is broadly recognized and adopted.

Toronto Hydro completed the implementation of an integrated EHSMS in 2011 and was subsequently certified by a third-party auditor as meeting the requirements of ISO 14001 and OHSAS 18001 in 2012.

Prior to integration of the environment, health and safety management functions into a single system, Toronto Hydro participated in a safety management program known as ZeroQuest® administered by the (then) Electrical Utility Safety Association (now the Infra-Structure Health and Safety Association).

The EHSMS provides a mechanism for early detection and mitigation of risks to achieving the corporate objectives relating to health, safety and environmental performance. In addition, the EHSMS is consistent with the risk management model adopted by Toronto Hydro under ISO 31000, as discussed in Exhibit 1C, Tab 3, Schedule 1, and dovetails with other management systems that allow for proactive planning, monitoring, reporting, and responding.

3.2. EHS Framework

Toronto Hydro's commitment to effective risk management, continual improvement and operational efficiency is demonstrated by the certification of its EHSMS with ISO 14001 and OHSAS 18001. Both ISO 14001 and OHSAS 18001 establish a framework based on the ***Plan–Do–Check–Act*** cycle, (also known as the Demming cycle), which is illustrated in Figure 1 below. Toronto Hydro plans, organizes and coordinates all EHS activities in accordance with this framework, which can be summarized as follows:

- 1 • **Plan:** Establish the objectives and
2 processes necessary to deliver results in
3 accordance with the Environmental and
4 Health & Safety Policies.
- 5 • **Do:** Implement the processes.
- 6 • **Check:** Monitor and measure processes
7 against the policies, objectives, targets, legal
8 and other requirements, and report the
9 results.
- 10 • **Act:** Take actions to continually improve
11 performance of the management system.



Figure 1: Demming Cycle

12 **Step 1: PLAN**

13 The planning portion of the cycle begins with a number of key tasks including an audit of
14 the EHS management system, and review of incident investigation findings and trends,
15 applicable and proposed legislation, occupational health and safety (“OHS”) hazards and
16 risks, and past EHS performance relative to established goals, objectives and
17 benchmarks. Based on this data and other considerations that may be put forth by
18 management, the utility develops an annual plan.

20 **Step 2: DO**

21 The EHS segment consultants implement the annual plan through a number of activities,
22 including:

- 23 • developing or amending EHS procedures and programs, associated training
24 materials, and education and awareness communication materials;
- 25 • conducting a variety of tests and assessments such as industrial hygiene testing,
26 ergonomic assessments, reviewing new equipment for the potential EHS risks and

benefits prior to entering the workplace, and assessing the layout of facilities to ensure the safety of the future occupants;

- collecting and analyzing performance data for corporate, divisional and departmental performance monitoring, as well as benchmarking activities;
- preparing reports to government agencies and other interested parties; and
- providing guidance to business units to ensure effective implementation of new or amended EHS procedures, and support in the pursuit of their EHS goals and objectives.

Step 3: CHECK

This part of the cycle includes inspections, audits, investigations and the maintenance of records to verify: 1) the implementation of the operational controls, 2) the timely completion of planned work, 3) the achievement of objectives and targets, and 4) that operations are conducted safely.

- **Inspections:** On average, Toronto Hydro's managers, directors and front line supervisors conduct approximately 15,000 inspections per year. The EHS works with the relevant programs to develop inspection comprehensive checklists provide coaching and training for conducting effective inspections, analyze the inspection data and prepare reports for performance management and benchmarking. Since 2011, Toronto Hydro inspection processes have been expanded to include environmental matters, such as spill reports. In addition, the utility refined the safety inspection process in 2012 to shift the focus on behaviour, rather than physical conditions. The key to this process is to identify and acknowledge positive safety behaviours.
- **Audits:** EHS conducts audits to ensure compliance with EHS legislation and established procedures, provide assurance to management that EHS-related activities are properly managed and verify that adequate controls are in place to mitigate identified risks.

- 1 • **Incident Investigations:** While the focus of audits and inspections is to prevent
2 incidents from occurring in the first place, investigations focus on determining the
3 root cause and implementing permanent corrective actions to prevent incidents
4 from re-occurring. Incidents reported and investigations include near misses,
5 occupational injuries and illness, motor vehicle accidents and environmental
6 spills.
- 7 • **Performance Indicators:** As required by ISO 14001 and OHSAS 18001, the
8 EHS segment tracks and reports on a variety of performance indicators that gauge
9 the effectiveness of the EHS management system. This helps ensure that costs
10 are controlled and productivity is not negatively affected through excessive waste,
11 injuries, illness, fines, legal fees, increased WSIB premiums, and property
12 damage. The measures tracked include occupational safety performance
13 indicators such as lost time frequency, severity, total recordable injury frequency,
14 restricted work days, WSIB costs, and motor vehicle incidents, as well as
15 environmental indicators relating to spills, hazardous and non-hazardous waste,
16 greenhouse gasses released, energy conservation, and waste manifest compliance.
17 Tracking the utility's performance against these outcomes, and taking appropriate
18 proactive or corrective steps in response to these outcomes, facilitates continuous
19 improvement at Toronto Hydro.

20
21 ***Step 4: ACT***

22 The EHSMS requires Toronto Hydro to take actions based on the observations and
23 findings of the checking component noted above, with the objective of ensuring that
24 adequate controls are in place to mitigate hazards, and that opportunities for continual
25 improvement are pursued. The actions could include: 1) modifying the physical
26 conditions; 2) amending existing procedures or training requirements; or 3) introducing
27 new equipment, tools, processes, or procedures and communicating these through
28 education and awareness. In some cases the action can be completed immediately, while

1 in other circumstances actions require the establishment of multi-year objectives, targets
2 and programs. If required, such objectives, targets and programs typically become part of
3 the next year's planning component.

4 5 **3.3. Occupational Health and Safety Activities**

6 The EHS team develops, monitors and maintains occupational health programs that
7 involve both proactive and reactive testing for ergonomics, indoor air quality, noise,
8 vibration, lighting, thermal stress and designated substances, including any associated
9 biological monitoring where warranted or required through legislation. These programs
10 ensure the long-term health and wellness of the utility's critical workforce. In 2013,
11 approximately 480 EHS related tests and/or assessments were conducted.

12
13 When required or appropriate, the EHS team issues EHS Bulletins to inform employees
14 about hazards, or simply to remind everyone of safe working practices. Examples of
15 EHS Bulletin topics include recall notices from suppliers, newly identified hazards, and
16 personal protective equipment safety reminders.

17
18 Safety meetings are another important venue for sharing of information about safety.
19 EHS contributes to this process, by gathering statistics and information, and preparing
20 materials to be shared with and communicated to employees at monthly safety meetings.

21
22 In accordance with s. 4.6.2 of the DSC, Toronto Hydro and/or its EHS professionals are
23 members of numerous industry-specific, recognized health and safety organization,
24 including:

- 25 • Infra-Structure Health and Safety Association ("IHSA").
- 26 • Association of Electrical Utility Safety Professionals ("AEUSP"). .
- 27 • Canadian Society of Safety Engineers ("CSSE").
- 28 • Occupational Hygiene Association of Ontario ("OHAO").

- Board of Canadian Registered Safety Professionals (“BCRSP”).
- National Safety Council.
- American Industrial Hygiene Association.

In addition, as an active member of the Canadian Electricity Association (“CEA”) Toronto Hydro exchanges safety information with other utilities and collaborates with its peers on public safety initiatives. For example, in 2013, Toronto Hydro assisted with the production of a public safety video directed at promotion awareness among construction contractors to about the hazards of electricity on construction sites, how to avoid electrical contact, and what to do if contact is made.

As illustrated below, from 2008 to 2013, Toronto Hydro achieved significant and sustained improvement relating to occupational safety, including:

- 56% decrease in total recordable injury frequency (TRIF) (Figure 2);
- 89% decrease in lost time injury severity (LTIS) (Figure 3);
- 83% decrease in lost time injury frequency (LTIF) (Figure 4); and
- 79% decrease in restricted work days (Figure 5).

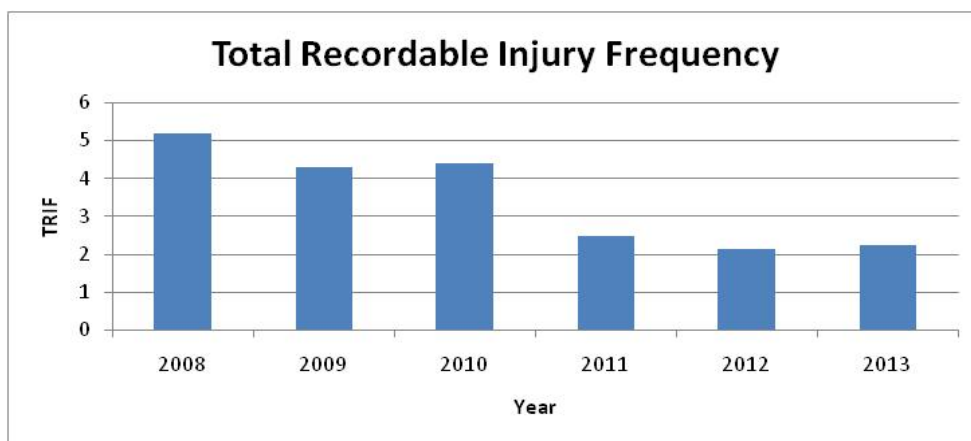
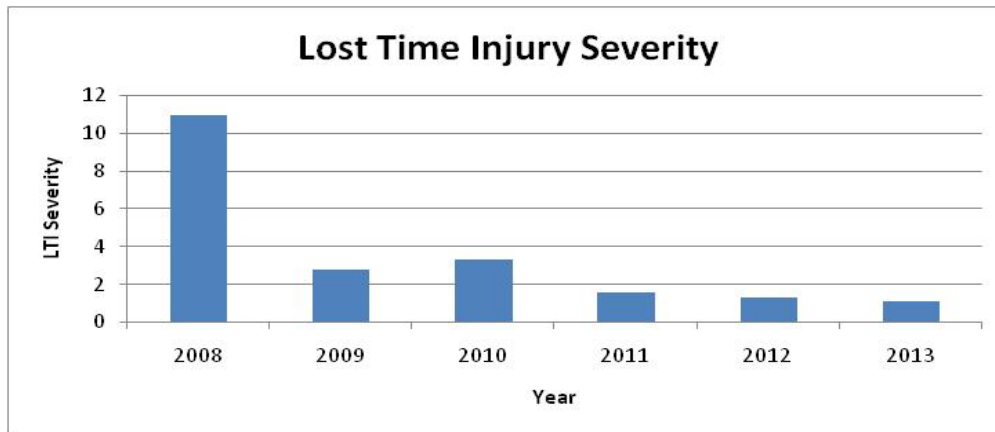
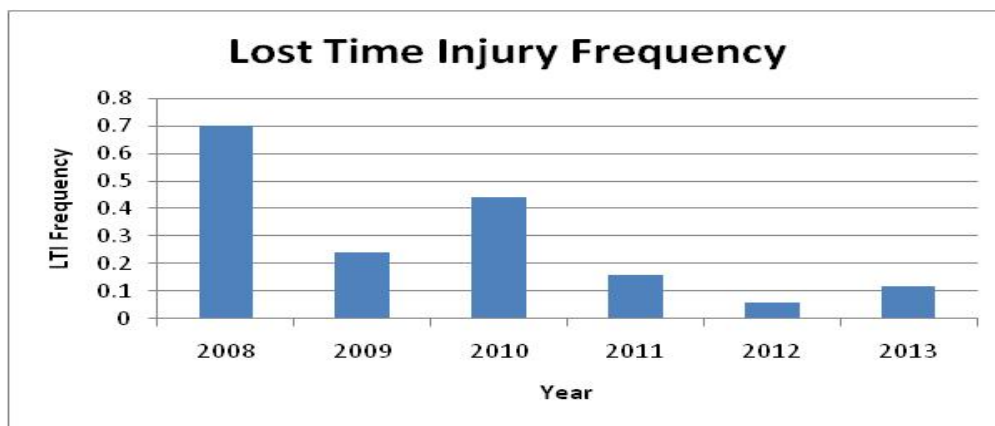


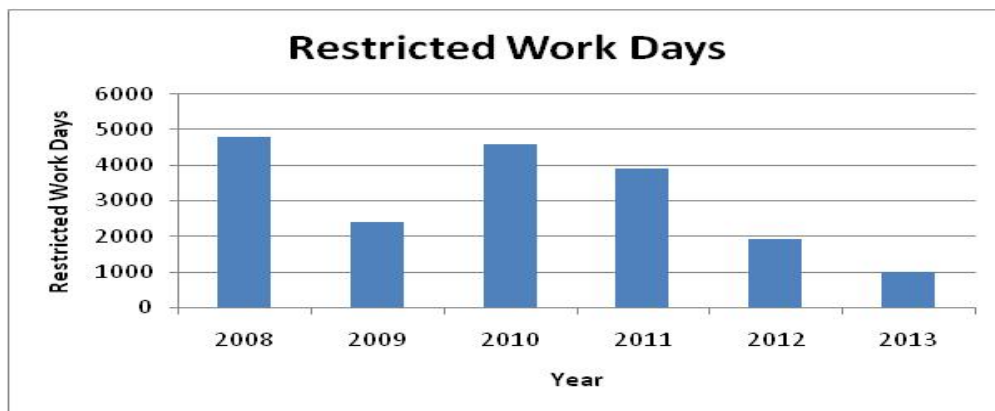
Figure 2: Total Recordable Injury Frequency



1 **Figure 3: Lost Time Injury Severity**



2 **Figure 4: Lost Time Injury Frequency**



3 **Figure 3: Restricted Work Days**

The above-noted performance improvements are a testament to the effectiveness of the Toronto Hydro's EHSMS and related policies, programs and procedures. Due to its outstanding safety performance record since 2011, the utility was recognized by the IHSA in August 2013 for having worked 3.5 million consecutive hours without a lost time injury. In addition, in 2013 Toronto Hydro was not issued a single order for non-compliance from the Ministry of Labour or Ministry of the Environment despite numerous inspections, and there were no employee work refusals. The utility achieved these performance improvements while keeping the segment cost increases from the 2011 historical to 2015 test year budgets to about 8%.

3.4. Sustainable Development

Toronto Hydro also uses the ISO 26000 standard to promote sustainable development and to integrate social responsibility into the utility's core values, processes and operations. The diagram below (Figure 6) illustrates the seven key principles and core subjects of the ISO 26000 standard:

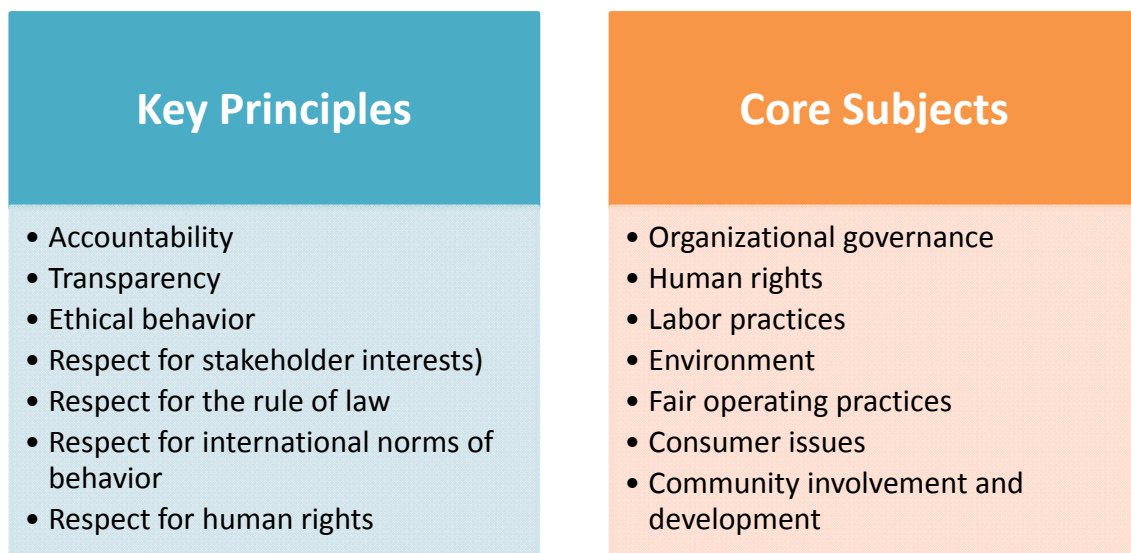


Figure 4: ISO 26000 Key Principles and Core Subjects

1 A Sustainability Committee, made up of the executive team and staff from the HR &
2 Safety program, was formed in 2013 to govern and oversee sustainable development at
3 Toronto Hydro. This committee establishes objectives and targets, and approve programs
4 relating to sustainable development.

5
6 In 2014, Toronto Hydro's first analysis of its alignment with ISO 26000, which was
7 reviewed and verified by an independent third party auditor, revealed only four gaps out
8 of approximately 250 requirements. Action plans have been established to close the
9 identified gaps.

11 **3.5. Environmental Stewardship**

12 The DSC (s. 4.6.5) requires distributors to have an environmental stewardship policy that
13 applies to all of the distributor's operations. Toronto Hydro complies with this obligation
14 through its Environmental Policy, which applies to all Toronto Hydro employees and
15 contractors who perform work on behalf of Toronto Hydro. The objective of this policy
16 is to help ensure that the utility conducts its business in a manner that minimizes the
17 impacts on the environment and embodies the principles of continual improvement.

18
19 The following are Toronto Hydro's core environmental principles:

- 20 1) **Comply With Legal Requirements:** At a minimum, comply with applicable
21 environmental legislation and other environmental commitments.
- 22 2) **Continual Improvement:** Continually improve environmental performance
23 through the establishment of annual objectives, targets and programs.
- 24 3) **Employee Engagement:** Engage and educate employees on the requirements
25 of this policy and the environmental management system, and provide
26 required training.

1 **4) Community Engagement:** Work constructively on environmental issues and
2 with open dialogue with stakeholders including suppliers, customers,
3 regulators, industry and the public.

4 **5) Prevention of Pollution:** Implement policies, programs, procedures or other
5 actions for the prevention of pollution that may result from Toronto Hydro's
6 activities.

7 **6) Consider The Environment In Business Processes:** Integrate environmental
8 considerations into our business processes.

9
10 EHS delivers a number of environmental protection and compliance programs, such as:

- 11
- 12 • management of non-hazardous and hazardous wastes, and of Polychlorinated Bi-
13 Phenyls ("PCBs") and PCB-containing equipment;
 - 14 • environmental spill response, cleanup, investigation and reporting;
 - 15 • delivery of prescribed environmental training (e.g., *Transportation of Dangerous*
16 *Goods Act, 1992*,⁹ and the associated regulations);
 - 17 • maintenance of air permits for equipment that discharges contaminants into the
18 atmosphere;
 - 19 • completion of annual reporting to federal, provincial, and municipal agencies; and
 - 20 • hazardous waste streams registrations with the Ministry of the Environment.
- 21

22 The segment also responds to public concerns about the environmental effects of Toronto
23 Hydro's activities (e.g., electromagnetic fields ("EMF"), presence of PCB's,
24 contaminated soil).

⁹ S.C. 1992, c. 34. ["TDG Act"]

1 **4. WORKER'S COMPENSATION**

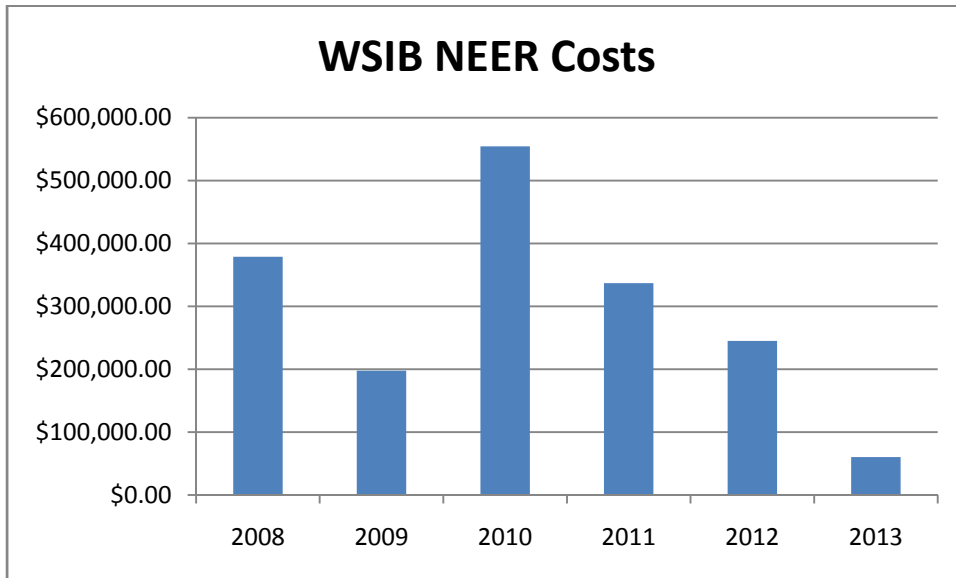
2 The EHS segment processes and monitors occupational health and injury claims on
3 behalf of Toronto Hydro, and works with injured employees to ensure their recovery
4 through appropriate treatment and to encourage their participation in the workplace
5 through meaningful work within their prescribed restrictions until they can safely return
6 to their pre-injury role. Diligence in executing this function helps the utility manage risk
7 in excess of \$2 million (difference between the maximum rebate and the maximum
8 surcharge under the NEER program).

9
10 The NEER program is a mandatory program administered by the WSIB, which tracks and
11 projects costs for WSIB claims. Each year, the WSIB establishes an expected annual cost
12 based on industry claim history and the size of organization, and compares the
13 employers' performance against this expected cost (calculated as the performance index).

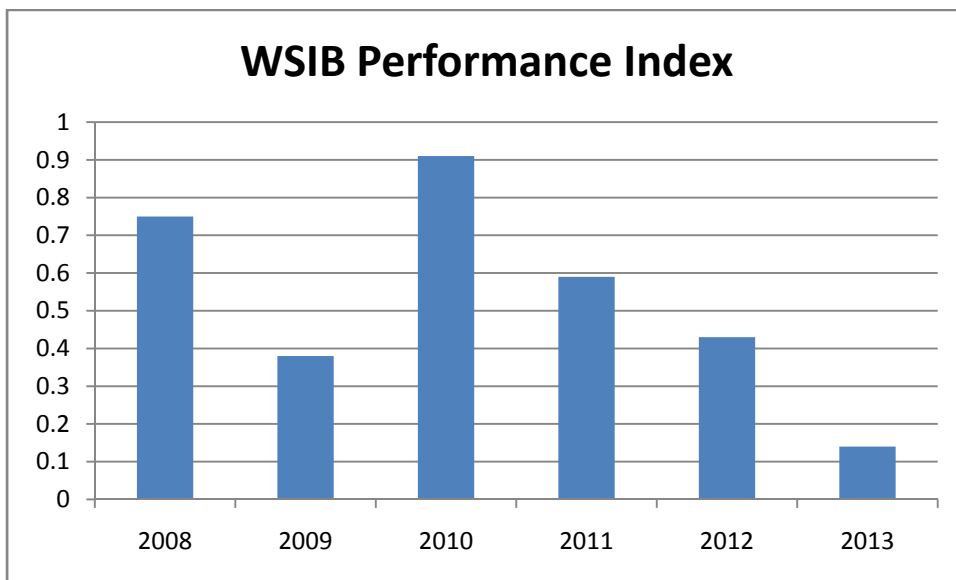
14
15 NEER costs are a combination of actual accident costs and compensation paid plus a
16 future reserve for the claim. This value is adjusted every four quarters over a four-year
17 period. The performance index is a ratio of actual NEER costs divided by expected costs.
18 The smaller the value of the performance index the better the performance of the utility.
19 If WSIB actual costs are below the expected cost, the employer receives a rebate of the
20 difference between the actual and expected costs. On the other hand, if the WSIB actual
21 costs exceed the expected cost, the employer must pay a surcharge up to three times the
22 expected cost.

23
24 Through diligent case management of WSIB claims and effective accident prevention
25 programs, Toronto Hydro's actual NEER costs have decreased by 84% from 2008 to
26 2013 (see Figure 7, below) and the WSIB performance index improved by 81% over the
27 same timeframe (see Figure 8, below).

28



1 **Figure 5: WSIB NEER Costs**



2 **Figure 6: WSIB Performance Index**

4.1. Internal and External Reporting

Toronto Hydro regularly reports on EHS performance for both internal and external purposes. Internally, the EHS team issues reports weekly, monthly, quarterly, and annually to management summarizing EHS activities and events and to the Joint Health and Safety Committees (as prescribed by OHSA).

External reporting includes mandatory reports and notifications to the City of Toronto¹⁰, the Ministry of Labour under sections 51, 52 and 53 of OHSA, the Ontario Workplace Safety and Insurance Board under the *Workplace Safety and Insurance Act, 1997*,¹¹ the Ministry of the Environment under Ontario Regulation 341 of the *Environmental Protection Act*,¹² and Environment Canada under the *Canadian Environmental Protection Act, 1999*.¹³

4.2. Segment Costs

Table 2 provides the Historical (2011-2013), Bridge (2014) and Test Year (2015) costs associated with the EHS segment.

Table 2: EHS Segment Costs (\$ Millions)

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Environment Health & Safety	\$2.3	\$2.2	\$2.4	\$2.7	\$2.8

4.3. 2011 – 2012

The cost of this segment decreased by \$0.1 million from 2011 to 2012 through: (1) rebalancing the core of the work force through downsizing and a voluntary exits

¹⁰ City of Toronto, by-law No. 457-2000, *Sewers Bylaw* (6 July 2000).

¹¹ S.O. 1997, C. 16. Sched. A. [“*Workplace Safety and Insurance Act*”]

¹² R.S.O. 1990, C. E.19. [“*Environmental Protection Act*”]

¹³ S.C. 1999, c. 33. [“*Canadian Environmental Protection Act*”]

1 program; and (2) organizational and job re-design in 2012 to adapt to changing
2 circumstances.

3
4 **4.4. 2012 – 2013**

5 EHS segment costs increased by \$0.2 million from 2012 to 2013 as additional resources
6 were required to support the safe execution of the utility's capital work program.

7
8 **4.5. 2013 - 2014**

9 EHS segment costs increased by \$0.3 million from 2013 to 2014 as additional resources
10 were required to support the safe execution of the utility's capital work program.

11
12 **4.6. Test Year Costs**

13 The proposed 2015 Test Year costs associated with the delivery of the functions and
14 responsibilities of the EHS segment is approximately \$2.8 million, which represents an
15 increase of \$0.5 million from the utility's last rebasing year (2011), \$0.4 million from the
16 most recent historical actual year (2013), and \$0.1 million from the bridge year (2014).

17 The primary driver of these projected variances is the cost associated with the additional
18 resources that Toronto Hydro requires to support the safe and responsible execution of
19 the utility's work plans over the 2015-2019 rate period (refer to the Distribution System
20 Plan filed at Exhibit 2B).

21
22 If the utility does not receive the funding it requires to execute this segment as described,
23 Toronto Hydro's employees could be exposed to unacceptable levels of risk, including
24 injuries and illness due to occupational health and safety hazards, and risks related to
25 legislative and regulatory non-compliance, such as fines and penalties, and stop work
26 orders. When inadequate resources are applied to accident prevention and environmental
27 protection, occupational injury and illness rates can increase, as can the risk and severity
28 of environmental contamination. Associated costs rise as the level of risk increases, and
29 such costs can exceed the cost of prevention activities. The utility could also experience a

1 decline in its safety performance record, which could result in an increase in WSIB
2 premium rates, a reduction of its overall levels of productivity and an adverse effect on its
3 ability to achieve key operating objectives.

4 5 6 **5. HUMAN RESOURE SERVICES AND EMPLOYEE RELATIONS** 7 **SEGMENT**

8 This segment is responsible for effective management of all employee relations,
9 including the interpretation and administration of the collective agreement provisions,
10 organization design, non-occupational employee claims and case management, design
11 and administration of the compensation and benefits program, as well as facilitation and
12 oversight of human resource technology systems and solutions. The segment maintains
13 and enforces human resources policies and legislative requirements and provides
14 corporate-wide human resource support in the execution of business deliverables. The
15 following discussion addresses the key operational dimensions of the HR Services and
16 Employee Relations segment, namely:

- 17 • Case Management;
- 18 • Employee Relations;
- 19 • Policies;
- 20 • Technology Systems and Reporting; and
- 21 • Compensation and Benefits.

22 23 **5.1. Case Management**

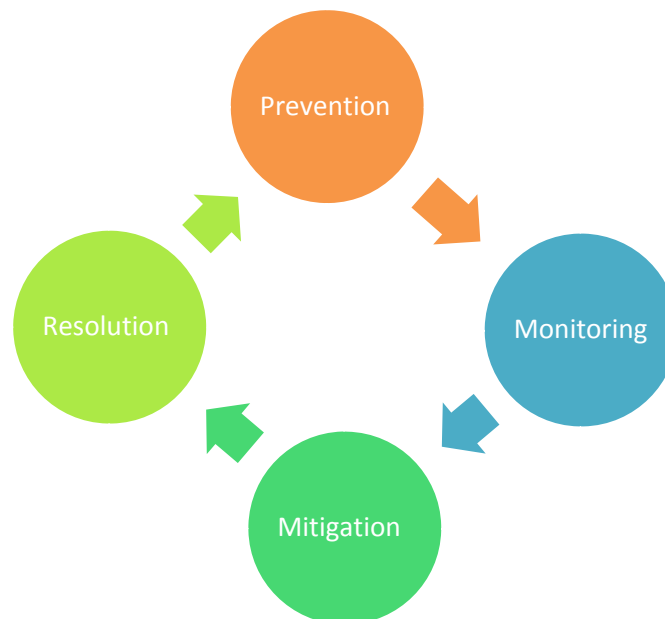
24 Case management focuses on the prevention, monitoring, mitigation, and resolution of
25 specific issues relating to attendance, health, short and long-term disability, and employee
26 compliance with corporate practices and collective agreement provisions. This function
27 is delivered through the comprehensive case management program outlined below, which

1 enables Toronto Hydro to promptly identify cases, provide support and resources, and
2 monitor situations appropriately to minimize work disruptions.

3
4 Toronto Hydro's exceptional corporate attendance record demonstrates the effectiveness
5 of the case management function. From 2008 to 2013, the corporate attendance number
6 improved by 45%, from 9.48 days in 2008 to 5.23 days in 2013. In addition, the utility
7 achieved and sustained a 79% reduction in restricted work days, from 2008 to 2013.
8 Effective health case management also resulted in a Long-Term Disability ("LTD")
9 refund of \$847,661 in 2013.

10
11 Through the comprehensive case management process, Toronto Hydro can identify cases
12 promptly, provide resources, and monitor appropriately to minimize work disruption.

13 The diagram below outlines Toronto Hydro's four step case management process.



14 **Figure 7: Case Management Process**

1 **5.1.1. Prevention**

2 Prevention consists of biological monitoring,¹⁴ health case management, health
3 prevention programs, and compliance education. In 2013, Toronto Hydro expanded the
4 safety culture to include a focus for health prevention. The key focus in 2013 was mental
5 health awareness. Toronto Hydro fosters a preventative health culture through the
6 offering of a wellness topic as part of monthly safety meetings. Compliance education
7 occurs through employee engagement functions to ensure awareness of, and compliance
8 with, corporate policies and legislative requirements. For example, all Toronto Hydro
9 employees have been educated on the *Accessibility for Ontarians with Disabilities Act*,
10 2005,¹⁵ requirements.

12 **5.1.2. Monitoring And Mitigation**

13 The Employee Relations and Human Resources Services team monitors employment
14 related trends and issues, develops mitigation strategies to address workplace problems
15 and proactively manages cases with business unit leaders in support of desired outcomes,
16 such as training, returning to work, health management, performance management, or
17 collective agreement adherence.

19 Toronto Hydro relies on a variety of tools and resources to support employees and
20 achieve the appropriate result in the particular circumstances of each case. These tools
21 and resources may include training, coaching for leaders, ergonomic assessments, health
22 assessments, or counseling.

24 An example of this work is the case of an employee whose primary responsibility was
25 computer work, who was diagnosed with Carpal Tunnel Syndrome and Elbow Tendinitis.

¹⁴ Biological monitoring is legislatively required under the OHSA as an early detection resource for Toronto Hydro employees exposed to designated substances and specific environmental conditions.

¹⁵ S.O. 2005, C. 11. ["AODA"]

1 The Health Services team conducted an ergonomic assessment of the employee's
2 workstation as well as an assessment of the individual's duties. Following this
3 assessment, the team determined that the employee's computer monitor had to be
4 adjusted and that a computer mouse with less movement was required. In addition, a
5 computer-based stretching tool was loaded to ensure the employee took the required
6 stretch break and did not overuse their arms/wrists. Within two weeks the employee felt
7 better and by four weeks the individual was performing their full duties. The ergonomic
8 modifications and the rotation of work duties facilitated the individual's complete
9 recovery and ability to return to their responsibilities.

11 **5.1.3. Resolution**

12 The Case Management cycle is complete with the resolution of the specific claim. This
13 can occur through the health recovery, reintegration, or development of a new
14 process/procedure to improve or resolve the initial claim. For example, in a situation
15 with an occupational or non-occupational illness or injury that results in a reintegration
16 into the workplace, Toronto Hydro utilizes the Early & Safe Return to Work ("ESRW")
17 process. The goal of the ESRW program is to return workers to their regular duties in a
18 safe and timely manner to the extent possible given the worker's restrictions. Where
19 return to pre-injury position is not possible, permanent accommodation is pursued. In
20 2013 and 2014, 74 employees returned to positions at Toronto Hydro through the ESRW
21 process.

23 **5.2. Employee Relations**

24 Toronto Hydro has a complex and diverse workforce of approximately 1,537 employees
25 in variety of roles and functions including certified and skilled trades, and designated and
26 technical professionals. Toronto Hydro also operates within a dynamic labour
27 environment, as approximately 67% of its employees belong to a union. Unionized
28 employees are organized into three bargaining units (inside workers, outside workers, and

1 professional engineers) and are represented by sophisticated and established labour
2 unions, Canadian Union of Public Employees, Local 1 (“CUPE”) and the Society of
3 Professional Engineers (the “Society”).
4

5 The Employee Relations function supports the operation of all of Toronto Hydro’s
6 unionized and non-unionized work groups by ensuring workplace issues are investigated
7 and addressed promptly and appropriately. The Employee Relations team also helps
8 ensure that the utility follows all applicable labour and employment related legislation,
9 policies, and collective agreement requirements, and drafts and reviews policies and
10 related documentation.
11

12 This work requires a team of sophisticated labour relations and legal professionals who
13 can provide proactive advice on how to address these challenges, and where necessary,
14 assist in preparing for litigation. Litigation preparation includes grievance arbitration,
15 civil employment claims, labour board matters, and human rights claims. The Employee
16 Relations stream also provides legal advice and assistance in regards to privacy matters
17 and freedom of information requests that pertain to employees of the organization.
18

19 The Employee Relations team plays a primary role in planning for and engaging in
20 collective bargaining. Since 2011, the team has negotiated two four-year agreements
21 with its bargaining units, providing stability for the organization over the next four years
22 with an average increase of 1.75% for CUPE and 1.8% for Society. These agreements
23 also allow the utility to have a more flexible and productive workforce, improve customer
24 service delivery and reduce costs through operational efficiencies.
25

26 **5.3. Policies**

27 Toronto Hydro develops, maintains and enforces a number of employment related
28 policies. These policies, which are summarized in Table 2 below, enable the utility to

1 satisfy key legislative obligations, manage its workforce in accordance with best
2 practices, or avoid employment-related risks.

3

4 **Table 3: Toronto Hydro Employment-Related Policies**

Policy	Source
Toronto Hydro's Violence Prevention in the Workplace Policy	Legislative Compliance with <i>Occupational Health and Safety Act</i>
Occupational Health & Safety Policy	Legislative Compliance with <i>Occupational Health and Safety Act</i>
Toronto Hydro's Workplace Harassment Policy	Legislative Compliance with <i>Occupational Health and Safety Act</i>
Toronto Hydro Code of Business Conduct	Best Practices
Accessibility Standards for Customer Service Policy	Legislative Compliance with <i>Accessibility for Ontarians with Disabilities Act</i> (AODA)
Employee Privacy Policy	Legislative Compliance with <i>Municipal Freedom of Information and Protection of Privacy Act</i> ¹⁶ (MFIPPA)
Recruitment and Selection Policy	Best Practices
Credentials Verification Policy	Best Practices
Fraud and Theft Policy	Best Practices
Toronto Hydro's Social Media and Digital Communications Guidelines	Best Practices
Cyber Security Policy and Technology Use Guidelines	Best Practices

5 **5.4. Technology Systems and Reporting**

6 This segment oversees a number of human resource technology systems and processes to
7 support managers and leaders in the execution of their workforce management duties. This
8 allows for fact-based decision-making in the program areas of performance and

¹⁶ R.S.O. 1990, C. M.56. ["MFIPPA"]

1 attendance, health and safety, training and development, and workforce planning.

2 Oversight includes maintaining data integrity for employee and safety data, work flow,
3 reporting, security, and technical process design. As an example of supporting data
4 integrity, timely orientation and exit protocol of employees ensures accurate data is
5 available for corporate financial reporting.

6
7 Data from the employee and safety systems directly feeds into other management systems
8 which are critical to the utility's operational activities, such as financial and engineering
9 systems. This segment provides foundational design support and oversight to the critical
10 corporate systems that employee and safety data interfaces with. As an example, current
11 enhancements to the time and attendance system help ensure availability of appropriate
12 capital and operational expense representation, critical to reporting on the progress of the
13 operational plan.

14
15 A number of these systems and processes, such as the Attendance Management System,
16 Resource Requisition, and Organization Change tools, have been automated to streamline
17 business processes and enable these functions to be executed more efficiently. For
18 example, the Organization Change tool which was released in 2013 resulted in timely
19 hierarchy information being interfaced with key systems that rely upon hierarchy
20 information to manage the business operations, such as allowing for accurate safety
21 incident reporting.

22
23 In a similar manner, the performance management system was recently consolidated and
24 automated to provide increased functionality, data integrity, and reporting capabilities.
25 Additional systems have also been developed to support employee communication and
26 claims management. Toronto Hydro enhanced the safety inspection process in 2011 with
27 the implementation of the EHS management software which allows supervisors to enter

1 inspection findings on their wireless laptops while in the field and automates reporting,
2 reducing administrative time.

3 4 5 **6. COMPENSATION AND BENEFITS**

6 This stream of the Human Resource Services and Employee Relations segment oversees
7 and administers Toronto Hydro's workforce compensation strategy and practices¹⁷ The
8 services provided through this function are critical to utility's ability to secure and
9 maintain a workforce that is skilled, adaptable, committed and performance-driven.
10 Toronto Hydro strives to achieve these key outcomes in a financially responsible manner
11 by providing wages and benefits that are competitive in the markets where Toronto
12 Hydro competes for talent, and by recognizing employee contributions in achieving
13 individual, divisional, and corporate performance goals.

14
15 This function is responsible for the benchmarking and annual review activities that enable
16 Toronto Hydro to strike an appropriate balance between controlling costs and providing
17 market-competitive compensation. It is also responsible for administering the
18 performance review program as it relates to compensation. This program is vital to
19 operational success because it drives desired behaviours and performance results with
20 respect to key areas of the utility's strategy,¹⁸ such as customer service, operational
21 efficiency and safety.

22
23 The Compensation and Benefits function also monitors and evaluates the employee
24 benefit program to ensure the program provides value for money, and that benefit carriers
25 comply with the benefit agreements and service level expectations. The team's efforts in
26 this respect enabled Toronto Hydro to save \$2 million in 2012 and \$1.1 million in 2013
27 in benefit costs by successfully negotiating lower rate increases with benefit providers.

¹⁷ Exhibit 4A, Tab 4, Schedule 5.

¹⁸ Exhibit 1C, Tab 1, Schedule 1.

In addition, the team implemented a number of cost-curtailling initiatives with respect to Toronto Hydro's benefit program, which have resulted in lower costs for the utility and greater flexibility and awareness by plan members regarding their benefits plan.¹⁹

6.1. Segment costs

Table 4 provides the Historical (2011-2013), Bridge (2014) and Test Year (2015) costs associated with the Human Resource Services and Employee Relations segment.

Table 4: Human Resources Services & Employee Relations Segment Costs
(\$ Millions)

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Human Resource Services and Employee Relations	\$4.7	\$5.2	\$6.2	\$5.7	\$5.8

6.2. 2011 – 2012

From 2011 to 2012, costs increased by \$0.5 million due to: 1) additional resources required to assist with the case management process, particularly attendance management, and to review and improve the benefit management process by implementing best practices, adopting cost containment measures and negotiating better rates with benefit providers; and 2) an increase in legal fees associated grievance arbitrations and labour board matters.

6.3. 2012 – 2013

From 2012 to 2013, costs increased by \$1 million due to: 1) an increase in legal fees associated with grievance arbitrations and other matters; and 2) additional resources required to support employee labour relations matters, and case management. The additional resources were necessary to manage an increase in Freedom of Information

¹⁹ Exhibit 4A, Tab 4, Schedule 5.

1 (“FOI”) requests, and to deliver additional human resource services to support the safe
2 and efficient execution of the utility’s capital work program.

3
4 **6.4. 2013 – 2014**

5 From 2013 to 2014 the budget is expected to decrease by approximately \$0.5 million, as
6 a result of reductions relating to professional fees.

7
8 **6.5. Test Year Costs**

9 The 2015 Test Year costs associated with the delivery of the functions and
10 responsibilities of the Human Resource Services and Employee Relations are
11 approximately \$5.8 million, which represents a \$1.1 million increase from the last
12 rebasing year (2011), a \$0.4 million decrease from the most recent actual year (2013),
13 and a \$0.1 million increase from Bridge Year forecast (2014).

14
15 Historically, the cost of delivering this segment has fluctuated to some extent due to legal
16 expenses associated with grievance arbitrations and other employment related legal
17 matters, all of which are beyond management’s control and ability to forecast. Toronto
18 Hydro’s legal expenses for employment related matters are expected to continue to
19 fluctuate over the 2015-2019 rate period.

20
21 Although Toronto Hydro’s overall staffing levels have decreased since its last rebasing
22 application in 2011, the utility requires additional resources to manage the complexities
23 associated with its aging workforce²⁰, and to support the safe and efficient execution of
24 the utility’s capital program.²¹ Toronto Hydro also needs the requested level of funding
25 to sustain the initiatives and programs that the utility has put in place over the current rate
26 period to foster greater productivity, enable the achievement of performance goals, and
27 curtail workforce-related costs.

²⁰ Exhibit 4A, Tab 4, Schedule 3.

²¹ Exhibit 2B.

1
2 If Toronto Hydro does not receive the requested level of funding to carry out the
3 functions and responsibilities that comprise this segment, the utility may be exposed to a
4 number of risks. These risks could include legislative or regulatory non-compliance as a
5 result of having insufficient resources to monitor, advise on, and enforce compliance with
6 the utility's statutory and regulatory obligations; lower levels of productivity across the
7 organization due to the inability to investigate and remedy employment issues such as
8 attendance management; and other miscellaneous risks, such as the inability to defend
9 itself against employment related claims, or to pursue further efficiencies and cost-saving
10 opportunities.

11
12
13 **7. TALENT MANAGEMENT AND ORGANIZATIONAL DEVELOPMENT**
14 **SEGMENT**

15 The Talent Management and Organizational Development segment is responsible for the
16 development and execution of the workforce staffing plan, succession, and employee
17 development strategies and programs. The primary objective of this segment is to attract
18 and maintain a skilled, productive and adaptable workforce that Toronto Hydro requires
19 to execute its programs and deliver safe and reliable electricity service to its customer.

20
21 Functions that enable Toronto Hydro to achieve these outcomes include: workforce
22 staffing; short-term and long-term succession planning; job and organizational design;
23 attraction, recruitment and selection of new employees; employee orientation,
24 engagement and communication; performance and change management systems; training
25 and development; and employee retention.

26
27 Toronto Hydro's operational realities and workforce challenges (i.e., dense urban
28 landscape, complex underground system, competition due to growth and construction in

1 the City of Toronto, and aging workforce) have important implications for the Talent
2 Management and Organizational Development segment. For example, the Talent
3 Management team must establish and implement multiple attraction and recruitment
4 strategies in order to satisfy the utility's diverse workforce requirements. These
5 strategies include promoting from within, hiring from the external market, and building
6 partnership with colleges and universities to hire new graduates.²²

7
8 Likewise, the Organizational Development stream must establish and implement a wide
9 variety of training, development and change management initiatives in order to ensure
10 that Toronto Hydro's employees have the skills, resources and tools they require to
11 execute the utility's plans safely, effectively and efficiently.

12 13 **7.1. Talent Management**

14 The Talent Management function plans and executes the utility's short- and long-term
15 staffing strategy²³ with regard to a number of factors including: the resources that the
16 utility needs to execute its capital plans and operational programs, the availability of
17 talent within the utility and in external market, and the actual and projected turnover
18 rates. This segment is also responsible for establishing and administering industry
19 specific collaborations with colleges and universities, attraction strategies, and the
20 recruitment and selection processes.

21
22 Talent Management guides and executes both the internal and external selection process,
23 ensuring that it is fair, barrier free, and that competition is not biased. Toronto Hydro
24 relies on a number of strategies to attract highly skilled and diverse candidates from the
25 external market. To be more specific, the utility,

- 26 • maintains a presence on professional social networking websites and uses these
27 websites to promote and protect its employment brand;

²² Exhibit 4A, Tab 4, Schedule 3.

²³ Exhibit 4A, Tab 4, Schedule 3.

- 1 • participates in job fairs at universities, colleges and professional associations; and
- 2 • leverages collaborations with educational institutions, such a Ryerson University
- 3 and Georgian College, local City colleges, and community organizations such as
- 4 The Learning Partnership, Micro Skills, and the Toronto Regional Immigrant
- 5 Employment Council.

6

7 Collaborations with educational institutions are particularly important because they allow

8 Toronto Hydro to spread awareness about its human resource requirements, build

9 recruitment relationships with future graduates, and influence and shape the programs

10 and curriculum offered to students with the utility's strategic goals and long-term needs.

11 Through these partnerships, Toronto Hydro hired approximately 18 full time employees

12 into the certified and skilled trades and designated and technical professional positions

13 between 2011 and 2013.

14

15 Toronto Hydro uses a competency-based selection process to fulfill vacancies, whereby

16 candidates are evaluated on both behavioural corporate competencies and technical job

17 specific requirements. Examples of behavioural competencies include the ability to

18 demonstrate a commitment to EHS and results associated with championing change,

19 productivity and innovation. Manual and physical dexterity are examples of technical job

20 specific requirements for the Certified Power Cable Person position. These skills would

21 be demonstrated by the completion of cable cutting, installation and taping tasks while

22 working in a "stooped" position.

23

24 The balance between behavioural and technical competencies ensures that highly

25 qualified candidates are identified and considered by the organization. Through this

26 comprehensive selection process, Toronto Hydro has been able to maintain a low

27 turnover rate over the 2011 to 2013 period.

28

1 A number of process improvement initiatives have been undertaken by the Talent
2 Management team to secure market competitive costs for various talent management
3 services. These initiatives included the execution of request for proposals (“RFPs”) to
4 establish preferred vendor relationships, the benefits of which are efficiencies relating to
5 pre-negotiated terms and condition of service, and discounted service rates with
6 temporary staffing agencies, leadership and technical search firms, and background
7 screening providers. These services are also valuable because they allow internal
8 resources to focus on more strategic activities such as job design, attraction strategies,
9 and competency evaluations.

11 **7.2. Organization Design**

12 Organization design assesses the functionality of Toronto Hydro’s business departments
13 and operational divisions by reviewing each business units’ functional responsibilities
14 and associated processes for meeting those responsibilities. Organization design staff
15 also work with the business units to plan for long-term goals and objectives, consider
16 succession opportunities, and devise the appropriate short-term and long-term workforce
17 requirements for meeting those goals and objectives. In addition, staff work with other
18 teams to review the organizational structure and identify strategies to enhance existing
19 processes, achieve operational efficiencies and cost savings, and improve overall
20 organization performance. This review also allows Toronto Hydro to be confident that
21 job roles are clearly defined, that performance is adequately measured and that
22 employees are compensated based on the appropriate job evaluation.

24 **7.3. Change Management**

25 The Organizational Development team collaborates with other business units to design
26 and administer change management functions, the objective of which is to implement
27 specific programs and initiatives to align the workforce with the utility’s goals and
28 objectives.

1
2 As an example, in 2013, Toronto Hydro relied on its internal change management
3 expertise to develop a program about working in energized chambers. A pilot project is
4 currently in place to train 30 employees, and the utility expects that the program will be
5 fully rolled out to in 2015. The objective of this initiative is to develop and implement a
6 procedure for safely working in live cable chambers, in order to overcome a number of
7 operational disadvantages associated with de-energizing cables. More specifically, when
8 cables are de-energized, all affected feeders are placed in an abnormal state, meaning that
9 nearby feeders have to carry the additional load, which puts additional strain on highly
10 loaded equipment and increases the risk of wide spread outages. This practice also
11 reduces the life span of cables and the availability of system redundancy which is critical
12 to reliability. In addition, it increases the complexities of job planning, as well as the
13 number of planned outages that Toronto Hydro has to undertake to perform work on the
14 system.

15
16 The change management team supports the messaging and training strategies associated
17 with this initiative, and plays an instrumental role in encouraging worker participation by
18 demonstrating that this work can be done safely

19 20 **7.4. Training and Development**

21 In order to develop and sustain a qualified and competent workforce, Toronto Hydro's
22 Organizational Development team administers an array of training and development
23 programs, including the new employee orientation, apprenticeship and leadership
24 programs. In 2013, the Organizational Developmental team organized and successfully
25 delivered 103 training programs, as summarized in the chart below (Table 5).

1 **Table 5: Training Programs**

Area	2011 Courses	2012 Courses	2013 Courses
Compliance (e.g., Environmental and Safety legislative training, EUSA and ESA Rules, Confined Space, Work Protection Code, Network Switching)	10	20	42
Legislative (e.g., WHMIS, Defensive Driving, Forklift Training)	5	17	20
Apprentice (e.g., Distribution Systems Technologist, Power Systems Controllers, Certified Power Cable Persons, Certified Power Line Persons, Meter Mechanics)	10	16	19
Leadership (e.g., Safety Leadership, Performance Management, Management Control & Reporting System , Project Management, Policy Administration)	9	7	6
Technical & Customer Service Training (e.g., Engineering Technicians, Electrical Awareness, Project Execution , Customer Education Training)	14	14	16
Total	48	74	103
Total Cost	\$1.23M	\$1.18M	\$1.47M

2 Successful integration of new employees depends upon the timely delivery of specific
3 training programs and initiatives to ensure that employees are competent and capable of
4 safely and effectively performing all components of their job. Training programs at

1 Toronto Hydro include courses with respect to the utility's operating standards and
2 procedures, as well as a host of legislative and compliance requirements, such as those
3 outlined in sections 25 and 26 of the *Occupational Health and Safety Act*.

4
5 Effective leadership and succession planning are essential to the utility's success and
6 provide value to Toronto Hydro's customers by driving productivity and efficiency, and
7 protecting the continuity of the utility's operations. Training and development facilitates
8 these objectives, in conjunction with the performance management program which allows
9 employees to identify career development goals, specific interests and any skill or
10 knowledge gaps that they would like to fill. This information is critical to recognizing
11 and developing potential leaders and successors from within the utility, and to delivering
12 Toronto Hydro's staffing strategy.²⁴

13
14 The development process unfolds over the employment lifecycle through various training
15 programs and initiatives. For example, the leadership program provides training with
16 respect to effective conflict resolution, improving productivity, developing regulatory
17 acumen, and providing exceptional customer service. Employees who participated in this
18 program have reported a significant improvement in their supervisory skills and
19 management capabilities. Without this initiatives, Toronto Hydro's present and future
20 ability to meet customers' needs and satisfy operational requirements could be negatively
21 affected as the utility may not have the available internal talent to satisfy leadership
22 requirements.

