OVERVIEW OF OPERATING, MAINTENANCE, AND ADMINISTRATION EXPENDITURES

This schedule provides a summary of Toronto Hydro's Operations, Maintenance, and Administration ("OM&A") plan and the process and considerations that informed the establishment of the plan.

1. CONCORDANCE WITH CHAPTER 2 FILING REQUIREMENTS

Consistent with applicable OEB guidance,[1] Toronto Hydro presents its Historical, Bridge, and Test Year OM&A expenditures as the sum of a series of discrete programs. 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, Toronto Hydro has further broken down a number of OM&A programs into segments – i.e. discrete activity-based areas that address the constituent components of a single program.

2. OVERVIEW OF THE OM&A PROGRAMS AND EXPENDITURES

Toronto Hydro's forecast OM&A expenditures for 2020 are $277.5 million, which represents a compounded average increase of 2.6 percent per year from 2015 Board-approved and 2015 historical actuals. When normalized for customer count, the compound growth rate in OM&A costs per customer is 1.6 percent over the rate period. Normalized for full time equivalent ("FTE"), the compound growth rate is 2.5 percent.

[1] Including, for example, Ontario Energy Board, Filing Requirements for Electricity Distribution Rate Applications, Chapter 2 (July 12, 2018), s. 2.4; and the Handbook for Utility Rate Applications (October 13, 2016), p. 19.

Detailed trend analyses are included in OEB Appendices 2-JA, 2-JB, 2-JC, and 2-L to this schedule.

Table 1, below, provides a breakdown of Toronto Hydro's Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) OM&A expenditures, by program. Descriptions of each program, including details about cost drivers, cost control measures taken by Toronto Hydro, and year-over-year variance analyses, are contained in Exhibit 4A, Tab 2, Schedules 1 through 21.

Table 1: Historical, Bridge, and Test Year OM&A Expenditures by Program ($ Millions)[2]

OM&A Program	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Preventative and Predictive Overhead Line Maintenance	6.3	7.6	6.7	6.6	6.8	6.0
Preventative and Predictive Underground Line Maintenance	2.6	2.9	3.2	4.5	5.2	5.5
Preventative and Predictive Station Maintenance	5.6	5.3	5.6	5.4	5.6	5.6
Corrective Maintenance	16.1	16.8	20.3	17.0	17.0	17.2
Emergency Response	16.4	15.2	15.9	16.4	16.5	16.6
Disaster Preparedness Management	2.3	2.4	2.2	2.6	2.8	2.7
Control Centre Operations	5.4	5.4	6.3	7.8	8.7	8.7
Customer-Driven Work	10.2	10.0	11.6	9.9	9.6	9.6
Asset and Program Management	11.2	18.1	11.5	14.8	14.7	13.1
Work Program Execution	19.5	19.5	20.5	19.1	20.3	21.8
Fleet and Equipment Services	10.1	9.8	11.0	10.9	11.0	11.0
Facilities Management	27.4	27.8	25.3	23.2	23.4	24.0
Supply Chain Services	10.4	13.4	11.4	11.7	12.3	12.6
Customer Care	41.0	38.1	39.6	43.0	44.0	49.4
Human Resources and Safety	14.1	15.2	14.7	15.2	15.5	15.9
Finance	16.1	15.0	13.6	15.9	16.2	16.2

[2] Numbers may not sum due to rounding.

OM&A Program	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Information Technology	34.4	35.0	38.4	41.7	43.5	44.0
Legal and Regulatory	12.1	13.4	14.0	15.3	15.1	15.9
Charitable Donations and LEAP	0.7	0.9	0.8	0.8	0.8	0.9
Common Costs and Adjustments	1.1	(0.1)	1.6	(0.7)	(1.3)	0.8
Allocations and Recoveries	(19.0)	(21.9)	(18.9)	(20.1)	(20.0)	(19.9)
Total OM&A	**244.0**	**249.8**	**255.3**	**261.2**	**267.6**	**277.5**

Toronto Hydro's 2020 OM&A plan was an output of its outcomes-oriented, customer-focused business planning activities. The development of the OM&A plan was informed by a number of factors, including operational needs (e.g. requirements relating to asset investment, maintenance, and staffing), legislative and regulatory obligations, the Outcomes Framework, and Customer Engagement. The OM&A plan was constrained by the strategic parameters established for the business plan, including upper limits on the 2020 OM&A budget and the cap on the average annual increase to base distribution rates (see Exhibit 1B, Tab 1, Schedule 1).

Toronto Hydro's OM&A plan was developed in accordance with the utility operating under an Incentive Regulation Mechanism ("IRM") framework for non-capital expenditures. For 2021 to 2024, funding for OM&A is constrained by the proposed rate framework, which includes the OEB's current inflation factor methodology, stretch factor methodology set on the basis of PSE's cost benchmarking study,[3] and current productivity factor policy.

Toronto Hydro used both general and specific cost and economic assumptions in its forecast of 2020 OM&A costs. The forecast for compensation costs considered previous

[3] See Exhibit 1B, Tab 4, Schedule 2.

and current collective agreement parameters, adjustments to reflect market-competitive pay increases for non-unionized employees, and the proposal to use the accrual method to account for Other Post-Employment Benefits. For more information on compensation costs, see Exhibit 4A, Tab 4, Schedules 2 and 4. Otherwise, a general inflation factor of 2.0 percent was applied, consistent with the OEB's inflation factor at the time of 1.9 percent.

The programs that constitute Toronto Hydro's plan are largely a continuation of its 2015-2019 OM&A programs, which are critical to the ongoing performance of the utility. They provide functions that support the safe and reliable operation of the distribution system, deliver customer-facing services that respond to customer expectations and improve ratepayer value, and provide critical corporate functions that allow the utility to operate in a financially responsible and policy-responsive manner.

Toronto Hydro's OM&A expenditures contribute to the achievement of the Outcomes Framework (see Exhibit 1B, Tab 2, Schedule 1) and the Electricity Service Quality Requirements (see Exhibit 1B, Tab 2, Schedule 3). Each OM&A program contains outcomes that Toronto Hydro expects to be attained as a result of the proposed investment, and are categorized into the six outcome categories under the Outcomes Framework.[4] This results-driven approach underscores the customer value generated by the proposed OM&A programs.

Toronto Hydro's OM&A programs detail the applicable cost drivers and the steps taken by the utility to reduce those costs on a program-specific basis. For example, in the

[4] The outcomes listed in each program are directly connected to, and dependent on, the forecasted funding needs for the program. Any change in overall rates funding for the term of the plan would require Toronto Hydro to reforecast cost allocation to each program and re-examine the corresponding outcomes.

Customer Care program (Exhibit 4A, Tab 2, Schedule 14) the annual cost of moving to monthly billing is being mitigated by increasing the penetration of eBilling, which is significantly less expensive than paper billing. The utility is proposing to drive further eBilling adoption through 2020 to 2024, and track its progress through a "Customers Receiving eBills" metrics in its Custom Performance Measures and Targets framework (see Exhibit 2B, Section C2).

Other programs experiencing significant cost pressures include: (i) Information Technology (Exhibit 4A, Tab 2, Section 17), which is an area where Toronto Hydro must adapt to externally-driven increases in maintenance costs and fees; and (ii) Control Centre Operations (Exhibit 4A, Tab 2, Schedule 7), which is an area where the utility must make non-discretionary workforce renewal investments in light of demographic challenges (as outlined in the Workforce Staffing Plan and Strategy at Exhibit 4A, Tab 4, Schedule 3). Both programs detail the specific actions Toronto Hydro is taking to control costs.

As discussed in detail in each OM&A program, the efficiencies expected to be achieved through Toronto Hydro's actions are partially offsetting program costs. For example, annual Facilities Management program costs (Exhibit 4A, Tab 2, Schedule 12) are expected to decrease by $3.4 million (12.4 percent) between 2015 and 2020, primarily due to Toronto Hydro's move from leased to owned facilities. The cost of other OM&A programs, such as Finance (Exhibit 4A, Tab 2, Schedule 16) and Emergency Response (Exhibit 4A, Tab 2, Schedule 5) are expected to decrease or remain virtually unchanged from 2015 to 2020 as a result of specific steps taken by the utility.

OEB Appendix 2-D (filed as Appendix A to Exhibit 2A, Tab 5, Schedule 2) details overall levels of, and changes to, Total Capitalized OM&A for 2015 to 2020. Annual variances are a function of the overall type and nature of the capital work being executed by Toronto Hydro. There have been no changes in the utility's overhead expense capitalization policy since its last rebasing application.

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

(in $ Millions)

	Last Rebasing Year (2015 Board-Approved)	2015 Actuals	2016 Actuals	2017 Actuals	2018 Bridge Year	2019 Bridge Year	2020 Test Year
Reporting Basis	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS
Operations	-	$ 48.6	$ 56.9	$ 55.1	$ 56.3	$ 60.2	$ 59.4
Maintenance	-	$ 67.1	$ 63.1	$ 64.3	$ 65.9	$ 67.1	$ 67.7
SubTotal	**-**	**$ 115.7**	**$ 120.0**	**$ 119.3**	**$ 122.2**	**$ 127.3**	**$ 127.1**
%Change (year over year)			3.7%	-0.5%	2.4%	4.1%	-0.1%
%Change (Test Year vs Last Rebasing Year - Actual)							9.9%
Billing and Collecting	-	$ 36.7	$ 33.4	$ 34.9	$ 37.8	$ 38.4	$ 38.8
Community Relations	-	$ 3.5	$ 2.5	$ 2.3	$ 2.6	$ 2.7	$ 2.8
Administrative and General	-	$ 81.9	$ 88.3	$ 92.5	$ 92.1	$ 93.4	$ 95.0
Taxes Other Than Income Taxes	-	$ 5.2	$ 4.6	$ 5.3	$ 5.6	$ 5.4	$ 5.5
Donations	-	$ 1.0	$ 1.0	$ 1.0	$ 0.9	$ 0.9	$ 1.0
SubTotal	**-**	**$ 128.3**	**$ 129.9**	**$ 135.9**	**$ 139.0**	**$ 140.9**	**$ 143.1**
%Change (year over year)			1.2%	4.7%	2.2%	1.4%	1.5%
%Change (Test Year vs Last Rebasing Year - Actual)							11.5%
Total	**$ 243.9**	**$ 244.0**	**$ 249.8**	**$ 255.3**	**$ 261.2**	**$ 268.2**	**$ 270.2**
%Change (year over year)			2.4%	2.2%	2.3%	2.7%	0.8%
Cash vs. Accrual OPEB and Monthly Billing	-	-	-	-	-	-	$ 7.3
Total - including Cash vs. Accrual OPEB and Monthly Billing	**$ 243.9**	**$ 244.0**	**$ 249.8**	**$ 255.3**	**$ 261.2**	**$ 268.2**	**$ 277.5**
%Change (year over year)			2.4%	2.2%	2.3%	2.7%	3.5%

	Last Rebasing Year (2015 Board-Approved)	2015 Actuals	2016 Actuals	2017 Actuals	2018 Bridge Year	2019 Bridge Year	2020 Test Year
Operations	-	$ 48.6	$ 56.9	$ 55.1	$ 56.3	$ 60.2	$ 59.4
Maintenance	-	$ 67.1	$ 63.1	$ 64.3	$ 65.9	$ 67.1	$ 67.7
Billing and Collecting	-	$ 36.7	$ 33.4	$ 34.9	$ 37.8	$ 38.4	$ 38.8
Community Relations	-	$ 3.5	$ 2.5	$ 2.3	$ 2.6	$ 2.7	$ 2.8
Administrative and General	-	$ 81.9	$ 88.3	$ 92.5	$ 92.1	$ 93.4	$ 95.0
Taxes Other Than Income Taxes	-	$ 5.2	$ 4.6	$ 5.3	$ 5.6	$ 5.4	$ 5.5
Donations	-	$ 1.0	$ 1.0	$ 1.0	$ 0.9	$ 0.9	$ 1.0
Cash vs. Accrual OPEB and Monthly Billing	-	-	-	-	-	-	$ 7.3
Total	**$ 243.9**	**$ 244.0**	**$ 249.8**	**$ 255.3**	**$ 261.2**	**$ 268.2**	**$ 277.5**
%Change (year over year)			2.4%	2.2%	2.3%	2.7%	3.5%

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

	Last Rebasing Year (2015 Board-Approved)	2015 Actuals	Variance 2015 BA - 2015 Actuals	2016 Actuals	Variance 2016 Actuals vs. 2015 Actuals	2017 Actuals	Variance 2017 Actuals vs. 2016 Actuals	2018 Bridge Year	Variance 2018 Bridge vs. 2017 Actuals	2019 Bridge Year	Variance 2019 Bridge vs. 2018 Bridge	2020 Test Year	Variance 2020 Test vs. 2019 Bridge
Operations	-	$ 48.6	$ (48.6)	$ 56.9	$ 8.3	$ 55.1	$ (1.9)	$ 56.3	$ 1.2	$ 60.2	$ 3.9	$ 59.4	$ (0.8)
Maintenance	-	$ 67.1	$ (67.1)	$ 63.1	$ (4.1)	$ 64.3	$ 1.2	$ 65.9	$ 1.7	$ 67.1	$ 1.1	$ 67.7	$ 0.6
Billing and Collecting	-	$ 36.7	$ (36.7)	$ 33.4	$ (3.4)	$ 34.9	$ 1.5	$ 37.8	$ 2.9	$ 38.4	$ 0.7	$ 38.8	$ 0.4
Community Relations	-	$ 3.5	$ (3.5)	$ 2.5	$ (1.0)	$ 2.3	$ (0.2)	$ 2.6	$ 0.3	$ 2.7	$ 0.1	$ 2.8	$ 0.1
Administrative and General	-	$ 81.9	$ (81.9)	$ 88.3	$ 6.4	$ 92.5	$ 4.1	$ 92.1	$ (0.4)	$ 93.4	$ 1.3	$ 95.0	$ 1.5
Taxes Other Than Income Taxes	-	$ 5.2	$ (5.2)	$ 4.6	$ (0.5)	$ 5.3	$ 0.6	$ 5.6	$ 0.3	$ 5.4	$ (0.2)	$ 5.5	$ 0.1
Donations	-	$ 1.0	$ (1.0)	$ 1.0	$ (0.0)	$ 1.0	$ (0.0)	$ 0.9	$ (0.0)	$ 0.9	$ 0.0	$ 1.0	$ 0.0
Cash vs. Accrual OPEB and Monthly Billing	-	-	-	-	-	-	-	-	-	-	-	$ 7.3	$ 7.3
Total OM&A Expenses	$ 243.9	$ 244.0	$ (244.0)	$ 249.8	$ 5.8	$ 255.3	$ 5.4	$ 261.2	$ 6.0	$ 268.2	$ 6.9	$ 277.5	$ 9.3
Adjustments for Total non-recoverable items (from Appendices 2-JA and 2-JB)	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Recoverable OM&A Expenses	$ 243.9	$ 244.0	$ (244.0)	$ 249.8	$ 5.8	$ 255.3	$ 5.4	$ 261.2	$ 6.0	$ 268.2	$ 6.9	$ 277.5	$ 9.3
Variance from previous year					$ 5.8		$ 5.4		$ 6.0		$ 6.9		$ 9.3
Percent change (year over year)					2.4%		2.2%		2.3%		2.7%		3.5%
Percent Change: Test year vs. Most Current Actual													3.7%
Simple average of % variance for all years													2.6%
Compound Annual Growth Rate for all years													2.6%

Note:

1 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.

OEB Appendix 2-JB
Recoverable OM&A Cost Driver Table

OM&A	Last Rebasing Year (2015 Board-Approved)	2016 Actuals	2017 Actuals	2018 Bridge Year	2019 Bridge Year	2020 Test Year
Reporting Basis	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS
Opening Balance	**$243.9**	**$244.0**	**$249.8**	**$255.3**	**$261.2**	**$268.2**
Distribution Operations						
Predictive and Preventative Maintenance Overhead	-	$1.3	($0.9)	($0.1)	$0.1	($0.7)
Predictive and Preventative Maintenance Underground	-	$0.3	$0.3	$1.3	$0.7	$0.2
Predictive and Preventative Maintenance Stations	-	($0.3)	$0.3	($0.1)	$0.2	($0.1)
Corrective Maintenance	-	$0.7	$3.5	($3.3)	($0.0)	$0.2
Emergency Response	-	($1.2)	$0.7	$0.4	$0.2	$0.1
Disaster Preparedness Management	-	$0.0	($0.2)	$0.4	$0.2	($0.1)
Control Centre Operations	-	$0.0	$0.8	$1.5	$0.9	$0.1
Customer Driven Work	-	($0.2)	$1.7	($1.7)	($0.4)	$0.0
Asset and Program Management	-	$6.9	($6.6)	$3.4	$0.4	($2.2)
Work Program Execution	-	($0.0)	$1.0	($1.4)	$1.1	$1.5
Fleet and Equipment	-	($0.3)	$1.2	($0.1)	$0.0	$0.0
Supply Chain	-	$3.0	($2.0)	$0.3	$0.6	$0.3
Customer Service and Communications						
Billing, Remittance & Meter Data Management	-	($2.3)	$2.2	$0.3	$0.4	$4.5
Collections	-	($0.5)	($1.0)	$2.9	$0.3	$0.1
Customer Relationship Management	-	$0.2	($0.1)	($1.1)	$0.1	$0.7
Communications & Public Affairs	-	($0.2)	$0.4	$1.3	$0.2	$0.1
LEAP	-	$0.2	($0.1)	$0.0	$0.0	$0.0
Human Resources and Safety						
Human Resource Services and Employee Labour Relations	-	$0.6	($0.0)	($0.3)	$0.0	$0.1
Environment Health and Safety	-	$0.1	($0.2)	$0.2	$0.1	$0.1
Talent Management & Organizational Effectiveness	-	$0.3	($0.3)	$0.7	$0.1	$0.2
Information Technology						
IT Governance	-	$0.2	$0.0	$0.3	$0.0	$0.1
IT Operations	-	$0.4	$2.6	$2.9	$1.5	$0.3
Project Execution	-	$0.2	$0.2	$0.0	$0.0	$0.1
Security & Enterprise Architecture	-	($0.2)	$0.4	$0.1	$0.3	$0.1
Common Corporate Costs						
Common Corporate Costs	-	($1.2)	$1.7	($2.3)	($0.6)	$2.1

OEB Appendix 2-JB
Recoverable OM&A Cost Driver Table

OM&A	Last Rebasing Year (2015 Board-Approved)	2016 Actuals	2017 Actuals	2018 Bridge Year	2019 Bridge Year	2020 Test Year
Reporting Basis	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS
Facilities Management						
Facilities Maintenance Services	-	$0.9	($0.1)	($1.2)	$0.5	$0.4
Rentals & Leases	-	$0.1	($3.6)	($1.4)	$0.0	$0.0
Utilities & Communications	-	($0.1)	$0.3	$0.5	($0.1)	$0.1
Property Taxes	-	($0.6)	$1.0	$0.0	($0.2)	$0.1
Other Various						
Finance	-	($1.1)	($1.4)	$2.3	$0.3	$0.0
Legal and Regulatory	-	$1.3	$0.6	$1.4	($0.2)	$0.7
Allocations and Recoveries	-	($2.9)	$3.0	($1.1)	$0.1	$0.0
Closing Balance	**$244.0**	**$249.8**	**$255.3**	**$261.2**	**$268.2**	**$277.5**

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 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 (2015 Board-Approved)	2015 Actuals	2016 Actuals	2017 Actuals	2018 Bridge Year	2019 Bridge Year	2020 Test Year	Variance (Test Year vs. 2017 Actuals)	Variance (Test Year vs. Last Rebasing Year (2015 Board-Approved)
Reporting Basis	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS		
Distribution Operations									
Predictive and Preventative Maintenance Overhead	-	6.3	7.6	6.7	6.6	6.8	6.0	(0.7)	6.0
Predictive and Preventative Maintenance Underground	-	2.6	2.9	3.2	4.5	5.2	5.5	2.2	5.5
Predictive and Preventative Maintenance Stations	-	5.6	5.3	5.6	5.4	5.6	5.6	0.0	5.6
Corrective Maintenance	-	16.1	16.8	20.3	17.0	17.0	17.2	(3.1)	17.2
Emergency Response	-	16.4	15.2	15.9	16.4	16.5	16.6	0.7	16.6
Disaster Preparedness Management	-	2.3	2.4	2.2	2.6	2.8	2.7	0.5	2.7
Control Centre Operations	-	5.4	5.4	6.3	7.8	8.7	8.7	2.5	8.7
Customer Driven Work	-	10.2	10.0	11.6	9.9	9.6	9.6	(2.1)	9.6
Asset and Program Management	-	11.2	18.1	11.5	14.8	15.3	13.1	1.6	13.1
Work Program Execution	-	19.5	19.5	20.5	19.1	20.3	21.8	1.3	21.8
Fleet and Equipment	-	10.1	9.8	11.0	10.9	11.0	11.0	(0.1)	11.0
Supply Chain	-	10.4	13.4	11.4	11.7	12.3	12.6	1.2	12.6
Sub-Total	-	116.1	126.5	126.3	126.9	131.0	130.4	4.1	130.4
Customer Care									
Billing, Remittance & Meter Data Management	-	15.7	13.4	15.5	15.9	16.2	20.7	5.2	20.7
Collections	-	10.8	10.3	9.2	12.1	12.4	12.6	3.3	12.6
Customer Relationship Management	-	11.4	11.6	11.5	10.4	10.6	11.3	(0.2)	11.3
Communications & Public Affairs	-	3.1	2.9	3.3	4.6	4.7	4.9	1.6	4.9
Sub-Total	-	41.0	38.1	39.6	43.0	44.0	49.4	9.8	49.4
Charitable Donations and LEAP									
LEAP	-	0.7	0.9	0.8	0.8	0.8	0.9	0.1	0.9
Sub-Total	-	0.7	0.9	0.8	0.8	0.8	0.9	0.1	0.9

OEB Appendix 2-JC
OM&A Programs Table

(in $ Millions)

Programs	Last Rebasing Year (2015 Board-Approved)	2015 Actuals	2016 Actuals	2017 Actuals	2018 Bridge Year	2019 Bridge Year	2020 Test Year	Variance (Test Year vs. 2017 Actuals)	Variance (Test Year vs. Last Rebasing Year (2015 Board-Approved)
Reporting Basis	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS		
Human Resources and Safety									
Human Resource Services and Employee Labour Relations	-	4.6	5.2	5.1	4.8	4.8	5.0	(0.2)	5.0
Environment Health and Safety	-	2.5	2.7	2.5	2.7	2.8	2.9	0.4	2.9
Talent Management & Organizational Effectiveness	-	7.0	7.3	7.0	7.8	7.9	8.1	1.1	8.1
Sub-Total	-	14.1	15.2	14.7	15.2	15.5	15.9	1.2	15.9
Information Technology									
IT Governance	-	2.7	2.9	3.0	3.2	3.3	3.4	0.4	3.4
IT Operations	-	27.9	28.3	30.9	33.8	35.3	35.6	4.7	35.6
Project Execution	-	1.2	1.4	1.6	1.6	1.6	1.7	0.1	1.7
Security & Enterprise Architecture	-	2.7	2.4	2.9	3.0	3.3	3.4	0.5	3.4
Sub-Total	-	34.4	35.0	38.4	41.7	43.5	44.0	5.7	44.0
Common Costs and Adjustments									
Common Corporate Costs	-	1.1	(0.1)	1.6	(0.7)	(1.3)	0.8	(0.8)	0.8
Sub-Total	-	1.1	(0.1)	1.6	(0.7)	(1.3)	0.8	(0.8)	0.8
Facilities Management									
Facilities Maintenance Services	-	14.6	15.4	15.3	14.1	14.7	15.1	(0.3)	15.1
Rentals & Leases	-	5.2	5.3	1.7	0.3	0.4	0.4	(1.4)	0.4
Utilities & Communications	-	2.4	2.4	2.6	3.1	3.0	3.1	0.4	3.1
Property Taxes	-	5.2	4.6	5.6	5.6	5.4	5.5	(0.0)	5.5
Sub-Total	-	27.4	27.8	25.3	23.2	23.4	24.0	(1.3)	24.0
Finance									
Controllership	-	8.4	7.3	6.4	7.2	7.2	7.0	0.6	7.0
External Reporting	-	2.5	2.7	2.7	3.0	3.1	3.2	0.5	3.2
Financial Services	-	5.2	5.0	4.6	5.7	5.9	6.1	1.5	6.1
Sub-Total	-	16.1	15.0	13.6	15.9	16.2	16.2	2.6	16.2

OEB Appendix 2-JC
OM&A Programs Table

(in $ Millions)

Programs	Last Rebasing Year (2015 Board-Approved)	2015 Actuals	2016 Actuals	2017 Actuals	2018 Bridge Year	2019 Bridge Year	2020 Test Year	Variance (Test Year vs. 2017 Actuals)	Variance (Test Year vs. Last Rebasing Year (2015 Board-Approved)
Reporting Basis	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS		
Legal and Regulatory									
Legal and Regulatory Program	-	12.1	13.4	14.0	15.3	15.1	15.9	1.9	15.9
Sub-Total	-	12.1	13.4	14.0	15.3	15.1	15.9	1.9	15.9
Allocations and Recoveries									
On-cost recovery	-	(10.6)	(11.5)	(11.3)	(11.9)	(11.8)	(11.8)	(0.5)	(11.8)
Fleet Recovery Offset	-	(12.5)	(12.4)	(11.5)	(11.4)	(11.4)	(11.6)	(0.1)	(11.6)
IT and Occupancy Charges	-	(0.7)	(1.1)	(1.0)	(1.0)	(1.0)	(1.0)	(0.0)	(1.0)
Shared Services	-	4.8	2.9	4.8	4.3	4.4	4.6	(0.2)	4.6
Other Allocated Costs	-	0.0	0.1	0.2	(0.1)	(0.1)	(0.1)	(0.3)	(0.1)
Sub-Total	-	(19.0)	(21.9)	(18.9)	(20.1)	(20.0)	(19.9)	(1.0)	(19.9)
Miscellaneous	-	-	-	-	-	-	-	-	-
Total	**243.9**	**244.0**	**249.8**	**255.3**	**261.2**	**268.2**	**277.5**	**22.2**	**33.6**

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 [1]

	Last Rebasing Year (2015 Board-Approved)	2015 Actuals	2016 Actuals	2017 Actuals	2018 Bridge Year	2019 Bridge Year	2020 Test Year
Reporting Basis							
OM&A Costs							
O&M	-	$ 115.7	$ 120.0	$ 119.3	$ 122.2	$ 127.3	$ 127.1
Admin Expenses	-	$ 128.3	$ 129.9	$ 135.9	$ 139.0	$ 140.9	$ 150.4
Total Recoverable OM&A from Appendix 2-JB [5]	$ 243.9	$ 244.0	$ 249.8	$ 255.3	$ 261.2	$ 268.2	$ 277.5
Number of Customers [2,4]	747,812	747,812	759,032	765,560	771,080	776,787	784,331
Number of FTEs [3,4,6]	1,630	1,630	1,605	1,589	1,621	1,646	1,639
Customers/FTEs	458.89	458.89	472.96	481.92	475.66	472.04	478.52
OM&A cost per customer							
O&M per customer	-	154.7	158.0	155.8	158.5	163.8	162.1
Admin per customer	-	171.6	171.1	177.6	180.3	181.4	191.7
Total OM&A per customer	326.2	326.3	329.1	333.4	338.8	345.2	353.8
OM&A cost per FTE							
O&M per FTE	-	70,984.6	74,748.3	75,105.8	75,396.7	77,339.4	77,563.5
Admin per FTE	-	78,732.1	80,913.3	85,579.5	85,739.7	85,617.0	91,737.1
Total OM&A per FTE	149,666.7	149,716.7	155,661.6	160,685.4	161,136.5	162,956.4	169,300.6

Notes:

1 If it has been more than four 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 four years ago, a minimum of three years of actual information is required.

2 The method of calculating the number of customers is the year end method
3 The method of calculating the number of FTEs is the mid year average
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 For the test year, the applicant should take into account the system O&M (line 22 of Appendix 2-AB) in developing its forecasted OM&A.
6 Difference to compensation table (appendix 2-K) FTE figures due to students

PREVENTATIVE AND PREDICTIVE OVERHEAD LINE MAINTENANCE

1. OVERVIEW

Table 1: Preventative and Predictive Overhead Line Maintenance Program Summary

2015-2017 Average Annual Cost ($M): 6.9	**2020 Cost ($M):** 6.0
Segments: • Overhead Line Patrols & Pole Inspections • Overhead Switch Maintenance & Insulator Washing • Vegetation Management • Metering Services	
Outcomes: Reliability, Environment, Safety, and Customer Service	

The Preventative and Predictive Overhead Line Maintenance program (the "Program") funds maintenance activities on: (i) Toronto Hydro's overhead line assets; and (ii) metering assets and associated communication systems that enable meter data collection and tracking to ensure compliance with applicable legislative and regulatory requirements. This Program involves inspection and maintenance tasks typically conducted on a fixed cycle, and inspection of equipment for indications of potential failure. The segments in this Program are focused on preserving and maximizing an asset's performance over its expected useful life while mitigating a wide variety of system risks. The Program is also designed to minimize overall lifecycle costs, account for factors such as the safety of Toronto Hydro work crews and the public, responsible environmental stewardship and associated obligations, and compliance with statutory and regulatory requirements.[1]

The Preventative and Predictive Overhead Line Maintenance program is comprised of the following four segments:

[1] Including the OEB's Minimum Inspection Requirements under Appendix C of the *Distribution System Code*.

- **Overhead Line Patrols & Pole Inspections:** this segment funds periodic line patrols to inspect all overhead distribution equipment, including pole-mounted transformers, switches, auxiliary equipment, and conductor wire. In addition to line patrols, the segment also includes dedicated pole inspections and wood pole treatment.
- **Overhead Switch Maintenance & Insulator Washing**: this segment funds two general sets of maintenance activities on the overhead distribution system: (i) the periodic inspection and maintenance of overhead switches such as SCADA-Mate and Three Phase Gang-Operated Switches; and (ii) the washing of porcelain insulators located at high-risk locations prone to contamination build-up.
- **Vegetation Management**: this segment funds the trimming of vegetation near overhead feeders to minimize the impact of tree-caused power interruptions on system reliability.
- **Metering Services:** this segment funds the inspection and maintenance of metering assets and associated communication technologies to ensure proper functionality and compliance with applicable legislative and regulatory requirements.

The proposed 2020 expenditures for this Program are based on historical levels. By preserving and maximizing the performance of overhead line and metering assets and ensuring these assets are fully operational, this Program contributes to maintaining safety, the environment, and overall system reliability at reasonable costs to Toronto Hydro's customers.

In addition, the Program contributes to customer experience and satisfaction by facilitating: (i) the tracking of accurate and timely electricity consumption information for customer billing purposes; and (ii) the use of up-to-date communication technology that enables remote reading and processing of customer meter information.

2. OUTCOMES AND MEASURES

Table 2: Preventative and Predictive Overhead Line Maintenance Program Outcomes and Measures Summary

Reliability	• Contribute to the overall system performance and reliability – as measured by performance metrics like SAIFI, SAIDI, Customers Interrupted ("CI"), and Customer Hours Interrupted ("CHI") – by promptly identifying potential asset failure or assets in substandard conditions before failure occurs, through planned inspections in compliance with the Ontario Energy Board's ("OEB") Distribution Systems Code ("DSC"). • On average, a trimmed feeder after experiencing three to four years of growth shows a 20 percent to 40 percent reduction in tree caused interruptions.
Environment	• Contribute to reducing the environmental impact of Toronto Hydro's distribution system by proactively identifying transformers exhibiting signs of oil deficiencies for replacement, thereby reducing the likelihood of oil spills into the environment.
Safety	• Contribute to Toronto Hydro's safety objectives (including compliance with Ontario Regulation 22/4, and safety performance as reflected by metrics like the Serious Electrical Incidents Index and Total Recordable Injury Frequency) through proactive inspections to identify and reduce the likelihood of equipment malfunction (e.g. porcelain switch breaking) and asset failures (e.g. collapse of a pole or flashovers on electrical equipment) which, if not prevented, may lead to injury of the general public and Toronto Hydro's crew.
Customer Service	• Contribute to Toronto Hydro's customer service performance and objectives by ensuring the accurate billing of all smart metered customers based on actual usage, and mitigating the risk of meter seals expiring before their testing and re-validation (which also supports compliance with applicable regulatory requirements like the *Electricity and Gas Inspection Act* and the *Weights and Measures Act*).

3. PROGRAM DESCRIPTION

The Preventative and Predictive Overhead Line Maintenance program funds all maintenance activities with respect to Toronto Hydro's overhead distribution system and metering assets, including meters and communication systems that enable meter data collection and tracking. This Program involves inspection and maintenance tasks typically conducted on a fixed cycle and inspection of equipment for predetermined conditions indicative of a potential failure. The segments in the Program focus on preserving and maximizing an asset's performance over its expected useful life while mitigating a wide variety of system risks. The Program is also designed to minimize overall costs and account for factors such as the safety of Toronto Hydro's work crews and the public, responsible environmental stewardship and associated obligations, and compliance with applicable statutory and regulatory requirements.

The Preventative and PredictiveOverhead Line Maintenance program is comprised of the following four segments:

- **Overhead Line Patrols & Pole Inspections**: this segment funds periodic line patrols to inspect and assess the condition of all overhead distribution equipment including pole-mounted transformers, switches, auxiliary equipment, and conductor wire. In addition, this segment also includes dedicated pole inspections of all wood, concrete and steel poles and wood poles treatment.
- **Overhead Switch Maintenance & Insulator Washing:** this segment funds two general sets of maintenance activities on the overhead distribution system (1) the periodic inspection and maintenance of overhead switches such as SCADA-Mate and Three Phase Gang-Operated Switches, and (2) the washing of porcelain insulators located at high-risk locations prone to contamination build-up.

- **Vegetation Management:** this segment funds the trimming of vegetation near overhead feeders to minimize the impact of tree-caused power interruptions on system reliability.
- **Metering Services:** this segment funds the inspections and maintenance of metering assets and associated communication technologies to ensure proper functionality and compliance with applicable legislative and regulatory requirements. Metering maintenance activities include: meter audits to verify meter accuracy; verifying, testing and troubleshooting wholesale meters installed at transmission grid supply points; investigating communication issues; and installing reused meters following accuracy testing.

4. PROGRAM COSTS

Toronto Hydro is requesting $6.0 million in 2020 to execute the functions in the Program. Without this level of funding, Toronto Hydro could be exposed to a number of risks:

- Reduced ability to comply with applicable legislative and regulatory requirements such as Measurement Canada's metering requirements or the OEB's Minimum Inspection Requirements.
- Increased frequency of equipment malfunctions or failures due to unidentified deficiencies or lack of maintenance leading to increased:
  - safety risks from incidents such as the collapse of a pole onto a roadway, sidewalk or residence or flashovers on electrical equipment;
  - environmental risk from oil leaks resulting from unidentified equipment deficiencies such as corrosion on the transformer tank; and
  - reliability risks from failure of overhead switches or other equipment which result in outages or interruptions caused by overgrown trees.

- Decreased ability to extend the life of wood poles through treatment.

The Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for each segment are summarized in Table 3 below.

Table 3: Overhead Maintenance Program Expenditures by Segment ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Overhead Line Patrols and Pole Inspections	0.5	0.9	0.9	0.8	0.6	0.6
Overhead Switch Maintenance and Insulator Washing	1.8	1.5	1.7	1.3	1.8	1.1
Vegetation Management	2.8	3.5	2.9	2.9	2.9	2.8
Metering Services	1.3	1.7	1.2	1.6	1.5	1.5
Total	**6.3**	**7.6**	**6.7**	**6.6**	**6.8**	**6.0**

4.1 Cost Drivers

The 2020 test year cost forecast represents a decrease of $0.3 million from Toronto Hydro's last rebasing year (2015), a decrease of $0.7 million from the most recent historical actual year (2017), and a decrease of $0.8 million from the bridge year (2019). The cost variances are primarily a result of:

- Expected reduction in the population of porcelain insulators requiring washing as Toronto Hydro's capital program starts to replace porcelain with polymer insulators beginning in 2020.
- One-off inspections of overhead distribution line insulators (required between 2016-2018 in response to a sharp rise in pole fires in 2015) which will no longer be required beyond 2018 once all insulators are inspected.
- Fluctuation in the number of overhead switches maintained over the 2015-2020 period.

4.2 Cost Control and Productivity Measures

4.2.1 Cost Management

Some maintenance activities require an outage to be taken to create a safe work zone in accordance with Toronto Hydro's Work Protection Code. Initiatives undertaken in 2016 included the development of an annual feeder scheduling program and enhanced work coordination to allow crews to carry out more maintenance work per outage. For maintenance activities that require an outage (e.g. overhead switch maintenance), this initiative entails cost control benefits given the need for fewer switching and isolation operations overall. In addition, the decision to replace porcelain insulators (which are prone to contamination build-up) will lead to immediate and long-term savings in terms of insulator washing maintenance costs.

4.2.2 Productivity

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 Overhead Line Maintenance program. In an effort to achieve greater productivity, Toronto Hydro has recently undertaken an overhaul and recertification process for all Reliability Centered Maintenance ("RCM") studies and has adjusted maintenance tasks and frequencies based on RCM and Condition-based Maintenance principles. Examples of these adjustments include:

- Standardizing the maintenance cycles of overhead switches to align with station maintenance cycles (i.e. every four years) wherever possible to minimize the need for multiple equipment outages and significant switching resources, enable efficient execution of more maintenance work per outage, and minimize the need for multiple visits to work on particular sites;

- implementing "find and fix" protocols whereby crews that identify minor asset deficiencies address the deficiencies (e.g. replacing equipment nomenclature or addressing missing or defective guy guards and pole ground wires) onsite, as opposed to only logging the deficiencies for future action under the Corrective Maintenance program:[2]
- Issuing longer-term inspection maintenance contracts to third party service providers to keep unit costs stable and increase service quality levels over time (i.e. as result of accumulated service provider experience and familiarity with identifying deficiencies on Toronto Hydro's distribution system); and
- Introducing new tools or making greater use of existing technology such as Infrared Thermography, Electronic Maintenance Sheets, and Online Partial Discharge Testing.

For the Metering Services segment, Toronto Hydro has pursued the following initiatives with productivity benefits:

- Introduced new metering technologies for interval metered and suite metered services to improve the success of daily metering communication;
- Migrated from the failing legacy 2G meters to 4G LTE meters with more reliable communication network, reducing costs associated with on-site investigations and troubleshooting; and
- Replaced power-line with direct-line communication for added reliability and data collection for suite metered services.

The following sections describe each of the segments in the Preventative and Predictive Overhead Line Maintenance program.

[2] Exhibit 4A, Tab 2, Schedule 4.

5. OVERHEAD LINE PATROLS AND POLE INSPECTIONS SEGMENT

5.1 Segment Description

Toronto Hydro conducts line patrols to inspect approximately 4,100 circuit kilometres of primary and 11,500 circuit kilometres of secondary distribution lines every three years. Infrared thermography scans are also performed annually on all primary lines and nearby secondary lines. The inspection cycles for line patrols are as mandated by the OEB's Minimum Inspection Requirements (under Appendix C of the DSC).[3]

Line patrols cover all overhead distribution equipment including poles, conductor wires, pole-mounted transformers, switches, lightning arrestors, line insulators, and other peripheral attachments. Approximately 177,000 poles, 29,600 overhead transformers, and 7,600 overhead switches are inspected through line patrols.