23
24 To track and administer its training programs more efficiently, the Organizational
25 Development team developed a comprehensive matrix that identifies the specific training
26 requirements applicable to each position and role within the utility. The matrix is used to
27 develop training plans for newly-hired, transferred, or promoted employees, as well as for

²⁴ Exhibit 4A, Tab 4, Schedule 3.

tracking and identifying the need to re-train existing employees. The matrix is periodically reviewed and updated as requirements change and evolve.

Comprehensive training is not only a legislative requirement under the *Occupational Health Safety Act* and other key statutes and codes that govern Toronto Hydro, but it also contributes to higher employee productivity, efficiency and safer operations. For example, the graph below (Figure 10) illustrates the correlation between Toronto Hydro's safety results as a measure by the Total Recordable Injury Frequency ("TRIF") metric, and the number of training days per year. This graph shows that TRIF figures have decreased significantly since Toronto Hydro implemented its comprehensive training program in 2006.

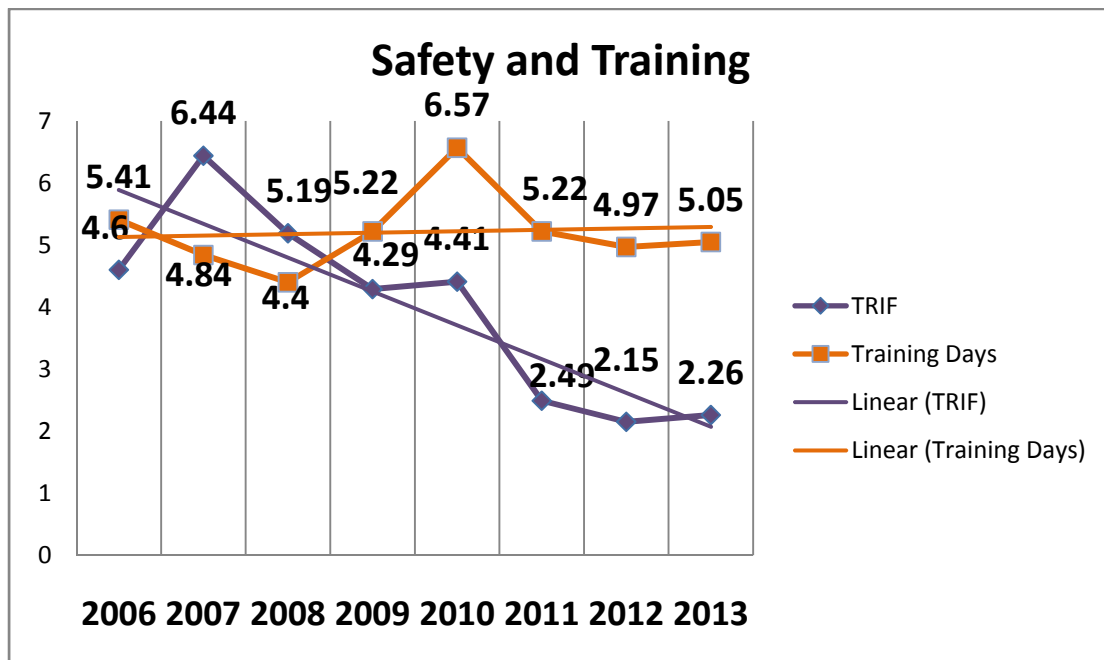


Figure 8: Safety Results vs. Training Days

Toronto Hydro's technical training and development programs are an essential resource for meeting all legislative, compliance and utility specific training requirements. These

1 programs are tailored and customized to address the specific needs and challenges of
2 Toronto Hydro's distribution system, and to align the utility's workforce with key safety
3 practices and operational procedures.

4
5 In addition, the technical training and development programs play a key role in
6 facilitating the development and transfer of core knowledge about the complexities of
7 Toronto Hydro's distribution system and in maintaining the specialized work skills which
8 are critical at Toronto Hydro (e.g., network switching, work on box construction, and
9 lead cable splicing in the underground system), to allow retiring older workers an
10 opportunity to share the complexities of the utility's assets with new workers.

11
12 Complexities related to box construction include equipment age, accessibility and safety
13 constraints. Complexities related to Paper-Insulated Lead Cable ("PILC") include
14 exposure to hazardous materials and when malfunctioning, there is a potential for an arc
15 flash fire.

16
17 Through the technical training and development programs, Toronto Hydro administers five
18 certified apprenticeship training programs:

- 19 • certified power line persons ("CPLP"),
- 20 • certified power cable persons ("CPCP"),
- 21 • distribution system technologists (DST),
- 22 • power system controllers ("PSC"), and
- 23 • certified meter mechanics ("CMM").

24
25 Toronto Hydro also administers two technical training programs: engineering
26 technologist and engineers.

27

1 The table below (Table 6) illustrates Toronto Hydro's historical and forecast
2 apprenticeship hiring.

3

4 **Table 6: Training Programs**

Apprentice Group	2011	2012	2013	2014	2015	2016	2017	2018	2019
CPCP	13	0	0	9	18	18	18	18	27
CPLP	12	0	0	0	24	12	12	12	12
DST	12	0	9	9	16	8	0	0	8
PSC	8	4	0	4	6	4	2	2	2
CMM	0	0	0	0	5	0	4	5	4
Engineering Technologist	17	6	2	15	6	6	8	2	12
Engineer	16	2	6	2	2	2	2	1	1
Total	78	12	17	39	77	50	46	40	66

5 The utility's CPLP program is recognized and accredited by the Ministry for Training,
6 Colleges and Universities ("MTCU"). The other four apprenticeship programs are
7 designed with the objective of developing and maintaining the specialized skills and
8 knowledge that certified and skilled trades and designated and technical professionals
9 require to work on Toronto Hydro's distribution plant safely and efficiently.

10

11 The MCTU considers Toronto Hydro a Training Delivery Agent ("TDA"), which means
12 that Toronto Hydro's apprenticeship programs must satisfy certain educational standards
13 and criteria, as outlined in the MTCU's TDA Approval Process Guidelines. These
14 requirements apply to the CPLP program, and these standards are consistently applied to
15 all other programs. Pursuant to these criteria and standards, Toronto Hydro must:

- 16 • support increased apprenticeship registrations, participations and completions;
- 17 • improve the apprenticeship delivery system in at least one of the key cornerstones
- 18 as determined by MTCU;

- 1 • indicate labour market demand for the specific program requested and provide
- 2 proof of local industry support for delivery at the requesting institution;
- 3 • demonstrate that it has and will make available for the course all curriculum
- 4 standards and equipment necessary to deliver ministry-approved curriculum
- 5 meeting all learning outcomes;
- 6 • outline the criteria it will use to select course instructors including, where
- 7 appropriate, language and culturally sensitive skills;
- 8 • demonstrate the availability of academic assistance programs and accommodations
- 9 for persons with disabilities or special needs;
- 10 • allow Ministry staff or a third party the required access to evaluate curriculum
- 11 delivery, including access to the premises, their staff and apprentices; and
- 12 Comply with all applicable legislation including the *Ontario College of Trades*
- 13 *and Apprenticeship Act, 2009*,²⁵ the *OHSA*, and any other laws and regulations
- 14 that may apply.

16 **7.5. Performance Management**

17 Toronto Hydro drives and incentivizes its employees to demonstrate specific behaviours
18 and achieve desired results through the annual performance management program.
19 Performance management is the process of jointly establishing performance expectations,
20 monitoring and evaluating performance throughout the year, providing regular coaching,
21 and assessing and recognizing employees' achievements. This function ensures that
22 employees know what is expected of them and that they understand how their roles
23 support the strategic direction and core objectives of the utility.²⁶ In addition to
24 mobilizing Toronto Hydro's workforce to achieve the core objectives outlined in the
25 corporate strategy, the annual performance management cycle facilitates career
26 development and contributes to employee engagement and enrichment.

²⁵ S.O. 2009, C. 22. [*"OCTAA"*]

²⁶ Exhibit 1C, Tab 3, Schedule 1.

7.6. Employee Engagement and Communication

The Organizational Development stream oversees employee engagement and communications at Toronto Hydro. This is achieved through the new employee orientation program, employee communications and employee events such as organizational updates and community involvement. Research indicates that companies who rank in the top quartile with respect to employee engagement have a higher rate of productivity and experience a decrease in turnover and in safety incidents relative to companies that rank in the bottom quartile.²⁷

In 2012, a comprehensive employee engagement program was established to support and engage employees during a time of ambiguity and change. This program encourages leaders to be accountable and visible to employees, to ensure that employees understand the messages and direction of the organization, and to address employee concerns.

7.7. Segment costs

Table 7 provides the Historical (2011-2013), Bridge (2014) and Test Year (2015) costs associated with the Talent Management and Organizational Development segment.

Table 7: Talent Management and Organizational Development Segment Costs (\$ Millions)

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Talent Management and Organization Development	\$6.7	\$5.9	\$6.6	\$6.9	\$7.5

7.8. 2011 – 2012

From 2011 to 2012, segment costs decreased by \$0.8 million. This was achieved by: (1) rebalancing the core of the work force through downsizing and a voluntary exits

²⁷ James K. Harter et al., *Q12® Meta-Analysis*, (Lincoln: The Gallup Organization, 2014).

1 program; and (2) organizational and job re-design in 2012 to adapt to changing
2 circumstances. Recruitment and selection volume also declined beginning in 2012. All of
3 these factors led to restructuring of the team responsible for delivering this segment and a
4 corresponding decline in associated labour costs.

5
6 **7.9. 2012 – 2013**

7 From 2012 to 2013, segment costs increased by \$0.7 million to support recruitment
8 activities, training and development programs, and change management initiatives. The
9 increases were required to enable the safe, safe and efficient execution of the utility's
10 capital work program.

11
12 **7.10. 2013 – 2014**

13 From 2013 to 2014, segment costs are expected to increase by \$0.3 million to account for
14 compensation and inflationary increases, and to support expanded functions relating to
15 recruitment and employee communication.

16
17 **7.11. 2015 Test Year Costs**

18 The 2015 test year costs associated with the delivery of the functions and responsibilities
19 of the Talent Management and Organizational Development segment are approximately
20 \$7.5 million. This represents an \$0.8 million increase from the last rebasing year (2011),
21 a \$0.9 million increase from the most recent historical year (2013), and a \$0.6 million
22 increase from the bridge year forecast (2014).

23
24 The primary driver of this variance is the need to support expanded recruitment, training
25 and development activities associated with ramping-up the apprenticeship hiring plan,
26 which is a critical aspect of the utility's workforce staffing strategy.²⁸ Toronto Hydro
27 must ramp-up the apprenticeship hiring program in order to: 1) facilitate prudent

²⁸ Exhibit 4A, Tab 4, Schedule 3.

1 succession planning; 2) prepare itself for the large wave of retirements that it expects to
2 encounter in the next five to ten years; and most importantly, 3) ensure that the utility has
3 the internal resources it requires to execute the its work plans safely and efficiently over
4 the rate period and thereafter.

5
6 If Toronto Hydro does not receive the requested level of funding to perform the functions
7 and satisfy the responsibilities identified in this segment, the utility could be exposed to a
8 number of risks. These risks most notably include a reduced ability to successfully
9 recruit and develop the skilled and specialized resources that Toronto Hydro requires in
10 the next five years, and to comply with the legislative training requirements that the
11 utility is subject to under statutes such as the *OHSA*. If these risks materialize during the
12 2015 to 2019 rate period, Toronto Hydro's exceptional safety performance record may
13 decline, and the utility may face financial consequences such as increased WSIB
14 premium rates and/or fines and penalties associated with non-compliance.

FINANCE PROGRAM

1. SUMMARY

Table 1: Finance Program Costs (\$ Millions)

Program	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Finance	16.1	14.7	15.7	17.0	17.9

Toronto Hydro’s Finance program oversees all functions related to ensuring the utility’s financial viability, sustainability, fulfillment of its financial obligations and maintenance of compliance requirements imposed by the relevant regulatory bodies. The Finance program supports every aspect of Toronto Hydro’s operations through business planning activities, payroll services, accounts payable, internal audit and other issue area-specific functions.

2. PROGRAM DESCRIPTION

The Finance program provides support to all segments and programs at Toronto Hydro. It enables Toronto Hydro to satisfy its statutory and regulatory financial reporting obligations. Statutory financial reporting requirements primarily relate to the preparation and issuance of quarterly and audited annual financial statements, including the Management Discussion & Analysis (“MD&A”) and Annual Information Form (“AIF”) as specified by the Ontario Securities Commission (“OSC”) and the Canada Revenue Agency (“CRA”). Regulatory financial reporting required by the Ontario Energy Board (“OEB”) includes quarterly and annual reporting under the OEB’s Electricity Reporting and Record Keeping Requirements (the “RRR”) and compliance with the OEB’s Accounting Procedures Handbook (“APH”).

1 The Finance program also delivers traditional finance functions such as Payroll services,
2 Accounts Payable, Treasury and Internal Audit that allow Toronto Hydro to meet its
3 regular and long-term financial and other obligations to its employees, external suppliers
4 and service providers, Toronto Hydro's debt holders, government agencies and the
5 external auditors. In addition, this program oversees a number of operational processes
6 (i.e., capital services, financial planning and budgeting, financial reporting and analysis,
7 and regulatory and revenue management) that monitor the utility's financial performance
8 and support management's ability to make informed, strategic decisions.

9
10 The Finance function is the backbone of the utility's operational effectiveness and
11 financial sustainability. Absent the requested level of funding to execute the Finance
12 Program as described, Toronto Hydro could be exposed to a number of risks, including:

- 13 • reporting errors and material misstatements for financial reporting purposes;
- 14 • reduced oversight and management functions that can impact operational
15 decisions and compromise the achievement of strategic objectives;
- 16 • inability to satisfy financial obligations to third party suppliers, employees and the
17 government;
- 18 • a compromised ability to secure funding to finance the capital programs and/or
19 risk of violation of the covenants contained in the existing debt issuances.

20
21 The Finance program at Toronto Hydro utilizes a centralized business model where all
22 the resources are part of one group. Such resources are at times allocated to various
23 business units to provide on-going support for the day-to-day operations. This program is
24 comprised of three segments:

- 25 1) **Controllershship** which leverages knowledge of operational processes and
26 internal controls to verify the accuracy, completeness and relevance of financial
27 information, and facilitates corporate and operational planning by providing
28 appropriate financial business unit support and senior management.

2) **Financial Services** which encompasses essential functions that allow Toronto Hydro to meet its regular and long-term financial obligations to its employees, external suppliers and service providers, debt holders and other stakeholders; and

3) **External Reporting** which oversees the preparation of external financial reporting materials, such publically filed annual and interim financial statements and disclosures, in accordance with applicable accounting standards and Securities legislation

Table 2 provides the Historical (2011-2013), Bridge (2014) and Test Year (2015) expenditures for each of the program's segments.

Table 2: Finance Program Costs by Segment (\$ Millions)

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Controllership	5.3	5.4	6.4	6.7	7.3
External Reporting	2.9	2.6	2.6	3.1	3.2
Financial Services	7.9	6.7	6.7	7.2	7.4
Total	16.1	14.7	15.7	17.0	17.9

The remainder of this schedule provides further details as to the scope, nature and value propositions of the functions and activities in each of the three segments comprising the Finance program.

3. CONTROLLERSHIP SEGMENT

The Controllership segment provides timely and accurate financial information and financial support to Toronto Hydro's senior management and operational business units,

1 and allows the utility's financial reports to meet both statutory and regulatory financial
2 reporting requirements. The Controllershship segment leverages knowledge of operational
3 processes to produce accurate and relevant financial information, and to provide
4 appropriate financial context for decision making by the operational business units and
5 senior management. This function is crucial in enabling management to make informed
6 decisions and for monitoring and analyzing the utility's financial performance against
7 short-term goals, long term plans and regulatory filings. The activities comprising this
8 segment encompass the following functions: financial planning and budgeting, financial
9 reporting and analysis, financial processes and internal controls, regulatory and revenue
10 reporting, and capital services.

11 12 **3.1. Financial Planning and Budgeting**

13 The financial planning and budgeting function oversees the development of the utility's
14 annual budget and long-term financial projections. The team leverages the analysis
15 provided through the Financial Reporting and Analysis function described below to
16 identify issues that may impact Toronto Hydro's ability to achieve its financial
17 objectives. Financial planning and budgeting is a key function to any successful
18 organization as it allows management to effectively make decisions that enable the
19 achievement of the company's strategic goals and performance objectives. Without this
20 function, Toronto Hydro's business planning and budgeting processes would be de-
21 centralized, which would likely introduce a variety of risks to the utility.

22 23 **3.2. Financial Reporting and Analysis**

24 The financial reporting function oversees internal management reporting and supports the
25 external reporting segment of the Finance program discussed in more detailed below.
26 Responsibilities of this function include: managing financial systems and processes to
27 effectively deliver timely reports and outlooks; reviewing, consolidating and preparing
28 analyses for management reports to enable timely decision making, external reporting

1 and disclosure; and reviewing and consolidating monthly financial outlooks. Without this
2 function, management would not have access to reliable financial information to make
3 effective decisions related to operational expenditures and capital investment. This
4 could expose the utility to a number of material financial risks.

5
6 External financial reporting supports the preparation and issuance of quarterly and annual
7 financial statements, including the Management Discussion & Analysis (“MD&A”) and
8 other financial reports required by Ontario Securities Commission (“OSC”), and the
9 Canada Revenue Agency (“CRA”). The function also supports Toronto Hydro’s auditors
10 in relation to quarterly reviews and annual audits. The specific duties of the external
11 financial reporting team include: collecting and reviewing account reconciliations for
12 financial consolidation and OSC reporting purpose; researching accounting standards and
13 preparing documentation to comply with these standards; addressing requests from
14 external auditors and the external reporting team; preparing account reconciliations and
15 analyses to support external disclosures; and preparing and providing feedback on note
16 disclosures. The team reviews all financial information to minimize the risk of material
17 errors, to confirm that the information complies with reporting requirements and
18 accounting standards, and to enable management to attest to the accuracy and
19 completeness of publically filed financial information.

20 21 **3.3. Financial Processes and Internal Controls**

22 Toronto Hydro must comply with numerous external requirements, including the OSC’s
23 financial disclosure rules, the OEB’s filing requirements and accounting procedures for
24 regulated utilities, accounting and reporting standards under United States Generally
25 Accepted Accounting Principles (“USGAAP”) and International Financial Reporting
26 Standards (“IFRS”). In addition, Toronto Hydro adheres to an array of internal controls
27 and processes imposed by way of corporate governance or as a matter of best practice.
28 This function of the Controllershship segment allows the utility to comply with the various

1 external and internal requirements and processes that govern Toronto Hydro's financial
2 operations. In addition, the financial processes and internal controls function supports the
3 identification, assessment, management, and mitigation of organizational risks relating to
4 Toronto Hydro's financial operations.

5
6 The financial processes and internal control function enables a more efficient external
7 auditing process, improve operational effectiveness, reduce the potential for reporting
8 errors, and review and improve the design and operation of existing controls to achieve
9 more efficient practices. These outcomes are achieved through the ongoing use and
10 administration of the internal control over financial reporting ("ICFR") process, a
11 financial governance framework of checks and balances, based on best practices,
12 monitored by management and the Board of Directors, and reviewed by external auditors.
13 ICFR facilitates the integrity of financial information for financial reporting purposes.
14 For example, as part of the ICFR, controls have been implemented that require review
15 and sign off, attesting to the accuracy and completeness of financial information, by
16 appropriate finance representatives. ICFR facilitates the preparation of Toronto Hydro's
17 Financial Statements.

18 19 **3.4. Regulatory and Revenue Management**

20 The Regulatory and Revenue Management function oversees financial activities
21 associated with OEB and is responsible for the accounting in relation to Toronto Hydro's
22 transactions with the IESO and other suppliers for cost of power expenses and other
23 related regulatory settlements. Other responsibilities include budgeting, forecasting,
24 financial analysis and reporting under the OEB's Electricity Reporting and Record
25 Keeping Requirements (the "RRR") and for the purpose of rate applications. This
26 function also supports OEB audits, enables compliance with the OEB financial and
27 regulatory accounting procedures outlined in the Accounting Procedures Handbook
28 ("APH") and supports the External Reporting, Financial Reporting and Analysis and

Financial Planning and Budgeting functions in relation to Regulatory Assets and Liabilities.

3.5. Capital Services

The Capital Services function records capital projects in the fixed asset register, and maintains tangible, intangible and regulatory assets financial data under both USGAAP and IFRS. The team provides monthly, quarterly and yearly fixed assets, capital expenditure (“Capex”), depreciation expense, construction work in process (“CWIP”) and in-service additions (“ISA”) continuities, reconciliations, reports and analysis to ensure compliance with OSC and OEB requirements. By providing regular reports and analysis of the capital work plan, this function enables Toronto Hydro to track and monitor its performance relating to execution of the plan. In addition, the team collaborates with operational groups to develop, implement and optimize internal controls and processes to maintain the integrity of financial data and improve efficiency. These services are essential to Toronto Hydro’s ability to comply with regulatory standards, to produce accurate financial statements, and to successfully deliver the utility’s capital work plans.

3.6. Segment Costs

Table 3 provides the Historical (2011-2013), Bridge (2014) and Test Year (2015) expenditures for the Controllership segment.

Table 3: Controllership Segment Expenses (\$ Millions)

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Controllership	5.3	5.4	6.4	6.7	7.3

3.7. 2011 – 2012

Segment costs increased from 2011 to 2012 by \$0.1 million due to normal inflationary pressures.

3.8. 2012 – 2013

Costs increased by \$1 million from 2012 to 2013, due to the addition of new resources to support the increased reporting requirements and reporting complexity related to Financial Planning and Budgeting, Regulatory Reporting and Capital Services as described below in Test Year Costs section.

3.9. 2013 – 2014

Costs are forecasted to rise by \$0.3 million due to inflation and the addition of resources to support increased reporting requirements and reporting complexity related to Financial Planning and Budgeting, Regulatory Reporting and Capital Services as described below in Test Year Costs section.

3.10. Test Year Costs

The 2015 proposed test year costs associated with the delivery of the functions and responsibilities of the Controllership segment are projected to be \$7.3 million, which represents an increase of \$2.0 million from the utility's last rebasing year (2011), \$0.9 million from the most recent historical actual year (2013), and \$0.6 million from the bridge year (2014). These variances are attributable to the following factors:

3.11. Implementation of IFRS/MIFRS:

- In 2011, a revised capitalization process involving the componentization of assets was completed following the initial conversion to IFRS. Due to this change, fixed assets are created and tracked at a more granular level of detail.

- 1 • In 2013, the Capital Services function completed the conversion to IFRS and
2 MFIRS (with an adoption date of January 1, 2014 for regulatory reporting
3 purposes). The Capital Services team now manages multiple ledgers, each of
4 which has their own reporting requirements.
- 5 • Under IFRS, the utility is required to administer de-recognition process to
6 facilitate the removal of assets from the fixed asset sub-ledger that are no longer
7 in use. To maintain the process, a monthly review of the operational data is
8 conducted by the Capital Services team to review and validate asset removals.
- 9 • Additional internal controls have been implemented to comply with financial
10 audit and regulatory reporting requirements under IFRS/MIFRS.

11

12 **3.12. Increased size and complexity of capital program:**

- 13 • The capital program is expected to grow from approximately \$445 million in
14 2011, to a forecasted \$524 million in 2015.
- 15 • The number of capital projects processed by the Capital Services team increased
16 from 1,943 in 2011 to 2,621 in 2013.
- 17 • Regulatory requirements regarding the accounting treatment of capital projects
18 (i.e., ICM) have increased the complexity of the financial planning, control and
19 reporting functions of this segment.
- 20 • Increased external audit scrutiny resulting in increased volumes of sample
21 selections. The number of audit samples selected for testing grew from 182 in
22 2011 to 301 in 2013.
- 23 • Additional resources are required to support the increase in the volume and
24 complexity of the work associated with Toronto Hydro's capital program.

25

26 **3.13. Other Drivers**

27 The implementation of smart meters has increased the quality of metering data available
28 for analysis, allowing for increased focus on Revenue and Cost of Power accounting.

1 This work includes implementing new controls for ensuring integrity and accuracy of all
2 the related components and more precise data to support financial data.

3
4 If Toronto Hydro does not receive the funding it requires to perform the functions
5 captured within this segment, the utility could be exposed to a number of risks, including:
6 reporting errors and material misstatements for financial reporting purposes; a reduced
7 ability to process financial data for internal and external reporting purposes; reduced
8 quality of financial planning, oversight and management functions which could have
9 detrimental consequences to operational effectiveness and the utility's ability to deliver
10 its plans.

13 **4. FINANCIAL SERVICES SEGMENT**

14 The Financial Services segment encompasses essential functions that allow Toronto
15 Hydro to meet its regular and long-term financial obligations to its employees, external
16 suppliers and service providers, Toronto Hydro's debt holders and the government. It
17 also allows the utility to plan for, secure and provide timely payments for market-
18 competitive debt instruments that it needs to finance its growing capital work program.

19
20 The Financial Services segment provides Toronto Hydro with a means to objectively
21 evaluate the accuracy, consistency and efficiency of its core functions and processes to
22 ensure compliance to internal and external policies and facilitate transparency in all
23 corporate activities. The scope of activities comprising this segment is typical for
24 organizations of Toronto Hydro's size, mandate and legal status, and includes the
25 following functions:

- 26 • Accounts Payable;
- 27 • Payroll Administration;
- 28 • Corporate Tax;

- Treasury; and
- Internal Audit.

4.1. Accounts Payable

The Accounts Payable function facilitates timely and accurate payment of all valid invoices to Toronto Hydro from its suppliers and service providers. It also processes payments for eligible customer refunds initiated by the customer service program. In performing these functions Accounts Payable utilizes financial software applications to validate and/or correct the amounts and timing of supplier invoices, review the payment files generated by the other applications and approve the resulting bank transfer files or cheque runs. Where the invoice validation procedures uncover errors or other inconsistencies, Accounts Payable works with suppliers and internal business units to confirm the scope, timing and nature of deliveries and ensure proper completion of all transactions.

4.2. Payroll Administration

The Payroll function ensures that Toronto Hydro employees are paid for their services in a timely and accurate manner, consistent with relevant time-keeping or other human resources applications and records. The function also ensures that all relevant legislative requirements and statutory deductions are properly applied to each employee's payments, including the maintenance of accurate pension records for all eligible employees.

4.3. Corporate Tax

The Corporate Tax function is responsible for processing corporate income taxes, harmonized sales tax, debt retirement charge, non-resident withholding tax, and payroll taxes. This group also executes Toronto Hydro tax-related financial planning activities, performs tax-related monitoring and reporting work, and supports compliance audit activities as required by applicable legislation and internal policies. Corporate Tax also

1 plays a role in business planning and regulatory compliance. For example, the group
2 prepares Payment in Lieu of Taxes (“PILs”)¹ calculations for the purposes of rate filings.

4 **4.4. Treasury and Insurance**

5 The Treasury and Insurance function oversees Toronto Hydro’s cash management
6 activities, debt management and investor relations services, and corporate insurance
7 requirements. Cash management activities include: daily investing and borrowing work
8 which provides the utility with adequate funds to meet its financial obligations; risk
9 control and independent verification of borrowing activities; and daily reporting and
10 reconciliation of Toronto Hydro’s cash position and general ledger and sub-ledger
11 accounts.

12
13 Toronto Hydro has issued both long term and short term debt instruments to fund its
14 capital program, and this function manages Toronto Hydro’s relationship with bond
15 investors, independent financial and credit analysts and credit rating agencies. The
16 activities performed by this group of finance professionals help facilitate a reliable debt
17 market from which Toronto Hydro may access funds to carry out its operations and fund
18 its long term capital program.

19
20 The Financial Services function also oversees the utility’s comprehensive insurance
21 requirements, the purpose of which are to ensure that Toronto Hydro has adequate
22 protection for asset exposure, corporate liability and other activities which may expose
23 the utility to financial loss. Current insurance policies administered by this group provide
24 coverage for a variety of losses and expenses, including comprehensive general liability,
25 all risk property and boiler and machinery insurance, liabilities of directors and officers,
26 automobile liability, professional liability and crime insurance. Without these
27 protections, the utility could face significant financial losses. Toronto Hydro’s

¹ Exhibit 4B, Tab 2.

comprehensive insurance program provides value for customers by protecting the utility against a variety of financial risks associated with its operations.

4.5. Internal Audit

Internal Audit provides independent and objective reporting to the utility's Audit Committee² and management through operational, compliance and performance audits. Internal Audit focuses on assessing the adequacy and effectiveness of the utility's risk management, governance and system of internal controls, and provides consultation and advisory services on the design, implementation and maintenance of internal controls and reporting systems, governance activities, fraud detection procedures and other matters requested by senior management. Internal Audit also provides an opinion on the utility's compliance with Bill 198/CSA Instrument 52-109 (securities regulation related to disclosure and internal controls). Compliance with Bill 198/CSA Instrument 52-109 is a financial reporting requirement of the OSC.

4.6. Segment Costs

Table 4 provides the Historical (2011-2013), Bridge (2014) and Test Year (2015) expenditures for the Financial Services segment.

Table 4: Historical, Bridge and Test year Costs (\$ Millions)

Segment	2011	2012	2013	2014	2015
Financial Services	7.9	6.7	6.7	7.2	7.4

4.7. 2011 – 2012

Segment costs declined by \$1.2 million from 2011 to 2012 due to savings in payroll costs related to a reduction of staff as part of the utility's reorganization efforts. In particular, the Accounts Payable department decreased staff as the transaction-heavy elements of the

² A copy of the Audit Committee Charter is filed at Exhibit 1C, Tab 2, Schedule 1, Appendix E.

work performed by this segment have been outsourced to an external service provider.
The remaining staff reductions occurred across each of the other functions within the
Financial Services segment.

4.8. 2012 – 2013

From 2012 to 2013, the utility sustained increased property insurance costs of \$0.4
million. The increases were offset by a further reduction of payroll costs relating to staff
reorganization in the Internal Audit Department.

4.9. 2013 – 2014

Costs are forecast to increase by \$0.5 million from 2013 to 2014 due to: insurance cost
increases of \$0.2 million, and cost of living and inflationary increases.

4.10. Test Year Segment Costs

The 2015 test year costs associated with the delivery of the functions and responsibilities
of the Financial Service segment are projected to be \$7.4 million, which represents a
decrease of \$0.5 million from the utility's last rebasing year (2011), an increase of \$0.7
million from the most recent historical actual year (2013), and a \$0.2 million increase
from the bridge year (2014).

As a result of the utility's reorganization efforts over the 2011 to 2013 period, the
forecast cost of delivering the Financial Services segment in the 2015 test year is notably
lower than in 2011. The payroll savings gained through the reorganization were partially
offset by increased property insurance premiums in 2013 due to external drivers in the
commercial property insurance market.

The functions performed by the Financial Services segment are all necessary to
effectively facilitate daily operations and long-term financial sustainability of a large and

1 complex corporation like Toronto Hydro. This segment enables Toronto Hydro to
2 achieve the following: 1) satisfy its financial obligations vis-a-vis third parties,
3 employees and the government; 2) secure necessary funding for operational and capital
4 programs; and 3) manage corporate financial risk exposure.

5
6
7 **5. EXTERNAL REPORTING SEGMENT**

8 The External Reporting segment oversees the preparation and compilation of external
9 financial reporting materials, such as those required by the OSC. Among other things,
10 this function requires preparation of publically filed annual and interim financial
11 statements and disclosures. In addition to preparing and publishing the external reporting
12 documentation, the segment is responsible for reviewing, documenting and
13 communicating all changes in accounting standards to relevant stakeholders.

14
15 To minimize the risk of material errors and to allow compliance with the applicable
16 accounting standards and other requirements, Toronto Hydro follows a strict process for
17 the preparation of publicly filed financial documents. The specific activities and internal
18 controls underlying these processes are subject to regular reviews by independent internal
19 and external auditors. Toronto Hydro is required to maintain the necessary
20 documentation that underlies its financial statements and disclosures to facilitate effective
21 audits and support management's attestation to the accuracy of publicly filed information.

22
23 To enable timely and accurate execution of its core functions, the segment undertakes
24 two sets of primary activities. First, the segment performs central accounting functions
25 such as consolidation entries, intercompany settlements and eliminations, accounting for
26 post-employment benefits, and other account reconciliation and management activities.
27 Second, it uses information in the company's accounting systems to prepare all required
28 financial filings. These include the audited annual financial statements and notes

(consolidated and for each legal entity separately), the Management Discussion and Analysis, the Annual Information Form (“AIF”) and other reporting requirements from time to time. With the exception of the AIF, the above documents are filed quarterly.

5.1. Segment Costs

Table 5 provides the Historical (2011-2013), Bridge (2014) and Test Year (2015) expenditures for the External Reporting segment.

Table 5: Historical, Bridge and Test Year Costs (\$ Millions)

Segment	2011	2012	2013	2014	2015
External Reporting	2.9	2.6	2.6	3.1	3.2

5.2. 2011 – 2012

Cost decreased by \$0.3 million from 2011 to 2012, due to the reduction of staff upon winding down of the initial IFRS conversion project. This reduction was offset by cost increases due to cost of living increases for existing staff and inflationary impacts on non-payroll costs.

5.3. 2012 – 2013

There was no change from 2012 to 2013. Cost of living increases for existing staff and inflationary impacts on non-payroll costs were offset by savings in non-payroll costs.

5.4. 2013 – 2014

Toronto Hydro forecasts the cost to increase by \$0.5 million from 2013 to 2014 due the transition from USGAAP to IFRS, and inflation. These costs relate to the incremental, ongoing reporting requirements under IFRS that the utility is required to incorporate into all its OSC corporate financial reports including, financial statements, the MD&A and the AIF.

1 **5.5. Test Year Segment Costs**

2 The 2015 Test Year costs associated with the delivery of the functions and
3 responsibilities of the External Reporting segment are projected to be \$3.2 million, which
4 represents a decrease of \$0.3 million from the utility's last rebasing year (2011), an
5 increase of \$0.5 million from the most recent historical actual year (2013), and a \$0.1
6 million increase from the Bridge Year (2014). The Bridge and Test Year costs represent
7 the incremental work required under IFRS to produce the corporate financial statements,
8 the notes to the financial statements, the MD&A and AIF.

9
10 The functions and activities comprising this segment are non-discretionary for a public
11 issuer like Toronto Hydro. Internal accounting and verification is required in order to
12 prepare accurate external filings and reports. If Toronto Hydro does not receive the
13 funding to execute this segment as described, it may not be able to satisfy its financial
14 reporting obligations as required by the OSC. In turn, this could inhibit Toronto Hydro's
15 ability to borrow funds to finance its capital programs, and could trigger a violation of the
16 covenants contained in its existing debt issuances.

INFORMATION TECHNOLOGY

Table 1: Information Technology (IT) Program Expenditures (\$ Millions)

Program	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Information Technology	30.3	28.5	31.0	33.4	34.9

1. SUMMARY

The Information Technology (“IT”) Program manages operational and information technologies and services that support every aspect of Toronto Hydro’s business. IT infrastructure and applications (collectively referred to as “systems”) allow Toronto Hydro to provide a safe, secure and reliable supply of electricity to its customers and facilitate efficient business operation of the utility.

Toronto Hydro’s IT Program deploys, supports and operates all information systems and associated components including hardware, software, network, telephony, communications and information security. The types of technology managed by the program include a mixture of computer resources, communications and storage infrastructure, user-facing applications and core infrastructure software. Toronto Hydro performs this work under clearly defined architectural standards and governance frameworks.

2. PROGRAM DESCRIPTION

The IT Program delivers operational asset management, support and other services to Toronto Hydro’s internal clients and external electricity customers. The utility carries

1 out its IT work in a secure, timely and cost-effective manner by adhering to key
2 objectives, which include:

- 3 • working closely with utility business units to identify and prioritize products and
4 services required to attain clearly defined objectives;
- 5 • providing timely technical maintenance and support to maximize the reliability
6 and operability of key business applications and underlying IT infrastructure;
- 7 • managing IT asset investments and IT Asset Lifecycle (asset definition, renewal
8 or replacement, operation and maintenance, disposal) according to industry
9 technical standards and risk management practices; and
- 10 • delivering effective and user-friendly IT products that keep pace with Toronto
11 Hydro's evolving operational requirements, customer preferences and support
12 continuous improvement across the utility.

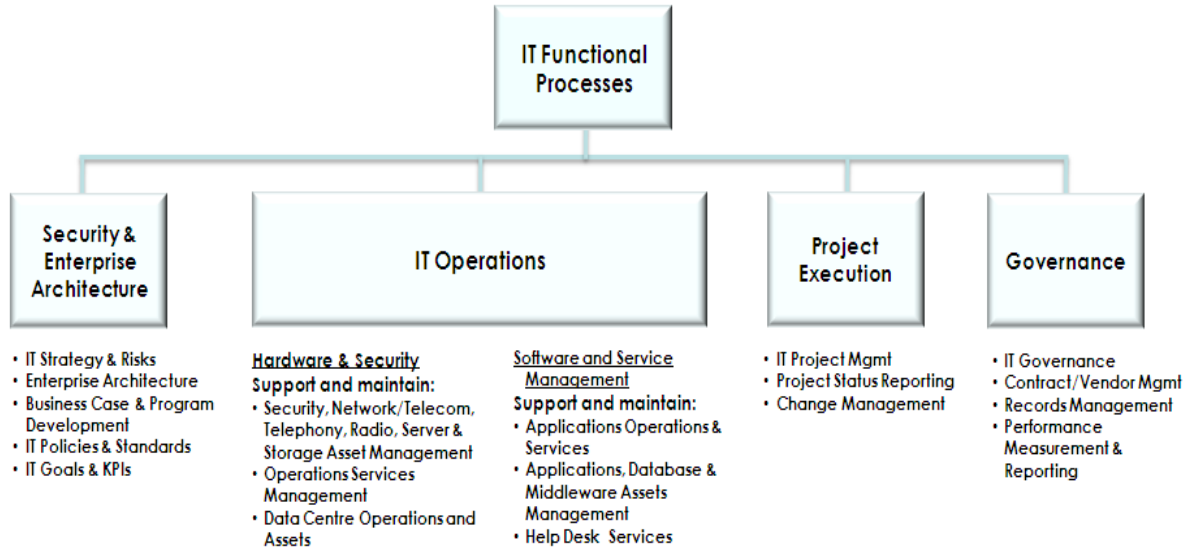
13
14 In accordance with the above objectives, Toronto Hydro's IT Program consists of four
15 discrete segments, each of which fills a unique role within the program. The four IT
16 Program segments are:

- 17 • **Security & Enterprise Architecture:** Defines and implements utility-wide IT
18 strategy, develops and oversees the adherence to corporate IT policies and
19 standards, and manages enterprise IT risks including cyber security. As set out in
20 Figure 1 (below), this segment provides the following outputs:
 - 21 o IT Policies and Standards (for all segments);
 - 22 o IT Goals (for all segments);
 - 23 o Program and Project Business Cases (for the Project Execution and
24 Governance segments);
 - 25 o Cyber Security and Asset Management Frameworks (for the IT Operations
26 segment);
 - 27 o Architectural resources (for the Project Execution segment).

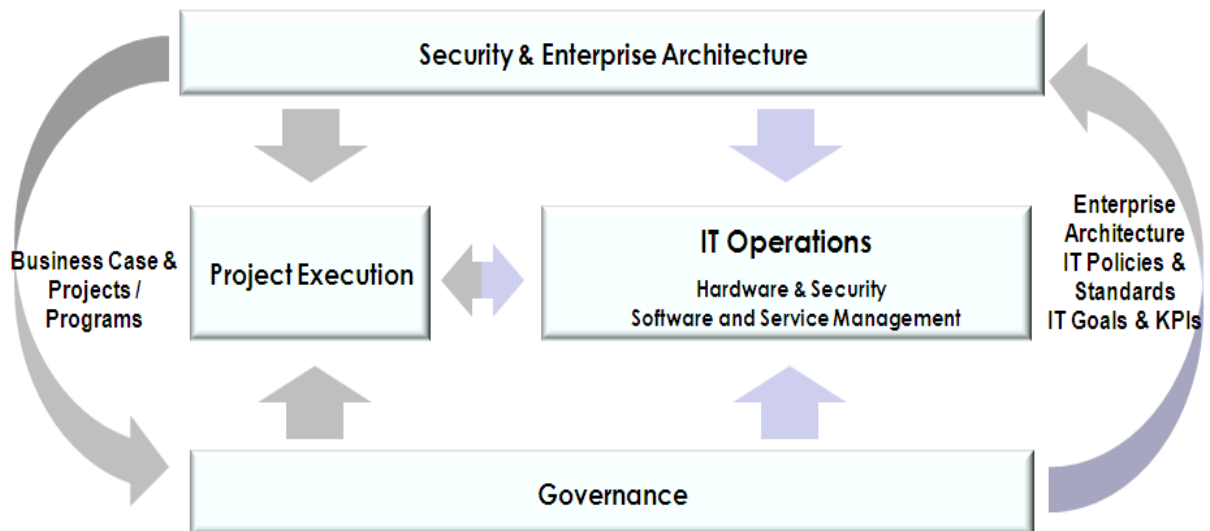
- 1 • **IT Operations:** Supports the day-to-day operation of Toronto Hydro's IT assets,
2 including core back-end infrastructure and customer-facing applications. As set
3 out in Figure 1 (below), this segment provides the following outputs:
 - 4 o Provide operations resources (for the Project Execution segment)
 - 5 o Manage and maintain all IT Assets and Services
- 6
- 7 • **IT Project Execution:** Facilitates the development and manages the
8 implementation of new IT solutions (projects, programs and applications)
9 requested by internal clients or otherwise required to achieve Toronto Hydro's
10 strategic objectives. As set out in Figure 1 (below), this segment provides the
11 following outputs:
 - 12 o Project Status reports (for the Governance segment)
 - 13 o Completed, operations ready solutions (for the IT Operations segment)
- 14
- 15 • **IT Governance:** Provides program governance, budget control, contract and
16 vendor management, records management, quality assurance and audit services.
17 As set out in Figure 1, this segment provides the following outputs:
 - 18 o Prioritized program/project list (for the Project Execution segment)
 - 19 o Governance and services (for the Project Execution and IT Operations
 - 20 segments)
 - 21 o Track and report on Divisional Budget, Project Status and associated
 - 22 metrics for the IT senior leadership team.
- 23

24 Figure 1 provides a graphical representation of the IT program segments and their
25 interaction, including brief summaries of key activities comprising each segment.

Information Technology Processes and Functional Responsibilities



Information Technology Process Flows



1 **Figure 1: IT Program Segments and their Interaction**

The Historical (2011-2013), Bridge Year (2014), and Test Year (2015) costs of Toronto Hydro's IT Program and each of the segments that comprise this program are shown in Table 2 below.

Table 2: IT Program Costs (\$ Millions)

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Security & Enterprise Architecture	2.0	2.0	1.4	1.4	1.4
IT Operations	25.6	24.5	28.0	29.7	30.9
Project Execution	1.3	0.9	0.5	0.8	1.1
IT Governance	1.3	1.2	1.1	1.5	1.5
TOTAL	30.3	28.5	31.0	33.4	34.9

3. SECURITY & ENTERPRISE ARCHITECTURE SEGMENT

The Security & Enterprise Architecture segment manages and oversees Toronto Hydro's corporate Information Technology portfolio, implements utility-wide IT architecture practices, and identifies and manages key enterprise IT risks, such as cyber security.

The segment performs several key functions, including:

- produces corporate IT standards, policies and enterprise architecture principles;
- manages compliance to the above policies and architecture principles;
- manages the enterprise information security posture and risk profile;
- drives operational cost efficiencies and business process streamlining; and
- develops the IT portfolio of programs and projects.

1 Due to the breadth of services comprising the Security & Enterprise Architecture
2 mandate, the segment operations are subdivided into two functional streams:

- 3 • The **Enterprise Architecture Stream** performs research on new technologies,
4 develops and oversees the implementation of technology standards and associated
5 governance frameworks, infrastructure architecture, physical and logical security
6 architecture, data and reporting architecture and application architecture
7 principles.
8
- 9 • The **Strategic Solutions Stream** develops and implements the IT program
10 strategy, defines and manages program- and segment-level performance
11 expectations, and facilitates the development of business plans for new
12 technological solutions.
13

14 Security and Enterprise Architecture outputs define and integrate the elements of Toronto
15 Hydro's IT infrastructure operations strategy, application support strategy and project
16 delivery strategy to enable compliance with technical standards, corporate policies and
17 practices. Some examples of the initiatives developed by the segment include server
18 consolidation and virtualization, perimeter security optimization and internal directory
19 services consolidation. These initiatives are further described in the IT Operations
20 Segment, where the strategies developed within the Security & Enterprise segment are
21 applied to the utility's operational activities to drive process consistency and operational
22 efficiencies.
23

24 The segment's scope of work also includes evaluation of major projects that include an
25 IT component. This analysis allows Toronto Hydro to evaluate the merits of IT-driven
26 initiatives on a consistent basis before committing to their implementation.

3.1. Segment Costs

Table 3 summarizes Historical (2011-2013), Bridge Year (2014), and Test Year (2015) costs expenditures for the IT Security & Enterprise Architecture segment, and shows that costs have and continue to remain below the 2011 levels.

Table 3: IT Security & Enterprise Architecture Segment Expenditures (\$ Millions)

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Security & Enterprise Architecture	2.0	2.0	1.4	1.4	1.4

A reduction of costs relative to 2011 was driven by organizational restructuring and realignment within the IT program throughout the historical period. The impact of the organizational restructuring and realignment within the IT Division upon completion yielded a total actual cost reduction of \$0.6 million in 2014 when compared to 2011 levels, despite inflationary pressures.

Since 2011, Toronto Hydro's Security & Enterprise Architecture segment developed conceptual frameworks for, and implemented, a number of new information technology standards and other governance structures. The new standards incorporate industry best practices within Toronto Hydro's business conditions to deliver procedural and technological benchmarks that position the utility to achieve operational efficiencies across the IT operations functions.

Among the key accomplishments is the development of Server and Storage Infrastructure Standards, Integration & Middleware Standards, Naming and Access Control Standards and many others. These standards and operating procedures homogenize and streamline existing operational processes, resulting in enhanced operational service levels by:

- reducing the need for technology/application-specific knowledge;

- mitigating the risk of vendor technology obsolescence;
- driving efficiencies in emerging program/project architectural designs;
- mitigating costs through standardized hardware and software procurements; and,
- simplifying the information technology environment, thereby creating faster and more efficient planning processes.

Standardizing system requirements and operational processes simplifies program and segment execution and audits, as few “unique” and non-standard factors require consideration. This allows Toronto Hydro to more easily drive program-wide continuous improvement through consistent performance measurement and evaluation processes.

3.2. Test Year Segment Costs

The forecasted 2015 Test Year expenditures for the IT Security and Enterprise Architecture segment of \$1.4 million are in line with the 2014 Bridge and 2013 Historical Year costs and remain below the 2011 costs. Toronto Hydro was able to keep the segment expenditures flat despite normal inflationary increases through the efficiencies described above.

The Security & Enterprise Architecture segment is the main driving force behind all Information Technology projects, programs and initiatives that create operational efficiencies and enhance business value while maintaining and improving systems reliability and availability. The segment defines Toronto Hydro’s IT landscape in light of current business requirements, future state forecasts and IT industry trends and opportunities. The portfolio of Technical Standards, Policies and Strategy documents developed as a part of the segment enables predictable budgeting, cost containment, forward planning and implementation of IT assets, projects and processes.

Moreover, due to rapid changes and advancements in the IT sector, the Security & Enterprise Architecture segment performs research of vendor and associated technology offerings in order to mitigate any technology obsolescence risks. The segment embarks on Proof-of-Concept assessments, keeping pace with the broader IT sector, to determine emerging opportunities and associated benefits offered by new technologies. These Proof-of-Concept assessments also help promote compatibility between disparate, but hierarchically interdependent technology layers. The resulting architecture enhancements and IT standard updates establish predictable service level baselines in terms of performance, availability, scalability and lifecycle of the entire IT landscape at Toronto Hydro.

Reducing the footprint or scope of the Security & Enterprise Architecture segment would likely place pressure on infrastructure reliability levels, create challenges to fulfilling business requirements, increase the risk of service outages due to a lack of IT architecture and governance, and could ultimately result in end-customer impacts such as web services issues or billing system complications.

4. OPERATIONS SEGMENT

The Operations segment is responsible for the day-to-day operation, deployment, maintenance and support of all IT systems at Toronto Hydro. This includes maintaining the integrity, availability and security of all corporate data, ensuring adequate computer resources to support real-time data processing of applications and databases, proactive capacity and performance planning, routine systems maintenance and continuous monitoring of all critical business systems.

Toronto Hydro's business processes rely on core back-end IT hardware assets, technology and end user software to remain reliable, available and secure. To facilitate

1 continued operation of these and other systems, the segment includes a 24/7 monitoring
2 and response structure to ensure timely resolution of incidents and problems to prevent or
3 quickly address major system outages.

4
5 Operations deploys, operates, maintains and supports all aspects of Toronto Hydro's IT
6 systems. This includes vendor payments for maintenance contracts, which provide
7 technology "bug" and performance fixes (i.e., patches), new features and functionality,
8 and critical cyber vulnerability fixes. The IT operations segment also administers patches
9 to the utility's technology assets on an ongoing basis as they are released by vendors,
10 thereby mitigating cyber and system performance risks.

11
12 The Operations segment consists of two core streams: 1) Hardware & Security and 2)
13 Software & Service Management.

14
15 The Hardware & Security stream is responsible for the deployment and management of
16 the following asset components and services:

- 17 • data and voice networks, fibre optic and radio infrastructure, telephony and
18 communication infrastructure;
- 19 • Advanced Metering Infrastructure and grid management networks (e.g. SCADA
20 - Supervisory Control And Data Acquisition);
- 21 • servers and operating system infrastructure;
- 22 • data storage and backup environments;
- 23 • IT security technologies such as firewalls, proxies, intrusion and data loss
24 prevention systems; and
- 25 • physical data centre infrastructure, (power, HVAC, fire suppression, floor plans,
26 cabling and racking).

The Software & Service Management stream is responsible for introduction and continuous operation of the following asset components and services:

- client-facing software assets;
- database and middleware software assets such as Oracle, Microsoft SQL and Middleware such as WebSphere;
- end user devices, including desktops, laptops, phones and printer asset deployment as well as services such as the upcoming deployment of Microsoft Office software applications;
- end user application development and reporting software assets and services; and
- Service request management, incident management facilitation, and change management services based on industry best practices.

4.1. Segment Costs

Table 4 summarizes Historical (2011-2013) and Bridge (2014) and Test Year (2014) expenditures for the IT Operations Segment

Table 4: IT Operations Segment Expenditures¹ (\$ Millions)

	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Software & Service Management	12.9	13.2	14.9	16.4	17.2
Hardware & Security	12.7	11.7	13.1	13.3	13.8
IT Operations Total	25.6	24.5	28.0	29.7	30.9

¹ Toronto Hydro has broken down the segment expenditures into Hardware and Software for ease of reference with the IT capital program expenditures captured in the Distribution System Plan (Exhibit 2B, E8.4 and E8.5).

4.2. 2011-2012

The segment costs decreased by \$1.1 million in 2012 relative to the 2011 levels, mainly due to the conclusion of contract negotiations for Smart Meter Communication services. The negotiations resulted in a credit from the provider in the amount of \$1.2 million applied in 2012.

4.3. 2012-2013

The 2013 costs increased by \$3.5 million owing to a combination of the following factors:

- Communications expenditures returned to normal levels following the above-noted credit.
- Commencement of an annual information security assessment to mitigate cyber-security risk exposure in the amount of \$0.3 million to align with industry best practices.
- Maintenance contract costs increased by \$1.5 million due to the support budget required for new and critical systems implemented from 2011 through 2013, including Customer Care & Billing (“CC&B”), Mobile System Response Report (“SRR”), Enterprise Service Bus (“ESB”), GPS system, Human Resources safety tracking systems. This increase was partially offset by the savings in cases where new technology replaced the incumbent technology that performed the same or similar functions in the past (e.g., the legacy Customer Information System that was replaced with CC&B).
- Inflation and costs driven by customer growth accounted for the remainder of variance.

4.4. 2013-2014

The 2014 forecasted increase of \$1.7 million relative to 2013 is attributable to the following drivers:

- 1 • Modest increases due to growing storage requirements due to the Smart Meter and
2 other operational data volume increases.
- 3 • Maintenance contract cost increases in the amount of \$1.5 million to support a
4 series of newly implemented critical systems: Warehouse Management System
5 (“WMS”), Employee Time Tracking, Customer Self Service Portal (“CSS”), and
6 the Advanced Metering Infrastructure (AMI) Suite Metering system.
- 7 • Cost inflation and customer growth amounted to the remainder of variance.

8
9 When the incremental requirements driven by business needs or changes outside of IT are
10 removed, as identified above, the IT Operations segment budget remained relatively flat
11 over the period, despite inflationary and organic growth pressures.

12
13 Since 2011, Toronto Hydro achieved a number of operational efficiencies through
14 standardization of the network architecture and implementation of new design and
15 equipment specifications. The utility improved its network, voice and associated
16 communication infrastructure service through introduction of fully redundant network
17 topologies and diverse cabling paths to eliminate single points of failure in the critical
18 communication networks, mitigating potential risks to the system.

19
20 Toronto Hydro achieved further operating efficiency gains by leveraging new server,
21 storage and backup architecture standards developed by the Security & Enterprise
22 Architecture segment. These standards helped Toronto Hydro minimize costly
23 “technology sprawl” (i.e., system growth using non-standard technologies) that is often
24 the result of data, service and resource demand growth. Moreover, migration from tape
25 backup libraries to a storage array-based disk duplication system eliminated obsolete and
26 expensive hardware, reduced archive storage costs and increased the capacity and
27 integrity of backup data environments.

1 The utility also carried out a large-scale server virtualization project, achieving 95%
2 consolidation of physical servers in order to improve the density and use of available
3 computer resources and reduce software licensing costs. Further operational efficiencies
4 were attained by decoupling server systems from underlying hardware resources,
5 resulting in improved service flexibility and increased system uptime. This enabled the
6 implementation of database and middleware standards that minimized the volume and
7 costs of database and middleware assets.

8
9 Finally, Toronto Hydro introduced new technology to reduce the risk of cyber-attacks
10 that are not normally preventable through conventional means such as firewalls and
11 intrusion prevention systems. Among these improvements was the implementation of a
12 critical threat prevention application, which uses sophisticated “sandboxing” methods to
13 stop “zero day” attacks.

14 15 **4.5. Test Year Costs**

16 The \$1.2 million increase over the 2014 forecasted expenditures is the result of a
17 combination of several factors:

- 18 • Migrating the SCADA Communication Fibre-Optic plant and SONET
19 communication equipment to IT Operation from the Engineering & Construction
20 Division increased operating costs by \$0.6 million. This includes asset
21 maintenance and support staff costs.
- 22 • The mandatory maintenance and software subscriptions of the new Voice Portal
23 technology required to expand the capacity of the Call Centre environment to
24 provide adequate customer service during large outage events results in another
25 \$0.3 million of annual operation cost increases.
- 26 • Enrolment in the province’s Microsoft Enterprise volume licensing agreement
27 resulted in a \$0.5 million budget increase. This increase offsets \$3.0 million of

1 capital funding that would have otherwise been required for the same licence
2 volumes if purchased individually.
3

4 It should be noted that the primary driver for the increases in segment expenditures were
5 the incremental business requirements, originating primarily outside of the IT program's
6 mandate. When normalized for these incremental expenditures, the IT Operations
7 segment costs have remained generally flat despite inflationary and organic growth
8 pressures.
9

10 The IT Operations segment enables Toronto Hydro to keep up with growing customer,
11 data and service request volumes. The proposed expenditures are necessary to continue
12 to ensure proper maintenance of Toronto Hydro's information technology environment
13 and to allow Toronto Hydro to retain appropriate skill sets and knowledge to meet the
14 needs of the organization and its customers. Reductions to this budget would likely put at
15 risk the utility's ability to adequately maintain and support critical systems, processes and
16 functions such as physical security, SCADA, metering, and business and customer
17 applications services.
18

19 **4.6. Project Execution Segment**

20 The IT Project Execution segment is responsible for the execution of Toronto Hydro's IT
21 programs that leverage the utility's existing IT assets and often require amendments to, or
22 implementation of, new applications procured externally or developed internally. This is
23 particularly true for efficiency and productivity-enhancing initiatives. Timely and
24 professional project management services allow Toronto Hydro to efficiently delivery the
25 utility's IT work program.
26

27 Services provided by the Project Execution segment include:

- 28 • project needs identification reflecting consensus from all parties involved;

- 1 • identifying and analyzing gaps, risks and opportunities in project management
- 2 and execution;
- 3 • defining and communicating process improvement mechanics targeted by project
- 4 sponsors;
- 5 • developing project execution strategy options and comparison analyses;
- 6 • classifying and quantifying project execution metrics, including tracking and
- 7 reporting;
- 8 • managing Vendors and System Integrators;
- 9 • overseeing project change management and scope parameter adherence; and
- 10 • managing and monitoring project resources.

11

12 Toronto Hydro’s IT Project Execution practices are consistent with industry standards of
13 project management frameworks, such as the Project Management Body of Knowledge
14 (“PMBOK”) and include developing and delivering project status reporting, project
15 related change documentation and other project artefacts. The staff who perform this
16 work have extensive experience and professional designations in project management and
17 other related fields. Since 2011, the Project Management segment has managed
18 anywhere from 10-20 complex projects per year, amounting to approximately \$12-\$15
19 million in annual capital expenditures.

20

21 **4.7. Segment Costs**

22 Table 5 summarizes Historical (2011-2013), Bridge (2014) and Test Year (2015)
23 expenditures for the IT Project Execution segment.

24

25 **Table 5: IT Project-Execution Segment Expenditures (\$ Millions)**

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
IT Project Execution	1.3	0.9	0.5	0.8	1.1

1 The reduction of costs since 2011 is attributable to organizational restructuring and
2 realignment of functional responsibilities within the IT program. Since 2011, the IT
3 Project Execution segment introduced and implemented a uniform IT project
4 management framework across the utility, and consolidated all pre-existing project
5 management plans into a single planning document. Toronto Hydro also streamlined the
6 project gating process, which allowed the utility to significantly expedite project
7 approvals and reduce the complexity of a number of existing programs and processes.

8
9 In addition, Toronto Hydro consolidated, eliminated or streamlined other project
10 management governance documents. The utility developed several key project
11 management artefacts and associated guidelines to support transparency across the utility
12 and identify future improvement opportunities.

13 14 **4.8. Test Year Segment Costs**

15 The proposed 2015 Test Year costs for the IT Project Management segment are \$1.1
16 million, which represents a \$0.3 million increase from the 2014 Bridge Year forecasts,
17 but a net \$0.2 million reduction from the 2011 actual costs.

18
19 Project Execution provides centralized IT project management oversight aligned to the
20 functional divisions within the organization. These expenditures allow Toronto Hydro to
21 retain business knowledge and deploy appropriate resources to fulfil new requirements of
22 IT Projects and Programs that are commonly driven by regulatory, legislative and other
23 requirements.

24
25 Reduction of the proposed budget would likely have a tangible impact on Toronto
26 Hydro's ability to identify and execute IT projects to support the utility's operations. IT
27 Project Execution is essential to support of new projects and program development, and
28 to facilitate customer-facing products such as the Toronto Hydro customer internet portal.

1 Reductions to the program could place at risk the successful execution of ongoing and
2 planned IT capital programs,² including initiatives related to safety, regulatory
3 compliance or customer service.

4 5 6 **5. IT GOVERNANCE SEGMENT**

7 The Governance segment provides oversight, budget control, contract and vendor
8 management, records management, quality assurance, and compliance and audit services
9 for Toronto Hydro's IT projects and services. The segment also facilitates
10 implementation of the IT capital portfolio. This entails activities such as compliance
11 review, project review and prioritization, project status monitoring/reporting and benefit
12 attainment monitoring/reporting. It Governance also houses all project and portfolio
13 documentation as the official enterprise custodian. By continuously monitoring the IT
14 portfolio through the above mentioned tools and processes, the Governance segment
15 facilitates timely, cost effective and otherwise successful delivery of IT projects.

16
17 The Governance segment is further divided into four parallel streams as follows:

- 18 • The **Project Governance** stream performs the necessary oversight, tracking and
19 reporting associated with the IT-based portfolio of programs and projects. The
20 scope of this stream's work also includes project reviews, status and change
21 control reviews, project prioritization and benefit attainment monitoring.
- 22 • The **Contract Management** stream oversees the administration of external IT
23 vendors, internal work order setup and purchase requisitions. This entails
24 monitoring contract expiry dates and vendor negotiations, service level analysis
25 and vendor consolidation work to drive savings.
- 26 • The **Records Management** stream supports the enterprise-wide tracking and
27 reporting requirements needed to comply with Toronto Hydro's Records

² Exhibit 2B, E8.4 and E8.5.

Management Policy. The stream enables Toronto Hydro to meet its regulatory and legal obligations for the retention and destruction of records, and to educate staff on the utility's Records Retention Schedule, policy, and program guidelines.

- The **Budget Control and Oversight** stream tracks and reports on IT program expenditures and their alignment with the overall budget. This enables Toronto Hydro to book IT expenditures to the correct expense accounts, and to post transactions in accordance with reporting requirements.

5.1. Segment Costs

Table 6 summarizes Historical (2011-2013), Bridge (2014) and Test Year (2015) expenditures for the IT Governance Segment.

Table 6: IT Governance Segment Costs (\$ Millions)

	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
IT Governance	1.3	1.2	1.1	1.5	1.5

The segment expenditures decreased during the historical period, due to program-wide efficiencies previously described.

The \$0.4 million increase projected in the Bridge Year is primarily attributed to the inclusion of new responsibilities and services to the Governance segment, which is part of the utility's Records Retention Policy release and implementation. The increase is also inclusive of inflationary pressures.

Since 2011, the IT Governance segment achieved a number of savings and efficiencies by consolidating vendor contracts and streamlining service provider arrangements. These activities include identifying opportunities to consolidate contractual arrangements for

1 the delivery of IT services, which allows Toronto Hydro to access volume rebates and
2 minimize administrative mark-ups with IT contract staffing agencies.

3
4 The Records Management stream successfully reduced off-site physical records and
5 associated storage costs since the program's inception in the fall 2012 by identifying and
6 managing the destruction of a volume of paper records that were outside of the policy-
7 defined retention schedule.

8
9 The work of the Budget Control and Oversight stream ensured that the division is
10 operating and reporting in a manner that supports Toronto Hydro's strategic direction.

11
12 **5.2. Test Year Segment Costs**

13 The proposed 2015 expenditures are projected to be \$1.5 million, consistent with the
14 Bridge year forecast, despite normal inflationary pressures, which are offset through
15 internal efficiencies.

16
17 The IT Governance segment helps ensure the delivery of quality solutions to the business
18 units. The absence of a proper governance framework could expose Toronto Hydro to
19 increased financial risk, manifesting itself in project overruns, contract inflation or late
20 penalties. Reduction or elimination of segment funding could also hinder Toronto
21 Hydro's ability to meet its regulatory and legal obligations for the retention and
22 destruction of records.

RATES AND REGULATORY AFFAIRS

1. SUMMARY

Table 1: Rates & Regulatory Program Expenses (\$ Millions)

Program	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test ¹	
Rates and Regulatory Affairs Total	7.2	7.8	8.4	9.9	10.1	} /C
Rates and Regulatory Affairs - 2015 Revenue Requirement					8.4	

Rates and Regulatory Affairs program provides Toronto Hydro with services related to the regulatory environment within which the utility operates. This includes regulatory oversight of the utility's operations and interaction with the Ontario Energy Board ("OEB"), Provincial Ministries, the Independent Electricity System Operator ("IESO") and the Ontario Power Authority ("OPA"). The main services provided include the development and execution of rate filings and other applications before the OEB, regulatory research and policy development, regulatory compliance monitoring, load forecasting, rate design, and liaising with the provincial government.

2. PROGRAM DESCRIPTION

Operating within a regulated industry requires specialized skills and knowledge. The program's current staffing complement includes individuals with education, professional designations and experience in areas as such as law, public policy, engineering and economics. The program's staffing levels facilitate a steady workload year-round, given a variety of one-time and reoccurring projects and processes that require the direction, input or oversight of the Regulatory and Rates program. When additional resources are required (such as development of major rate filings), Toronto Hydro fills incremental

¹The 2015 forecast spending amount depicted in Table Row ! 1 reflects Toronto Hydro's full anticipated OM&A expenditures for the year prior to the application of the amortization methodology as proposed by the utility. The amount captured in Row 2 (\$8.4 million) reflects the proposed 2015 revenue requirement contribution, based on the proposed amortization methodology. For further cost breakdown and derivation of the amount proposed for inclusion in Toronto Hydro's 2015 revenue requirement, refer to Table 2.

1 needs with short-term contract resources and third-party service providers to effectively
2 manage workloads and costs.

3
4 Since regulatory policy developments in the Province of Ontario affect all utilities, the
5 Regulatory Affairs program maintains coordination with other utilities and industry
6 groups to participate in consultations and other collaborative processes. In recent years,
7 Toronto Hydro has often voiced its position on the emerging regulatory and ratemaking
8 matters through the joint submissions of the Coalition of Large Distributors (“CLD”).

9
10 The program is also the primary point of contact between Toronto Hydro and the
11 provincial government ministries and agencies, most notably the Ministry of Energy.
12 Maintaining a close relationship with the provincial government ensures that Toronto
13 Hydro’s planned or ongoing activities are informed by the latest government policy
14 developments that may directly or indirectly affect Toronto Hydro and its customers.

15
16 The program is comprised of the Regulatory Affairs and Rates functional areas, as
17 explained in more detailed below. These two functions are highly integrated in the
18 oversight and fulfillment of Toronto Hydro’s regulatory obligations.

19 20 **2.1. Regulatory Affairs**

21 The Regulatory Affairs function is Toronto Hydro’s contact and liaison with the OEB,
22 the IESO, the Ontario Power Authority (“OPA”), government ministries, and other
23 electricity sector agencies on all regulatory matters. In consultation with internal and
24 external stakeholders, the Regulatory Affairs function develops Toronto Hydro’s
25 positions on emerging sector issues, prepares regulatory filings and rate applications, and
26 makes submissions in industry consultations coordinated by the OEB or the Ministry of
27 Energy.

1 Development of Toronto Hydro's rate filings and other OEB applications is a major
2 responsibility of the Regulatory Affairs function. Distribution rate applications involve
3 extensive co-ordination and development of evidence across the entire utility. In special
4 cases, such as with the current application, complex regulatory filings require extensive
5 research, strategy formulation and regulatory risk analysis, all of which are performed by
6 the Regulatory Affairs function with input from external advisors and legal counsel as
7 necessary.

8
9 Regulatory Affairs works closely with other areas of the utility to ensure that the
10 information provided in rate filings is complete, correct, and satisfies regulatory filing
11 requirements, as well as other OEB and government policy objectives. On an ongoing
12 basis, the function provides education to all business areas on the regulatory aspects of
13 their respective activities to increase the general awareness and specific regulatory
14 acumen across the utility. This work allows Toronto Hydro to better integrate utility
15 operations with the applicable regulatory regimes, thus facilitating compliance on all
16 matters and minimizing the likelihood of potential regulatory risks. It also ensures that
17 regulatory information provided to Toronto Hydro's customers (generally through
18 intervenor representatives in rate applications) is clear, well-organized and informative so
19 as to enable the participation of interested parties in Toronto Hydro's rate applications.

20
21 In addition to rate applications and other regular OEB proceedings, the Regulatory
22 Affairs function facilitates the communication of Toronto Hydro's position on emerging
23 regulatory matters through OEB policy-making consultations such as the Renewed
24 Regulatory Framework for Electricity² proceedings (EB-2010-0377/78/79) and other /C
25 proceedings that are material to the utility, its customers, and to the industry in general.
26 Being the largest municipally-owned distributor in Ontario, the policy decisions affecting

² Ontario Energy Board, *Report of the Board: Renewed Regulatory Framework for Electricity Distributors: A Performance-Based Approach* (Toronto: Ontario Energy Board, 2012), online: Ontario Energy Board < http://www.ontarioenergyboard.ca/oeb/Documents/Documents/Report_Renewed_Regulatory_Framework_RRFE_20121018.pdf>. ["RRFE"] /C

1 Toronto Hydro have a direct bearing on 15% of Ontario's electricity customers. The staff
2 members' experience and knowledge of the industry and regulatory environment is a
3 significant and important input into these exercises. As noted previously, the Regulatory
4 Affairs function works closely with other utilities and industry associations in order to
5 provide input in an informed, efficient and coordinated manner.

6
7 Regulatory Affairs also facilitates Toronto Hydro's link with provincial government
8 ministries and agencies that oversee Toronto Hydro's regulated activities. Acting as a
9 single point of contact with Toronto Hydro's industry experts, the Regulatory Affairs
10 function supports all types of requests and collaborative efforts between the utility,
11 provincial policymakers and entities under their oversight. Most commonly, Toronto
12 Hydro works with the Ministry of Energy on matters involving securing and interpreting
13 confidential data on customer consumption patterns, or reviewing the utility's plans with
14 respect to testing or deploying Smart Grid technologies. Toronto Hydro also provides the
15 government with constructive inputs on contemplated policy directions when the
16 opportunities to provide such feedback present themselves. For example, staff
17 coordinated the preparation of Toronto Hydro's submission for the Ontario Distribution
18 Sector Review Panel.

19
20 Beyond the Ministry of Energy, Regulatory Affairs staff facilitate an ongoing dialogue
21 between the utility and other government stakeholders affected by the utility's activities,
22 such as the Ministry of Transportation ("MTO"), the Ministry of Municipal Affairs and
23 Housing ("MMAH"), GO Transit, Metrolinx and others.

24
25 Toronto Hydro takes compliance with regulatory requirements very seriously. The
26 Regulatory Affairs function oversees the gathering and reporting of information to the
27 OEB through quarterly and annual Reporting and Record Keeping Requirements (the
28 "RRR") filings, and assists the utility's business units in interpreting and responding to

1 any new requirements. Continually evolving regulatory requirements (e.g., Ontario
2 Clean Energy Benefit, Class A global adjustment, updated OEB codes, Distributor
3 Scorecard, etc.) require a significant effort in co-ordinating with affected areas of the
4 utility and the OEB. The group also guides the utility's processes to promote compliance
5 with the Affiliate Relationships Code ensuring confidentiality of customer information,
6 as well as assisting business units in interpreting and complying with other applicable
7 requirements.

9 **2.2. Rates**

10 The Rates function oversees distribution rate development and implementation,
11 wholesale monitoring and settlement activities, and develops annual forecasts of the
12 utility's load and number of customers. Beyond undertaking regular functions driven by
13 OEB rate decisions and wholesale market activities, the Rates function staff participate in
14 OEB policy consultations such as the Review of Cost Allocation Policy for Unmetered
15 Loads (EB-2012-0383) and the Development of Standby Rates Policy for Load
16 Displacement Generation (EB-2013-0004).

18 Rate case filings are the utility's source of funding for regulated activities. Rates staff
19 support regulatory filings through the development of the revenue requirement, cost
20 allocation, and rate design exhibits as well as potential approaches to rate mitigation.
21 They also provide analytical support and other services in the clearance of regulated asset
22 deferral and variance accounts as required in the course of Toronto Hydro regulatory
23 proceedings. The group's knowledge of cost allocation and rate design help ensure that
24 the revenue requirements are allocated and collected from the correct customer classes,
25 minimizing any inter-class cross subsidization.

26
27 Implementation of rate decisions, semi-annual commodity rate changes and other
28 regulated rate updates (e.g., RRRP, WMSC, and RTSRs) usually require configuration,

1 updating, and testing in Toronto Hydro's billing system to ensure that Toronto Hydro
2 charges applies the right rates to the appropriate customer classes and otherwise properly
3 implements OEB decisions. This function is also responsible for the configuration and
4 maintenance of the rates component of the utility's Customer Care and Billing ("CC&B")
5 system, and for advising Customer Care program³ on a range of issues requiring
6 specialized knowledge of rate-making principles and specific analytical skills, such as
7 providing explanations for bill components and rate riders for customers. Changes to
8 provincial legislation and OEB policy (such as the introduction of the Global Adjustment
9 Class A category) require significant effort in the area of rates configuration and testing
10 in the billing system. The Rates function assists other Toronto Hydro programs in
11 completing the tasks that ensue from such decisions.

12

13 Another major area of activity for the Rates staff is forecasting. Staff utilize their skills
14 and experience in economics, econometrics and other related fields to develop the
15 forecasts of Toronto Hydro's load and number of customers. Performing this work
16 requires regular communication with other Toronto Hydro programs, such as
17 Conservation and Demand Management and Customer Connections. Beyond the
18 customer and load forecasts that support the utility's rate applications, this function also
19 facilitates the analysis of incoming customer and load data to refine future financial and
20 asset management planning activities, and assess the impact of a variety of conservation
21 programs offered by the utility.

22

23 The Rates function enables Toronto Hydro's participation in the IESO Wholesale Market
24 settlement activities by providing daily reconciliation of IESO meter data with internal
25 meter readings to ensure that any discrepancies which impact electricity commodity costs
26 are handled according to IESO Market Rules. The group is also responsible for the
27 monthly settlement of the IESO invoice, and providing the necessary data to the IESO for

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³ Exhibit 4A, Tab 2, Schedule 13.

generation, global adjustment, and RPP amounts. As a Market Participant, Toronto Hydro has numerous obligations under the Market Rules that it must perform in a timely and accurate fashion. The Rates function ensures that Toronto Hydro complies with these obligations.

Staff supporting the Rates segment is highly knowledgeable and experienced in the areas of cost allocation, rate design, and forecasting. When required, consulting resources are acquired (such as for the Suite Metering issue as part of EB-2010-0142) to supplement internal resources and provide additional specialized expertise.

3. PROGRAM COSTS

The Historical (2011-2013), Bridge (2014) and Test Year (2015) program costs are summarized in Table 2. These costs include regular operating expenses associated with the activities described above. Since Toronto Hydro's last rebasing in 2011, Rates and Regulatory Affairs program costs have increased in total by approximately \$ 2.9M, or just over 4% annually. The main drivers of this increase are costs of preparing rate applications, namely the 2012-14 Incremental Capital Module ("ICM") application (EB-2012-0064), the wireless attachment forbearance application (EB-2013-0234) and the current 2015 Custom Incentive Rate-Setting ("CIR" or "Custom IR") application, the proposed treatment of which is discussed below.

Table 2: Rates & Regulatory Program Expenses (\$ Millions)

Program	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Total Rates and Regulatory Affairs	7.2	7.8	8.4	9.9	10.1

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Program	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Total CIR + Wireless costs		0.1	1.2	3.3	3.2
Rates and Regulatory Affairs excluding CIR + Wireless costs	7.2	7.7	7.1	6.5	6.9
CIR + Wireless costs amortized over 2015-19 period					1.6 (= 7.8 / 5)
Rates and Regulatory Affairs budget included in 2015 OM&A					8.4

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1 **3.1. 2011 – 2012**

2 From 2011 to 2012, costs increased by \$0.6 million largely due to the preparation and
3 filing of Toronto Hydro's 2012-2014 ICM application (EB-2012-0064). This included
4 the need for the production of expert reports and supporting materials, in addition to
5 continued efforts by internal staff.

6

7 **3.2. 2012 – 2013**

8 The \$0.6 million increase from 2012 to 2013 is largely a result of the continuation of the
9 2012-2014 ICM proceeding, as well as additional costs required as a result of the filing of
10 Toronto Hydro's wireless attachment forbearance application (EB-2013-0234).

11

12 **3.3. 2013-2014**

13 The 2014 forecast of \$9.9 million includes an estimate of \$2.7 million in incremental
14 costs associated with legal and consulting costs for the current 2015 CIR application and

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1 approximately \$0.7 million in costs related to the wireless forbearance application. For
2 the purposes of setting rates for 2015-19, these incremental costs are proposed to be
3 amortized over the 2015-19 period.

4 5 **3.4. Test Year Program Costs**

6 The 2015 Test Year program costs are forecast to be \$10.1 million, reflecting continued
7 legal, consulting, and intervenor costs for the CIR filing of approximately \$3.2 million.

8
9 Toronto Hydro's current rate filing will set rates for the following five years. In addition
10 to the regular responsibilities of the group, this period will include implementation,
11 monitoring, and potential reporting on aspects of the current Custom Incentive Rate-
12 setting application, the preparation and filing of a clearance application relating to
13 Toronto Hydro's ICM Deferral Accounts, development of the utility's 2020 rebasing
14 application, as well as several expected major policy consultations. The program will
15 also continue to provide ongoing regulatory consulting and services to the rest of the
16 utility.

17
18 For the purposes of determining the Rates and Regulatory Affairs operating budget to be
19 included in 2015 Revenue Requirement, Toronto Hydro proposes to amortize the costs
20 incurred over the 2013-2015 period associated with the CIR application costs over the
21 2015-2019 rate period, as well as the costs associated with the Wireless Forbearance
22 (Wireless) application. None of these costs were included in setting rates in the last 2011
23 cost of service application, which formed the basis for distribution rates over the 2011-14
24 period. For regulatory accounting purposes, these costs will be recorded in Account 1525
25 Miscellaneous Deferred Debits, and drawn down over the 2015-19 period.

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26
27 The legal, consulting and intervenor costs associated with the 2015 CIR application are
28 driven primarily due to the work involved in preparing a comprehensive five year

1 application, being one of the first to be heard under the new rate-setting framework,
2 meets and surpasses the OEB's requirements. Toronto Hydro expects the hearing of this
3 case to involve a significant amount of OEB Staff and intervenor involvement, and has
4 budgeted accordingly.

5

6 Appendix 2-M provides the breakdown of the actual and anticipated CIR and Wireless
7 application costs as required by s. 2.7.3.5 of the OEB Filing Requirements (July 17,
8 2013).

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OEB Appendix 2-M Regulatory Cost Schedule

Regulatory Cost Category		USoA Account	USoA Account Balance	Ongoing or One-time Cost? ²	Last Rebasings Year (2011 Board Approved)	Most Current Actuals Year 2013	2014 Bridge Year	Annual % Change	2015 Test Year	Annual % Change
(A)		(B)	(C)	(D)	(E)	(F)	(G)	(H) = [(G)-(F)]/(F)	(I)	(J) = [(I)-(G)]/(G)
1	OEB Annual Assessment	5655		On-Going	\$ 3,177,253	\$ 3,217,753	\$ 3,216,000	-0.05%	\$ 3,270,672	1.70%
2	OEB Section 30 Costs (Applicant-originated)	5655		On-Going	\$ 56,296	\$ 76,667	\$ 63,337	-17.39%	\$ 79,734	25.89%
3	OEB Section 30 Costs (OEB-initiated)	5655		On-Going	\$ 138,025	\$ 116,273	\$ 119,976	3.19%	\$ 120,924	0.79%
4	Expert Witness costs for regulatory matters	5655		One-Time	note 5	note 5	note 5		note 5	
5	Legal costs for regulatory matters	5655		One-Time	\$ 299,600	\$ 1,027,651	\$ 1,491,893	45.18%	\$ 1,926,047	29.10%
6	Consultants' costs for regulatory matters	5655		One-Time	\$ 797,837	\$ 811,288	\$ 1,709,814	110.75%	\$ 967,319	-43.43%
7	Operating expenses associated with staff resources allocated to regulatory matters			On-Going	note 6	\$ 1,733,069	\$ 4,828,578		note 6	
8	Operating expenses associated with other resources allocated to regulatory matters ¹									
9	Other regulatory agency fees or assessments	5655		On-Going	\$ 800	\$ 800	\$ 800	0.00%	\$ 800	0.00%
10	Any other costs for regulatory matters (please define)									
11	Intervenor costs	5655		One-Time	\$ 322,817	\$ 563,916	\$ 322,360	-42.84%	\$ 650,000	101.64%
12	Sub-total - Ongoing Costs ³		\$ -		\$ 3,372,374	\$ 5,144,562	\$ 8,228,692	59.95%	\$ 3,472,130	-57.80%
13	Sub-total - One-time Costs ⁴		\$ -		\$ 1,420,254	\$ 2,402,855	\$ 3,524,067	46.66%	\$ 3,543,366	0.55%
14	Total		\$ -		\$ 4,792,628	\$ 7,547,417	\$ 11,752,758	55.72%	\$ 7,015,495	-40.31%

Please fill out the following table for all one-time costs related to this cost of service application to be amortized over the test year plus the IRM period

	Historical Year(s)	2014 Bridge Year	2015 Test Year
4	Expert Witness costs	note 5	note 5
5	Legal costs - CIR	\$ 51,226	\$ 960,877
5	Legal costs - Wireless	\$ 549,101	\$ 331,016
6	Consulting costs - CIR	\$ 373,030	\$ 1,392,829
6	Consulting costs - Wireless	\$ 353,120	\$ 316,985
7	Incremental operating expenses associated with staff resources allocated to this application.		
8	Incremental operating expenses associated with other resources allocated to this application. ¹		
11	Intervenor costs - CIR	\$ -	\$ -
11	Intervenor costs - Wireless	\$ -	\$ 650,000

IC

¹ Please identify the resources involved.

² Where a category's costs include both one-time and ongoing costs, the applicant should prove a separate breakdown between one-time and ongoing cost:

³ Sum of all ongoing costs identified in rows 1 to 11 inclusive

⁴ Sum of all one-time costs identified in rows 1 to 11 inclusive.

⁵ Expert Witness and Consulting costs aggregated

⁶ For 2013 and 2014, this is an estimate of all Toronto Hydro staff involved in rate filing. Estimates for 2011 and 2015 not available

LEGAL SERVICES PROGRAM

1. SUMMARY

Table 1: Legal Services Program (\$Millions)

Program	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Legal Services	5.5	4.3	4.5	5.3	5.5

The Legal Services program provides legal advice and guidance, strategic direction and project leadership in respect of a wide variety of legal issues that arise within the course of the utility's business. It is focused on providing its business unit clients with timely, accessible, specific and accurate advice and support. The Legal Services program ultimately helps the utility operate in an efficient and legally compliant manner, and develop corporate strategy with an understanding of the organization's legal requirements.

The Legal Services program also includes dispute resolution services, which both defends the utility from legal threats and claims from external parties, and supports Toronto Hydro's efforts to redress damages suffered by the utility. The program also enables the utility to carry out commercial and real property transactions with necessary legal protections and due diligence, and ensures that corporate practices and organizational structure meet legal standards. To fulfill these obligations, the Legal Services program employs and engages a combination of internal professional and administrative staff and external legal experts, with an appropriate balance to provide optimal service levels.

2. PROGRAM DESCRIPTION

The Legal Services program is comprised of the following segments:

- 1 1) Corporate, Commercial and Real Property; and
- 2 2) Litigation and Claims.

3

4 Table 2 showcases the Historical (2011-2013), Bridge (2014) and Test Year (2015) costs

5 for the Legal Services program by segment.

6

7 **Table 2: Legal Services Program Expenses (\$ Millions)**

Program	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Corporate, Commercial and Real Property	3.2	2.5	2.1	2.9	3.1
Litigation and Claims	2.3	1.8	2.4	2.4	2.5
Total	5.5	4.3	4.5	5.3	5.5

8 By integrating their practice with the operations of the utility's business units, the Legal

9 Services program is able to proactively provide timely and context-specific legal service.

10 Legal staff engage with their internal clients and colleagues to support legal compliance

11 in operational matters and provide risk analysis and mitigation in transactional and

12 dispute situations. In this way, the Legal Services program works to limit the operational

13 and financial risk to the utility and related costs that could potentially be passed along to

14 Toronto Hydro's customers.

15

16 Key issues covered by legal review in typical operational and transactional matters

17 include interpretation of rights and obligations of the parties, liabilities, confidentiality,

18 events of default, remedies and termination. The Legal Services program provides value

19 to Toronto Hydro by facilitating the correct structuring of transactions and operations to

20 prevent legal disputes and compliance issues from arising in the first place.

21

22 The department utilizes a mixed legal services model, which combines a dedicated team

23 of internal legal counsel with specialist resources provided by external legal firms. This

1 model provides significant value in comparison to alternative approaches, by developing
2 and making available internal legal service providers with company and industry-specific
3 knowledge and experience, and augmenting those assets with specific technical expertise
4 and market experience of highly skilled external practitioners.

5
6 The majority of expenditures made by the Legal Services department relate to costs for
7 legal advice, including both internal legal professional staff and external legal firms and
8 consultants. Therefore, to provide optimal value to the organization, the Legal Services
9 program must find the appropriate balance between the utilization of internal and external
10 resources. Beginning in 2012 and continuing into 2014, the Legal Services department
11 that delivers the program underwent a phased re-organization to establish the appropriate
12 balance between internal and external resources and maximize value for expenditures.
13 The re-organization resulted in lawyers both leaving and joining the department and a
14 reduction in non-professional administrative staff.

15
16 The market of available lawyers with knowledge of the electricity distribution industry is
17 limited and expensive. Accordingly, the reorganization focused on procuring less costly
18 junior lawyers with strong general skills that could be further developed and specialized
19 in the utility's business. The development of new legal staff requires exposure to the
20 various operational areas of the utility, with senior counsel more focused on key practice
21 areas, such as information technology and finance. The program has expended
22 significant development time on its new staff to enable better client service.

23
24 As a result of the reorganization completed between 2012 and 2014, the Legal Services
25 program is now comprised of a slightly larger, but more diverse group of lawyers as
26 compared to the staffing complement in 2011. The new staffing structure is better
27 positioned to provide more efficient customer service to a broader set of business
28 activities.

1
2 Under the reorganized Legal Services department, external resources are only employed
3 to deal with unique or complex situations which require specialized practice knowledge
4 and experience which internal lawyers are unable to provide at that time. This covers
5 insurable litigation files, highly specialized practice issues (e.g., construction law,
6 securities law and intellectual property), significant matters consuming a number of legal
7 resources or times of extraordinary demand on internal legal staff. By staffing
8 challenging files with a combination of external counsel and more junior internal counsel,
9 Toronto Hydro's legal staff members are able to develop their skills and knowledge in
10 such specialized practices.

11
12 In 2013, Legal Services undertook a review of the department's use of external law firms,
13 resulting in a request for proposals ("RFP") process by which interest from law firms was
14 solicited for the provision of services in corporate/commercial, litigation and real estate.
15 The RFP process was responded to with proposals from 13 firms. After careful
16 consideration, Legal Services selected three firms and entered into agreements with two
17 firms (one of the selected firms ceased operating in early 2014). The arrangements have
18 resulted in reduced rates for external services (in the range of 5 to 25% depending on
19 practice area) and the attainment of various additional benefits (e.g., access to law
20 libraries, training and professional development sessions and practice management
21 services) at no additional cost. The arrangements are expected to continue to drive value
22 as the firms vie for work and Legal Services directs more of the externally resourced
23 work to the firm that demonstrates the best value for money.

24
25 Despite increasing demands, as discussed above, the Legal Services program provides
26 timely responses and improved customer service, at lower overall costs. Beginning in
27 2013, the program commenced the measurement of the initial response times to requests
28 from client programs. The performance standard was set at a rate of 90% of requests

1 responded to within 48 hours. In 2013, professional staff members were able to achieve a
2 response rate of 100% against that standard.

3
4 **3. CORPORATE, COMMERCIAL AND REAL PROPERTY SEGMENT**

5 This segment of the Legal Services program covers day to day legal advice to operational
6 clients, the review, negotiation and drafting of commercial agreements and completion of
7 corporate, financial and commercial transactions for all of the organization's business
8 units. It also includes the corporate secretarial function of the utility, and all corporate
9 reorganization and governance matters. In addition, this segment includes a real property
10 function which provides legal advice with respect to real estate matters including
11 reviewing, negotiating and drafting legal documents relating to real property such as
12 offers to connect, supply agreements and easements, as well as real property dispositions
13 and acquisitions and leasing arrangements. The legal staff supporting the real property
14 function work closely with the construction, asset management, stations and facilities
15 operational units in their activities to help ensure that existing legal requirements of the
16 utility and its counterparties related to property access, maintenance and repair, are
17 complied with and, where necessary, new rights are obtained. This allows such projects
18 to move forward efficiently and avoid penalties or damages relating to non-compliance
19 with existing legislative restrictions or contractual obligations.

20
21 In 2013, approximately 67 percent of the expenses of the Corporate, Commercial and
22 Real Property segment were attributed to services provided by internal counsel, compared
23 with less than 63 percent in 2011. This demonstrates Toronto Hydro's effort to bring
24 more legal work inside the department at a lower hourly cost and to develop internal
25 expertise. Legal staff are also working with other business units across the utility and
26 various outside agencies regarding the creation of standard work coordination
27 arrangements. Such arrangements are expected to simplify large the plant relocation

work projects requested by external agencies¹, drive greater process efficiency in the completion of such projects, and reduce the risks associated with this work to the utility.

3.1. Segment Costs

Table 3 presents the Historical (2011-2013), Bridge (2014) and Test Year (2015) costs of delivering the Corporate, Commercial and Real Property segment of the Legal Services program.

Table 2: Corporate, Commercial and Real Property Segment Expenses (\$ Millions)

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Corporate, Commercial & Real Property	3.2	2.5	2.1	2.9	3.1

3.2. 2011 – 2012

From 2011 to 2012, the cost of delivering this segment decreased by \$0.7 million due a reduction in staff as part of the departmental re-organization initiative.

3.3. 2012 – 2013

From 2012 to 2013, segment costs further decreased of \$0.4 million due to: 1) ongoing reorganization efforts and unfilled vacancies during recruitment of new staff; and 2) a reduction in the costs associated with external legal services for various reasons, including the completion of the RFP process. This reduction, along with that incurred from 2011 to 2012, was not sustainable due to the significant increase in demand on existing staff and the organizational objective to build a more robust legal practice based on customer service excellence and responsiveness.

¹ The project are outside the control of Toronto Hydro, as discussed in Exhibit 2B, E5.3.

1 **3.4. 2013 – 2014**

2 From 2013 to 2014, Toronto Hydro forecasts the segment costs to return to historical
3 (2011) levels, but reflecting the operational efficiencies and productivity savings gained
4 from the reorganization and the RFP for legal services. Overall, this represents a \$0.7M
5 increase from the 2013 costs due to various factors including: 1) additional internal and
6 external resources required to address increasing demands on existing staff, particularly
7 relating to capital projects and key initiatives (e.g., Anti-Spam); and 2) the transfer of the
8 procurement document management function from the Supply Chain Services program.

10 **3.5. Test Year Segment Costs**

11 The 2015 Test Year costs associated with the delivery of the functions and
12 responsibilities of the Corporate and Commercial segment are projected to be \$3.1
13 million, which represents an increase of \$0.2 million from the forecasted Bridge Year
14 costs and a \$0.1 million reduction from the last rebasing year (2011). The primary driver
15 of these variances is the cost associated with additional resources required to support the
16 execution of the utility's capital program, particularly additional legal support related to
17 material and equipment procurement, project advice and construction services. Although
18 the utility's proposed capital program over the 2015-2019 rate period is approximately 18
19 percent larger than the program in 2011, Toronto Hydro plans to operate the supporting
20 legal functions captured within this segment within the historical expenditure levels.
21 Efficiencies driven by the reorganization, the development of previous junior-level
22 professional hires, maintenance of a steady state of staffing levels, and the use of external
23 firms from the RFP process are anticipated to help address the workload pressures
24 associated with the capital work program and other key initiatives.

1 **4. LITIGATION AND CLAIMS SEGMENT**

2 The Litigation and Claims segment manages the investigation of incidents and supervises
3 external adjusters in the review of damage claims. It is part of the segment's function to
4 manage and settle matters prior to proceeding to formal litigation.

5
6 Legal professional staff in the Litigation and Claims segment also lead the preparation
7 and filing of statements of claim, statements of defence and related documentation, and
8 undertake, or work with external counsel in respect of, the defence and prosecution of
9 personal injury and property damage matters and commercial disputes as they proceed to
10 formal litigation.

11
12 The segment's legal practitioners also oversee class action matters should they arise. For
13 matters which may be covered by the organization's insurance policies, Toronto Hydro
14 retains external counsel approved by its insurers. In addition, Litigation and Claims
15 advises on privacy compliance, customer issues and many other business unit and
16 external requests. Finally, Litigation and Claims supports the company's business units
17 when issues are raised that have the potential to become legal disputes. In 2013, the
18 Litigation and Claims segment handled over 1,100 new general liability claims matters
19 and in excess of 120 files under actual litigation.

20
21 As part of the Legal Services department re-organization, the claims function, which
22 handles processing and determinations with respect to claims prior to the formal
23 commencement of litigation, was combined with the litigation function. The segments
24 were placed under a single legal manager to provide strategic oversight for dealing with
25 claims made by or against the utility from beginning to end. Combining the litigation and
26 claims functions under one segment allows for significant process improvements.

27

In addition to resolving claims brought against the utility, the Litigation and Claims segment also support Toronto Hydro's efforts to obtain compensation when the organization has been harmed, such as when the utility's plant is damaged through third-party actions. By pursuing demands and legal actions, Litigation and Claims is able to make recoveries in respect of damages suffered by Toronto Hydro which otherwise would be unrecovered losses.

The chief risk in anticipating and budgeting for legal costs arising from Litigation and Claims is the inherently reactive nature of the area. Typically, claims arise from unanticipated matters, which the utility attempts to resolve through its claims settlement process, including the use of collections agents, prior to engaging in more costly and protracted legal procedures. Should that process not reach a conclusion that Toronto Hydro or the opposing parties are willing to accept, the matter may advance to litigation. The formal litigation process is considerably more expensive than using the internal claims function, due to costs for external legal counsel's time and efforts and court-related fees and costs, and may not lead to a successful result depending on many factors. If a party is unsuccessful in litigation, it may be required to pay for a portion of the other side's legal fees.

4.1. Segment Costs

Table 3 presents the Historical (2011-2013), Bridge (2014) and Test Year (2015) costs of delivering the Litigation and Claim segment of the Legal Services program.

Table 3: Litigation and Claims segment Costs (\$ Millions)

Segment	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Litigation & Claims	2.3	1.8	2.4	2.4	2.5

4.2. 2011 – 2012

From 2011 to 2012, segment costs decreased by \$0.5 million due a reduction in staff as part of the department's reorganization initiative, and a reduction in payments made in respect of claims.

4.3. 2012 – 2013

From 2012 to 2013, segment costs increased by \$0.6 million due to a significant increase in the value of claims made and settled against the utility. These results were much more closely in line with historical trends than those experienced in 2012.

4.4. 2013 – 2014

From 2013 to 2014, Toronto Hydro forecasts the segment costs to remain steady, despite increases in claims, privacy information requests and litigation activity. This is achieved through leveraging the efficiencies gained through organization and the improved value from external counsel as result of the legal RFP process.

4.5. 2015 Test Year Segment Costs

The 2015 Test Year costs associated with the delivery of the functions and responsibilities of the Litigation and Claims segment is forecasted to be \$2.5 million, which represents an increase of \$0.2 million from the utility's last rebasing year (2011), and a \$0.1 million increase from the forecasted Bridge Year (2014) costs. Efficiencies driven by the completion of the reorganization, synergies between litigation and claims and the transfer of external workload to firms chosen under the RFP process are anticipated to balance increased litigation arising as a result of more construction-intensive capital work and aging infrastructure.

Although the Legal Services department has been able to accomplish significant productivity gains to provide better value to its clients and Toronto Hydro without

1 increasing the costs of the segment, there is a risk of markedly increased litigation and
2 claims costs that could arise when major external damage events takes place. As a result
3 of the changes required by its insurers, commencing in 2013 Toronto Hydro became
4 responsible for a deductible of \$250,000 per matter, as opposed to the previous cost of
5 \$100,000. This increase in deductible consequently results in an increased liability to the
6 utility for legal and other costs in insurable matters.

7
8 Maintaining this level of expenditure in the Litigation and Claims segment is vital to
9 Toronto Hydro, since a reduction in budget could limit the utility's ability to support and
10 defend the utility effectively against external claims or make claims for damages where it
11 has been harmed. Equally important, a reduction in Legal Services' budget could also
12 diminish the ability of the utility to properly anticipate and consider legal issues in its
13 operations, so that potential damages are mitigated.

14
15 The proposed amount of expenditures for this segment is based on the utility's historical
16 experience with respect to litigation and claims. However, since it is anticipated that the
17 litigation and claims caseload will likely continue to increase due to the growth in size
18 and complexity of the capital program, increasing legislative compliance requirements,
19 and because of the largely unpredictable nature of damage occurrences, the Legal
20 Services program expects to at least maintain its historical budgetary levels.

CHARITABLE DONATIONS AND LOW-INCOME ENERGY ASSISTANCE PROGRAM (“LEAP”)

1. SUMMARY

Toronto Hydro’s total historic and forecast charitable contributions are summarized in Table 1 below.

Table 1: Charitable Contributions Summary (\$000s)

Category	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Rate Recoverable	720	660	660	660	850
Non-Rate Recoverable	83	50	54	50	250
Total	803	710	714	710	1,100

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Toronto Hydro’s non-rate recoverable charitable contributions are comprised of multiple minor donations to a number of registered charities and charitable causes within the Toronto area, in addition to a \$200,000 donation to George Brown College in 2015.

/C

Toronto Hydro’s sole rate recoverable charitable contributions for the 2015-2019 period are its payments towards the Low-Income Energy Assistance Program (“LEAP”).¹

In accordance with the Ontario Energy Board’s (“OEB”) directives concerning LEAP funding, Toronto Hydro has allocated 0.12 percent of its total (service) distribution revenue requirement towards LEAP. This amounts to approximately \$850,000 disbursed annually over the 2015-2019 period.

¹ Toronto Hydro ceased its participation in the legacy Winter Warmth program upon the adoption of LEAP in 2011.

1 In addition to the normal LEAP funding, Toronto Hydro is also proposing to disburse a
2 one-time donation of \$16,682 for 2015, composed of outstanding over-collected late
3 payment charges on currently inactive accounts. Toronto Hydro originally presented
4 these credits to the OEB for consideration in its Reconciliation Report as part of an OEB
5 Decision (see below) authorizing certain temporary exemptions from select customer care
6 provisions within the Distribution System Code (“DSC”) and the Retail Settlement Code
7 (“RSC”).
8

9 At present, Toronto Hydro continues to rely on the Neighbourhood Information Post
10 (“NIP”) as its designated LEAP agency. NIP has been responsible for operating Toronto
11 Hydro’s LEAP program since 2011, and was the United Way’s designated agency for the
12 Toronto area for the preceding Winter Warmth program. The extended working
13 relationship with NIP has allowed Toronto Hydro to establish operational efficiencies in
14 qualifying low income customers, processing approved grants, and resolving any
15 potential operational issues.

2. PROGRAM DESCRIPTION

2.1. Expenditure Summary

The table below shows Toronto Hydro's annual LEAP contributions and grant amounts:

Table 2: Toronto Hydro LEAP Program Disbursement Summary (\$000s)

	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Annual Contribution ¹	720	660	660	660	850
Carryover from prior years	62	325	464	95	0
One-Time Contribution ²	0	0	0	0	17
Total Available	782	985	1124	755	867
Total Dispersed (including admin fees) ³	457	521	1029	755	N/A
Total Unused	325	464	95	0	N/A

1. In 2011 Toronto Hydro disbursed a slightly higher amount than required by the OEB LEAP directive.

2. Consists of over-collected late payment charges outstanding to currently inactive customer accounts (see below for details)

3. Calculations exclude grants using Garland Settlement funds administered by the United Way (see below for details)

Prior to the OEB's LEAP program coming into effect in 2011, Toronto Hydro had participated in the preceding Winter Warmth program. As the Winter Warmth program was only available during winter months and accordingly required lower funding levels, Toronto Hydro and NIP faced initial challenges to transition from a seasonal to an annual cycle and to increase its volume of processed grants up to the new levels required by LEAP.

In early 2011, only two-thirds of the annual allotment was distributed to customers in need of financial assistance. In response, Toronto Hydro worked with NIP to increase promotion and communication of the program in 2012, which resulted in a corresponding

1 increase in both the amount of funds distributed and the number of LEAP applicants
2 approved.

3
4 By 2013, continued efforts to improve outreach and communications, as well as efforts to
5 augment the existing LEAP program using Garland Settlement Funds (see below),
6 resulted in a significant increase in LEAP assistance to customers, using up the entire
7 annual allotment and a majority of carryover funding accumulated over 2011 and 2012.
8 Toronto Hydro expects that its new annual contribution level, in combination with
9 available Settlement Funds, will be sufficient to meet the demand of its low income
10 customers over the 2015-2019 period.

11 12 **2.2. Settlement Funds**

13 Toronto Hydro was subject to the Garland Settlement, through which \$4.4 million was
14 entrusted to the United Way in 2012 for the purposes of energy assistance to Toronto
15 customers. As of the end of 2013, approximately \$3.5 million of the original fund
16 amount remains undisbursed, and the United Way continues to collaborate with Toronto
17 Hydro on the most efficient way to make use of this funding.

18
19 In 2012 and 2013, when Toronto Hydro's annual funding was sufficient to cover LEAP
20 grants, the Settlement Funds were used to augment the OEB's existing LEAP program
21 with two specific measures:

- 22 1) Customers who did not qualify using the LEAP income criteria (gross income <
23 LICO+15%) could be provided with a grant using Settlement Funds by qualifying
24 under slightly less restrictive criteria (gross income < LICO +25%).
- 25 2) Customers who were in arrears in excess of \$500 (the LEAP individual grant
26 maximum), could be granted the net amount in excess of \$500 (i.e., up to an
27 additional \$500, to a maximum of \$1000) from the Settlement Funds.

1 In 2014, Toronto Hydro expects that its annual OEB-directed LEAP funds will be
2 insufficient to cover demand throughout the entire year, given an increased rate of
3 distribution of LEAP grants in Toronto Hydro's service territory. As a result, the United
4 Way discontinued the above measures and the remaining Settlement Funds have been
5 reserved to cover any shortfall in funding once Toronto Hydro's annual LEAP fund
6 allocation is expended. The magnitude of the remaining Settlement Funds, in
7 combination with existing utility contribution levels (\$850,000 per year over the next five
8 years) are expected to allow Toronto Hydro to fully meet LEAP demand through to the
9 end of 2019.

11 **2.3. Late Payment Charge Credits To Inactive Customers**

12 On July 18, 2011, Toronto Hydro filed an application seeking temporary exemptions
13 from certain portions of the DSC and RSC (EB-2011-0269). By decision dated February
14 22, 2012, the OEB granted the relief sought by Toronto Hydro in its application.² As part
15 of that decision, the OEB ordered Toronto Hydro to provide a Reconciliation Report to
16 the OEB, outlining the measures Toronto Hydro had taken to become compliant with the
17 relevant sections of the DSC and RSC and to confirm that any affected customers had
18 been properly reimbursed all owed amounts.