In addition, Toronto Hydro also conducts dedicated pole inspections for wood, concrete, and steel poles on a ten-year cycle. Toronto Hydro has approximately 106,000 wood poles, 61,000 concrete poles and 10,000 steel poles. All wood poles are either butt or full length treated against rot.

Overhead line patrols are designed to identify visible deficiencies (such as signs of leaking transformers, loose or broken attachments (e.g. cross-arms, insulator brackets), and damaged poles), as well as deficiencies that can be identified through infrared thermography. This technology identifies thermal anomalies, such as a 63°C increase in temperature at the secondary connection point of the pole-mounted transformer shown in Figure 1. If undetected and not addressed, such a deficiency can lead to a failure of the connection over time and result in safety and environmental risks due to

[3] *Supra* note 1.

arcing, which can lead to a transformer fire and release of oil into the environment. The Institute of Electrical and Electronics Engineers ("IEEE"), American National Standards Institute ("ANSI") and the International Electrotechnical Commission ("IEC") all publish standard temperature ratings for assets, which are used to determine if an electrical component has a temperature above the recommended value. Thermography is an accepted and encouraged practice in the utility industry as evidenced by the National Fire Protection Association's standard 70B: Recommended Practice for Electrical Equipment Maintenance.[4]

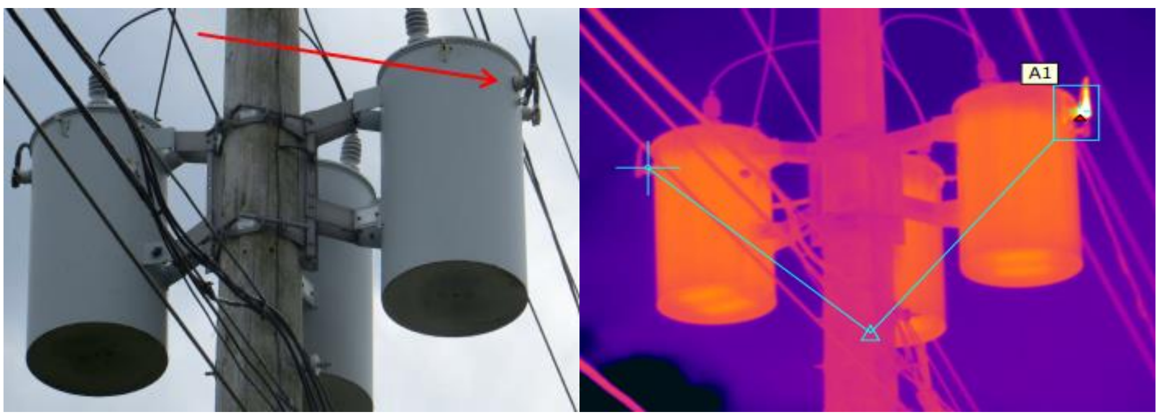


Figure 1: Secondary Connection on Pole-Mounted Transformer (Left) with an Infrared Thermography Image of the Same Asset Denoting a Hot Spot at A1 (Right)

Wood pole inspections involve a visual assessment of each pole and a sounding test using a hammer to check for internal cavities, which can indicate an infested or internally decayed pole. Based on the results of this assessment, one or more of the following steps may be taken:

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

- A bore test (using a 12 millimetre diameter bit to drill into the pole) to assess the condition of the shavings from the interior;
- A resistograph test (using a 2 millimetre diameter needle drill bit and an electronic resistance measurement device to drill into the pole) to determine the presence of wood decay, stages of rot, and hollow areas;
- Treatment using a boron glass rod or copper-boron glass rod wood preservative;
- Treatment using an external copper napthenate wrap; and
- Treatment using an internal fumigant.

From 2020 onward, Toronto Hydro will inspect steel and concrete poles as part of its dedicated pole inspection program. Inspections of these poles will allow Toronto Hydro to improve decisions on planned renewal investments for these assets. Further, this is expected to reduce the burden on reactive capital by proactively identifying poles with substandard conditions and scheduling them for replacement before they require costly reactive intervention.

Overhead line patrols and pole inspections serve to assess asset conditions and identify overhead asset deficiencies resulting from aging assets or exposure to weather, animals, trees, or other environmental elements. Condition and deficiency information gathered during these activities is utilized to plan and prioritize capital and corrective maintenance work, so that public and employee safety, environmental, system reliability, and financial risks can be mitigated. Pole treatment activities are undertaken to extend the life of the pole and mitigate the risk of decay.

During 2015-2017, Toronto Hydro identified on average approximately 2,400 deficiencies annually during line patrols. Deficiencies identified include loose or deteriorated connections, missing guy guards, tracking insulators, rusted equipment, oil leaks, vegetation interference, damaged conductors and conductor splices, which are all addressed in the Corrective Maintenance or Reactive and Corrective Capital programs.[5] Identifying and addressing these issues reduces the likelihood of a component failure and the associated risks. For example, an aging conductor splice that fails could result in a live conductor dropping to the ground, which would create a serious safety risk to the public and Toronto Hydro employees and cause a power interruption that may impact hundreds of customers. Thermography is used to mitigate this risk as it allows such deficiencies in splices to be identified.

Toronto Hydro has approximately 106,000 wood, 10,000 steel, and 61,000 concrete poles. Dedicated pole inspections identify poles that have lost their mechanical strength and are likely to fail, endangering the crews working on them and possibly resulting in collapse if they remain in service.

For wood poles, the primary indicator of health and remaining life is mechanical strength, given that the main function of poles is to act as support structures. As a natural material, a wood pole undergoes a different degradation process than most other distribution assets. The degradation processes are primarily biological and cumulative with age. They consist of insect infestation, moisture ingress, and bird or fungi attacks. Decay causes a wood pole to lose its strength and functionality, which increases the risk of a structural failure. Poles often support and withstand significant static loads such as transformer banks and conductors, and dynamic loads such as climbing workers or high winds. They typically fail with the onset of age and the loss of structural strength.

[5] See Exhibit 4A, Tab 2, Schedule 4 and Exhibit 2B, Section E6.7.

As further illustrated in Figures 2 and 3 below, deficiencies such as rot and excessive cracking are common causes of pole failures. Between 2015 and 2017, Toronto Hydro condemned on average over 290 wood poles annually.

Figure 2: Rot at Base of a Pole

Figure 3: (Left) Cracked Wood Pole, (Right) Surface Rot on Pole

For steel poles, the most common cause of degradation is corrosion. The corrosion protection system for steel poles can be compromised by mechanical degradation of the coating due to external impacts by foreign objects or abrasion, adverse weather conditions, and loss of coating due to age.

Concrete poles can begin to deteriorate from weather events or mechanical damage by external factors such as vehicle impacts. Cracks on concrete poles can either be circumferential (around the pole) or longitudinal (along the length of the pole), with the latter type typically being more serious in nature as shown in Figure 4 below. Longitudinal cracks can be caused by reinforcing steel being overly close to the surface of the concrete pole or degradation due to weather events such as freeze-thaw conditions.

Figure 4: (Left) Longitudinal Crack on Pole, (Right) Cracked Concrete Base

Poles are found predominantly along sidewalks, roadways, and other areas of high pedestrian and vehicular traffic. Without routine inspection, there is an unacceptable risk that poles and associated attachments could collapse onto sidewalks, roadways, and even residences. The collapse of a pole can also cause oil spills from ruptured transformer tanks, electrical arcs, flashovers, and fires, which pose serious environmental risks and safety risks to the public and Toronto Hydro employees. Minimizing the likelihood of a pole failure will mitigate these risks. Moreover, pole inspection activities, and in particular wood pole treatments (e.g. application of boron rods, copper napthenate wraps, and internal fumigant) extend the life of poles and allow for a more efficient and structured capital pole replacement program.

Between 2015 and 2017, there were on average approximately 190 incidents of overhead asset failures (excluding major event days) each year. These failures were primarily attributed to overhead transformers, switches, conductors, insulators, lightning arrestors and poles, and resulted in excess of 125,000 CIs and 89,000 CHIs annually. Line patrols and pole inspection activities are in place to identify deficiencies that, if left unaddressed, may lead to incidents that impact system reliability.

5.2 Overhead Line Patrols and Pole Inspections Segment Costs

Table 4 below provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for this segment.

Table 4: Overhead Line Patrols and Pole Inspections Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Overhead Line Patrols and Pole Inspections	0.5	0.9	0.9	0.8	0.6	0.6

The 2020 test year costs associated with this segment are projected to be $0.6 million, which represents an increase of $0.1 million from the utility's last rebasing year (2015), a $0.3 million reduction from the most recent actual year (2017), and no change from the bridge year (2019).

5.3 Overhead Line Patrols and Pole Inspections Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

Expenditures increased by approximately $0.4 million from 2015 to 2016, which was attributed to (i) inspecting for overhead line insulators as a response to the sharp rise in pole fires in 2015, as explained further in section 6.1; and (ii) testing an additional 4,700 wood poles due for inspections.

2016 – 2017 Variance Explanation

There is no material variance in this period.

2017 – 2018 Variance Explanation

The costs from 2017 to 2018 are forecast to decrease by $0.1 million as the number of insulator inspections decreases in 2018 as they are ramped down in their final year and the number of wood poles requiring testing return to 2015 levels.

2018 – 2019 Variance Explanation

The costs from 2018 to 2019 are forecast to decrease by $0.2 million as costs are expected to return to near 2015 spending levels after completion of the insulator inspections in 2018.

2019 – 2020 Variance Explanation

There is no material variance forecast for this period. From 2020 onwards, expenditures will be approximately $0.1 million higher than the 2015 spending levels to begin funding inspections of concrete and steel poles.

6. OVERHEAD SWITCH MAINTENANCE AND INSULATOR WASHING

6.1 Segment Description

This segment includes two general sets of maintenance activities on the overhead distribution system: (i) maintenance of overhead switches; and (ii) washing of porcelain overhead line insulators.

1) Overhead Switches: Toronto Hydro maintains overhead switches on a four-year cycle. There are two main types of switches on Toronto Hydro's distribution system:
   a) Supervisory Control and Data Acquisition ("SCADA") Switches (or SCADA-Mate Switches): These switches are motorized, and can be operated remotely from 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. 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 5 below shows a typical SCADA switch.

Figure 5: SCADA-Mate Switch

b) 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. While some have motorized controls, the vast majority are manually operable at the physical switch location. 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 6 below shows a gang-operated switch.

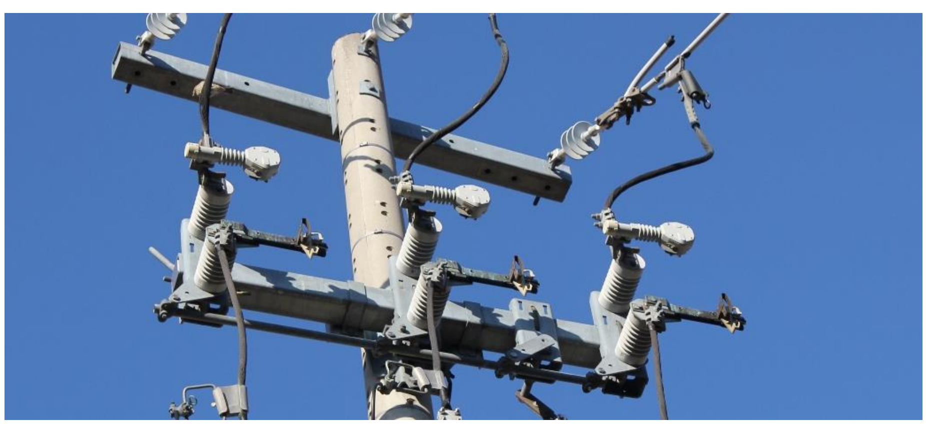


Figure 6: Manual Gang-Operated Switch

In total, Toronto Hydro maintains approximately 2,100 overhead switches comprising of 1,100 SCADA switches and 990 Three Phase Gang-Operated Switches.

2) Insulator Washing: Conductors and switches used on the overhead distribution system have historically been attached to poles and structural infrastructure using porcelain insulators. Porcelain insulators have a high dielectric strength and good mechanical properties, including hardness and resistance to chemical erosion and thermal shock. However, porcelain has poor resistance to contamination build-up, which causes tracking (i.e. leakage of electricity across the insulator). The accumulation of dirt and salt, combined with moisture (during misty or foggy days), reduces the effective insulation levels, and can lead to insulator tracking, flashover, and potential pole fires. To mitigate the risk of contamination and insulator tracking, insulators at the highest risk locations are washed twice a year. Insulator washing is performed using a high-pressure intermittent water jet while lines are energized. Figure 7 shows an example of a porcelain insulator being washed.

Figure 7: Porcelain Insulator Washed Using a High Pressure Water Jet

Overhead switch maintenance and insulator washing serve to mitigate public and employee safety, system reliability, and financial risks. Manual overhead switching is a common and high-risk activity undertaken by Toronto Hydro crews. Switches that are not regularly maintained can be difficult to operate, which has led to strains and injuries for crew members. Regular maintenance enables the detection and prediction of common failure modes, including the failure of a switch's insulator as shown in Figure 8 below, which can result in an arc flash that can seriously injure crew members.

Figure 8: Broken Switch Insulator

A second common failure mode is corrosion of switch metal blades. This naturally occurs from contaminants such as road salt and water settling on the switch blades. It can result in excessive heating of the blade and, over time, can lead to the blade failing to conduct electricity. Contaminants and corrosion on a switch blade during a load break operation may also cause the electrical arc to elongate, which causes additional damage to the blade and can lead to blade failure. Associated safety risks include burns from an arc-flash and overexertion injuries to an employee (i.e. if a switch requires a significant amount of force to operate).

Other common failure modes include switch seizure due to the drying out of lubrication, excessive arcing due to the misalignment of blades, and in the case of SCADA switches, failure of batteries – all of which can lead to switch malfunction, and pose a risk of injury to Toronto Hydro employees.

Between 2015 and 2017, Toronto Hydro identified on average over 235 switch-related deficiencies annually. These deficiencies are addressed by overhead switch maintenance activities such as identifying and correcting deteriorated insulators and corroded switch blades, ensuring blades are properly aligned, lubricating switches, and replacing batteries proactively. Deficiencies requiring further follow-up action or replacement of the switch are addressed in the Corrective Maintenance or Reactive and Corrective Capital programs.[6]

From a system reliability perspective, reducing the likelihood of switch failures can reduce the number of CIs and CHIs. Between 2015 and 2017, Toronto Hydro's distribution system experienced on average approximately 38 power interruptions per year due to switch failures, which resulted in excess of 28,000 CIs and 15,000 CHIs annually. Switches are designed to isolate line sections from the distribution system when a fault occurs or for the purposes of undertaking planned work. Their function and impact on system reliability can be illustrated using the example in Figure 9 below.

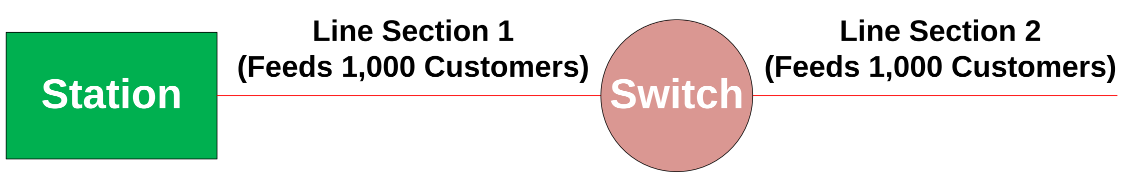


Figure 9: Example of Overhead Switch Impact on System Reliability

[6] *Supra* note 5.

Depicted above is a feeder that serves 2,000 customers, divided into two line sections using a switch, with each section serving 1,000 customers. When a fault occurs on Line Section 2, the switch can be operated to isolate that line section such that the station can continue to supply the customers on Line Section 1. Without an operable switch, 2,000 CIs would result, as the feeder would be isolated in its entirety from the station. Maintaining the switch in good working order has the potential to reduce that number to 1,000 CIs as only Line Section 2 would be isolated. Assuming in this theoretical example a fault is equally likely to occur on Line Section 1 or Line Section 2, an operable switch would improve system reliability by 33 percent.

Approximately one third of Toronto Hydro's overhead distribution system utilizes porcelain insulators. This equates to approximately 31,000 pole locations that are vulnerable to contamination building up on insulators. Thousands of these locations are at an increased risk as they are close to industrial areas and busy arterial roads and highways (such as the 401, 400, 427, and the Don Valley, Allen, and Gardiner Expressways), where salt used to melt snow or ice in the winter months becomes airborne through "salt spray" and deposits on the insulators.

Removing contamination through insulator washing reduces the risk of electrical tracking, pole fires, and insulator failures. From a safety perspective, pole fires and insulator failures in Toronto's dense urban areas can cause injury to individuals at ground level and crew members working near the insulators. The primary failure mode for porcelain equipment is cracking, which may start as a hairline crack, but has the potential to lead to a catastrophic failure with shards of debris falling to the ground and striking anyone in the vicinity and an arc flash risk to workers nearby. Figure 10 below shows a close-up view of a porcelain insulator damaged by electrical tracking over time.

Figure 10: Close-up of Damaged Porcelain Insulator Showing Tracking

From a system reliability perspective, insulator failures, depending on where they occur on a feeder, will cause a power interruption for tens to possibly thousands of customers. On March 3, 2015, Toronto Hydro experienced an all-time high of 121 pole fires, caused by a freezing rain storm event. These pole fires impacted approximately 107,000 customers and resulted in approximately 292,000 CHIs. The cause of the fires was a combination of the higher moisture levels caused by freezing rain and the build-up of salt used on roads, which became airborne and accumulated on the insulators. This combination of factors can significantly increase the risk of a pole fire (see example of a pole fire in Figure 11 below).

Figure 11: Pole fire on December 22nd, 2017

From a financial perspective, pole fires resulting from insulator tracking necessitate emergency response, equipment replacement, and in some instances, the payment of damage claims. Emergency response costs incurred by Toronto Hydro for the March 3, 2015 freezing rain event totalled $1.5 million.

In response to this event, Toronto Hydro developed a reactive insulator washing program, which involves additional system wide insulator washing of all high risk pole locations on a reactive basis, based on weather patterns and road salt usage trends. This work is funded through the Corrective Maintenance program.[7] Since this Program

[7] Exhibit 2B, Section D3

began, Toronto Hydro has not seen pole fires at 2015 levels. From 2016-2017, Toronto Hydro experienced a combined 66 pole fire events which were nearly half of what was experienced in 2015.

Given the risks associated with contaminated porcelain insulators (including public and employee safety, system reliability, and financial risks), routine Insulator washing is a necessary and prudent means of reducing the likelihood of contingencies resulting from debris build-up on insulators. Reductions in the amount of insulator washing could result in increased incidents of insulator tracking and poles fires.

As Toronto Hydro replaces porcelain insulators with polymer insulators through its Overhead System Renewal program,[8] the need for insulator washing is expected to diminish, as polymer insulators are hydrophobic and are not susceptible to the same failure mode due to contamination. However, based on the insulator inspections undertaken over the past few years (see section 4.1), Toronto Hydro has found that the number of additional locations requiring washing has outpaced capital replacements in recent years. The need for insulator washing will not diminish considerably in the short-term and continued insulator washing is expected to be required until 2020, after which it is projected the population of high risk locations will start to decline over the 2020-2024 period.

6.2 Overhead Switch Maintenance and Insulator Washing Segment Costs

Table 5 below provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for this segment.

[8] Exhibit 2B, Section E6.5

Table 5: Overhead Switch Maintenance and Insulator Washing Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Overhead Switch Maintenance and Insulator Washing	1.8	1.5	1.7	1.3	1.8	1.1

The 2020 test year costs associated with this segment are projected to be $1.1 million, which represents reductions of $0.7 million from the utility's last rebasing year (2015), $0.6 million from the most recent actual year (2017), and $0.7 million from the bridge year (2019).

6.3 Overhead Switch Maintenance and Insulator Washing Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

Expenditures decreased by approximately $0.2 million from 2015 to 2016. In 2015, Toronto Hydro washed an additional 1,900 poles with porcelain insulators to mitigate outage and pole fire risks in preparation for the 2015 Pan American Game venues. Because this work required a short turn around, it needed to be executed outside of the existing insulator wash contract, which resulted in higher costs. In addition, Toronto Hydro maintained more switches, from 641 units in 2015 to 352 units in 2016.

2016 – 2017 Variance Explanation

Expenditures increased by approximately $0.1 million from 2016 to 2017, which was primarily attributed to an increase in batteries replaced for SCADA-Mate Switches from 245 units in 2016 to 368 units in 2017.

2017 – 2018 Variance Explanation

The costs from 2017 to 2018 are forecast to decrease by approximately $0.3 million due to a decrease in the number of switches planned for maintenance from 344 units in 2017 to 294 units in 2018.

2018 – 2019 Variance Explanation

The costs from 2018 to 2019 are forecast to increase by $0.5 million, which is primarily due to an increase in the number of switches planned for maintenance from 294 units in 2018 to 526 units in 2019.

2019 – 2020 Variance Explanation

The costs from 2019 to 2020 are forecast to decrease by $0.7 million, which is attributed to: (i) the expected reduction in the population of porcelain insulators requiring washing from 4,750 poles washed bi-annually to 3,000 poles washed bi-annually, as Toronto Hydro's capital program starts to replace porcelain with polymer insulators beginning in 2020; and (ii) a reduction in the number of switches requiring maintenance from 526 units in 2019 to 401 units in 2020.

7. VEGETATION MANAGEMENT

7.1 Segment Description

Toronto Hydro performs vegetation management on over 800 overhead primary feeders extending almost 4,100 circuit kilometres along Toronto's arterial thoroughfares, rights-of-way, and residential streets. These feeders co-exist with the City of Toronto's mature and dense tree canopy, which includes about 600,000 City-owned "street trees" and thousands of trees located on customer properties. In total, there are over 10 million trees in the City of Toronto. Over 125,000 of these street trees are adjacent to primary overhead feeders, and their overgrowth can potentially interfere with the safe and reliable distribution of electricity.

Planned vegetation management activities are executed by contractors with support from Toronto Hydro's internal resources. Trees and branches are pruned according to minimum clearance standards based on American National Standards Institute ("ANSI") A300 – Standard Practices for Trees, Shrubs and other Woody Plant Maintenance,[9] and the City of Toronto Forestry Pruning Guidelines. In addition to the minimum clearance standards, Toronto Hydro considers other factors such as:

- **Species and growth patterns of a tree**: fast-growing trees are trimmed more and slow-growing trees are trimmed less;
- **Natural trimming practices**: branches are pruned back to a natural point of growth in the crown of the tree and leaders are "trained" (shaped) to grow away from the lines;
- Distance of major limbs that exhibit minimal growth, versus minor branches that can exhibit aggressive growth;
- **Directional pruning practices**: maintenance of tree shape and branch patterning;
- 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.

[9] 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).

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, and given the above-noted factors, Toronto Hydro mandates the use of certified utility arborists for vegetation management activities with training, knowledge, and certification in the practice of arboriculture.

Vegetation management mitigates the risk of vegetation interference by pruning trees near Toronto Hydro's overhead feeders. Each year, Toronto Hydro identifies the feeders in greatest need of tree pruning based on prioritization criteria such as feeder reliability history, number of customers supplied by each feeder, and the amount of time that has elapsed since the trees surrounding the feeder were last pruned. The prioritization process results in pruning trees surrounding feeders once every two to five years, with the system average being approximately three years. On average, Toronto Hydro pruned 1,628 circuit kilometres and approximately 53,000 trees annually between 2015 and 2017.

Figure 12: Tree Trimming of an Overhead Feeder

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

Vegetation-related power interruptions have a significant impact on system reliability and are second only to defective equipment as the leading cause of system outages. Statistics from 2015 to 2017 show that tree contacts are responsible for over 60 power interruptions a year, and cause approximately 77,000 CIs and 105,000 CHIs annually. When all interruptions are considered, over the period of 2015-2017, trees accounted for approximately 7 percent of all CIs and 15 percent of all CHIs annually on average. These statistics exclude interruptions that occurred on major event days. During such days, the distribution system is particularly vulnerable to tree contacts and costly tree damage.

As more time passes since the last tree pruning for a particular feeder, it becomes more likely that tree contacts will occur and associated risks will increase (including system reliability, financial, and safety risks). These risks can be effectively mitigated through tree trimming.

From a reliability standpoint, Figure 13 illustrates the expected number of vegetation-related interruptions relative to time elapsed since the last pruning and trimming activities. An average feeder that is cleared after having experienced three to four years of growth is expected to exhibit a reduction of approximately 20 percent to 40 percent in the number of tree-caused interruptions.

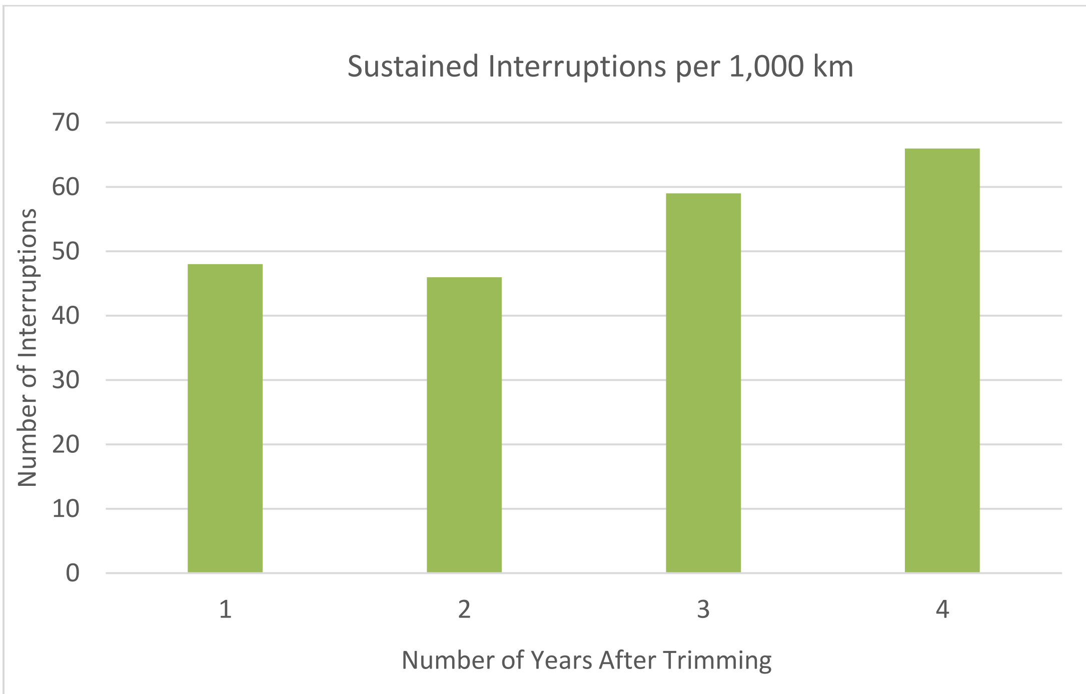


Figure 13: Expected Number of Tree-Related Interruptions

Vegetation management is also a widely accepted means of effectively "storm-hardening" a system (i.e. proactively mitigating against storm damage and associated system reliability risks). Storm hardening involves selectively removing portions of a tree canopy to reduce the "sail effect" of branches during high winds and to reduce the likelihood that broken branches will make contact with lines. As such, more frequent tree pruning further reduces risks posed by severe weather.

Toronto Hydro's system is susceptible to severe weather and storm damage, as evidenced by the 2013 ice storm and more recently the November 15, 2017 wind storm.

In many cases, the effects of these storms continue well after the storm has passed. Broken and weakened trees and tree limbs continue to pose a threat to overhead lines until the next tree pruning date. From a financial perspective, planned vegetation management is expected to reduce reactive expenditures from corrective and emergency responses.

In addition to system reliability and financial risks, vegetation management serves to mitigate safety risks, including as a result of trees and vegetation that grows or is blown into power lines. This vegetation can become energized, and in certain situations, can cause fires or step and touch potential risks to the general public. Another safety risk stems from branches or trees that bring energized conductors to the ground when they fall, which pose significant safety hazards to the public. Vegetation management is expected to mitigate these risks.

Within Toronto, vegetation risks have been increasing in recent years due to invasive species infestation such as the Emerald Ash Borer and the Asian Long-Horned Beetle. Both these species compromise a tree's structural integrity and greatly increase the risk of a branch or tree falling into overhead feeders. It is estimated that Toronto will lose approximately 860,000 of its ash trees to the Emerald Ash Borer,[10] while the Asian Long-Horned Beetle poses a risk to 42 percent of all street trees.[11] Vegetation management is expected to enable Toronto Hydro to mitigate the risks associated with invasive species by removing the dead and dying tree limbs that they cause.

[10] City of Toronto, *Emerald Ash Borer in Toronto: Managing Public and Private Trees* (2013).
[11] City of Toronto, *Trees Under Threat: The Asian Long-horned Beetle in Greater Toronto* (2014), online: <http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=f26fdada600f0410VgnVCM10000071d60f89RCRD&vgnextchannel=17f4cacb759e0410VgnVCM10000071d60f89RCRD>.

7.2 Vegetation Management Segment Costs

Table 6 below provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for this segment.

Table 6: Vegetation Management Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Vegetation Management	2.8	3.5	2.9	2.9	2.9	2.8

The 2020 test year costs associated with this segment are projected to be $2.8 million, which is equal to the utility's last rebasing year (2015), and $0.1 million less than the most recent historical actual year (2017) and the bridge year (2019).

7.3 Vegetation Management Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

Expenditures increased by approximately $0.8 million from 2015 to 2016. In 2016, Toronto Hydro experienced a high volume of tree contact related interruptions, which resulted in excess of 87,000 CIs and 82,000 CHIs, and 30 percent of these interruptions occurred in the month of August. In response to this spike in tree-caused interruptions, Toronto Hydro increased tree trimming expenditures in late 2016 to trim additional feeders and mitigate further reliability impacts.

2016 – 2017 Variance Explanation

Expenditures decreased by approximately $0.6 million from 2016 to 2017 as spending returned to historical spending levels after the increase in late 2016 in response to the high volume of tree contact related interruptions.

2017 – 2018 Variance Explanation

There is no material variance forecast for this period.

2018 – 2019 Variance Explanation

There is no material variance forecast for this period.

2019 – 2020 Variance Explanation

The costs from 2019 to 2020 are forecast to decrease slightly by less than $0.1 million, which is consistent with historical spending levels.

8. METERING SERVICES SEGMENT

8.1 Segment Description

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 proper functionality and compliance with applicable legislative and regulatory requirements.

Toronto Hydro's metering assets include both meters and the communication systems that enable meter data collection and tracking. The maintenance of metering equipment is critical to ensuring the ongoing accuracy of meter reads and the associated billing and settlement data. Moreover, meter testing is a requirement under the *Electricity and Gas Inspection Act* administered by Measurement Canada. Metering Services maintains Toronto Hydro's 758,000 smart and suite meters and 153 wholesale meter installations as of December 31, 2017), examples of which are illustrated in Figures 14 and 15 below.

Figure 14: Smart MeterInstallation at Customer Location.

Figure 15: Wholesale Meter Installation at Transformer Station.

Metering Services activities consist of three major functional categories: (i) Meter Sampling & Testing; (ii) Wholesale Meter Maintenance; and (iii) Field Response.

8.1.1 Meter Sampling and Testing

Toronto Hydro is required to comply with the metering requirements set out by Measurement Canada, which state that all meters must be resealed at specific intervals in order to ensure that customers' electricity use is metered accurately. The Toronto Hydro meter sampling and testing program verifies the accuracy of meters, ensuring compliance with applicable requirements under the *Electricity and Gas Inspection Act* and the *Weights and Measures Act*. These statutes permit the use of meters for a set period of time, also referred to as a "seal period", before they must be either tested (i.e. re-verified) or replaced. For smart meters, this time span is typically ten years. When meters are tested and re-verified for accuracy, the seal period is extended.

For meter testing purposes, Measurement Canada permits utilities to form isolation lots (i.e. groups of meters with homogeneous meter characteristics), and test only a small number (called the sample group) from the isolation lot. Typically, 2-5 percent of randomly selected meters from each isolation lot form the sample group. For smaller homogeneous lots, the sampling rate could be as high as 50 percent. These sampling rates are allowed given the large number of meters in-service. The number of meters to be tested is determined in accordance with Measurement Canada's specification S-S-06, *Sampling Plans for the Inspection of Isolated Lots of Meters in Service*.[12] The seal period of the isolation lot of meters can be extended if the accuracy statistics for the sample group meet tolerances stipulated in Measurement Canada's specification. Some unique meters do not belong to any isolation lot and must be removed from service and tested individually before their seal periods expire. Table 7 lists the number of meters with a seal period that will expire during the 2020-2024 period. It also lists the number of meters that will need to form the sample groups for meter testing purposes based on the sample size for each isolation lot, so as to comply with Measurement Canada's requirements.

Table 7: Number of Seal Expiring Meters in 2020-2024 and Sampling Units

Year	Seal-Expiring Meters	Sample Group Meters
2020	49,000	37,000
2021	21,600	15,000
2022	14,800	4,800
2023	25,000	10,400
2024	216,600	203,700
Total	**327,000**	**270,900**

[12] See Annex C, Table 2, Limiting Quality 3.15.

In conducting 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 documentation and further 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. For the utility's smart meters with a ten-year initial seal period, provided the meters pass testing, the seals will be extended for all of the meters within the group by an additional eight years.

8.1.2 Wholesale Meter Maintenance

Wholesale meters, including instrument transformers, are installed at transmission grid supply points to measure electricity supplied from Hydro One Networks Inc. ("Hydro One") to Toronto Hydro. Wholesale meter maintenance involves re-verifying (i.e. testing every six years) and troubleshooting wholesale meters, and ensuring compliance with all applicable regulations, such as the requirement to notify the Independent Electricity System Operator ("IESO") of Meter Trouble Reports within 48 hours pursuant to the IESO's *Market Rules* and *Market Manual*.

Meter Trouble Reports are issued if there is any failure in data communication or if the data is suspected to contain errors. Data communication failures can arise from issues with Toronto Hydro's wireless 4G private network, Bell phone lines, the meter itself or the modem. If such a failure occurs, Toronto Hydro attempts to resolve the issue remotely. If remote resolution is unsuccessful, Toronto Hydro deploys field crews to the site of the particular wholesale meter to address the issue directly.

Prior to market opening in 2002, Hydro One was the Meter Service Provider ("MSP") for all wholesale meters. As the MSP, Hydro One was the owner of the wholesale meter installations and was responsible for the meters, their communications, maintenance, troubleshooting, and replacement. Beginning in 2002, Local Distribution Companies ("LDCs") in Ontario, such as Toronto Hydro, were required to take ownership of the installations and assume the MSP responsibilities and costs.

8.1.3 Field Response

The third category of activities within Metering Services is Field Response, which includes activities such as:

- Testing the accuracy of large user meter installations;
- Converting legacy flat rate services (e.g. Water heaters) into metered activities; and
- Installing reused meters following accuracy testing.

Toronto Hydro's 684,000 smart meters have a failure rate of 0.9 percent (i.e. approximately 6,000 units annually). Toronto Hydro's 79,500 suite meters have a failure rate of 2 percent (i.e. approximately 1,600 annually). The majority of the failures are related to: (i) the use of radio frequency mesh technology for smart meters; and (ii) powerline carrier for the suite meters, to deliver the meter reading data back to Toronto Hydro's centralized meter reading software. As failures occur, staff and field crews must investigate failure causes and restore communications in a timely manner, as well as perform on-site interval energy data downloads to maintain time sensitive billing (time-of-use).

Overall, a significant portion of the work undertaken by Metering Services is not 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.

8.2 Metering Services Segment Costs

Table 8 below provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for this segment.

Table 8: Metering Services Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Metering Services	1.3	1.7	1.2	1.6	1.5	1.5

The 2020 test year costs associated with this segment are projected to be $1.5 million, which represents an increase of $0.2 and $0.3 million from the utility's last rebasing year (2015) and the most recent historical actual year (2017) respectively, and is equal to the bridge year (2019).

8.3 Metering Services Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

Expenditures increased by approximately $0.4 million from 2015 to 2016 due to the migration of time-of-use rates for billing purposes, which required significantly more investigations of data and communication issues.

2016 – 2017 Variance Explanation

Expenditures decreased by approximately $0.5 million from 2016 to 2017 as, the responsibility of meter data collection and investigations was transferred from Meter

Services to Customer Care In 2017 as part of the Meter Service Investigation Orders ("MSIO") process.

<u>2017 – 2018 Variance Explanation</u>

The costs from 2017 to 2018 are forecast to increase by $0.4 million. This is largely due to a slightly higher than anticipated failure rate of suite meters. This higher than expected failure rate was an anomaly, and is not expected to reoccur, as Toronto Hydro has since moved from Bell telephone lines to a more robust 4G wireless network.

<u>2018 – 2019 Variance Explanation</u>

The costs from 2018 to 2019 are forecast to decrease slightly by approximately $0.1 million due to the higher than expected failure rate of suite meters in 2018, partially offset by growing number of suite metering units as number of condominium residents increases.

<u>2019 – 2020 Variance Explanation</u>

There is no material variance forecast for this period. Toronto Hydro's 2020 forecast expenditure of $1.5 million for this segment is generally consistent with historical spending levels, and takes into account the growing number of suite metering units, in conjunction with the growing population of condominium residents.

PREVENTATIVE AND PREDICTIVE UNDERGROUND LINE MAINTENANCE

1. OVERVIEW

Table 1: Preventative and Predictive Underground Line Maintenance Program Summary

2015-2017 Average Annual Cost ($M): 2.9	**2020 Cost ($M):** 5.5
Segments: • Below-Grade Equipment Maintenance • Padmounted Equipment Maintenance • Contact Voltage Scanning	
Outcomes: Reliability, Environment, and Safety	

The Preventative and Predictive Underground Line Maintenance program (the "Program") funds maintenance activities on Toronto Hydro's underground assets. This Program involves inspection and maintenance tasks typically conducted on a fixed cycle and inspection of equipment for predetermined conditions indicative of a potential failure. The activities comprising the individual segments in this Program are focused on preserving and maximizing an asset's performance over its expected useful life while mitigating a wide variety of system risks. This Program is also designed to minimize overall costs and account for other factors such as the safety of Toronto Hydro's work crew and the public, and statutory and regulatory requirements.[1] The Preventative and Predictive Underground Line Maintenance program is comprised of the following three segments:

- **Below-Grade Equipment Maintenance:** this segment includes the periodic inspection and maintenance of all underground vaults (such as network vaults

[1] Including the Minimum Inspection Requirements under Appendix C of the Ontario Energy Board's *Distribution System Code*.

primarily located in downtown core of Toronto), submersible vaults, cable chambers, and equipment housed within them.

- **Padmounted Equipment Maintenance:** this segment includes the periodic inspection of padmounted equipment (e.g. transformers, switches) and cable diagnostic testing.
- **Contact Voltage Scanning**: this segment addresses the periodic scanning of Toronto hydro's distribution system for contact voltage. Simply put, contact voltage results from an unintentional connection between structures or surfaces (e.g. bus shelters, surfaces above buried distribution equipment) and Toronto Hydro's distribution system. The main activity in this segment involves using vehicle mounted mobile scanning tools to scan for electrical connections and terminations that potentially energize poles, bus shelters etc., due to exposure to weather elements, thereby creating public safety hazards.