19
20 Toronto Hydro filed its Reconciliation Report on December 3, 2012 (attached as
21 Appendix A to this schedule), and while it had managed to become compliant in all
22 aspects for which exemptions were granted, it identified a sum of \$36,241.35 of over-
23 collected late payment charges that remained outstanding to customers who no longer had
24 active accounts with Toronto Hydro.

25
26 Given that most of these refunds were of immaterially small amounts, Toronto Hydro
27 sought the OEB's guidance on how best to clear this balance. By Toronto Hydro's

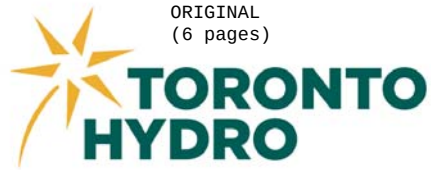
² EB-2011-0269, Decision and Order, (February 22, 2012).

estimation, the cost of actively issuing all cheques to these inactive customers would greatly exceed the value of the credits themselves. In addition, it is very likely that despite the effort and cost required, Toronto Hydro would not be successful in returning a majority of these funds to the rightful customers, nor that all customers would particularly want to receive cheques for such diminutive amounts.

As a result, as part of this application, Toronto Hydro proposes to donate the outstanding balance of these credits to its LEAP contribution for 2015. Toronto Hydro notes that of the original amount of \$36,241, only \$16,682 is currently outstanding, the difference having been already returned over the preceding years to any customers who had contacted Toronto Hydro inquiring about the outstanding credit on their account, in addition to any relatively larger credits for which Toronto Hydro actively attempted to locate the rightful recipient. An updated summary of the outstanding credits is provided below:

Table 3: Outstanding Late Payment Charge Credits for Inactive Accounts

Amount of Credit	Number of Affected Accounts	Total Credit (LPC Over-collection + Accumulated Interest)
<\$1	10,844	(\$4,360.17)
\$1 to \$2	2,713	(\$3,803.21)
>\$2	1,739	(\$8,518.95)
Total	15,296	(\$16,682.33)



Amanda Klein

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December 3, 2012

via RESS e-filing – signed original to follow by courier

Ms. Kirsten Walli
Board Secretary
Ontario Energy Board
PO Box 2319
2300 Yonge Street, 27th floor
Toronto, ON M4P 1E4

Dear Ms. Walli:

**Re: Toronto Hydro-Electric System Limited ("THESL")
OEB File No. EB-2011-0269
THESL's Temporary Exemption from Certain Sections of the Distribution
System Code ("DSC") and the Retail Settlement Code ("RSC")**

THESL writes in respect of the above-noted matter.

Pursuant to the Board's February 22, 2012 decision, please find attached THESL's Reconciliation Report outlining the measures THESL had taken to become compliant with the relevant sections of the DSC and RSC.

Please do not hesitate to contact me if you have any questions.

Yours truly,

[original signed by]

Amanda Klein

Director, Regulatory Affairs
Toronto Hydro-Electric System Limited
regulatoryaffairs@torontohydro.com

:AK/jl

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

AND IN THE MATTER OF an application pursuant to section 74 of the Ontario Energy Board Act, 1998 by Toronto Hydro-Electric System Limited for temporary exemption from certain provisions of the Distribution System Code and the Retail Settlement Code.

Reconciliation Report

Background

On July 18, 2011, Toronto Hydro-Electric System Limited (“THESL”) filed an application seeking temporary exemptions from certain portions of the Distribution System Code (“DSC”) and Retail Settlement Code (“RSC”) (the “Exemption Application”). By decision dated February 22, 2012, the Ontario Energy Board (“OEB”) granted the relief sought by THESL in its Exemption Application – such temporary exemptions lasting until December 17, 2012.

As part of that decision, the OEB ordered THESL to provide a Reconciliation Report to the OEB by December 3, 2012, outlining the measures THESL had taken to become compliant with the relevant sections of the DSC and RSC and to confirm that any affected customers had been properly reimbursed all owed amounts (the “Order”).

Status of THESL’s Compliance

Pursuant to the Order, THESL advises the OEB that as of November 30, 2012, THESL is fully compliant with the sections of code previously subject to the exemption. Furthermore, with the exception of the Inactive Accounts (as defined and discussed in detail below), THESL has taken

all necessary steps to reimburse all customers that may have been affected by THESL's temporary non-compliance with specific code measures.

Section 2.4.26A of the DSC – Application of Security Deposits prior to issuance of Disconnection Notices

THESL is now fully compliant with the requirements of section 2.4.26A of the DSC.

In its reply submissions dated November 28, 2011, THESL indicated that it was operating at approximately 100% compliance with this section as a result of manual workarounds, but would implement an automated solution in 2012 to ensure that manual workarounds would not be necessary.

However, after an extensive analysis of its security deposit system, and the existing regulatory framework governing their ongoing collection and return, THESL determined that from a business perspective, it would no longer be cost effective nor prudent to continue to collect security deposits from its residential customers. Consequently, in the third quarter of 2012 THESL ceased collecting new security deposits from residential customers, and began systematically refunding all existing deposits.

As of November 30, 2012, all residential security deposits have been refunded. THESL continues to maintain full compliance with section 2.4.26A of the DSC, as it no longer makes use of residential security deposits.

Section 7.7.1 of the RSC – Option of Refunds for Over Billing Corrections

THESL is now fully compliant with the requirements of section 7.7.1 of the RSC.

At the time of its exemption application, THESL was operating at approximately 90% compliance with section 7.7.1 of the RSC through the use of manual workarounds. While most

customers were notified of the option of a refund of large credit balances as a result of overbilling adjustments, the system functionality resulted in a few situations where manual cancellation of bills and automatic recalculations could occur without a notification being sent to the customer. For these few customers who were inadvertently omitted but requested refunds on their own initiative, THESL provided them with a cheque refund.

As of November 30, 2012, THESL completed the implementation of a solution that identifies accounts that have been overbilled by an amount greater than or equal to a customer's average monthly bill, and letters are issued to customers outlining the options prescribed in section 7.7.1 of the RSC. This new solution computes the average monthly bill, compares this to the credit balance on the account due to a billing adjustment to determine if it is above the threshold and outputs the required parameters required to issue the customer a letter.

Section 4.2.2.4 of the DSC – Attempting to Contact Customers 48-hours Prior to a Scheduled Disconnection

THESL is now fully compliant with the requirements of section 4.2.2.4 of the DSC.

At the time of its exemption application, THESL had been operating at approximately 100% compliance with section 4.2.2.4 of the DSC as a result of manual workarounds. On February 3, 2012, THESL implemented a solution by which it identifies all accounts that should receive a 48-hour call prior to disconnection, and relays this account list to its third party auto-dialer contractor to make the required outbound calls. This solution has eliminated the manual intervention involved in reviewing planned field activities to determine which customers should receive the standard 48-hour call, and manually preparing and dispersing this list to the third-party vendor. The new solution references the disconnection event date parameters and dollar thresholds of the automated severance process to identify the accounts that should be extracted and transmitted.

Section 2.6.5 of the DSC – Late Payment Charges

Compliance

On February 21, 2012, THESL implemented code into its new CIS that brought it into compliance with Section 2.6.5 of DSC. All late payment charges as of this date have been and continue to be correctly calculated.

Reimbursement

Customers that were overbilled late payment charges during the affected period from July 6, 2011 to February 21, 2012, were reimbursed on November 24, 2012 through a credit to their account for the amount of the overbilling plus appropriate interest, calculated in accordance with Section 7.7.9 of the RSC. The late payment charge and interest credit applied to active accounts has been used to off-set any outstanding balances or will be applied against charges on future bills. Where a substantial credit balance exists, customers also have the option of requesting a refund cheque as per section 7.7.9 of the RSC. As detailed in Table 1 below, the average dollar amount reimbursed per active customer account is \$2.48 (inclusive of interest).

Table 1 – Reimbursement of Late Payment Amounts - Summary

	Active	Inactive	Total
Number of Accounts Affected	176,209.00	20,325.00	196,534.00
Late Payment Charge Credited	(\$422,751.85)	(\$35,108.35)	(\$457,860.20)
Interest Credited	(\$13,560.44)	(\$1,133.00)	(\$14,693.44)
Total Credit Applied	(\$436,312.29)	(\$36,241.35)	(\$472,553.64)
Average Credit per Account	(\$2.48)	(\$1.78)	(\$2.40)

Inactive Accounts:

Of the total number of accounts affected, 20,325 are no longer active and as such, THESL no longer has a confirmed address for the former customers associated with those accounts. THESL has issued and sent bills, noting these credits, to the last address on record. Nevertheless, THESL is uncertain whether any substantial proportion of these bills will reach the right customers (i.e. those customers who are entitled to the credits). More importantly, and as

detailed in Table 2 below, of the 20,325 inactive accounts, 17,339 involve refunds of \$2.00 or less (and a majority of these are for particularly small amounts of as little as \$0.10). The aggregate credit total for these inactive accounts is \$36,241.35, inclusive of interest.

By THESL's estimation, the cost of actively issuing all cheques to inactive customers would exceed the value of the credits themselves. In addition, it is very likely that despite the effort and cost required, THESL would not be successful in returning a majority of these funds to the rightful customers, nor that all customers would particularly want to receive cheques for such diminutive amounts.

Table 2 – Summary of Inactive Accounts

Amount of Credit	Number of Accounts	LPC Charge	Interest Credited	Total Credit
< \$1.00	13,722.00	(\$5,658.98)	(\$180.23)	(\$5,839.21)
\$1.00 to < \$2.00	3,617.00	(\$5,068.84)	(\$162.89)	(\$5,231.73)
\$2.00 and >	2,986.00	(\$24,380.53)	(\$789.88)	(\$25,170.41)
Total	20,325.00	(\$35,108.35)	(\$1,133.00)	(\$36,241.35)

In seeking the relief sought by THESL in its Exemption Application, THESL committed to reimburse any funds owed to its customers resulting from its non-compliance during the affected period. However, given the above-noted difficulties and inefficiencies involved in refunding such small amounts to inactive accounts, THESL feels it is prudent to explore alternative solutions.

THESL seeks the OEB's guidance as to how to proceed with the amounts currently due to customers of inactive accounts, and would be pleased to work with the OEB to find a pragmatic solution in this regard. Given the circumstances, one approach would be for THESL to publish a notice, requesting that any customer who has received a bill for these credits be given a time-limited option to request a cheque from THESL for their credit, after which THESL would make a contribution corresponding to any outstanding unclaimed amount (of the total of \$36,241.35) to a charitable organization, or to its LEAP agency partner. THESL respectfully seeks the OEB's guidance concerning this issue, and is eager to work with the OEB to develop an appropriate course of action.

COMMON COSTS AND ADJUSTMENTS

1. SUMMARY

Table 1: Common Costs and Adjustments (\$Millions)

Cost/Adjustment Type	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Ongoing or Recurring	2.5	4.3	0.5	2.3	1.0
One-time	3.2	-10.3	0.0	0.0	0.0
Total	5.7	-6.0	0.6	2.3	1.0

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This schedule describes Toronto Hydro's costs that are not attributable to a specific program or would be administratively difficult or immaterial to allocate. The total expenditures associated with this segment are made up of two types of entries: ongoing or recurring items and one-time events.

2. ONGOING OR RECURRING COSTS AND ADJUSTMENTS

2.1. Difference in Forecast and Actual Employee Benefits Costs

Toronto Hydro provides current employees with benefits that include medical, dental and life insurance benefits for current employees and includes a provision for employee future benefits. Benefit costs are allocated through the payroll process using budgeted rates. The actual costs for benefits are based on consumption. The difference between the budgeted cost of benefits and the actual benefit costs incurred by the company remains in this segment.

2.2. Future Employee Benefits Provision

Toronto Hydro also provides benefits to employees upon their retirement, including medical, dental and life insurance benefits. The accrued benefit obligation and net

periodic benefit cost are calculated by independent actuaries using the projected unit credit method and based on assumptions that reflect management's best estimate.¹ Differences in the Budgeted employee future benefits cost and the final valuation are accounted for here.

2.3. Financing Costs

Financing costs are made up of standby fees and the amortization of the upfront and arrangement fees for Toronto Hydro's revolving credit facility and letters of credit fees. This cost also includes interest paid on customer deposits.

2.4. Governance

This category includes the costs that the company incurs for the development, implementation and monitoring of corporate-wide strategic planning, which includes enterprise risk management initiatives and disaster preparedness frameworks.

2.5 Investment Tax Credits

For the 2011 to 2014 Bridge period this segment contains refundable Investment Tax Credits ("ITC") that are received each year. Non-refundable ITCs are charged to PILS. The 2015 Test year reflects both refundable and non-refundable ITCs in compliance with International Financial Reporting Standards ("IFRS").

/C

3. ONE-TIME COSTS AND ADJUSTMENTS

3.1. Christian Helm Class Action

On April 30, 2012, a settlement reached by the parties of the Christian Helm Class Action was approved by Order of the Ontario Superior Court of Justice. Pursuant to the terms of the Order, Toronto Hydro was required to pay the amount of \$5.8 million plus costs in settlement of all claims, substantially all of which had been paid as at December 31, 2012. Toronto Hydro previously accrued a liability in 2010 to cover the expected settlement. This amount proved to be in excess Toronto Hydro's actual liability and so the corresponding net one-time reduction in operating expenses is accounted for here.

¹ See Exhibit 4A, Tab 4, Schedules 5 and 7 for more information.

1 **3.2. Refund of Payments in Lieu of Additional Municipal and School Taxes**

2 The Ontario Ministry of Finance issued Ontario Regulation 423/11 on August 31, 2011
3 that corrected a technical error of its assessment of Toronto Hydro's payments in lieu of
4 additional municipal and school taxes under Section 92 of the *Electricity Act, 1998*². The
5 new regulation corrected the inaccurate information the Ministry had collected to
6 calculate those amounts retroactively to 1999. In May 2012, the Ministry of Finance
7 completed its reassessment, resulting in a one-time refund to Toronto Hydro.

8
9 **3.3. Special Purpose Charge**

10 This amount represents a one-time Special Purpose Charge collected on behalf of the
11 Ministry of Energy and Infrastructure in 2011 for energy conservation and renewal
12 programs. An offsetting amount is charged to Revenue Offsets.³

² S.O. 1998, C. 15, Sched. A. [*"Electricity Act"*]

³ Please see Exhibit 3, Tab 2, Schedule 1 for details.

1 ALLOCATIONS AND RECOVERIES

3 1. SUMMARY

4 This schedule discusses the adjustments to Toronto Hydro's total Operations,
5 Maintenance and Administration ("OM&A") costs to reflect the recovery of certain
6 expenditures such as Warehousing, IT, Facilities Fleet and Equipment from the internal
7 user departments through other OM&A and/or capital programs and Shared Services.

9 2. DESCRIPTION

10 Table 1 provides a breakdown of the Historical (2011-2013), Bridge (2014) and Test
11 Year (2015) Allocations and Recoveries adjustments to Toronto Hydro's OM&A
12 expenditures. The manner of allocating each individual component is discussed in more
13 detail below.

15 **Table 1: Allocation and Recoveries Adjustments to OM&A (\$ Millions)**

Allocations & Recoveries	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
On-cost Recovery	(9.3)	(7.8)	(10.7)	(11.0)	(10.7)
Fleet Recovery	(10.8)	(10.7)	(10.3)	(12.4)	(13.2)
IT and Occupancy Charges	(0.6)	(0.5)	(0.5)	(0.6)	(0.5)
Shared Services	1.2	1.6	1.0	4.1	4.2
Other Allocated Costs	(0.4)	(0.0)	7.1	-	-
Allocations & Recoveries Total	(19.9)	(17.4)	(13.3)	(19.9)	(20.2)

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3. ON-COST RECOVERY

On-cost recovery is a material handling surcharge applied to all inventory issuances from warehouse to both capital and operating projects.¹ As a result, if the items issued from the warehouse are associated with capital projects, the on-cost charge is capitalized, whereas if the items issued are associated with operating projects, the on-cost charge is expensed in the period in which it is incurred.

The costs included in the on-cost recovery are mainly comprised of:

- Compensation costs;
- Directly attributable support costs; and
- Warehouse overhead.

4. FLEET RECOVERY

The allocation of fleet costs to other programs is done to optimize the number of vehicles and to allocate the vehicles to either maintenance or capital projects. The allocation is based on the number and type of vehicles. In the case of maintenance projects, the allocation provides for a transfer of operating costs from the Fleet and Equipment program to other programs using the service. In the case of capital projects, the allocation provides for a transfer of operating costs to capital investments. The allocation to capital is based on the nature of the work performed and follows Toronto Hydro's labour costing methodology.

The costs included in the fleet allocation are mainly comprised of:

- Fleet compensation costs;
- Parts and material;
- Vehicle insurance, licensing and registration; and
- Fleet overhead.

¹ Exhibit 4A, Tab 2, Schedule 12.

Fleet and Equipment Services program also allocates costs related to large tools and laboratory services using the same methodology. Costs allocated to unregulated affiliates include a component for depreciation and return on assets.

Fleet and Equipment Services program² employs a vehicle “lease-rate” cost recovery model, whereby vehicle expenses are recovered using a monthly user charge at the vehicle class level (e.g., “Compact Car”, “Passenger Minivan up to 2500 kilograms”). The lease-rate is calculated on an annual basis to ensure that operating cost changes at the vehicle class level are accurately reflected in user lease rates of the following year.

5. IT AND OCCUPANCY CHARGES

The allocation of IT costs to business units is done to optimize the use of technology assets. The allocation is based on IT’s support to the end users, including directly attributable labour and support costs. The allocation provides for a transfer of operating costs in the IT program³ to other client units.

The costs included in the IT allocation are comprised mainly of:

- Compensation costs; and
- Directly attributable support costs.

The allocation of Occupancy/Facilities costs to business units is done to optimize the use of space within Toronto Hydro’s facilities. The allocation is based on square-footage and type of space. The allocation provides for a transfer of operating costs from the Facilities program⁴ to the business units.

² Exhibit 4A, Tab 2, Schedule 10.

³ Exhibit 4A, Tab 2, Schedule 16.

⁴ Exhibit 4A, Tab 2, Schedule 11.

1 The costs included in the Occupancy/Facilities allocation mainly consist of:

- 2 • Compensation costs;
- 3 • Property leases;
- 4 • Maintenance costs;
- 5 • Facilities overhead;
- 6 • Utilities costs; and
- 7 • Property taxes.

8
9 **6. SHARED SERVICES⁵**

10 Shared services recoveries have historically been reported in OM&A; however in
11 accordance with section 2.6.3 and 2.7.3.2 OEB's Filing Requirement (July 17, 2013), the
12 2014 Bridge and 2015 Test Year shared services recoveries are reported as revenue
13 offsets.⁶ The \$3.1 million increase in 2014 Bridge, compared to 2013 is due to this
14 change in reporting.

15
16 **7. OTHER ALLOCATED COSTS**

17 Other allocated costs represent costs which are not specifically attributed to an OM&A
18 program. The costs of \$7.1 million shown in 2013 actuals represent the recognition of
19 operating expenses due to the disposition of the 2008-2010 smart meter deferral account
20 balances.

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⁵ Refer to Exhibit 4A, Tab 5 for more information about Toronto Hydro's shared services.

⁶ Refer to Exhibit 3, Tab 2, Schedule 1 for more information about Toronto Hydro's revenue offsets.

PURCHASE OF NON-AFFILIATE SERVICES

The objective of Toronto Hydro's Procurement Policy (the "Policy")¹ is to help ensure that the services, equipment and materials procured by Toronto Hydro represent the best value for its customers while also satisfying the operational needs of the utility. The Policy helps Toronto Hydro achieve the four performance outcomes set out by the Ontario Energy Board ("OEB") in the Renewed Regulatory Framework for Electricity Distributors.

- **Customer Focus:** the efficient procurement of services, equipment and materials at favourable total cost of ownership help Toronto Hydro deliver overall value for its rate payers.
- **Operational Effectiveness:** the use of a robust and competitive procurement system helps to ensure that effective purchases are made, minimizing costs and enhancing productivity.
- **Policy Responsiveness:** the use of a fair vendor selection process helps ensure that selected vendors meet or exceed quality, safety, regulatory, and environmental requirements.
- **Financial Performance:** over time, use of the Policy generates data that allows Toronto Hydro to minimize both operational and capital costs, contributing to the utility's financial performance.

Except as described below, procurements with a contract value exceeding \$25,000 are sourced in compliance with Toronto Hydro's *Procedure for Competitive Bids* (Appendix A). Limited and specific exceptions are set out in the *Exceptions to General Procurement Rules* (Appendix B). The *Procedure for Competitive Bids* (Appendix C) outlines the general competitive bid process and sets various rules with respect to communications, negotiations, bid reviews and conflicts of interest. This formalized competitive bidding

¹ Filed as Exhibit 4A, Tab 3, Schedule 2.

1 process helps to ensure that the procurement process remains transparent, efficient and
2 consistent.

3
4 While recognizing that there are justified exceptions, Toronto Hydro's objective is to
5 maximize the use and success of the competitive bid process. Procurement staff work
6 with various Toronto Hydro departments to enable earlier recognition of business needs.
7 In addition, efforts have been made to collaborate with Toronto Hydro's legal department
8 to improve the clarity and accessibility of procurement documents whilst reducing the
9 average competitive bid process timeline, from initiation to the execution of contracts
10 and/or issuance of purchase orders (additional info concerning Toronto Hydro's Supply
11 Chain program is provided at Exhibit 4A, Tab 2, Schedule 12).

12
13 Once a procurement is finalized, either through a competitive process or a documented
14 exception, applicable terms and conditions are set out in a negotiated contract and/or a
15 purchase order with a vendor.

16
17 When Toronto Hydro contemplates a civil or electrical construction project, potential
18 contractors are pre-qualified in accordance with Toronto Hydro's Construction
19 Contractor Pre-Qualification Application. A contractor's pre-qualification signifies that
20 the contractor has met the minimum requirements established by Toronto Hydro for the
21 purposes of a project. The factors used for evaluating contractors at this stage include,
22 but are not limited to, technical skill and competence, experience, financial viability,
23 health and safety record, reputation, work load, and any previous relationship with
24 Toronto Hydro. Contractor pre-qualification does not guarantee that a contractor will be
25 invited to bid on projects; rather, it simply establishes a baseline reassuring Toronto
26 Hydro that the respondents selected for particular projects are sufficiently qualified.

27
28 Toronto Hydro's levels of signing authority are provided in Appendix D.

1
2 In accordance with s. 2.7.3.3 of the OEB's Filing Requirements (July 17, 2013), the
3 tables below identify non-affiliate services that were procured without a competitive
4 process in 2011, 2012 and 2013 that meet Toronto Hydro's materiality threshold.
5 Toronto Hydro confirms that all non-affiliate services in the 2011, 2012 and 2012
6 historical year were procured in compliance with the utility's Policy.

7
8 **Table 1: 2011 Non-Affiliate Purchased Products or Services over \$1 Million**
9 **Procured without a Competitive Process**

Vendor Name	Product and Service	Method of Selection	Justification
Oracle Canada ULC	Staff augmentation and change request for the implementation of the Oracle Utilities Customer Care and Billing System.	Sole source	Extension of support agreement with incumbent pending technical availability of the new Customer Care and Billing System.
Elster	Purchase of the Elster Transformer Smart Meter that was required to complete pilot installations.	Sole source	To help ensure compatibility with existing technologies.
Nedco	Nedco acts as the program manager for the Direct Install Lighting & Water Heating Initiative, to bridge gap between master agreement sign-off & development of new request for proposal. CDM initiative.	Sole source	Extension of existing contract pending issuance and award of RFP.
BOMA	Channel partner for the Equipment Replacement Incentive initiative.	Sole source	Vendor selected due to expertise delivering OPA/CDM programs in

Vendor Name	Product and Service	Method of Selection	Justification
	CDM initiative.		2007-2010.
Borden Ladner Gervais	Provide professional legal consulting services.	Sole source	Continuation of existing counsel.
The Herjavec Group	Managed Security Services for Security Info & Event management, Data Loss Prevention and Monitoring services for Intrusion Protection Services, Firewall and Governance Risk & Compliance.	Sole source	Awarded work based on success evidenced by other Toronto-based companies and excellent history with Toronto Hydro.
Bell Canada	Master Communications Agreement renewal.	Sole source	Leveraging City of Toronto rates for City affiliates to avoid risks associated with migrating to a new provider.

- 1 **Table 2: 2012 Non-Affiliate Purchased Products or Services over \$1 Million**
- 2 **Procured without a Competitive Process**

Vendor Name	Product and Service	Method of Selection	Justification
Various Providers	OPA directed incentive payments for retrofit projects. CDM initiative.	Sole source	OPA directed payments.
Rogers Communication	Continuation of a contract awarded for airtime and data services for cellular pagers, blackberries, mobile devices, smart meters and substations in addition to	Sole source	Terms continued from previous agreement. Negotiated material annual discount with provider as opposed to going out to market.

Vendor Name	Product and Service	Method of Selection	Justification
	cable and video services.		
Hydro One	Provide Agincourt TS Bypass Capacity.	Sole source	The nature of the assets requires Toronto Hydro to use Hydro One for this work.
Optima Communications	Call centre/clerical services.	Sole source	The work subsequently went out for RFP in November 2012. Prior to that point, time constraints prevented Toronto Hydro from undertaking a competitive bidding process.
Vmware	Software licenses and maintenance for Vmware virtualization software products.	Sole source	Updated licenses are only provided by the original supplier of the application.
Olameter Inc.	Meter reading services.	Sole source	To cover spend between expiry of existing agreement and final award of RFP.
Emeter Corporation	Five years of licensing and support for Energy IP software and two years of support for register reads on the bill (RROB) solution.	Sole source	Emeter is the only provider capable of providing this service. As well, this vendor is required for compatibility reasons.
IBM Canada	Augmentation of existing contract with IBM for helpdesk services.	Sole source	Expansion of existing services in contract.
Oracle Canada ULC	Consolidation of multiple software license renewals for existing applications.	Sole source	Updated licenses are only provided by the original supplier of the application.

Vendor Name	Product and Service	Method of Selection	Justification
Hydro One	Replacement of wholesale revenue metering to comply with Independent Electricity System Operator (IESO) requirements.	Sole source	The nature of the assets requires Toronto Hydro to use Hydro One for this work.
Bell Canada	Voice and data services for all rims meters, smart meters, analog and digital circuits, pagers, mega links and related support services	Sole source	Leveraging City of Toronto agreed-rates for city affiliates to avoid risks associated with migrating to a new provider.
Carte	Supply pad mount transformers.	Sole source	To cover spend for the time between the expiry of existing agreement and final award of RFP to new provider.
Hydro One	Temporary bypass at Agincourt station.	Sole source	The nature of the assets requires Toronto Hydro to use Hydro One for this work.
IBM	Cover the cost for IBM support services under the Gold Card Agreement option.	Sole source	These services are proprietary.

- 1 **Table 3: 2013 Non-Affiliate Purchased Products or Services over \$1 Million**
- 2 **Procured without a Competitive Process**

Vendor Name	Product and Service	Method of Selection	Justification
DDP Technologies	Inspection services for Pad Tx, Sub Tx, network vaults	Sole source	The need to commence the program on an urgent basis

Vendor Name	Product and Service	Method of Selection	Justification
	and building vaults along with "Find it - Fix it" repairs for each program.		prevented the use of a competitive bid process. Informal quotes were obtained from five suppliers and the program was granted to the lowest, qualified provider.
Carillion Construction Inc.	Carillion originally awarded work on Copeland Station via RFP. The increase in contract value associated with the change in scope.	Sole source	To cover increase of scope identified after award of RFP.
Panasonic Canada	Three years supply of Panasonic tough books and tough pads consistent with existing technology used by field staff	Sole source	Negotiations with Panasonic coupled with market benchmarking indicated it was cheaper to deal direct with manufacturer instead of issuing RFP to resellers.
QX Technical Services	Locates agreement extension to align with other Locate Consortium members.	Sole source	To cover spend for the time between the expiry of existing agreement to new RFP in June 2014.
Tyco Integrated Security	Station close circuit TV cameras (CCTV) and locking hardware upgrade.	Sole source	Purchase from current security provider to ensure compatibility with existing systems.
Metsco Energy Solutions	Additional spend incremental to awarded dollars for Engineering Services on RFP 12P-046.	Sole source	Increase of spend versus original estimates.



POLICY

PROCUREMENT	<u>Policy Owner:</u> Executive Vice President, Grid Operations (THESL)
	<u>Policy Approver:</u> Policy Administration Steering Committee
	<u>Version Approval Date:</u> V3.1 2013-12-09
	<u>Last Reviewed by PASC:</u> 2013-12-09
The most recent version of this policy can be obtained from the Toronto Hydro intranet Plugged In at: http://pluggedin.torontohydro.com/policy/Pages/DistributionGridManagementPolicies.aspx	
The distribution of this policy is not restricted.	

This policy was approved by the Policy Administration Steering Committee on:

2013-12-09

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1 DOCUMENT REVIEW & REVISION HISTORY

This policy is reviewed annually.

Version Number	Date of Review	Reviewed By	Brief Description of Change
V1.0	2007-07-01	PASC	V1.0 approved by PASC.
V2.0	2009-10-23	PASC	V2.0 Approved outside of regular scheduled PASC meeting
V3.0	2013-04-25	PASC	V3.0 approved by PASC members
V.3.1	2013-12-09	PASC	V.3.1 approved by PASC

2 DISTRIBUTION HISTORY

Version Number	Date of Issue	Recipients
V1.0	2007-07-01	Toronto Hydro @ Home Employee Extranet
V2.0	2009-10-26	Toronto Hydro @ Home Employee Extranet
V3.0	2013-05-10	Toronto Hydro Intranet Plugged In at: http://pluggedin.torontohydro.com/policy/Pages/
V.3.1	2013-12-09	Toronto Hydro Intranet Plugged In at: http://pluggedin.torontohydro.com/policy/Pages/

3 POLICY OVERVIEW

This policy outlines the process that is to be followed for the procurement of any good or service by any of Toronto Hydro's corporate entities. The goals of this policy are to ensure Toronto Hydro business objectives are achieved and to facilitate compliance with applicable internal standards and requirements as well as regulatory, statutory and other legal requirements.

4 DEFINITIONS AND ABBREVIATIONS

<u>TERM or ACRONYM</u>	<u>DESCRIPTION</u>
Affiliate	Toronto Hydro-Electric System Limited, and any other affiliate of Toronto Hydro Corporation from time to time.
Authorization Level Document	The most recent version of the Authorization Level Document setting out expenditure levels for authorized persons.
Board	The Board of Directors of Toronto Hydro Corporation or of any Affiliate as may be applicable.
Business Unit	The Toronto Hydro Corporation or Affiliate department requesting a Procurement.
CEO	President and Chief Executive Officer of Toronto Hydro Corporation.
CIO	Chief Information Officer of THESL.
Contract Value	The total amount of expenditures required under any Procurement, which shall be determined by calculating • The total amount of all possible expenditure over the term of the contract, ○ Including all years of a multi-year term and all years of all possible contract renewals, ○ Including the potential maximum of all conditional, contingent or variable payments, • Excluding all applicable taxes. Procurements shall not be artificially divided so as to constitute a Contract Value below applicable threshold values
Manager	The Director, Senior Manager or Manager of any Business Unit with responsibility for an approved budget for the Procurement in question.
President	President of THESL.
Procurement	A purchase, agreement to purchase, licence, lease or rental of any good or service, including an agreement to purchase construction services. Includes any extension or renewal of any procurement or construction contract made prior to the date of this Procurement Policy.
Operation Support Services Department	THESL's Operation Support Services Department.
Manager of Operation Support Services	The Manager or Director responsible for the operation of the Operation Support Services Department.
Procurement Policy	This Procurement Policy together with all forms and procedures referenced herein.
Signing Policies	The most recent versions of the signing policies of Toronto Hydro Corporation and its Affiliates, as approved by the Policy Administration Steering Committee.

<u>TERM or ACRONYM</u>	<u>DESCRIPTION</u>
THESL	Toronto Hydro-Electric System Limited.
Toronto Hydro	Toronto Hydro Corporation and all of its Affiliates

5 SCOPE

This policy applies to all Procurements made by Toronto Hydro except as otherwise authorized in writing by the Board, the President or the CEO.

6 OBJECTIVES

- 6.1 The Procurement Policy is intended to assist in achieving Toronto Hydro business objectives such as:
- Ensuring efficient Procurements at most favourable acquisition cost
 - Promoting the use of competition in selecting suppliers and contractors.
 - Providing for the fair and equitable treatment of all suppliers and contractors.
 - Providing safeguards for maintaining a procurement system of quality and integrity.
 - Ensuring suppliers meet or exceed Toronto Hydro Corporation's quality, safety and environmental requirements
 - Ensuring that all Procurements are made in compliance with all regulatory requirements and applicable laws.

7 GENERAL PROCUREMENT RULES APPLICABLE TO ALL BUSINESS UNITS

Unless otherwise authorized in writing by the Board, the President or the CEO:

- 7.1 All Procurements shall be administered by the Operation Support Services–Department and authorized by the Manager of Operation Support Services or his/her authorized delegate.
- 7.2 Other than the exceptions in *Appendix A - Exceptions to General Procurement Rules*, all Procurements with a Contract Value exceeding \$25,000, shall be sourced via the *Procedure for Competitive Bids*.
- 7.3 All approved Procurements (regardless of value or whether they were approved via a competitive bid process) shall be processed and documented in accordance with the *Procedure to Document Approved Procurements*.
- 7.4 All Procurements of information technology related goods or services (including computer equipment, software or related services) must be made in accordance with the most recent version of Toronto Hydro's *Systems and Client Support Services – CSS660- Hardware and Software Purchasing Procedure* and any such Procurement with a Contract Value greater than \$25,000 must also be approved by the CIO in writing .
- 7.5 The initial term for any Contract shall not exceed five (5) years, and any renewal term(s) shall not exceed a total of five (5) years.
- 7.6 The Manager of Operation Support Services may at any time request that a particular Procurement be made through the *Procedure for Competitive Bids*.

8 OWNERSHIP, APPROVAL AND RESPONSIBILITIES

Policy Owner

8.1 This policy is owned by the Executive Vice President, Grid Operations (THESL).

8.2 The Executive Vice President, Grid Operations is responsible for:

- Ensuring that this policy is comprehensive, clear and current.
- Ensuring that this policy is implemented and communicated to the departments and staff that are impacted.
- Ensuring ongoing compliance with this policy.
- Reviewing this policy annually.

Policy Approver

8.3 This policy is approved by the Policy Administration Steering Committee.

8.4 The Policy Administration Steering Committee is responsible for:

- Considering the impact of the proposed policy to the identified risk.
- Reviewing and approving any proposed amendments or extensions to this policy.
- Reviewing and approving this policy annually.

Designated Responsible Person (DRP)

8.5 This policy is managed by the Manager of Operation Support Services.

8.6 The Manager of Operation Support Services is responsible for:

- Immediately communicating any exceptions or violations of this policy to the Executive Vice President, Grid Operations.
- Reviewing this policy annually and communicating any proposed amendments to the Executive Vice President, Grid Operations.
- Conducting quarterly reviews to ensure compliance with this Policy.

Staff

8.7 All Toronto Hydro employees, officers and directors are required to comply with this policy.

9 POLICY COMMUNICATION

<u>TYPE OF COMMUNICATION</u>	<u>COMMUNICATION TRIGGER</u>	<u>PARTY RESPONSIBLE FOR POLICY COMMUNICATION</u>	<u>AUDIENCE</u>	<u>ACKNOWLEDGEMENT?</u>
E-mail	Policy Revision	Manager of Operation Support Services	All Business Unit employees involved in any Procurement	No
Presentation	Policy Revision	Manager of Operation Support Services	All Business Unit employees involved in any Procurement	Attendance Sheet and Quiz

10 POLICY COMPLIANCE AND VIOLATIONS

- 10.1 Any employee who fails to comply with this policy is subject to disciplinary action up to and including dismissal.
- 10.2 Failure to comply with this policy will pose significant financial, operational, legal and regulatory risks to Toronto Hydro.

11 RELATED LAWS, REGULATIONS AND DOCUMENTATION

- 11.1 This Procurement Policy shall be read and applied in conjunction with the Signing Policies, the Authorization Level Document, as well as the following procedures and forms:
- *Procedure for Competitive Bids*
 - *Competitive Procurement Request Form*
 - *Competitive Bid Evaluation Report/Recommendation*
 - *Sole Source Justification Report*
 - *Extending Existing Contract Justification Report*
 - *Procedure to Document Approved Procurements*
 - *Non-Discretionary Providers List*
 - *Construction Contractor Pre-Qualification Application*
 - *Systems and Client Support Services – CSS660 - Hardware and Software Purchasing Procedure*

- *Signing Policies*
- *Authorization Level Document*

PROCUREMENT POLICY
APPENDIX – EXCEPTIONS TO GENERAL PROCUREMENT RULES

Exception 1 – Petty Cash or Procurement Credit Card Purchases	This policy does not apply to Procurements that are processed via Toronto Hydro Corporation's Petty Cash or Corporate Card (Procard) procedures or policies, as implemented or amended from time to time.
Exception 2 – Purchases Below \$25,000	Procurements with a Contract Value below \$25,000 need not be sourced via the competitive procedures described in Rules 7.2 or 7.3 of the Procurement Policy. Instead, a Manager may, in his/her discretion, approve Procurements not exceeding \$25,000 in Contract Value in writing without receiving any competitive bids The Business Unit shall retain all documentation substantiating the Procurement, approval and the award for annual review by Operation Support Services, or Toronto Hydro Corporation's Internal Audit Department, or otherwise as necessary. Such documentation should be retained for no less than six years in conjunction with Toronto Hydro's Document Retention Policy. Procurements shall not be artificially divided so as to constitute a Contract Value below \$25,000.
Exception 3 – Contract Value Adjustments	1.1 Procurements which represent an amendment to the original Contract Value of an active, unexpired Contract need not be sourced via the competitive procedures described in Sections 7.2 or 7.3 of the Procurement Policy, nor need to meet the procedure for Sole Source procurements so long as the incremental increase in cost is less than or equal to 10% of the Contract Value, or \$250,000 whichever is less. Instead, the responsible Manager, Director or Vice President, depending on required approval level, may approve such Procurements. 1.2 The Business Unit shall retain all documentation substantiating the change to the Contract Value for review by Operation Support Services, Toronto Hydro's Legal Division, or Internal Audit, as necessary. Such documentation should be retained for no less than seven years in conjunction with Toronto Hydro's Document Retention Policy. 1.3 Procurements shall not be artificially divided so as to constitute an adjustment below 10% or \$250,000 whichever is less. 1.4 In the event of multiple adjustments, the cumulative value of the adjustments shall apply.
Exception 4 – Sole Source Procurements	The following procedure shall be followed when a Business Unit wishes to purchase any goods and/or services (including construction contracts) from a sole source vendor without going through the competitive procedures described in Rules 7.2 or 7.3 of the Procurement Policy: (i) In order to obtain approval for a sole source purchase, the Business Unit must complete, sign, and submit a <i>Sole Source Justification Report</i> to the Operation Support Services Department. The <i>Sole Source Justification Report</i> will require appropriate signing authority in accordance with the Authorization Level Document. (ii) Upon receiving a completed <i>Sole Source Justification Report</i>, the Operation Support Services Department will conduct a due diligent review of the sole source purchase request to confirm that: (a) only one vendor is uniquely capable of providing the goods and/or services

	required and no other vendor can provide such goods and/or services; (b) an unforeseeable situation of urgency or emergency exists and the goods and/or services or construction cannot be obtained by means of a competitive process as required by the Procurement Policy; or (c) the Contract Value of an active, unexpired Contract for a good and/or service increases by greater than 10% or \$250,000, whichever is less, versus its original approved value. The review will also determine if the sole source purchase is in the best interests of Toronto Hydro, and include a review of the proposed contract's specifications, scope, definition, commercial terms, liabilities, and insurance requirements. (iii) If approved, the Sole Source Procurement shall be processed by the Operation Support Services Department in accordance with the <i>Procedure to Document Approved Procurements</i>.
Exception 5 – Procurements From Non-Discretionary Providers	Procurements from specified government entities, utilities, and organizations providing certain corporate industry or professional memberships need not be sourced via the competitive procedures described in Rules 7.2 or 7.3 of the Procurement Policy, nor meet the procedure for Sole Source procurements. Instead, an authorized person under the Authorization Level Document may approve such Procurements, regardless of Contract Value, without receiving any competitive bids or submitting a Request For Sole Source Procurement so long as the vendor appears on the <i>Non-Discretionary Providers List</i>. <i>The Non-Discretionary Providers List</i> shall be updated on an annual basis. Any proposed amendments to such list shall be reviewed by the Vice President, Distribution Grid Management, and subject to the approval of the Policy Administration Steering Committee.
Exception 6 - Extension of Existing Contracts	When a Business Unit wishes to exercise its contractual right to extend an existing Procurement as set out in an existing contract : (i) In order to obtain approval to extend an existing contract, the Business Unit must complete, sign and submit an <i>Extending Existing Contract Justification Report</i> to the Operation Support Services Department. The <i>Extending Existing Contract Justification Report</i> will require approval by an authorized person in accordance with the Authorization Level Document. (ii) Upon receiving a completed <i>Extending Existing Contract Justification Report</i>, the Operation Support Services Department in consultation with Toronto Hydro's Legal Division will conduct a due diligent review of the extension request to determine if the current contract permits such an extension and whether such extension is in the best interests of Toronto Hydro, including a review of the proposed contract's specifications, scope, commercial terms, liabilities, and insurance requirements. (iii) If approved by the Operation Support Services Department, the Extension to the Existing Contract shall be processed by the Operation Support Services Department in accordance with the <i>Procedure to Document Approved Procurements</i>.



PROCEDURE FOR COMPETITIVE BIDS

1. **Application:** This Procedure for Competitive Bids shall apply whenever the Procurement Policy, the President or CEO, the Board, or the Manager of Operation Support Services requires that a purchase of goods and/or services be made via a competitive process.
2. **Procurement Request Form:** In order to begin the competitive process, the Business Unit must complete, sign, and submit a Competitive Procurement Request Form to the Operation Support Services Department. The Competitive Procurement Request Form shall be signed by a Manager.
3. **Contract Administration Form:** Upon receiving a duly completed and authorized Competitive Procurement Request Form, the Operation Support Services Department will open a new file to administer the competitive process
4. **Solicitation Document:** The Operation Support Services Department in consultation with Toronto Hydro's Legal Division will then conduct a due diligent review of the Procurement request to determine which of the following standard-form solicitation documents are appropriate for the Procurement in question:
 - (a) a Request for Proposals shall be utilized whenever the Business Unit knows what goods and/or services it requires, but is seeking proposals from respondents regarding the method, ability and price of the Procurement;
 - (b) a Request for Quotations shall be utilized whenever the Business Unit knows what goods and/or services it requires, and how such goods and/or services should be provided (e.g. specifications, terms of contract) and is seeking bids from respondents in order to determine the best available price for such goods and/or services;
 - (c) an Invitation to Tender and Construction Contract shall be utilized whenever the Business Unit seeks bids for any construction project; or
 - (d) such other form of solicitation document as approved by the Manager of Operation Support Services and Toronto Hydro's Legal Division.

Once the proper form of solicitation document has been determined, the Operation Support Services Department will assist the Business Unit in completing the solicitation document and determine the list of prospective suppliers or contractors. All solicitation documents shall be reviewed and approved by Toronto Hydro's Legal Division, prior to being sent to prospective respondents.

5. Construction Contractor Pre-Qualification: Invitations to Tender for construction projects shall only be granted to contractors having met THESL's Construction Contractor Pre-Qualification requirements.
6. Evaluation Criteria: The Operation Support Services Department, working in conjunction with the Business Unit shall develop a written set of evaluation criteria and marking scheme prior to sending out the solicitation document to prospective respondents/bidders. This evaluation criteria and marking scheme shall be applied to all proposals/bids equally, and without revision.
7. Communications: The Operation Support Services Department shall be responsible to issue and administer all competitive processes. No Business Unit representative nor any other representative of Toronto Hydro shall communicate with any of the prospective respondents regarding the competitive process without having a representative of the Operation Support Services Department present.
8. Amendments or Supplements to Solicitation Document: Any amendments or supplements to the solicitation document shall be made prior to the deadline for the submission of proposals/bids, and shall be issued in writing by the Operation Support Services Department to all prospective respondents.
9. Receipt of Bids: The Operation Support Services Department shall receive and keep an original copy of all proposals/bids received. All proposals/bids shall be time-stamped but not opened upon receipt, and shall be stored in a secure place until opening.
10. Modifications or Withdrawals to Proposals/Bids before Submission Deadline: Respondents shall be permitted to modify or withdraw their proposals/bids at any time prior to the submission deadline, in accordance with the instructions found in the solicitation document. After the submission deadline, all decisions to allow for the correction or withdrawal of proposals/bids shall be authorized in writing by the Manager of Operation Support Services.
11. Opening: The Operation Support Services Department shall arrange for the opening and recording of proposals/bids, including the completion of an Opening Bids Summary Page to determine which proposals/bids are compliant with the requirements as stated in the solicitation document. At least one (1) representative of the Operation Support Services

Department and at least one (1) representative from the Business Unit shall be present and witness the opening of proposals/bids and shall sign the Opening Bids Summary Page. All parties present shall also sign each proposal/bids price summary sheet.

12. Proposal/Bid Review by Business Unit: The Business Unit along with Operation Support Services will then perform a full evaluation of the proposals/bids and complete the Competitive Bid Evaluation/Recommendation Report, including award recommendation. The Competitive Bid Evaluation/Recommendation Report shall be signed by authorized representatives of the Business Unit, in accordance with the Signing Policies. The Business Unit shall then return its completed and signed Competitive Bid Evaluation/Recommendation Report to the Operation Support Services Department, for approval and signature. The Operation Support Services Department shall forward a completed and signed copy of the Competitive Bid Evaluation/ Recommendation Report to Toronto Hydro's Legal Division for processing in accordance with the Procedure to Document Approved Documents.
13. Negotiations: Negotiations may only be conducted in accordance with the instructions and specifications as specified in the solicitation document. The communication of such negotiations shall be made either solely by or together with the Operation Support Services Department. No respondent shall be provided information about any other respondent's bid/proposal, and no respondent shall be assisted in bringing its bid/proposal up to the level of any other bid/proposal. Respondents shall not be directed to reduce their proposed prices to a specific amount in order to be considered for award. A common deadline shall be established for receipt of bid/proposal revisions based on negotiations.
14. Cancellation of Competitive Process: A competitive process may be cancelled and all proposals/bids that have already been received may be rejected by the Business Unit and the Operation Support Services Department if:
 - (a) the Business Unit no longer requires the Procurement in question;
 - (b) the Business Unit can no longer reasonably expect to fund the Procurement or construction project;
 - (c) necessary amendments to the solicitation would be at such magnitude that a new solicitation would be desirable;
 - (d) prices exceed available funds and it would not be appropriate to adjust quantities to come within available funds;

- (e) there is reason to believe that proposals/bids may not have been independently arrived at in open competition, may have been collusive, or may have been submitted in bad faith;
- (f) for any other good cause of a similar nature that is in the best interest and sole discretion of Toronto Hydro.

The reasons for cancellation shall be documented in the Operation Support Services Department and a written notice of cancellation (without reasons) shall be sent by the Operation Support Services Department to all recipients of the solicitation document.

15. Award: The Operation Support Services Department shall approve the Business Unit's award recommendation if such award to be made to a compliant respondent/bidder who, in the Business Unit and Operation Support Services Department's evaluation, offers the greatest overall value to Toronto Hydro, taking into account price, technical, and other factors as specified in the solicitation. If only one compliant proposal/bid is received, an award shall not be made unless a cost analysis verifies the reasonableness of the price. All awards shall be made to responsible contractors, i.e., those who have the technical and financial competence to perform and who have a satisfactory record of integrity, compliance with applicable laws, record of past performance, and financial and technical resources. All parties having submitted a proposal/bid in response to a competitive process shall be advised, in writing, of whether their proposal/bid has been selected or not.
16. Award Protests: If an actual or prospective supplier or contractor protests the solicitation or the award of a contract, such protest shall be requested to be submitted in writing to the Manager of Operation Support Services, who may, in his or her discretion, suspend the Procurement pending resolution of the protest, if warranted by the facts presented. The Operation Support Services Department shall advise Toronto Hydro's Legal Division and Toronto Hydro's Internal Audit Department of any such award protest.
17. Conflicts of Interest: No employee or contractor of Toronto Hydro shall participate directly or indirectly in the selection, or in the award or administration of any contract if a conflict of interest, real, perceived, or apparent, would be involved. Such conflict of interest will be deemed to arise where financial or other interests in the supplier or contractor is held by the employee or contractor involved in making the awards, by his or her partner or other relatives, or by an organization under the control (as defined by relevant corporate legislation) of the employee or contractor in question. Without limiting the generality of the foregoing, employees and contractors shall not solicit or accept opportunities, favors, or anything of monetary value from any respondent's suppliers, contractors, or parties to subcontracts, and shall not use any of the bidder/respondent proposals for actual or anticipated personal gain.

18. Documenting Award: Once a successful supplier or contractor has been selected, the Operation Support Services Department, with the assistance of the Business Unit and Toronto Hydro's Legal Division, shall proceed to document the purchase in accordance with the Procedure to Document Approved Procurements.
19. Previous Procedures: This Procedure and all forms mentioned herein shall be deemed to replace and supersede any and all other competitive bid procedures or forms and, unless otherwise authorized by the Board, no other procurement method or forms shall be utilized to administer a competitive process.
20. Defined Terms: Any capitalized terms used but not defined herein shall have the meaning as defined in the Procurement Policy.

AUTHORIZATION LEVEL

10-Mar-14

<u>APPROVAL LEVEL</u>	<u>PURCHASE REQUISITION AND MANUAL INVOICE APPROVAL LIMITS</u>
THC (District 5)	
Board of Directors and Approved Officer(s)	Unlimited
President & CEO	\$30,000,000
Chief Financial Officer	Unlimited to Canada Revenue Agency (ie. tax payments)
Chief Financial Officer	\$3,000,000 (all other payments)
THESL/THESU (District 1/District 8)	
Board of Directors and Approved Officer(s)	Unlimited
President & CEO (THC)	\$30,000,000
Chief Financial Officer (THC)	Unlimited to IESO (ie. energy costs)
Chief Financial Officer (THC)	Unlimited to Canada Revenue Agency (ie. tax payments)
Chief Financial Officer (THC)	\$3,000,000 (all other payments)
Executive Vice President/Vice President	\$1,000,000
Controller	\$1,000,000
Director/Manager	\$150,000
Supervisor	\$2,000
THESI - Generation (District 2)	
Board of Directors and Approved Officer(s)	Unlimited
President & CEO (THC)	\$30,000,000
Chief Financial Officer (THC)	Unlimited to Canada Revenue Agency (ie. tax payments)
Chief Financial Officer (THC)	\$3,000,000 (all other payments)
Executive Vice President/Vice President	\$1,000,000
Director/Manager	\$25,000
Supervisor	\$2,000
THESI - Street Lighting (District 2)	
Board of Directors and Approved Officer(s)	Unlimited
President & CEO	\$30,000,000
Chief Financial Officer (THC)	Unlimited to Canada Revenue Agency (ie. tax payments)
Chief Financial Officer (THC)	\$3,000,000 (all other payments)
Executive Vice President/Vice President	\$1,000,000
Director/Manager	\$25,000
Supervisor	\$2,000

EXECUTIVE SUMMARY

The evidence filed in Exhibit 4A, Tab 4 presents and discusses Toronto Hydro's workforce staffing plans and challenges (Schedules 3 and 4), and compensation strategies and costs (Schedule 5 and 6).