The proposed 2020 expenditure is based on historical levels and accounts for the OM&A treatment of the contact voltage segment; this is discussed in detail under the contact voltage segment below. By preserving and maximizing the performance of underground assets, this Program contributes to maintaining safety, environmental responsibility, and overall system reliability at reasonable costs to Toronto Hydro's customers.

2. OUTCOMES AND MEASURES

Table 2: Preventative and Predictive Underground Line Maintenance Program Outcomes and Measures Summary

Reliability	• Contribute to maintaining existing levels of system reliability – as measured by performance metrics like SAIDI, SAIFI, Customers Interrupted ("CI"), and Customer Hours Interrupted ("CHI") – through the effective inspection of underground assets for deficiencies in compliance with the Ontario Energy Board's ("OEB") Distribution Systems Code ("DSC").
Environment	• Contribute to reducing the environmental impact of Toronto Hydro's distribution system by proactively identifying transformers exhibiting signs of oil deficiencies for replacement, thereby reducing the likelihood of oil spill into the environment.[2]
Safety	• Contribute to Toronto Hydro's safety objectives (including compliance with Ontario Regulation 22/4, and safety performance as measured through the Serious Electrical Incidents Index) by: o minimizing public exposure to contact voltage by finding and eliminating energized (4.5 volts or greater) surfaces and structures on Toronto hydro's distribution system; and o minimizing exposure to cable chamber lid incidents through prompt identification and resolution of chamber lid deficiencies.

3. PROGRAM DESCRIPTION

The Preventative and Predictive Underground Line Maintenance program funds maintenance activities on Toronto Hydro's underground assets. This Program involves inspection and maintenance tasks typically conducted on a fixed cycle and inspection of equipment for predetermined conditions indicative of a potential failure. The activities comprising the individual segments in this Program are focused on preserving and maximizing an asset's performance over its expected useful life while mitigating a wide variety of system risks. Tasks in this Program are also designed to minimize overall costs

[2] 1,620 oil deficiencies (e.g. leaking underground transformers) were found and reported between 2015 and 2017.

and account for factors such as the safety of Toronto Hydro work crews and the public and statutory and regulatory requirements.

Maintenance activities include vault and cable chamber inspections to assess the condition of civil structures and the equipment housed inside (e.g. transformers, switches and cables), inspections of padmounted transformers and switches; cable diagnostic testing for underground cables; and contact voltage scanning for stray voltages across the distribution system.

- **Below-Grade Equipment Maintenance:** this segment funds the periodic inspection and maintenance of all underground vaults (such as network vaults primarily located in the downtown core of Toronto), CRD vaults, cable chambers, and equipment housed within them.
- **Padmounted Equipment Maintenance:** this segment funds the periodic inspections of padmounted equipment (e.g. transformers, switches) and cable diagnostic testing.
- **Contact Voltage Scanning:** this segment funds the periodic scanning of Toronto Hydro's distribution system for contact voltage. Simply put, contact voltage results from an unintentional connection between structures or surfaces (e.g. bus shelters, surfaces above buried distribution equipment etc.) and Toronto Hydro's distribution system. The main activity in this segment is the use of vehicle mounted mobile scanning tools to scan for electrical connections and terminations that potentially energize poles, bus shelters etc. due to exposure to weather elements, thereby creating public safety hazards.

4. PROGRAM COSTS

Toronto Hydro requires approximately $5.5 million per year during the 2020 to 2024 period to efficiently execute the functions in the Preventative and Predictive Underground Line Maintenance program. Without this level of funding, Toronto Hydro could be exposed to a number of risks. Those include:

- Inability to carry out the cyclical inspections necessary to maintain assets and prevent the below risks;
- Failure risks, such as increased number of failures and associated outages on the system due to a reduction in asset inspection and maintenance;
- Public and employee safety, such as:
  - The inability to prevent safety hazards such as electrical shocks caused by contact voltage which endanger the public, workers, and animals that may come into contact with energized surfaces; and
  - Inability to mitigate safety hazards associated with below-grade and padmounted equipment.
- Financial risks, such as the inability to mitigate costly failures, as the costs associated with emergency response and equipment replacement can result in ten to hundreds of thousands of dollars in repairs.

Table 3 provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for each of the Program's segments.

Table 3: Preventative and Predictive Underground Line Maintenance Program Expenditures by Segment ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Below-Grade Equipment Maintenance	2.2	2.5	2.6	2.5	2.6	2.8
Pad-mounted Equipment Maintenance	0.4	0.4	0.6	0.6	0.5	0.7
Contact Voltage	-	-	0.0	1.5	2.0	1.9
Total	**2.6**	**2.9**	**3.2**	**4.5**	**5.2**	**5.5**

4.1 Cost Drivers

The 2020 test year cost forecast represents an increase of $2.9 million from Toronto Hydro's last rebasing year (2015), an increase of $2.3 million from the most recent historical actual year (2017), and an increase of $0.3 million from the bridge year (2019).

4.1.1 Volume of Maintenance Work

The number of equipment units requiring maintenance from year to year is based on their inspection cycle. For example, in the Below–Grade Equipment Maintenance segment, Toronto Hydro increased the number of network protectors maintained from 270 units in 2015 to 382 units in 2016 (an increase of over 40 percent) by aligning the overhauls of network protectors with stations maintenance schedules. In the Padmounted Equipment Maintenance segment, Toronto Hydro inspected more padmounted transformers that were due for inspection, from 1,947 units in 2016 to 2,467 units in 2017.

4.1.2 Cost Amortization

The Contact Voltage segment of this Program is being fully amortized as of July 2018, therefore the costs are treated as OM&A rather than capital costs.

4.2 Cost Control and Productivity Measures

4.2.1 Cost Management

As explained in detail in Toronto Hydro's overall productivity discussions, certain maintenance activities require an outage to be taken to create a safe work zone in accordance with Toronto Hydro's Work Protection code.[3] Initiatives undertaken in 2016 include developing an annual feeder scheduling program and enhanced work coordination to allow crews to do more maintenance work per outage. This initiative improved maintenance accomplishments for activities requiring an outage (e.g. network protector maintenance).

4.2.2 Productivity

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 Underground Line Maintenance program. In an effort to achieve greater productivity, Toronto Hydro has recently undertaken an overhaul and recertification process for all Reliability Centered Maintenance ("RCM") studies and adjusted maintenance tasks and frequencies that are based on RCM and Condition-based Maintenance ("CBM") principles. Examples of these adjustments include:

- Beginning in 2015, Toronto Hydro updated its processes for capturing greater details about substandard conditions or deficiencies found during inspections. This update enabled better prioritization and determination of the most appropriate corrective action for each deficiency to better mitigate public and employee safety, as well as environmental, system reliability, and financial risks.
- Standardizing the maintenance of network protector overhauls to align with station maintenance cycles at four years wherever possible to minimize the need

[3] See Exhibit 1B, Tab 2, Schedule 1

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 whereby crews that identify minor asset deficiencies also address the deficiencies on site (through actions such as lubricating components, replacing faulted circuit indicators, replacing sump pumps, clearing drains, caulking ducts and roof slabs, and replacing defective locks, hinges or handles) as opposed to only logging the deficiencies for the Corrective Maintenance program.
- Introducing new tools or making greater use of technology such as 3D imaging and modelling of underground structures, Cable Diagnostic Testing, Contact Voltage Scanning, Infrared Thermography, Electronic Maintenance Sheets, and Online Partial Discharge Testing.

The following sections describe and discuss the drivers of each of the segments within the Preventative and Predictive Underground Line Maintenance program.

5. BELOW-GRADE EQUIPMENT MAINTENANCE SEGMENT

5.1 Segment Description

This segment covers the inspection and maintenance of underground vaults and cable chambers and the equipment housed within them. These below-grade structures are constructed out of reinforced or un-reinforced concrete and house transformers, switches, cables, and other electrical distribution equipment. Inspections and maintenance activities are conducted on various types of below-grade structures including network vaults, CRD vaults, underground residential distribution ("URD") vaults, submersible vaults, and cable chamber.

Constructed in the 1950s and 1960s, network vaults are primarily located in the downtown core of Toronto. These vaults are the largest of the below-grade structures, and house interconnected electrical equipment used for the secondary network system that provides reliable supply to large and critical customers in the city's dense downtown core. The four main electrical components within network vaults are: (i) primary switches, which isolate supply to transformers; (ii) transformers; (iii) network protectors, which open when reverse power flow is sensed, preventing the secondary grid from feeding a primary side fault; and (iv) fuse panels, which protect the cables feeding the secondary grid. The transformer and the network protector are referred to as a network unit, an example of which is illustrated in Figure 1. Toronto Hydro has over 1,000 network vaults and 1,800 network units that require inspection and maintenance. The civil structure of network vaults is inspected on a six-month cycle and the electrical assets are inspected annually. Network protectors are also inspected, cleaned, and functionally tested to ensure operability on a four-year cycle for high voltage protectors, and a five-year cycle for low voltage protectors.

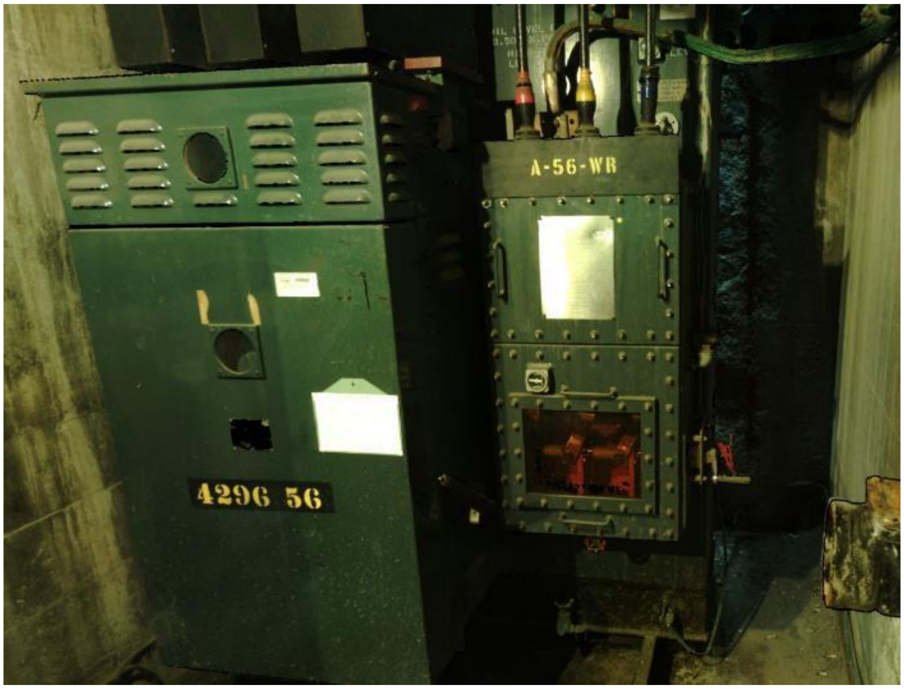


Figure 1: A Network Unit

Toronto Hydro's CRD and URD systems were constructed in the early 1990s and 2000s respectively. CRD vaults were designed to be a cheaper alternative to network vaults because of their simpler design. CRD vaults typically supply small retail, apartment, and commercial office buildings. URD vaults were used for 4 kV to 13.8 kV conversion projects and primarily power small residential or commercial buildings. Toronto Hydro has 690 CRD and URD vaults, which are inspected annually.

Submersible vaults are small civil structures installed on public road allowances, or private properties, and are used for residential distribution. These vaults contain transformers, switches, loop-through primary conductors, and secondary circuits. The vaults are sized to accommodate a transformer and secondary connections only. The over 8,600 submersible transformer vaults in Toronto Hydro's distribution system are inspected on a three-year cycle. Figure 2 illustrates a submersible vault.

Figure 2: Submersible Vault

Cable chambers are civil structures typically installed on public road allowances, and contain primary and secondary cables, cable splices, and in many cases, third party installations such as Toronto Transit Commission ("TTC") power cables, television cables, and phone lines. Located along the route of underground feeder, cable chambers facilitate cable installation in underground ducts. Toronto Hydro has over 11,000 cable chambers that are inspected on a ten-year maintenance cycle.

Below-Grade Equipment Maintenance, regardless of the type of vault or chamber, includes visual inspections of the civil infrastructure and electrical equipment, thermographic scans, partial discharge testing and drainage and sump pump tests.

The inspection cycles in this segment are designed to meet or exceed mandated cycles specified by the OEB's Minimum Inspection Requirements (Appendix C to the Distribution System Code).[4]

The average life of below-grade structures (including network vaults, CRD and URD vaults, and submersible vaults) is 60 years. The roofs of those structures however are expected to last for only 25 years, due to greater exposure to the environment and dynamic loads such as pedestrian and vehicular traffic. The equipment housed within below-grade structures is expected to have an average life between 30 and 45 years depending on the type of equipment.

The ages of Toronto Hydro's vaults vary from the relatively new URD and CRD vaults to the older network vaults in the downtown areas of the city. Approximately 60 percent of all network vaults will reach their expected life within the next five years, and approximately 80 percent of network vault roofs and 60 percent of all cable chamber roofs are already beyond their useful life.

As below-grade structures age, the greatest concern becomes structural strength. Structural deficiencies affecting vaults include degradation of concrete and corrosion of supports such as beams and rebar. Once degradation and corrosion set in, conditions can deteriorate rapidly and in many cases from one season to the next. Of particular concern is the winter season when moisture and water (often containing road salt) enter below-grade structures and, freeze and thaw. Figures 3 and 4 depict structural deficiencies that are common in older vaults.

[4] *Supra* note 1.

Figure 3: Crumbling Vault Roof with Exposed Rebar

Figure 4: Corroded I-Beams

Below-Grade Equipment Maintenance mitigates the risks that deterioration of civil and electrical assets pose, including public and employee safety, financial, environmental, and system reliability risks. Toronto Hydro mitigates these risks by identifying deficiencies in below-grade structures before they cause a failure. As illustrated in Figure 5 below, Toronto Hydro has identified on average over 12,000 deficiencies each year since 2015 and the number of deficiencies continues to rise year-over-year. Of the identified deficiencies, 46 percent on average are found in network vaults, and 28 percent in submersible vaults. These deficiencies are corrected under the Corrective Maintenance and Reactive and Corrective Capital programs.[5]

[5] See Exhibit 4A, Tab 2, Schedule 4 and Exhibit 2B, Section E6.7.

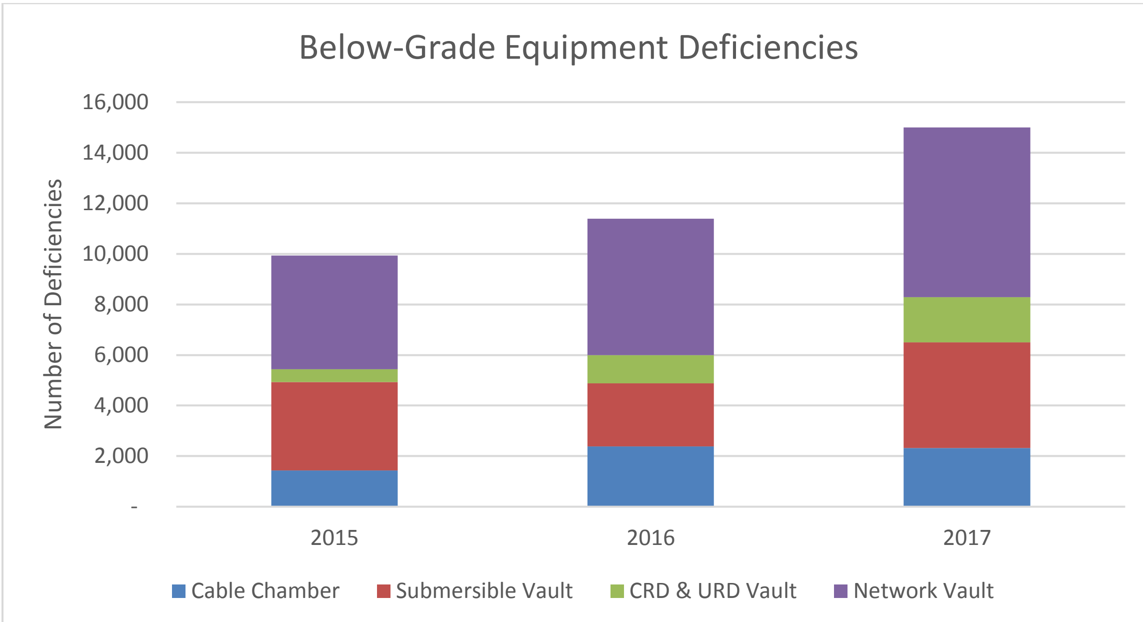


Figure 5: Below-Grade Equipment Deficiencies Identified Between 2015 and 2017

Below-grade structures are typically installed underneath roadways, pedestrian walkways and/or in residential neighbourhoods. Given their locations, it is important to identify and correct structural defects and potential failures proactively.

In addition to the importance of their structural integrity, vaults must be maintained in a relatively clean state, and contain appropriate nomenclature, functional lighting and drainage systems. Oil barrier devices installed in vault drains are also inspected and replaced as required. Vaults are naturally ventilated using grates to ensure uninterrupted ventilation. However, debris can enter over time, and if not addressed, create slip and fall hazards for employees.

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 6) enables corrective action to be taken and reduces the risk that the debris will catalyse asset corrosion as shown in Figure 7, or potentially result in an arc flash or fire.

Figure 6: Vault Full of Dirt and Debris

Figure 7: Corrosion on Top of a Transformer

When equipment failures occur, emergency response and equipment replacement can result in tens of thousands or even hundreds of thousands of dollars in repair costs. An underground transformer replacement, for example, can approach $100,000, and a structural rebuild of a vault can exceed $100,000 and sometimes approach $1 million. These expenditures can 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 equipment before an oil leak develops, potentially washing into the drainage system, which could result regulatory penalties and environmental restoration costs. Figure 8 below depicts an oil leak within a vault. This type of deficiency is addressed by cleaning activities, as shown in Figure 9.

Figure 8: Oil Leaking from a Transformer Base Inside a vault

Figure 9: Crews Cleaning a Vault that had a Transformer Oil Leak

In addition to the value provided by mitigating the aforementioned safety, financial, and environmental risks, below-grade equipment maintenance provides value to customers by mitigating system reliability risks associated with civil infrastructure or electrical equipment failures. Between 2015 and 2017, the distribution system experienced approximately 100 incidents of below-grade equipment failures annually, which resulted in excess of 71,000 customer interruptions and 66,000 customer hours of interruption annually.

Between 2015 and 2017, Toronto Hydro experienced on average of three incidents of cable chamber lids blowing off annually. Failures also occur on CRD, URD, and submersible vaults, where Toronto Hydro experienced approximately 48 submersible transformer failures over the 2015-2017 period. 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 through routine visual inspections, but also by thermographic scanning. Thermographic or infrared scanning identifies thermal anomalies in the target equipment, and is an effective predictor of equipment failure. Figure 10 below shows an example of a thermographic photograph of cable splices inside a cable chamber. The deficiency, as evidenced by an 80°C increase in temperature on one of the splices, is not visually evident (see picture on the left), but is easily identified using the infrared image (see picture on the right) so it can be corrected before failure.

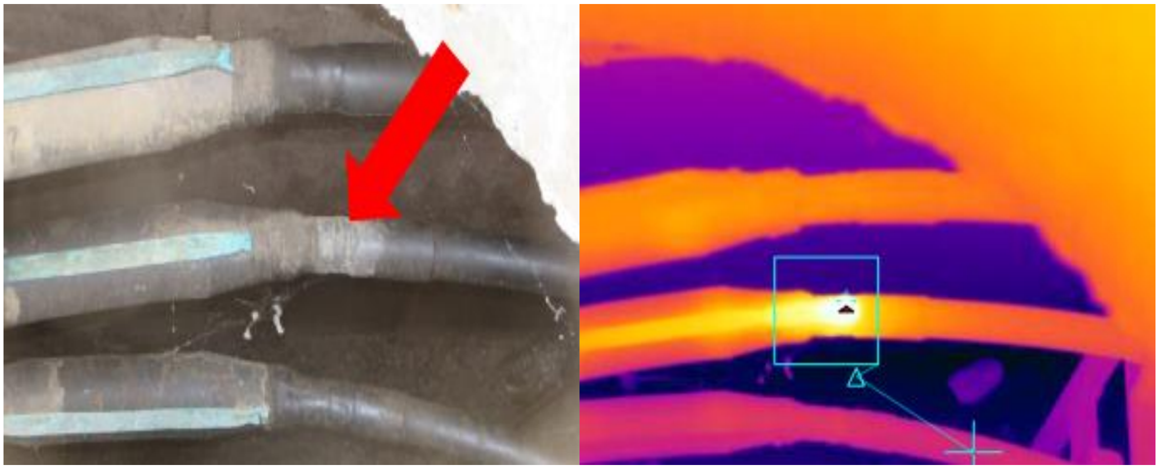


Figure 10: Cables Inside a Cable Chamber (Left) with an Infrared Thermography Image of the Same Cables Denoting a Hot Spot (Right)

5.2 Below-Grade Equipment Maintenance Segment Costs

Toronto Hydro requires approximately $2.8 million each year during the 2020 to 2024 period to execute the functions in this segment. Table 4 provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for this segment.

Table 4: Below-Grade Equipment Maintenance Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Below-Grade Equipment Maintenance	2.2	2.5	2.6	2.5	2.6	2.8

The 2020 proposed test year represents an increase of $0.6 million from the utility's last rebasing year (2015), and $0.2 million from the most recent historical actual year (2017) and bridge year (2019).

5.3 Below-Grade Equipment Maintenance Segment Year-over-Year Variance Analysis

2015-2016 Variance Explanation

Costs in 2016 increased by $0.3 million over 2015 actuals. This is attributed to the increased number of network protectors inspected and maintained (e.g. cleaning and testing of the equipment) after execution challenges experienced in 2015 were addressed. Toronto Hydro managed to increase the number of units maintained from 270 units in 2015 to 382 units in 2016 (an increase of over 40 percent).

2016-2017 Variance Explanation

From 2016 to 2017, expenditures increased by approximately $0.1 million due to an increase in network protectors inspected and maintained from 382 units in 2016 to 399 units in 2017.

2017-2018 Variance Explanation

Costs in 2018 are expected to decrease by $0.1 million, the net product of efficiency gains more than offsetting inflationary pressures.

2018-2019 Variance Explanation

Cost in 2019 are expected to increase by $0.1 million over 2018 as a result of inflationary pressures.

2019-2020 Variance Explanation

Costs in 2020 are expected to increase by $0.2 million over 2019. This is attributed to inflationary pressures and the planned inspection of approximately 300 more submersible transformers based on their three-year cycle. This represents an 11 percent increase over the total number of submersible transformers planned for inspection in 2019.

6. PADMOUNTED EQUIPMENT MAINTENANCE SEGMENT

6.1 Segment Description

Padmounted transformers and switches (collectively referred to as “padmounted equipment”), are metal-clad enclosures with lockable cabinet doors located on top of concrete pads within road allowances or on private properties. These assets are found on the underground distribution system where cables enter underground equipment through the pad. Padmounted transformers (see Figure 11) supply residential areas or commercial buildings, and padmounted switches (see Figure 12) enables the sectionalizing of underground feeders. Toronto Hydro owns approximately 6,600 padmounted transformers and 900 padmounted switches.

Figure 11: Padmounted Transformer

Figure 12: Padmounted SF6-Insulated Switch

Padmounted Equipment Maintenance includes: visual inspection of pads and protective bollards for damage or deterioration; visual inspection of the elevation of the pad in relation to the grade; removal of overgrown vegetation that may be encroaching on the pad; and a visual inspection and verification of equipment labels and safety signs. Visual inspections focus on both the mechanical components (e.g. doors, locks, hinges, handles, latches, and paint) and electrical components (e.g. terminations, bushings, elbow connectors, transformer tank, primary and secondary switches, fuses, disconnects, barriers, fault indicators, relays, oil levels). In addition, maintenance includes thermographic scans and partial discharge testing of electrical connections.

The following additional maintenance activities are carried out for padmounted switches:

- Batteries in SCADA switches are replaced once every three years;
- Gas levels are verified on units that are filled with SF_6 gas;
- Cable duct entries are inspected to ensure they are sealed, and ultrasonic testing is conducted to identify any partial discharge; and
- Air-insulated switches that have significant dirt build-up on their insulators, show evidence of tracking, or have exposed electrical terminations, are scheduled for CO_2 cleaning.

CO_2 cleaning is performed as part of the Corrective Maintenance program[6], to remove dirt and other contaminants from the switch to prevent tracking, which can lead to an arc flash and equipment failure.

[6] Exhibit 4A, Tab 2, Schedule 4

Toronto Hydro carries out the above noted activities on a three-year cycle for padmounted transformers and annually for padmounted switches. Regular maintenance cycles ensure Toronto Hydro is able to comply with applicable inspection requirements[7] and properly maintain padmounted equipment.

In addition to the above maintenance activities on padmounted equipment, since 2015, Toronto Hydro started performing diagnostic testing on all newly installed underground primary cables and cables at high risk locations (locations that exhibited underground faults based on reliability data). The two most common types of cables installed in Toronto Hydro's underground system are Paper Insulated Lead-Covered ("PILC") and Cross-Linked Polyethylene ("XLPE"), as shown in Figure 13.

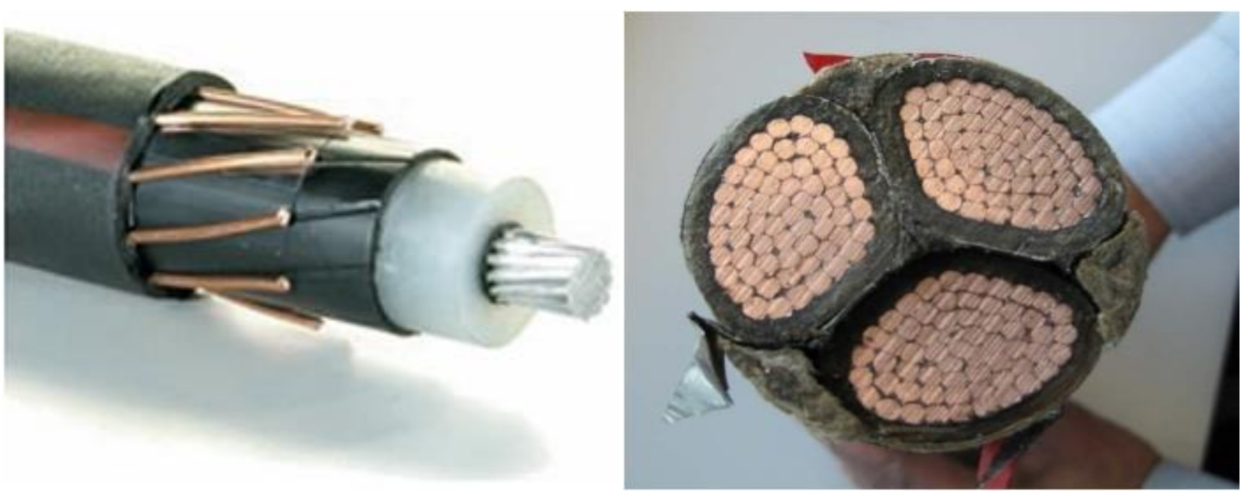


Figure 13: Example of XLPE Cable (Left) and PILC Cable (Right)

Toronto Hydro has approximately 1,200 circuit kilometres of PILC cables, and 4,000 circuit kilometres of XLPE cable.

---

[7] *Supra* note 1.

Currently, age is used to determine appropriate replacement strategies for these cables. Therefore, cable diagnostic testing provides a more accurate assessment of the condition of underground cables, splices, joints, and terminations. It enables predictive analysis and allows Toronto Hydro planners and engineers to effectively determine the cables that are, or will be, at a high risk of failure.

Cable diagnostic testing is an accepted practice industry-wide and used in numerous other electrical utilities in Canada and the United States. IEEE 400-2012, IEC 60060, IEC 60085, and IEC 60502 are some of the standards that support and provide guidelines for cable testing in the field. Diagnostic testing is expected to support the delivery of more reliable service to customers, and allow more effective use capital allocation by providing a stronger basis for informed underground project planning and prioritization. Toronto Hydro will be focusing its testing on direct buried XLPE cable, which has the highest rate of failure amongst underground cable installations.

The average useful life of padmounted transformers and switches are 35 and 30 years, respectively. The expected life of underground cable varies by type and construction, the expected life of XLPE cable is 25 years for direct buried installations, and 40 years for concrete duct installations. The expected life of PILC cable is 75 years. Approximately 18 percent of padmounted transformers have reached or surpassed their expected service life, while the padmounted switch population is significantly younger (none has exceeded 30 years). Approximately 95 percent of the PILC and XLPE cable populations (which were installed in the beginning in the early 1900s and 1950s, respectively) targeted for cable testing have reached their expected useful lives.

As padmounted transformers, switches, and cables age, the likelihood of failure increases as a result of:

- Current surges, ingress of moisture, dirt, and salt leading to excessive corrosion, mechanical damage, and the degradation of insulating barriers for equipment; and
- Water treeing, electrical treeing, and insulation breakdown for cables.

In addition, cables will experience aging differently depending on the following factors:

- Manufacturing quality;
- Damage during installation and workmanship issues;
- Installation environment (e.g. areas with high moisture levels result in water penetration of the insulation (or water treeing and cause insulation failure),
- Operating temperature and loading (e.g. higher loading and resulting temperatures accelerate the aging process); and
- Ambient temperature of the installation environment (e.g. higher temperatures accelerate the aging process).

As illustrated in Figure 14 below, Toronto Hydro's maintenance activities identified over 4,000 padmounted equipment deficiencies per year on average between 2015 and 2017, and the number of deficiencies rose year-over-year. Identifying and addressing these deficiencies (through the Corrective Maintenance and Reactive and Corrective Capital programs) serve to mitigate a wide variety of safety, environmental and system reliability risks.[8] Mitigating these risks is particularly important given this equipment is predominantly located in residential areas.

---

[8] *Supra* note 5.

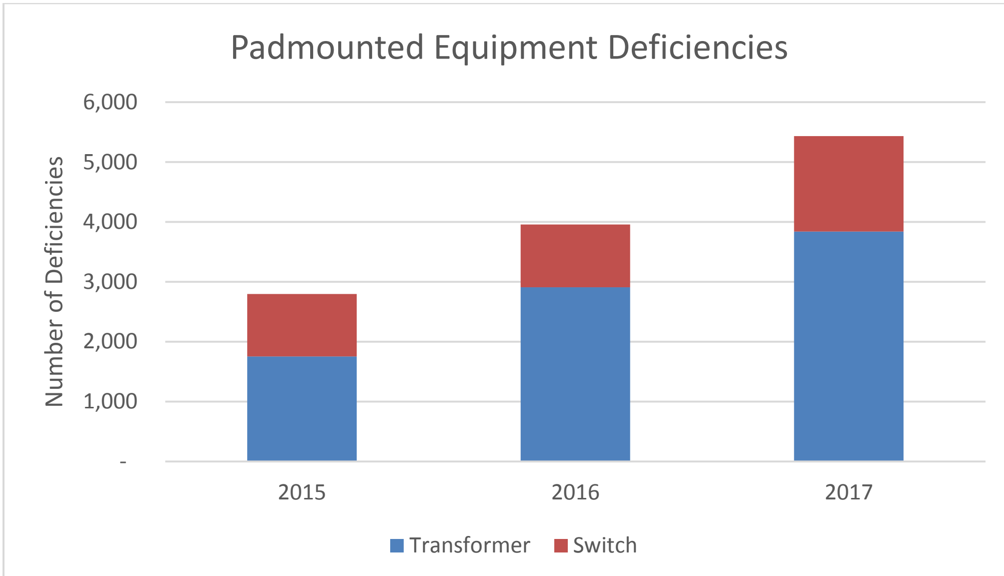


Figure 14: Padmounted Equipment Deficiencies Identified Between 2015 and 2017

An example of risk mitigation is promptly identifying a corroding enclosure as illustrated in Figure 15 below. If not identified and addressed, corrosion (which may also be present on internal components) can give rise to significant environmental, safety and reliability risks. Through maintenance activities, Toronto Hydro also rectifies switches with rusted coil springs (as shown in Figure 16 below), which may break during activation and prevent the switch from opening and closing. If undetected, this condition can result in an arc flash and endanger employees operating the switch.

Figure 15: Padmounted Transformer with Surface Corrosion

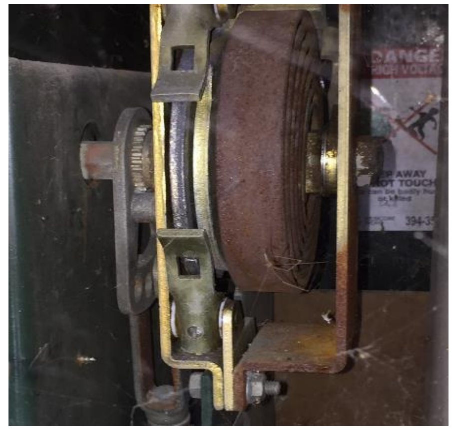


Figure 16: Padmounted Switch with Rusted Coil Spring

Another example of risk mitigation is identifying and addressing excessive vegetation growth near equipment. If unaddressed, overgrown vegetation not only hinders access to the transformer during an emergency, but can also pose a safety and fire risk. Electricity can arc or flashover to nearby vegetation, even without physical contact. Figure 17 below illustrates an example of excessive vegetation growth.

Figure 17: Padmounted Transformer Requiring Vegetation Removal

Transformers also require maintenance where locks, hinges, or warning signage have been vandalized, broken, or removed. If unaddressed, these conditions can lead to serious safety-related incidents if someone inadvertently comes into contact with padmounted equipment.

Padmounted unit failures also impact Toronto Hydro's system reliability, potentially affecting anywhere from several residential and commercial customers (when a transformer fails), to hundreds of customers in the case of a switch failure. When a switch unit fails, multiple feeders can experience a power interruption, as switches often act as a tie point for multiple feeders. Maintenance activities are designed to mitigate the risk of such failures and ensure SCADA switches do not contain failed batteries that render switches inoperable remotely. Between 2015 and 2017, the distribution system experienced over 5,400 customer interruptions and 5,400 customer hours of interruption annually due to failures of padmounted equipment.

Defective primary cables accounted for approximately 64 percent of all customer interruptions and 67 percent of all customer hours of interruption for underground equipment between 2015 and 2017. On average, over the same period, over 160 interruptions a year were related to defective underground primary cables, which resulted in over 138,000 customers interrupted and 144,000 customer hours of interruption annually.

Based on Toronto Hydro's experience, when a cable fails once, repeated failures are very likely. Cables prone to failure not only impact system reliability, but also entail safety and environmental risks. Figures 18 depicts a leaking cable splice.

Figure 18: Oil Leakage from Cable Lead Splice

6.2 Padmounted Equipment Maintenance Segment Costs

Toronto Hydro requires approximately $0.7 million each year during the 2020 to 2024 period to execute the functions in this segment. Table 5 below provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for this segment.

Table 5: Padmounted Equipment Maintenance Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Pad-mounted Equipment Maintenance	0.4	0.4	0.6	0.6	0.5	0.7

The 2020 proposed test year represents an increase of $0.3 million from the utility's last rebasing year (2015), $0.1 million from the most recent historical actual year (2017) and an increase of $0.2 million from the bridge year (2019).

6.3 Padmounted Equipment Maintenance Segment Year-over-Year Variance Analysis

2015-2016 Variance Explanation

Costs in 2016 did not change over 2015 costs, as variances were minor and offsetting.

2016-2017 Variance Explanation

Costs in 2017 increased by $0.2 million over 2016. Increases are attributed to an increase in padmounted transformers due for inspection (from 1,947 units in 2016 to 2,467 in 2017).

2017-2018 Variance Explanation

From 2017 to 2018, costs are not expected to change, with some variances being minor and offsetting.

2018-2019 Variance Explanation

From 2018 to 2019, costs are expected to decrease by $0.1 million. This is attributed to a decrease in the number of padmounted transformers inspected from 2,201 units in 2018 to 1,950 units in 2019.

2019-2020 Variance Explanation

From 2019 to 2020, costs are expected to increase by $0.2 million. This is attributed to the introduction of scheduled diagnostic testing for underground primary cables in 2020 and an increase in the number of padmounted transformers inspected form 1,950 units in 2019 to 2,102 units in 2020.

7. CONTACT VOLTAGE SCANNING SEGMENT

7.1 Segment Description

Most of Toronto Hydro's electrical distribution equipment is exposed to environmental elements, including wide seasonal temperature variations and accumulation of dirt or debris. This may result in the partial or total failures of electrical distribution equipment, and can lead to live wires making contact with nearby structures (poles, bus shelters, concrete housing etc.).

These issues create a public safety hazard known as contact voltage, which has the potential to cause electric shock. A typical example of a contact voltage hazard is an exposed secondary voltage wire in a sidewalk handwell or inside a street lighting pole that energizes the sidewalk or pole. Contact voltage endangers the public, workers, and pets that may come into contact with the energized surface.

The main activity in this segment is the use of a mobile scanning tool (i.e. a voltage detection system) mounted onto a vehicle to scan for contact voltage throughout Toronto Hydro's service area. Data is collected and analyzed to determine the location and nature of the fault. Based on the results, a repair crew is dispatched to further investigate and eliminate the fault.

Scanning is conducted on the entire distribution system on a one year cycle. The mobile scanning tool locates assets with contact voltages greater than 1 volt. Toronto Hydro uses the Third Harmonic ("3HD") as a guideline (as recommended by the IEEE Working Group on "Voltages at Publicly and Privately Accessible Locations") to prioritize corrective action for stray voltages found. If a contact voltage equal to or greater than 10 volts is found, the scanning crew will identify and barricade the relevant area and remain on site until a follow-up emergency response crew arrives to make permanent repairs. With respect to a contact voltage between 4.5 volts and 10 volts, the voltage supply is disconnected and repairs are made immediately if the contact voltage was found on a distribution asset. Notices are issued to affected parties if the contact voltage was found on customer or third party owned equipment. Contact voltage incidents less than 4.5 volts are reported to Toronto Hydro for review, and notices are issued to affected parties (where the contact voltage was found on customer or third party owned equipment).

Figures 19 below shows the volume of contact voltage incidents (>4.5 volts) identified between 2015 and 2017.

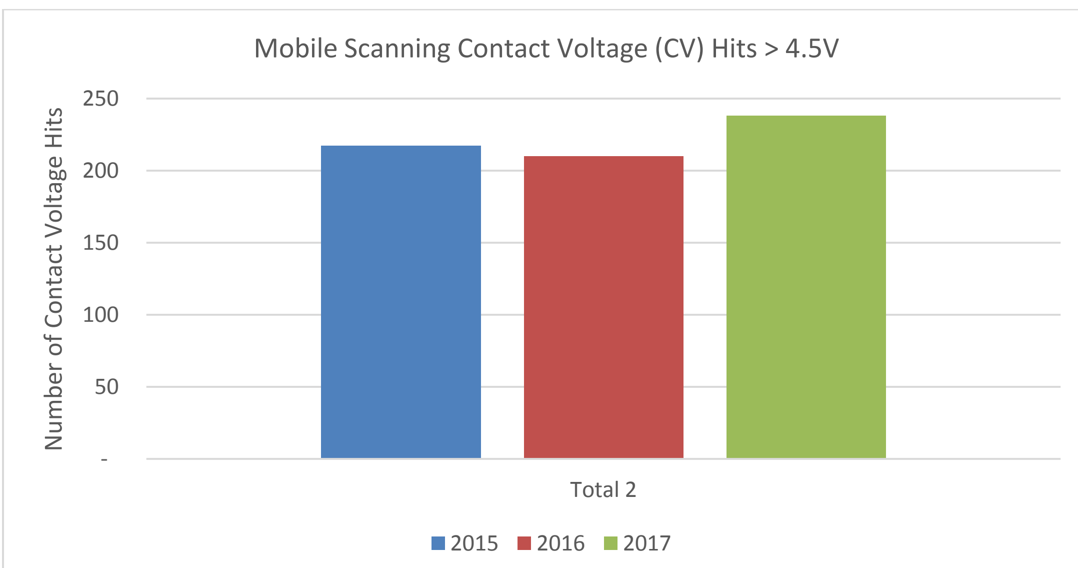


Figure 19: Contact Voltage Hits (>4.5 V) (2015-2017)

Traffic lights, bus shelters, street light poles, and handwells have been the primary sources of contact voltages throughout the City of Toronto in recent years as shown in Figure 20.

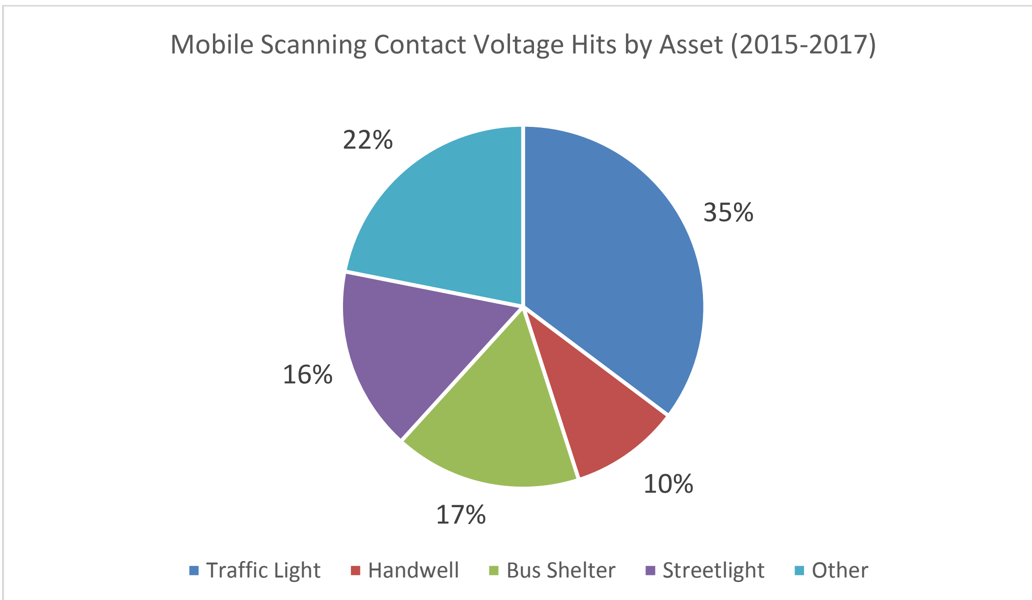


Figure 20: Contact Voltage Hits by Equipment (2015-2017)

In Toronto, most cases of contact voltage occur during the winter months. Underlying causes include aging infrastructure, freezing/thawing conditions, and vibrations at or below grade (which can cause wires to dislodge).

Due to their inherent design deficiencies, handwells also contribute significantly to contact voltage. They were the main driver in multiple stray voltage incidents in late 2009 that prompted Toronto Hydro to declare a Level III Emergency. Through the Reactive and Corrective Capital program, Toronto Hydro spent over $14.3 million in 2010 and over $2.6 million in 2011 on contact voltage remediation work.

Despite the handwell replacement work to date, contact voltage remains a risk for pedestrians and pets in the City of Toronto. By scanning for contact voltages across the city and addressing defective equipment through the Corrective Maintenance or Reactive and Corrective Capital program, the number of contact voltage related safety incidents can be reduced.

7.2 Contact Voltage Segment Costs

Toronto Hydro requires approximately $1.9 million each year during the 2020 to 2024 period to execute the functions in this segment. Table 6 provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for this segment.

Table 6: Contact Voltage Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Contact Voltage	-	-	0.0	1.5	2.0	1.9

The 2020 proposed test year represents an increase of $1.9 million from the utility's last rebasing year (2015), a $1.9 increase from the previous historical actual year (2017) and a decrease of $0.1 million from the bridge year (2019).

7.3 Contact Voltage Segment Year-over-Year Variance Analysis

Toronto Hydro has been carrying out contact voltage work since 2009 as part of a contractual agreement (treated as a capital lease since 2011). The costs associated with the lease will be fully amortized upon its expiration by the end of June 2018. Beginning in July 2018, Toronto Hydro will continue this work as part of this segment.

2018-2019 Variance Explanation

Costs in 2019 are expected to increase by $0.5 million over 2018. This is attributed to costs being fully amortized as of July 2018, therefore, costs in 2019 will be consistent with historical spending levels.

2019-2020 Variance Explanation

Costs in 2020 are expected to decrease by $0.1 million remaining consistent with historical spending levels. This is driven by the net result of inflationary pressures and a slight decrease in the volume of contact voltage work.

PREVENTATIVE AND PREDICTIVE STATION MAINTENANCE

1. OVERVIEW

Table 1: Preventative and Predictive Station Maintenance Program Summary

2015-2017 Average Annual Cost ($M): 5.5	**2020 Cost ($M):** 5.6
Segments: • Customer Location Maintenance • Station Inspections and Auxiliary Equipment Maintenance • Station Switchgear Maintenance • Station Equipment Maintenance	
Outcomes: Reliability, Environment, and Safety	

The Preventative and Predictive Station Maintenance program (the "Program") addresses maintenance activities on Toronto Hydro's: (i) station assets; and (ii) assets located at customer-owned buildings or dedicated areas on customer premises. This Program involves inspection and maintenance tasks typically conducted on a fixed cycle and inspection of equipment for predetermined conditions indicative of a potential failure. The activities comprising the individual segments in this Program are focused on preserving and maximizing an asset's performance over its expected useful life while mitigating a wide variety of system risks.

This Program is also designed to minimize overall costs and account for other factors such as the safety of Toronto Hydro's work crew and the public and ensures compliance with statutory and regulatory requirements.[1] The Station Maintenance program is comprised of the following four segments:

[1] Ontario Energy Board, *Distribution System Code*, (Toronto: Ontario Energy Board, 2017), at Appendix C ["DSC"].

- **Customer Location Maintenance:** A subset of Toronto Hydro's customers is supplied by electrical equipment such as transformers and switches located within customer-owned buildings (vaults) or dedicated areas on customer premises. The activities in this segment are aimed at inspecting and maintaining these equipment.
- **Station Inspections and Auxiliary Equipment Maintenance:** This segment focusses on two sets of work: (i) the periodic inspection of all Transformer Stations ("TS")[2] and Municipal Stations ("MS") and associated equipment; and (ii) maintenance of auxiliary equipment housed or used at stations, including station batteries, air compressors, and testing equipment.
- **Station Switchgear Maintenance:** This segment includes the testing and maintenance of Toronto Hydro owned switchgear units and circuit breakers located at TSs and MSs across the utility's service territory.
- **Station Equipment Maintenance:** This segment oversees and maintains equipment located at all of Toronto Hydro's 36 TS and 149 MS locations, including 235 station transformers.

The proposed 2020 expenditure for this Program is based on historical levels of approximately $5.6 million. By preserving and maximizing the performance of station assets and assets located in customer-owned buildings, this Program contributes to maintaining safety and the environment, and overall system reliability at reasonable costs to Toronto Hydro's customers.

[2] Transformer stations are points of power supply from Hydro One Networks Inc. ("Hydro One") transmission system which step down supply voltages.

2. OUTCOMES AND MEASURES

Table 2: Preventative and Predictive Station Maintenance Program Outcomes and Measures Summary

Reliability	• Contributes to maintaining existing levels of system reliability (SAIDI/SAIFI) by inspecting station assets for deficiencies in compliance with the Ontario Energy Board's ("OEB") Distribution Systems Code ("DSC").
Environment	• Operate in an environmentally responsible manner and reduce the environmental impact of Toronto Hydro's distribution system by proactively identifying station equipment (i.e. transformers) exhibiting signs of oil deficiencies for replacement and minimizing the likelihood of an oil spill into the environment.
Safety	• Contribute to Toronto Hydro's public safety performance (as measured by the OEB distributor scorecard safety metrics), employee safety performance, and compliance with applicable safety requirements (including Ontario Regulation 22/4, the *Ontario Fire Code*[3], and the *Occupational Health and Safety Act*) by proactively performing inspections to reduce the risk of asset failures that may otherwise endanger the general public and Toronto Hydro crews (e.g. failure of a vault transformer, station power transformer or switchgear which can result in a fire).

3. PROGRAM DESCRIPTION

The Preventative and Predictive Station Maintenance program funds maintenance activities in respect of: (i) Toronto Hydro's station assets; and (ii) Toronto Hydro's assets located at customer-owned buildings or dedicated areas on customer premises. This Program involves inspection and maintenance tasks typically conducted on a fixed cycle and inspection of equipment for indications of potential failure. The activities

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

comprising the individual segments in this Program are focused on preserving and maximizing an asset's performance over its expected useful life while mitigating a wide variety of system risks. This Program is also designed to minimize overall costs and account for other factors such as the safety of Toronto Hydro work crews and the public and ensure compliance with statutory and regulatory requirements.

Maintenance activities in this Program include inspections to assess the condition of customer location building vault structures and the equipment housed inside (including transformers, switches and cables), as well as inspections of station facilities and station assets (including power transformers, switchgear and auxiliary station equipment). The Station Maintenance program is comprised of the following four segments:

- **Customer Location Maintenance:** A subset of Toronto Hydro's customers is supplied by electrical equipment such as transformers and switches that are located within customer-owned buildings (vaults) or dedicated areas on customer premises. The activities in this segment are aimed at inspecting and maintaining these equipment.
- **Station Inspections and Auxiliary Equipment Maintenance:** This segment funds two types of work: (i) periodic inspection of all TSs and MSs and the associated equipment; and (ii) maintenance of auxiliary equipment housed or used at stations including station batteries, air compressors, and testing equipment.
- **Station Switchgear Maintenance**: This segment includes the testing and maintenance of Toronto Hydro owned switchgear units and circuit breakers located at TSs and MSs across the utility's service territory.
- **Station Equipment Maintenance** – This segment overseas and maintains equipment located at all of Toronto Hydro's 36 TS and 149 MS locations, including 235 station transformers.

Detailed descriptions of the segments are provided in sections 5-8 below.

4. PROGRAM COSTS

Toronto Hydro requires approximately $5.6 million each year to to support the efficient and effective execution of the segments in the Station Maintenance program. Without this level of funding, Toronto Hydro could be exposed to a number of risks.

- Reduced ability to comply with applicable legislative and regulatory requirements such as the OEB's *Distribution System Code*, *Ontario Fire Code* and *Occupational Health and Safety Act* requirements.
- Increased frequency of station equipment malfunctions or failures due to unidentified deficiencies or lack of maintenance leading to increased:
    - public safety risks from deficiencies at station access points and other security infrastructure
    - environmental risk from oil leaks resulting from unidentified equipment deficiencies such as transformers and cables, and
    - reliability risks from the failure of station backup battery systems operating as required during power interruption

Table 3 provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for each of the Program's segments.

Table 3: Stations Maintenance Program Expenditures by Segment ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Customer Location Maintenance	2.6	1.4	1.2	1.2	1.1	1.1
Station Inspections and Auxiliary Equipment Maintenance	1.0	0.9	1.0	0.9	0.9	1.0
Station Switchgear Maintenance	1.7	2.2	2.6	2.6	2.9	2.6
Station Equipment Maintenance	0.3	0.8	0.7	0.7	0.8	0.9
Total	**5.6**	**5.3**	**5.6**	**5.4**	**5.6**	**5.6**

4.1 Cost Drivers

The 2020 test year cost forecast represents an increase of under $0.1 million on the most recent historical actual year (2017), and a decrease of less than $0.1 million from the bridge year (2019).

Year-over-year expenditures in this Program has been relatively stable. Minor variations have been largely attributed to:

- Management decision in 2016 following the oil testing pilot program for the Customer Location Maintenance Segment (see Customer Location Segment section below for further details).
- Variation in the number of equipment maintained. For example, Toronto Hydro is currently able to maintain more station equipment than in past years due to improvements in managing work execution risks and by coordinating station outages on a four-year maintenance cycle. This has enabled Toronto Hydro work crews to maintain all equipment units at a station at once, without the need for multiple planned outages.

4.2 Cost Control and Productivity Measures

4.2.1 Cost Management

As explained in detail in the general productivity discussions, certain maintenance activities require an outage to create a safe work zone in accordance with Toronto Hydro's Work Protection Code.[4] Initiatives undertaken in 2016 included the development of an annual feeder scheduling program and enhanced work coordination to allow crews to carry out more maintenance work per outage. This initiative improved

[4] Exhibit 1B, Tab 2, Schedule 1

maintenance accomplishments for activities requiring an outage and reduced costs resulting from doing fewer switching and isolations for maintenance.

4.2.2 Productivity

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 Station Maintenance program. In an effort to achieve greater productivity, Toronto Hydro has recently undertaken an overhaul and recertification process for all Reliability Centered Maintenance ("RCM") studies and have adjusted maintenance tasks and frequencies that are based on RCM, Condition-Based Maintenance and continuous improvement principles. Examples of these adjustments include:

- Beginning in 2015, Toronto Hydro updated all inspection forms for its distribution equipment to capture greater details about substandard conditions found during inspections (such as the location and extent of an oil leak or corrosion on a transformer). This update allowed Toronto Hydro to improve its processes in prioritizing and determining the appropriate corrective action for each deficiency, so as to more effectively mitigate public and employee safety, environmental, system reliability, and financial risks.
- Implementing "find and fix" protocols whereby crews that identify minor asset deficiencies address the deficiencies by replacing them onsite as opposed to only logging the deficiencies for the Corrective Maintenance program.[5]
- Issuing longer-term inspection maintenance contracts to third party service providers help keep unit costs stable and increases service quality levels over time as retaining the same service provider increases service provider

[5] See Exhibit 4A, Tab 2, Schedule 4.

experience and familiarity with identifying deficiencies on Toronto Hydro's distribution system.

- Introducing new tools or making greater use of technology such as Infrared Thermography, Electronic Maintenance Sheets, Furan Sampling, Double Testing, Dissolved Gas Testing, Online Partial Discharge Testing, and Enhanced Battery Testing.

The following sections discuss the drivers of each of the segments that make up the Preventative and Predictive Station Maintenance program.

5. CUSTOMER LOCATION MAINTENANCE SEGMENT

5.1 Segment Description

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

The equipment contained in these sites is typically owned by Toronto Hydro and requires regular inspection and maintenance. Where the equipment is not owned by Toronto Hydro, it is nevertheless necessary to conduct switching operations at the location. As a result, on-site inspections are required to ensure ongoing operability and safety. There are approximately 5,380 customer-owned locations where Toronto Hydro must maintain or inspect equipment.

Of the 5,380 customer-owned locations, approximately 4,645 contain Toronto Hydro-owned equipment, including over 12,000 transformers. For maintenance purposes, these 5,380 locations are divided into two subsets based on customer load requirements: (i) Customer Building Vaults, which possess transformation capacity less than 2,000 kVA; and (ii) Customer Substations, which have transformation capacity of 2,000 kVA or above.

Toronto Hydro maintains Customer Building Vaults on a three-year cycle, in compliance with the OEB's Minimum Inspection Requirements (Appendix C of the DSC). Maintenance of Customer Building Vaults includes a visual inspection of the vault and equipment, thermographic scans and partial discharge testing of all electrical equipment and connections to detect thermal anomalies and corona, and general cleaning to reduce contamination build-up and electrical tracking. Deficiencies that are noted during inspections are either addressed immediately or subsequently addressed through corrective maintenance. The condition of the customer's civil structure is also assessed and any identified deficiencies are communicated to the customer for remediation.

Customer Substations are inspected annually and maintained every four years. Inspections ensure that ventilation, access, and drainage systems are operating as required and that equipment is not leaking, defective, or corroded. Maintenance includes visual inspections, thermographic scans, functional tests, oil testing, and general cleaning. Toronto Hydro maintains a total of 411 Customer Substations.

Through Customer Location Maintenance, Toronto Hydro identifies deficiencies in electrical equipment and verifies the integrity and security of the structures that house the equipment at Customer Building Vaults and Customer Substations. Identifying and addressing deficiencies minimize the likelihood of equipment failure, mitigating risks relating to public and employee safety, the environmental, financial impact, and system reliability. As illustrated in Figure 1 below, since 2015, Toronto Hydro has identified on average over 7,000 deficiencies at Customer Locations each year. These deficiencies are addressed as part of the Corrective Maintenance and Reactive Capital programs.

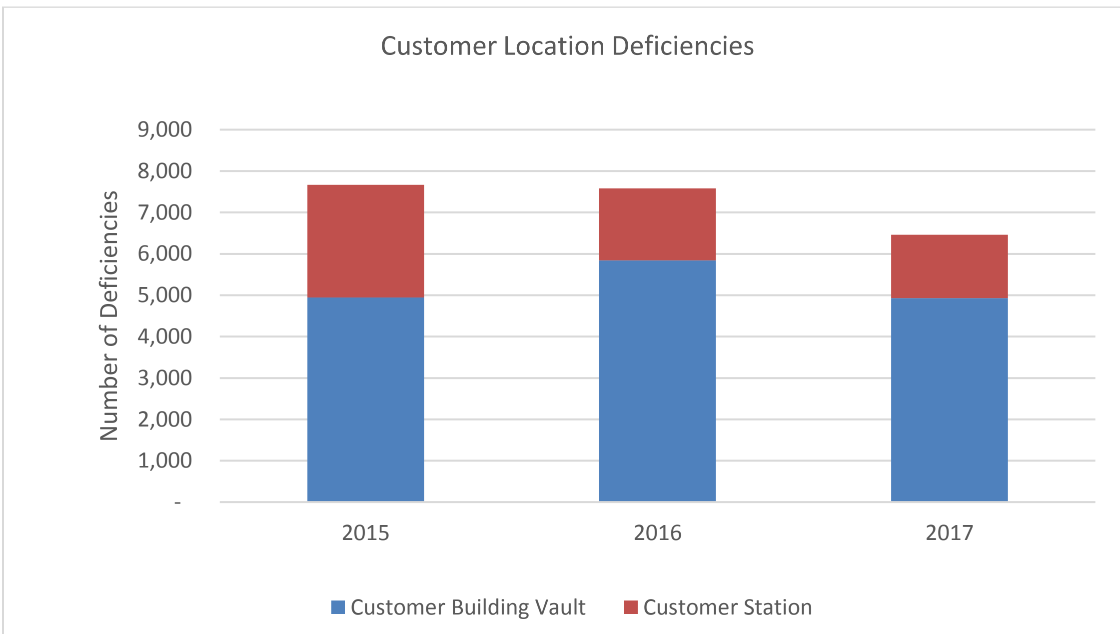


Figure 1: Customer Location Deficiencies Identified Between 2015 and 2017

Specific examples of deficiencies identified and their associated risks include:

- Dirty vaults that require cleaning to reduce the risks of flashover caused by contamination build-up and premature equipment failure, which can result in injury to employees, customers and members of the public that are near these vaults, as well as property damage;

- Corrosion of equipment, locks and doors (as illustrated in Figure 2 below), which can result in unauthorized entry and pose a safety risk if individuals make contact with energized equipment;
- Oil leaking from cables or transformers (as illustrated in Figure 3 below), which if not addressed in a timely manner, can result in oil entering the drainage system and potentially spilling into environmentally sensitive areas;
- "Hot spots" on equipment identified using a thermographic cameras before excessively high temperatures cause burnt insulation and electrical faults, which pose serious safety risks (e.g. vault fire); and
- Degradation of a transformer's insulating oil properties due to the concentrations of certain gases (e.g. hydrogen, carbon monoxide, methane, and acetylene), which can be identified via transformer oil testing as indications of an elevated risk of transformer failure.

Beyond inspections of the electrical equipment, Customer Location Maintenance activities include inspections of the civil infrastructure housing the equipment. Such civil infrastructure is owned by Toronto Hydro's customers, who are responsible for repairs. Nevertheless, it is prudent for Toronto Hydro to continue inspections and issue follow-up Customer Action Forms given the risk that customers may fail to carry out necessary repairs in a timely manner. It is not uncommon for structural elements to be in poor condition to the point that walls (as illustrated in Figure 4 below) and roofs are at risk of collapsing on Toronto Hydro's equipment.

In addition, improperly maintained landscaping and vegetation at or near outdoor customer locations can pose safety risks (e.g. vegetation becoming energized and possibly catching fire) and prevent Toronto Hydro crews from entering the sites to carry out required work (as illustrated in Figure 5 below). Such serious deficiencies are communicated to customers so that they can be addressed.

Figure 2: Rusted Door

Figure 3: Transformer Leaking Oil

Figure 4: Cracked Walls

Figure 5: Vegetation Overgrowth

By preventing equipment failures and non-electrical deficiencies, Customer Location Maintenance activities also prevent power interruptions. A failure at a Customer Building Vault will typically impact one or more customers for a prolonged period of time depending on the type of failure. Failures at Customer Substations have a greater impact as more than 2,000 kVA of load may be interrupted for similar durations.

Through premises and equipment safety inspections, Toronto Hydro also manages the risk of equipment failure at Customer Locations involving all customer-owned civil and electrical equipment. Even though the assets are not owned by Toronto Hydro, an equipment failure at such location will still have an impact on system reliability, especially if the customer's protection equipment is not coordinated with the distribution system's protection devices or if the customer's 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 purposes of field response by utility crews during emergency situations. Toronto Hydro inspects over 770 of these locations annually.

5.2 Customer Location Maintenance Segment Costs

Toronto Hydro requires approximately $1.1 million each year during the 2020 to 2024 period to execute the functions in this segment. Table 4 provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for this segment.

Table 4: Customer Location Maintenance Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Customer Location Maintenance	2.6	1.4	1.2	1.2	1.1	1.1

The 2020 test year costs associated with this segment are projected to be $1.1 million which represents a decrease of $1.5 million from the utility's last rebasing year (2015), $0.1 million reduction from the most recent historical actual year (2017) and no change relative to the bridge year (2019).

5.3 Customer Location Maintenance Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

In 2015, Toronto Hydro conducted an oil testing pilot to obtain more data about the health of transformers and improve asset renewal plans for customer owned locations. The results of the pilot showed it is more efficient to target only customer locations without load break switches, and with loads greater than or equal to 2,000 kVA. This approach minimizes reliability impacts, as an outage is required to safely take an oil sample, and in many instances, it would be costly or not possible to isolate a location. This change accounts for most of the $1.2 million cost reduction in 2016.

2016 – 2017 Variance Explanation

The reduction of $0.2 million expenditures between 2016 and 2017 is primarily attributable to an approximately 13 percent reduction in the number of units requiring inspection in 2017.

2017 – 2018 Variance Explanation

There are no variances between 2017 and 2018 expenditures.

2018 – 2019 Variance Explanation

Variances in expenditures from 2018 to 2019 are primarily attributable to variations in the number of units inspected and maintained annually.

2019 – 2020 Variance Explanation

There is no material variance forecast for this period. Toronto Hydro's planned 2020 expenditures align in general with historical expenditures and equal those of 2019.

6. STATION INSPECTIONS AND AUXILIARY EQUIPMENT MAINTENANCE SEGMENT

6.1 Segment Description

Toronto Hydro owns equipment at 36 TSs and 149 MSs throughout the City of Toronto. Equipment is located either inside buildings or outside in fenced yards. The Station Inspections and Auxiliary Equipment Maintenance segment funds the following two categories of work:

- Periodic inspections of all TSs and MSs and the associated equipment; and
- Maintenance of auxiliary equipment housed or used at stations including station batteries, air compressors, and testing equipment.

Figures 6 and 7 show a typical MS found in a residential neighbourhood, and Figure 8 shows a TS yard.

Figure 6: Residential Area MS (front view)

Figure 7: Residential Area MS (rear view)

Figure 8: The Station Yard at Cavanagh TS

Periodic inspections of stations are conducted either monthly or semi-annually. During semi-annual inspections, crews look for any signs of transformer oil leaks, confirm transformer cooling fan operation, check battery electrolyte levels, verify the condition of equipment alarms, and look for any visual signs of equipment deterioration or imminent failure. In addition, adjustments to heating and ventilation systems are performed during the spring and fall to ensure assets are protected from damage due to temperature (e.g. turning on or turning off control cabinet heaters) and in the fall, oil samples are collected from power transformers for testing. During monthly inspections, crews also look for deficiencies in station fences, gates, doors, building walls, roofs, danger signs, and lighting.

In addition to inspections, maintenance of station auxiliary equipment is performed. This equipment provides a support or service function and can be described as being peripheral to station power and protection and control equipment. Station auxiliary equipment includes: (i) Battery Banks; (ii) Station Protection Systems; (iii) Station Compressed Air Systems; and (iv) other miscellaneous station apparatus, including station buses, specialized environmental protection systems, and testing equipment. This equipment is described as follows:

- **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 9 below, and are charged by station rectifiers (chargers). Stations typically have lead-acid or nickel cadmium batteries. Specialized inspections and tests on these battery banks are conducted every six months for MS and monthly for TS 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.
- **Station Protection Systems:** TS and MS stations are equipped with alarms to monitor and ensure proper functioning of various assets in stations including buildings, batteries, compressors, switchgear, and service transformers. Maintenance includes assessing the physical and mechanical conditions of the alarms and coordinating with the control room to perform functional tests. This work is carried out on a one year cycle.
- **Compressed Air Systems:** These systems are required to supply dry compressed air for the operation of air blast circuit breakers as depicted in Figure 10. Air

blast circuit breakers use compressed air to open their arcing contacts, and to extinguish the electrical arc that forms during breaker operation. There are approximately 20 air compressors used in Toronto Hydro's 4.16 kV and 13.8 kV stations. These assets are inspected and maintained twice a year.

Figure 9: Station Battery System at George and Duke MS

Figure 10: Air Compressor System

Station Inspections and Auxiliary Equipment Maintenance are undertaken to address two broad sets of needs: (i) the need to mitigate the risks posed by deficient or failed equipment and components, including public and employee safety, environmental, financial, and system reliability risks; and (ii) the need to ensure compliance with applicable regulatory requirements such as the *Ontario Fire Code* and the *Occupational Health and Safety Act*.

6.1.1 Station Inspections

During 2015-2017, Station Inspections identified over 1,400 deficiencies on average annually. Identified deficiencies were addressed through the Corrective Maintenance program,[6] or equipment replacement programs as discussed in the Stations Renewal program.[7]

From a safety perspective, deficiencies at stations within urban and residential settings can pose significant risks. For example, deficiencies at access points such as gates, doors, fences, signs, and other security infrastructure can result in a station becoming accessible to the general public. Such deficiencies can arise due to structural degradation or other common causes including vandalism and wildlife, and can contribute to risk of injury to the general public. Frequent inspections are critical to maintaining secure station sites in a densely populated environment.

From an employee safety perspective, inspections identify deficiencies with station safety features such as alarms, emergency lightning, burn kits, eyewash stations, first aid kits, and fire extinguishers. This equipment is critical in protecting employees during emergency situations such as station fires. Inspections also enable Toronto Hydro to remain compliant with the Ontario *Fire Protection and Prevention Act* which requires, among others, fire extinguishers to be inspected monthly.[8]

From an environmental perspective, inspections allow for the identification of equipment that is leaking oil (an example of a leaking transformer is depicted in Figure 11). Leaking transformers or cables pose environmental risks, where oil can enter waterways, ground water and potentially sensitive ecological areas. Frequent inspections can identify signs of oil leaks, which can indicate assets that are at risk of

---

[6] *Supra* note 5.
[7] Exhibit 2B, Section E6.6
[8] Ontario *Fire Protection and Prevention Act, 1997*, S.O. 1997, c. 4

failing. Based on such findings, Toronto Hydro can address the leak and prevent equipment failures.

Figure 11: Oil Leak on a Station Transformer

Inspections also identify vegetation concerns and damage to grading and landscaping as depicted in Figure 12. Failure to address these deficiencies can result in customer complaints, damage to stations (i.e. due to poor drainage), and safety risks for employees including accessibility risks from vegetation overgrowth and slip-and-fall risks from poor landscaping.

Figure 12: Damaged Landscaping

In addition to identifying deficiencies to mitigate safety and environmental risks, Station Inspection work involves the oil sampling and testing of power transformers in order to mitigate financial and system reliability risks. Industry-standard oil tests are performed to identify poor conditions and abnormalities that cannot otherwise be detected without a complete disassembly of the transformer. Such tests include: (i) Dissolved Gas Analysis; (ii) Furan analysis; and (iii) tests for acid levels, moisture levels, and other oil quality attributes.

Oil testing is particularly valuable because it allows Toronto Hydro to identify transformers that may be at a high risk of failure and to schedule corrective action such as oil reclamation or replacement before a catastrophic event occurs. Consequences of such an event can include oil spills, fire, emergency response, substantial equipment replacement costs, and a prolonged power interruption.

6.1.2 Auxiliary Equipment Maintenance

As discussed above, Auxiliary Equipment Maintenance is performed to mitigate a variety of risks. Maintenance of station backup battery systems reduces the risk that a station’s protection and control system will not operate as required during a power interruption. During such an event, the system's DC power source allows all station protection and control equipment to function and communicate normally. Loss of the backup power supply can have consequences ranging from loss of communication and remote operation capability, to failure of a protecting device to function posing both safety and system reliability risks.

Maintenance of protection systems ensures the operability and dependability of alarms at station facilities so that Toronto Hydro can be notified and proactively respond to defective equipment before they lead to failure, which in turn can pose safety, environmental, and system reliability risks.

Maintenance of compressed air systems are designed to ensure that air blast circuit breakers are available to operate as designed when required. Without a certain pressure and volume of compressed air available, the circuit breakers will not close or trip. Failure to operate during fault conditions will expose employees to the risk of 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 MS 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 factors including breaker 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.

6.2 Station Inspections & Auxiliary Equipment Segment Costs

Toronto Hydro requires approximately $1.0 million each year during the 2020 to 2024 period to execute the functions in this segment. Table 5 below provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for this segment.

Table 5: Station Inspections & Auxiliary Equipment Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Station Inspections and Auxiliary Equipment Maintenance	1.0	0.9	1.0	0.9	0.9	1.0

The test year (2020) costs associated with this segment are projected to be $1.0 million which are equal to the utility's last rebasing year (2015), and the most recent historical actual year costs (2017), and are $0.1 million lower than the bridge year (2019).

6.3 Station Inspections & Auxiliary Equipment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

Expenditures under this segment have remained relatively stable during 2015 and 2016, with no material variances. Toronto Hydro anticipates this trend will continue into 2020.

2016 – 2017 Variance Explanation

Expenditures under this segment have remained relatively stable during 2016 and 2017, with no material variances. Toronto Hydro anticipates this trend will continue into 2020.

2017 – 2018 Variance Explanation

There is no material variance forecast for this period.

2018 – 2019 Variance Explanation

There is no material variance forecast for this period.

2019 – 2020 Variance Explanation

There is no material variance forecast for this period. Planned expenditure for 2020 is $1.0 million and is consistent with historical expenditures.

7. STATION SWITCHGEAR MAINTENANCE SEGMENT

7.1 Segment Description

Station Switchgear Maintenance includes testing and maintenance of Toronto Hydro's switchgear units and circuit breakers that are located at TSs and MSs across the utility's service territory. A switchgear unit is a combination of switching devices and their associated controls, measuring, protection, and regulating equipment. Assemblies of these devices and equipment, with associated interconnections, accessories, enclosures and supporting structures, are found at Toronto Hydro's distribution stations. There are approximately 250 switchgears installed within the distribution system and they collectively contain over 1,800 circuit breakers.

Switchgears and circuit breakers must operate quickly and reliably when an electrical interference or equipment failure causes a fault on the distribution system. Switchgear maintenance activities mitigate the risk that the equipment will malfunction during a contingency, failing to protect the downstream feeders and equipment and possibly leading to a safety incident involving the public or Toronto Hydro employees. Maintenance is particularly critical for the fleet of switchgear owned by Toronto Hydro, as many circuit breakers have surpassed their expected lives and rely on obsolete 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 of switchgear are illustrated in Figure 13 below.

Figure 13: (Left) Outdoor Enclosure Housing Metal clad Switchgear. (Right) Indoor Metal clad Switchgear

Station Switchgear Maintenance includes three sets of activities.

1) **Circuit Breaker Maintenance**: Circuit breakers (Figure 14) use various mediums to extinguish the electric arc that forms during an interruption operation. Toronto Hydro owns the following types of circuit breakers: air magnetic, air blast, Sulphur Hexafluoride (SF_6), oil, and vacuum units, which are maintained every four years. 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.


Figure 14: (Left) KSO Oil Circuit Breaker, (Right) Vacuum Circuit Breaker

2) **Protection & Control ("P&C") Maintenance**: 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 verified to ensure that the system remains protected, the settings are appropriate for the current state and loads, and a failure event does

not result in cascading outage events. More specifically, maintenance activities involve verifying the AC voltage and current to the fault detecting relay, testing the operating characteristics of the relay, validating relay settings, verifying the operation of auxiliary relays, and verifying output functions such as alarms and annunciations. This equipment is maintained every four years.

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

Maintenance activities are designed to reduce the likelihood of switchgear or breaker failure and to mitigate the associated risks. One way that this is accomplished is by identifying deficiencies that can lead to common switchgear failure modes. These deficiencies include worn components, loose connections, degradation, corrosion, and contamination. Examples of these are shown in Figures 15 and 16, which illustrate a corroded switchgear enclosure and pest infestation inside an outdoor switchgear.

Figure 15: Rusted Switchgear Enclosure

Figure 16: Pests Inside Outdoor Switchgear

Figure 17 below shows an example of an internal arc fault, which can be destructive and pose a risk of injury because of the energy levels reached within the confined compartment.

Figure 17: Impact of Internal Arc Fault in a Switchgear

As illustrated in Figure 18 below, Toronto Hydro has identified on average 700 deficiencies on switchgear assets each year since 2015.

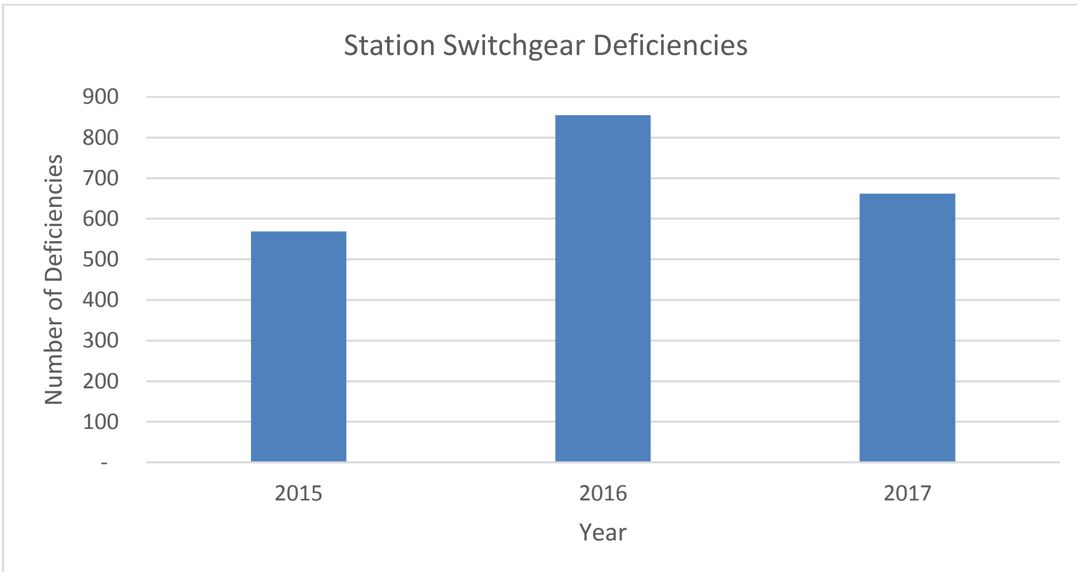


Figure 18: Switchgear Deficiencies Identified Between 2015 and 2017

The likelihood of deficiencies existing and leading to a failure increases as switchgear and breakers age and approach their end-of-life. The average expected lives of switchgear enclosures and circuit breakers are 50 and 45 years, respectively.

Approximately 28 percent of Toronto Hydro's switchgear and outdoor TS circuit breakers have surpassed their expected useful life. Of particular concern are the high numbers of air magnetic, air blast, and oil breakers that have exceeded their expected life. The likelihood of failure increases for these assets due to wear and tear caused by high occurrences of operations, contamination, loose connections, and corrosion.

Toronto Hydro's Asset Condition Assessment[9] indicates that over 40 percent of the population of switchgear have moderate to material deterioration and are at an increased likelihood of failure. A failure of one of these assets has the potential to lead to a catastrophic fire, release harmful contaminants into the environment (e.g. oil spills, combustion by-products), and safety risks in the form of debris or arc-flashes that can cause injury and property damage. The replacement of worn and corroded components, the alignment of switch blades, the lubrication of switches, and the removal of dirt and other contamination during maintenance mitigates the risk of failures and associated employee safety, financial, environmental, and system reliability risks that are associated with switchgear failure.

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

The financial consequences of failures of switchgear and circuit breakers are also significant. The replacement of a circuit breaker can exceed $100,000 and approach $1 million depending on various factors including breaker type, voltage rating, and location.

[9] Exhibit 2B, Sections D1 & D3

The total replacement cost of a transformer station switchgear, including the costs of the enclosure and circuit breakers, is approximately $6 million. These costs significantly exceed the annual cost of switchgear maintenance activities. As such, the prevention of even one catastrophic failure over a multi-year period will offset the planned maintenance expenditures during the period.

In addition to mitigating safety, environmental, and financial risks, Switchgear Maintenance provides customer value by mitigating system reliability risks. A failure of station switchgear or a circuit breaker can result in a large number of customer interruptions and long interruption durations. During the 2015-2017 period, Toronto Hydro experienced seven incidents on average annually that were related to switchgear failures, which resulted in over 6,000 customers impacted and 7,000 customer hours of interruption annually on average.

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

7.2 Station Switchgear Maintenance Segment Costs

Toronto Hydro requires approximately $2.6 million each year during the 2020 to 2024 period to execute the functions in this segment. Table 6 below provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for this segment.

Table 6: Station Switchgear Maintenance Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Station Switchgear Maintenance	1.7	2.2	2.6	2.6	2.9	2.6

The test year (2020) costs associated with this segment are projected to be $2.6 million which represents an increase of $0.9 million from the utility's last rebasing year (2015), no change from the most recent historical actual year (2017), and a reduction of $0.3 million from the bridge year (2019).

7.3 Station Switchgear Maintenance Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

The 2015-2016 variance is attributed to the optimization of station maintenance cycles. Station outages are currently coordinated on a four-year cycle; whereas in the past, certain equipment at stations were maintained on varying cycles such as every three years and eight years. This optimization has allowed Toronto Hydro work crews to maintain all station equipment units at once, without the need for multiple planned outages. This change resulted in a $0.5 million increase in expenditures from 2015 to 2016 to allow Toronto Hydro to maintain more breakers (an increase of 27 percent in 2017 from 2015 levels). Toronto Hydro maintained 304 circuit breakers in 2015, as compared to 378 in 2016.