Toronto Hydro submits that the plans, strategies and costs set out in this evidence are aligned with, and necessary to, fulfill the following key objectives:

- execute planned programs in a safe and cost effective manner;
- provide customer value by maintaining and improving reliability of service without compromising safety, and by satisfying external obligations and legal requirement in a timely and cost effective manner;
- mitigate the risks associated with the projected retirement of approximately 50% of Toronto Hydro's workforce over the next decade by investing in training and development programs which facilitate knowledge transfer and allow new hires to acquire the specialized skills required to work on the utility's plant safely and effectively;
- attract, develop and retain a highly skilled, responsive and adaptable workforce within a results-driven framework that is aligned with the utility's objectives;
- constrain compensation costs by maintaining relatively stable staffing levels and market competitive wage increases; and
- continue to prudently manage the workforce complement and costs over the course of the rate period (2015-2019).

1 **1. EMPLOYEE COST BREAKDOWN (OEB APPENDIX 2-K)**

2 A copy of OEB Appendix 2-K, which summarizes Toronto Hydro's historical and
3 forecast staffing levels and compensation costs, is filed at Exhibit 4A, Tab 4, Schedule 2.
4 This table shows the following:

- 5 • the number of full-time equivalent employees ("FTEs")¹ is expected to continue
6 to decrease from approximately 1,820 in 2011 to 1,564 in 2015; and
- 7 • total compensation costs² are expected to continue to decrease from
8 approximately \$234.6 million in 2011, to \$225.3 million in 2015.

11 **2. STAFFING PLAN AND CHALLENGES**

12 Toronto Hydro relies on a highly skilled and dedicated workforce to provide safe and
13 reliable electricity service to its customers. The 2013 ice storm highlighted the
14 dedication and commitment of the utility's employees, who put serving customers ahead
15 of their own needs. Toronto Hydro's crews worked around the clock throughout the
16 holiday season to restore electricity service, communicate with customers about the
17 restoration efforts, and ensure public safety. Despite extreme conditions, not a single
18 Toronto Hydro employee suffered a serious injury or fatality. This remarkable outcome
19 is attributable to the skills and training of the workforce.

20
21 Toronto Hydro employees also play an essential role in the execution of planned work
22 programs that are necessary to maintain the distribution system's integrity, mitigate
23 unacceptable risks in the areas of reliability and safety, and operate the system
24 responsibly. As detailed in the Distribution System Plan ("DSP") filed at Exhibit 2B,
25 over the course the next five years, the utility plans continue to executing the largest
26 capital investment program in its history, renewing critical parts of its aging

¹ The definition of a full-time equivalent (FTE) employee is aligned with the Board's Filing Guide for Electricity Distributors' Reporting and Record Keeping Requirements (the "Guide") dated April 3, 2012.

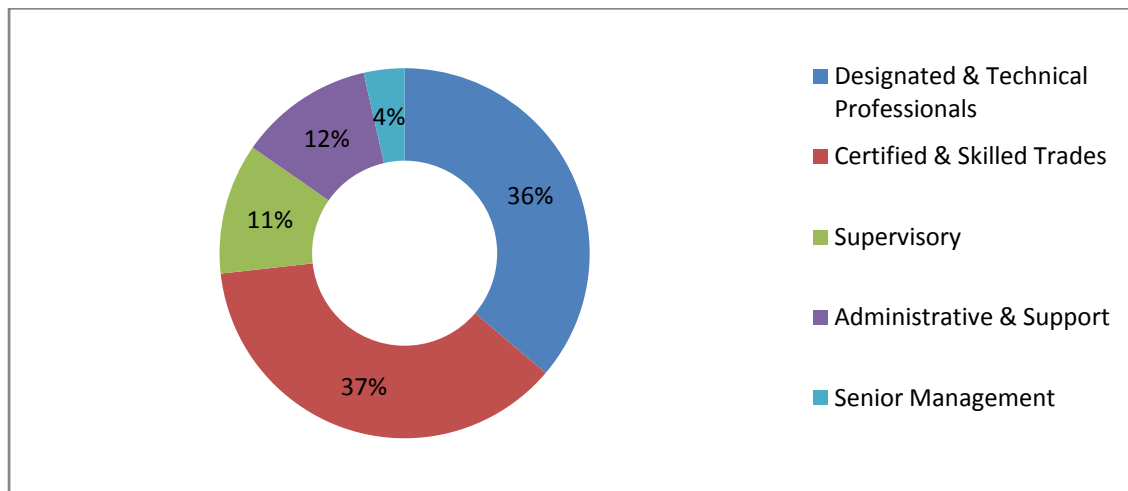
² Total compensation costs include: salary, wages, overtime, incentive pay, and benefits.

1 infrastructure and to meet the growing needs of the City of Toronto. To succeed in these
2 endeavours the utility must maintain a workforce that is dependable, adaptable, highly
3 skilled and knowledgeable.

4 5 **2.1. Workforce Segmentation**

6 In 2013, Toronto Hydro employed approximately 1,527 FTEs. As illustrated in Figure 1
7 below, Toronto Hydro's workforce can be broken down into the following segments:

8
9 **Figure 1: Toronto Hydro's Workforce Segments**



- 10 • **Certified and skilled trades** are critical for executing the capital and
11 maintenance programs. Without funding to maintain the core staffing levels,
12 Toronto Hydro will not be able to execute its work plan and its ability to respond
13 to customer needs may be compromised.
- 14 • **Designated & Technical Professionals** include engineering technologists,
15 engineers and corporate professionals. These employees are required to ensure
16 Toronto Hydro is compliant with legislative standards and best practices. They
17 are essential to designing and planning a safe, secure and reliable grid.

- 1 • **Supervisors** who are trained and developed internally to oversee the safe and
2 efficient design and execution of the work plan. They perform inspections,
3 audits, investigations, training, role-modeling, performance management and case
4 management, and are instrumental to the safe and cost efficient delivery of service
5 and operations.
- 6 • **Administrative and Support staff** perform important functions that enable
7 operations, customer care and the corporate functions to operate with enhanced
8 efficiency.
- 9 • **Senior Management (including the executive team)** provide the strategic
10 leadership and guidance required to effectively operate the utility. They have
11 extensive accountabilities and provide oversight to multiple subject portfolios,
12 enhancing organizational productivity.

13

14 **2.2. Aging Workforce Challenge and Mitigation Strategy**

15 Toronto Hydro expects that approximately 25% of its workforce (approximately 400
16 FTEs) will retire between 2014 and 2019. Of that number, approximately half are from
17 the key segments (certified and skilled trades, designated and technical professionals, and
18 supervisory positions), which are critical to maintaining and operating the distribution
19 system in a safe and efficient manner. Refer to the Conference Board of Canada Report
20 (Schedule 3) for a discussion of the range of market challenges facing Toronto Hydro,
21 including levels of retirement that are higher than the utility sector overall.

22

23 To constrain compensation costs over the rate period, Toronto Hydro plans to continue to
24 replace retiring employees on a “just-in-time” basis; however, this is not ideal because it
25 does not address the knowledge gap that will be created between the retirements and the
26 time it takes to train new certified and skilled trades (four to six years), and develop new
27 supervisors (one to two years).

28

Toronto Hydro also proposes to utilize an integrated, multi-faceted staffing model to fulfill its human resource requirements over the rate period, which consistent of the following approaches:

1. **Hire new graduates and train them in a staged manner** – Toronto Hydro plans to admit 320 individuals to its in-house apprentice program over the 2014 to 2019 period. This program provides cost-effective training that enables crews to learn the specialized skills which are required to work safely and efficiently on Toronto Hydro's distribution plant.
2. **Promote from within** – Between 2011 and 2013 approximately 150 vacancies were filled internally. This is cost effective approach as it builds on existing knowledge, talent and skills, and rewards high performance. The utility plans to continue to develop its existing workforce to fill positions as they become available.
3. **Hire skilled labour from the external market** – This approach is utilized when there is a lack of qualified internal candidates. However, for a number of reasons, it is not a viable option to fill positions for certified and skilled trades. External hires in these categories typically require an additional year of on-the-job training before they can safely work on Toronto Hydro's plant. In addition, the external labour market for certified and skilled trades is also constrained by aging workforce challenges.
4. **Rely on third party service providers** – This option provides Toronto Hydro flexibility to cost-effectively resource peak demands, while maintaining a stable complement of employees.

3. COMPENSATION COSTS AND STRATEGIES

Toronto Hydro expects to reduce compensation costs from \$234.6 million in its last rebasing year (2011) to \$225.3 million in the 2015 test year. In preparing this forecast, Toronto Hydro considered inflation rates contained in its collective agreements, relevant labour market-data and other factors such as the increasing size and complexity of the work-plan over the next five years.

3.1. Compensation Strategy

Toronto Hydro's strategy is to provide wages and benefits that are competitive in the markets where Toronto Hydro competes for talent. Refer to Compensation and Benefits Benchmarking Report prepared by Towers Watson (Schedule 6), which found that Toronto Hydro's compensation levels are generally aligned with the market.

Toronto Hydro's strategy also includes offering a compensation program that aligns the behaviour and performance of the workforce with the core objectives and goals of the utility. The compensation strategy is an important tool for communicating performance expectations, fostering productivity and rewarding employees for their contributions.

Between 2015 and 2019, Toronto Hydro intends to continue to rely on these principles to manage human resource requirements and costs appropriately and responsibly. The utility must do so with regard to the dynamic labour relations environment that it operates within, and the workforce challenges that it must contend with over the next five years.

3.2. Non-Bargaining Unit Employees

Less than one-third of Toronto Hydro's employees are not members of a bargaining unit. These employees receive a total cash compensation package comprised of base salary and variable performance pay. Salary grade/levels are set to correspond to a salary range. Salaries are set and adjusted with regard to external market benchmarking.

1

2 **3.3. Bargaining Unit Employees**

3 Approximately two-thirds of Toronto Hydro's employees are represented by the
4 following bargaining units with collective agreements in-place:

- 5 • **CUPE** collective agreement effective February 13, 2014 to January 31, 2018.
- 6 • **The Society** collective agreement effective April 12, 2012 to December 31,
7 2015.

8

9 **3.4. Benefits and Pensions**

10 Full-time employees are entitled to medical and dental benefits, short and long-term
11 disability income protection, life insurance, accidental death and dismemberment, and
12 leaves of absence (maternity, adoption and parental leaves). Employees are also eligible
13 to participate in the OMERS pension plan and receive post-retirement benefits. The cost
14 of employee benefits is expected to decrease from \$57.47 million in 2011 to \$55.87
15 million in 2015.

OEB Appendix 2-K

EMPLOYEE COSTS /COMPENSATION TABLE

	2011 Actuals	2012 Actuals	2013 Actuals	2014 BRIDGE	2015 TEST
Number of Employees (FTEs including Part-Time)¹					
Management (including executive)	61.8	53.0	55.2	55	55
Non-Management (union and non-union)	1,675.2	1,547.8	1,472.2	1,482	1,509
Total	1,737.0	1,600.8	1,527.4	1,537	1,564
Total Salary and Wages (including overtime and incentive pay)					
Management (including executive)	\$ 11,503,925	\$ 10,484,857	\$ 10,916,952	11,357,809	11,676,362
Non-Management (union and non-union)	\$ 165,601,764	\$ 149,723,035	\$ 147,970,550	152,531,929	157,754,790
Total	\$ 177,105,689	\$ 160,207,891	\$ 158,887,502	\$ 163,889,738	\$ 169,431,152
Total Benefits (Current + Accrued)					
Management (including executive)	\$ 3,700,705	\$ 3,207,397	\$ 3,497,371	3,622,390	3,586,525
Non-Management (union and non-union)	\$ 53,771,361	\$ 52,158,435	\$ 54,433,118	53,051,955	52,279,791
Total	\$ 57,472,066	\$ 55,365,832	\$ 57,930,489	\$ 56,674,344	\$ 55,866,316
Total Compensation (Salary, Wages, & Benefits)					
Management (including executive)	\$ 15,204,630	\$ 13,692,253	\$ 14,414,323	\$ 14,980,199	\$ 15,262,887
Non-Management (union and non-union)	\$ 219,373,125	\$ 201,881,469	\$ 202,403,668	\$ 205,583,884	\$ 210,034,581
Total	\$ 234,577,755	\$ 215,573,723	\$ 216,817,992	\$ 220,564,082	\$ 225,297,468

WORKFORCE STAFFING PLAN AND STRATEGY

This schedule describes Toronto Hydro's workforce segments, and provides an overview of the utility's past, present and expected staffing levels, further to the data outlined in the OEB Appendix 2-K – Employee Cost, filed at Exhibit 4A, Tab 4, Schedule 2.

The schedule also describes Toronto Hydro's aging workforce challenge and discusses the staffing and development strategy that the utility has adopted to respond to this challenge over the 2015 to 2019 rate period. The evidence is presented as follows:

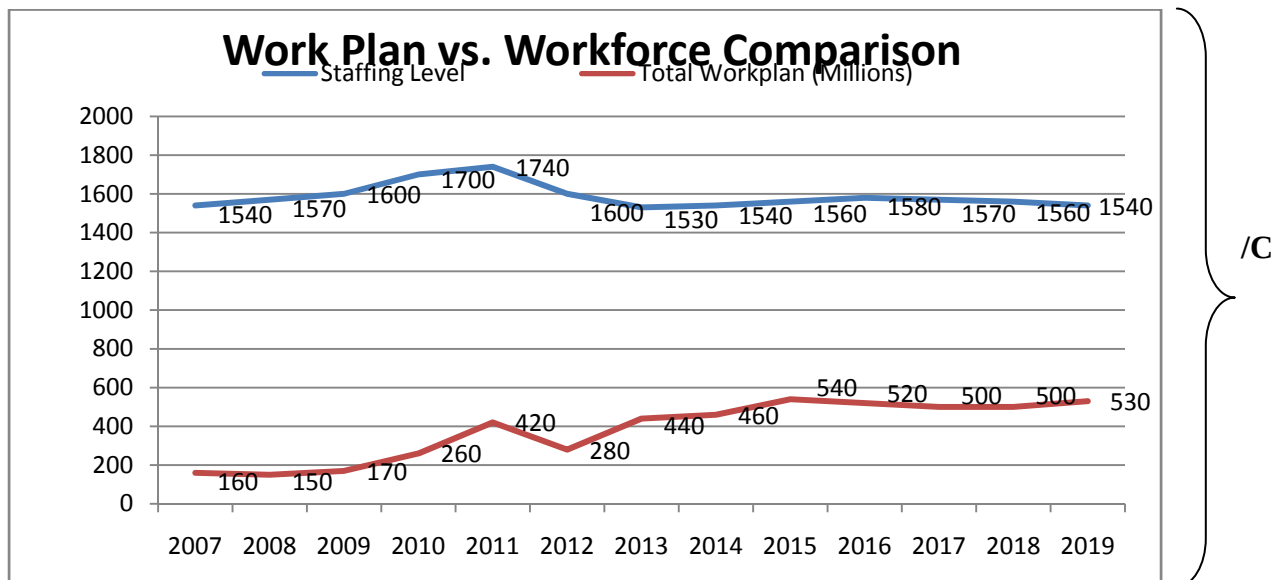
- 1) Introduction
- 2) Toronto Hydro's Workforce Segments
- 3) Staffing Levels: Past, Present and Future
- 4) Aging Workforce Challenge
- 5) Staffing and Development Strategy

1. INTRODUCTION

To facilitate the safe and efficient execution of Toronto Hydro's planned capital and operational programs, while meeting customer expectations and external obligations, Toronto Hydro needs to maintain a highly skilled workforce with a focus on certified and skilled trades, designated and technical professionals workforce, and leadership. The graph below (Figure 1) illustrates the relationship between Toronto Hydro's staffing levels and the utility's historical and proposed capital expenditures from 2007 to 2019. At a high-level, this graph demonstrates the progress that Toronto Hydro has made toward finding efficiencies in executing its work programs.

While Toronto Hydro is committed to continuous improvement and operational efficiency, the reality is that it must, at the very least, maintain current staffing levels in

1 order to secure the specific knowledge and talent that the utility requires to meet
2 operational requirements going forward. The utility must also balance this need against
3 the wave of projected retirements over the next five to ten years, and the varying training
4 durations required for new entrants to the workforce to become fully competent.



5 **Figure 1: Capital Expenditures vs. Staffing Levels (2007 – 2019)**

6 To deliver its capital programs, Toronto Hydro relies on a number of key Certified and
7 Skilled Trades and Designated and Technical Professional positions, such as Certified
8 Power Cable Person (“CPCP”), Certified Power Line Person (“CPLP”), Distribution
9 System Technologist (“DST”), Certified Meter Mechanic/Tester, Power System
10 Controller (“PSC”), Engineering Technologist (“ETL”), and Engineers. The utility
11 forecasts a large number of retirements in these positions over the next five to ten years,
12 and must continue to invest in training and development in order to facilitate the transfer
13 of critical knowledge and key skills that employees in these positions require to safely
14 and efficiently plan and execute the utility’s work programs.

15

Detailed descriptions of Toronto Hydro's workforce segments are set out in section 2 of this schedule. The summary below provides an overview of the roles and responsibilities of the key Designated & Technical Professionals and Certified & Skilled Trades.

- **Engineer** – Participates in short and long range strategic planning on technical matters; prepares engineering reports and studies; performs analysis and evaluations; provides timely technical support/consultation, project management and testing; develops proposals and plans; prepares and/or reviews methods, procedures (process re-engineering), and designs. Engineers are accountable, and legally responsible, for personal drawings, calculations, documents and the work of others for which the Engineer has signed.
- **Engineering Technologist (ETL)** – Supports the formulation of electric system plans and co-ordinates system operation services with the control centre. Develops distribution plans by developing load forecasts; prepares conceptual and detail designs and cost estimates for projects related to system expansion, rehabilitation and maintenance of the electrical and civil infrastructure. Conducts studies, prepares reports, makes recommendations relating to station and system distribution load forecasts, engineering studies, technical standards, utility materials, tools and construction practices. Prepares, reviews and maintains project schedules.
- **Power System Controller (PSC)** – Operates the electrical distribution system to provide safe, reliable and cost-effective delivery of electrical power on a 24-hour basis. In performing this function, Power System Controllers monitor system conditions, develop, direct and dispatch system switching, work protection and trouble response for planned and emergency events.
- **Certified Meter Mechanic/Tester** – Installs, removes, repairs, inspects, conducts tests and calibrates all types of meters and metering equipment and troubleshoots to determine faults in meters, metering equipment and test boards.

1 Assists in high voltage testing, repairing street lights and flat rate relays.

2 Investigates and reports on system anomalies.

- 3 • **Distribution System Technologist (DST)** – Operates, installs, commissions,
4 constructs, repairs, maintains, and decommissions all types of substation
5 equipment, protective relay and control systems, station metering, distribution
6 automation equipment, and SCADA systems, including completion of all
7 associated work orders, specifications, engineering drawings, reports, and work
8 procedures.
- 9 • **Certified Power Line Person (CPLP)** – Responsible for the construction and
10 maintenance of the overhead and underground distribution systems, and all
11 voltages, in a safe and efficient manner. Constructs, maintains, operates, and
12 troubleshoots the overhead and underground distribution plant, including
13 emergency repairs and switching operations. Performs line clearing duties as
14 required.
- 15 • **Certified Power Cable Person (CPCP)** – Responsible for maintaining,
16 operating and troubleshooting the underground distribution systems for all
17 voltages. Installs, removes, constructs, alters, operates, inspects and maintains
18 equipment associated with the underground distribution system, including
19 transformers, switchgear, protectors, primary switches, cables and related
20 equipment located in cable chambers, transformer vaults, etc. containing
21 energized circuits.

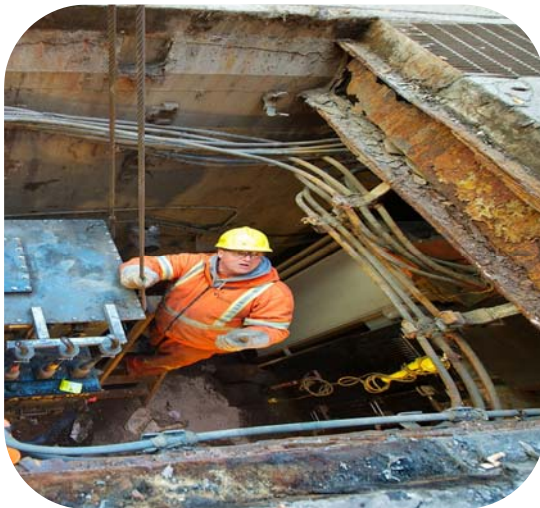
24 2. TORONTO HYDRO'S WORKFORCE SEGMENTS

25 Toronto Hydro employs a workforce of skilled employees who serve customers, allow
26 the utility to satisfy its legal and regulatory obligations, safely maintain and operate the
27 distribution system and execute the utility's plans. As explained in more detail below,
28 the major segments of the workforce include certified and skilled trades, designated and

1 technical professionals, supervisory staff, administrative and support staff, and senior
2 management.

3 4 **2.1. Certified and Skilled Trades**

5
6 Approximately 37 percent of Toronto Hydro's workforce is comprised of recognized
7 certified and skilled trades. These positions (two of which are illustrated below in Figure
8 2) are critical for executing the primary activities and programs that enable the utility to
9 construct and maintain the distribution system, to deliver safe and reliable power to its
10 customers and to respond to trouble calls and emergency situations.



CPCP - Underground Plant



CPLP - Overhead Plant

11 **Figure 2: CPCP and CPLP Employees at Work**

12 The table below provides some of examples of the capital and operational work programs
13 executed by certified and skilled trades. For more information about these programs,
14 please refer to the Distribution System Plan ("DSP") filed at Exhibit 2B, and the
15 Maintenance Programs filed at Exhibit 4A, Tab 2.

1 **Table 1: Examples of Work Programs Executed by Certified and Skilled Trades**

Capital Program (Exhibit 2B)	Type of Resources Required
Feeder Automation (E7.3)	CPLP and DST
Stations Switchgear Replacement (E6.13)	DST
Station Power Transformer Renewal (E6.14)	CPCP and DST
Underground Circuit Renewal (E6.1)	CPCP and CPLP
Box Construction Conversion (E6.7)	CPCP, CPLP and DST
Overhead Circuit Renewal (E6.4)	CPLP
Circuit Breaker Renewal (E6.15)	DST
Reactive Capital (E6.20)	CPCP, CPLP and DST
Maintenance Programs (Exhibit 4A, Tab 2)	Type of Resources Required
Station Inspections and Auxiliary Equipment Maintenance (Schedule 1)	DST
Switchgear Maintenance (Schedule 1)	DST
Station Equipment Maintenance (Schedule 1)	DST
Network Protector Maintenance (Schedule 1)	CPCP
Overhead Switch Maintenance (Schedule 1)	CPCP
Corrective Maintenance (Schedule 2)	CPCP, CPLP and DST
Emergency Maintenance (Schedule 3)	CPCP, CPLP and DST

3 Over the next five years, Toronto Hydro plans to continue making significant investments
4 in the distribution system, undertaking the largest capital and maintenance work program
5 in the utility's history in order to maintain reliable electricity service for its customers,
6 renew aging infrastructure, and sustain the pace of growth within the City of Toronto. To
7 do so safely and responsibly, the utility relies on having a stable complement of certified
8 and skilled trades.

9
10 If Toronto Hydro does not receive the funding it requires to maintain a core staffing level,
11 its ability to execute the work plan, and respond to customer needs may be compromised.
12 Customer impacts may include increased frequency and duration of power outages as a
13 result of insufficient resources to respond to trouble calls or to renew aging infrastructure.

2.2. Designated and Technical Professionals

Approximately 36 percent of Toronto Hydro's workforce is employed in designated and technical professional positions which include engineering technologists, engineers and corporate professionals. This segment of the workforce is responsible for planning, designing and executing the programs that enable the utility to construct and maintain the distribution system, and deliver safe and reliable power to its customers.

Technical positions complete studies, calculations and reports, plan, design, co-ordinate, and support infrastructure projects and maintenance programs. Additionally, the corporate professionals in this group enable the utility to satisfy a variety of external obligations and internal responsibilities in the area of Finance (Exhibit 4A, Tab 2, Schedule 15), Information Technology (Exhibit 4A, Tab 2, Schedule 16), Legal and Regulatory Services (Exhibit 4A, Tab 2, Schedule 18 and 17, respectively), and Human Resources and Environment, Health and Safety (Exhibit 4A, Tab 2, Schedule 14). For more detailed information about the activities that these employees perform, please refer to Toronto Hydro's capital investment plan filed at Exhibit 2B, Section E, and the operational programs filed at Exhibit 4A, Tab 2.

Without appropriate staffing levels of these designated and technical professionals, Toronto Hydro may not have the necessary resources to maintain legislative compliance and to adhere to standards and best practices, or to design and plan for a safe, secure, and reliable grid.

2.3. Supervisory

Approximately 11 percent of Toronto Hydro's workforce supervises the design and execution of the work plan. This segment is primarily trained, developed and promoted from within the organization, leveraging the wealth of specific internal knowledge developed within the utility. The responsibilities associated with these positions include

1 inspections, audits, investigations, training, role modeling, performance management, and
2 case management.

3
4 The supervisory segment is critical to the delivery of the work program and instrumental
5 in ensuring that employees work in a safe and productive manner. Toronto Hydro
6 attributes its positive developments in safety and attendance records to the work
7 performed by employees in these positions. The utility's achievements in this respect are
8 set out in the HR & Safety Program (Exhibit 4A, Tab 2, Schedule 14), and include:

- 9 • recognition by the Infrastructure Health and Safety Association in August 2013
10 for having worked 3.5 million consecutive hours without a lost time injury;
- 11 • a decrease of 56 % in the Total Recordable Injury Frequency (TRIF) between
12 2008 and 2013; and
- 13 • a reduction of 26 % in the average absenteeism rates from 2011 to 2013.

14
15 Relative to its accountabilities, this segment represents a small-but-critical portion of the
16 Toronto Hydro's workforce. Without an appropriate complement of supervisory
17 positions, Toronto Hydro may experience a reduction in productivity, and its exceptional
18 safety record may be compromised.

19 20 **2.4. Administrative and Support**

21 Approximately 12 percent of Toronto Hydro's workforce provides support to Operations,
22 Customer Care and corporate functions in the delivery of the work plan. Administrative
23 and support employees also play an important role in enabling the utility to satisfy a
24 variety of external obligations and internal responsibilities, such as scheduling and
25 timekeeping, invoicing, project coordination, tracking and reporting, and research.
26 Without appropriate staffing levels in these positions, Toronto Hydro may experience a
27 reduction in productivity as a result of more highly skilled resources having to perform
28 this type of work.

1 **2.5. Senior Management**

2 Senior management employees, including the executive team, represent approximately
3 four percent of the utility's workforce. These individuals provide the leadership and
4 strategic guidance that a utility of Toronto Hydro's size and complexity requires in order
5 to perform effectively and responsibly in a complex regulatory business environment.
6 Their accountabilities are extensive, with many senior management positions providing
7 oversight to multiple subject portfolios.

10 **3. WORKFORCE COMPLEMENT: PAST, PRESENT AND FUTURE**

11 In 1998, after Toronto Hydro was formed through the amalgamation of six former
12 utilities, the utility's workforce was comprised of approximately 2,400 employees. Over
13 a period of four years (i.e., 1998-2001), the workforce was reduced to approximately
14 1,550 employees. This reduction in headcount was achieved as a result of voluntary
15 retirement program and a voluntary separation program in 2001 that resulted in the loss
16 of critical positions for the utility (such as those in the certified and skilled trades).

18 Over time, Toronto Hydro has been working towards staffing up its workforce in these
19 critical positions in preparation for the wave of retirements expected over the next five to
20 ten years, to support capital infrastructure renewal, and to allow for the lead-time
21 required to safely train new workforce entrants.

23 From 2011 to 2013, Toronto Hydro experienced another notable reduction in the size of
24 its workforce, from approximately 1,737 full time equivalent ("FTE") employees in 2011
25 to 1,527 FTEs in 2013. The workforce reduction that Toronto Hydro sustained between
26 2011 and 2013 was a result of: (1) rebalancing of the critical workforce (such as certified
27 and skilled trades and designated and technical professional) through a voluntary exit

1 program¹ and workforce downsizing; and (2) organizational and job design, following
2 the Ontario Energy Board's ("OEB") decision in EB-2011-0144².

3
4 In April 2013, the OEB substantially approved the investments proposed in Toronto
5 Hydro's Incremental Capital Module ("ICM") application.³ The capital work in that
6 application represented a continuation of the elevated level of capital spending (and
7 specifically system renewal spending) that the utility has been engaged in for several
8 years. While it represented a significant management challenge, Toronto Hydro was able
9 to safely execute the ICM plan using the funding available to it in that period. The utility
10 accomplished this through various means, including the efficient planning and hiring
11 decisions, as well as the prudent use of external resources.

12
13 In the 2015-2019 rate period, Toronto Hydro plans to execute the largest capital work
14 program in utility's history (refer to the DSP in Exhibit 2B), using approximately the
15 same number of internal resources as it did in the 2012-2013 period. One of the greatest
16 risks to the safe and responsible execution of this work program is the increasing wave of
17 retirements projected in the next five to ten years.

18
19 As discussed in more detail in the Aging Workforce Challenge section below, Toronto
20 Hydro expects a large wave of retirements in the next five to ten years and must invest in
21 developing and maintaining a dependable, adaptable and highly-skilled workforce. To
22 prudently manage costs during the upcoming rate period, Toronto Hydro proposes a
23 conservative staffing plan, despite challenges that it faces over the next five years (i.e., 25
24 percent of the workforce is expect to retire in the next five years, and the size of capital
25 program is expected to increase by approximately 22 percent, relative to 2013).

¹ The program targeted administrative and clerical positions, and focused on the reduction of non-certified trades jobs in areas where automation increased and outsourcing opportunities at a lower operating cost presented itself.

² EB-2011-0144, Decision with Reasons (January 5, 2012).

³ EB-2012-0064, Partial Decision and Order (April 2, 2013).

1
2 To limit the rate increases for the upcoming rate period, Toronto Hydro proposes to
3 continue to replace employees as they retire on a “just in time” basis. This is not the
4 optimal approach to workforce renewal, given the time that is required to safely and
5 effectively train new workforce entrants to work on Toronto Hydro’s distribution system.
6 It was adopted, however, to constrain costs over the 2015 to 2019 period. As a long-term
7 strategy, this approach is not preferred because it may compromise Toronto Hydro’s
8 ability to satisfy its commitments.

9
10 Toronto Hydro has implemented a multi-faceted staffing strategy to maintain quality
11 service and value to rate payers, and to plan for upcoming retirements. Toronto Hydro’s
12 Workforce Renewal Strategy is discussed in more detail in section 4 below.

13 14 15 **4. AGING WORKFORCE CHALLENGE**

16 The Canadian utility industry faces a major workforce renewal challenge over the next
17 decade, as the wave of baby-boomer⁴ retirements intensifies (refer to the Conference
18 Board of Canada Report on Labour Market and Human Resource Trends for the
19 Canadian Utility Sector, which is filed at Exhibit 4A, Tab 4, Schedule 4).

20
21 To illustrate the effect of this challenge on Toronto Hydro’s workforce, the chart below
22 (Table 2) compares, by age group, the Canadian population to Toronto Hydro’s
23 workforce. The average age at Toronto Hydro currently is 46.

⁴ The term “baby boomers” refers to those individuals that were born between 1947 and 1965.

1 **Table 2: Population by Age Group (Canada and Toronto Hydro)**

Demographic Cohorts	Statistics Canada % of Workforce	Toronto Hydro % of Workforce
Age		
Age <25	14.87%	1.75%
Age 25-34	21.60%	22.17%
Age 35-44	21.24%	14.41%
Age 45-54	23.47%	42.21%
Age 55-64	15.35%	18.03%
Age >65	3.48%	1.42%

2 The 45 to 54 age group, which include the youngest baby boomers, is the focus of the
3 aging workforce challenge, as these employees represent approximately 42 percent of
4 Toronto Hydro's workforce. More specifically, the challenge is that the 35 to 44 age-
5 group that immediately follows the youngest boomers, is relatively small (14.41%) in
6 comparison to the percentage of the workforce that is over 45. The immediate
7 consequence of this challenge is that as young boomers step in to fill the roles of senior
8 boomers who, by 2015, will be in their mid to late 60s, the employees in the 35 to 44 age
9 group will be called on to fill their positions. To ensure the workforce is prepared to
10 safely and effectively perform these senior roles, the workers in the 35 to 44 age group
11 must undergo the required training and development before they are called on to fill more
12 senior positions.

13
14 To manage the challenge of the large wave of retirements that are expected to place in the
15 next five to ten years, Toronto Hydro requires funding to invest in hiring new entrants
16 and facilitating apprenticeships, co-op programs and in-house training. Toronto Hydro
17 must pursue these investments now to account for the time it takes to train new
18 employees and to transfer corporate and technical knowledge to them from senior
19 employees.

1

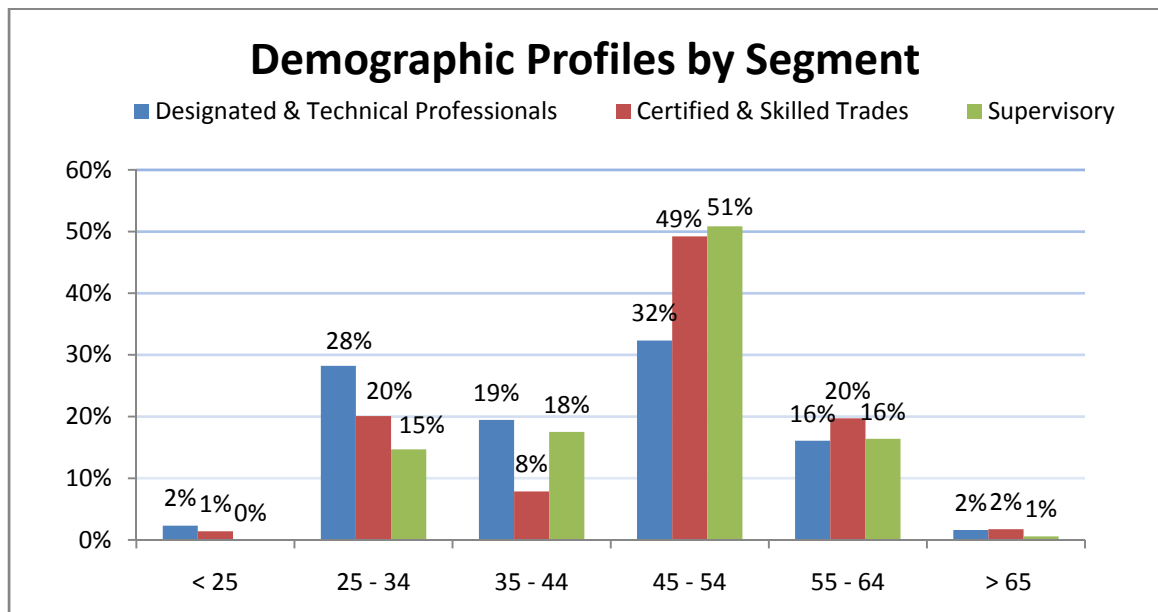
2 The potential consequences to delays in hiring and lack of funding to administer training
3 programs include not having adequate number of resources to maintain and operate the
4 systems or relying on an inexperienced or inadequately trained workforce to perform
5 highly complex, safety-sensitive tasks. If these consequences materialize, they could
6 have significant effects on all critical aspects of the utility's business: customer
7 experience, reliability, safety, and financial performance.

8

9 As highlighted in the chart above (Table 2), the aging workforce challenge is particularly
10 acute for Toronto Hydro. Approximately 42 percent of the utility's workforce is situated
11 in the 45 to 54 age group, and 18 percent of employees in the 55-64 age group. This
12 means that over the next decade (i.e., by 2025), more than 50 percent of Toronto Hydro's
13 workforce is expected to be eligible for retirement.

14

15 In the wake of a retirement, the organization must deal with not only a loss of knowledge
16 and experience, but also a need to train and develop the individuals that have been
17 promoted or newly hired to fill critical positions. As the chart below illustrates (Figure
18 3), the aging workforce challenge is even greater for those segments of the workforce
19 which are instrumental to executing the utility's capital programs, maintaining existing
20 infrastructure and sustaining safe and reliable operations into the future.



1 **Figure 3: Toronto Hydro Workforce Demographic Profiles by Segment**

2 Because Toronto Hydro employees below age 45 represent approximately 38 percent of
3 the utility's workforce, relative to the 62 percent of employees over age 45, the utility
4 could face a significant labour shortage in the next ten years if it does not continue
5 investing in workforce renewal. Given the physical nature of certain positions,
6 particularly in the certified and skilled trades segment, and the participation of employees
7 in a defined benefits pension plan, retaining employees beyond their retirement date is a
8 challenge.

9
10 The staffing plan endeavours to maintain an appropriate complement of employees to
11 respond safely and effectively to the needs of customers and to maintain and renewal
12 Toronto Hydro's distribution system.

13
14 Toronto Hydro's second largest demographic profile is the 25 to 34 age group.
15 Employees in this bracket are those that have been hired in recent years and that typically

require significant training and development over the course of the next five years to fulfil the roles and positions of retiring employees.

On average, it takes approximately four to six years to train a new certified and skilled trades hire, and one to two years to develop a new supervisor. The development period for Certified and Skilled Trades position considers legislative training requirements, Toronto Hydro compliance training based on operational requirements and best practices, and apprenticeship training (technical trades training) and testing requirements. The table below (Table 3) provides an example of training requirements for a CPCP Apprentice.

Table 3: CPCP Apprentice Training Requirements

Course Type	Legislative	TH Compliance	Apprentice	Total Courses
Year 1	8	10	16	34
Year 2	N/A	3	18	21
Year 3	N/A	2	22	24
Year 4	5	7	9	21
Total Courses	13	22	65	100

In 2010, Toronto Hydro adopted more stringent education requirements for certain apprenticeship positions. At a minimum, the utility now requires new hires to have a university or college diploma in an electrical background. As a result of this change, Toronto Hydro apprentices' in-class training-time has decreased by 13 percent allowing employees to work on Toronto Hydro's distribution system four weeks sooner. Toronto Hydro attributes this improvement to a variety of qualities that are associated with higher education; namely, enhanced problem-solving skills, increased learning abilities, communication and comprehension aptitudes, and heightened initiative and resourcefulness.

4.1. Retirements

In the 2014 to 2019 period, approximately 25 percent of Toronto Hydro's current workforce (i.e., 400 employees) will be eligible for retirement (please refer to Table 4 below). Of the 400 projected retirements, approximately half are expected to be from the Certified and Skilled trades, Designated and Technical Professionals, and Supervisory positions, which are critical to maintaining and operating the distribution system. As of April 30, 2014, 55 employees have actually retired, and nine additional employees have notified the utility of their intention to retire, or have initiated retirement planning. The table below (Table 4) summarizes Toronto Hydro's retirement projections up to the end of the upcoming rate period.

Table 4: Toronto Hydro Retirement Projections (2014-2019)

YEAR	2014	2015	2016	2017	2018	2019
ANNUAL	80 ⁵	36	47	59	72	106
CUMULATIVE	80	116	163	222	294	400

Toronto Hydro uses the following criteria to project retirements: OMERS normal retirement age (65 years old), Toronto Hydro's average retirement age based on historical trends (59 years old), combined with eligibility for an unreduced pension under OMERS.⁶ Using these criteria, Toronto Hydro has been able to forecast the expected number of retirements in the past with reasonable accuracy. Based on the retirement projections that Toronto Hydro has provided in its three most recent cost of service applications before the OEB, Toronto Hydro's accuracy rate for forecasting retirements exceeds 90%.

⁵ 2014 projection includes individuals who were eligible to retire in 2013 but have not yet retired.

⁶ OMERS pension eligibility criteria for an unreduced pension stipulate that a member must be:

- a minimum of 55 years of age with 30 years of OMERS service,
- a minimum of 55 years of age, with total years of service and the age of retirement totaling 90, or
- OMERS Normal Retirement Age 65.

1 **Table 5: Toronto Hydro Forecast of Retirements**

Rate Application	EB-2009-0139	EB-2010-0142	EB-2011-0114
Accuracy Rate %	98%	96%	90%

3 The decision to retire is a highly personal life choice that is influenced by a number of
4 factors (e.g., economic conditions, health, physical nature of role, family finances), which
5 are beyond the utility's control and visibility. Being mindful of these complexities,
6 Toronto Hydro submits that its retirement forecasting practices are reasonable and
7 appropriate, as evidenced by the utility's rate of accuracy at its most recent applications.

8

9

10 **5. STAFFING AND DEVELOPMENT STRATEGY**

11 Workforce planning is a continuous process aimed at ensuring that the organization has
12 sufficient talent to meet its human resource needs. The process is forward-looking and
13 considers various sources of talent including permanent employment, contracting, and
14 partnerships. The appropriate mixture of talent is determined by examining various
15 factors including changing business requirements, actual resource availabilities and
16 utilization, projected and actual loss of knowledge (e.g., retirements, attrition), and the
17 results of recruitment, training, development, and other (e.g., job harmonization)
18 initiatives. Prudent workforce planning enables the utility to have a cost-effective and
19 sustainable workforce, and facilitates continuous improvements over time. For example,
20 through responsible workforce planning Toronto Hydro has been able to consolidate 41
21 job classifications into 10, since 2007.

22

23 The overarching principles of Toronto Hydro's staffing strategy are to:

- 24 1) provide flexibility in the allocation of resources (internal resources and external
25 contractors) to complete the approved work program;

- 1 2) align future professional trades and technical hiring with capital and maintenance
- 2 program volumes; and
- 3 3) continually review requirements to drive decision-making for effective resource
- 4 cost management.

5

6 As discussed in the Aging Workforce Challenges section above, Toronto Hydro must

7 find a solution to bridge the gap between the utility's current staffing levels, projected

8 retirements and the resources it requires to deliver its programs and satisfy its obligations

9 over the next five years. Failing to do so could expose the utility to a multitude of

10 operational and financial risks, such as not having the resources required to provide safe

11 and reliable electricity service to its customers, and not being able to fulfill legal and

12 regulatory requirements (as noted in the OM&A programs, at Exhibit 4A, Tab 2).

13

14 Toronto Hydro utilizes a number of solutions to address this problem. These include: 1)

15 promoting from within the utility, 2) hiring skilled labour from the external market, 3)

16 acquiring and training new graduates, or 4) use third-party service providers. As

17 explained in more detail below, each of these alternatives has its relative advantages and

18 disadvantages, but none of these solutions are independently sufficient to address Toronto

19 Hydro's human resource requirements. Toronto Hydro decided that the most prudent

20 solution is an approach that allows the utility to leverage the relative strengths of each of

21 these options as appropriate in the circumstances.

22

23 Toronto Hydro has adopted a multi-faceted staffing strategy because it provides the

24 utility the flexibility to staff up or down as required to effectively plan and manage its

25 staffing needs over the next five years and likely beyond. Given the breadth and

26 complexity of the utility's operations, and the rate at which the City of Toronto is

27 growing and expanding, flexibility is particularly important for Toronto Hydro. Toronto

28 Hydro also considers a multi-faceted approach to be a more effective and cost-efficient

1 solution to addresses the aging workforce challenge that the utility faces in the next five
2 to ten years, than implementing a single or double-pronged strategy.

3 4 **5.1. Hire from Within**

5 Hiring from within allows Toronto Hydro to recognize and advance those employees that
6 have demonstrated exceptional skills, knowledge and leadership qualities. These
7 individuals are critical to training the new generation of employees and overseeing the
8 key functions of the utility. Toronto Hydro relies on this strategy to fulfill supervisory
9 positions, and for senior certified and skilled trades' positions and designated and
10 technical professionals. Despite the obvious advantages of hiring from within, Toronto
11 Hydro cannot rely on this strategy for entry level positions, and cannot rely on this option
12 alone to fulfill retirement vacancies because the utility does not have a sufficient pool of
13 employees. Between 2011 and 2013, approximately 150 vacancies were filled internally.

14 15 **5.2. Hire from the External Market**

16 This option entails going to market to hire the skilled and experienced resources that the
17 utility requires over the next five years. To the extent that the external market has an
18 available pool of qualified candidates, this option allows the utility to meet its human
19 resource needs. However, because of the complexity of its distribution plant and
20 dynamic operating conditions, it is challenging for Toronto Hydro to hire skilled labour
21 without investing in training and development. For example, an experienced CPLP from
22 the external market would require one year of additional on-the-job training to become
23 fully-competent to work on Toronto Hydro's plant. Due to the lack of qualified
24 candidates in the job market, hiring skilled labour is not an optimal strategy in and of
25 itself, especially for Certified and Skilled Trades positions.

1 **5.3. Hire New Graduates**

2 The third option is to hire new graduates and rely on the utility's training and
3 apprenticeship programs to teach these employees the specialized skills and knowledge
4 that they require to safely work on the distribution system. This has proven to be a
5 reliable source for skilled entry level positions; however, while this option allows
6 Toronto Hydro to develop and maintain a dependable workforce that is capable of
7 servicing the operational needs well into the future, it is not desirable for the utility to
8 rely on this option alone, as the utility is limited by the ability to safely absorb and
9 integrate apprentices.

10
11 Toronto Hydro seeks opportunities to collaborate with colleges and universities like
12 Ryerson University and Georgian College who offer academic programs that are aligned
13 to entry level qualifications for Certified and Skilled Trades and Designated and
14 Technical professionals. Collaborations like these are valuable because they allow
15 Toronto Hydro to:

- 16 • influence and shape the programs and curriculum offered to students with the
- 17 utility's strategic goals and long-term needs,
- 18 • spread awareness about the utility's human resource requirements, and
- 19 • build recruitment relationships with future graduates.

20
21 Toronto Hydro's partnership with Georgian College has yielded 17 recruits since the
22 inception of the partnership in 2011 (12 Certified and Skilled Trades and five Designated
23 and Technical professionals). As Toronto Hydro ramps up its recruitment program to fill
24 retirement- related vacancies, Toronto Hydro expects that it will continue to leverage its
25 alliances with universities and colleges to recruit new graduates.

5.4. Use Third Party Service Providers:

Outsourcing Toronto Hydro's workforce requirements to third-party service providers is another option employed by the utility. In many cases, third-party service-providers enable the utility to cost-effectively resource peak demands, maintain flexibility in operations, and gain access to specialized expertise. However, it would not be feasible for the utility to outsource all of its workforce needs, as third party service providers are also constrained by demographic challenges and must invest in replenishing their workforces. Further, it would not be prudent for Toronto Hydro to rely solely on third-party service providers because the utility requires a stable complement of employees to satisfy its on-going legislative and regulatory requirements and customer obligations.

5.5. Development Strategy

Toronto Hydro's workforce development strategy focuses on in-house training to cultivate skilled apprentices, technical staff, and leaders. Due to the complexity of its system, the aging workforce challenges that it faces over the next five to ten years, and the utility's need for sustained capital investment to renew its infrastructure, Toronto Hydro must resource these positions from within. To do so, the utility relies on having a robust talent pool for entry-level certified and skilled trades and designated and technical professional positions, and requires funding to accelerate its training and development programs. In the long-term, this strategy helps to ensure that Toronto Hydro has the resources it requires to perform core activities and satisfy key obligations.

As summarized in the chart below (Table 6), from 2011 to 2013, Toronto Hydro administered more than 200 training and development programs at a total cost of approximately \$1.5 million per year. While many of these programs were targeted at developing the specialized skills sets required to work on Toronto Hydro's distribution system, the utility also leveraged its training facilities to deliver a variety of legislative

1 and compliance programs. For more information about the value of these initiatives,
2 refer to the Human Resources and Safety Program at Exhibit 4A, Tab 2, Schedule 14.

3

4 **Table 6: Training and Development Programs (2011 – 2013)**

Area	2011 Courses	2012 Courses	2013 Courses
Compliance (e.g., Environmental and Safety legislative training, EUSA and ESA Rules, Confined Space, Work Protection Code, Network Switching)	10	20	42
Legislative (e.g., WHMIS, Defensive Driving, Forklift Training)	5	17	20
Apprentice (e.g., Distribution Systems Technologist, Power Systems Controllers, Certified Power Cable Persons, Certified Power Line Persons, Meter Mechanics)	10	16	19
Leadership (e.g., Safety Leadership, Performance Management, Management Control & Reporting System, Project Management, Policy Administration)	9	7	6
Technical & Customer Service Training (e.g., Engineering Technicians, Electrical Awareness, Project Execution, Customer Education Training)	14	14	16
Total	48	74	103
Total Cost	\$1.23M	\$1.18M	\$1.47M

5 The apprenticeship program is a key aspect of the Toronto Hydro's workforce
6 development strategy because it enables the utility to train and develop employees with

1 the specialized skills including Certified Power Cable Persons, who work on the
2 underground system (see Figure 4 below), and Distribution Station Technologists, who
3 operate and maintain equipment in the stations.



4 **Figure 4: Underground cable chamber in Toronto Hydro's system.**

5 Toronto Hydro initiated the apprenticeship program in 2003, when the utility realized the
6 basic training that crews acquired externally was insufficient to enable them to work
7 safely and efficiently in Toronto Hydro's system. For example, Figure 4 shows a
8 complex underground cable chamber that is common in Toronto Hydro's distribution
9 system.

10

11 Between 2003 and 2013, Toronto Hydro admitted over 200 apprentices to the program
12 and retained approximately 88 percent of these individuals as full-time employees. The
13 table below (Table 7) summarizes the number of certified and skilled trades that the

utility developed through its apprenticeship program, and retained as full-time employees, as of the end of the second quarter in 2014.

Table 7: Apprenticeship Program Summary (as of Q2 2014)

	CPLP	DST	Meter Mechanic	PSC	CPCP	ETL	Engineer	Total
Apprentices	106	24	7	25	54	86	54	356
# Retained	87	24	7	20	51	78	44	311
% Retained	82.1	100.0	100.0	80.0	94.4	90.7	81.5	87.4%

To prepare itself for the large wave of retirements that it expects to encounter over the next five to ten years, Toronto Hydro expects to admit approximately 320 individuals to the apprenticeship program during the 2014-2019 timeframe. Toronto Hydro plans to hire apprentices in a staged approach as outlined in table below (Table 8), to facilitate workforce renewal in a safe and effective way, while ensuring knowledge transfer and maintaining productivity.

The staged approach allows for new entrants to be safely absorbed and integrated into Toronto Hydro's system with the appropriate training, supervision and mentoring on Toronto Hydro practices, procedures, and standards. It also allows for supervision and mentoring practices to be undertaken without jeopardizing the utility's objectives or its ability to safely and effectively deliver its capital and maintenance work programs.

Table 8: Apprenticeship Hiring Plan (2014 – 2019)

Apprentice Group	2014	2015	2016	2017	2018	2019	TOTAL
CPCP	9	18	18	18	18	27	108
CPLP	0	24	12	12	12	12	72
DST	9	16	8	0	0	8	41
PSC	4	6	4	2	2	2	20
Certified Meter Mechanic	0	5	0	4	5	4	18

Apprentice Group	2014	2015	2016	2017	2018	2019	TOTAL
Engineering Technologist	15	6	6	8	2	12	49
Engineer	2	2	2	2	1	1	10
Total	39	77	50	46	40	66	318



Toronto Hydro-Electric System Limited (“Toronto Hydro”)
Labour Market and Human Resources Trends
Canadian Utility Sector

July 24, 2014

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Executive Summary

Toronto Hydro faces a number of complex and interwoven sector-wide economic and demographic trends that are expected to exert significant pressure on its workforce management approach and human resources strategies over the next five to ten years. Situated in one of Canada's most vibrant labour markets – fueled by the Pan Am Games, housing growth, investments in transportation and power-related infrastructure, and surrounded by a half dozen or more direct sector-specific competitors – Ontario Power Generation, Hydro One, Bruce Power and multiple municipally owned utilities – Toronto Hydro is facing high levels of retirement at the same time as many other competitor organizations face the same challenge as well as shrinking high skilled labour pool.