2016 – 2017 Variance Explanation

Variances in expenditures from 2016 to 2017 are primarily attributable to variations in the number of units inspected and maintained annually. For example, Toronto Hydro maintained 378 circuit breakers in 2016, as compared to 385 in 2017.

2017 – 2018 Variance Explanation

There is no material variance forecast for this period.

2018 – 2019 Variance Explanation

From 2018-2019, expenditures are expected to increase slightly as Toronto Hydro continues to align breaker maintenance with prescribed maintenance cycles by increasing the number of circuit breakers maintained. The first maintenance cycle for breakers will be complete in 2019 and costs are expected to stabilize in 2020 at $2.6 million.

2019 – 2020 Variance Explanation

Planned expenditures for 2020 are consistent with historical (2017-2018) spending levels.

8. STATION EQUIPMENT MAINTENANCE SEGMENT

8.1 Segment Description

The Station Equipment Maintenance segment includes equipment that is located at all of Toronto Hydro's 36 TS and 149 MS locations, including 235 station power transformers. TSs are points of power supply from the Hydro One transmission system to Toronto Hydro's distribution system. These stations 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 Hydro One. MSs are stations within Toronto Hydro's distribution system that 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.

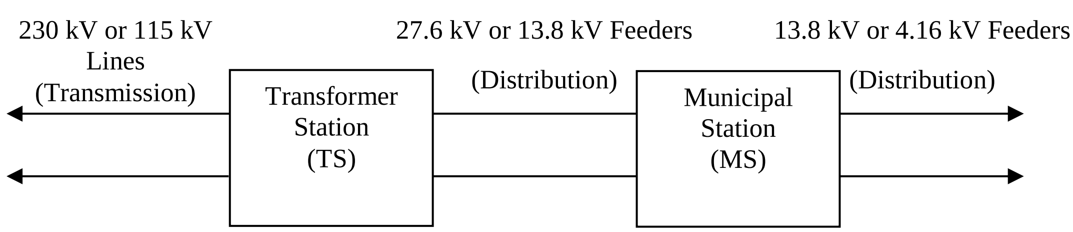


Figure 19: System Configuration

Figures 20 and 21 as follows depict examples of station power transformers at Toronto Hydro's stations.

Figure 20: Power Transformer at Cavanagh TS

Figure 21: Power Transformer at Neilson Dr. MS

Toronto Hydro's station equipment is aging, and a significant proportion has exceeded their expected useful life. The best indicator in this regard is the age demographics for power transformers, which are essential components of every station. Approximately two-thirds of Toronto Hydro's transformers were installed in the 1950s through the 1970s. The average useful life of these units is 45 years and over half of the entire population is beyond their useful life. In addition, Toronto Hydro's Asset Condition Assessment tool shows that currently over a third of all power transformers have moderate to material deterioration and are at an increased likelihood of failure.

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

Maintenance activities are focused on inspecting, testing, and cleaning assets, including power transformers and their auxiliary equipment, current transformers, potential transformers, station service transformers, DC batteries, chargers, disconnect switches, load break switches, fuses, interconnect cables, and remote terminal units. Failure of such equipment, and in particular, failure of power transformers, can result in station fires, oil leaks, significant emergency response and equipment replacement costs, and power interruptions impacting a large number of customers. Maintenance activities are vital for mitigating the risk of such failures and associated consequences. Maintenance activities also help to extend the useful life of equipment by promptly identifying failing insulation, deterioration of insulating oil, and transformer winding irregularities such as shorted turns, all of which can cause catastrophic equipment failure if not addressed in a timely manner.

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

- Comprehensive transformer testing including winding resistance and power factor testing to evaluate the insulation integrity of the core and windings;
- Cleaning of power transformer bushings to remove contamination that can lead to tracking and flashovers;
- Inspections and calibrations of transformer auxiliary equipment such as relays, temperature and oil gauges, and alarms;
- Verifying the integrity of all clamped and bolted connections on primary feeders, insulators, bushings, secondary feeders and buses;

- Cleaning and testing of on-load tap changers, which are devices used to regulate voltage; and
- Testing of transfer trip relays between a MS transformer (at 4 kV) and the upstream 13.8 kV or 27.6 kV supply feeder.

Station Equipment Maintenance, including the aforementioned activities, requires planned outages and is scheduled on a four-year cycle. In this regard, preventative and predictive tools and tests are employed during maintenance to prevent and identify deterioration on equipment that can lead to failures and associated consequences.

As illustrated in Figure 22 below, Toronto Hydro has identified on average 82 deficiencies on station equipment each year since 2015.

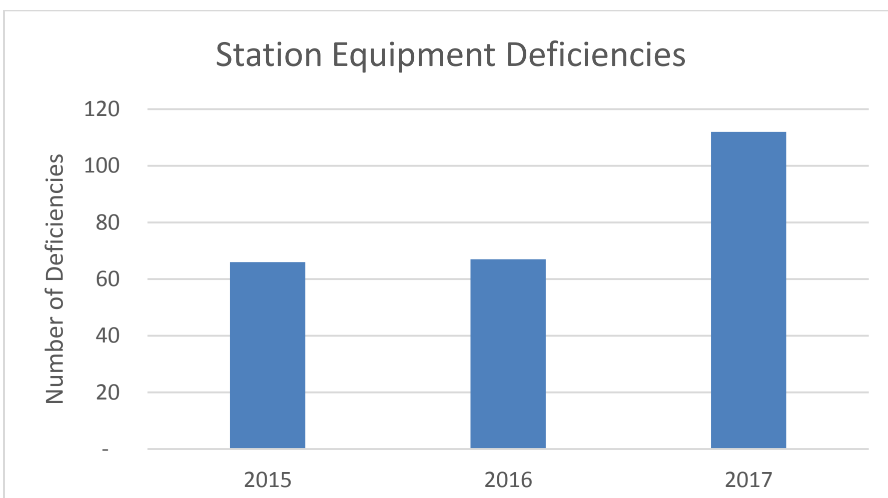


Figure 22: Station Equipment Deficiencies Identified Between 2015 and 2017

When equipment failures occur (e.g. on a power transformer), they pose significant safety, environmental, financial, and system reliability risks. An example of a transformer failure is one that occurred at Dupont MS in 2003. The 49-year old transformer failed and resulted in a fire that caused damage to two other power transformers at the station and caused oil and fluids to spill into the station. This event interrupted 5,675 customers, resulting in over 23,341 customer hours interrupted. The entire outage lasted for 6.6 hours. Figures 23 to 25 show the damage caused by this incident.

Figure 23: Failed Power Transformer

Figure 24: Damages to the MS Wall

Figure 25: Leaking Fluids from Failed Transformer

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

During 2015-2017, Toronto Hydro experienced six outage incidents cause by failed station transformer equipment. Fortunately, none of these incidents were of the magnitude of the failure at Dupont MS in 2003; however, they did cause over 3,600 customer interruptions and 3,000 customer hours of interruption over the three-year period and thousands of dollars in emergency response. From a financial perspective, transformer failures can result in emergency response and equipment replacement expenditures that range between $0.2 million and $4 million. Given these figures, the mitigation of even one costly failure can result in savings that substantially offset the cost of the Station Equipment Maintenance program.

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 MSs. 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. To ensure the successful operation of a switch during fault conditions, maintenance activities 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.

8.2 Station Equipment Maintenance Segment Costs

Toronto Hydro requires approximately $0.9 million each year during the 2020 to 2024 period to execute the functions in this segment. Table 7 below provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for this segment.

Table 7: Station Equipment Maintenance Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Station Equipment Maintenance	0.3	0.8	0.7	0.7	0.8	0.9

The 2020 test year costs associated with this segment are projected to be $0.9 million, which represents an increase of $0.6 million from the utility's last rebasing year (2015), $0.2 from the most recent historical actual year (2017), and of $0.1 million, from the bridge year (2019).

8.3 Station Equipment Maintenance Segment Year-over-Year Variance Analysis

2015 -2016 Variance Explanation

The 2015-2016 variance is attributable to optimizations made to aligning and achieving a four-year maintenance cycle for all stations. Station outages are coordinated on a four-year cycle to allow work crews to maintain all station equipment units at once, without the need for multiple planned outages. This optimization has allowed Toronto Hydro to maintain equipment at more stations in the downtown core than in the past, where 46 stations were maintained in 2016 when compared to the maintenance of 22 stations in 2015.

2016 -2017 Variance Explanation

Expenditures decreased by $0.1 million from 2016 to 2017 primarily due to a lower number of stations maintained in the downtown core (36 stations).

2017 -2018 Variance Explanation

Expenditures from 2017-2018 are forecast to be relatively stable, with potential variations in spending attributable to variations in the number of stations maintained.

2018 -2019 Variance Explanation

Expenditures from 2017-2018 are forecast to be relatively stable, with potential variations in spending attributable to variations in the number of stations maintained.

2019 -2020 Variance Explanation

The test year (2020) costs are generally consistent with historical spending levels.

CORRECTIVE MAINTENANCE

1. OVERVIEW

Table 1: Corrective Maintenance Program Summary

2015-2017 Average Annual Cost ($M): 17.7	**2020 Cost ($M):** 17.2
Segments: Corrective Maintenance	
Outcomes: Reliability, Environment, and Safety	

As part of the Corrective Maintenance program (the "Program"), the utility undertakes actions to address deficiencies or substandard conditions across the entire distribution system that are identified during the normal course of operations. This typically includes deficiencies or substandard conditions identified through activities undertaken as part of the Preventative and Predictive Maintenance programs[1] or the Emergency Response program.[2] Corrective Maintenance activities are non-discretionary, typically cover short planning horizons (given the risks that deficiencies and substandard conditions can pose if left unaddressed), and involve restoring assets to their normal operating conditions through maintenance, refurbishment, or minor component replacements.

Toronto Hydro's primary objective for this Program is to contribute to maintaining safety, environmental integrity, and overall system reliability by correcting or repairing deficiencies or substandard conditions on the distribution system. There has been a rise in the volume of corrective work requests executed under the Corrective Maintenance program attributed to the significant proportion of assets that are deteriorating from a

[1] Exhibit 4A, Tab 2, Schedule 1-3
[2] Exhibit 4A, Tab 2, Schedule 5

condition perspective or have exceeded their expected lives, thereby elevating the risk of failure across the distribution system.

The proposed 2020 expenditures for the Corrective Maintenance program are based on historical levels. Other than the 2017 costs which are notably higher than 2016 (as explained in the costs section below), the Program as a whole has seen an overall gradual increase in expenditures.

2. OUTCOMES AND MEASURES

Table 2: Corrective Maintenance Program Outcomes and Measures Summary

Reliability	• Contributes to Toronto Hydro's system reliability objectives (SAIFI, SAIDI, FESI-7) by repairing and restoring assets through corrective maintenance to acceptable operating conditions.
Environment	• Contributes to Toronto Hydro's environmental objectives by: ○ Repairing cables exhibiting signs of oil deficiency to prevent oil spills into the environment; and ○ Preventing excessive corrosion by cleaning oil-filled equipment and applying corrosion inhibiting coatings.
Safety	• Contributes to Toronto Hydro's public and employee safety objectives by: ○ Promptly repairing high-risk assets approaching imminent failure. ○ Washing insulators located in high contamination areas and preventing flashovers and pole fires; and ○ Detecting and eliminating energized contact voltage (4.5 volts or greater), surfaces and structures within Toronto Hydro's distribution system.

3. PROGRAM DESCRIPTION

By correcting or repairing deficiencies or substandard conditions on the distribution system, Toronto Hydro's primary objective for this Program is to contribute to maintaining the safety of Toronto Hydro's work crew and general public, environmental integrity, and overall system reliability.

Deficiencies or substandard conditions across Toronto Hydro's distribution system are identified through the normal course of operations, the Preventative and Predictive Maintenance programs, or the Emergency Response program, as shown in Figure 1 below. Identified deficiencies or substandard conditions are subsequently addressed through a variety of programs; some are addressed immediately when found as part of the Preventative and Predictive Maintenance programs, some through the Reactive and Corrective Capital program,[3] and others through the Corrective Maintenance program.

Corrective Maintenance activities are non-discretionary, typically cover short planning horizons (given the risks that deficiencies and substandard conditions can pose if left unaddressed), and involve restoring assets to their normal operating conditions through maintenance, refurbishment or component replacements.

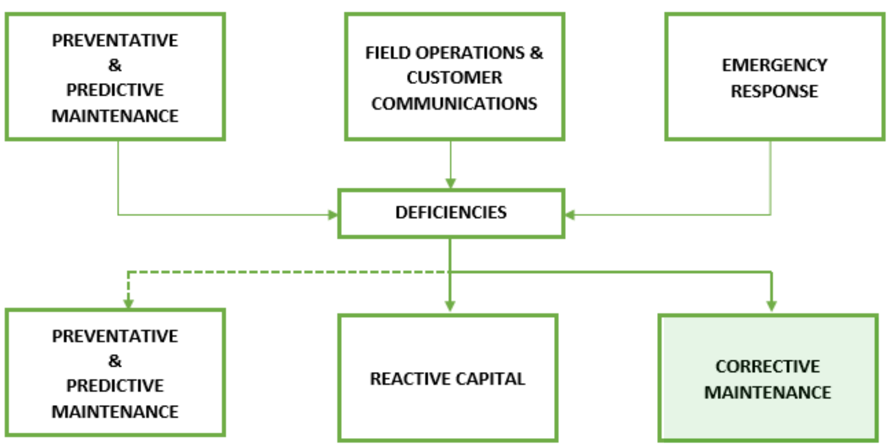


Figure 1: Deficiency Capturing Process[4]

[3] Exhibit 2B, Section E6.7
[4] The deficiency capturing process is described in detail in Exhibit 2B, Section D3.

- **Preventative & Predictive Maintenance Activities:** Field crews identify asset failures and deficiencies as part of scheduled maintenance inspection activities.
- **Field Operations & Customer Communications:** Corrective work can also be triggered by sources outside scheduled/planned maintenance activities. These include, but are not limited to: (i) phone calls from customers; (ii) external emails; (iii) observations by field crews during the normal course of operations; and (iv) customer inquiries requiring field assessment and follow up.
- **Emergency Response:** Corrective work can also be required as a result of emergencies or unplanned system events. For example, a faulted section of underground cable that has been isolated from the system during an emergency response may be unearthed and replaced as a corrective maintenance action.

All deficiencies from the above sources are reviewed to validate the need for reactive intervention, assess the nature of reactive intervention required (capital versus maintenance), and the level of urgency or priority to be assigned to each item. Toronto Hydro addresses the deficiencies identified through the above sources by issuing work requests.[5] The scope of the corrective maintenance work includes all overhead and underground assets and municipal and transformer stations. It also includes temporary repairs to assets during an emergency event, but excludes emergency repair work managed under the Emergency Response program. More specifically, the Corrective Maintenance program consists of the following activities:

- **Distribution Overhead Maintenance:** Corrective restoration of 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. Overhead maintenance

[5] Work requests are forms issued to assign and schedule corrective work to be performed by Toronto Hydro crew.

work includes vegetation management in response to off-cycle requests and spot trimming needs identified by Toronto Hydro crews or direct customer feedback, including dying or damaged tree limbs and branches, storm damage, or excessive tree growth that threatens overhead distribution lines or poses system reliability risks. Overhead work also includes the spot maintenance of worst performing feeders, which targets feeders that are at risk of experiencing seven or more power outages in a single year and may consist of tree trimming, switch maintenance, line patrols, and insulator washing depending on the needs of particular feeders.

- **Distribution Underground Maintenance:** Restoration of equipment that is part of the underground and network distribution system, including cables, cable splices, vaults, ducts, vents, hatchways, sump pumps, transformers, and switches. Activities may include patching spalling surfaces, leveling surfaces to eliminate tripping hazards, and replacing oil drain plugs, door locks, and hinges. This work also includes equipment CO_2 washing, which cleans excessive dirt, debris, and contamination from energized equipment in below-grade and padmounted installations to prevent arcing and flashover risks. This work also targets oil testing that is required to enable Toronto Hydro to comply with PCB regulations.
- **Stations Maintenance:** Corrective repairs to station equipment such as transformers, tap changers, cooling systems, switchgear, bus-bars, air compressors, circuit breakers, station auxiliary and DC power supplies, current transformers, potential transformers, relays, meters, fire alarms, remote terminal units, and SCADA systems. This work also includes oil reclamation, which involves filtering of transformer oil that has been found to contain

excessive moisture or contaminants and the restoration of the oil's properties to near new condition.

These activities are critical to maintaining distribution lines and stations assets, as assets are exposed to normal degradation processes (e.g. corrosion, water ingress, heavy loading) and external forces (e.g. adverse weather, tree contacts, foreign interference) that cause deficiencies and accelerate asset deterioration. Exhibit 4A, Tab 2, Schedules 1-3 (Preventative and Predictive Maintenance programs) set out the number of deficiencies that Toronto Hydro identifies annually for a variety of assets.
Figure 2 below shows a breakdown of the number and types of corrective work requests generated between 2015 and 2017.

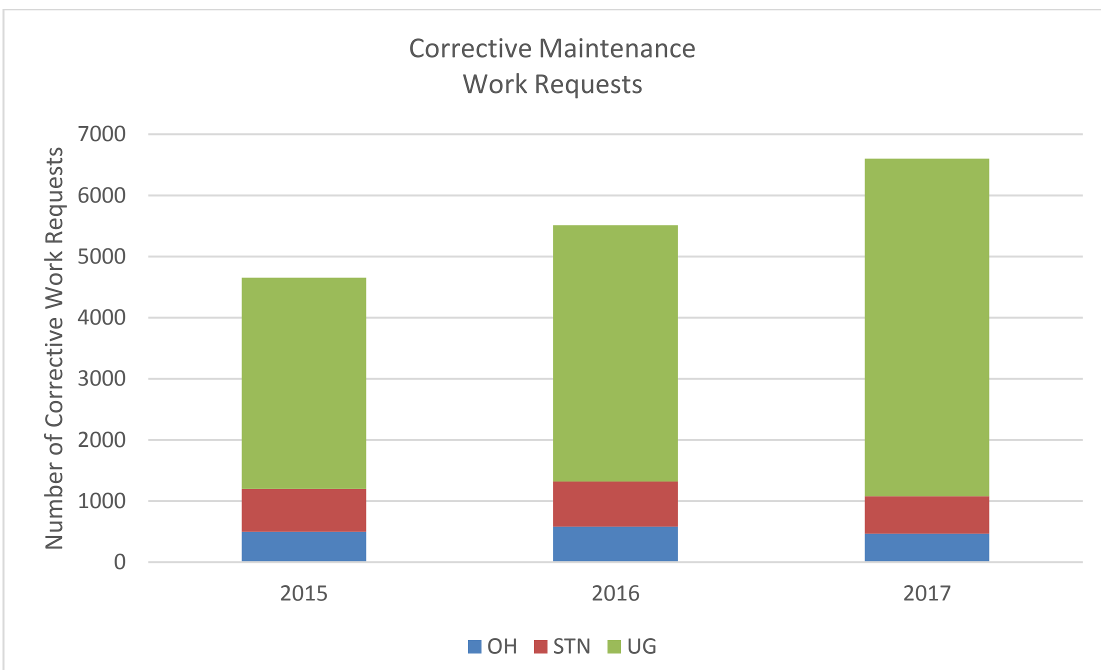


Figure 2: Historical Corrective Work Requests

There has been a rise in the volume of corrective work requests executed under the Corrective Maintenance program mainly due to the proportion of assets exhibiting deteriorating conditions and exceeding their expected lives, thereby elevating the risk of failure across the distribution system.

Beginning in 2015, Toronto Hydro updated its inspection forms for all asset types in order to capture greater details about substandard conditions found during inspections. As a result of this update, Toronto Hydro improved its process for capturing deficiencies and determining the appropriate corrective action. Consequently, the number of deficiencies reported from Preventative and Predictive maintenance activities increased starting in 2015, which contributed to the increase in the volume of corrective work requests.

On average, approximately 5,600 corrective work requests were issued each year between 2015 and 2017, with the majority targeting underground system assets such as vaults, cable chambers, padmounted equipment, and cables. In general, corrective maintenance needs tend to vary both in the volume and type of work required from year to year.

From a safety perspective, corrective maintenance addresses deficiencies that, if ignored, could endanger members of the public and Toronto Hydro employees. For example, a deficiency that is routinely found during overhead line patrols, using infrared thermography, is a thermal anomaly (or “hot spot”) on a conductor splice. Hot spots are evidence of over-heating within the splice and, if not addressed in a timely manner, could result in a live conductor failing, falling to the ground, and energizing the surrounding area. Such a condition presents an unacceptable risk that must be mitigated through corrective maintenance in a timely manner.

The “hot spot” issue on a conductor splice also gives rise to system reliability risks. Splice failure, depending on the specific location of the conductor, may result in a power interruption to hundreds of customers for an hour or more. Other deficiencies that pose similar system reliability risks include deteriorated components such as insulators, mounting brackets and cross-arms, broken ground wire or guy wires, overgrown vegetation and dying branches, faulted circuit indicators with depleted batteries, failed surge arresters, conductor clearance issues (e.g. excessive conductor sag), transformer oil with high moisture or acid levels, and excessively dirty installations (e.g. vaults, padmounted transformers and switches). In aggregate, these individual deficiencies pose significant reliability risks.

From an environmental standpoint, corrective maintenance mitigates the risk of oil leaks and premature equipment failures. For example, cables leaking oil must be repaired promptly to prevent oil from entering the soil, drains, and waterways. Oil-filled equipment that is at risk of corroding should be maintained in a clean state, free of contaminants that can act as catalysts for corrosion. As part of the Corrective Maintenance program, Toronto Hydro crews clean dirty vaults and padmounted installations and apply corrosion inhibiting coatings to equipment to prevent excessive corrosion and the possibility of subsequent oil leaks. Corrective maintenance activities directed at corrosion prevention also serves to mitigate financial risks.

Maintenance work can extend the life of assets and defer the need for capital equipment replacement expenditures. An example 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 may cost hundreds of thousands of dollars. Water ingress can also accelerate corrosion of equipment, leading to premature failure and associated costs.

4. PROGRAM COSTS

Toronto Hydro requires approximately $17.2 million each year during the 2020 to 2024 period to execute the functions in the Corrective Maintenance program, as described above. Without this level of funding, Toronto Hydro could be exposed to a number of risks:

- Reduced ability to address deficiencies that pose safety risks to the public and Toronto Hydro employees such as hot spots on conductor splices that could lead to failure of a live conductor and energization of a surrounding area if the conductor falls to the ground.
- Reduced ability to address deficiencies that pose risks to system reliability such as deteriorated or failed components, overgrown or dying vegetation, and excessively contaminated transformer oil or installations.
- Reduced ability to address failed or corroded equipment that could negatively impact the environment through oil leaks.
- Increased need for capital expenditures to replace equipment that otherwise could have been deferred through maintenance such as caulking of civil infrastructure.

Table 3 provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for this Program.

Table 3: Corrective Maintenance Program Expenditures ($ Millions)

Program	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Corrective Maintenance	16.1	16.8	20.3	17.0	17.0	17.2

4.1 Cost Drivers

The Test Year (2020) costs associated with this segment are projected to be $17.2 million which represents an increase of $1.1 million from 2015, a decrease of $3.1 million from the most recent historical actual year (2017), and an increase of $0.2 million from the bridge year (2019).

As discussed above, corrective maintenance needs tend to vary both in the volume and type of work required from year to year. Toronto Hydro continues to process increasing volumes of corrective work requests to address identified deficiencies. Overall, the observed variances are primarily attributable to:

- The type of work addressed each year. For example, on average, corrective work on underground assets tends to cost less than work performed on overhead and station assets.
- Increased corrective work volume in 2017 due to the completion of corrective work to address a backlog of issues across the system, and in particular for station assets. This included work on transformers/tap changers, circuit breakers, switches, primary fuses, switchgears, relays, SCADA/RTUs, tripping hazards, concrete patching, and poles and high voltage electrical work.

Toronto Hydro's 2020 forecast program expenditure of $17.2 million is based on historical spending levels and work request volumes, after accounting for the higher 2017 costs to address a backlog of work.

4.2 Cost Control and Productivity Measures

Corrective maintenance expenditures are driven largely by work request volumes and the types of repairs required. With work request volumes rising and the budget remaining relatively stable, Toronto Hydro is getting more work done for fewer dollars. Toronto Hydro has taken steps to manage costs and improve work processes in this Program.

- In 2016, Toronto Hydro introduced new inspection forms to capture more objectively quantifiable and measureable facts from field inspections. The revised inspection forms presented engineers with greater visibility into asset health and allowed for more effective condition assessment and risk mitigation.
- Toronto Hydro also continues to emphasize "find it and fix it" practices in the Preventative and Predictive Maintenance programs, which promote the on-site repair of minor deficiencies as they are identified. Examples of minor deficiencies and associated corrective actions include lubricating components, replacing nomenclature, replacing faulted circuit indicators, replacing sump pumps, clearing drains, caulking ducts and roof slabs, installing missing guy guards, and repairing or replacing locks, hinges, and handles. Addressing these deficiencies while on site during Preventative and Predictive Maintenance reduces the likelihood of having to dispatch another crew in the near future.
- The work request process has been improved in several ways in recent years. In particular, the time required for processing deficiencies into work request for execution has decreased. Updated records have helped to clarify asset

ownership and to more appropriately allocate spending (i.e. Toronto Hydro issues Customer Action Forms to non-Toronto Hydro owned assets).

- Lastly, through the "find it fix it" approach, Toronto Hydro strives to have cable chamber nomenclature deficiencies corrected on the spot as the contractor performing cable chamber infrared inspection identifies the need for such corrections. This eliminates the need to create a separate work request and additional travel time for repair, resulting in savings of approximately $400,000 per year. Furthermore, deficiency and work request reviews are now done digitally. This leads to a savings of approximately $50,000 per year.

4.3 Corrective Maintenance Program Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

The costs from 2015 to 2016 increased by $0.7 million due to an increase in the volume of corrective maintenance work requests.

2016 – 2017 Variance Explanation

The costs from 2016 to 2017 increased by $3.5 million as work volume increased to address backlog of issues across distribution system, especially for station assets.

2017 – 2018 Variance Explanation

The costs from 2017 to 2018 are forecast to decrease by $3.3 million as the backlog of work in 2017 has been addressed and work volumes are expected to return to steady increase consistent with 2015 and 2016 expenditures.

2018 – 2019 Variance Explanation

There is no material variance in this period.

2019 – 2020 Variance Explanation

The costs from 2019 to 2020 are forecast to increase slightly due to a higher budget for vegetation management, which is necessary to mitigate interruptions caused by worst performing feeders.

EMERGENCY RESPONSE

1. OVERVIEW

Table 1: Emergency Response Program Summary

2015-2017 Average Cost ($M): 15.9	**2020 Cost ($M):** 16.6
Segments: Emergency Response	
Outcomes: Customer Service, Public Policy, Reliability, Safety	

The Emergency Response program (the "Program") entails the provision of emergency response and restoration services related to unplanned and urgent events. The Program ensures that Toronto Hydro is compliant with applicable Distribution System Code ("DSC") requirements regarding emergency response to both types of events, and that customer service and system reliability are maintained.

The Program consists of three major functions: (i) dispatch logistics; (ii) grid response; and (iii) storm and major event restoration.

2. OUTCOMES AND MEASURES

Table 2: Emergency Response Program Outcomes and Measures Summary

Customer Service	• Contributes to Toronto Hydro's customer service objectives by: o Improving communications in relation to urgent events and emergency response, including urgent planned events which customers have identified as a priority for them; o Maintaining outage restoration time; and o Improving communication during urgent events, including urgent planned events which customers have communicated to Toronto Hydro as a priority for them.

Public Policy	• Contributes to Toronto Hydro's public policy objectives by responding to police, fire and ambulance calls, where necessary, with qualified staff within 60 minutes, 80 percent of the time as prescribed by section 7.9 of the DSC.
Reliability	• Contribute to Toronto Hydro's system reliability objectives (e.g. SAIFI, SAIDI, FESI-7) by reducing restoration times.
Safety	• Contributes to Toronto Hydro's public and employee safety objectives and performance (as measured via metrics like Total Recordable Injury Frequency) by: o Ensuring timely response to failing assets and cascading asset failures, to mitigate the risk of injury to the City of Toronto's emergency first responders, the general public and Toronto Hydro crews; and o Remaining compliant with Electrical Distribution Safety Regulation O. Reg. 22/04 (particularly, section 4 – safety standards) by ensuring that Toronto Hydro facilities present no undue hazard to the public).

3. PROGRAM DESCRIPTION

The primary purpose of the Emergency Response program is to provide emergency response and restoration services related to unplanned and urgent events. The program also ensures that Toronto Hydro remains compliant with sections 4.5 (Unplanned Outages and Emergency Conditions) and 7.9 (Emergency Response) of the DSC while responding to and restoring services during and following these events.

The program includes three main functions:

- **Dispatch Logistics**: This function involves communications intake (e.g. telephone calls, email, and social media) from external stakeholders (e.g. customers, governmental authorities), information collection about incidents and events on the distribution system, and field resource assignment and dispatch for the purposes of investigating and resolving abnormal conditions.

- **Grid Response**: This function includes the senior trades staff and contract crews that are dispatched in response to emergency situations, including compromised or failing distribution assets, primary and secondary service interruptions, half-power calls, and other customer service related deficiencies.
- **Storm and Major Event Restoration**: This function involves efforts to restore power after major events, extended loss of transmission supply, and damage arising from severe weather related events.

The Program engages: (i) internal and contract crews on shift for immediate response and making temporary repairs, (ii) internal reactive crews and standby crews for emergency reconstruction, and (iii) dispatchers to communicate and collect information and to coordinate emergency responses.

Toronto Hydro operates within a dynamic and dense urban environment where emergency response may be required for a variety of reasons, including: (i) response to Toronto emergency management services ("EMS") (i.e. police, fire, and ambulance); (ii) equipment failure; (iii) events related to severe weather; (iv) motor vehicle accidents (as shown in Figure 1); (v) power quality issues; and (vi) equipment isolations.

Figure 1: Toronto Hydro Crews Responding to a Motor Vehicle Accident with a Distribution Pole

Over the 2015-2017 period, Toronto Hydro received approximately 24,000 calls per year related to events that required crew dispatch, representing over half of the calls received by Dispatchers.

Toronto Hydro classifies these events into the following four main categories:

- Emergency calls, including calls made by Toronto EMS (i.e. police, fire, and ambulance);
- "Power Off" calls attributed to power interruptions on primary facilities (i.e. on the primary side of the distribution transformer);
- "Power Off" calls attributed to interruptions on secondary facilities (i.e. the distribution transformer or equipment on the secondary side of transformer), and "Power On" events where power has not been interrupted but an issue has been identified on primary facilities; and

- Other situations such as sagging wires, objects on wires, feeder patrol findings,[1] and planned outages.

Figure 2 below shows the number of events by category during the 2015 to 2017 period.

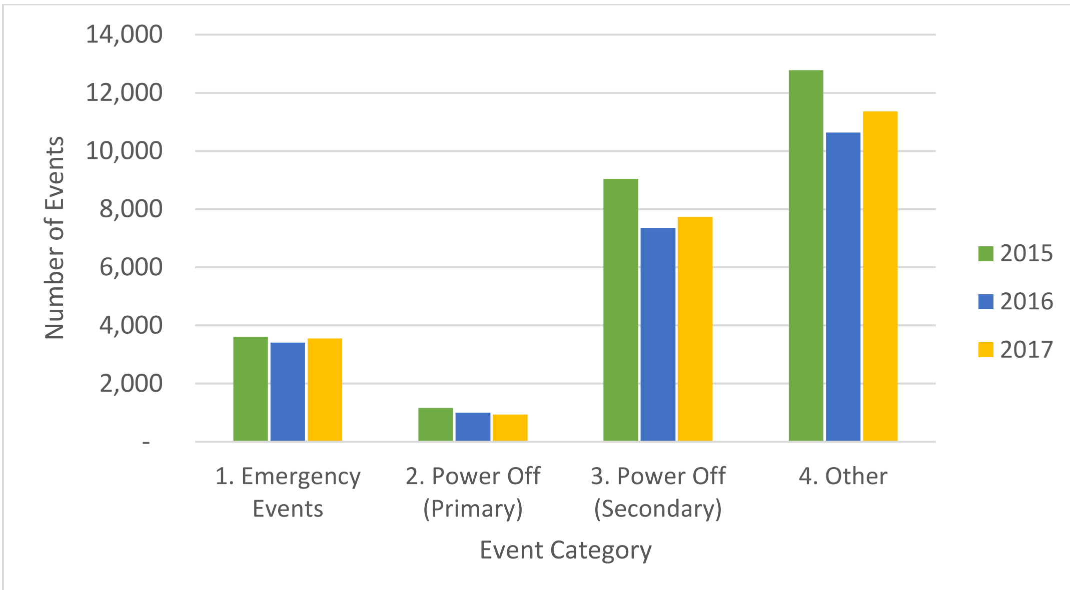


Figure 2: Number of Emergency Response Events (2015-2017)

Categories 1 and 2 (i.e. emergency and primary "power off" events) are the highest priority events for dispatchers.

Category 1 emergency calls (reported by Toronto EMS or members of the public) may involve significant public health and safety risks. Pursuant to the DSC (section 7.9), Toronto Hydro crew must arrive at the location of the event within one hour of being notified of the event, 80 percent of the time. Of the nearly 4,000 Category 1 emergency events annually, over 1,200 of those calls were from EMS and members of the public.

[1] Results of visual inspections of feeder assets

Category 2 primary "power off" events involve power disruptions to sizeable loads and large numbers of customers, typically requiring coordinated switching, load transfers, and often direct engagement with building superintendents and operations staff on location.

Category 3 and 4 events represent the largest number of calls and typically involve power interruptions to a small number of customers or lower risk situations. These events, which occur daily as part of the utility's routine operations, require timely response by crews that are properly equipped and trained to address potentially high risk situations. Due to the frequency of these events, Toronto Hydro assigns dedicated staff to the Grid Response function, which typically involves:

- An emergency crew restoring power to all customers and making all necessary permanent repairs (e.g. when current-limiting fuses have ruptured, primary or secondary conductors are down, or insulators or arrestors have failed);
- An emergency crew restoring power to all customers but only making temporary repairs or isolating the deficiency (necessitating follow-up repairs, usually commencing the next day); or
- An emergency crew arriving on site and, after assessing the situation and making the area safe for the public and employees, determining that the scope of the repair is beyond that crew's capabilities and that construction or civil crews are required to fully address the situation.

In addition to the events shown in Figure 2, Grid Response also attends to power interruptions on major or significant event days,[2] including significant storm damage. Severe weather systems and large scale events (e.g. loss of upstream supply from Hydro

[2] Major event days are considered are defined in accordance with the IEEE 1366 Standard.

One Networks Inc.) can necessitate significant crew efforts 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 2015-2017 period, Toronto Hydro experienced two major events. First, freezing rain on March 3, 2015 resulted in 38 fires on distribution poles. Second, a severe wind storm on October 15, 2017 (see Figure 3 below) knocked down trees and powerlines, affecting approximately 25,000 customers.

Figure 3: Fallen Tree on Power Lines from November 15, 2017 Wind Storm

Regardless of whether storm events are minor or major in nature, the damage that they inflict on the distribution system can require significant crew effort and resources to repair. Figure 4 and Figure 5 illustrate examples of damage that had to be repaired following past storm events.

Figure 4: Fallen Tree on Oower Lines from High Wind Event on October 15th, 2017

Figure 5: Pole Fire on December 22nd, 2017

When major events and storm damage occur, Toronto Hydro directs requisite resources to repair the damage and restore power. For very large events such as the 2013 ice storm, which caused tremendous, widespread damage, all available resources are utilized and funded through the Emergency Response program, including internal resources (e.g. crews on planned projects) and external resources (e.g. contractors, mutual aid crews from other utilities).

Recently, the City of Toronto was experienced a severe wind storm that resulted in power outages across Toronto Hydro's service territory. Toronto Hydro's Grid Emergency Management team received a special weather statement from Environment Canada calling for strong winds throughout the day, including wind gusts between 90 and 100 Kilometres per hour in the Greater Toronto Area. The forecast conditions materialized, with the most severe conditions manifesting (during peak commuting hours in the city. During this time, winds ranged between 65-87km/hour, with gusts reaching up to 119 Kilometres per hour. As a result of these conditions, and at the event's peak, there were over 1,400 outage events that caused more than 68,000 customers to lose power across the city. In response, Toronto Hydro declared a Level 3 Emergency and activated its full emergency management organization (i.e. secondary or "storm" roles) to respond. Examples of the damages sustained from this incident can be seen in Figure 6 below.

Figure 6: Examples of Wind Damage Recent 2018 Storm

In the aftermath of the wind storm, restoration took place over a five day period. In day 1 of restoration, 90 percent of affected customers were restored; day 2 saw 96 percent of customers restored; day 3 saw 99 percent of customers restored; and, by day 4, 100 percent of customers were restored.[3] Certain challenges persisted into day 5 in terms of enabling customers to obtain repairs on their equipment so as to allow re-connection. Nevertheless, by the end of day 5, all customers impacted by the storm were reconnected and Toronto Hydro was able to focus its recovery efforts on general post-storm clean up.

Throughout the incident, Toronto Hydro had approximately 210 staff and contractors working during a given shift to restore impacted customers, with about 21 dedicated

[3] Referring to those customers whose customer-owned equipment was not damaged and could be reconnected safely to the Toronto Hydro distribution system.

emergency management team members during a given shift to coordinate response activities. All responders and emergency management personnel worked around the clock to ensure efficient and effective restoration. Despite working in hazardous and challenging conditions, all workers returned home safely with no major health or safety incidents reported.

Toronto Hydro's approach to this and other incidents is largely driven by the need to ensure that critical infrastructure and services (such as transit, hospitals and water pumping stations) remain functional, and to restore power to customers as quickly as possible. This approach is also reinforced by the 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) associated with storm damage and major events.

Grid Response teams also address deficiencies in equipment or components that are identified in the course of planned activities and that require immediate attention. For example, a subset of deficiencies found from Toronto Hydro's Preventative and Predictive Maintenance programs[4] are directed to Grid Response for immediate action on an emergency basis to address any unacceptable safety, environmental, or system reliability risks.

Given the nature of the events that Grid Response attends to, the vast majority of its work is non-discretionary. Restoration efforts after power interruptions, for example, are expected to be expedient to minimize customer outage time and maintain system reliability. Timely responses to EMS calls mandated by the DSC, which requires

[4] See Exhibit 4A, Tab 2, Schedules 1, 2, and 3.

emergency calls to be responded to within 60 minutes at least 80 percent of the time. Responses to serious equipment deficiencies are necessary to mitigate potential public safety, environmental, and system reliability risks. Such deficiencies include, for example, damaged poles (illustrated in Figures 7 and 8) that are likely to collapse and harm members of the public, and oil leak from a transformer (illustrated in Figure 9) which can contaminate residential and environmentally sensitive areas.

Figure 7: Distribution Poles Damaged by Vehicle Impacts

Figure 8: Distribution Poles Damaged by Vehicle Impacts

Figure 9: Distribution Transformer Leaking Oil After Vehicle Impact with Pole

4. PROGRAM COSTS

Toronto Hydro requires approximately $16.6 million each year during the 2020 to 2024 period to execute the functions in the Emergency Response program. Without this level of funding, Toronto Hydro will be exposed to a number of risks, including:

- Potential non-compliance with the DSC (Service Quality Requirements for emergency response),
- Delayed response to safety and environmental risks, thus increasing customer and crew exposure to unsafe conditions, plus increased potential for fines by federal, provincial and municipal regulatory agencies of failure to report and or mitigate spills in a timely manner,
- Extended customer outage durations,

- More frequent and longer duration resulting from second contingencies, placing added stress on assets and increasing the likelihood of more prolonged outages, and
- Delayed response to urgent customer and agency concerns.

Table 3 below provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for the Emergency Response program.

Table 3: Emergency Response Program Expenditures ($ Millions)

Program	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Emergency Response	16.4	15.2	15.9	16.4	16.5	16.6

4.1 Cost Drivers

The 2020 test year cost forecast represents an increase of $0.2 million from the utility's last rebasing year (2015), $0.7 million from the most recent historical actual year (2017), and $0.1 million from the bridge year (2019).

Due to the nature of events addressed by this program, costs can vary significantly from year to year. Major storms and the frequency of smaller storms are the drivers of the largest variances from year to year.

4.2 Cost Control and Productivity Measures

4.2.1 Cost Management

The frequency and severity of emergency and storm events are beyond Toronto Hydro's control. However, the impact of those events can be mitigated through effective planning and response. Continuous improvement in engineering and the work of the standards committees, as well as preventative and predictive maintenance programs (including vegetation management and storm hardening) all contribute to the resilience of the distribution system. A more resilient system would incur lower emergency response costs. In addition, distribution asset renewal plays a significant role in maintaining, and in some cases, improving overall asset performance, and reducing reactive and emergency costs.

Toronto Hydro's complement of dispatch and emergency response staff is determined by the utility's obligation to meet emergency response requirements on a 24/7/365 basis, and to manage the key categories of work identified in Figure 2. Complement and shift arrangements are monitored and optimized to ensure requisite resources continue to support the level of response and volume of work.

4.2.2 Productivity

Call volumes vary over the course of each day, from week to week and month to month for weather-related and other reasons. When call volume is relatively low, this creates opportunities for the completion of additional work. In this regard, maintenance and small capital jobs (which can be dropped for higher priority calls) are assigned to crews to maximize labour utilization.

Increasing the time crews are available for work, by reducing downtime and assigning additional work during periods of lower call volumes, directly improves productivity. During the 2015 to 2017 period, dispatchers attended to, on average, over 41,500 telephone calls annually. For each call, dispatchers must interpret the nature of the event that has occurred, prioritize the event (if there are multiple overlapping events), and then dispatch the appropriate resources to the event. To accomplish this, dispatchers gather the required information and interact with various systems including

Toronto Hydro's Outage Management System ("OMS"), the Distribution Management System ("DMS"), the Geospatial Information System ("GIS"), and the Customer Information System ("CIS ").

Although the processing and proper dispatching of calls is a time consuming function, call volumes vary over time, presenting opportunities to assign additional duties to dispatchers Such duties may include entering information regarding planned work in the OMS, such as scheduling customer isolations, and inspections and maintenance tasks that can be issued to crews during times of low priority call volume.

Additionally, Toronto Hydro continues to assess and optimize the number of crews on shift throughout each day of the week, so as to maximize resources by, for example, staggering crew start and stop times and prioritizing events to increase the number of events responded to per crew shift. These productivity efficiencies have resulted in year over year improvements for response times during the 2015-2017 period, from 81 percent in 2015 to 89 percent in 2017.

4.3 Emergency Response Program Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

Relative to 2015, storm days were considerably reduced in 2016. The freezing rain event on March 3, 2015 resulted in approximately $2.1 million in response costs. There were no events of this magnitude in 2016.

2016 – 2017 Variance Explanation

Despite no major storm events during this period, 11 storm events resulted in an increase of $0.7 million in response costs in 2017 relative to 2016. The 2017 costs were in line with the 2015-2019 average cost of $16.1 million.

2017 – 2018 Variance Explanation

Costs in 2018 are expected to increase by $0.5 million, driven by slight increases for Storm and Major Event Damage, Emergency Field Response, and for Dispatch. It is also driven by inflation and costs expecting to be in line with a 5 year average cost of $16.1 million

2018 – 2019 Variance Explanation

Costs in 2019 are expected to increase by $0.1 million as a result of inflation.

2019 – 2020 Variance Explanation

Costs in 2020 are expected to increase by $0.1 million as a result of inflation.

DISASTER PREPAREDNESS MANAGEMENT

1. OVERVIEW

Table 1: Disaster Preparedness Management Program Summary

2015-2017 Average Cost ($M): 2.3	**2020 Cost ($M):** 2.7
Segments: Disaster Preparedness Management Program	
Outcomes: Customer Service, Reliability, and Safety	

The Disaster Preparedness Management program (the "Program") is responsible for the implementation of Toronto Hydro's robust and comprehensive disaster preparedness framework. The Program is comprised of activities to prepare for, respond to, and recover from disasters or large-scale emergencies (e.g. severe storms, major system/facility disruptions) at both a system and corporate level. It delivers the governance, planning, and training that enable Toronto Hydro to mobilize, and deploy its resources rapidly and effectively during and following disasters in order to mitigate the public safety, reliability, and financial-related risks that can materialize at those critical times.

Toronto is home to approximately 2.9 million residents and 106,000 businesses.[1] It is Canada's largest city and includes the Country's largest financial institutions, leading medical and research facilities, educational institutions, major transportation hubs, and federal, provincial, and municipal government offices. In addition, the City is a frequent host to events of regional, national, and international significance. Extended power disruptions can have significant impacts on these important organizations and events, causing far-reaching social and economic consequences. Accordingly, it is essential that

[1] City of Toronto, Toronto at a Glance, available at <https://www.toronto.ca/city-government/data-research-maps/toronto-at-a-glance/>.

Toronto Hydro respond quickly and effectively to minimize disaster-related power disruptions. The urgency of this need is further heightened given the growing likelihood and intensity of extreme weather events and deliberate threats (e.g. cyber-attacks).

Figure 1: Damage Caused by Toronto Ice Storm in April 2018

This Program is a continuation of the activities described in the Disaster Preparedness Management program from Toronto Hydro's 2015-2019 Rate Application.[2] The Program is necessary to ensure the continued implementation of a comprehensive and industry-leading disaster readiness program that satisfies customer expectations, maintains adequate service levels, and ensures public and employee safety during and following disasters.

[2] EB-2014-0116, Toronto Hydro-Electric System Limited Application (filed July 31, 2014, corrected February 6, 2015), Exhibit 4A, Tab 2, Schedule 4.

2. OUTCOMES AND MEASURES

Table 2: Disaster Preparedness Management Program Outcomes and Measures

Summary

Reliability	• Contributes to Toronto Hydro's system reliability objectives (e.g. SAIDI, SAIFI, FESI-7) by:
	  ○ Responding more efficiently (including through more effective utilization of available resources) to major disruptions;
	  ○ Reducing response times by conducting regular assessments to understand the utility's exposure to hazards and align preparatory activities based on expected event outcomes;
	  ○ Maximizing and expanding potential resources for disaster response and restoration by establishing mutual assistance relationships with external partners; and
	  ○ Using digital and physical damage assessment capabilities to enable more effective and informed prioritization of restoration efforts, in alignment with industry best practices.
	• Ensure compliance with Section 39 of the *Electricity Act, 1998* and Chapter 5, Section 11 of the IESO Market Rules that aim to alleviate the effects of an emergency on the electricity system by preparing and implementing emergency plans.

Safety	• Responding to disasters in a timely manner and lessening the public health and safety risks. • Increasing the number of staff available to maintain a perimeter for safety or risk hazards following a disaster event. • Providing clear role assignment and training with respect to disaster and emergency incident response.

Customer Service	• Contributes to Toronto Hydro's customer service objectives by:
	  ○ Coordinating more effectively with impacted customers, particularly those identified as key customers;
	  ○ Restoring customers more efficiently and effectively, using all available internal and external resources (e.g. through the utilization of mutual aid assistance); and
	  ○ Establishing and communicating accurate key outage restoration times for disaster incidents;

3. PROGRAM DESCRIPTION

The Program aims to increase the reliability of grid operations by implementing mechanisms to more effectively and efficiently restore operations in response to disaster events. This is consistent with both identified Toronto Hydro customer priorities and statutory and regulatory requirements regarding market participants' obligations to prepare and plan for disasters.[3]

Figure 2: Damage Caused by Toronto Wind Storm in April 2018

Toronto Hydro customers also expect the utility to deliver services safely and provide accurate and timely communications of restoration times during outages. However, providing electricity distribution services to a city of Toronto's size and complexity presents a host of operational challenges even under normal operating conditions. These challenges are drastically amplified during events such as severe storms and critical system disruptions. Table 3, below, outlines several recent examples of weather-related disaster incidents that exceeded the utility's standard response practices and

[3] Independent Electricity System Operator Market Rules for the Ontario Electricity Market, Chapter 5, Section 11.

triggered the deployment of additional planning and response resources under the Program.

Table 3: Examples of Recent Severe Weather Events in the City of Toronto

Event	Description
Freezing Rain (February 2017)	• Approximately 2-6 mm of freezing rain followed by additional heavy rain. • Estimated 9,200 customers out at peak; all customers restored within 24 hours of the start of the freezing rain event.
High-water/flooding (May - June 2017)	• Heavy rainfall in southern Ontario exceeded the yearly average for an entire summer. • Numerous incidents of high-water/flooding reported across Toronto. • No customers were directly impacted during this 55-day incident due to the utility's proactive damage assessment and DPM mitigation measures, including flood mitigation efforts.
Wind Storm (October 2017)	• Strong wind gusts approaching 100 km/h in some areas and lasting approximately 3 hours. • Estimated 43,000 customers out at peak. • 90 percent of customers restored within 11 hours of event; all customers restored within 48 hours of the end of the event.
Wind storm (April 2018)	• Sustained 65km/h winds, with gusts approaching 90km/h. • Estimated 24,000 customers out at peak; all customers restored within 48 hours of the end of the event.
Ice Storm (April 2018)	• Approximately 10-20 mm of freezing rain, 20-25 mm rain, sustained winds of 70 km/h with gusts up to 110 km/h. • Estimated 51,000 customers out at peak. • 99 percent of customers restored within first two days of response; all impacted customers restored within 5 days of the start of the event.
Wind Storm (May 2018)	• High winds reported throughout service territory with gusts reaching approximately 120 km/h. • Estimated 68,000 customers out at peak. • 96 percent of customers restored within 48 hours of the start of the event.
Flash Storm (June 2018)	• High winds reported throughout service territory with gusts reaching approximately 90-100/h. • Estimated 16,500 customers out at peak. • 86 percent of customers restored within the first 12 hours and 97 percent of customers restored within the first 24 hours of the event.

In light of the increasing frequency and severity of natural disasters (i.e. due to climate change) and deliberate hazards (including cyber-attacks and transnational threats to critical infrastructure), incidents can rapidly escalate in scope, cross jurisdictional lines, and result in significant losses. In this regard, the risk exposure of Canadian utilities– particularly those in its largest city – is a complex and urgent issue that could materialize in far-reaching social and economic consequences at the local, regional and national levels. In this context, it is imperative for Toronto Hydro to implement a comprehensive disaster preparedness framework that underpins its multi-faceted approach to planning, response, operations and recovery.

Overall, the Program enhances the utility's capacity for effective planning, communications, and response activity coordination in anticipation of, during, and following disasters that result in significant and widespread supply interruptions and/or threats to public safety. Program planning is calibrated to reflect Toronto Hydro's current risk profile and relevant standards and best practices.[4]

3.1 Disaster Preparedness Management Program Functions

The Program functions include hazard/risk profiling and planning and disaster preparedness framework implementation, evaluation, maintenance and improvement. Each function is summarized below. Hazard or risk profiling and disaster planning is the primary and largest function of the Program. This component encompasses business impact analysis, production of disaster/emergency management plans and procedures (including distribution system disaster preparedness planning), and external partnerships management.

[4] The Program aligns with the Canadian Standards Association's Z1600 Emergency and Continuity Management Program (CSAZ1600) standard. CSAZ1600 outlines requirements for emergency and continuity management programs that address disaster prevention, mitigation, preparedness, response, and recovery.

3.1.1 Hazard Identification Risk Assessment ("HIRA")

HIRA entails the identification of specific hazards and risks to Toronto Hydro's operations. Through HIRA, the utility determines how frequently such hazards can materialize, the severity of the potential impact, and which hazards pose the greatest threat to distribution system operations. HIRA findings enable the utility to prepare for worst-case scenarios and most likely risks, and efficiently allocate resources to hazards that may occur within its service territory.

In 2016-2017, the utility established a sustainable enterprise-wide HIRA framework consistent with industry best practices. Going forward, Toronto Hydro expects to fully operationalize the HIRA framework with a view to increasing its understanding of its up-to-date hazard exposure profile and to develop hazard risk models by correlating anticipated external events (e.g. weather forecast) to power system impacts in order to enhance operational decision-making in anticipation of an incident.

3.1.2 Business Impact Analysis ("BIA")

Through BIA, the utility predicts the consequences of an incident/disruption on key business functions and gathers information needed to develop disaster recovery strategies. BIA results show how hazards will impact the reliable distribution of electricity. In other words, which key services, facilities, and equipment are likely be impacted.

In 2016, Toronto Hydro retained an external consultant to conduct a BIA of the utility's Control Centre & Dispatch Operations. This BIA pilot project enabled documentation of key operational processes, recovery strategies, and down-time thresholds beyond which grid operations and oversight (including compliance with applicable regulatory requirements) would be compromised. Toronto Hydro plans to conduct BIAs for all departments that carry out business critical functions, implementing a standardized approach to business continuity planning across the entire utility.

3.1.3 Response Planning

Toronto Hydro adopts an all-hazards approach to disaster preparedness, which involves the identification and integration of common disaster response elements across all hazard types (e.g. severe storms, cyber-attacks, large-scale system failures, etc.). This is accomplished through the use of the Ontario Incident Management System approach to emergency management, which includes recommendations on how personnel, facilities, equipment, procedures, and communications are to be coordinated during an incident. This increases planning efficiency, improves utilization of internal resources, and ensures standardized and efficient response if and when the utility must react rapidly. This approach also streamlines processes and improves the utility's ability to focus on unique response requirements for specific hazards and risks.

The Program produces and houses key disaster preparedness frameworks, including planning documents covering corporate disaster preparedness governance; emergency management; hazard-specific planning in respect of system damage and restoration strategies; Toronto Hydro's role in participating in a province-wide, black-start restoration of the provincial grid; planning for the management of supply chain, purchasing, and material distribution during emergencies; and the utility's approach to effectively engaging with customers and external stakeholders during emergencies.

Figure 3: Damage Caused by Toronto Wind Storm in June 2018

In addition, Toronto Hydro is frequently approached by public authorities and organizations hosting events in the City, to provide assurance in the form of contingency plans for specific events (e.g. G20 summit, PanAm Games) that bring together thousands of attendees. Each of these events is unique in nature, requiring custom response plans that are tailored in scope and approach relative to the existing grid emergency plans.

3.1.4 External Partnerships

The utility collaborates closely with electricity sector partners (e.g. Ontario Power Generation, Hydro One Networks Inc., Independent Electricity System Operator) to ensure consistent response and collaborative restoration. In addition, through Mutual Assistance ("MA") agreements with other utilities, Toronto Hydro has access to "at cost" crews, equipment, supplies or expertise following a disaster.

The Program includes planning for the deployment and onboarding of MA crews. This is because MA can give rise to operational challenges and requires significant planning and coordination to be leveraged safely and efficiently. To ensure the safety of external crews assisting Toronto Hydro during disasters, the utility needs to undertake significant research, negotiation, and planning to implement the necessary MA arrangements and derive the maximum benefits of such arrangements. Jurisdiction-specific legislative and regulatory regimes, along with different operating standards and system configurations, can limit the host utility's ability to take full advantage of MA within a short timeframe. Operational complications associated with differences in safety practices, work protection code, construction standards, and restoration practices, and/or lack of familiarity with the requesting utility's system may result in MA crews being assigned simpler, non-critical tasks, which ultimately leads to longer restoration timelines and prevents the full utilization of highly qualified resources. Further, the difficulties encountered in the deployment of mutual aid resources can lead to an increase in overall restoration costs without the proper advance planning and coordination. For these reasons, during the 2020-2024 plan period, the utility will produce a plan for sourcing, onboarding, and utilizing non-Toronto Hydro crews following a disaster event.

3.2 Program Implementation and Evaluation

This Program function entails the delivery of required workforce training and execution of approved plans and processes during a disaster incident. The Program provides employees with training on updated disaster preparedness frameworks and processes, emergency roles, and incident management. It also integrates emergency response/preparedness requirements into new corporate IT systems.

The Program evaluates ongoing disaster planning and procedures through testing and exercises. Using simulation techniques (e.g. drills, system tests, etc.), the utility is able to identify gaps in its disaster planning including in respect to training, internal and external coordination and communication and resource availability. For instance, in 2017, Toronto Hydro carried out the following disaster simulation activities:

- Administration of a utility-wide functional emergency exercise involving 80 participants from across Toronto Hydro;
- Two damage assessment drills; and
- Participation in IESO-led GridEx functional exercise that simulated a coordinated physical and cyberattack on the interconnected electricity system.

During the 2020-2024 plan period, Toronto Hydro expects to build and enhance a comprehensive exercise and testing program for disaster preparedness. It will continue to design and conduct disaster simulations and tests that identify program gaps with a view to inform adjustments and improvements in the overall disaster planning framework and supporting plans and procedures.

3.3 Program Maintenance & Improvement

This function consists of reviewing all elements of the Program including hazard/risk assessment, planning, business impact assessment, and exercises and testing, in order to ensure an updated framework that meets the utility's needs and risk profile. Given the unique characteristics of disaster events and the need to respond efficiently and effectively in each case, dedicated resources and processes are required in order to research, identify, evaluate, and implement adjustments and enhancements to existing practices.

Toronto Hydro aims to maintain and improve the effectiveness of the Program on an ongoing basis through the use of both internal and external reviews and assessments. For the 2020-2024 plan period, the utility intends to, through an "after-action" review process, continue its systematic reviews of the Program by gathering feedback from internal personnel involved in disaster response as well as impacted stakeholders. In addition, the Program will establish a formal audit cycle to ensure continued program alignment with applicable regulatory requirements and industry standards. Finally, through the use of third party assessors, Toronto Hydro will ensure its disaster planning processes are robust and effective. Accordingly, in addition to training program development and facilitation, Toronto Hydro requires funding to source auditors and emergency management consultants to periodically evaluate and provide recommendations as the Program evolves.

4. PROGRAM COSTS

Toronto Hydro requires approximately $2.7 million per year over the 2020-2024 plan period to execute the functions describes above. Without this level of funding, Toronto Hydro could be exposed to a number of risks, including:

- Reduced disaster preparedness and response activities leading to possibly longer outage restoration times during such events;
- Adoption of an ad-hoc, reactive approach to disaster management (as compared to a proactive, systematic approach that includes ongoing risk/hazard assessments);
- Reduced ability to adequately perform drills and testing on current disaster framework;
- Reduced ability to retain internal expertise required to continuously improve the Program and bring it in line with industry best practices; and
- Reduced ability to provide essential disaster preparedness training to employees.

Table 4 below provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for the Disaster Preparedness Management program.

Table 4: Disaster Preparedness and Management Program Expenditures ($ Millions)

Program	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Disaster Preparedness Management	2.3	2.4	2.2	2.6	2.8	2.7

4.1 Cost Drivers

The requested forecast 2020 test year costs of $2.7 million represents an increase of $0.4 million from the utility's last rebasing year actual costs (2015), $0.5 million from the most recent historical actual year (2017), and $0.1 million less than the bridge year (2019). The variances are attributable to the following factors:

- **Reduction in external consulting costs**: Initial program development and implementation relied heavily on external expertise to compensate for the lack of internal experience and familiarity with industry best practices. As the Program has matured, the scope of major program development work has been reduced and a skilled and experienced internal resource base has been developed continue to update the disaster planning framework.
- **Increase in net payroll/labour costs and employee expenses**: These costs are associated with recruitment, training, and development of employees who are skilled, knowledgeable and qualified in the fields of emergency management, business continuity, and utility operations. Effective development and sustainment of the Program require dedicated employees with specialized skills and knowledge in utility operations and emergency management.
- **External testing and assessment costs**: Ongoing evaluation through testing and exercises provide insight into the effectiveness of the Program. The consulting

costs for the 2020-2024 plan period are associated with external auditing and benchmarking to maintain program efficacy and continued alignment with best practices. This budget will also be allocated for conducting large scale emergency response exercises across the utility.

4.2 Cost Control and Productivity Measures

The Program aims to ensure an up-to-date and robust utility-wide disaster planning framework while utilizing cost control and productivity initiatives to manage costs. For instance, as mentioned above, due to significant efforts to build and retain internal disaster planning expertise, the Program is able to reduce reliance on external consultants for program guidance and development, leading to cost savings.
In addition, the Program facilitates efficient use of internal resources with a view to controlling external labour costs. The Program aims to leverage existing emergency response capabilities within the utility by assigning Toronto Hydro employees to emergency functions. The Program trains employees on the utility's emergency structure and the emergency roles they will need to fulfill to assist with system operation and restoration. Lastly, in partnering with other utilities via the MA agreements, Toronto Hydro has access to "at cost" crews, equipment, supplies and expertise following a disaster event. These initiatives enables the utility to significantly increase the number of resources available for disaster response without an increased reliance on external resources and other labour costs.

Since 2016, Toronto Hydro has also adopted a number of tools, processes, and/or related improvements in support of program execution during actual events, including:

- Full implementation of the Ontario Incident Management System, which is the response system used by the vast majority of responders in the Province.

Adoption of this system means that Toronto Hydro is now positioned for collaborative response with other utilities (e.g. Enbridge), public safety organizations (e.g. Toronto Police, Fire, and Emergency Medical Services), and municipal/provincial governments. This provides the utility with access to all levels of emergency management and response organizations (e.g. municipal public works and forestry crews) during disaster response; and

- Implementation of statistical and comprehensive damage assessment tools aimed at enabling more rapid and effective estimation of restoration durations following a disaster event. This increases Toronto Hydro's understanding of which areas of the system have been most significantly impacted and require the most immediate attention. This allows the utility to plan its resource usage more effectively, focusing restoration efforts on areas requiring immediate response and those which will most positively impact the greatest number of customers and the impacted community.

4.3 Disaster Preparedness Management Program Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

Program costs increased by $0.1 million from 2015 to 2016 due to an increase in employee headcount related to improving and implementing the Program, which was offset by a reduction in external consulting costs for emergency management program development.

2016 – 2017 Variance Explanation

Program costs decreased by $0.2 million from 2016 to 2017 as a result of a decrease in external consulting costs which were partially offset by an increase in employee headcount related to improving and implementing the Program.

2017 – 2018 Variance Explanation

Program costs are forecast to increase by $0.4 million from 2017 to 2018 as a result of an increase in employee headcount related to improving and implementing the Program which will be partially offset by a further reduction in external consulting costs.

2018 – 2019 Variance Explanation

Program costs are budgeted to increase by $0.2 million from 2018 to 2019 as a result of an increase in employee headcount related to improving and implementing the Program, which will be partially offset by a further reduction in external consulting costs.

2019 – 2020 Variance Explanation

Program costs are forecasted to decrease by $0.1 million from 2019 to 2020 as a result of a retirement.

CONTROL CENTRE OPERATIONS

1. OVERVIEW

Table 1: Control Centre Program Summary

2015-2017 Average Annual Cost ($M): 5.7	**2020 Cost ($M):** 8.7
Segments: Control Centre Operations	
Outcomes: Reliability, Safety, Customer Service, Public Policy	

Toronto Hydro's Control Centre Operations program (the "Program") facilitates the safe and reliable operation of the utility's distribution grid through real-time system control and monitoring activities on a 24/7, 365-day basis. The Program coordinates system switching and restoration work through Toronto Hydro's Control Centre to mitigate the effect of outages on customers, and enables safe load transfers for capital and maintenance work. The Program further leverages the Control Centre to monitor the flow of electricity and asset performance across Toronto Hydro's distribution plant to provide real-time information and system condition data for future use in system planning activities. The Program includes the following functions:

- **Distribution System Operations:** Real-time, 24/7 operation of the distribution grid to monitor system conditions, respond to outages, enable field crews to safely work on the distribution system and coordinate operations with Hydro One and the Independent Electricity System Operator ("IESO");
- **Work and Outage Scheduling/Coordination**: Review and approval of work on the distribution system and scheduling outages or work to minimize system and customer impact;
- **Grid Analytics**: Reliability reporting and grid analysis to monitor risks, performance and approved construction project design; and

- **Supervisory Control and Data Acquisition ("SCADA") Maintenance and Support**: Maintenance, configuration and troubleshooting of the Toronto Hydro SCADA system, which enables Power System Controllers to monitor and operate distribution system equipment remotely and in real time.

The Program is a continuation of the activities described in the Control Centre Operations program in Toronto Hydro's 2015-2019 Rate Application.[1]

2. OUTCOMES AND MEASURES

Table 2: Control Centre Operations Program Outcomes and Measures Summary

Reliability	• Contributes to Toronto Hydro's system reliability objectives (e.g. SAIDI, SAIFI, FESI-7) by: o Supporting and enabling successful execution of the annual distribution system capital and maintenance investment programs; o Maintaining the integrity of the registry database that pertains to system asset quantity and type. This information is used for planned and reactive distribution system work; and o Ensuring compliance with all statutory requirements related to grid emergency preparedness and business continuity, including emergency preparedness requirements outlined in Section 39 of the *Electricity Act, 1998* and IESO's Market Rules relating to emergency preparedness planning and system restoration planning.

[1] EB-2014-0116, Toronto Hydro-Electric System Limited Application (filed July 31, 2014, corrected February 6, 2015), Exhibit 4A, Tab 2, Schedule 5.

Safety	• Contributes to Toronto Hydro's safety objectives measured through metrics such as the Total Recordable Injury Frequency ("TRIF") by: ○ Providing seamless visibility over the distribution system, including load management and control over inadvertent energizing of equipment; and ○ Ensuring compliance with electrical distribution safety regulations through timely reporting of serious electrical incidents involving Toronto Hydro infrastructure.
Customer Service	• Contributes to Toronto Hydro's customer service objectives by: ○ Receiving and responding expeditiously to trouble calls from customers and/or external stakeholders; ○ Maintaining the capability to effectively manage, prioritize and resolve multiple concurrent system issues impacting customers; and ○ Providing relevant and timely outage information for customers, such as estimated outage restoration times and other situational information relating to system outages.
Public Policy	• Contributes to Toronto Hydro's public policy objectives by ensuring compliance with: ○ Emergency response-related provisions of the Distribution System Code by ensuring emergency calls are responded within a target of 60 minutes (in urban areas), 80% of the time; and ○ Ensuring compliance with requirements relating to the OEB Major Event Day reporting (Report of the Board EB-2015-0182), by efficiently communicating with external and internal parties, prioritizing system alarms, external and internal reports, and dispatching resources effectively.

3. PROGRAM DESCRIPTION

3.1 Control Centre Functions

As set out above, the Control Centre is responsible for the safe and efficient operation of the distribution system. This includes directly opening and closing remotely operable switches to redirect the flow of electricity, directing/instructing field crews with respect to the operation of locally operable switches and administering Toronto Hydro's Work Protection Code to ensure that work on or in proximity to Toronto Hydro's infrastructure can be conducted safely. Power System Controllers are responsible for establishing the existing system conditions, identifying the necessary steps to safely complete the work and minimize interruptions to customers, directing field crews in execution of these steps and maintaining records of which steps have been completed and which workers are actively working on the system.

Other processes administered by the Control Centre are switching steps and the issuance of "Hold Offs." Switching steps are documented as "Orders to Operate" safety documents. Each Order to Operate 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. Hold Offs are special conditions that prevent certain automatic equipment operations for the duration of time that a field crew is working in proximity to Toronto Hydro's infrastructure. Power System Controllers record the location of workers within the direct proximity of electrical equipment (e.g. working on energized apparatus) to limit the possibility that other concurrent activities may increase the risk of equipment damage. Application of Hold Offs for certain activities are a requirement of Toronto Hydro's work procedures, and if not applied, can result in equipment damage and create extended outages should an incident occur in the physical or electrical proximity to the work site.

The Control Centre also plays a significant role with respect to outage restoration. When a feeder circuit breaker trips, the Control Centre is usually notified immediately through the SCADA system. Power System Controllers take immediate action to remotely isolate the issue, restore power where possible by switching to alternate supplies, coordinate with grid response crews to identify the specific location of the fault, make repairs and plan the final restoration. Where available, the Control Centre will relay situational information such as outage boundaries; number of customers effected and estimated restoration times to the Toronto Hydro communications team for dissemination to the public. Similarly, when issues on the transmission system impact supply to the Toronto Hydro's system, the Control Centre is the direct point of contact for the IESO and/or Hydro One. The Control Centre is also the point of contact for coordination of restoration efforts following a major disruption to the provincial electricity grid.

3.1.1 Distribution System Monitoring

The Control Centre is responsible for monitoring the status and operational state of the distribution system on a 24/7/365 basis. Power System Controllers maintain a real-time model and understanding of switch positions, device states, power flows, loading, work-in-progress, trouble alarms and abnormal system events across all 1,700+ circuits. This is accomplished through a combination of processes and tools.

3.1.2 Distribution Work and Outage Coordination

The Control Centre acts as a central authority for the operational assessment of designs, scheduling and coordination of work on the distribution system. All construction work involving modifications to the distribution system is submitted to the Control Centre for review. Control Centre engineers and technicians consider the operational impacts and safety of the proposed designs and provide feedback and/or approval. Prior to work initiation, execution groups must also submit work requests to the Control Centre for planning and coordination purposes. This information is used to develop a plan that eliminates conflicts between jobs, identifies synergies (e.g. grouping of work requiring similar isolations to reduce the number of switching activities) and allows the work execution groups and the Control Centre to coordinate and optimize the use of shared field switching resources.

The Control Centre is also responsible for planning service isolations and restorations at the request of customers who require these services to safely work on their electrical systems.

3.1.3 Grid Analytics

The Control Centre analyzes system performance, calculates reliability statistics, reviews outage restoration performance, and plays a role in processing system record changes following the completion of work in the field. In addition, Control Centre engineers and technicians maintain the Interruption Tracking Information System, which stores data related to outages, including impacted devices/circuits, customer minutes out, customers impacted and the restoration sequence. From this database, the team compiles system performance statistics for reporting to internal and external stakeholders. The group also conducts in depth reviews of outages on a case by case basis to assess performance and identify improvement opportunities.

Toronto Hydro’s distribution grid is in a state of perpetual change as new customers connect to the system and capital projects make modifications to the permanent physical design and configuration of the grid. The Control Centre requires access to the most current information in order to effectively and safely carry out their work. The Control Centre, therefore, plays an important role in ensuring that system records are consistently and expediently updated. This work helps protect Toronto Hydro crews and customers from exposure to unsafe conditions and ensures that switching and other Control Centre activities achieve planned results without compromising system integrity and reliability.

3.1.4 SCADA System Maintenance and Support

As the SCADA system is integral to the efficient operation of the Control Centre, a team of specialized engineers oversee the activities related to maintaining, improving, and modifying Toronto Hydro's SCADA system to maintain cyber security and facilitate system operation efficiency. The SCADA team consists of trained engineers and technicians that possess specific skill sets in SCADA or industrial control systems. Their efforts facilitate remote system monitoring and control, and help ensure that decisions and orders from the Control Centre are quickly and efficiently executed. When Toronto Hydro installs new system monitoring and control equipment, it relies on SCADA engineers to configure and enable these devices to work seamlessly with the existing equipment and applications.

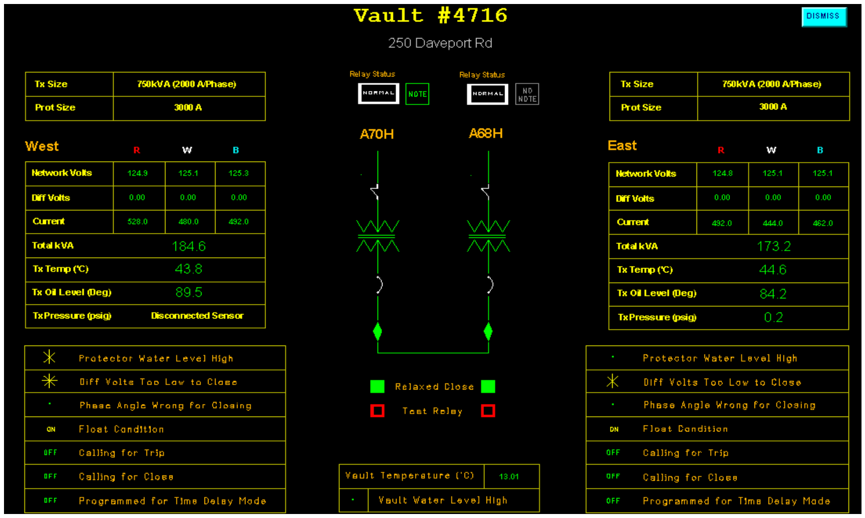


Figure 1: SCADA Display of a Typical Toronto Hydro Network Vault

3.2 Control Centre Operations

The Control Centre is comprised of two functions: (i) 24/7 Operations; and (ii) Grid Performance Analysis and Support. The 24/7 Operations is responsible for distribution system monitoring and operations, and work scheduling/coordination. This area is primarily staffed by Power System Controllers, Power System Controller Apprentices and Distribution Grid Operations Supervisors who work on a 24/7/365 shift schedule. The Grid Performance Analysis and Support function is primarily comprised of engineering technicians and engineers. The employees performing this function typically work a regular day schedule with after-hours support available through a rotating standby schedule.

Control Center functions require highly trained and experienced Power System Controllers.[2] The density and complexity of Toronto Hydro's urban setting adds additional complexities and challenges and therefore, Power System Controller

[2] Power System Controllers in training are referred to as apprentices, while fully trained Power System Controllers are referred to as journey persons.

qualifications can only be developed through a combination of in-class training and on the job experience. Power System Controller Apprentices, irrespective of educational backgrounds and prior experience, are required to complete a 4.5 year apprentice program, including 2-3 years of progressively more complex assignments, to substantially familiarize themselves with Toronto Hydro's system and become fully qualified Power System Controllers. Sustainment and development of this workforce is critical in ensuring that Toronto Hydro has the capability to realize the outcomes targeted by the utility.

Between 2018 and 2024, a substantial number of the current Power System Controllers are expected to retire. This trend is likely to continue for several more years. See Figure 2, below, for Toronto Hydro's forecast of expected Power System Controller retirements. Without a strategy to offset the expected loss of experience, it will be increasingly difficult for the Control Centre to sustain an appropriate level of service. This will negatively impact the utility's ability to meet strategic targets and outcomes related to safety, reliability and customer service.

Owing to the number of retirements forecasted to occur within a short period of time, the Program must continue to hire apprentices in order to sustain levels that are commensurate to the volume of work and the hours required to successfully run Control Centre operations. The Control Centre will need to continue to renew its workforce and incur expenses related to bridging the knowledge transfer (24/7 supervision), on-boarding new hires, and supporting competency evaluation, associated with mentoring new apprentices.

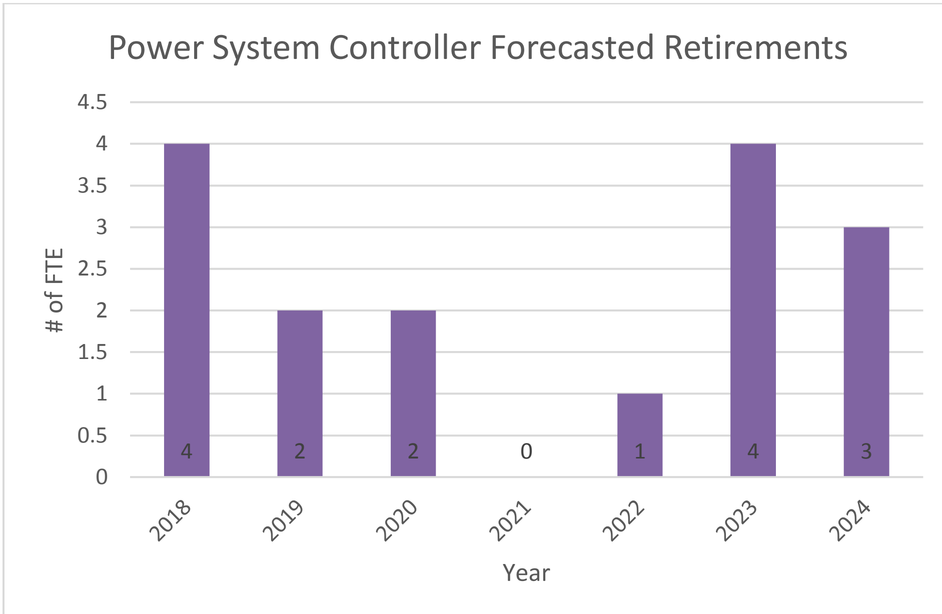


Figure 2: Forecast Power System Controller Retirements over 2018-2024 period

In order to ensure that there is sustainability within the workforce over the long term, the Power System Controller Apprentice Program will continue through to at least 2024. This will ensure Power System Controller Apprentice numbers are kept at a level that maintains qualified staff to handle work volumes and support a 24/7 schedule. In order to mitigate this retirement trend and account for voluntary exists of apprentices and Power System Controllers, Toronto Hydro plans to hire apprentices according to the plan shown in Figure 3, below.

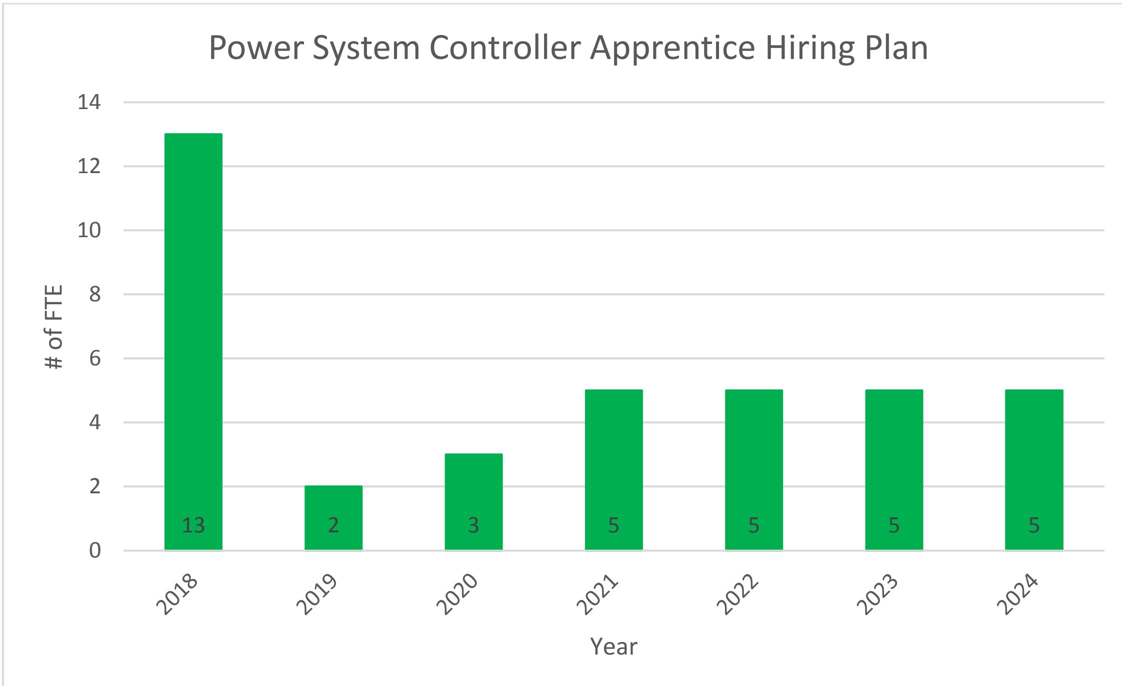


Figure 3: Power System Controller Apprentice Hiring Plan

In 2016, Control Centre operations transitioned to a 24/7 supervision model whereby Control Centre Supervisors work a rotating schedule of twelve hour shifts. The schedule ensures that at least one supervisor is present in the Centre at all times. As Power System Controllers coordinate with field crews to analyze, plan, execute and resolve public safety incidents or restore power outages, accurate customer centric information must be available in a timely manner. The new 24/7 supervision model allows for more consistent operational decision-making, more accurate and timely dissemination of information, and increased service for customer escalations. More importantly, as a result of retirements of experienced Power System Controllers, there is a significant reduction in the amount of experience present in the Control Centre at any given time. Having a Supervisor present at all times provides support for more junior apprentices as they develop their skills and knowledge, and benefit from leadership guidance for public safety incidents and customer communication escalations.