While the Conference Board of Canada's research demonstrates high levels of retirement across the broad Canadian labour market, the forecasted retirement rate for the Canadian utility sector as a whole is much greater, and as detailed in our report, Toronto Hydro's levels of retirement are higher than the sector overall.

Category	Retirement Rate over the next Five Years (2014-2018)*
All	4.2%
Utilities	16.3%
Toronto Hydro	19.1%
Source: The Conference Board of Canada Toronto Hydro data provided by Toronto Hydro	

*For comparative purposes, this table looks at the years 2014 through to 2018 inclusive. For more detailed information on the period of 2014 to 2019, please see Table 12.

Not only does the sector face higher than average levels of retirements, but the nature of the Toronto Hydro workforce demands significant lead time for training and development in order to achieve optimal levels of both high skill capability and productivity. Given the time needed to train a number of the skilled technical and trades roles in the unique operations of Toronto Hydro (four to six years), Toronto Hydro must increasingly shift to a recruitment model that is more proactive in anticipating upcoming recruitment profiles and preparing well in advance.

In addition, as the labour market data attests, the available talent pool is shrinking, and as such, Toronto Hydro must focus on a more multi-pronged model for staffing in the future, which further incorporates other models of partnerships such as contracting or outsourcing. Staffing strategies for the future must consider new models as well as new sources for talent. For Toronto Hydro, like all employers, the shift in staffing strategies will demand shifts in a wide range of other related human resources (HR) programs to ensure engagement of an increasingly diverse population is achieved and translates into high levels of safety and productivity.

While levels of retirement, other exits and the challenge of recruitment point to the demand for more complex staffing strategies, Toronto Hydro is also faced with the operational and service transformation challenge of infrastructural renewal. Given the natural ebbs and flows in renewal and construction, Toronto Hydro will also have to design a workforce model that is inherently flexible to respond to changes in workforce needs – volume, skill and competences. In order to plan and manage the workforce, Toronto Hydro's human resources leadership will be required to make investments in

technology, training and development to lead the complex workforce analytics required to support this effort.

Toronto Hydro, in designing future-oriented and responsive human resources practices, must also be cognizant of two additional and linked HR considerations – the collective bargaining environment, and cost implications and trade-offs. Toronto Hydro operates in a highly unionized environment, with a demonstrated ability of labour to secure the support of its membership for a strike mandate, which brings additional pressure and complexity to its labour relations climate. While we are of the view that the short-term economic environment will moderate the demands made by unions, as the labour market begins to tighten over the next decade, unions may find themselves with greater leverage which will translate into cost pressures for employers. Moreover, as noted in the report, retiree benefit costs are significant, and with the retirement profile for Toronto Hydro rising, Toronto Hydro will likely need to address related and increasing cost pressures and demands.

The human resources trends, profiles and challenges facing Toronto Hydro are real business issues that if not optimally addressed and mitigated, will represent material risks to its ability to fulfill its mandate and service commitments to its customers and stakeholders. Moreover, the Conference Board of Canada's report, *Shedding Light on the Economic Impact of Investing in Electricity Infrastructure: Economic Performance and Trends* detailed how integral the supply of electricity is to a modern economy, to driving competitive advantage, to overall economic activity, and to broader employment realized through capital investment. The report concluded that over a 20 year period (2011 – 2030), investments in the sector will result in an annual contribution to real gross domestic product of almost \$11 billion and approximately 156,000 jobs per annum. In turn, this increased economic activity will lift household income as well as return significant value to government.

With Boards of Directors and Chief Executive Officers increasingly focused on human resources issues, the priority of the talent agenda within organizations is at the forefront. This not only signals the centrality of the talent agenda for business, but will put greater and greater demands on Human Resources leaders for innovative and effective strategies. With the attention of the CEO office squarely focused on HR issues, the people dimension of business will continue to be a key driver and differentiation of organizational performance. At the same time that Human Resources issues are rising to the top of Canadian CEOs agenda, so too are Canadian Boards of Directors prioritizing talent issues as a Board priority and a key competitive, strategic differentiator (Source: Conference Board of Canada's *Canadian Directors' Compensation Practices, 20th Edition*, April, 2014).

1. Introduction

Section Highlights

- **The broad Canadian energy sector will face increased competition internally and with other related sectors, such as construction, for skilled technical workers at a time when the labour pool is shrinking.**
- **The pressure on recruitment will demand a broadening of approach and strategy as well as increased innovation across all human resources practices in order to attract and retain talent.**
 - **New models of staffing including full time employment, outsourcing/contracting, and contingent supply sources**
 - **New sources of talent**
- **With the sector itself undergoing significant transformation through infrastructure renewal as well as the introduction of new technologies, the nature of the workforce will continue to evolve.**
- **While uneven across the country, there are signs of economic recovery that will put new pressures on the Canadian labour market. With high levels of construction and infrastructure renewal in Toronto, the prospects for a strengthening economy are encouraging.**

1.1 Report Overview

The Conference Board of Canada was retained to provide independent research on current labour market and human resources trends for the utility and related sectors in connection with Toronto Hydro's regulatory submission and rate application.

Over the last number of years, the Conference Board of Canada has undertaken a number of studies to identify trends and implications related to the changing demographic profile of the Canadian labour market with a focus on supply and demand as well as related human resources practices. Our work includes each of national, provincial as well as select metro perspectives across a number of key areas including:

- Demographics – Supply and Demand
- Talent Acquisition / Recruitment
- Leadership
- Development and Learning
- Compensation and Benefits
- Collective Bargaining

This report largely focuses on trends and data relevant to the Canadian utilities sector. However, recognizing that Toronto Hydro is located in one of the most competitive labour markets in Canada competes for talent beyond technical operations in areas such as strategy, finance, information technology, human resources, etc., the report also provides data related to the Ontario/Toronto market

place. In addition, given the highly technical nature of the work undertaken by Toronto Hydro and competitive labour markets for skilled and knowledge workers across the broader construction and energy sectors, a national and broader sectoral view has also been provided.

The report is structured into the following key sections:

- Introductory Strategic Context
- Perspective on Labour Market and Human Resources Trends
- Conclusions and Implications

The report also includes tables with key statistical trends.

1.2 Information and Data Sources

In preparing this submission, the Conference Board of Canada not only relied on existing Conference Board of Canada proprietary data and research, but also undertook a literature search to identify other key, relevant information for contextual purposes. Of note is the most recent report of Electricity Sector Council, *Power in Motion, Labour Market Information (LMI) Study Full Report – 2012 Update*. This report builds on two earlier studies: 2004 – *Keeping the Future Bright* (Canadian Electricity Association), and 2008's *Powering up the Future* (Electricity Sector Council).

1.3 Sector Context and Trends

The 2012 report update *Power in Motion* provides a number of key statistics, trends and considerations that are relevant for Toronto Hydro and its workforce planning and strategies:

- For the period 2011 – 2016, the combined energy and renewable energy sector will recruit over 45,000 new employees representing a two-fold increase from the previous five year period, and equal to 40 per cent of the current workforce.
- These 45,000 employees will be comprised of a mix of critical workforce segments from across the sector and include both technical and more traditional management and administrative roles. (Source: Statistics Canada). Among the electrical occupations, more than fifty per cent of the employment resides in four occupations, which are key to Toronto Hydro:
 - Electrical and Electronic Engineering Technicians and Technologists.
 - Electrical Power Line and Cable Workers.
 - Power System Electricians.
 - Power System and Power Station Operators.
- The new workforce profile will pose major challenges for employers including a need to replace skilled, experienced workers at a time when the sector is increasing in complexity due to changing technology and infrastructure needs.
- Industry churn will continue with up to 30 per cent of the required human resources moving between existing sector-specific employers, leaving a major gap to be filled from other sources – in this regard, it should be noted that development and recruitment of sector-specific talent is a critical workforce challenge.

- Recruitment practices will have to broaden to include sources of talent that are under-represented across the sector.
- The electricity sector will face increasing competition from other sectors (oil and gas, construction) particularly for new recruits.
- Retirement rates and transition must be managed to ensure effective knowledge transfer.
- The challenge of filling technically skilled jobs will be matched by the need for supervisory and management roles.
- While outsourcing and contingent workforces provide options for talent acquisition, the outsourcers and suppliers in the sector face many of the same challenges as Canada's largest utility sector organizations, both public and private.
- The magnitude of the workforce transformation is so large that any one organization cannot solve the challenges faced by the electricity sector and will require each of employers, government, unions and the education/training sectors to participate in solutions.

It is also important to recognize that the changing demands for human resources within the electricity sector are both driven by and compounded by fundamental changes to the sector itself; the challenge is not simply one of high levels of workforce exits due to retirement, although that is perhaps the most significant issue. Large municipal and provincial energy organizations that historically have not had to compete with new market entrants and/or intensifying competition from other sectors, now face increased competition for a limited talent pool as demographics shift. Deregulation and restructuring combined with changes to technology and high levels of investment in infrastructure are having profound impacts on human resources practices within the electricity sector - ranging from recruitment and training through to leadership development and succession management.

The Conference Board of Canada's report of 2012, *Shedding Light on the Economic Impact of Investing in Electricity Infrastructure: Economic Performance and Trends* detailed how integral the supply of electricity is to a modern economy, to driving competitive advantage, to overall economic activity, and to broader employment realized through capital investment. The report concluded that over a 20 year period (2011 – 2030), investments in the sector will result in an annual contribution to real gross domestic product of almost \$11 billion and approximately 156,000 jobs per annum. In turn, this increased economic activity will lift household income as well as return significant value to government.

Shedding Light on the Economic Impact of Investing in Electricity Infrastructure: Economic Performance and Trends further notes that the labour requirements to accommodate the investment in electricity infrastructure will exert pressure on an already tight labour market. For example, employment in electric power engineering construction is expected to increase by 49,000 jobs per year over the period 2011 – 2030. Given the front-loaded nature of investment, the pressure on the labour market from 2011 – 2016 will be even greater where 78,000+ jobs will be created in electric power engineering. The increase in employment will, of course, result in a decline in unemployment rates.

1.4 Economic Context

This section of the report provides an overview of the relevant economic and labour market trends impacting Toronto Hydro, at each of the national, provincial and sector levels.

Canada

Given that Toronto Hydro operates to some extent within the context of the broader Canadian labour market, it is important to understand key related trends across the country. Economic growth is uneven in Canada, with some provincial and regional economies [western Canada] experiencing more robust economic growth than others. At the same time, Canada's economy will benefit from a lower Canadian dollar and improving US economy overall but growth will be modest at 2.3 per cent in 2014.

The labour market is expected to benefit from stronger economic activity, with job growth forecast to average 1.6 per cent per year between 2014 and 2015, up from 1.3 per cent in 2013. Unemployment will realize further reduction from 7.1 per cent (2013) to a forecast of 5.7 per cent (2018). However, rates will vary significantly across the country – lower in the western Canadian economy than in Toronto or Ontario (Toronto 8.2 per cent; Ontario 7.5 per cent; Saskatchewan 4.0 per cent; Alberta 4.6 per cent). Given the competitive national labour market, there is strong domestic migration to Alberta from elsewhere in Canada.

Ontario

The Conference Board's recent *How Canada Performs* research reveals that Ontario remains a relatively healthy economy. However, Ontario remains in a long-term transition that started more than a decade ago. This has implications for Ontario's economic climate, and in comparison with other parts of Canada, and puts pressure on labour migration patterns and compensation as a shrinking talent pool becomes more competitively targeted:

- *Income per capita* – Ontario scores a “C” in the Conference Board of Canada's How Canada Performs analysis, comparable to Canada. Ontario ranks far behind Alberta (“A+”) on the income per capita metric.
- On the metric of *labour productivity growth*, Ontario scores a “C” grade, again in line with Canada as a whole.
- *Gross Domestic Product* – Ontario's grade for GDP growth has steadily slipped over the past few decades and currently scores a “B” grade.

Ontario's domestic economy is quickly losing steam, but stronger external demand from the U.S. will help support growth this year and next. Real GDP growth will pick up a little this year compared to 2013, increasing 1.8 per cent as the recovery south of the border solidifies. But growth will be restrained by weak investment and consumption in Ontario. Next year, the economy will see healthier growth of 2.7 per cent as exports steer Ontario's economy out of its slump. As summarized in Table 1 below:

- The Ontario-specific price index will continue to move upward.
- On-going upward pressure on wages/salaries.
- Limited growth in the available workforce and the unemployment rate will continue to fall.

Table 1: Key Employment-Related Economic Indicators, Ontario

	2013 (actual)	2014 (forecast)	2015 (forecast)	2016 (forecast)	2017 (forecast)	2018 (forecast)
Consumer Price Index (2002=1.0)	1.2	1.3	1.3	1.3	1.3	1.4
Wages & Salary Per Employee (Thousands)	46.5	47.4	48.7	50.0	51.4	52.9
Population Of Labour Force Age ('000)	11,204	11,340	11,478	11,619	11,765	11,915
Labour Force ('000)	7,440	7,480	7,569	7,650	7,729	7,818
Employment ('000)	6,879	6,935	7,057	7,155	7,264	7,365
Unemployment Rate	7.5	7.3	6.8	6.5	6.0	5.8
Source: The Conference Board of Canada						

Employment has grown at a faster rate than the size of the labour force since the recession; this difference has allowed the unemployment rate to decline. The proportion of Ontario's population aged 15-24 that is employed (known as the "employment rate") remains five percentage points lower than it was in 2008. Meanwhile, the employment rate for Ontario's population aged 55-64 has continued to climb unabated, sitting two percentage points higher now than in 2008.

Toronto

The Conference Board's recently released *Economic Insights into 13 Canadian Metropolitan Economies*, provides an overview of Toronto's economic context. Like Ontario, Toronto is expected to experience some real growth in the coming years. As highlighted in Table 2, in future years, Toronto is expected to match or outperform a number of Canadian cities.

Table 2: Real GDP Growth for Select Canadian Cities

City	2013 (actual) (per cent)	2014 (forecast) (per cent)	2015-2018 (forecast) (per cent)
Calgary	3.7	3.4	3.1
Regina	5.1	3.3	2.3
Edmonton	5.1	3.1	3.0
Saskatoon	6.7	2.9	2.4
Halifax	2.2	2.7	2.6
Vancouver	2.5	2.7	3.2
Toronto	1.8	2.7	3.0
Hamilton	0.4	2.1	2.2
Montreal	1.7	2.1	2.2
Quebec City	1.2	1.9	2.0
Winnipeg	1.1	1.8	2.6
Victoria	0.2	1.4	2.2
Ottawa-Gatineau	0.1	0.9	2.2
Source: The Conference Board of Canada			

This level of growth is reflected in higher employment and a falling unemployment level.

Table 3: Key Employment Related Economic Indicators for Toronto

Economic indicators	2013 (actual)	2014 (forecast)	2015 (forecast)	2016 (forecast)	2017 (forecast)	2018 (forecast)
Total employment (000s)	3,120	3,186	3,264	3,334	3,405	3,477
<i>Percentage change</i>	3.8	2.1	2.4	2.2	2.1	2.1
Unemployment rate (per cent)	8.2	7.8	7.2	6.9	6.5	6.3
Source: Statistics Canada						

In the midst of the ongoing construction activity and infrastructure renewal in Toronto, the demand for semi-skilled and skilled labour will build. With forecasted growth of 2.1 per cent in 2014, total employment is expected to increase by just over two per cent per year through to 2017. At the same time, the unemployment rate is expected to fall from 8.2 per cent in 2013 to 6.5 per cent in 2017.

2.0 Perspectives on Labour Market and Human Resources Trends - Implications for Toronto Hydro Electric-System Limited

Section Highlights

- Human resource challenges, particularly those related to the aging workforce and the need for effective recruitment and retention strategy are now clearly on the agenda of Canada's CEO and Board of Director's agendas – CEOs now see workforce management as one of their top strategic priorities.
- The Canadian electricity sector faces a higher than average age profile compared to the broader Canadian labour market. Toronto Hydro has projected retirements of almost 5 times the overall Canadian labour market. In select instances, such as Certified and Skilled Trades, the retirement rate exceeds 7 times the overall Canadian labour market. Over the next ten years, Toronto Hydro will see a retirement rate of approximately 50%.
- The magnitude of retirement's demands that sectors operate in tandem to create solutions, and that individual organizations such as Toronto Hydro develop a range of new approaches to workforce management. A more proactive and longer term strategy is require to ensure a trained and productive workforce for the future. Human resources challenges and implications include:
 - The need for a related knowledge transfer strategy between generations of workers.
 - Cost implications related to pension and post-retirement benefits.
 - The need to recruit many workers that are seasoned and experienced – new graduates will not be adequate to meet the technical demands.
 - Sophisticated workforce analytics.
 - Strong value proposition (work-life balance, compensation/benefits, culture [employee engagement and leadership strength] and presence in a wide range of traditional and new media.
 - Development of relationships with universities, colleges and other organizations that are talent pipelines.
 - Effective alumni networks.
 - Effective succession management processes built on best-in-class performance management processes for talent development and high-potential identification.
 - Investments in learning and development.
 - Upward pressure on total compensation including base salary and benefit.
- Canada's public sector with its very high rate of unionization will continue to exert pressure on employers.

2.1 Introduction

As discussed in the preceding section, the Canadian utilities sector, including Toronto Hydro, faces two key, related challenges:

- The sector is expanding to meet growing demand, adapting to meet new technological advancements, and making a major investment to deal with aging infrastructure, all of which demand significant investments in financial, material and human resources.
- The sector is beginning to experience unprecedented levels of retirement and a shrinking talent pool to draw from, and a talent pool which is under increased competitive pressures from other, related sectors such as construction, oil and gas.

This section of the report provides both a qualitative and qualitative perspective on key labour market and human resources challenges for the sector broadly and the specific implications for Toronto Hydro. The section is structured around the following key issues:

- Leadership's Priorities.
- Demographics – Supply and Demand.
- Talent Acquisition / Recruitment.
- Leadership.
- Development and Learning.
- Compensation and Benefits.
- Retention and Turnover.
- Collective Bargaining.

This section of the report builds on the work of the Conference Board of Canada and most specifically the 2014 *Human Resources Trends and Metrics: HR Measurement Benchmarking, Third Edition*, to provide an overview of both the broader Canadian labour market as well as the utility sector. Undertaken during 2012/2013, *Human Resources Trends and Metrics: HR Measurement Benchmarking, Third Edition* provides data for 169 Canadian organizations with the following attributes:

- Forty-seven per cent of organizations were based in Ontario.
- Over one-third of participant organizations were public sector organizations.
- Fifty-five per cent of organizations included a unionized workforce.
- Almost one-quarter of the organizations were of similar size to Toronto, while almost one-half of the total participants were equal to or larger based on their number of employees.
- Five per cent of organizations represent Canada's Utilities sector (11 organizations) while an additional five per cent represent organizations in those sectors that compete for talent with Toronto Hydro—oil, gas, and construction.

While detailed information and insights are provided throughout this section of our report, the overall conclusion of the *Human Resource Trends and Metrics* report is relevant to organizations in the utility sector broadly and Toronto Hydro specifically, and states:

Building leadership capacity and attracting and retaining talent with critical skills will be top priorities for employers as a sputtering economy gains a more solid footing in 2014. Even in a moderate growth scenario, labour markets will tighten beyond 2015 as retirements accelerate and the number of new employees joining the workforce declines. A slow growth environment has provided employers with breathing room to evolve talent management practices rather than simply reacting to the demands of rapid growth. Nevertheless, the combination of demographic shifts and global competitive pressures, as well as concerns about cost, lagging productivity, and the need to innovate, suggests that there are significant risks to optimal business performance. Without effective organizational responses, these pressures will constrain organizations' long-term productive capacity.

2.2 Leadership's Priorities

While CEOs remain focused on traditional business issues such as productivity and risk, the CEO agenda has shifted to the people-dimension of the business, regardless of sector. The issues of attracting and retaining talent have never been as central to the CEO agenda as is the case now. This is expected to continue over the next decade. The convergence of high levels of retirements with shrinking labour supply, have moved the conversation to the top of the leadership agenda both in Canada and around the world given the risk to operations that current and future HR challenges present.

The Conference Board's annual research study *CEO Challenge 2014*, asked Chief Executive Officers around the world to identify their top anticipated business challenges for the coming year and to provide their preferred strategies to meet these challenges. The global survey has been conducted by the Conference Board Inc. since 1999. Globally, a total of 1,020 chief executive officers were surveyed in the regions of Asia, including India (479), China (139), India (55), the United States (233), Latin America (114), Europe (105), Canada (74), and Rest of World (15).

This year's findings demonstrate that Canadian CEOs are focusing their efforts and resources where they have more control and influence – operational excellence and, of particular note, human capital (see Table 4). While the economy continues in a slow growth mode within Canada and abroad, the competitive differentiators will be internal practices and programs to enhance efficiency, alignment and increased emphasis on performance and accountability. While last year's results indicated an emphasis on engaging and developing employees, it appears that in 2014 CEOs will be more focused on the "top" of the organization working to improve alignment, performance and accountability of senior management, improving leadership development and succession planning programs and the effectiveness of their senior management teams.

Table 4: Top 10 Challenges of Greatest Concern to CEOs in Canada

Challenge	Canada	United States	Global
Operational excellence	1	3	T3
Human Capital	2	2	1
Customer relationships	3	1	2
Innovation	4	4	T3
Corporate brand and reputation	T5	T5	5
Government regulation	T5	T5	7
Sustainability	7	8	8
Global political / economic risk	8	7	6
Global / international expansion	T9	9	9
Trust in business	T9	10	10
T=denotes a tie			
Source: The Conference Board of Canada			

Canadian and US CEOs are strongly aligned in the identification of their top challenges – operational excellence, human capital, customer relationships and innovation. Interestingly, this alignment carried across most of the world underlining the global nature of many business challenges, most importantly Human Capital. In fact, Human Capital rated as either 1 or 2 for each of Europe, Latin America, Asia, China and India.

Chief Executive Officers were also asked to comment on strategies to respond to the top five challenges – Operational Excellence, Human Capital, Customer Relationships, Innovation, Corporate Brand and Government Regulation. In their responses, not only does the Human Capital vertical focus on people issues – performance, succession, employee engagement – but so too do many of the other verticals. For example, CEOs note that Operational Excellence is achieved through employee engagement, performance and organizational flexibility while Customer Relationships are about the personal relationships, and Innovation is dependent of building innovation into employee skills sets.

CEOs were also asked about “hot button” issues – the more immediate, tactical issues that are keeping CEOs up at night. Once again, for Canadian CEOs, many of their top issues are the people-related – labour relations and leadership. Canadian CEOs also pointed to volatility in the energy markets as a significant business concern. As this report highlights at different points, the centrality of the broad energy sector, including electricity/utilities, cannot be underestimated. The sector itself is a lynchpin for other sectors of the Canadian economy.

With Chief Executive Officers increasingly focused on human resources issues, the priority of the talent agenda within organizations is increasingly at the forefront. This not only signals the centrality of the talent agenda for business, but will put greater and greater demands on Human Resources leaders for innovative and effective strategies. With the attention of the CEO office squarely focused on HR issues, the people dimension of business will continue to be a key driver and differentiation of organizational performance.

At the same time that Human Resources issues are rising to the top of the Canadian CEO agenda, so too are Canadian Boards of Directors prioritizing talent issues as a governance priority and a key

competitive, strategic differentiator (Source: Conference Board of Canada's *Canadian Directors' Compensation Practices, 20th Edition*, April, 2014).

2.3 Human Capital Challenges and Human Resources Issues

Increasingly, the CEO agenda and the human resources agenda are aligned and focused on the people dimension of business success. Participants (HR leaders) from the Conference Board of Canada's third edition of *HR Measurement and Benchmarking* identified their top human capital challenges in both the short term (one year horizon) and for the longer term (three-to-five year horizon). While the timeline is not significantly different, by extending the timeline by just a couple of years, employers identify the aging workforce more often than any other issue (over 40 per cent of all organizations) as their most significant challenge. In the nearer term, Canada's employers, including those in the utility sector, are concerned about the ability to attract and retain the talent needed. As will be discussed later in this section, the challenge of the demographic shift – increased retirements and a smaller incoming labour pool – is driving the issue of recruitment and retention to the top of the HR agenda.

While all Canadian organizations from across sectors are concerned about leadership capacity and challenges in attracting and retaining employees, it is of note that over the longer term, organizations representing the utility sector highlight the challenge of *capacity to respond to change*. With changing demands and expectations related to infrastructure renewal, cost pressures, customer expectations, heightened requirements for environmentally sound practices, the utilities sector, much like the oil and gas sector, faces unprecedented change beyond workforce capacity.

Table 5: Top 3 Human Capital Issues in the Canadian Labour Market

Short Term Human Capital Challenges		Long Term Human Capital Challenges	
All organizations	Utility sector	All organizations	Utility sector
Leadership capacity	Leadership capacity	Aging workforce	Aging workforce
Attracting and recruiting	Retaining employees	Leadership capacity	Leadership capacity
Employee engagement	Attracting and retaining	Attracting and retaining	Capacity to respond to change

Source: The Conference Board of Canada

Given the top Human Capital challenges facing the broader Canadian labour market, it is not surprising that the top three Human Resources priorities for both the broader labour market and the utilities sector focus on solutions to building and managing organizational capacity at all levels – leadership development and succession planning, managing retirement exits (knowledge transfer) and learning and development.

Table 6: Top 3 Human Resource Priorities in Canadian Labour Market

Short Term Human Resource Priorities		Long Term Human Resource Priorities	
All organizations	Utility sector	All organizations	Utility sector
Management/ leadership development	Management/ leadership development	Strategic workforce planning	Succession management
Strategic workforce planning	Employee retention	Succession management	Management/ leadership development
Performance management	Learning and development	Management/ leadership development	Managing retirement exits
Source: The Conference Board of Canada			

Each of these challenges – workforce planning, succession management, leadership development and retiree management – demand sophisticated technological tools that provide the foundation for effective workforce analytics as well as highly skilled Human Resources professionals to design and deliver programs and strategies.

2.4 Demographics, Retirements and other Exits

Over the last 10 to 15 years, much has been made about the shift in the Canadian labour market as baby boomers begin to retire. This shift to an aging workforce is also true for organizations in the electricity sector, and, in fact, more pronounced. The following tables from Statistics Canada provide a profile of the aging workforce for the Canadian Labour Force.

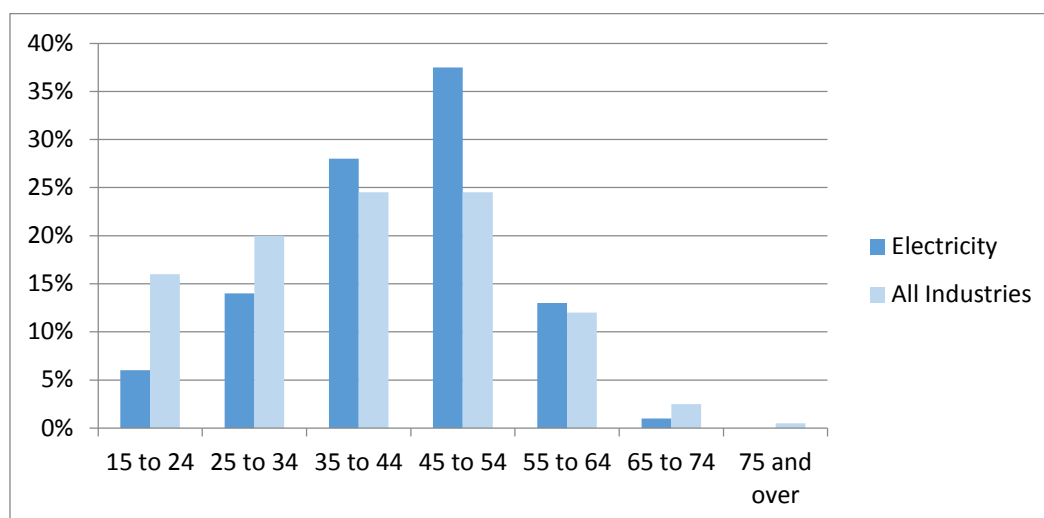
Table 7: Age Distribution of Labour Force in Canada / All Industries (2013)

Age	Actual Labour Force (All Industries)	Percentage of Labour Force (All Industries)
15-24	2,837,900	14.87%
25-34	4,120,400	21.60%
35-44	4,051,600	21.24%
45-54	4,478,500	23.47%
55-64	2,927,800	15.35%
65+	663,200	3.48%
Total	19,079,400	100%
Source: Statistics Canada		

The Electricity Sector Council's *Power in Motion* study also reported on the age distribution of electricity sector occupations based on their employer survey. Where the broader Canadian labour market reports 23.47 per cent of employees between the ages of 45 – 54, for the electricity sector, this number (employees aged 45 – 54), rises to 37 per cent. In fact, while the broader Canadian labour market has about 60 per cent of its workforce below the age of 45, for the electricity sector, it is less than 50 per cent (see Chart 1). Select occupations, such as Utility Managers and Supervisors, are much higher at 58

per cent and 56 per cent respectively for workers aged 45 – 54, and a much larger proportion over the age of 45 – for Utility Managers, 77 per cent, and for Supervisors, 74 per cent. (See Table 8).

Chart 1: Electricity Industry in Canada Age Distribution of the Workforce (Per Cent)



Source: Statistics Canada, 2006 Census

Table 8: Age Distribution, Electricity Sector Occupations

Category	Per cent of Sample By Age							Total
	n	<25	25-34	35-44	45-54	55-64	>65	
Engineering Managers	43	0	4	22	49	24	1	143
Utilities Managers	38	0	4	19	58	19	0	138
Construction Managers	27	0	4	18	48	29	1	127
Supervisors of Electricians and Electrical Power Line Workers	50	1	7	19	56	17	1	151
Electrical and Electronic Engineers	37	4	29	24	27	14	1	136
Electrical and Electronics Engineering Technicians and Technologists	36	4	22	22	38	13	1	136
Electrical Power Line and Cable Workers	50	9	29	22	28	12	1	151
Power System Operators	29	7	23	20	37	13	0	129
Power Station Operators	20	4	23	26	36	12	0	121
All Other Trades	29	4	16	18	43	19	1	130
Total ESC	359	33	161	210	420	172	7	1362
Percentage of Total Sample	26.4	2.4	11.8	15.4	30.8	12.6	0.5	100

Source: Electricity Sector Council (*Power in Motion*)

The implications of an aging workforce are many, but most notably when looking at workforce retirement profiles. Table 9 below provides a profile of projected retirements for each of the broad Canadian labour market, the Utility sector overall, as well as Toronto Hydro in particular. As is clear

from the data, Toronto Hydro faces a major challenge in the level of retirements it faces. This challenge is compounded by the fact that there are unique roles within Toronto Hydro, and the sector broadly, that demand significant levels of training in order to reach full levels of productivity – replacement must be planned and managed well in advance of actual retirements.

Table 9: Retirement Profile (as per cent of workforce)

Category	Retirement Rate over the next Five Years (2014-2018)
All	4.2%
Utilities	16.3%
Toronto Hydro	19.1%
Source: The Conference Board of Canada Toronto Hydro data provided by Toronto Hydro	

*For comparative purposes, this table looks at the years 2014 through to 2018 inclusive. For more detailed information on the period of 2014 to 2019, please see Table 12.

The *Power in Motion* study also highlights the relatively younger age of retirement for the electricity sector relative to the broader Canadian labour market – 58 years of age versus 61 years of age. In addition, the report also points to a number of specific occupations where the rate of retirement is projected to escalate over the period 2011 – 2016.

Table 10: Retirement Projections, Electricity Sector Occupations

Category	n	Per cent of Workforce Retiring in 2011	Per cent of Workforce Retiring in 2016
Engineering Managers	20	4.9	8.3
Utility Managers	27	6.3	10.6
Construction Managers	18	7.3	12.9
Supervisors of Electricians / Electrical Power Line Workers	28	7.0	19.8
Electrical and Electronic Engineers	20	2.7	5.8
Electrical Engineering Technicians and Technologists	23	3.4	10.0
Electrical Power Line and Cable Workers	33	1.7	4.5
Power System Operators	24	6.4	25.4
Power Station Operators	14	3.2	7.0
All Other Trades	18	5.7	18.8
Source: Electricity Sector Council (<i>Power in Motion</i>)			

The following table provides a profile of the past and current workforce profile for Toronto Hydro (at year end), demonstrating a flat or downward trend in overall workforce size:

Table 11: Toronto Hydro – Workforce Profile

Category	2011	2012	2013
Designated & Technical Professionals	591	528	559
Certified and Skilled Trades	712	624	573
Supervisory	190	153	177
Administrative and Support	234	183	183
Senior management	62	56	55
Total	1,789	1,544	1,547
Source: Toronto Hydro			

Looking forward to 2019, Toronto Hydro will experience significant actual numbers of retirees representing high percentage of its overall workforce. Similar to the profile found in *Power in Motion*, the rate varies by occupational category.

Table 12: Toronto Hydro – Retirement Projections

Category	2014		2015		2016		2017		2018		2019	
	n	%	n	%	n	%	n	%	n	%	n	%
Designated & Technical Professionals	23	4.1	16	2.9	13	2.3	23	4.1	21	3.8	34	6.1
Certified and Skilled Trades	41	7.2	23	4.0	15	2.6	21	3.7	22	3.8	41	7.2
Supervisory	11	6.2	2	1.1	7	4.0	5	2.8	6	3.4	15	8.5
Administrative and Support	4	2.2	9	4.9	6	3.3	8	4.4	13	7.1	9	4.9
Senior Management	1	1.8	1	1.8	1	1.8	0	0	3	5.5	1	1.8
Annual Total	80	5.2	51	3.3	42	2.7	57	3.7	65	4.2	100	6.5
Cumulative Total	80	5.2	131	8.5	173	11.2	230	14.9	295	19.1	395	25.5
Source: Toronto Hydro												

Note: Percentages are calculated using 2013 workforce headcount as a base

Projections for a ten year period are even more pronounced; using the 2013 workforce profile as the baseline, almost 50 per cent of the total workforce will retire. For many of the roles found within the Certified and Skilled Trades, there is a long period of training, development and apprenticeship which will demand an approach that cannot be just-in-time, and may also have to consider alternative models such as contracted and contingent workforce sources. As highlighted in the introduction and supported by the industry-wide retirement patterns, no single organization within the sector will be able to solve the challenges related to high levels of retirement and lower levels of new entrants. Sector-wide strategies and increasing levels of partnership and outsourcing will be needed. This will become increasingly important as the retirement projections over the next decade are realized. With a loss equal to 50 per cent of staff in key categories – Certified and Skilled Trades / Supervisory – the need for alternative models of workforce deployment will be required. This will be compounded by the challenge of "ebbs and flows" in the requirement for highly-skilled technical and trade roles for the renewal and building of infrastructure.

Table 13: Toronto Hydro Ten Year Retirement Projection

Category	10 Year Retirement Projection	10 Year Total as % of 2013 Workforce
Designated & Technical Professionals	217	38.8%
Certified and Skilled Trades	298	52.0%
Supervisory	88	49.7%
Administrative and Support	90	49.2%
Senior management	19	34.5%
Total	712	46.0%
Source: Toronto Hydro		

While the retirement profile is concerning, and requires concerted and immediate effort to plan and manage the change, Toronto Hydro can also expect to lose additional staff through typical processes where employees depart on both a voluntary and involuntary basis. Using 2013 as an illustrative example, in addition to 54 retirements, there are an additional 44 departures from the organization. (See Table 14).

Table 14: Toronto Hydro Total Exits 2013

Category	2012 Staff*	Retirement 2013	Other Exits 2013	Total Exits 2013
Designated & Technical Professionals	528	10	23	33
Certified and Skilled Trades	624	29	9	38
Supervisory	153	12	4	16
Administrative and Support	183	1	6	7
Senior management	56	2	2	4
Total	1,544	54	44	98
Source: Toronto Hydro				

*Note: 2012 headcount was used to calculate exits

It is important to note that by comparison with other organizations in its sector as well as the broader Canadian labour market, Toronto Hydro appears to be doing an excellent job of managing retention and therefore other exits, both voluntary and involuntary; related rates as a per cent of workforce are significantly lower than any of the comparators provided in Table 15.

Table 15: Voluntary and Involuntary Turnover

Category	Voluntary (%)	Involuntary (%)
Overall	7.3	3.7
Utilities	5.0	1.7
Public sector	8.1	4.2
Private sector	5.1	2.3
Toronto Hydro	1.4	0.9
Source: The Conference Board of Canada / Toronto Hydro data provided by Toronto Hydro		

Conclusions and Implications

As discussed in the Electricity Sector Council Report, *Power in Motion*, there will be a need for a significant intake of employees to meet the wave of retirement and to fill the need created by system expansion and renewal. Similar to the sector broadly, Toronto Hydro estimates a cumulative retirement in its trades, technical and supervisory workforce segments in excess of 50 per cent over the next decade. Any organization, but particularly those with highly educated and trained technical specialist roles must view this as a major business challenge requiring significant planning and investment. As discussed in the overview of the economic context, while past years of slow growth have provided employers some breathing room to respond to this challenge, the expectation of increased economic performance in the near term will put significant pressure of employers to respond.

The aging workforce has a number of key human resources implications for Toronto Hydro including:

- Increased competition for talent and corresponding pressures in talent acquisition (from sourcing through to on-boarding).
- Management of retirement rates and types, and the need for a related knowledge transfer strategy between generations of workers.
- Cost implications related to pension and post-retirement benefits.
- Potential for gaps in technical, supervisory, management and leadership positions, and the corresponding impact on productivity and innovation.
- Skill and knowledge replacement.

Given the combined levels of growth and retirement occurring within the utility sector and Toronto Hydro particularly, there are unique demands for talent acquisition. Not only will there be a need for a strategy that leverages a wide range of approaches such as use of contractors, partnerships and full time staffing, but given the nature of the work and the need for significant training to achieve levels of full productivity, advanced planning and retention will be critical. It will likely not be adequate for Toronto Hydro to undertake a short-term planning cycle for replacement, but there will be a need to be more proactive, while also recognizing the need to manage costs (balancing immediate staffing needs with longer term training to productivity cycles). It will be important to find the balance between the value of building long-term workforce development and deployment and incurring short-term costs in order to do so. Below we discuss the challenges related to talent acquisition.

2.5 Talent Acquisition and Recruitment

Within the Canadian utility sector, the current and future wave of retirement is *the* critical workforce issue. Given the demand for well-educated and highly trained professionals across all facets of operations (technical, management and leadership), strategies for talent acquisition must be best-in-class. As highlighted in Tables 7 and 8, the attraction and retention of talent are reported as being among the most significant issues facing organizations in the utility sector.

As reported in the Conference Board of Canada's *HR Measurement Benchmarking* report, while the vast majority of all Canadian organizations report real challenges in recruitment of quality candidates, the utility sector reports at even higher levels for jobs defined as "hot skills" or "critical skills."¹ With

¹ Critical skills are skills needed to perform key tasks identified as essential to an organization. Hot skills are skills that are in short supply and high demand in the labour market.

declines in both labour market participation and unemployment levels, skills shortages will intensify and the already challenging market for recruitment will continue become increasingly challenging.

Table 16: Challenges in Recruiting Quality Candidates by Industry and Skill Type
(Per cent of organizations reporting yes)

Select Industries	Hot Skills	Critical Skills	Management/ Executive Talent	All Categories
All industries	72	80	22	12
Utilities	100	90	10	0
Natural Resources (including oil and gas)	92	82	3	0
Manufacturing and construction	92	100	33	9
Finance, insurance and real estate	77	83	28	26
Source: The Conference Board of Canada				

Interestingly, while leadership capacity remains a challenge for all organizations, the ability to recruit quality leadership and management candidates remains relatively low as a challenge relative to either hot or critical skill jobs. Challenges related to the leadership category was reported by less than one quarter of all respondent organizations, and only 10 per cent of those organizations representing the utility sector. Based on the Conference Board of Canada's longitudinal database, these numbers are on the rise over the period 2005 – 2008 and 2008 – 2013. It is clear that while the challenge of recruiting top talent has been long standing, it is heating up in recent years, particularly as the Canadian economy continues to improve.

At the same time that Toronto Hydro is preparing for and managing significant waves of retirement, the organization is also focused on hiring, particularly roles that are critical skills/hot jobs in a highly competitive labour market. Over the past three years, Toronto Hydro has hired over 470 staff. The vast majority are new hires and are from two occupational categories – designated and technical professionals and certified and skilled trades.

Table 17: Total Toronto Hydro Hires

Category	2011		2012		2013		Total		Composite Total
	External	Internal	External	Internal	External	Internal	External	Internal	
Designated & Technical Prof's	111	37	21	5	55	18	187	60	247
Certified and Skilled Trades	41	43	0	0	6	8	47	51	98
Supervisory	19	17	1	2	17	7	37	26	63
Administrative & Support	25	0	5	0	8	2	38	2	40
Senior Management	5	2	2	8	2	4	9	14	23
Total	201	99	29	15	88	39	318	153	471
Total by Year	300		44		127		471		
% of Total by Year	67%	33%	66%	34%	69%	31%	68%	33%	

Source: Toronto Hydro

Of the total Toronto Hydro hires in the three-year period above in Table 17, an overall average of 68 per cent were recruited from the external market, with the remaining one-third of the workforce was replaced internally from promotion and development. The profile varies significantly with select occupational categories having higher/lower levels of entrants from the external market, with variation over time.

Table 18: Occupational Category Hires from External Market
(Per cent of total hire pool per occupational group)

Category	2011	2012	2013	Total
Designated and technical professionals	75.0	80.8	75.3	75.7
Certified & Skilled Trades	48.8	NA	42.9	48.0
Supervisory	52.8	33.3	70.8	58.7
Administrative and Support	100	100	80.0	95.0
Senior Management	71.4	20.0	33.3	39.1

Source: Toronto Hydro

The above profile reflects broader market practices of vacancies that are filled from within an organization and the balance from the external market. The Conference Board's *HR Measurement Benchmarking* survey reported that 42.5 per cent of vacancies are filled from within. When looking specifically at the Trades category, Toronto Hydro has an average of 52 per cent of vacancies that are filled from within the organization, as compared to 41.9 per cent in the Conference Board's survey (see Table 19).

Table 19: Vacancies Filled from Within

Category	Mean	Median
Overall	42.5	39.3
Senior executives	29.1	0
Executives	46.0	45.0
Management	51.9	53.0
Professional – technical	37.5	36.5
Professional - non technical	36.6	25.0
Technical and skilled trades	41.9	44.0
Clerical and support	46.4	50.0
Source: The Conference Board of Canada		

It is important to highlight that while Toronto Hydro will recruit a number of employees with limited work experience, albeit with higher than average levels of education, like most Canadian organizations, there is a high need for experienced employees. Given that Toronto Hydro will be competing directly with both sector- specific organizations as well as organizations that have similar workforce demands – oil and gas, construction – there is an expectation that not only will there be challenges to find the talent, but that the shortage and competitive market will also drive premium compensation and benefits levels as well as place increased pressure on organizations for programs that effectively retain employees.

Conclusions and Implications

Canadian organizations see talent acquisition and management as a critical workforce issues. As such, talent acquisition has shifted from being a transactional, “just-in-time” model to one that is strategic and takes a long term perspective to ensure robust talent pipelines are in place to meet needs.

In addition to a more strategic approach, all organizations have expanded recruitment strategies. As discussed in the *Power in Motion Study*, the electricity sector will need to work collaboratively to develop a ready talent pool (education and training) and to look beyond what has been its traditional talent pool. Strategies, policy and programs to engage with the diversifying workforce will be essential. Not only must employers develop programs for more diversified populations, but they must also develop the necessary human resources and cultural infrastructure to ensure ease and success in orientation and retention.

Given the combination of higher levels of retirement in the utilities sector and the challenge of hiring experienced employees, organizations like Toronto Hydro will require a forward looking, aggressive recruitment strategy characterized and underpinned by:

- Sophisticated workforce analytics.
- Strong value proposition (work-life balance, compensation/benefits, culture [employee engagement and leadership strength] and presence in a wide range of traditional and new media.
- Relationships with universities, colleges and other organizations that are talent pipelines.

- Effective alumni networks.
- Effective succession management processes built on best-in-class performance management processes for talent development and high-potential identification.

2.6 Leadership, Development and Learning

Whether data are drawn from the Conference Board of Canada's *2014 HR Measurement Benchmarking, CEO Challenge 2014* or any number of reports by reputable research and consulting practices, leadership continues to grow as a priority human resources issue. While retirement is a major contributor to the challenge, perhaps more so, is the changing nature of leadership and the changing expectations and demands of those that are led. All organizations must make greater and greater levels of investment in leadership development, at all levels. It is not enough to only focus on the "c-suite," but effort must also be focused on front line managers and supervisors, at the same time that the future leadership pipeline – at all levels – is being groomed.

The Conference Board of Canada's *Learning and Development Outlook – Strong Learning Organizations, Strong Leadership* (12th Edition, 2014) highlighted the following:

- Over half (55 per cent) of all Canadian organizations indicate that learning is a top priority.
- From the period 2010 to 2013, Canadian organizations increased their spending per employee from \$688 to \$705.
- In the utilities sector, spending was above average at \$1,080 per employee.
- Employees across Canada received, on average, 28.3 hours of training.
- Organizations are increasingly building internal capacity for delivery of learning with a corresponding drop in the reliance on external vendors.
- There is greater reliance and use of informal learning options such as social networking, online peer information sharing.

Establishing a strong learning culture is critical for organizations to ensure they remain competitive in the face of challenging and dynamic economic and labour market trends. As reported in our 2014 *Learning and Development Outlook*, the International Institute for Management Development ranked Canada 28th out of 59 countries in terms of the importance placed on workforce training. Prior to 2000, Canada was consistently in the top 20 and stood at 19th in 2012. Whether in professional or highly specialized technical areas, not only must organizations do more to simply ensure an available workforce, but Canadian organizations must do more to ensure an innovative and productive workforce. Moreover, as employee engagement surveys consistently demonstrate, access to learning and development are a major lever for improved engagement and retention.

Table 20: Direct Learning and Development Expenditure, 2012/13

	n	Per employee investment in training (mean)	n	Annual hours of training, per employee (mean)
Overall	115	\$705	58	28.3
Utilities	3	\$1,080	3	25.1
Public sector	54	\$628	25	23.9
Private sector	61	\$773	33	31.6
Toronto Hydro		\$963		35.5
Source: The Conference Board of Canada Toronto Hydro data provided by Toronto Hydro				

Conclusions and Implications

Toronto Hydro's investment in the area of learning and development will need to be persistent. Toronto Hydro will have to continue to have a best-in-class school for training specialized skill sets [as has been the case for a number of years]. While the programs have been operational for a number of years, there will be a need to continue to refresh the curriculum as technologies and infrastructure continue to evolve.

Beyond the continuous efforts to develop specialized skill sets, Toronto Hydro will also need to focus on sustaining best-in-class organizational performance and retaining top talent. In order to do so, Toronto Hydro will have to make investments in learning and development across the organization for professional, supervisory, management and leadership development. As highlighted in the Conference Board of Canada's *Learning and Development Outlook*, organizations across Canada are repatriating learning and development from external providers/contractors to build in-house capacity.

2.7 Compensation and Benefits

Generally speaking, tight labour markets and skill shortages drive compensation levels upwards over time, and there is perhaps no better evidence in this regard than Alberta's labour market profile relative to the rest of Canada. Drawing from the data presented in the Conference Board of Canada's *Compensation Planning Outlook 2014* report, it is clear that those provincial labour markets in Canada that are having the greatest attraction success are those having to offer premium compensation differentials as measured by actual annual compensation adjustments:

Table 21: Annual Compensation Increases in 2013 by Province

Province	Percentage Increase
Atlantic	2.9
Quebec	2.7
Ontario	2.3
Manitoba	3.2
Saskatchewan	3.9
Alberta	3.8
British Columbia	2.6
Source: The Conference Board of Canada	

When a sector perspective is used, the premium variation is even more pronounced:

Table 22: Annual Compensation Increases in 2013 by Selected Industries

Industry	Percentage Increase
Oil and gas	4.8
Construction	3.9
Natural Resources	3.3
Government	2.9
Utilities	2.9
Finance	2.7
Source: The Conference Board of Canada	

We are of the view that as the Toronto Hydro labour market continues to tighten as a result of retirement and labour shortages, there will likely be upward pressure on compensation.

In addition, post-retirement costs can be significant, and based on the data from the 2014 *Human Resource Trends and Metrics: HR Measurement Benchmarking, Third Edition*, post-retirement benefits are significantly higher for utility sector organizations. For all participant organizations, 1.23 per cent of annual payroll is required, while for utilities sector the mean is 2.03 per cent of payroll. As Toronto Hydro continues to see increasingly levels of retirement, there will likely be incremental financial resources required.

Conclusions and Implications

Toronto Hydro is facing increased costs in compensation and benefits through the dual pressures of an increasingly competitive labour market as well as increasing levels of retirees. While a wide range of HR programs (strong learning and development, effective leadership, work/life, etc.) can be used in part to offset compensation and benefit costs, the reality is that each program has a range of both hard and soft costs – development, lost productivity – that impact an organization's bottom line.

2.8 Collective Bargaining

In the Conference Board's annual *CEO Challenge* research study, CEOs were asked about "hot button" issues – the more immediate, tactical issues that are keeping CEOs up at night. Labour relations was identified as the number one issue by Canadian CEOs in 2014.

Unions are operating in a new reality as a result of lingering impacts of the recession and the related fiscal landscape for government, globalization, deregulation, and a shifting political landscape. While union density has been in relative decline in the private sector, it remains high in the public sector and in the energy and utilities sector. Given the current economic outlook, it is increasingly difficult to manage expectations ahead of collective bargaining and for both management and labour to reach mutually agreeable settlements. It is important to note, however, that while Canada's union coverage has declined from a 1980's peak of 34 per cent to 31 per cent, this 31 per cent is increasingly dominated by high levels of public sector unionization. In fact, almost 85 per cent of all public sector employees are covered by a union contract.

The Conference Board is of the view that this challenging environment for labour will become increasingly so, making the bargaining process more and more difficult. Research from the Conference Board of Canada provides some evidence that wages, benefits and pensions will be a focus in bargaining as will issues of productivity and competitiveness (see *Back to Basics for the Labour Movement*). However, given the challenging labour market, the overall economic environment, and the willingness of governments to intervene to end strikes and lockouts, it is expected that there will be limited labour disruption in the near future.

Conclusions and Implications

Toronto Hydro operates in a highly unionized environment, with a demonstrated ability of labour to secure the support of its membership for a strike mandate, which brings additional pressure and complexity to its labour relations climate. While we are of the view that the short-term economic environment will moderate the demands made by unions, as the labour market begins to tighten over the next decade, unions may find themselves with greater leverage which will translate into cost pressures for employers.

Sources Consulted

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Metropolitan Outlook 1: Economic Insights into 13 Canadian Metropolitan Economies: Spring 2014, The Conference Board of Canada, May, 2014.

Power in Motion 2011 Labour Market Information (LMI Study Full Report, Electricity Sector Council, 2011.

Shedding Light on the Economic Impact of Investing in Electricity Infrastructure, The Conference Board of Canada, February, 2012.

COMPENSATION STRATEGY & WORKFORCE GOVERNANCE

This schedule includes evidence regarding Toronto Hydro's compensation strategy and workforce governance practices. Further to the information outlined in the OEB Appendix 2-K Employee Cost (Exhibit 4A, Tab 4, Schedule 2), this schedule provides an overview of Toronto Hydro's compensation costs and practices, and pension and benefit programs and costs. The evidence is organized as follows:

- 1) Compensation Costs Overview;
- 2) Compensation Strategy and Workforce Governance;
- 3) Compensation Practices for Non-Union Employees;
- 4) Compensation Practices for Bargaining Unit Employees; and
- 5) Benefits and Pensions.

1. COMPENSATION COSTS OVERVIEW

Table 1 below summarizes Toronto Hydro's total compensation costs, which include base salary wages, overtime and incentive payments, and actual and accrued benefits.