Lastly, there are other externally driven factors that will likely increase the volume or complexity of Control Centre activities, further necessitating a supervisor presence in the Control Centre at all times, including:

- Increased market penetration of distributed generation, electric vehicles / vehicle charging stations and energy storage. This shift will introduce additional nodes that will need to be monitored and controlled to manage impact to the grid. The transition from a system where power flows primarily in one direction to multi-directional flows will also complicate switching operations in order to ensure that Toronto Hydro plant is safely isolated and grounded;
- Increases in extreme weather-related events due to climate change. Studies for the Toronto area predict that we will see an increased volume of adverse weather with the potential to disrupt the power grid, including extreme heat, ice storms, extreme wind and flooding. These events typically put a significant amount of stress on Control Centre operations as they frequently result in an extraordinary number of outages that must be managed and restored;[3] and
- Increasing customer expectations with respect to communication of outage status information. Along with grid response crews, Power System Controllers are typically directly responsible for coordinating restoration efforts and are often the source of this information. Toronto Hydro recognizes that it is important to be responsive to customer expectations around being kept informed about outages and restoration times.

---

[3] For a discussion of recent extreme weather related events experienced by the City, please refer to the Disaster Preparedness Management program at Exhibit 4A, Tab 2, Schedule 6.

4. PROGRAM COSTS

Toronto Hydro requires approximately $8.7 million each year over the 2020 to 2024 period to execute the functions described above. Without this level of funding, Toronto Hydro may encounter a number of risks, including**:**

- Inability to successfully execute the capital and maintenance investment programs due to Control Centre-related delays in administering field work;
- Significantly longer restoration times for outages;
- Less effective coordination with Hydro One and IESO counterparts with respect to bulk system issues, resulting in prolonged outages for customers;
- Reduced operating efficiency and higher safety risks as a result of the reduced ability to manage data on changing system configuration in a timely manner; and
- Persistence of abnormal system configurations, which can cause additional or prolonged outages.

Table 3 provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for the Program.

Table 3: Control Centre Operations Program Expenditures ($ Millions)

Program	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Control Centre Operations	5.4	5.4	6.3	7.8	8.7	8.7

4.1 Cost Drivers

The 2020 test year cost forecast represents an increase of $3.3 million from the utility's last rebasing year actual costs (2015) and $2.4 million from the most recent historical actual year (2017).

The cost drivers for this Program include the non-discretionary renewal of Toronto Hydro's Power System Controller workforce, a shift to 24/7 supervision, and additional support staff costs.

4.2 Cost Control and Productivity Measures

The Control Centre has led and/or supported several system modernization initiatives to control costs, improve productivity, and enable further optimization of operations. For instance, one such initiative resulted in a significant reduction in the average time crews spend waiting for Hold Offs (see Figure 4, below).

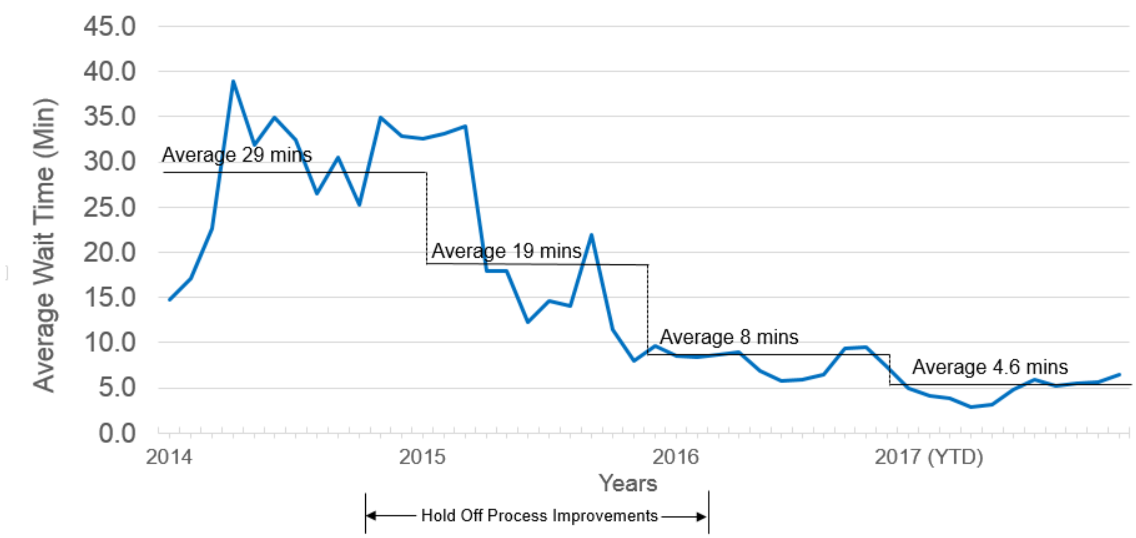


Figure 4: Average Wait Times for Planned Hold Offs

This reduction translates directly into increased productivity for field crews, as they spend less time waiting for a Hold Off before initiating work. The reduction was achieved by analyzing Hold Off volume data and spreading the peak demand across a longer time frame by staggering call-in times.

Another example of continued productivity improvements within the Control Centre is illustrated in Figure 5, below, which demonstrates a steady increase in the Control Centre's target for percentage of planned Orders To Operate which are to be written prior to work execution. By having Orders To Operate ready prior to execution, it reduces last minute work volume and increases the likelihood that field work can commence without delays caused by the Control Centre. While there is significant volatility in the planned Orders To Operate from month to month due to volatility in work volume, Toronto Hydro will continue to look for opportunities to improve in the future through improved scheduling and further process optimization.

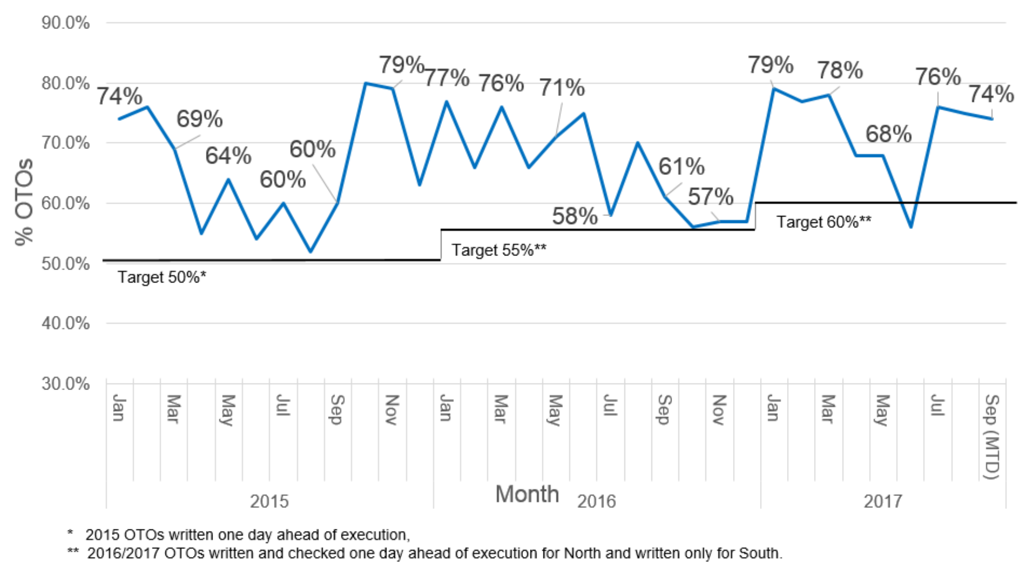


Figure 5: Percentage of Orders To Operate Prepared Ahead of Execution

The Control Centre has also increased the volume of work it processes. The work processed by the Control Centre is variable and dependant on several factors, including the size and complexity of Toronto Hydro's capital and maintenance programs, the number of equipment failures and external factors that influence system reliability such as weather. Table 4, below, provides some measurable Control Centre output in recent years.

Table 4: Historical Control Centre Work Volumes

	2013	2014	2015	2016	2017
Total OTO Steps	63526	106734	237906	256098	278839
Executed OTOs	2936	3489	3574	3547	3696
Hold Offs	25741	27108	26468	24499	20544

Table 4 shows an increasing number of Orders To Operate steps which is a reflection of the complexity of the work being undertaken on Toronto Hydro's distribution system. The increase is generally attributable to a higher portion of electrical capital and maintenance work that requires extensive Control Centre support in recent years, as compared to civil work, which requires less Control Centre support. This volume will persist as Toronto Hydro continues to invest in its distribution system.

Table 5, below, provides examples of other productivity initiatives along with the results that will be enabled.

1 **Table 5: Examples of Control Centre Productivity Initiatives**

Initiative	Timing	Results
Development of Apprentice Programs	Ongoing	Enhancement of specialized skill sets in Power System Controllers, which will enable efficiencies in performance.
Network Management System Upgrade	2015-2018	Replacement of obsolete Distribution Management System and Outage Management System will lead to better system stability and performance due to vendor support, allow for increased capacity for Power System Controllers, dispatchers, and support staff during extra-ordinary circumstances, increase access to back-end operational data for reporting and productivity analysis, and enable implementation of various mobile solutions.
Mobile Orders To Operate	2018-2019	Eliminates the need for paper-based Orders To Operate to be sent between the Control Centre and field workers. The process enables Orders To Operate to be sent directly from the Power System Controller to the field crew's laptop or mobile device, reducing errors and increasing efficiency.
Operational Analytics	2018-2019	Enhances access to operational data that eliminates several manual reports and enables advanced reporting and analytics. The change modernizes reliability calculation processes.
Telephone Queuing	2016-2018	Enables allocation of customer and crew calls into Trouble Dispatchers to measure and prioritize timely response to crew work clearances, decreasing crew wait times. The process optimizes communications between Power System Controllers and field crews, allowing segregation of simple versus complex work and real-time work intake processes. Lastly, it also enables real-time performance reporting and analysis, which will inform further Control Centre process optimizations.

4.3 Control Centre Operations Program Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

There was virtually no variance between actual 2015 and actual 2016 costs. Retirements and other employee departures were offset by new hires.

2016 – 2017 Variance Explanation

Costs increased by $0.8 million between 2016 and 2017. This increase is attributable to an increase in net labour and payroll costs of approximately $0.2 million relating to continued implementation of the 24/7 supervision model and hiring of Power System Controller Apprentices and support staff, as well as costs associated with external consulting services and purchased services of approximately $0.6 million. External consulting services were utilized to conduct engineering studies and to develop and deliver training material for new hires. These costs are required to support continued development and delivery of highly specialized training modules and technical studies of operational work practices to identify/validate improvement opportunities and implement costs associated with system modernization initiatives.

2017 – 2018 Variance Explanation

Costs increased by $1.5 million between 2017 and 2018. This increase is attributable to an increase of approximately $0.9 million in payroll and labour costs related to continued implementation of the 24/7 supervision model and hiring of Power System Controller Apprentices and support staff, as well as continuation of costs associated with external consulting services and purchased services of approximately $0.6 million, for the reasons mentioned above.

2018 – 2019 Variance Explanation

Costs are forecast to increase by $0.9 million between 2018 and 2019. This increase is primarily attributable to an increase in staffing costs related to continued implementation of the 24/7 supervision model and hiring of Power System Controller Apprentices and support staff.

2019 – 2020 Variance Explanation

There is no forecasted variance between 2019 and 2020. A small increase in payroll and labour costs is offset by a decrease in external consulting and purchased services.

CUSTOMER-DRIVEN WORK

1. OVERVIEW

Table 1: Customer-Driven Work Program Summary

2015-2017 Average Cost ($M): 10.6	**2020 Cost ($M):** 9.6
Segments: • Customer Connections • Public Safety and Damage Prevention • Customer-Owned Equipment Services	
Outcomes: Customer Service, Safety	

The Customer-Driven Work program (the "Program") delivers services that respond to requests from existing and future customers. The specific activities this Program covers include planning, engineering, design, and field work to safely and efficiently enable customer connections and meet customer requests. This work is categorized into three segments as follows:

- Customer Connections;
- Public Safety and Damage Prevention; and
- Customer-Owned Equipment Services.

2. OUTCOMES AND MEASURES

Table 2: Customer-Driven Work Program Outcomes and Measures Summary

Customer Service	• Contributes to meeting Toronto Hydro's obligations for customer connections (including OEB mandated ESQR measures)[1] by: o Ensuring sufficient planning staff and required tools or resources are available to efficiently plan and design service connections and meet service request volumes; and o Providing the public with information concerning the location of Toronto Hydro's buried equipment (i.e. to facilitate construction) within five days 90 percent of the time, as required under the Ontario One Call regime. • Contributes to Toronto Hydro's customer service objectives by working with customers to ensure customer-owned civil structures containing distribution equipment on customer property are adequately maintained.
Safety	• Contributes to Toronto Hydro's public safety performance and objectives by providing cable locates in a timely manner; thereby improving general public safety.

3. PROGRAM DESCRIPTION

Most of the activities in the Program are driven by legislative and regulatory requirements, including the *Electricity Act, 1998*, the OEB's Distribution System Code ("DSC"), the *Ontario Underground Infrastructure Notification System Act, 2012* ("One

[1] More specifically, Toronto Hydro's customer connection-related obligations include:
(i) completing low and high voltage connections within five and ten business days respectively at least 90 percent of the time, as measured pursuant to the OEB's new connection metrics and section 7.2 of the Distribution System Code ("DSC");
(ii) completing customer appointments in accordance with the OEB's Appointment Scheduling and Appointments Met metrics 90 percent of the time, as per sections 7.3 and 7.4 of the DSC; and
(iii) responding to inquiries requiring a written response within ten business days at least 80 percent of the time, as measured pursuant to the OEB's Written Response metric and section 7.8 of the DSC.

Call Act"), the *Construction Projects Regulation O. Reg. 213/91*, and other legislative requirements governing fire prevention and detection activities.

The Program covers the interactions between Toronto Hydro's customers and its distribution system, addressing everything from customer requests for access to the grid to the safe completion of work in proximity of Toronto Hydro equipment. More specifically, the three Program segments are:

- **Customer Connections**, which includes the administrative and unrecovered costs associated with the investigative engineering, design, and field work to facilitate customer connection requests in accordance with applicable customer service and regulatory obligations.
- **Public Safety and Damage Prevention**, which aims to provide the general public and other utilities with timely information regarding the location of Toronto Hydro's buried equipment in accordance with applicable regulatory requirements.
- **Customer-Owned Equipment Services**, which aims to provide customers the means to access and service their equipment operating on the distribution system, including vault access, isolations and disconnections.

4. PROGRAM COSTS

Toronto Hydro requires approximately $9.6 million each year during the 2020 to 2024 period to execute the Customer-Driven Work program, as described above. Without this level of funding, Toronto Hydro could be exposed to a number of risks, including:

- Reduced ability to provide potential customers safe and reliable connection options in a timely manner. An in-depth analysis is required to determine the impact of a new customer on the grid to ensure system integrity, and insufficient funding could compromise the ability to properly conduct this analysis;

- Customer dig-ins while performing work, which could potentially result in damaged distribution assets, service outages, or personnel injuries;
- Reduced ability to provide customers with isolations for the maintenance of their electrical equipment, resulting in potential reliability degradation on the distribution system; and
- Reduced ability to provide disconnection and asset removal services to customer wishing to upgrade or redevelop their land.

Table 3 provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for each of the Program's segments.

Table 3: Customer-Driven Work Program Expenditures by Segment ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Customer Connections	2.1	2.4	2.3	3.0	3.1	3.2
Public Safety and Damage	4.0	4.2	5.9	5.1	4.7	4.5
Customer-Owned Equipment	4.1	3.4	3.5	1.9	1.8	1.9
Total	**10.2**	**10.0**	**11.6**	**9.9**	**9.6**	**9.6**

4.1 Cost Drivers

The 2020 test year cost forecast represents a decrease of $0.6 million from the utility's last rebasing year (2015), a decrease of $2.0 million from the most recent historical actual year (2017), and is largely unchanged from the bridge year (2019).

The variances in the Customer Connections segment are attributable to the complexity of the initial investigation required prior to making an Offer to Connect. As both the number and complexity of expansion projects have been increasing over time, it is expected that the overall time and administrative burden involved in these investigations will also increase. Projects that do not proceed are not capitalized. Any unfunded costs (including administrative resources) relating to such investigation are funded through this Program.

Variances in the Public Safety and Damage Prevention segment are attributable to a change in locate contractors in 2018 due to performance concerns. The work is now divided between two contractors. To onboard the new contractors, segment costs increased in 2017 and 2018, but are expected to decrease in 2019 and stabilize going forward. The discontinuation of the Line Cover-up Program Administration is also expected to decrease overall costs starting in 2019.

The decrease in Customer-Owned Equipment Services costs between 2015 and 2018 is primarily driven by customer-specific payment for isolations.

4.2 Cost Control and Productivity Measures

4.2.1 Cost Management

Toronto Hydro undertakes a number of measures to control costs in this Program. Under the Customer Connections segment, Toronto Hydro reviews pre-payment values on a project basis to ensure they cover a reasonable portion of the initial investigation work and mitigate financial risks should the project not proceed.

For the Public Safety and Damage Prevention segment, the utility is working with its cable locate services contractors to streamline the “clear” process, which indicates to customers that their work will be clear of any Toronto Hydro equipment. Toronto Hydro changed locate contractors in 2017. As part of the on-boarding process, the new contractors have been primarily using "field clears", where members of the team are sent into the field to address calls, even when there were no conflicts. Calls where there were no conflicts represent 57 percent of calls, and the potential to be addressed from the office (known as "office clears"). Toronto Hydro is working with the contractors to increase the use of "office clears." This is expected to reduce costs.

Under the Customer-Owned Equipment Services segment, Toronto Hydro provides vault access at its expense, recognizing that the utility gains benefits, including the identification of potential hazards or deficiencies. However, Toronto Hydro does limit the free access to one time per year. Customers requiring access to vaults more than once per year are responsible for the full costs. This in turn incentivizes customers to find efficiencies during their access.

4.2.2 Productivity

Customer Connections

In 2017, Toronto Hydro combined its Low Voltage and High Voltage design teams. Prior to this, the Low Voltage team dealt with short turn-around seasonal work, while the High Voltage team dealt with larger developments that had long lead times. This merger has allowed the allocation and distribution of work across design team members in a more effective and efficient manner.

In addition, Toronto Hydro implemented an online ("C1") form with standardized fields that customers complete in respect of their inquiries. A properly completed customer inquiry form would be promptly and accurately directed to the correct resource, thus minimizing the need for an inquiry to be passed from one department to another.

In 2016, Toronto Hydro piloted a Customer Relationship Management ("CRM") system to enable enhanced and more transparent project management and tracking. The pilot allowed Toronto Hydro to better manage customer requests by recording relevant information (e.g. when requests were received, milestone progress, response times, assigned designer, and project status). This ensures that existing customers or those who want to restart a project receive seamless and efficient service from the utility. This pilot system had led Toronto Hydro to consider expanding and implementing the CRM solution to capitalize on the potential benefits offered by the system.

Public Safety and Damage Prevention

As of 2017, Toronto Hydro divided its service territory (east and west of Yonge Street) between its two locate service providers. This boundary is flexible and allows Toronto Hydro to optimize the responsibilities of each contractor based on workload, costs, and performance as well as realize efficiencies by allowing contractors to focus on specific geographic areas. This enables the utility to minimize costs while meeting customer locate requirements. In December 2016, Toronto Hydro met the five day measure (i.e. to provide information within five days) 58 percent of the time. That number improved to 91 percent by December of 2017.

Customer-Owned Equipment Services

In 2017, Toronto Hydro initiated a pilot program with a new contractor to perform residential underground isolations. The new contractor performed the isolations successfully, meeting all safety and performance standards, at approximately half of the costs. Since isolations are fully billed to the customer, this saving is passed on fully to the customer.

5. CUSTOMER CONNECTIONS SEGMENT

5.1 Segment Description

The Customer Connections segment is driven by customer requests to connect to Toronto Hydro's distribution system or service upgrades for existing customers. Serving one of the fastest growing cities in North America, Toronto Hydro receives high volumes of request for connections and upgrades for residential and commercial developments each year. The requests vary in location, load requirements and the complexity of underlying planning or construction work. In accordance with its regulatory obligations, Toronto Hydro must connect a customer to its distribution system within prescribed timelines if that customer and the associated connection meet all technical requirements outlined in the DSC (Section 7.2) and the utility's Conditions of Service. Customer connections can be in the form of a basic connection, or a connection requiring expansion work. The types of connections Toronto Hydro performs can generally be divided into two categories as follows:

- **Low Voltage Requests:** These requests primarily relate to residential and small commercial customers that utilize existing Toronto Hydro transformation for their connection. As shown in Figure 1, the high volume of requests presents challenges as they require extensive project coordination and administrative oversight. The level of work is typically seasonal and has a relatively short turnaround time. To meet its service obligations, Toronto Hydro works with customers to provide options for a new connection or service upgrade.

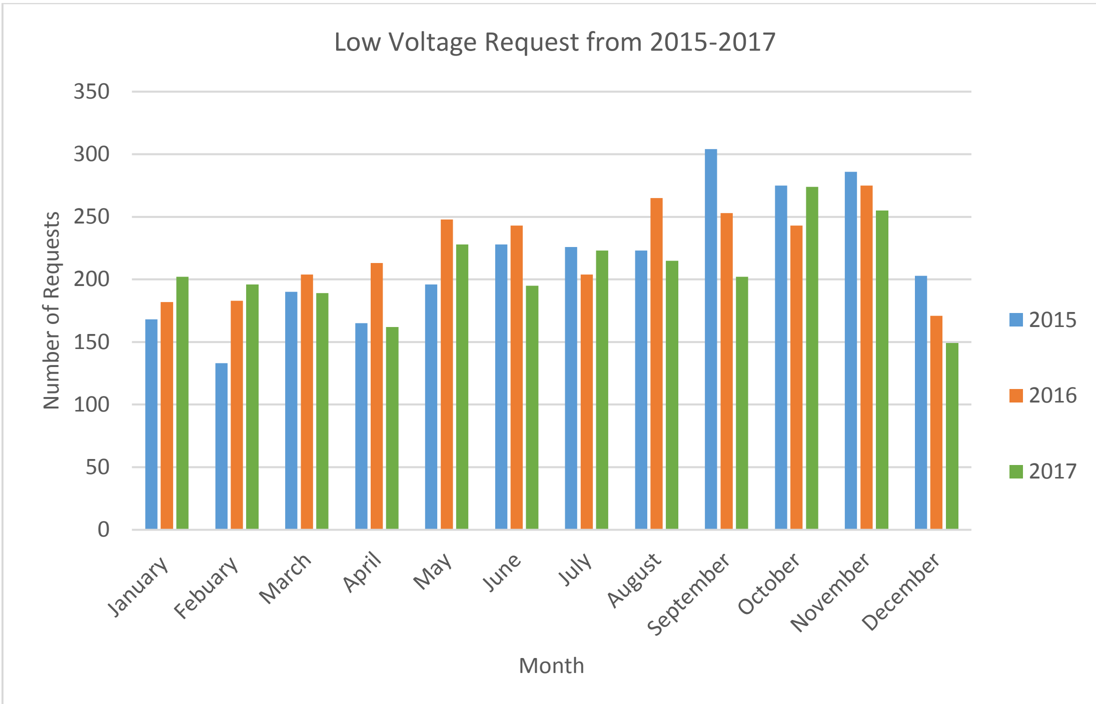


Figure 1: Low Voltage Connection Requests by Month (2015-2017)

- **High Voltage Requests**: These requests primarily relate to larger residential and commercial developments with dedicated transformation on customer property. These customers typically engage Toronto Hydro years before service is required. Figure 2 provides a year-over-year comparison of the volume of new formalized High Voltage requests that Toronto Hydro receives on an annual basis.

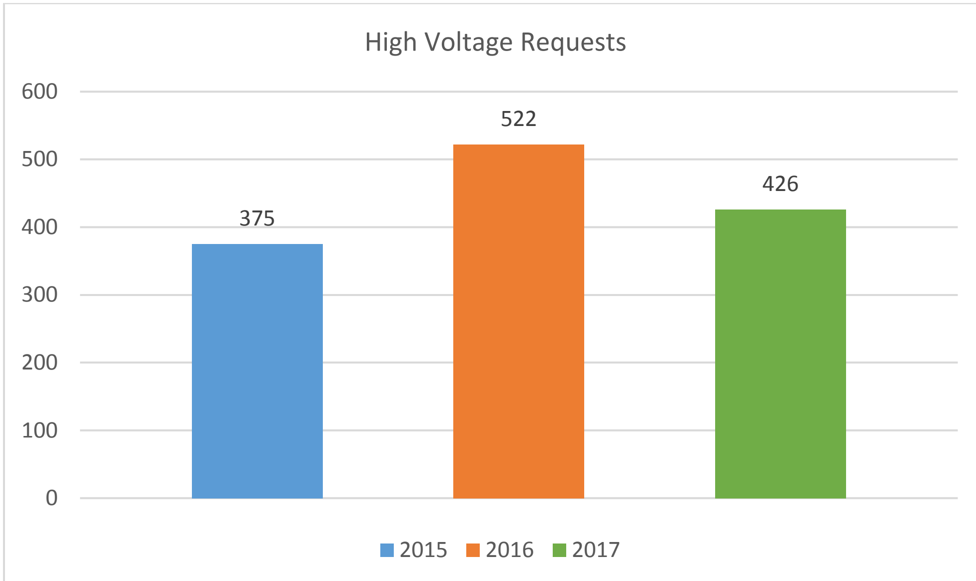


Figure 2: High Voltage Connection Requests (2015-2017)

Following the receipt of a connection request, Toronto Hydro works with prospective customers to develop an appropriate connection design, calculate the design pre-payment, and establish a mutually satisfactory construction schedule. Given the high density of Toronto's urban core, there are capacity limitations at many of the utility's Transformer Stations ("TS") and Municipal Stations ("MS") as well as spatial restrictions of existing underground or overhead easements. As such, Toronto Hydro may be required to undertake plant expansion and enhancement work to enable safe and reliable power. Projects with expansion work typically require connections that extend beyond the closest pole or cable chamber, resulting in work on various sections of the circuit or sometimes the entire circuit. Such work is complicated and requires a specialized team (including designers and distribution and stations engineers) to plan the system to accommodate the connection. As a result, customer jobs requiring expansion work require significantly more resources to prepare an Offer to Connect. Figure 3 illustrates the year-over-year volumes of Offers to Connect requiring expansion projects. Over the past four years, both the volume and average complexity of expansion work have increased.

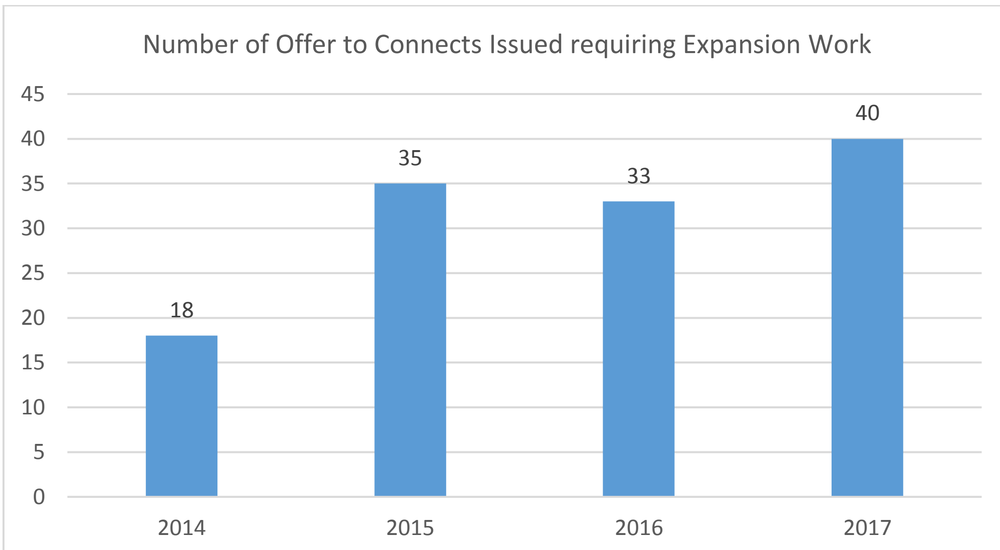


Figure 3: Number of Connections Requiring Expansion Work (2014-2017)

Given the current pace of Toronto's growth and the volume of large connection requests, Toronto Hydro identifies and addresses areas where insufficient connection capacity exists or is projected to materialize in the near or medium term. In this regard, the utility's customer connection work also entails an analysis of development plans prepared by provincial and municipal agencies and private development firms. Toronto Hydro incorporates the results of this analytical work into its load forecasts, system upgrade, and expansion plans.[2]

Throughout the duration of connection planning and design activities, Toronto Hydro maintains frequent communications with prospective customers to effectively manage

[2] See Load Demand at Exhibit 2B, Section E5.3 and Stations Expansion, Exhibit 2B, Section E7.4

their expectations and accommodate their evolving requirements or concerns where applicable. If planned or ongoing connection work may temporarily affect service quality, reliability or otherwise cause disruptions for existing Toronto Hydro customers, the utility endeavours to ensure that affected customers receive timely notifications and are able to provide input regarding the scheduling of planned activities.

The utility recovers eligible costs associated with the planning and execution of connection work from the requesting customers in accordance with the DSC and other relevant OEB and internal policies. The remainder of the costs is either capitalized or recovered through operating costs as described below.

Finally, operating costs related to customer connection work also include Program support costs such as tools and equipment, uniforms, information technology, vehicle and occupancy costs.

5.2 Customer Connections Segment Costs

Toronto Hydro requires approximately $3.2 million each year during the 2020 to 2024 period to execute the functions in this segment.

Table 4 provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for the Customer Connection segment.

Table 4: Customer Connections Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Customer Connections	2.1	2.4	2.3	3.0	3.1	3.2

The 2020 test year costs proposed in this segment represent an increase of $1.1 million from the utility's last rebasing year (2015), $0.9 million from the most recent historical actual year (2017), and $0.1 million from the bridge year (2019).

5.3 Customer Connections Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

The costs from 2015 to 2016 increased by $0.3 million due to a decrease in the recoveries from new service investigations.

2016 – 2017 Variance Explanation

There is no material variance in this period.

2017 – 2018 Variance Explanation

The costs from 2017 to 2018 are forecast to increase by $0.7 million due to the increasing complexity of projects and design work on customer connection jobs.

2018 – 2019 Variance Explanation

There is no material variance in this period.

2019 – 2020 Variance Explanation

There is no material variance in this period.

6. PUBLIC SAFETY AND DAMAGE PREVENTION SEGMENT

6.1 Segment Description

The Public Safety and Damage Prevention segment consists of the governance, oversight, and execution of work to ensure public safety and prevent potential damage to Toronto Hydro's equipment when work is performed by customers (or their contractors) in proximity to the utility's assets. The primary activity in the segment is identifying the location of Toronto Hydro's underground assets (commonly referred to as "cable locates").

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 third party providers who process incoming requests and identify the location of Toronto Hydro's underground infrastructure.

The public is not charged for using Ontario One Call. This encourages the widespread adoption of the service, which yields significant public safety benefits and prevents costly damage to utility infrastructure. Toronto Hydro is obligated to pay Ontario One Call for the call centre services it provides. The utility must also pay third party contractors to perform the actual locate work. The cost of an individual locate varies depending on the nature of work requested and the timeline for its execution.

The following tables outline the number of requests received by Ontario One Call relating to Toronto Hydro's territory and the associated costs of the service.

Table 5: Ontario One Call Customer Request Volumes and Costs

Year	Number of Requests	Cost ($ Millions)
2015	161,275	$ 0.2
2016	164,291	$ 0.2
2017	162,652	$ 0.2

Table 6: Third Party Locates Provider Volumes and Costs

Year	Number of Locates	Cost ($ Millions)
2015	134,989	$ 1.7
2016	131,222	$ 1.7
2017	116,479	$ 2.5

Segment activities also include the planning and execution of Alternate Locate Agreements ("ALAs") with large excavation companies. Through an ALA, an excavation company is assigned a blanket locate and an excavator identification number. Prior to excavating, the company can call Ontario One Call and obtain immediate approval to excavate. As a result, such companies are able to bypass the standard five-day turnaround time for the receipt of the service. In addition, Toronto Hydro is able to minimize the costs associated with completing the locate. ALAs result in higher customer satisfaction, require less coordination and oversight from Toronto Hydro, and lead to cost reductions for Toronto Hydro and its customers.

6.2 Public Safety and Damage Prevention Segment Costs

Toronto Hydro requires approximately $4.5 million each year during the 2020 to 2024 period to execute the functions in this segment.

Table 7 provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for this segment.

Table 7: Public Safety and Damage Prevention Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Public Safety and Damage	4.0	4.2	5.9	5.1	4.7	4.5

The 2020 test year cost forecast represents an increase of $0.5 million from the utility's last rebasing year (2015), a $1.4 million decrease from the most recent historical actual year (2017), and a decrease of $0.2 million from the bridge year (2019).

6.3 Public Safety and Damage Prevention Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

There is no material variance in this period.

2016 – 2017 Variance Explanation

Due to Toronto Hydro's inability to meet its obligated five day turnaround time with respect to One Call locates, it procured the services of two new locate providers in an effort to improve the overall service quality, which led to the $1.7 million increase during this period.

2017 – 2018 Variance Explanation

The costs between 2017 and 2018 increased by $0.8 million due to the increase in unit costs. This increase is primarily due to the onboarding process of new contractors that are not currently utilizing office clears.

2018 – 2019 Variance Explanation

From 2018 to 2019, costs are forecast to decrease by $0.4 million. Prior to 2019, Toronto Hydro provided the oversight for the installation of protective power line covers, which were originally intended to allow competent individuals to be within the safe limits of approach during construction or maintenance work. In practice, a result of the use of line covers by the public was a false sense of safety when individuals without proper qualifications, such as window washers, worked near energized equipment. As such, Toronto Hydro is planning to discontinue the line cover program because of public safety risks. In addition, once locates contractors are fully on-boarded, costs are expected to decrease as a result of the lower unit costs.

2019 – 2020 Variance Explanation

There is no material variance in this period.

7. CUSTOMER-OWNED EQUIPMENT SERVICES SEGMENT

7.1 Segment Description

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 the temporary or permanent disconnection of these assets from the grid.

7.1.1 Vault Access

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 serve non-metered connections. The 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, however, customer equipment access activities involve transformer vaults located on customer property. In the interest of public safety, Toronto Hydro places locks on transformer vault doors, helping to ensure that only qualified personnel have access to these rooms and the high-voltage electrical equipment they contain. From time to time, Toronto Hydro customers require access to vaults for periodic maintenance and inspections, or to perform repairs identified as necessary during prior site visits.

There are over 4,600 customer-owned vaults in the Toronto Hydro service territory that contain electrical plant owned by the utility. Each vault is required to contain fire detection equipment, which must be inspected annually in accordance with the applicable legislative requirements. During vault inspections, qualified Toronto Hydro staff must be on hand for safety purposes and to prevent damage to the utility's assets. When Toronto Hydro identifies structural deficiencies with the vault or a problem with the access door, it provides the customer with a completed Customer Action Form ("CAF"), which explains the nature of the deficiencies and recommends corrective steps.

7.1.2 Customer Action Forms

A CAF is a notice issued to a customer when any electrical or civil deficiencies are found in the field on customer-owned equipment or structures. Customers are responsible for replacing or repairing their defective electrical equipment, and those that own a transformer vault are responsible for inspecting, maintaining, repairing and replacing their vault when necessary.[3] This customer work is necessary to maintain the safety and reliability of their electrical equipment and civil assets as well as Toronto Hydro's electrical infrastructure, and help avoid potential disruptions to the electrical grid. Approximately 2,000 electrical and 1,500 civil defect CAFs are issued by Toronto Hydro field groups each year.

---

[3] Examples of such electrical equipment or civil assets include electrical meter base, stand pipe, transformer vault that houses Toronto Hydro high voltage equipment, etc.

Following a process review in 2016, Toronto Hydro implemented a more rigorous CAF process to ensure that customers are made aware of their deficiencies and corrective obligations and that the deficiencies are addressed promptly to maintain the continued safe and reliable operation of the distribution system

7.1.3 Customer Isolations

Customer isolation work (i.e. temporary disconnection of customer equipment from Toronto Hydro's distribution grid) allows customers to perform inspection, maintenance, repairs or replacement of their electrical equipment.

In June 2014, Toronto Hydro, alongside the Electrical Safety Authority, stopped allowing self-isolations by customers or their authorized electrical contractors to perform work (e.g. panel change outs), and required all isolations to be performed by Toronto Hydro, including service upgrades. This was done in order to ensure the safety of electrical contractors and the general public. In the subsequent two years, there has been a significant increase to the number of isolation service orders, from an immaterial number to over 10,000 per year. Figure 4 shows the total number of service orders related to customer isolation activities for 2015 to 2017.

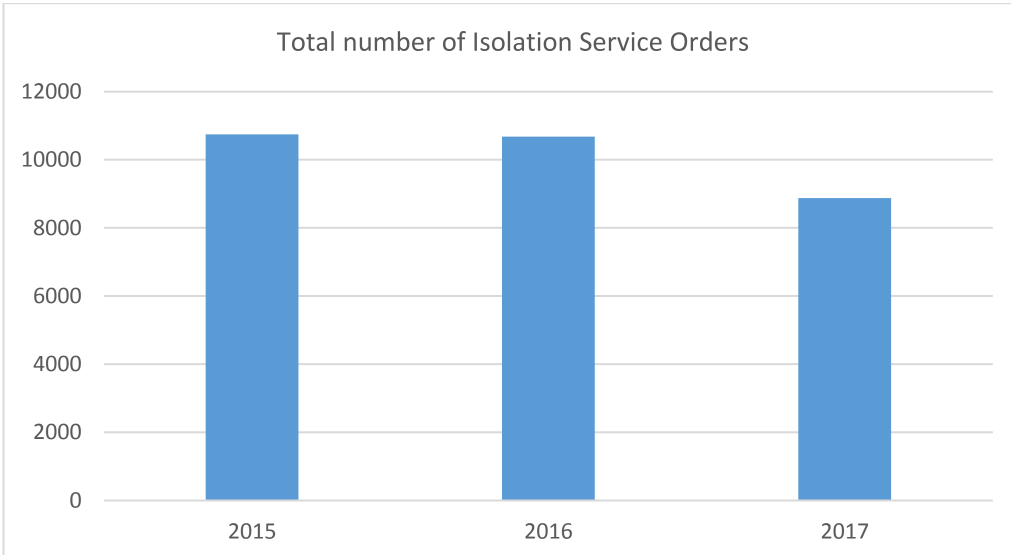


Figure 4: Total Number of Service Orders Related to Customer Isolation Activities

7.1.4 Deconstruction and Disconnections

Toronto Hydro typically carries out service disconnections and removals of the associated equipment in response to customer requests. In certain circumstances, such as where Toronto Hydro discovers unauthorized use of power, the utility carries out the disconnection work on its own initiative.