Table 1: Salary and Wages including Overtime and Incentive Pay (\$ Millions)

Year	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test Year
Management (including executive)	15.2	13.7	14.4	15.0	15.3
Non-Management (union and non-union)	219.4	202.0	202.4	205.6	210
Total	234.6	215.7	216.8	220.6	225.3

*Rounding errors may exist

Since 2011, Toronto Hydro has made notable improvements relating to its compensation costs, and the utility plans to sustain these efficiencies over the 2015 to 2019 period by

1 managing its compensation expenses in a financially responsible and cost-constrained
2 manner. Toronto Hydro's plan to control compensation costs between 2015 and 2019
3 presents a considerable challenge for the utility, both on its own and in the context of the
4 utility's plans over that period. During the same timeframe, Toronto Hydro is proposing
5 to execute the largest capital program (Exhibit 2B) in the utility's history, as well as
6 prepare itself for the large wave of retirements that it expects to encounter in the next
7 five to ten years. For more information about the utility's aging workforce challenge,
8 please refer to the evidence at Exhibit 4A, Tab 4, Schedule 3.

9
11 The total compensation costs for management positions decreased 8.9 percent from 2011
12 to 2012 as a result of the corporate downsizing and restructuring that occurred in 2012
13 (Exhibit 4A, Tab 4, Schedule 3). Management costs increased 4.1 percent from 2012 to
14 2013 due to hiring and internal promotions related to expanded portfolios and to meet
15 increased statutory and regulatory reporting requirements. As an example, refer to the
16 Finance program filed at Exhibit 4A, Tab 2, Schedule 15. Toronto Hydro forecasts that
17 management costs will remain relatively static in 2014 and 2015.

18
19 Compensation costs for non-management positions declined 10.6 percent from 2011 to
20 2013 as a result of the corporate downsizing and restructuring that occurred in 2012
21 (Exhibit 4A, Tab 4, Schedule 3). Toronto Hydro's non-management compensation costs
22 are forecast to increase by 9.6 percent from 2013 to 2015, due to the addition of new
23 staff, cost of living increases with respect to salary and wages, and succession planning to
24 address upcoming retirements.

25
26 In preparing its 2014 and 2015 forecasts, Toronto Hydro considered the inflation rates set
27 out in its collective agreements, as well as relevant labour market data. Other factors,
28 such as the increasing size and complexity of the utility's work plan over the next five
29 years, were also taken into consideration.

1 **2. COMPENSATION STRATEGY AND WORKFORCE GOVERNANCE**

2 Toronto Hydro's workforce is the means by which the utility provides service and value
3 to its customers, carries out its business objectives, and complies with its obligations.

4 The utility strives to secure and maintain a workforce that is skilled, adaptable,
5 committed and performance-driven. To achieve these key outcomes in a financially
6 responsible manner, Toronto Hydro's strategy is to provide wages and benefits that are
7 competitive in the markets where Toronto Hydro competes for talent. Toronto Hydro's
8 strategy also includes offering a compensation program that aligns the behaviour and
9 performance of the workforce with the core objectives and goals of the utility. The
10 utility's compensation program is therefore an important tool for communicating
11 performance expectations, fostering productivity and rewarding employees for their
12 contributions.

13
14 **2.1. Market-Competitive**

15 Toronto Hydro's compensation strategy aims to strike a balance between controlling
16 costs and providing market-competitive compensation. Providing value to customers
17 means spending prudently, while maintaining the ability to attract, motivate, and retain
18 employees who have the skills that are critical to the utility's success and who are
19 capable of exceptional performance.

20
21 Maintaining a market-competitive compensation program is essential to the utility's
22 ability to complete its proposed work plan, achieve its performance objectives and
23 otherwise meet its obligations. In addition to the fact that the uniqueness and complexity
24 of Toronto Hydro's distribution plant makes it challenging to hire skilled labour, the
25 utility competes with industries and organizations like Ontario Power Generation and
26 Hydro One, which also currently have a high-demand for many of the same certified and
27 skilled trades, designated and technical professional, supervisory, and leadership
28 positions.

1
2 Over the 2015 to 2019 period, Toronto Hydro expects to encounter additional constraints
3 on the eligible talent pool and its retention capabilities as a result of a number of factors,
4 including: the aging Canadian population, a declining unemployment rate in the Ontario,
5 and economic growth and ongoing construction activity in the City of Toronto. For more
6 information about these factors, refer to the Conference Board of Canada Report on
7 Labour market and Human Resources Trends for the Canadian Utility Sector (Exhibit
8 4A, Tab 4, Schedule 4).

9
10 The utility periodically reviews the external competitiveness of its compensation
11 programs, to help ensure that the level, form and mix of compensation offered by Toronto
12 Hydro is competitive with those provided for comparable jobs in the markets where the
13 utility competes for talent. For example, in December 2013, Toronto Hydro engaged an
14 independent human resources consulting firm, Towers Watson, to undertake a detailed
15 compensation and benefits benchmarking study. The results of the study indicate that the
16 utility is generally aligned with the markets in which it competes, in relation to both
17 compensation (base salary and performance pay) and benefits (Exhibit 4A, Tab 4,
18 Schedule 6).

19
20 Toronto Hydro reviews the market-competitiveness of its compensation packages for
21 non-union employees as part of its annual business planning and budgeting process. This
22 review begins with participating in total compensation salary surveys offered through
23 independent consulting firms, such as Mercer and Towers Watson, which specialize in
24 the compilation of aggregate compensation data. Following receipt of the compiled
25 external compensation survey data, Toronto Hydro compares the available compensation
26 data (i.e., base salary, target performance pay, and target total cash compensation) against
27 aggregate information from companies of similar size, industry, and/or geographic
28 location.

Toronto Hydro uses benchmarking results to review and adjust the job rates to align salary ranges with the competitive market. The final salary budget requires the approval of the Board of Directors. The findings of the benchmarking exercise and the corporate budget are the key considerations for any recommendation to the Board of Directors regarding merit adjustments for the coming year.

2.2. Performance-Based Compensation

Toronto Hydro's compensation strategy is to align the capabilities and competencies of its workforce with the core objectives and goals of the utility, which are embodied in the four pillars outlined below (Figure 1). The utility's philosophy is to reward employees who demonstrate a particular set of competencies – such as commitment to safety and a customer service focus – that allow the utility to achieve its goals and objectives more efficiently and effectively. In 2013, this philosophy enabled the utility to achieve 3.5 million consecutive hours without lost time injury.

Toronto Hydro developed a set of corporate competencies to manage its workforce in an integrated fashion, and to encourage employees to demonstrate certain behaviours and achieve defined performance expectations. The diagram below (Figure 1) illustrates Toronto Hydro's corporate pillars and the chart that follows (Table 2) lists the competencies and descriptors that the utility relies upon to attain these core objectives.



1 **Figure 1: Toronto Hydro's Corporate Pillars (Exhibit 1C, Tab 3, Schedule 1)**

2 **Table 2: Toronto Hydro's Workforce Competencies and Descriptors**

Workforce Competencies	Workforce Descriptors
Drives Results & Accountability	• Set high standards • Holds self and others accountable • Stays focused on priorities
Demonstrates Customer-Focus	• Decisions and actions consider impact on customer
Builds Strong Relationships	• Collaboration • Communication • Networking • Strategic Influence • Trust/Integrity/Respect
Develops Culture & People	• Empowers staff • Focus on people development • Has coaching conversations • Attracts talent and retains employees
Champions Change, Productivity & Innovation	• Continuous improvement • Forward-thinking • Flexibility • Adaptability
Demonstrates Commitment to Environment, Health & Safety	• Does not sacrifice safety to achieve results • Proactive about social responsibility, environment, health and safety

1 Toronto Hydro's corporate competencies guide all areas of human resource management:

- 2 • **Recruitment and Selection** – Toronto Hydro utilizes the corporate competencies
3 in developing the recruitment process for a particular position and takes the
4 competencies into consideration as part of the selection criteria.
- 5 • **Training and Development** – The corporate competencies underpin the utility's
6 training initiatives. As an example, if Toronto Hydro determines through the
7 performance management process that an individual or team lacks in the customer
8 focus competencies, a training needs assessment would be performed, and based
9 on the results, an appropriate customer awareness training program would be
10 implemented to assist in closing this gap.
- 11 • **Performance Management and Compensation** – The corporate competencies
12 are integrated with Toronto Hydro's compensation practices. For non-union
13 employees, this occurs through the assignment of performance ratings, which
14 evaluate employees' performance in relation to the corporate competencies. The
15 performance rating is one of the components that determine the base salary
16 increase. For unionized employees, Toronto Hydro uses performance
17 assessments to determine base step increases for employees with a solid
18 performance rating that are not at the top of the defined salary range.
- 19 • **Succession Planning and Promotion** – Decisions on succession planning and
20 promotion focus on developing employees who consistently meet the corporate
21 competencies, as indicated by their annual performance ratings.

24 3. COMPENSATION PRACTICES FOR NON-UNION EMPLOYEES

25 Toronto Hydro provides non-unionized employees with a total cash compensation
26 package comprised of two elements: base salary and variable performance pay. Base
27 salary compensates an employee for completion of their responsibilities, accountabilities
28 and technical skills, while variable performance pay rewards employees for their

1 contribution to the achievement of business goals and objectives tied to the utility's
2 pillars in combination with the successfully demonstrated corporate competencies.

3
4 Each non-union position at Toronto Hydro has a salary grade/level with a corresponding
5 salary range. To maintain alignment with the competitive market, the utility adjusts
6 salary ranges based on annual market reviews.

7
8 Non-union employees receive a portion of their annual compensation through the
9 variable performance pay program. This program is an incentive performance-based
10 compensation tool designed to retain, motivate and reward employees for reaching
11 performance objectives, which are established at the beginning of each calendar year.
12 Each employee's variable performance pay is based on a weighting of performance
13 objectives, which are measured by Key Performance Indicators, and by individual goals
14 set out in the employee's annual performance contract.

15
16
17 **4. COMPENSATION PRACTICES: BARGAINING UNIT EMPLOYEES**

18 Approximately two-thirds of Toronto Hydro's employees are represented by collective
19 bargaining units: CUPE Local No. 1 ("CUPE") or the Society of Professional Engineers
20 ("the Society"). Toronto Hydro's compensation costs with respect to these employees
21 are negotiated through the periodic collective bargaining processes. The utility is obliged
22 to bargain in good faith with the unions, pursuant to section 17 of the *Ontario Labour*
23 *Relations Act, 1995*,³ and has a contractual and statutory obligation⁴ to honour the terms
24 of its collective bargaining agreements.

25
26 Toronto Hydro's bargaining interests are focused on changes that improve the
27 organization's ability to safely execute capital and operational programs in an efficient

³ S.O. 1995, C. 1, Sched. A., at section 17. ["*Ontario Labour Relations Act*"]

⁴ *Ontario Labour Relations Act* at section 56.

1 and cost effective manner while preserving management's rights to manage and direct the
2 workforce. For example, the most recent round of bargaining that the utility engaged in
3 with CUPE resulted in a variety of changes aimed at improving efficiency and
4 productivity and reducing costs in both the short and long term, including agreeing to a
5 modest 1.75% average wage increase over four years and significant cost containment
6 with respect to post-retirement benefits.

7
8 Toronto Hydro bargains with the focus of achieving the best outcomes with its customers
9 in mind. For example, in the most recent round of bargaining with CUPE, Toronto
10 Hydro introduced provisions that allow for work to be performed outside of the
11 traditional scheduled hours of work. This change improves Toronto Hydro's ability to
12 serve its customers, to respond to trouble calls more efficiently, and to accommodate the
13 realities of operating in large and dynamic urban environment.

14
15 The utility continually reviews external compensation data to understand the
16 compensation landscape both at the time of negotiation, as well as in the years preceding
17 and following bargaining. In doing so, the utility monitors bargaining trends and reviews
18 past settlements. In preparation for the most recent round bargaining with CUPE, the
19 utility also undertook a compensation study by an independent third party, Towers
20 Watson. To review the results of this study, refer to report filed at Exhibit 4A, Tab 4,
21 Schedule 6.

22 23 **4.1. CUPE Collective Agreement**

24 The current collective agreement with CUPE was signed on February 13, 2014 and is
25 valid until January 31, 2018. The table below (Table 3) summarizes the year over year
26 percentage increases in base salary under the previous and current collective agreement.

Table 3: CUPE Base Salary Increases (2011 – 2017)

2011	2012	2013	2014*	2015	2016	2017
3.0%	3.0%	3.0%	1.5%	1.75%	1.75%	2.0%

*New collective agreement effective February 1, 2014 until January 31, 2018.

In negotiating the modest wage rate increases illustrated above, Toronto Hydro considered: 1) the OEB's 4th Generation IRM inflation parameters⁵, which were released in November 2013; and 2) the Towers Watson compensation benchmarking study (Exhibit 4A, Tab 4, Schedule 6), which found that CUPE positions were somewhat ahead of the market. Based on these key considerations, Toronto Hydro's bargaining position was that the year over year increases had to stay relatively close to inflation in order to maintain alignment with the competitive market.

4.2. Society Collective Agreement

The current Collective Agreement with the Society was ratified on April 12, 2012 and is valid until December 31, 2015. The table below (Table 4) summarizes the year over year base salary percentage increases for Society employees.

Table 4: Society Base Salary Increases (2011-2015)

2011	2012	2013	2014	2015
2.75%	1.5%	1.75%	2.0%	2.0%

Toronto Hydro's objectives during the 2012 negotiations with the Society – all of which were achieved, were to:

- (1) obtain stability through a long term agreement,
- (2) control current and future costs through modest wage rate increases, and
- (3) resist any changes that would limit or restrict management's right to manage and direct the workforce.

⁵ EB-2010-0379 Report of the Board Rate Setting Parameters and Benchmarking under the Renewed Regulatory Framework for Ontario's Electricity Distributors (Issued November 21, 2013 and corrected on December 4, 2013).

1 (4) to clarify the process that applied to employees progressing along wage scales in
2 the Collective Agreement.

3 All of these objectives were achieved during the 2012 negotiations.
4

5 For the purpose of these negotiations, Toronto Hydro considered comparable market
6 data, which was collected through a review of external surveys and external
7 compensation data. Toronto Hydro compared base salary and variable performance pay
8 against information from companies within the utility sector (such as Hydro One). As a
9 result of these analyses, Toronto Hydro's compensation position was that year-over-year
10 increases had to stay relatively close to inflation in order to maintain alignment with the
11 market.
12

13 Employees who are part of the Society are also eligible for variable performance pay
14 based on their achievement of the deliverables outlined in their annual performance
15 contract, as well as the achievement of the utility's performance objectives.
16
17

18 **5. BENEFITS AND PENSIONS**

19 Toronto Hydro's employee benefit programs provide coverage for full-time employees in
20 the following areas:

- 21 • Medical, including vision care, prescription drugs, and paramedical services;
 - 22 • Dental, including major dental and orthodontic services;
 - 23 • Short term and long term disability income protection;
 - 24 • Life Insurance and accidental death and dismemberment (AD&D) insurance;
 - 25 • Leaves of absence, including maternity, adoption and parental leaves; and
 - 26 • Refundable expenses, such as the fitness reimbursement program.
- 27

The historical and forecasted cost of providing the above noted employee benefit programs are summarized in the table below (Table 5).

Table 5: Employee Benefit Costs (2011-2015) (\$ Millions)

	2011	2012	2013	2014	2015
Employee Benefit Total Cost	57.47	55.37	57.93	56.67	55.87

Toronto Hydro periodically reviews the trends and costs associated with its benefit programs to help ensure that the utility receives value for its money, and that it is aligned with the markets within which it competes for talent.

In 2013, Toronto Hydro retained the firm Towers Watson to conduct a review of its compensation and benefits programs, (Exhibit 4A, Tab 4, Schedule 6). This study found that the value of the Toronto Hydro employer-paid benefits is just below the median observed for the peer group, primarily driven by the high employee pension contributions in comparison to plans offered by other organizations in the peer group. With consideration to the employee contributions, Toronto Hydro benefits are just above the market median due to the higher than typical employee pension contributions.

Since 2011, Toronto Hydro has implemented a number of cost-curtailling changes to its employee benefit programs. For example, the utility bundled paramedical treatment allotment and included reasonable and customary rates for certain services such as dental service using the general practitioners' fee guides. These initiatives have resulted in lower costs for the utility and greater flexibility and awareness by plan members regarding their benefits plan.

As a long-term cost mitigation strategy, Toronto Hydro implemented a comprehensive health prevention program in 2012. Key initiatives of this program include physical

activity, eating well, stress management, mental health, and smoking cessation. Toronto Hydro hopes that this program will reduce future benefit costs relating to prescription drugs, and disability costs, and to improve employee absenteeism, productivity, engagement, and retention.

In addition to benefits, Toronto Hydro also provides a pension for fulltime employees through its membership in the Ontario Municipal Employees Retirement System (“OMERS”), a multi-employer defined benefit pension plan. Under this plan, both participating employers and their employees are required (by virtue of their membership in the plan) to make contributions to the plan. The required contribution rates are based on the employee’s earnings, and are periodically reviewed by the OMERS Sponsors Corporation in light of the assets and obligations of the plan.

The most recent annual valuation of the OMERS Pension plan and additional considerations reviewed by the OMERS Sponsors Corporation resulted in no change to the contribution rates for 2014. The table below (Table 6) summarizes Toronto Hydro’s historical and forecasted contributions to the plan over the 2011 to 2015 period, as well as the employer and employee contribution rates required by OMERS.

Table 6: OMERS Contribution Rates (2011 – 2015)

	2011	2012	2013	2014	2015
Employer Rate	7.4% to YMPE 10.7% over YMPE	8.3% to YMPE 12.8% over YMPE	9% to YMPE 14.6% over YMPE	9% to YMPE 14.6% over YMPE	9% to YMPE 14.6% over YMPE
Employee Rate	7.4% to YMPE 10.7% over YMPE	8.3% to YMPE 12.8% over YMPE	9% to YMPE 14.6% over YMPE	9% to YMPE 14.6% over YMPE	9% to YMPE 14.6% over YMPE

Employees and employers in the OMERS pension plan contribute less to the pension plan on earnings received up to the annual Yearly Maximum Pensionable Earnings

(“YMPE”), and a higher amount on earnings above the YMPE. The YMPE is the Canadian Pension Plan (“CPP”) earnings limit: contributions to the CPP are made on earnings up to this limit. The OMERS Plan contribution rate is lower up to the YMPE because OMERS is designed to work together with CPP to provide combined pension benefits.

The table below (Table 7) summarizes Toronto Hydro’s historical (2011 – 2013) and forecasted (2014 – 2015) pension costs, including capitalized and expensed amounts each year.

Table 7: Pension Costs (2011 – 2015) (\$ millions)

	2011	2012	2013	2014	2015
Pension Premiums	13.56	16.13	17.85	17.02	17.45
Less: Amount Capitalized	5.49	5.79	6.81	8.82	10.14
Amount Expensed in Each Year	8.07	10.34	11.04	8.20	7.32

In addition to pension benefits, employees also earn an entitlement to certain post-retirement benefits, including health, dental and life insurance. These future benefit expenses are based on the most recent actuarial valuation by Tower Watson, which was performed in January 2012 (refer to Exhibit 4A, Tab 4, Schedule 7), and are recognized on an accrual basis in the period during which employees render their services. As a long-term cost-containment measure, effective February 1, 2014, new hires to the organization have been limited to post-retirement health and dental benefits until age 65, provided they satisfy the ten years of service eligibility criterion.

1 The table below (Table 8) presents Toronto Hydro's historical (2011 – 2013) and
2 forecasted (2014 – 2015) post-retirement benefit costs, including capitalized and
3 expensed amounts.

4

5 **Table 8: Post-Retirement Benefit Costs (2011-2014) (\$ Millions)**

	2011	2012	2013	2014	2015
Post-Benefit Costs	16.67	20.35	17.35	16.33	16.46
Capitalized Amounts	6.76	7.31	6.62	6.47	6.52
Expensed Amounts	9.94	13.05	10.72	9.86	9.94

Toronto Hydro Electric Systems Limited

**Toronto Hydro
Compensation and
Benefits Review**

Completed: January 2014

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INTRODUCTION AND EXECUTIVE SUMMARY

Towers Watson was retained by Torys on behalf of its client Toronto Hydro to complete a review of market competitive compensation and benefits levels in January 2014.

Methodology

The review, findings and observations focused on compensation and benefits separately. Towers Watson encourages Toronto Hydro to consider compensation and benefits in aggregate when reviewing overall position to market for a given level or role.

The compensation review covered analysis of annualized base pay, target short-term incentive levels, and total target cash (base pay plus target short-term incentive) at Toronto Hydro and in the external market (see peer group notes below).

Following Towers Watson's advice, benchmark roles – selected to reflect the wide range of positions at Toronto Hydro – were identified to support the compensation analysis. Balanced selection criteria were applied to ensure functional or level based bias did not disproportionately skew the analyses. Benchmark roles covered 66% of Toronto Hydro's employee population (well within the range (50% - 75%) typically suggested for this type of analysis).

The benefits review covered aggregate analysis of both employer paid value and total (employer plus employee paid) value for all core benefits, including pension, savings, disability, health (active and retiree), dental (active and retiree), life insurance (active and retiree), vacation and holidays.

Peer group selection

On Towers Watson's recommendation and to ensure relevant conclusions could be drawn from the compensation analysis, the "external market" was viewed through a number of lenses with several peer groups identified:

- A named comparator group of companies from Towers Watson's 2013 Energy Compensation Survey to cover as many roles as possible (but focusing mostly on industry-specific jobs),
- A named comparator group of companies from Hay Group's 2013 Energy Industry Survey to cover as many roles as possible (focusing mostly on the utilities industry),
- A broader "whole sample" peer group covering all participants of Towers Watson's 2013 Energy Compensation Survey,
- A named comparator group of GTA companies from Tower Watson's 2013 General Industry Survey that meet headcount and revenue / budget scope criteria for non-industry-specific jobs, and
- A broader "whole sample" peer group covering all participants of the 2013 General Industry Survey as a supplementary reference point.

Benchmark jobs were matched to equivalent survey jobs and levels in the aforementioned Towers Watson and Hay Group compensation surveys to support the analysis. Survey matching was validated by Towers Watson and Hay Group consultants.

A single named peer group was identified to support the benefits analysis. Comparator organizations were selected on the basis of industry (vertically integrated electricity organizations and electricity and gas organizations – Canada-wide) and geography (energy companies operating solely in Ontario). Once established, Towers Watson's proprietary benefits valuation tool (BENVAL®) was used to provide a consistent valuation of the Toronto Hydro's benefits compared to those offered by other peer group organizations.

Details for each peer group are presented in the Appendix to this report.

Observations and findings

Compensation and benefits at Toronto Hydro are closely aligned to mid-market (median) rates across all peer groups.

Compensation

In most instances, and against all comparator groups, Toronto Hydro pay sits within what we would consider a market competitive range of +/-15% of the relevant mid-market data. Competitive positioning does not vary significantly between base pay and total target cash, with target short-term incentive award levels closely aligned to mid-market rates.

Benefits

The value of employer paid benefits is just below the median observed for the peer group. Including, employee contributions, Toronto Hydro sits just above the market median. This position is due to higher than typical employee pension contributions.

REPORT DETAIL

Introduction

Towers Watson was retained by Torys on behalf of its client Toronto Hydro to undertake an analysis of external market compensation and benefits levels.

Following consultation with Towers Watson on the most robust approach to market comparison, Toronto Hydro selected the following areas to include in the scope of the review:

Compensation:

- Annualized base pay
- Target short-term incentive
- Total target cash ((annualized) base pay plus target short-term incentive award)

Please note that our analysis excludes long-term incentive eligibility and award levels which do not constitute part of Toronto Hydro's reward package.

Benefits:

Benefits data and information is presented at an aggregate and summary benefit level for all core benefits irrespective of level. The benefits review looks at market competitiveness through two lenses:

- Employer paid value of all core benefits – total value less employee contributions
- Total value of all core benefits – the combined value of employer and employee paid contributions

The balance of this report details the review methodology followed in arriving at our findings and observations, including peer group considerations and any assumptions made through the course of the analysis. Findings and observations are outlined at a summary level from page 11 with further detail in the Appendix.

Methodology

Summary

Jobs across all grades were benchmarked against equivalent roles within organizations from one or more of Toronto Hydro's defined peer groups (see below). Data was drawn from the following Towers Watson surveys:

- The Towers Watson 2013 Energy Compensation Survey¹
- The Towers Watson 2013 General Industry Middle Management, Professional and Support Compensation Survey
- The Towers Watson 2013 Benefit Data Source – Canada (BDS Canada)

Additionally, we reviewed data from Hay Group's 2013 Energy Industry Compensation Survey to ensure that Ontario based utilities organizations that are not represented in Towers Watson compensation surveys were reflected in our findings and observations. Towers Watson and Hay Group data was supplemented with collective agreement data for national utilities organizations collected and provided by Toronto Hydro (see Appendix 4).

Compensation benchmarking and analysis

Towers Watson's compensation benchmarking methodology assesses jobs on two bases. First, we assess job content as outlined in Toronto Hydro job descriptions to establish appropriate matches to compensation survey jobs. Second, we evaluate the level of each job, drawing on our knowledge and understanding of both internal (Toronto Hydro) relativities and external comparability.

To support the benchmarking process, Toronto Hydro provided Towers Watson with current job descriptions for each "in scope" role with suggested compensation survey matches based on those used to support the business as usual annual compensation review. Survey job and level matches for each in-scope role were independently reviewed and validated by Towers Watson.

Please note that Towers Watson did not validate Toronto Hydro's job or level matching to Hay Group's Energy Industry Compensation Survey. However, based on discussion with Toronto Hydro it is our view that matching was completed accurately and we understand that all matches and data have been confirmed by Hay Group Compensation Consultants.

Aggregate results of our analysis of market competitive pay are presented from page 8. Aggregate data is presented for mid-market (median) statistics only. Data is presented in tabular form to show Toronto Hydro's position to mid-market data using comparison ratio's (compa-ratios).

Compa-ratios, expressed as a percentage, illustrate the extent of divergence between our mid-market assessment of market competitive pay and current levels of pay within Toronto Hydro. A positive compa-ratio of more than 0% shows that pay at Toronto Hydro is above the market median. A negative compa-ratio of less than 0% suggests that pay at Toronto Hydro is behind the mid-market rates.

¹ Note: 2013 Energy Survey data has been supplemented with 2012 data for direct comparator organizations that were participants in 2012 but have since opted out.

For this analysis, compa-ratios for multiple incumbent positions are based on median incumbent pay.

Our analysis summarized market competitiveness for the following compensation elements:

- Annualized base pay
- Target short-term incentive
- Total target cash ((annualized) base pay plus target short-term incentive award)

When interpreting the findings of the review, it is important to note that our analysis of market competitive pay is based on the data available to us. The findings presented in this report do not constitute a recommendation of pay for any particular individual. In our experience, pay levels of up to 15% either side of the mid-market data can be considered to be “market competitive”. This is, of course, dependent on a number of factors, including an individual’s experience, time in job and level of performance. We would normally expect companies to apply judgement in reaching individual pay decisions.

Benefits benchmarking and analysis

Benefits benchmarking was completed through Towers Watson’s proprietary benefits valuation tool (BENVAL®) which provides a consistent valuation of the Toronto Hydro’s benefits compared to those offered by other peer group organizations on a named basis. “Core” benefits covered in our review include pension, savings, disability, health (active and retiree), dental (active and retiree), life insurance (active and retiree), vacation and holidays.

BENVAL® analysis shows the competitiveness of the value of existing benefits programs by plan and in aggregate. The methodology has been tested and refined over the years to ensure a true “apples to apples” comparison.

The tool is underpinned by a controlled environment in which differences in the reported value of each organization’s benefits plans are exclusively a function of differences in plan provisions. Each organization’s benefits costs are affected by program design, but also by other factors which are not captured in this analysis such as funding decisions, plan experience and demographics.

To develop reported values, benefits are initially analyzed in terms of when they become payable:

- **Benefits payable in the future:** defined benefit pension plans (all ancillary benefits included) and post-retirement, health care and dental care benefits – are valued, in terms of anticipated prospective benefit payments being allocated over the employee’s entire working history (Projected Unit Credit with services prorate method).
- **Benefits potentially payable in the current year:** defined contribution pension plans, savings plans, pre-retirement death, health care and dental care benefits, disability benefits and vacations and holidays – are valued based on the probabilities of the various events occurring within the year, multiplied by the value of the benefit (Term Cost Method).

The employer-provided value of benefits is determined by deducting employee contributions from the total value of benefits provided. Each plan is valued under the same actuarial valuation method using a common set of actuarial assumptions and consistent employee population assumptions.

Peer group considerations

To support the selection of relevant and appropriate peer groups for the analysis, Towers Watson recommended that Toronto Hydro consider:

- Organizations with a similar “remit” to that of Toronto Hydro – including industry organizations within and outside of the province and other prominent organizations that face regulatory and public scrutiny
- Organizations that are similar to Toronto Hydro in terms of scope (size/complexity, etc.). This criterion is more important at the “middle-manager” and “senior-manager” levels which can vary widely in interpretation from organization to organization.
- Organizations that Toronto Hydro is most likely to lose individuals to and hire individuals from – this varies from job to job
- Organizations that key stakeholders (internally and externally) viewed as relevant (most likely to focus on utilities and public sector/crown corporate comparison)

On the advice of Towers Watson, six peer groups (five to support the compensation analysis and one to support the benefits analysis; detailed in Appendix 1) were established, including:

- Compensation
 - A named peer comparator group of companies from Towers Watson’s 2013 Energy Compensation Survey to cover as many roles as possible (but focusing mostly on industry-specific jobs)
 - A named comparator group of companies from Hay Group’s 2013 Energy Industry Survey to cover as many roles as possible that were not reported in the Towers Watson surveys. This survey focused mainly on utilities industry
 - A broader “whole sample” peer group covering all participants of Towers Watson’s 2013 Energy Compensation Survey
 - A named comparator group of GTA companies from Towers Watson’s 2013 General Industry Survey that meet headcount and revenue/budget scope criteria for non-industry-specific jobs
 - A broader “whole sample” peer group covering all participants of the 2013 General Industry Survey as a supplementary reference point. This was reviewed only in instances where there was no named peer group or “whole sample” energy peer group data available
- Benefits
 - A named comparator group of companies from Towers Watson’s 2013 Benefits Data Source to provide benefits data for roles at all levels in the organization

Toronto Hydro together with Towers Watson carefully considered the relevance of each peer group for each role. Peer group relevance consideration included, for example, the requirement for industry specific experience and expertise, and the prevalent market for talent (focussing on organizations that Toronto Hydro tends to lose people to and hire people from).

Assumptions and inputs

All incumbent pay data was provided to Towers Watson by Toronto Hydro and was accurate as at November 30th, 2013.

In-scope jobs were selected by Toronto Hydro following Towers Watson's guidance to ensure a reasonable representation of employees across all functions and levels in the organization. To support the matching validation process, Toronto Hydro shared job descriptions for all 65 in-scope jobs with Towers Watson. We relied on these job descriptions to obtain an understanding of the in-scope jobs and believe them to be up-to-date and accurate.

Target short-term incentive award levels were used rather than actual incentives paid to smooth out year-to-year differences in variable payments that are often subject to individual, team and company performance.

Hay Group compensation survey data has been provided to Towers Watson by Toronto Hydro and is accurate as at May 1st, 2013.

Compensation review findings

The tables below illustrate Toronto Hydro's position to market at an aggregate level for each grade in the organization. Data presented reflects mid-market (median) values.

Incumbent data has been aggregated to illustrate median for:

- Annualized base pay:
 - For hourly rate employees, annualized base pay is calculated taking hourly rate x 2080 hours
 - For weekly rate employees, annualized base pay is calculated taking weekly rate x 52 weeks
- Target short-term incentive (STI target %, expressed as a percentage of base pay), and
- Total target cash compensation (TTC ((annualized) base pay plus target short-term incentive)).

Competitive data for each compensation element are reported when median statistics are provided for positions with at least four participant matches. Average statistics are provided for positions with at least three participant matches.

As described in the methodology section of the report, compa-ratio analysis is presented for each of Toronto Hydro's current grades. All roles falling above or below 15% of the market median have been highlighted in red to highlight what Towers Watson considers to be a material variance from the market.

Aggregate Market Results by Grade: Grades Y3 to V3

Toronto Hydro Compensation Data by Grade				Towers Watson: 2013 Compensation Data (000s)												Hay Group: 2013 Compensation Data (000s)		
				Energy – Named Peer Group			Energy – Whole sample			General Industry – Named Peer Group			General Industry – Whole Sample			Utilities Peer Group		
Grade	Base Pay	Target STI	TTC	Base Pay	Target STI %	TTC	Base Pay	Target STI %	TTC	Base Pay	Target STI %	TTC	Base Pay	Target STI %	TTC	Base Pay	Target STI %	TTC
Y3	\$152.5	25%	\$190.6	\$166	24%	\$192	\$145	21%	\$175	\$166	24%	\$182	\$113	15%	\$130	\$130	---	\$147
				-8%	---	-1%	6%	---	9%	-8%	---	5%	35%	---	47%	17%	---	30%
Y2	\$128.2	15%	\$147.4	---	---	---	\$132	20%	\$161	\$133	16%	\$150	\$105	13%	\$119	\$121	---	\$135
				---	---	---	-3%	---	-8%	-4%	---	-2%	22%	---	24%	6%	---	10%
X1	\$136.0	12%	\$152.3	---	---	---	\$129	18%	\$153	\$142	16%	\$163	\$129	18%	\$148	\$118	---	\$130
				---	---	---	5%	---	0%	-4%	---	-7%	5%	---	3%	15%	---	17%
W4	\$108.1	10%	\$118.9	---	---	---	\$107	11%	\$120	\$104	14%	\$117	\$140	20%	\$158	\$108	---	\$119
				---	---	---	1%	---	-1%	4%	---	2%	-23%	---	-24%	0%	---	0%
W3	\$104.3	10%	\$114.7	---	---	---	\$106	13%	\$123	\$107	13%	\$118	\$121	18%	\$137	\$95	---	\$100
				---	---	---	-2%	---	-6%	-3%	---	-3%	-13%	---	-16%	10%	---	15%
W2	\$98.3	8%	\$106.2	---	---	---	\$71	10%	\$75	\$84	10%	\$90	\$85	12%	\$94	\$91	---	\$94
				---	---	---	38%	---	42%	17%	---	18%	16%	---	13%	8%	---	13%
V4	\$109.2	8%	\$118.0	---	---	---	\$103	10%	\$113	---	---	---	\$80	12%	\$90	\$100	---	\$108
				---	---	---	6%	---	4%	---	---	---	37%	---	31%	9%	---	9%
V3	\$100.0	8%	\$108.0	\$99	---	\$109	\$88	10%	\$96	\$94	10%	\$100	\$72	10%	\$76	\$85	---	\$89
				1%	---	-1%	14%	---	12%	6%	---	9%	39%	---	42%	18%	---	22%

Aggregate Market Results by Grade: Grades V2 to CUPE

Toronto Hydro Compensation Data by Grade				Towers Watson: 2013 Compensation Data (000s)												Hay Group: 2013 Compensation Data (000s)		
				Energy – Named Peer Group			Energy – Whole sample			General Industry – Named Peer Group			General Industry – Whole Sample			Utilities Peer Group		
Grade	Base Pay	Target STI	TTC	Base Pay	Target STI %	TTC	Base Pay	Target STI %	TTC	Base Pay	Target STI %	TTC	Base Pay	Target STI %	TTC	Base Pay	Target STI %	TTC
V2	\$85.2	8%	\$92.1	\$96	---	\$105	\$84	10%	\$94	\$81	10%	\$88	\$63	9%	\$68	\$84	---	\$88
				-11%	---	-12%	2%	---	-2%	6%	---	5%	35%	---	36%	1%	---	5%
V1	\$85.7	8%	\$92.6	---	---	---	---	---	---	---	---	---	\$61	8%	\$66	\$75	---	\$76
				---	---	---	---	---	---	---	---	---	41%	---	40%	15%	---	21%
U3	\$64.8	6%	\$68.7	\$81	10%	\$89	\$74	10%	\$80	\$73	10%	\$79	\$60	10%	\$63	\$73	---	\$72
				-20%	---	-23%	-12%	---	-14%	-11%	---	-13%	8%	---	9%	-11%	---	-4%
U2	\$64.6	6%	\$68.4	---	---	---	\$64	8%	\$69	\$65	8%	\$69	\$53	7%	\$55	\$73	---	\$72
				---	---	---	1%	---	-1%	-1%	---	-1%	22%	---	24%	-11%	---	-4%
U1	\$64.7	6%	\$68.6	---	---	---	\$62	0%	\$64	\$66	8%	\$73	\$58	8%	\$61	\$69	---	\$71
				---	---	---	4%	---	7%	-2%	---	-6%	13%	---	13%	-7%	---	-3%
T2	\$58.7	6%	\$62.2	---	---	---	---	---	---	---	---	---	\$45	6%	\$48	\$64	---	\$65
				---	---	---	---	---	---	---	---	---	30%	---	30%	-8%	---	-4%
T1	\$48.3	6%	\$51.2	---	---	---	\$48	6%	\$50	\$50	7%	\$53	\$40	7%	\$41	\$66	---	\$66
				---	---	---	2%	---	3%	-3%	---	-3%	22%	---	25%	-27%	---	-23%
SOCIETY	\$101.4	8%	\$109.5	\$94	10%	\$95	\$94	12%	\$111	\$90	10%	\$95	\$79	10%	\$84	\$91	---	\$94
				8%	---	15%	8%	---	-1%	13%	---	15%	28%	---	30%	12%	---	16%
CUPE	\$86.3	0%	\$86.3	\$95	---	\$94	\$73	6%	\$76	\$56	4%	\$59	\$54	7%	\$57	---	---	---
				-9%	---	-8%	18%	---	14%	54%	---	47%	61%	---	53%	---	---	---

Observations

With the exception of a minority of grades (see below for more detail), Toronto Hydro pay is closely aligned to mid-market rates across all peer groups. Following the peer group selection criteria, it is Towers Watson's view that the energy peer groups (Towers Watson and Hay Group) and the named general industry peer group were of most relevance since they represent the companies that Toronto Hydro is most likely to recruit individuals from and lose employees to. For this reason, we advise that the whole sample general industry peer group is only reviewed in instances where there is very limited or no peer group data.

Target total cash (TTC)

Data was very limited for Towers Watson's named company energy peer group. However, where data was available, Toronto Hydro TTC levels were broadly aligned to market. The one exception is grade "U3" which, at an aggregate level, was behind market by 23%.

Toronto Hydro TTC levels were equally well aligned to Towers Watson's whole sample energy peer group. With the exception of grade "W2" which was 42% ahead of the market, all grades were positioned within the market competitive range of +/-15% of mid-market rates. Although at face value "W2" pay levels appear anomalous we understand that this is a result of compression within the bargaining unit.

Against Towers Watson's named general industry peer group, we observed similar alignment on TTC. Toronto Hydro grades "W2" and "CUPE" were the outliers in this instance, sitting 18% and 47% ahead of the market respectively.

As noted above, data for Towers Watson's whole sample general industry peer group was less relevant given the wide variance in organizational size and geographic dispersion and should be considered supplementary in instances where named peer group data is not available. Against this peer group, Toronto Hydro TTC levels were high with only 4 grades ("X1", "W2", "U3", and "U1") sitting within the market competitive range of +/-15% of the market median.

Against the Hay Group data, we observed that the majority of grades are positioned within the competitive market range with 6 grades falling above market ("Y3", "X1", "V3", "V1" & "Society"), and grade "T1" being the exception, falling below the market by 23%.

Base pay

Notwithstanding data limitations for Towers Watson's named company energy peer group, Toronto Hydro base pay levels were broadly aligned with the market. The one exception was at grade "U3" which, on an aggregate level, was behind the market by 20%.

Toronto Hydro base pay levels were well aligned to Towers Watson's whole sample energy peer group. With the exception of grade "W2" and "CUPE", which were 38% and 18% ahead of the market, all grades are positioned within the market competitive range of +/- 15% of mid-market rates.

Against Towers Watson's named general industry peer group, we observed close alignment. Grades "W2" and "CUPE" were the outliers in this instance, sitting 17% and 54% ahead of market respectively.

Against Towers Watson's whole sample general industry peer group, Toronto Hydro base pay levels were high with only 4 grades ("X1", "W3", "U1" and "U3") sitting within the market competitive range of +/- 15% of the market median.

Toronto Hydro base pay levels were well aligned to the Hay Group data with only 2 grades falling above market ("Y3" and "V3") and one grade ("T1") falling below market competitive range by 27%.

Benefits review findings and observations

Detailed graphs that illustrate Toronto Hydro's position to market are presented in Appendix 3. The graphs illustrate Toronto Hydro's position to market with regards to benefits, looking at both employer provided value and total provided value at an aggregate (total benefits package) level. The graphs present Toronto Hydro's benefits offering as a whole in addition to highlighting the value of several core benefits programs described earlier in this report.

Toronto Hydro offers a generous pension plan in comparison to the named peer group. However, employee contributions were high in comparison to plans offered by other organizations in the peer group. Most active group benefit plans were close to the market median, except the dental plan that is more generous than that offered by comparator organizations. Two areas where the Toronto Hydro plan ranked particularly favourably include the uncapped maximum for basic and major services, and the competitive orthodontic coverage.

Toronto Hydro provided a slightly less generous paid time-off schedule than the peer group at median.

The graphs in Appendix 3 indicate that the employer-paid value of Toronto Hydro's benefits plan in aggregate was equivalent to 31.8% of base pay compared to a market median at 34.7%. This suggests that Toronto Hydro program was behind market by approximately 2.9%. This was off-set by employee contributions which – as illustrated in Appendix 3 – contribute significantly to the competitiveness of the overall benefits offering.

Please note that benefit plan values are expressed as a percentage of base pay and represent the average value, per employee, for the valuation year. Plan valuations are based on the provisions that applied to newly hired salary employees only. Legacy benefits that are no longer available to new hires were not considered.

Appendix 1: Peer Group Details

Named energy peer group

Organizations within the Towers Watson 2013 Energy Compensation Survey were selected based on the following criteria:

- Electricity or gas organizations
- Vertically integrated electricity company
- Energy company operating solely in Ontario
- The OPA and IESO

Below is Toronto Hydro's named peer group from Towers Watson 2013 Energy Compensation Survey:

ATCO Electric	Ontario Power Generation
AltaLink	Saskpower
British Columbia Hydro and Power Authority	Spectra Energy Transmission
Bruce Power	TransCanada
City of Medicine Hat (Hydro Division)	Independent Electricity System Operator
Enbridge Inc.	New Brunswick Power Corporation
Enmax Corporation	Newfoundland & Labrador Hydro Electric Corporation
EPCOR Utilities	Nova Scotia Power
Fortis Alberta	Ontario Power Authority
Hydro-Quebec	

Where we observed insufficient data availability from the above peer group, a whole sample energy survey peer group was used (see below).

Whole sample energy peer group

Agrium	Columbia Power	Ontario Power Generation
Alberta Energy Regulator	ConocoPhillips	Pembina Pipeline Corporation
Alliance Pipeline Ltd.	Devon Canada Corporation	Penn West Energy Trust
AltaLink Management	Dow Chemical	Powerex Corp.
Apache Canada Ltd.	Enbridge	Precision Drilling Trust
ARC Resources	Encana Corporation	Saskpower
ATCO Electric	Enmax Corporation	Shell Canada Limited
ATCO Energy Solutions	EPCOR Utilities	Siemens Canada
ATCO Gas	ExxonMobil	Spectra Energy
ATCO Group	ExxonMobil Business Support Centre Canada	Statoil Canada
ATCO Pipelines	FortisAlberta	Suncor Energy
ATCO Power	Gaz Metro	Synchrude Canada Ltd.
Aux Sable Canada	GDF SUEZ Energy North America	Talisman Energy
BP Canada Energy Company	Husky Energy	Tenaris Canada
British Columbia Hydro and Power Authority	Hydro-Québec	Toronto Hydro Electric Systems
Bruce Power	Imperial Oil Limited	TransAlta Corporation
Canadian Natural Resources Limited	INEOS Canada Partnership	TransCanada
Canadian Oil Sands	Irving Oil Commercial G.P	Valero Energy
Canexus Corporation	Kinder Morgan Canada (Pipelines)	Weatherford International
Capital Power Corporation	MEG Energy	Williams Companies
Cenovus Energy	Nexen	Ontario Power Generation
Chevron Canada Limited (Downstream)	NextEra Energy, Inc.	
Chevron Canada Resources (Upstream)	Niko Resources	
City of Medicine Hat (Hydro Division)	NOVA Chemicals Corporation	

Named general industry peer group

Organizations within the Towers Watson 2013 General Industry MMPS Survey were chosen based upon the following criteria:

- Located within the GTA
- Organizations of comparable size ((e.g. revenues between \$1B and \$5B) to THESL; and
- A headcount between of 1000 to 2000 employees

Below is Toronto Hydro's named peer group from Towers Watson's 2013 General Industry MMPS Survey:

Allstate	Fortis Alberta	Ontario Power Generation
AstraZeneca	General Electric Canada	Owens Corning Canada
ATCO Electric	Graham Group Ltd.	PCL Constructors
AltaLink	Homes by Avi Canada Inc.	Saskpower
British Columbia Hydro and Power Authority	Huskey Injection Molding Systems Ltd.	Siemens Canada Lts.
Bruce Power	Hydro-Quebec	SNC Lavalin Group Inc.
Cadillac Fairview Corporation Limited	Ledcor Group of Companies	Spectra Energy Transmission
Cisco Systems	Lehigh Hanson Canada	State Farm Insurance
City of Medicine Hat (Hydro Division)	Mattamy Homes Limited	The Shaw Group Ltd
Enbridge Inc.	Microsoft	TransCanada
Enmax Corporation	Northbridge	Unilever
EPCOR Utilities	Omicron Canada Inc.	

Where we observed insufficient data availability from the above peer group, a whole sample General Industry survey peer group was used (a full listing of over 300 organizations can be provided separately if required).

Named Hay Group peer group

Organizations within the Hay Group 2013 Energy Industry Compensation Survey were selected based on the following criteria:

- Utility Sector Organizations with revenue above 205 million

Below is Toronto Hydro's peer group from the Hay Group Survey:

Bruce Power L.P.	Hydro One Brampton
Capital Power Corporation	Hydro One Inc.
Enersource Hydro Mississauga Inc	Hydro Ottawa Limited
Fortis Inc.	NB Power Holding Corporation
FortisAlberta Inc.	Newfoundland Power Inc.
FortisBC Energy Inc.	Ontario Power Generation Inc.
FortisBC Inc.	SaskEnergy Incorporated
GDF SUEZ Energy North America, Inc.	SaskPower

Benefits peer group criteria

Organizations within the Towers Watson 2013 Benefits Data Source were selected based on the following criteria:

- Electricity or gas organizations
- Vertically integrated electricity company
- Energy company operating solely in Ontario

Below is Toronto Hydro's named peer group from Towers Watson's 2013 Benefits Data Source:

Alberta Electric System Operator	Fortis Alberta
AltaLink Management Ltd.	Hydro One
ATCO Group	Hydro-Quebec
British Columbia Hydro and Power Authority	Independent Electricity System Operator
Bruce Power	Manitoba Hydro
Capital Power Generation	Newfoundland Power Inc.
City of Medicine Hat	Ontario Power Generation Inc.
Emera Inc.	Saskpower
Enbridge Pipelines Inc.	TransAlta Corporation
ENMAX Corporation	TransCanada Pipelines Limited
EPCOR Utilities Inc.	

Appendix 2: In-Scope Jobs

“In-scope” jobs (those included within the scope of the review) were carefully selected in order to provide representative coverage of Toronto Hydro’s employee population. Although no single job or group of jobs have been deliberately excluded from the scope of the review, Toronto Hydro acted on the advice of Towers Watson in ensuring that in-scope jobs did not disproportionately focus on single incumbent positions (this would weaken the extent to which the review of findings are representative of the whole organization) or include positions that are unique to Toronto Hydro and that do not have external data availability.

To guide the selection of in-scope jobs, Toronto Hydro followed Towers Watson’s advice to include:

- Both corporate and operational positions
- Management, unionized, and individual contributor jobs
- Multiple incumbent jobs (i.e., single jobs that cover a population of 5 or more employees)
- Positions at each level in the organization
- Jobs across multiple functions to ensure no functional bias

It is Towers Watson’s view that the in-scope jobs listed below provide an accurate reflection of the broader compensation and benefits picture at Toronto Hydro. They represent a group of driver positions and cover 66% of Toronto Hydro’s employee population which is well within the range (50%-75%) that we typically encourage our clients to strive for.

In scope positions are listed below:

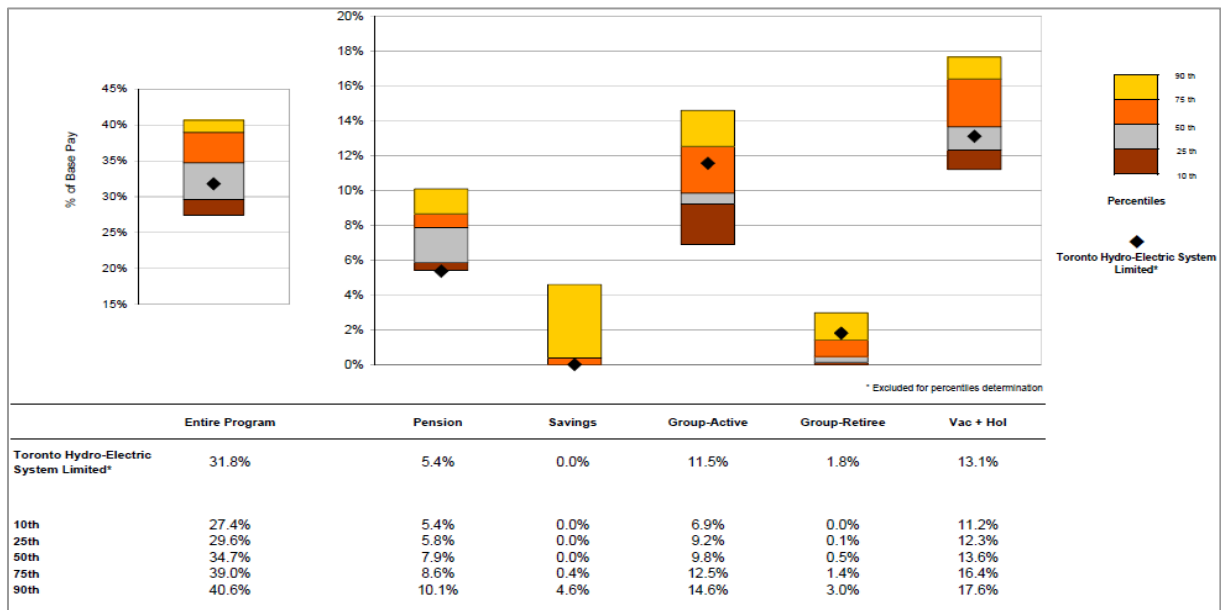
#	Title	Current Grade	#	Title	Current Grade
1	Director, Employee/Labour Relations	Y3	21	Supervisor, Project Planning	W4
2	Director, Strategy & Enterprise Risk Management	Y3	22	Supervisor, Facilities	W3
3	Director, Power System Services	Y3	23	Supervisor, Supply Chain Services	W3
4	Controller	Y3	24	Supervisor, Construction & Maintenance	W3
5	Director, Program Support Office	Y3	25	Supervisor Program Management Office	W3
6	Director, IT Security, Architecture & Infrastructure Operations	Y3	26	Supervisor, Design	W3
7	Director, Environmental Health & Safety	Y3	27	Supervisor, Call Centre	W2
8	Director, Legal Services & Corporate Secretary	Y3	28	Architect, Database & Integration	V4
9	Director, Rates & Regulatory Affairs	Y3	29	Enterprise Project Management Consultant	V3
10	Director, Internal Audit	Y3	30	IT Technical Consultant	V3
11	Manager, Call Centre	Y2	31	Senior Financial Analyst	V3
12	Manager, Talent Acquisition	Y2	32	Employee Labour Relations Consultant	V3
13	Manager, Rates	Y2	33	Safety & Environmental Consultant	V3
14	Manager, Finance Operations	Y2	34	Senior Internal Auditor	V3
15	Manager, Project Management	Y2	35	Strategic Planning Consultant	V3
16	Senior Litigation Counsel	X1	36	Solicitor, Commercial	V3
17	Lead, Regulatory Counsel	X1	37	Regulatory Counsel	V3
18	Lead, Corporate Applications	W4	38	Program Management Consultant	V2
19	Lead, Legal Services, Commercial	W4	39	Communications Consultant	V2
20	Lead, Project Management	W4	40	Financial Analyst	V2

In scope roles continued...

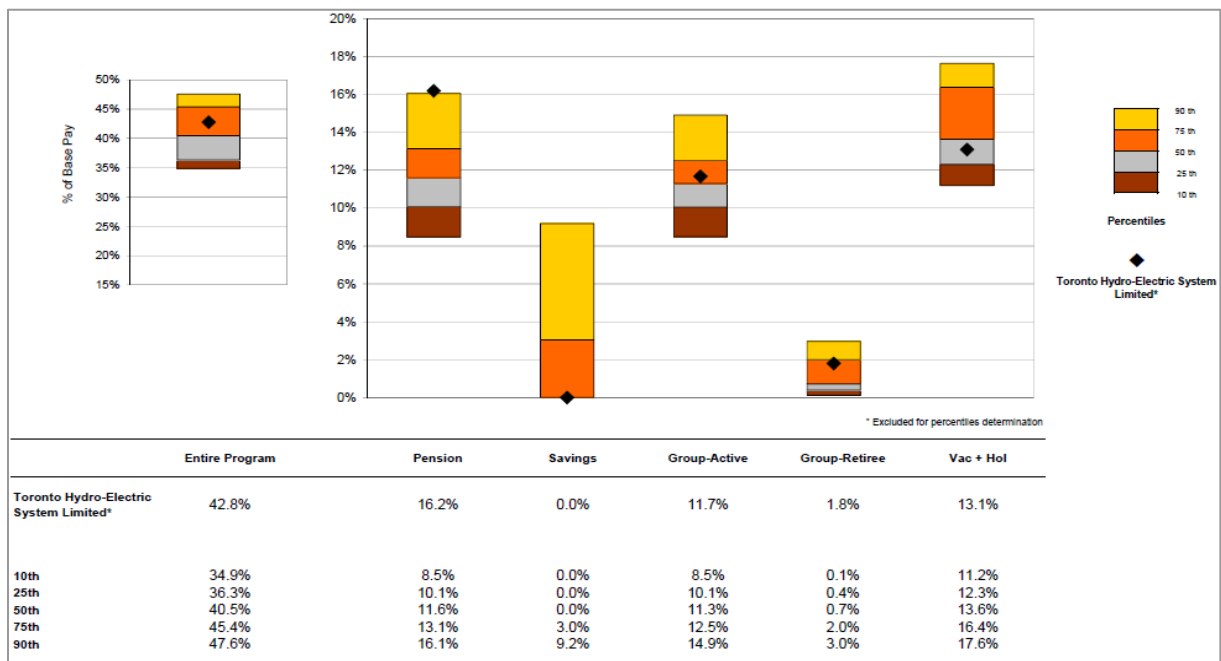
#	Title	Current Grade
41	Talent Acquisition Consultant	V2
42	Claims Investigation Specialist	V1
43	Quality Assurance Associate	U3
44	Research Analyst	U3
45	Environmental Health & Safety Associate	U3
46	Payroll Analyst	U2
47	Staffing Associate	U2
48	Enterprise Risk Management & Policy Administration Analyst	U2
49	Executive Assistant	U1
50	Marketing Coordinator	U1
51	Service Requisition & ID Security Coordinator	U1
52	Desk Side Support	U1
53	Claims Administrator	T2
54	Organizational Development Administrator	T1
55	Administrative Assistant	T1
56	Engineer	SOCIETY
57	Senior Office Clerk 1	CUPE
58	Certified Meter Mechanic / Tester	CUPE
59	Certified Power Cable Person	CUPE
60	Crew Leader, Certified Power Cable	CUPE

#	Title	Current Grade
61	Customer Service Representative	CUPE
62	Distribution System Technologist	CUPE
63	Engineering Technologist Level 1	CUPE
64	Engineering Technologist Level 2	CUPE
65	Power System Controller	CUPE

Entire benefit program by plan: Employer provided value



Entire benefit program by plan: Total provided value



Appendix 4: Collective agreement data

	Toronto Hydro Annualized Base Pay	Collective Agreement Data (Annualized core wage rates)	Compa-Ratio
MIN	\$62,326	\$52,782	18%
AVERAGE	\$87,796	\$83,589	5%
MAX	\$106,309	\$121,634	-13%
25th Percentile	\$81,536	\$77,082	6%
50th Percentile	\$86,258	\$83,742	3%
75th Percentile	\$97,166	\$90,542	7%

Core wage rates for the following roles are included in the above data which is based on analysis of collective agreement data findings presented to Towers Watson by Toronto Hydro:

Toronto Hydro Job Title
Certified Power Line Person
Certified Power Cable Person
Certified Crew Leader, Line
Crew Leader, CPCP
Distribution System Technologist
System Response REP
Power System Controller
CPSL Dispatcher
Certified Meter Mechanic/Tester
Engineering Technologist - Level 1
Engineering Technologist - Level 2

Note: Annualized base pay and annualized core wage rates are calculated taking hourly rate x 2080 hours. Collective agreement data has been provided by Toronto Hydro, rendering results from 19 companies in total.

Organization
BC Hydro
Enersource
Enmax
Epcor
Fortis Hydro
Horizon
Hydro One
Hydro One Brampton
Hydro Ottawa
Hydro Quebec
London Hydro
New Brunswick Power
Nova Scotia Power
Oakville Hydro
Oshawa
PowerStream
Veridian

Note: Organizations reported data for each role as applicable – i.e., not all organizations reported data for all jobs

January 16, 2014

Mr. Daniel Paquin
Toronto Hydro
14 Carlton Street
Toronto, ON
M5B 1K5

Dear Dan:

POST-EMPLOYMENT BENEFITS FOR EMPLOYEES OF TORONTO HYDRO
2013 YEAR END DISCLOSURES AND ESTIMATED 2014 AND 2015 NET PERIODIC COST UNDER
US GAAP

As requested, this letter and appendices have been prepared for Toronto Hydro Corporation ("the Company", or "Toronto Hydro") and present the Company's liabilities and costs in respect of the following post-employment benefits plans ("the Plans"):

- Extended health benefits for retirees and members on long-term disability;
- Dental benefits for retirees and members on long-term disability;
- Life insurance benefits for retirees;
- Vested sick leave benefits;
- OMERS top up pension; and
- Executive retirement allowances.

This letter and appendices have been prepared for the Company for the following purposes:

- Determining the final calculation of the 2013 net periodic benefit cost to be reported in the Company's 2013 financial statements;
- Providing the required information for year-end disclosure purposes as of December 31, 2013 to be reported in the Company's 2013 financial statements; and
- Determining an estimate of 2014 and 2015 net periodic benefit cost.

The information contained in this letter and appendices is presented in thousands of Canadian dollars and is in respect of the benefits mentioned above only.

All valuation results and accounting calculations presented in this letter and appendices were prepared in accordance with US GAAP (FASB Accounting Standards Codification 715).

The 2013 net periodic benefit cost is based on the 2013 net periodic benefit cost provided in our 2012 disclosure letter dated January 13, 2013, with updates for immediate recognition of the impact of the retirement allowance. The 2013 year-end disclosure obligations and extrapolations for 2014 and 2015 are based on the January 1, 2012 actuarial valuation conducted by Towers Watson.

In 2013, the Company chose to include an obligation in respect of two retiree allowances granted to one key employee. As directed by the company, the impact of this change was recognized as part of the service cost in expense as at June 30, 2013 in the financial accounting for the Plans under US GAAP for the Toronto Hydro Corporation division. Please refer to our email dated July 18, 2013 for additional information.

The balance of this letter sets out comments and notes to our calculations. Appendix A provides details of the relevant accounting results. Please refer to the January 1, 2012 actuarial valuation report prepared by Towers Watson for the summaries of the plan provisions, the membership data and the actuarial basis used in the valuation.

ACTUARIAL ASSUMPTIONS AND METHODS

- The measurement date used for fiscal 2013 year-end disclosure is December 31, 2013.
- The 2013 benefit cost is based on a discount rate of 4.25% per annum and the accrued benefit obligation ("ABO") at December 31, 2013 is based on a discount rate of 4.75% per annum, as instructed by the Company. The discount rates are based on long-term high-quality Canadian corporate bond yields at December 31, 2012 and at December 31, 2013, respectively.
- Other than those noted in this letter, the actuarial methods and assumptions used for the determination of the 2013 net periodic benefit cost and the December 31, 2013 obligation are consistent with those used for the 2012 disclosures.
- The obligation as of December 31, 2013 and the 2014 and 2015 expense estimates are based on extrapolations from the January 1, 2012 valuation results for the medical, dental, life insurance, sick leave and OMERS benefit plans, and the June 30, 2013 valuation results for the retirement allowance benefit plans, assuming that there are no experience gains and losses other than from actual benefit payments being different from expected, and reflecting changes in the assumptions during the extrapolation period such as changes in the discount rate.

DISCLOSURE RESULTS SUMMARY

The summary of Fiscal 2013 net periodic benefit costs, the ABO and accumulated other comprehensive income ("AOCI") as at December 31, 2013, under US GAAP are as follows (in \$000s):

	<i>Fiscal 2013 Net Periodic Benefit Costs</i>	<i>ABO at December 31, 2013</i>	<i>AOCI at December 31, 2013</i>
Toronto Hydro-Electric System Limited	\$ 17,347	\$ 232,669	\$ 39,630
Toronto Hydro Corporation	341	2,233	(1,300)
Toronto Hydro-Energy Service Incorporation	259	2,811	359
Toronto Hydro-LDC Unregulated	105	1,079	92
Toronto Hydro – Consolidated	18,052	238,792	38,781

- Actual benefit payments for 2013 of \$10,432,000 are based on information provided by the Company on January 9, 2013. We have projected 2014 and 2015 benefit payments based on the valuation assumptions.

ACCOUNTING METHODS

- Actuarial gains and losses will be reflected in the statement of comprehensive income. To the extent that they exceed 10% of the accumulated benefit obligation, these gains and losses will be recognized over the expected average remaining service period of active employees participating in the plans.
- Prior service costs will be reflected in the statement of comprehensive income, and recognized through expense over a straight line basis over the average service period (to full eligibility) of employees active at the date of amendment.

OTHER COMMENTS

- We understand that the post-retirement benefit plan is not pre-funded, and therefore our accounting results do not consider any expected investment income on plan assets.
- A draft report on Canadian Pensioners Mortality has been published by the Canadian Institute of Actuaries. We understand that the Company will assess the appropriateness of the new mortality tables when the report is released.
- Other than those described in this letter and appendices, the Company's management has confirmed that there have been no significant events, changes to the plan provisions or changes to plan membership since January 1, 2012 for the all benefit plans other than the retirement allowance, and since June 30, 2013 for the retirement allowance, that would materially affect the results of our valuations.

* * * * *

ACTUARIAL CERTIFICATION

The consulting actuaries are members of the Canadian Institute of Actuaries and Society of Actuaries and other professional actuarial organizations and meets their "General Qualification Standard for Statements of Actuarial Opinions" relating to pension and other postretirement benefit plans.

In preparing the results presented in this letter (including attached exhibits), we have relied upon information provided to us regarding plan provisions, actual benefit payments, historical plan costs and plan participants. We have reviewed this information for overall reasonableness and consistency, but have neither audited nor independently verified this information. The accuracy of the results presented in this letter is dependent upon the accuracy and completeness of the underlying information.

The figures provided in this letter reflect, to the best of our knowledge, all of the Company's substantive commitments and obligations, as described herein. Furthermore, to the best of our knowledge, there are no other subsequent events, the occurrence of which is probable and the effects of which are reasonably estimable, which have not been reflected in the figures provided as of the date of our letter.

The actuarial assumptions and the accounting policies and methods employed in the development of the pension and postretirement plan costs have been selected by the Toronto Hydro management as representing their best estimates of future contingent events. The assumptions are not intended to include any provision for adverse deviations, and we do not express any opinion of them. FASB ASC 715 requires that each significant assumption "individually represent the best estimate of a particular future event."

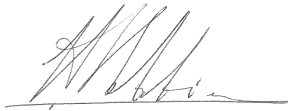
The results shown in this letter have been developed based on actuarial assumptions that are considered to be reasonable and within the "best-estimate range" as described by the Actuarial Standards of Practice. Other actuarial assumptions could also be considered to be reasonable and within the best-estimate range. Thus, reasonable results differing from those presented in this report could have been developed by selecting different points within the best-estimate ranges for various assumptions.

* * * * *

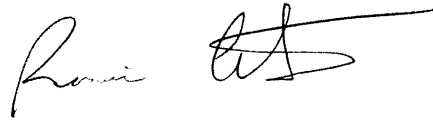
The information contained in this report was prepared for Toronto Hydro, for its internal use and for the preparation of its periodic financial disclosures, and its auditors, for the preparation of its periodic financial disclosures. It is neither intended nor necessarily suitable for other purposes. Further distribution to, or use by, other parties of all or part of this report is expressly prohibited with Towers Watson's prior written consent.

We are pleased to provide you with this year-end disclosure report. Please contact us if you need any additional information.

Towers Watson



Harindra Sebastian, FCIA, FSA
Direct Dial: (416) 960-2765



Rosario Cristiano, FCIA, FSA
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Enclosures

cc: Olga Baliakina, Mitchell Coviensky — Towers Watson

Post-Employment Benefits Plan - US GAAP - 2013 Disclosure (\$ 000's)

	Electric System Limited	Toronto Hydro Corporation	Energy Services Incorporated	LDC Unregulated	Consolidated
Funded status					
January 01, 2013					
Funded status	(247,777)	(2,076)	(2,928)	(1,109)	(253,890)
Current vs. Non-Current OPEB Liability					
January 01, 2013					
Current	(9,790)	(79)	(37)	(19)	(9,925)
Non-Current Liability	(237,987)	(1,997)	(2,891)	(1,090)	(243,965)
Total	(247,777)	(2,076)	(2,928)	(1,109)	(253,890)
Amounts Recognized in Accumulated Other Comprehensive Income					
January 01, 2013					
Prior service (credit)/cost					
July 2000 past service costs	-	-	(5)	-	(5)
Jan 2001 past service costs	-	-	-	-	-
Jan 2003 past service costs	2	1	24	-	27
Net actuarial (gain)/loss	61,821	(1,195)	656	195	61,477
Total	61,823	(1,194)	675	195	61,499
Change in Accumulated Benefit Obligation (ABO)					
2013					
Accumulated benefit obligation at beginning of year	247,777	2,076	2,928	1,109	253,890
Service cost	4,766	312	98	50	5,226
Interest cost	10,521	94	128	49	10,792
Actuarial (gain) loss	(20,133)	(171)	(283)	(97)	(20,684)
Benefits paid	(10,262)	(78)	(60)	(32)	(10,432)
Accumulated benefit obligation at end of year	232,669	2,233	2,811	1,079	238,792
Change in Plan Assets					
2013					
Fair value of plan assets at beginning of year	-	-	-	-	-
Actual return on plan assets	-	-	-	-	-
Employer contribution	10,262	78	60	32	10,432
Plan participants' contributions	-	-	-	-	-
Benefits paid	(10,262)	(78)	(60)	(32)	(10,432)
Fair value of plan assets at end of year	-	-	-	-	-
Net Periodic Benefit Cost					
2013					
Service cost	4,766	312	98	50	5,226
Interest cost	10,521	94	128	49	10,792
Amortization of prior service cost					
July 2000 past service costs	-	-	(3)	-	(3)
Jan 2001 past service costs	-	-	-	-	-
Jan 2003 past service costs	2	1	8	-	11
Amortization of net (gain) loss	2,058	(66)	28	6	2,026
Net periodic benefit cost	17,347	341	259	105	18,052
Funded status					
December 31, 2013					
Funded status	(232,669)	(2,233)	(2,811)	(1,079)	(238,792)
Current vs. Non-Current OPEB Liability					
December 31, 2013					
Current	(7,855)	(88)	(39)	(21)	(8,003)
Non-Current Liability	(224,814)	(2,145)	(2,772)	(1,058)	(230,789)
Total	(232,669)	(2,233)	(2,811)	(1,079)	(238,792)
Amounts Recognized in Accumulated Other Comprehensive Income					
December 31, 2013					
Prior service (credit)/cost					
July 2000 past service costs	-	-	(2)	-	(2)
Jan 2001 past service costs	-	-	-	-	-
Jan 2003 past service costs	-	-	16	-	16
Net actuarial (gain)/loss	39,630	(1,300)	345	92	38,767
Total	39,630	(1,300)	359	92	38,781
Additional information					
Average future working lifetime as at December 31, 2013	18	15	13	15	
Average future working lifetime as at December 31, 2012	18	15	13	15	
Key Assumptions					
Discount rate as at December 31, 2013 (used for Dec 31/13 ABO)	4.75%	4.75%	4.75%	4.75%	4.75%
Discount rate as at December 31, 2012 (used for 2013 Benefit Costs)	4.25%	4.25%	4.25%	4.25%	4.25%
Assumed medical and dental cost trend rate at December 31, 2013					
Dental care cost trend rate assumed for next year	4.0%	4.0%	4.0%	4.0%	4.0%
For pre July 2000 retirements:					
Medical cost trend rate assumed for next year	6.0%	6.0%	6.0%	6.0%	6.0%
Rate that the cost trend gradually declines to	5.0%	5.0%	5.0%	5.0%	5.0%
Year that the rate reaches the ultimate rate	2016	2016	2016	2016	2016
For other retirements:					
Medical cost trend rate assumed for next year	7.5%	7.5%	7.5%	7.5%	7.5%
Rate that the cost trend gradually declines to	5.0%	5.0%	5.0%	5.0%	5.0%
Year that the rate reaches the ultimate rate	2019	2019	2019	2019	2019
Sensitivity to Changes in Medical and Dental Trend Rate Assumption					
Effect on total of service and interest cost for 2013					
1% point increase	2,308	(28)	40	19	2,339
1% point decrease	(2,031)	18	(35)	(15)	(2,063)
Effect on accrued benefit obligation at December 31, 2013					
1% point increase	29,559	206	458	165	30,388
1% point decrease	(25,931)	(185)	(401)	(147)	(26,664)
Sensitivity to Changes in Discount Rate Assumption					
Effect on estimated 2014 Net Periodic Benefit Cost					
1% point increase	(1,701)	(76)	(29)	(12)	(1,818)
1% point decrease	2,907	92	67	30	3,096
Effect on accrued benefit obligation at December 31, 2013					
1% point increase	(35,997)	(330)	(523)	(191)	(37,041)
1% point decrease	44,170	400	655	244	45,469
Projection of Benefit Payments					
2014	8,039	90	40	22	8,191
2015	8,238	96	44	25	8,403
2016	8,912	99	51	28	9,090
2017	9,354	100	57	30	9,541
2018	9,852	164	66	30	10,112
2019-2023	57,910	705	579	200	59,394

Post-Employment Benefits Plan - US GAAP - 2014 Estimate Expense (\$ 000's)

	Electric System Limited	Toronto Hydro Corporation	Energy Services Incorporated	LDC Unregulated	Consolidated
Funded status	January 1, 2014				
Funded status	(232,669)	(2,233)	(2,811)	(1,079)	(238,792)
Amounts Recognized in Accumulated Other Comprehensive Income	January 1, 2014				
Prior service (credit)/cost					
July 2000 past service costs	-	-	(2)	-	(2)
Jan 2001 past service costs	-	-	-	-	-
Jan 2003 past service costs	-	-	16	-	16
Net actuarial (gain)/loss	39,630	(1,300)	345	92	38,767
Total	39,630	(1,300)	359	92	38,781
Change in Accumulated benefit obligation	2014				
Accumulated benefit obligation at beginning of year	232,669	2,233	2,811	1,079	238,792
Service cost	4,354	189	89	46	4,678
Interest cost	11,068	113	137	53	11,371
Actuarial (gain) loss	-	-	-	-	-
Benefits paid	(8,039)	(90)	(40)	(22)	(8,191)
Accumulated benefit obligation at end of year	240,052	2,445	2,997	1,156	246,650
Change in plan assets	2014				
Fair value of plan assets at beginning of year	-	-	-	-	-
Actual return on plan assets	-	-	-	-	-
Employer contribution	8,039	90	40	22	8,191
Plan participants' contributions	-	-	-	-	-
Benefits paid	(8,039)	(90)	(40)	(22)	(8,191)
Fair value of plan assets at end of year	-	-	-	-	-
Net Periodic Benefit Cost	2014				
Service cost	4,354	189	89	46	4,678
Interest cost	11,068	113	137	53	11,371
Amortization of prior service cost					
July 2000 past service costs	-	-	(2)	-	(2)
Jan 2001 past service costs	-	-	-	-	-
Jan 2003 past service costs	-	-	8	-	8
Amortization of net (gain) loss	909	(72)	5	-	842
Net periodic benefit cost	16,331	230	237	99	16,897
Funded status	December 31, 2014				
Funded status	(240,052)	(2,445)	(2,997)	(1,156)	(246,650)
Current vs. Non-Current OPEB Liability	December 31, 2014				
Current	(8,049)	(94)	(43)	(24)	(8,210)
Non-Current Liability	(232,003)	(2,351)	(2,954)	(1,132)	(238,440)
Total	(240,052)	(2,445)	(2,997)	(1,156)	(246,650)
Amounts Recognized in Accumulated Other Comprehensive Income	December 31, 2014				
Prior service (credit)/cost					
July 2000 past service costs	-	-	-	-	-
Jan 2001 past service costs	-	-	-	-	-
Jan 2003 past service costs	-	-	8	-	8
Net actuarial (gain)/loss	38,721	(1,228)	340	92	37,925
Total	38,721	(1,228)	348	92	37,933
Additional information					
Average future working lifetime as at December 31, 2013	18	15	13	15	
Key Assumptions					
Discount rate as at December 31, 2014 (used for Dec 31/14 APBO)	4.75%	4.75%	4.75%	4.75%	4.75%
Discount rate as at December 31, 2013 (used for 2014 Benefit Costs)	4.75%	4.75%	4.75%	4.75%	4.75%
Assumed medical and dental cost trend rate at December 31, 2013					
Dental care cost trend rate assumed for next year	4.0%	4.0%	4.0%	4.0%	4.0%
For pre July 2000 retirements:					
Medical cost trend rate assumed for next year	5.5%	5.5%	5.5%	5.5%	5.5%
Rate that the cost trend gradually declines to	5.0%	5.0%	5.0%	5.0%	5.0%
Year that the rate reaches the ultimate rate	2016	2016	2016	2016	2016
For other retirements:					
Medical cost trend rate assumed for next year	7.0%	7.0%	7.0%	7.0%	7.0%
Rate that the cost trend gradually declines to	5.0%	5.0%	5.0%	5.0%	5.0%
Year that the rate reaches the ultimate rate	2019	2019	2019	2019	2019

Post-Employment Benefits Plan - US GAAP - 2015 Estimate Expense (\$ 000's)

	Electric System Limited	Toronto Hydro Corporation	Energy Services Incorporated	LDC Unregulated	Consolidated
Funded status	January 1, 2015				
Funded status	(240,052)	(2,445)	(2,997)	(1,156)	(246,650)
Amounts Recognized in Accumulated Other Comprehensive Income	January 1, 2015				
Prior service (credit)/cost	-	-	-	-	-
July 2000 past service costs	-	-	-	-	-
Jan 2001 past service costs	-	-	-	-	-
Jan 2003 past service costs	-	-	8	-	8
Net actuarial (gain)/loss	38,721	(1,228)	340	92	37,925
Total	38,721	(1,228)	348	92	37,933
Change in Accumulated benefit obligation	2015				
Accumulated benefit obligation at beginning of year	240,052	2,445	2,997	1,156	246,650
Service cost	4,528	197	93	48	4,866
Interest cost	11,422	123	146	57	11,748
Actuarial (gain) loss	-	-	-	-	-
Benefits paid	(8,238)	(96)	(44)	(25)	(8,403)
Accumulated benefit obligation at end of year	247,764	2,669	3,192	1,236	254,861
Change in plan assets	2015				
Fair value of plan assets at beginning of year	-	-	-	-	-
Actual return on plan assets	-	-	-	-	-
Employer contribution	8,238	96	44	25	8,403
Plan participants' contributions	-	-	-	-	-
Benefits paid	(8,238)	(96)	(44)	(25)	(8,403)
Fair value of plan assets at end of year	-	-	-	-	-
Net Periodic Benefit Cost	2015				
Service cost	4,528	197	93	48	4,866
Interest cost	11,422	123	146	57	11,748
Amortization of prior service cost	-	-	-	-	-
July 2000 past service costs	-	-	-	-	-
Jan 2001 past service costs	-	-	-	-	-
Jan 2003 past service costs	-	-	8	-	8
Amortization of net (gain) loss	818	(66)	3	-	755
Net periodic benefit cost	16,768	254	250	105	17,377
Funded status	December 31, 2015				
Funded status	(247,764)	(2,669)	(3,192)	(1,236)	(254,861)
Current vs. Non-Current OPEB Liability	December 31, 2015				
Current	(8,708)	(97)	(50)	(27)	(8,882)
Non-Current Liability	(239,056)	(2,572)	(3,142)	(1,209)	(245,979)
Total	(247,764)	(2,669)	(3,192)	(1,236)	(254,861)
Amounts Recognized in Accumulated Other Comprehensive Income	December 31, 2015				
Prior service (credit)/cost	-	-	-	-	-
July 2000 past service costs	-	-	-	-	-
Jan 2001 past service costs	-	-	-	-	-
Jan 2003 past service costs	-	-	-	-	-
Net actuarial (gain)/loss	37,903	(1,162)	337	92	37,170
Total	37,903	(1,162)	337	92	37,170
Additional information					
Average future working lifetime as at December 31, 2013	18	15	13	15	
Key Assumptions					
Discount rate as at December 31, 2015 (used for Dec 31/15 APBO)	4.75%	4.75%	4.75%	4.75%	4.75%
Discount rate as at December 31, 2014 (used for 2015 Benefit Costs)	4.75%	4.75%	4.75%	4.75%	4.75%
Assumed medical and dental cost trend rate at December 31, 2013					
Dental care cost trend rate assumed for next year	4.0%	4.0%	4.0%	4.0%	4.0%
For pre July 2000 retirements:					
Medical cost trend rate assumed for next year	5.0%	5.0%	5.0%	5.0%	5.0%
Rate that the cost trend gradually declines to	5.0%	5.0%	5.0%	5.0%	5.0%
Year that the rate reaches the ultimate rate	2016	2016	2016	2016	2016
For other retirements:					
Medical cost trend rate assumed for next year	6.5%	6.5%	6.5%	6.5%	6.5%
Rate that the cost trend gradually declines to	5.0%	5.0%	5.0%	5.0%	5.0%
Year that the rate reaches the ultimate rate	2019	2019	2019	2019	2019

1 **SHARED SERVICES AND CORPORATE COSTS ALLOCATIONS**

2
3 In accordance with s. 2.7. 3.2 of the OEB's Filing Requirements (July 17, 2013), this
4 schedule provides information about shared services and corporate costs allocations
5 between Toronto Hydro and the affiliated corporate entities described below. For more
6 information about these entities and their relationship to Toronto Hydro, please refer to
7 Corporate Structure and Governance evidence at Exhibit 1C, Tab 2, Schedule 1:

- 8 • **Toronto Hydro Corporation ("THC")** – THC provides strategic direction,
9 leadership and communication to Toronto Hydro and Toronto Hydro Energy
10 Services Inc. ("TH Energy"). Based on THC's 2013 financial statements
11 compiled by its auditors, its investment in Toronto Hydro represents 97 percent of
12 its total long-term investments. THC receives shared corporate services from
13 Toronto Hydro, and provides such services to Toronto Hydro as described above.
- 14 • **TH Energy** – TH Energy's primary line of business is the provision of street
15 lighting and expressway lighting maintenance and operation services to the City
16 of Toronto, but the company also holds electricity retailer and generator licenses.
17 TH Energy receives shared corporate services from Toronto Hydro, and provides
18 Toronto Hydro with emergency services including storm damage response and
19 project design support services.

20
21 This schedule provides information about corporate cost allocations to the non-rate
22 regulated aspects of Toronto Hydro's business (referred to as "THESU"), including
23 Conservation Demand Management ("CDM") and generation activities. From 2012 to
24 2014, Toronto Hydro's non-rate regulated line of business also included activities
25 pertaining to the former street lighting assets that were transferred to Toronto Hydro on
26 January 1, 2012, but that were not included in the utility's rate base. Toronto Hydro
27 proposes to transfer these assets into rate base effective January 1, 2015. Please refer to

Exhibit 2A, Tab 5 for more information about the proposed transfer of the former street lighting assets into the utility's rate base.

1. OEB APPENDIX 2-N

A completed copy of OEB Appendix 2-N is filed at Exhibit 4A, Tab 5, Schedule 2. This appendix provides cost information and allocation details relating to each shared service provided or received by Toronto Hydro in the historical years (2011 to 2013), the bridge year (2014) and the test year (2015). The amount of Board of Directors related costs included in THC's cost allocation to Toronto Hydro is also provided in this appendix.

2. SHARED SERVICE MODEL

Toronto Hydro's shared services methodology has not changed since the utility's last rebasing application (EB-2010-0142).

Each service transaction is reviewed to determine the costing formula and method of allocation. In establishing the price of a service transaction, Toronto Hydro follows the Affiliate Relationships Code ("ARC"). The ARC provides for the use of fully allocated cost based pricing ("CBP") for shared corporate services, and the use of fair market value ("FMV"), where a reasonably competitive market exists.

If a competitive market does not exist, Toronto Hydro uses fully-allocated cost-based pricing. With regard to these fundamental principles and historical information about the quantity of services provided, Toronto Hydro assesses the approximate annual cost of each service. At the end of the fiscal year, the estimated cost of providing or receiving each service is reconciled with actuals and any differences are settled.

1 Table 1, below provides a description of Toronto Hydro's corporate cost allocators by
2 each functional service:

4 **Table 1: Shared Corporate Services Primary Allocation Drivers**

Functional service	Allocator	Reason
Finance (other than payroll, accounts payable, insurance)	Time allocation	Financial support, analysis, planning, calculations and reports provided for certain affiliates are more labour intensive than others.
Finance - Payroll	Headcount	Amount of payroll services required such as processing is dependent on the number of employees.
Finance - Accounts Payable	Invoices	Amount of accounts payable services required such as processing is dependent on the number of invoices.
Finance - Insurance	Usage proportion	Amount of insurance required is dependent on the coverage required.
Health and Safety	Union headcount	Services are mainly required for unionized positions as these positions typically are required to perform field work.
Information Technology & Services	By employee	Required equipment and IT services are dependent on the number of employees who need equipment/services.

Functional service	Allocator	Reason
Legal	Billable hours	Legal services and support for some affiliates are more labour intensive than others.
Organizational Effectiveness (“OE”) (other than Talent Management and Administration)	Headcount	Amount of OE services required such as compensation/benefits related services is dependent on the number of employees.
OE - Talent Management and Administration	Time allocation	Services provided to certain affiliates are more labour intensive than others.
Procurement	Number of purchase orders	Amount procured for each affiliate is dependent on the number of purchase orders.
Facilities	Square footage	Amount of building space required is measured in square foot.
THC - CEO, CFO, Board of Directors	Time allocation	Services provided to certain affiliates are more labour intensive than others.

1 For other services, Toronto Hydro uses market price, if a reasonably competitive market
2 exists for the service, and if it is practicable and cost efficient to undertake a market value
3 assessment for the service.

4

5 If market price can be determined, Toronto Hydro charges the higher of fully-allocated
6 cost or market price for any non-shared corporate services that it provides to the affiliated
7 entities, and pays the lower of fully-allocated cost or market price for any such services
8 that its receives from the affiliated entities.

If a market price cannot be determined, Toronto Hydro applies fully allocated cost-based pricing, which includes direct costs, indirect cost and cost of capital, to determine the cost of providing or receiving the non-shared corporate service.

3. VARIANCE ANALYSIS

3.1. TH Energy

Further to Appendix 2-N, filed at Exhibit 4A, Tab 5, Schedule 2, the table below provides a summary of the cost of shared service provided to and received by Toronto Hydro from TH Energy. A variance analysis between 2011 actuals and 2015 test year amounts, as well as 2013 actuals and 2014 test year amounts is included after the table.

Table 2: Summary of the Cost of Shared Services Provided to and Received by Toronto Hydro from TH Energy (\$ Millions)

	2011 OEB	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Services provided by Toronto Hydro	1.6	1.6	1.7	1.8	1.8	1.9
Services received by Toronto Hydro	0	0.2	0.5	0.8	0.5	0.5

3.1.1. 2011 Actual v. 2015 Test Year

- **Services Provided by Toronto Hydro:** The \$0.3 million variance between 2011 actual amounts and the 2015 test year forecasted amounts is primarily driven by an: 1) increase in Human Resources and Organizational Effectiveness services required to support additional recruitment activities; and 2) an increase in the

forecasted cost of providing finance services consistent with Toronto Hydro's Finance program (Exhibit 4A, Tab 2, Schedule 15).

- **Services Received by Toronto Hydro:** The \$0.3 million variance between 2011 actual amounts and the 2015 test year forecasted amounts is primarily attributable to the provision of design services by TH Energy to Toronto Hydro. In 2011, TH Energy mainly provided emergency services to Toronto Hydro.

3.1.2. 2013 Actual v. 2015 Test Year

- **Services Provided by Toronto Hydro:** The \$0.1 million variance from the 2013 actual amounts and the 2015 test year forecasted amounts is primarily attributable to an increase in allocated fleet services costs.
- **Services Received by Toronto Hydro:** The \$0.3 million variance from the 2013 actual amounts and the 2015 test year forecasted amounts is primarily associated with the provision of emergency services during the December 2013 ice storm.

3.2. Non-Rate Regulated Toronto Hydro Activities

Further to Appendix 2-N, filed at Exhibit 4A, Tab 5, Schedule 2, the table below provides a summary of the cost of shared service relating to Toronto Hydro's non-rate regulated activities (i.e., CDM, generation, and street lighting assets from 2012 to 2015). A written variance analysis is provided after the table.

Table 3: Summary of the Cost of Services relating to Non-Rate Regulated Toronto Hydro activities (\$ Millions)

	2011 OEB	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Services provided by Toronto Hydro	0.6	1.0	0.9	1.4	1.5	1.3

3.2.1. 2011 Actual v. 2015 Test Year

For non-rate regulated Toronto Hydro activities, the increase in the shared corporate services allocation between 2011 actual amounts and 2015 forecasts is primarily due to the following:

- the transfer of the former street lighting assets to Toronto Hydro on January 1, 2012 (refer to Exhibit 2A, Tab 5, Schedule 1 for more information about Toronto Hydro proposal to transfer these assets into the utility's rate base effective January 1, 2015);
- an increase in Human Resources and Organizational Effectiveness services required to support additional recruitment activities; and
- an increase in Procurement services required due to an increase of purchase orders related to the street lighting transfer and CDM activities.

3.2.2. 2013 Actual v. 2015 Test Year

The \$0.1 million variance from the 2013 actual amounts and the 2015 test year forecasted amounts is primarily due to the proposed transfer of the street lighting assets into the utility's rate base effective January 1, 2015.

3.3. THC

Further to Appendix 2-N, filed at Exhibit 4A, Tab 5, Schedule 2, the table below provides a summary of the cost of shared service provided to and received by Toronto Hydro from THC. A variance analysis between 2011 actuals and 2015 test year amounts, as well as 2013 actuals and 2014 test year amounts is included after the table .

1 **Table 4: Summary of the Cost of Shared Services Provided to and Received by**
2 **Toronto Hydro from THC (\$ Millions)**

	2011 OEB	2011 Actual	2012 Actual	2013 Actual	2014 Bridge	2015 Test
Services provided by Toronto Hydro	0.1	0.4	0.7	1.1	1.3	1.3
Services received by Toronto Hydro	2.0	3.1	3.7	4.3	4.1	4.2

3 **3.3.1. 2011 Actual v. 2015 Test Year**

- 4 • **Services Provided by Toronto Hydro:** The \$0.9 million variance from the 2011
5 actual amounts and the 2015 test year forecasted amounts is primarily due to
6 additional services provided related to finance, legal, and human resources &
7 organizational effectiveness in 2015.
- 8 • **Services Received by Toronto Hydro:** The \$1.1 million variance from the 2011
9 actual amounts and the 2015 test year forecasted amounts is primarily related to
10 the increase in THC's costs before recoveries and related to additional governance
11 and financial stewardship work performed by THC to support the increasing
12 complexity of Toronto Hydro's regulated activities.

13
14 **3.3.2. 2013 Actual v. 2015 Test Year**

- 15 • **Services Provided by Toronto Hydro:** The \$0.2 million variance from the 2013
16 actual amounts and the 2015 test year forecasted amounts is primarily attributable
17 to an increase in the forecasted cost of providing legal services consistent with
18 Toronto Hydro's Legal Services program (Exhibit 4A, Tab 2, Schedule 18).
- 19 • **Services Received by Toronto Hydro:** The \$0.1 million variance from the 2013
20 actual amounts and the 2015 test year forecasted amounts is immaterial.

OEB Appendix 2-N Shared Services and Corporate Cost Allocation

Year: 2011

Shared Services

Name of Company		Service Offered	Pricing Methodology	Price for the Service	Cost for the Service
From	To			\$	\$
THESL	THESI	Fleet	Fully allocated-cost	0.42	0.42
THESL	THESI	Emergency Calls	Market**	0.17	0.15
THESI	THESL	Emergency	Market**	0.18	0.03

** Because of cost-benefit impacts and impracticability, there was no study done to verify market amounts.

Corporate Cost Allocation

Name of Company		Service Offered	Pricing Methodology	% of Corporate Costs Allocated	Amount Allocated
From	To			%	\$
THESL	THESI	Finance/Treasury/Insurance	Fully allocated-cost	2.8%	0.50
THESL	THESI	EHS	Fully allocated-cost	0.7%	0.02
THESL	THESI	Legal	Fully allocated-cost	1.4%	0.07
THESL	THESI	HR&OE	Fully allocated-cost	0.4%	0.04
THESL	THESI	Procurement	Fully allocated-cost	5.5%	0.08
THESL	THESI	Consolidated Billing	Fully allocated-cost	42.7%	0.12
THESL	THESI	IT&S	Fully allocated-cost	0.2%	0.06
THESL	THESI	Facilities	Fully allocated-cost	0.3%	0.06
THESL	THESU	Finance/Treasury/Insurance	Fully allocated-cost	2.6%	0.47
THESL	THESU	Legal	Fully allocated-cost	0.4%	0.02
THESL	THESU	HR&OE	Fully allocated-cost	0.5%	0.07
THESL	THESU	Procurement	Fully allocated-cost	3.7%	0.06
THESL	THESU	IT&S	Fully allocated-cost	0.4%	0.12
THESL	THESU	Facilities	Fully allocated-cost	1.0%	0.23
THESL	THC	Finance/Treasury/Insurance	Fully allocated-cost	0.1%	0.01
THESL	THC	Legal	Fully allocated-cost	4.9%	0.25
THESL	THC	Procurement	Fully allocated-cost	0.3%	0.01
THESL	THC	IT&S	Fully allocated-cost	0.1%	0.03
THESL	THC	Facilities	Fully allocated-cost	0.3%	0.06
THC	THESL	Corporate Stewardship - CEO	Fully allocated-cost	99.6%	1.85
THC	THESL	Corporate Governance - Board of Directors	Fully allocated-cost	63.9%	0.20
THC	THESL	Finance Stewardship - CFO	Fully allocated-cost	99.5%	1.09
THC	THESI	Corporate Governance - Board of Directors	Fully allocated-cost	31.2%	0.10

Year: 2012

Shared Services

Name of Company		Service Offered	Pricing Methodology	Price for the Service	Cost for the Service
From	To			\$	\$
THESL	THESI	Fleet*	Fully allocated-cost	0.30	0.30
THESL	THESI	Emergency Calls	Market**	0.32	0.27
THESI	THESL	Emergency	Market**	0.22	0.22
THESI	THESL	Sandy Storm	Market**	0.03	0.03
THESI	THESL	Design	Market**	0.25	0.25

* A portion of the fleet charge is allocated from THESI to THESU.

** Because of cost-benefit impacts and impracticability, there was no study done to verify market amounts.

Corporate Cost Allocation

Name of Company		Service Offered	Pricing Methodology	% of Corporate Costs Allocated	Amount Allocated
From	To			%	\$
THESL	THESI	Finance/Treasury/Insurance	Fully allocated-cost	3.1%	0.47
THESL	THESI	EHS	Fully allocated-cost	0.5%	0.01
THESL	THESI	Legal	Fully allocated-cost	1.2%	0.06
THESL	THESI	HR&OE	Fully allocated-cost	1.2%	0.14
THESL	THESI	Procurement	Fully allocated-cost	5.0%	0.09
THESL	THESI	Consolidated Billing	Fully allocated-cost	89.7%	0.14
THESL	THESI	IT&S	Fully allocated-cost	0.2%	0.06
THESL	THESI	Facilities	Fully allocated-cost	0.2%	0.06
THESL	THESU	Finance/Treasury/Insurance	Fully allocated-cost	2.1%	0.32
THESL	THESU	Legal	Fully allocated-cost	3.7%	0.17
THESL	THESU	HR&OE	Fully allocated-cost	0.1%	0.01
THESL	THESU	Procurement	Fully allocated-cost	8.4%	0.15
THESL	THESU	IT&S	Fully allocated-cost	0.2%	0.08
THESL	THESU	Facilities	Fully allocated-cost	0.7%	0.17
THESL	THC	Finance/Treasury/Insurance	Fully allocated-cost	3.2%	0.49
THESL	THC	Legal	Fully allocated-cost	1.8%	0.09
THESL	THC	Procurement	Fully allocated-cost	0.4%	0.01
THESL	THC	IT&S	Fully allocated-cost	0.1%	0.02
THESL	THC	Facilities	Fully allocated-cost	0.2%	0.06
THC	THESL	Corporate Stewardship - CEO	Fully allocated-cost	100.0%	2.28
THC	THESL	Corporate Governance - Board of Directors	Fully allocated-cost	95.5%	0.33
THC	THESL	Finance Stewardship - CFO	Fully allocated-cost	100.0%	1.08
THC	THESI	Corporate Governance - Board of Directors	Fully allocated-cost	4.5%	0.02

Year: 2013

Shared Services

Name of Company		Service Offered	Pricing Methodology	Price for the Service	Cost for the Service
From	To			\$	\$
THESL	THESI	Fleet*	Fully allocated-cost	0.26	0.26
THESL	THESI	Emergency Calls / Streetlighting Relamping	Market**	0.34	0.34
THESI	THESL	Emergency	Market**	0.14	0.16
THESI	THESL	Ice Storm	Market**	0.27	0.30
THESI	THESL	Design	Market**	0.35	0.38

* A portion of the fleet charge is allocated from THESI to THESU.

** Because of cost-benefit impacts and impracticability, there was no study done to verify market amounts.

Corporate Cost Allocation

Name of Company		Service Offered	Pricing Methodology	% of Corporate Costs Allocated	Amount Allocated
From	To			%	\$
THESL	THESI	Finance/Treasury/Insurance	Fully allocated-cost	3.3%	0.60
THESL	THESI	EHS	Fully allocated-cost	0.5%	0.01
THESL	THESI	Legal	Fully allocated-cost	0.9%	0.03
THESL	THESI	HR&OE	Fully allocated-cost	1.6%	0.23
THESL	THESI	Procurement	Fully allocated-cost	3.3%	0.10
THESL	THESI	Consolidated Billing	Fully allocated-cost	65.8%	0.10
THESL	THESI	IT&S	Fully allocated-cost	0.2%	0.06
THESL	THESI	Facilities	Fully allocated-cost	0.2%	0.06
THESL	THESU	Finance/Treasury/Insurance	Fully allocated-cost	2.0%	0.36
THESL	THESU	Legal	Fully allocated-cost	1.1%	0.04
THESL	THESU	HR&OE	Fully allocated-cost	1.8%	0.25
THESL	THESU	Procurement	Fully allocated-cost	14.9%	0.47
THESL	THESU	IT&S	Fully allocated-cost	0.2%	0.07
THESL	THESU	Facilities	Fully allocated-cost	0.7%	0.17
THESL	THC	Finance/Treasury/Insurance	Fully allocated-cost	3.2%	0.58
THESL	THC	Legal	Fully allocated-cost	9.2%	0.33
THESL	THC	HR&OE	Fully allocated-cost	0.9%	0.12
THESL	THC	Procurement	Fully allocated-cost	0.4%	0.01
THESL	THC	IT&S	Fully allocated-cost	0.02%	0.01
THESL	THC	Facilities	Fully allocated-cost	0.2%	0.06
THC	THESL	Corporate Stewardship - CEO	Fully allocated-cost	94.8%	2.66
THC	THESL	Corporate Governance - Board of Directors	Fully allocated-cost	86.0%	0.26
THC	THESL	Finance Stewardship - CFO	Fully allocated-cost	85.8%	1.33
THC	THESI	Corporate Governance - Board of Directors	Fully allocated-cost	4.8%	0.01

Year: 2014

Shared Services

Name of Company		Service Offered	Pricing Methodology	Price for the Service	Cost for the Service
From	To			\$	\$
THESL	THESI	Fleet*	Fully allocated-cost	0.44	0.44
THESL	THESI	Emergency Calls / Streetlighting Relamping	Market**	0.27	0.23
THESI	THESL	Emergency	Market**	0.18	0.18
THESI	THESL	Design	Market**	0.30	0.30

* A portion of the fleet charge is allocated from THESI to THESU.

** Because of cost-benefit impacts and impracticability, there was no study done to verify market amounts.

Corporate Cost Allocation

Name of Company		Service Offered	Pricing Methodology	% of Corporate Costs Allocated	Amount Allocated
From	To			%	\$
THESL	THESI	Finance/Treasury/Insurance	Fully allocated-cost	3.3%	0.64
THESL	THESI	EHS	Fully allocated-cost	0.7%	0.02
THESL	THESI	Legal	Fully allocated-cost	0.9%	0.04
THESL	THESI	HR&OE	Fully allocated-cost	1.7%	0.24
THESL	THESI	Procurement	Fully allocated-cost	3.5%	0.08
THESL	THESI	IT&S	Fully allocated-cost	0.2%	0.06
THESL	THESI	Facilities	Fully allocated-cost	0.1%	0.03
THESL	THESU	Finance/Treasury/Insurance	Fully allocated-cost	2.4%	0.47
THESL	THESU	Legal	Fully allocated-cost	1.3%	0.06
THESL	THESU	HR&OE	Fully allocated-cost	1.8%	0.26
THESL	THESU	Procurement	Fully allocated-cost	14.6%	0.34
THESL	THESU	IT&S	Fully allocated-cost	0.2%	0.06
THESL	THESU	Facilities	Fully allocated-cost	1.0%	0.27
THESL	THC	Finance/Treasury/Insurance	Fully allocated-cost	3.2%	0.62
THESL	THC	Legal	Fully allocated-cost	10.5%	0.49
THESL	THC	HR&OE	Fully allocated-cost	0.9%	0.13
THESL	THC	Procurement	Fully allocated-cost	0.4%	0.01
THESL	THC	IT&S	Fully allocated-cost	0.02%	0.01
THESL	THC	Facilities	Fully allocated-cost	0.3%	0.07
THC	THESL	Corporate Stewardship - CEO	Fully allocated-cost	95.0%	2.75
THC	THESL	Corporate Governance - Board of Directors	Fully allocated-cost	90.0%	0.25
THC	THESL	Finance Stewardship - CFO	Fully allocated-cost	95.0%	1.09
THC	THESI	Corporate Governance - Board of Directors	Fully allocated-cost	5.0%	0.01

Year: 2015

Shared Services

Name of Company		Service Offered	Pricing Methodology	Price for the Service	Cost for the Service
From	To			\$	\$
THESL	THESI	Fleet*	Fully allocated-cost	0.49	0.49
THESL	THESI	Emergency Calls / Streetlighting Relamping	Market**	0.27	0.23
THESI	THESL	Emergency	Market**	0.18	0.18
THESI	THESL	Design	Market**	0.30	0.30

* A portion of the fleet charge is allocated from THESI to THESU.

** Because of cost-benefit impacts and impracticability, there was no study done to verify market amounts.

Corporate Cost Allocation

Name of Company		Service Offered	Pricing Methodology	% of Corporate Costs Allocated	Amount Allocated
From	To			%	\$
THESL	THESI	Finance/Treasury/Insurance	Fully allocated-cost	3.2%	0.66
THESL	THESI	EHS	Fully allocated-cost	0.7%	0.02
THESL	THESI	Legal	Fully allocated-cost	0.8%	0.04
THESL	THESI	HR&OE	Fully allocated-cost	1.8%	0.26
THESL	THESI	Procurement	Fully allocated-cost	3.2%	0.08
THESL	THESI	IT&S	Fully allocated-cost	0.2%	0.06
THESL	THESI	Facilities	Fully allocated-cost	0.1%	0.02
THESL	THESU	Finance/Treasury/Insurance	Fully allocated-cost	1.8%	0.37
THESL	THESU	Legal	Fully allocated-cost	1.0%	0.05
THESL	THESU	HR&OE	Fully allocated-cost	2.1%	0.31
THESL	THESU	Procurement	Fully allocated-cost	13.0%	0.32
THESL	THESU	IT&S	Fully allocated-cost	0.2%	0.07
THESL	THESU	Facilities	Fully allocated-cost	0.8%	0.24
THESL	THC	Finance/Treasury/Insurance	Fully allocated-cost	3.1%	0.63
THESL	THC	Legal	Fully allocated-cost	10.2%	0.49
THESL	THC	HR&OE	Fully allocated-cost	1.2%	0.17
THESL	THC	Procurement	Fully allocated-cost	0.4%	0.01
THESL	THC	IT&S	Fully allocated-cost	0.02%	0.01
THESL	THC	Facilities	Fully allocated-cost	0.0%	-
THC	THESL	Corporate Stewardship - CEO	Fully allocated-cost	95.0%	2.87
THC	THESL	Corporate Governance - Board of Directors	Fully allocated-cost	90.0%	0.25
THC	THESL	Finance Stewardship - CFO	Fully allocated-cost	95.0%	1.06
THC	THESI	Corporate Governance - Board of Directors	Fully allocated-cost	5.0%	0.01

Note:

- 1 This appendix must be completed in relation to each service provided or received for the Historical (actuals), Bridge and Test years. The required information includes:

- Type of Service:**

Services such as billing, accounting, payroll, etc. The applicant must identify any costs related to the Board of Directors of the parent company that are allocated to the applicant.

- Pricing Methodology:**

Pricing Methodology includes approaches such as cost-base, market-base, tendering, etc. The applicant must provide evidence demonstrating the pricing methodology used. The applicant must also provide a description of why that pricing methodology was chosen, whether or not it is in conformity with ARC, and why it is appropriate.

- % Allocation:**

The applicant must provide the percentage of the costs allocated to the entity for the service being offered. The Applicant must also provide a description of the allocator and why it is an appropriate allocator.