The utility recovers the costs of normal disconnection and removal work for Residential and Small General Service (Class 1 and Class 2) customers through rates, as these costs are assumed at the time of the economic evaluation of customer connection requests. For larger customers (Classes 3 and 4), Toronto Hydro recovers these costs directly from the requesting customers, based on procedures outlined in its Conditions of Service.

7.2 Customer-Owned Equipment Services Segment Costs

Toronto Hydro requires approximately $1.9 million each year during the 2020 to 2024 period to execute the functions in this segment.

Table 8 provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for the Customer-Owned Equipment Services segment.

Table 8: Customer-Owned Equipment Services Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Customer-Owned Equipment Services	4.1	3.4	3.5	1.9	1.8	1.9

The 2020 test year cost forecast represents a decrease of $2.2 million from the utility's last rebasing year (2015), $1.6 million from the most recent historical actual year (2017), and a $0.1 million increase from the bridge year (2019).

7.3 Customer-Owned Equipment Services Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

The costs between 2015 and 2016 decreased by $0.7 million, due to a lower volume of isolation requests.

2016 – 2017 Variance Explanation

There is no material variance in this period. In 2017, costs decreased as Toronto Hydro stopped offering free low voltage isolations, but this was offset by an increase in costs for isolating larger customer-owned structures (which are not recovered by the customer) due to the CAF process becoming more stringent.

2017 – 2018 Variance Explanation

The costs between 2017 and 2018 decrease by $1.6 million. This is primarily the result of Toronto Hydro recovering the costs of isolations from specific customers.

2018 – 2019 Variance Explanation

There are no material variances over this period.

2019 – 2020 Variance Explanation

There are no material variances over this period.

ASSET AND PROGRAM MANAGEMENT

1. OVERVIEW

Table 1: Asset and Program Management Program Summary

2015-2017 Average Cost ($M): 13.6	**2020 Cost ($M):** 13.1
Segments: • System Planning • Standards and Policies • Local Demand Response ("DR") • Program Management and Support	
Outcomes: Customer Service, Reliability, Safety, Public Policy, and Environment	

Toronto Hydro's Asset and Program Management program (the "Program") encompasses a broad range of asset management functions to support the reliable and safe operation of the utility's electricity distribution system.

The functions in this Program are performed under four segments: (i) System Planning; (ii) Standards and Policies; (iii) Local Demand Response; and (iv) Program Management and Support. The activities performed in these segments include:

- Equipment, materials and standards research;
- System planning and design;
- Forecasting customer and system needs;
- Outage investigations and reliability planning;
- Integration of new technologies into the utility's system;
- Incentive programs targeted at reducing peak load in areas where system expansion may be required in the medium-term; and
- Program planning, budgeting, scheduling, resourcing, and tracking/reporting of Toronto Hydro's distribution-related programs

The key outputs of the Program are plans and scopes of work, organized in annual work programs, for capital and maintenance investments, as well as incentive programs, all aimed at maintaining and improving Toronto Hydro's distribution system performance. While a portion of the associated costs are capitalized (i.e. for work directly related to capital planning and the execution of capital programs), this Program funds the remaining costs that are through operational expenditures.

2. OUTCOMES AND MEASURES

The most significant output of this Program is the Distribution System Plan ("DSP") and its maintenance and annual updates.[1] As such, the outcomes detailed in the plan are indirectly enabled by this Program. The following table summarizes specific outcomes directly attributable to this Program.

Table 2: Asset and Program Management Program Outcomes and Measures Summary

Customer Service	• Contributes to meeting Toronto Hydro's obligations for customer connections (including OEB mandated ESQR measures)[2] by: ○ Processing and executing, in a timely manner, customer connection requests and offers to connect both load and generation customers as prescribed in section 7.2 of the Distribution System Code ("DSC"), ○ Routinely meeting with, engaging, and responding to customer and stakeholder requests and concerns. • Consulting directly with customers through Local DR programs to develop cost-effective demand-side approaches that present mutually beneficial outcomes for both the utility and customers.

[1] For more details on the DSP, refer to Exhibit 2B.

[2] More specifically, Toronto Hydro's customer connection-related obligations include:
(i) completing low and high voltage connections within 5 and 10 business days respectively at least 90 percent of the time, as measured pursuant to the OEB's new connection metrics and section 7.2 of the DSC;
(ii) completing customer appointments in accordance with the OEB's Appointment Scheduling and Appointments Met metrics 90 percent of the time, as per sections 7.3 and 7.4 of the DSC; and
(iii) responding to inquiries requiring a written response within 10 business days at least 80 percent of the time, as measured pursuant to the OEB's Written Response metric and section 7.8 of the DSC.

Reliability	• Contributes to Toronto Hydro's system reliability objectives (e.g. SAIDI, SAIFI, FESI-7) by: • Maintaining and actively managing Toronto Hydro's system and customer-specific reliability performance • Ensuring ongoing stewardship of the distribution system and its ability to safely and reliably function in the long-term by maintaining asset records, scheduling maintenance activities, and developing capital investment scopes of work, and • Maximizing the usage of existing assets by conducting asset condition assessments and utilizing DR resources to maximize existing system capacity.
Public Policy	• Contributes to Toronto Hydro's public policy objectives by; ○ Ensuring regular inspection of assets to, at a minimum, comply with Appendix C of the DSC, ○ Supporting Ontario's and the City of Toronto's greenhouse gas reduction targets by helping reduce peak demand within Toronto Hydro's service area, which supports curtailing high-emitting peaking gas-fired generation.
Environment	• Contributes to Toronto Hydro's environmental objectives by: ○ Contributing to reducing the environmental impact and risks associated with Toronto Hydro's distribution system by removing underground assets at or beyond useful life that contain or are at risk of containing PCBs by 2024, pursuant to PCB regulations; and ○ Reducing greenhouse gas emissions by reducing peak demand within Toronto Hydro's service area, which curtails high-emitting peaking gas-fired generation.

Safety	• Contributes to Toronto Hydro's public and employee safety objectives by: ○ By reviewing inspection findings, scheduling timely corrective work to address deficient equipment and infrastructure, and planning asset renewal investments over the medium to long-term; thereby mitigating safety risks ○ Monitoring system capacity conditions and minimize the risk of operating the system in violation of applicable design parameters through local DR, load transfer or capacity expansion projects. ○ Actively reviewing, researching, and updating material and standards documentation related to system assets and operating procedures
Financial	• Contributes to Toronto Hydro's financial objectives by: ○ Actively mitigating system risks that can result in costly failures and associated restoration work. ○ Enabling deferral of capital investment at selected stations, allowing the utility to allocate capital to priority projects.

3. PROGRAM DESCRIPTION

The Asset and Program Management program encompasses all functions supporting Toronto Hydro's asset management work and its coordination through the following segments:

- **System Planning:** This segment enables Toronto Hydro to analyze distribution system performance and needs, develop the utility's asset management strategy, develop the DSP as well as scopes of work for executing the DSP, and manage records keeping.
- **Standards and Policies**: This segment entails the development of all design and construction standards, management of the utility's quality programs, and facilitation of load connections through the offer to connect process.

- **Local Demand Response**: This segment utilizes demand-side approaches to support Toronto Hydro's station expansion activities, (including) identifying distribution system constraints that can be addressed using demand-side measures so as to enable the deferral of potentially high-cost asset upgrades.
- **Program Management and Support**: This segment funds activities that enable the planning, budgeting, scheduling, resourcing, and tracking and reporting of Toronto Hydro's distribution-related programs. It also manages changes throughout the lifecycle of capital and maintenance projects.

4. PROGRAM COSTS

Toronto Hydro requires approximately $13.1 million each year during the 2020 to 2024 period to execute the functions in the Asset and Program Management program. Without this level of funding, Toronto Hydro could be exposed to a number of risks, including:

- System planning risks, such as:
  - Inefficient and ineffective system planning;
  - Inability to support or plan capitalized work due to reduced ability to monitor and analyze distribution system performance measures, identify system needs, or develop the capital portions of the DSP;
  - Decreased short- and long-term reliability of the distribution system.
  - Inability to capitalize on synergies or maximize the use of existing distribution system assets;
  - Sub-optimal coordination with the IESO and regional planning groups, and with customers for purposes of enabling distributed generation ("DG") connections (resulting in potential non-compliance with OEB prescribed processes and timelines); and

  - Significant safety and reliability risks if records and data updates are not synchronized with equipment or system configuration changes (given that such data is relied on by investment planners, system controllers, designers, and trades staff across the organization).
- Standards and policy-related risks, such as:
  - Reduced ability to facilitate load connections through the offer to connect process, thus resulting in potential non-compliance with OEB prescribed timelines;
  - Risk of not receiving the highest quality equipment from suppliers;
  - Less effective management of Toronto Hydro's quality programmes; and
  - Reduced access to highly specialized engineering expertise.
- Local DR-related risks, such as:
  - Inability to support Toronto Hydro's capital plans for Local DR.
- Program management and support-related risks, such as:
  - Decreased service levels in respect of customer service connections requests;
  - Less efficient use of design and construction labour resources, raising the risk for resource stranding;
  - Less effective project coordination, including sub-optimal alignment and integration with third party projects;
  - Reduced funding for governance and reporting functions that drive crucial elements of project management, such as cost controls, project performance and change management;
  - Potential for increased cost variances in execution, inconsistency in the application of design and construction standards, and adverse impact on

project development processes (including the assessment of projects for scope definition and executability); and

- Decreased risk management during operational phases.

Table provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for each of the Program's segments.

Table 3: Asset and Program Management Program Expenditures by Segment ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
System Planning	6.6	10.1	6.6	7.8	7.7	7.7
Local Demand Response	0.1	0.0	0.0	1.7	2.3	-
Standards & Policies	2.5	2.6	2.9	2.7	2.7	2.8
Program Managemnet & Support	2.0	5.3	2.0	2.6	2.6	2.6
Total	**11.2**	**18.1**	**11.5**	**14.8**	**15.3**	**13.1**

4.1 Cost Drivers

The 2020 test year cost forecast represents an increase of $1.9 million from Toronto Hydro's last rebasing year (2015), an increase of $1.6 million from the most recent historical actual year (2017), and a decrease of $2.2 million from the bridge year (2019). The high level cost drivers are described below. Specific variance explanations can be found under the detailed description of each Program segment in the sections below.

4.1.1 Planned Capital and Maintenance Work

The Program is driven by the amount of planned capital (system access, renewal, and service) and maintenance work, and associates scopes of work that must be developed. The costs of work that is required to support these programs is generally proportional to their magnitude.

4.1.2 Reactive Capital and Maintenance Work

Costs are also driven by the number of deficiencies identified through maintenance and inspections that must be processed.

4.1.3 Standards Change Requests

Costs in the Standards and Policies segment are driven by the number of standards change requests submitted and required.

4.1.4 Marketing and Legal

Costs in the Local DR segment are driven by incentive payments to customers, legal costs, software development (for the purpose of DR deployment), and program marketing materials. Toronto Hydro will benefit from the efforts made over the current rate period to develop program materials, customer contracts, and software platforms. It is therefore expected that there will be minimal risks of upward pressures over the next rate period.

4.1.5 Evolving Design Standards

The Standards and Policies segment costs are also driven by the need to comply with applicable compliance requirements, including Ontario Regulation 22/04 - Electrical Distribution Safety ("Electrical Distribution Safety Regulation").[3] For instance, all installation work must be based on standard design drawings and specifications, and all electrical equipment installed on the distribution system must be approved pursuant to that regulation. With revisions to industry standards (including CSA standards on Overhead and Underground Distribution Lines), standard design drawings and specifications are subject to change to ensure that safety standards as per the Electrical

[3] Ontario Regulation 22/04, made under the *Electricity Act, 1998*, S.O. 1998, c. 15, Sched. A.

Distribution Safety Regulation are met. Furthermore, as Toronto Hydro continues to explore the use of new technologies in its distribution system to achieve reliability improvement, gain operational efficiencies and reduce overall operating costs, standard designs evolve to reflect industry best practices.

4.2 Cost Control and Productivity Measures

Toronto Hydro expects cost control and productivity measures within the Asset and Program Management program to enable the program to maintain expenditures below 2016 and 2017 levels, thereby offsetting inflation. However, the results of these measures are not fully evident in the expenditure tables as efficiencies gained in some areas have been offset by new functions within the program. These measures include:

In the System Planning segment, despite an increased workload in terms of expanded scope of planning, Toronto Hydro expects to maintain segment expenditures below 2016 through continuous improvement measures, including:

- Implementation of new analytics tools and a data warehouse that have significantly reduced the amount of time it takes to prepare and analyze data for reliability, condition, and other risk analyses;
- Core IT system upgrades and replacements (e.g. GIS, ERP, NMS) that will enable staff to interact with the systems in a more efficient manner; and
- Strategic usage of records service providers to more cost effectively update and maintain asset records within core systems such as the GIS, ERP, and document management systems.

In the Standards and Policies segment, Toronto Hydro expects to maintain segment expenditures below 2017 levels through continuous improvement measures, including:

- Much of the work performed in this segment is initiated through formal change requests (e.g. change a construction standard to accommodate new equipment) or informal requests for support (e.g. technical clarification regarding a design policy). All instances of such services provided by this segment are tracked and categorized. The data is then used to identify trends and recurring issues, and opportunities for improvement and efficiency gains.
- Regular reviews of Key Performance Indicators and the data described above, focusing on continuous improvement, have enabled productivity gains. For example, in early 2017, the request process for changes and technical support was changed from paper-based to online. This not only made it easier to submit a request, but managing and tracking hundreds of requests became significantly more efficient. This change allowed staff to successfully handle the increase in requests discussed above.

In the Local Demand Response segment, productivity and efficiencies include:

- The development of generic templates (e.g. a generic DR contract, a residential DR program that is easily scalable) that are applicable to future Local DR programs. As a result, the costs required for marketing materials, legal documents, and software development are minimized. In the next phase, efforts to build in such efficiencies will continue, enabling increasingly more efficient programs in the future.
- Reductions in incentive payments, particularly for residential DR in the Cecil TS program, have driven significant cost savings. With a large base of residential DR participants (receiving a one-time incentive), the deployment cost associated with the DR capacity will significantly decrease.

- Additionally, based on an in-depth market segmentation analysis, selecting Basin TS will enable the next phase of Local DR to focus on Large DR projects (i.e. Toronto Hydro will contract for DR capacity directly with large electricity users).[4] This type of DR is cost-effective as it results in large capacity commitments with little overhead cost for the utility or the customer. The cost of this DR is projected to be about $110 per MW of capacity, whereas the value of that capacity to the grid is several orders of magnitude higher.

In the Program Management and Support segment, productivity and operational efficiencies are gained through the following:

- Broad productivity enhancements such as:
  - the introduction of new software to more efficiently track project information and associated change management;
  - new processes to improve the scheduling of feeder switching, which ultimately improves the effectiveness of field resource utilization as well as project execution; and
- The implementation of new time keeping software that has reduced the administration associated with labour cost processes (i.e. time sheets for field crews) by 35 percent.

5. SYSTEM PLANNING SEGMENT

5.1 Segment Description

The work done through the System Planning segment is divided into four functional areas:

- Distribution Lines & Stations Capital Planning;

[4] Local DR includes programs and technological solutions that encourage load curtailment and load-shifting, including targeted DR resource procurement at two stations: Cecil TS (continuation of current program) and Basin TS.

- Maintenance Planning;
- Generation & Capacity Planning; and
- Records Management.

Together, these functional areas enable Toronto Hydro to analyze the distribution system's performance and needs, develop the utility's asset management strategy, and produce the DSP as well as scopes of work for DSP execution.

5.1.1 Distribution Lines & Stations Planning

The Distribution Lines & Stations Planning function allows Toronto Hydro to monitor and analyze performance measures for its distribution system, identify system needs, and develop the capital portions of the DSP. The analytical work undertaken includes:

- **Reliability Analysis**: System power outage data is analyzed to: (i) identify performance patterns and trends related to specific types of equipment or geographical areas, and (ii) develop reliability forecasts based on investment scenarios. Outage data captured in specialized outage software is used to conduct detailed analyses of outage events, and identify worst performing areas as well as customers most affected by system outages. The analytical work performed under this function is critical to identifying system needs, informing investment decisions, and prioritization in various System Renewal and System Service capital programs. The results of reliability forecasting for the plan based on the DSP are provided in Exhibit 2B, Section E2. This analysis also forms the basis for managing reliability targets for measures such as SAIFI, SAIDI, and FESI-6 (further described in Exhibit 2B, Section C2), both from year to year and over the longer term.

- **Asset Condition Analysis**: This is done at both the discrete equipment and feeder (or station) levels to identify assets showing signs of significant deterioration and in need of replacement, refurbishment or other forms of intervention. This ensures the continued safe and reliable operation of the distribution system. As described in Exhibit 2B, Section D, Appendix C, Toronto Hydro devoted a significant amount of time to improve its ACA framework and algorithms and in 2017 and 2018 adopted the Common Network Asset Indices Methodology ("CNAIM"), which is a leading approach to assessing asset conditions.
- **Other Analyses**: The planning function supports the works of engineering groups by assessing risks relating to: environment and safety (e.g. oil leak deficiencies, PCB presence), customers (e.g. customer interruption costs, impact on large account customers), legal (e.g. claims relating to property damage), and corporate brand and reputation (e.g. with respect to various stakeholders, the media, specific communities).

As mentioned, the analytical work conducted as part of the Distributions Lines & Stations Planning function forms the basis of the development of Toronto Hydro's DSP and contributes to individual projects that together enable the utility to execute its capital and maintenance programs and address reliability, condition, or system risk needs at local levels (i.e. individual equipment, line sections, stations). Insights from the detailed analyses are used to explore feasible mitigation options to determine optimal solutions to specific issues. If the preferred solution for a particular issue is a capital investment, a scope of work is created. Figure 1 below illustrates Toronto Hydro's historic and forecasted capital expenditures initiated by a scope of work. Scoped work represents planned work that requires design, whereas demand program represents work that is reactive in nature or requested or initiated by customers or a third party.

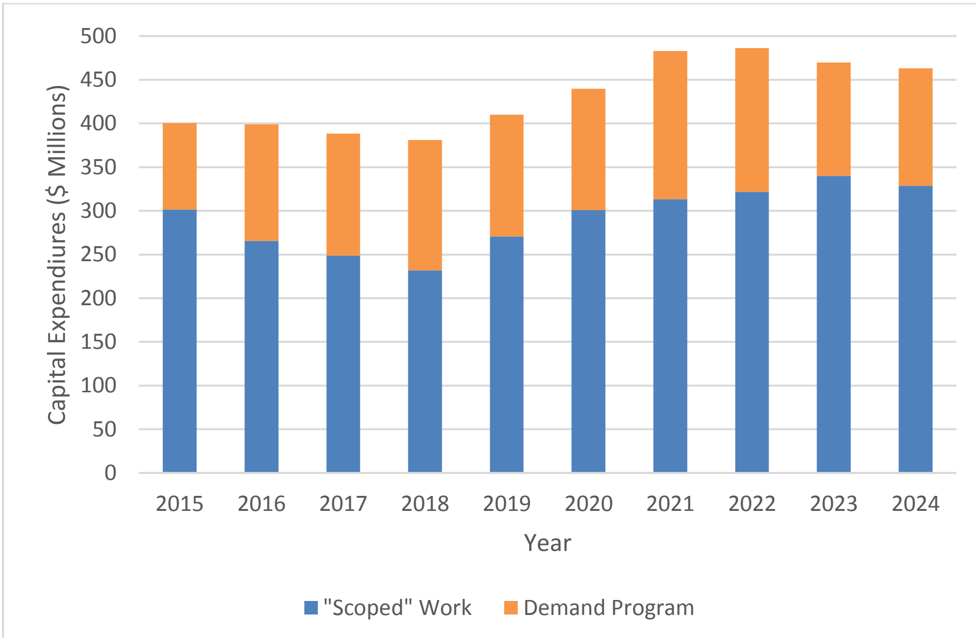


Figure 1: Value of Scopes of Work (Renewal, Service, Access)

5.1.2 Maintenance Planning

The Maintenance Planning function includes the analysis and preparation of Toronto Hydro's maintenance plans and schedules for all components of its distribution system. In 2003, Toronto Hydro adopted a Reliability-Centered Maintenance ("RCM") framework as the foundation for its maintenance planning, with subsequent review and updates in 2011 and 2016. RCM is an established engineering framework that determines failure management policies for any physical asset in its present operating context to maximize reliability and extend useful life based on the asset's function and the consequences of functional failure on the distribution system. RCM analyses are critical in scheduling asset maintenance programs and activities. From 2016 to 2018, Toronto Hydro updated the RCM results and analyses for each asset certified to align with RCM best practices.[5] See Exhibit 4A, Tab 2, Schedules 1, 2, and 3 for details on Preventative and Predictive Maintenance.

Beginning in 2017, extensive work was also performed to update the ACA (based on the most recent inspection results) and adopt a new ACA framework. The ACA is crucial to guiding planners in deciding which assets to include in their investment plans. Details regarding the ACA model are provided in Appendix C of Exhibit 2B, Section D.

The Maintenance Planning function also entails the review of all asset deficiencies identified through maintenance and inspection activities. During the 2015-2017 period, approximately 29,000 deficiencies were reported annually, and reviewed and categorized for the purposes of formulating corrective and reactive responses (as detailed in Exhibit 4A, Tab 2, Schedule 4 Corrective Maintenance). Figure 2 below shows the number of past deficiencies processed and those forecasted to be processed. It also indicates the total volume of deficiency inquiries processed to determine those that can be cancelled (as they do not warrant action to be taken) and the volume of work that is executed (i.e. executable work) using Toronto Hydro's priority (i.e. P1, P2, P3) system.

[5] Applicable Standards: SAE JA-1011 (Evaluation Criteria for Reliability-Centered Maintenance (RCM) Processes). Applicable Guideline: SAE JA-1012 (A Guide to the Reliability-Centered Maintenance (RCM) Standard)

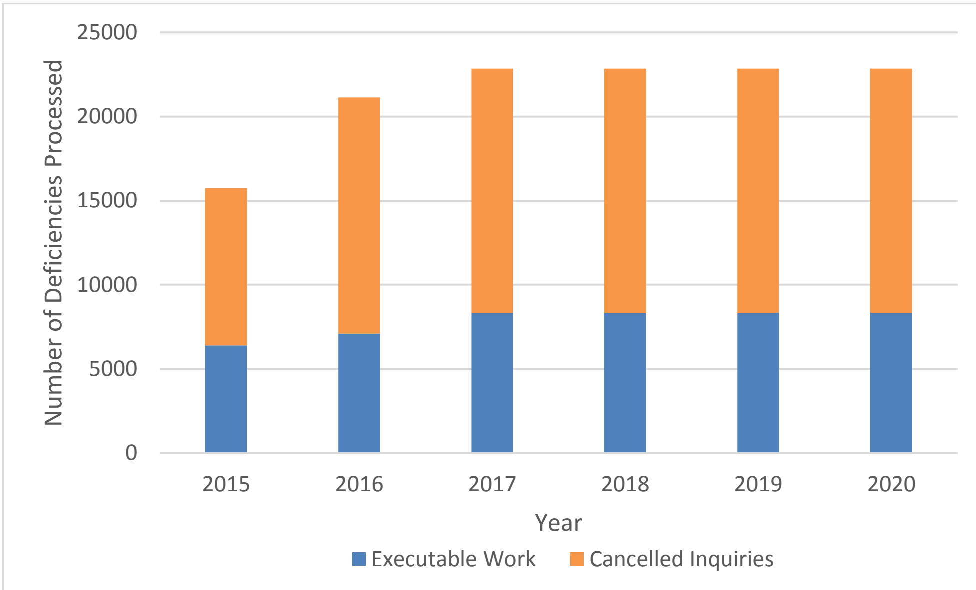


Figure 2: Number of Deficiencies Processed

The work undertaken in Maintenance Planning is critical to both the short-term viability (e.g. by addressing equipment deficiencies) and long-term viability (e.g. by prudently maintaining assets) of the distribution system.

5.1.3 Capacity and Generation Planning

This functional area is responsible for planning both the distribution system's future load requirements driven by customer growth, and requisite connection capacity to accommodate current and forecasted levels of DG in Toronto Hydro's service area. This group also identifies opportunities for adopting non-wires alternatives (including Local DR) to maximize the use of existing distribution system assets.

Capacity planning work requires the constant monitoring of changing system characteristics, such as feeder and transformer station loadings, short-circuit levels and system performance measures. Combining system performance data with past system demand trends and known requests for load and generation connections, Toronto Hydro produces system demand forecasts.[6]

Given the nature of its mandate, the capacity and generation planning function is Toronto Hydro's technical liaison with the Independent Electricity System Operator ("IESO") on all matters related to DG programs (e.g. the former Feed-in-Tariff ("FIT") and MicroFIT) as well as regional planning. Toronto Hydro has a dedicated generation planning team that works closely with customers to ensure the DG connection process is followed and timelines are met. The Capacity & Generation Planning function is responsible for the capacity plan found in Exhibit 2B, Section E5.1 Customer Connections.

5.1.4 Records Management

The Records Management function involves the maintenance and upkeep of digital records of Toronto Hydro's distribution system. The utility must maintain up-to-date records to enable efficient and effective system planning and operations due to constantly evolving system capacity and configuration resulting from new customer connections, as well as equipment failures, retirements and additions. Toronto Hydro also maintains records of its distribution asset inspections pursuant to the Electrical Distribution Safety Regulation. When Toronto Hydro installs new assets on its distribution system on a planned or reactive basis, key data management systems must be updated based on relevant installation and inspection records.[7] Figure 3 below shows the historical and projected trend in the number of equipment change-outs processed and forecasted to be processed through the above systems.

[6] See Exhibit 2B, Section D2.
[7] e.g. Geographic Information System (GIS) – Referred to as GEAR (i.e. Geospatially Enabled Asset Registry), which also serves as the source of information for Toronto Hydro's DMS/NMS, and Enterprise Asset Management System (EAM) – Referred to as Ellipse, which at the time of filing was in the process of being replaced with SAP.

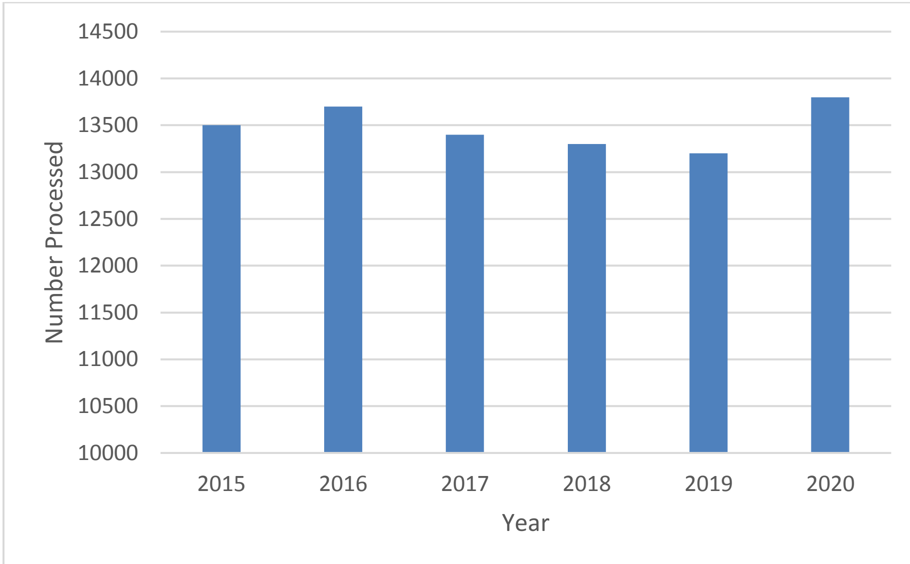


Figure 3: Number of Equipment Changeout Forms Processed

Failure to update systems and records when equipment is replaced or reconfigured in the system raises significant safety and reliability risks as this data is referenced and relied on daily by investment planners, system controllers, designers, and trades staff across the organization. The Records Management function plays a crucial role in ensuring the quality and accuracy of data maintained and used at Toronto Hydro.

5.2 System Planning Segment Costs

Toronto Hydro requires approximately $7.7 million each year during the 2020 to 2024 period to execute the functions in this segment. Table 4 provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for the segment.

Table 4: System Planning Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
System Planning	6.6	10.1	6.6	7.8	7.7	7.7

The 2020 test year costs represent an increase of $1.1 million from the utility's last rebasing year (2015), and an increase of $1.1 million from the most recent historical actual year (2017), and no change from the bridge year (2019).

5.3 System Planning Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

Costs in 2016 increased by $3.5 million over 2015 actuals. This is attributed to:

- An increase of $2.7 million associated with construction work in progress ("CWIP") write-offs in 2016 with respect to capacity, generation, records, investment, and maintenance and reliability work. These write-offs include any work that has had costs charged against it but is no longer required due to various factors including changes to system conditions, customer needs, or technology changes. $2.7 million represents approximately one percent of the scoped work that was executed in 2015. Beginning in 2016, Toronto Hydro undertook more rigorous reviews to identify work that qualifies as a CWIP write-off. Once this work is identified, the capital expenditure is expensed in accordance with applicable accounting policies.
- The remaining increase of $0.7 million is associated with increased payroll and contractor costs across the various functions for purposes that include updating RCM analyses, conducting preliminary work before implementing a new ACA framework, and addressing regulatory requirements.

2016 – 2017 Variance Explanation

The variance of $3.5 million from 2016 to 2017 is attributable to a reduction in CWIP write-offs.

2017 – 2018 Variance Explanation

Expenditures in 2018 are expected to increase by $1.2 million, as a result of inflation and a slight increase in the forecast for CWIP write-offs.

2018 – 2019 Variance Explanation

Costs in 2019 are expected to remain relatively consistent with 2018 costs.

2019 – 2020 Variance Explanation

Costs in 2020 are expected to be unchanged from costs in 2019, as a result of cost control measures offsetting inflationary pressures.

6. STANDARDS AND POLICIES SEGMENT

6.1 Segment Description

The Standards and Policies Segment is responsible for the development of the utility's design and construction standards, managing the utility's quality programs, and facilitating load connections through the offer to connect process.

More specifically, the segment's core function is the development and maintenance of design, construction and equipment standards and specifications for the electrical and civil construction work executed by Toronto Hydro. It is driven by the Electrical Distribution Safety Regulation, which requires distributors to create standard design drawings and specifications for all equipment comprising the distribution system. This function has a significant focus on safety with respect to utility workers as well as the public. "Safety by design" is a core principle routinely applied in the utility's decision making. Toronto Hydro has more than 1,000 construction standards managed by this function. Changes to these standards are driven by reliability improvements, new technologies, regulatory changes, and industry standards (e.g. CSA standards) revisions. Figure 4 below shows the number of standard change requests processed in the past three years, as well as a forecast for 2018 to 2020. Recent increases are due to improvements to the standards change request process related to awareness, request submission, communication, and transparency.

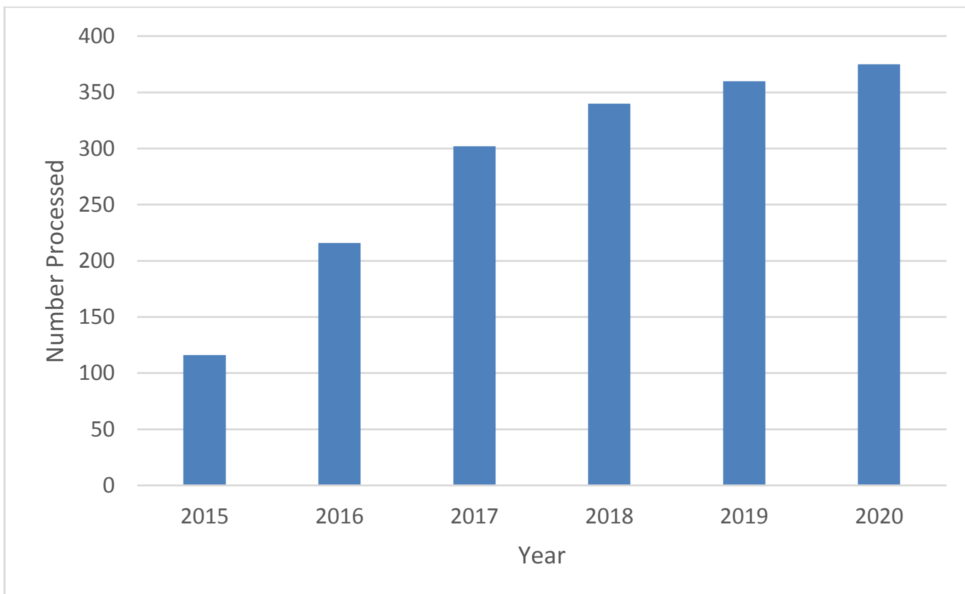


Figure 4: Number of Standards Change Requests Processed

The segment also provides services in the area of quality control throughout the equipment lifecycle. Quality audits, and reviews and investigations are conducted from when equipment and materials are procured from suppliers to when they fail in the field. Root cause analysis is the cornerstone of this segment's quality activities. Corrective and preventative actions, often issued through non-conformance reports to Toronto Hydro's equipment suppliers, drive improvements to standards and equipment. Where feasible, costs due to poor quality (e.g. equipment repairs and replacement) are recovered from equipment suppliers. This segment's quality programs play a critical role in ensuring Toronto Hydro receives equipment of the highest quality from its suppliers. Figure 5 below shows the number of failed equipment returned from the field in the past three years, as well as a forecast for 2018 to 2020. Recent increases are due to improvements to the equipment return process related to employee training, awareness, and communication.

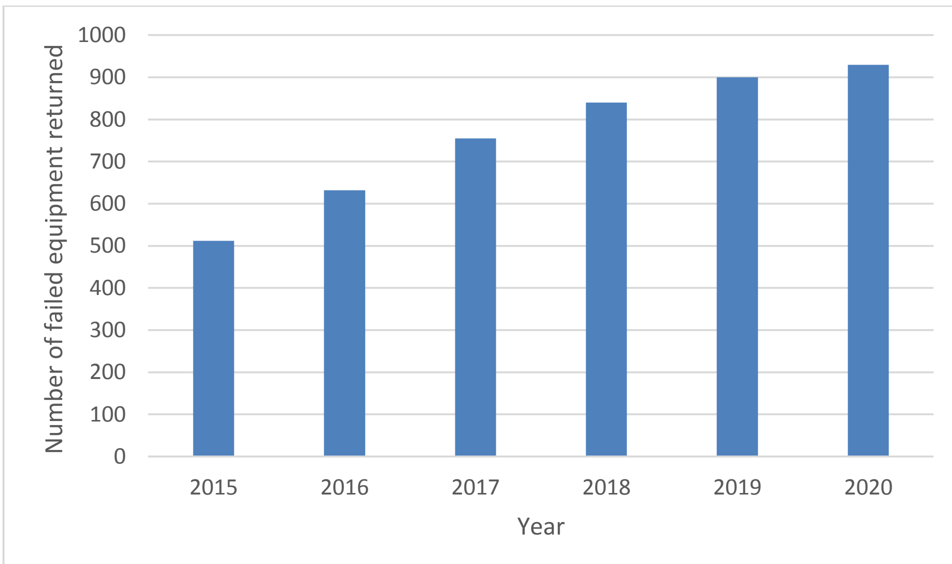


Figure 5: Number of Failed Equipment Returned from the Field

Finally, the Standards & Policies segment facilitates Toronto Hydro's offer to connect process, including economic evaluations to calculate capital contributions and expansion deposits for customer connections in accordance with the Distribution System Code. Additional details about Toronto Hydro's Customer Connections program may be found in Exhibit 2B, Section E5.1.

6.2 Standards and Policies Segment Costs

Toronto Hydro requires approximately $2.8 million each year during the 2020 to 2024 period to execute the functions in this segment. Table provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for the Standards and Policies segment.

Table 5: Standards and Policies Segment Expenditures ($ Million)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Standards & Policies	2.5	2.6	2.9	2.7	2.7	2.8

The 2020 test year costs represent an increase of $0.3 million from the utility's last rebasing year (2015), a $0.1 million decrease from the previous historical actual year (2017), and an increase of $0.1 million from the bridge year (2019).

6.3 Standards and Policies Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

There is no material variation in this period.

2016 – 2017 Variance Explanation

The variance of $0.3 million from 2016 to 2017 is attributable to an increase in spending on studies.

2017 – 2018 Variance Explanation

Costs in 2018 are expected to decrease by $0.2 million, as the net result of cost controls more than offsetting inflationary pressures.

2018 – 2019 Variance Explanation

Costs in 2019 are expected to remain stagnant over 2018, as the net result of cost controls offsetting inflationary pressures.

2019 – 2020 Variance Explanation

Costs in 2020 are expected to increase by $0.1 million over 2019, driven by a combination of the need to fund normal-course payroll cost escalations and inflationary pressures, slightly offset by cost control measures.

7. LOCAL DEMAND RESPONSE SEGMENT

7.1 Segment Description

The Local DR segment utilizes demand-side approaches to support Toronto Hydro's station expansion activities. The utility works to identify distribution system constraints that can be addressed using demand-side measures, enabling the deferral of potentially high-cost asset upgrades. Local DR supports the goals of the Conservation First Framework, the Toronto Integrated Regional Resource Plan ("IRRP") and the Ontario Long-Term Energy Plan ("LTEP") to meet local needs with distributed energy resources and conservation and demand response.

Local DR includes programs and technological solutions that encourage load curtailment and load-shifting, including targeted DR resource procurement at two stations: Cecil TS (continuation of current program) and Basin TS. These programs can help relieve capacity constraints using targeted deployment of DR, expanding the toolbox beyond wires options when determining the lowest cost capacity solution. Through DR, certain investment costs may be deferred, thus allowing the utility to reallocate and optimize capital as medium-term investment options are considered.

Local DR is needed to address capacity constraints that will begin developing in the 2020-2024 period. This program will mitigate the risks of operating the system in violation of applicable design parameters or having to undertake complex load transfer projects to free up capacity for new customers. Failure to address the capacity constraint will lead to operational and reliability risks (see Exhibit 2B, Section E7.4, Stations Expansion program for more details).

7.2 Local Demand Response Segment Costs

Toronto Hydro requires approximately $0.8 million each year during the 2020 to 2024 period to execute the functions in this segment. Table 6 provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for the Local Demand Response segment.

Table 6: Local Demand Response Segment Expenditures ($ Millions)[8]

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Local Demand Response	0.1	0.0	-	1.7	2.3	0.8

The 2020 test year costs represent an increase of $0.7 million from the last rebasing year (2015), $0.8 million from the most recent actual year (2017), and a decrease of $1.5 million from the bridge year (2019).

7.3 Local Demand Response Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Analysis

Costs in 2016 decreased by $0.1 million over 2015 actuals. This is attributed to the lack of need for labour or operating costs during the development phase of the Local DR program.

[8] Capital costs for the Local DR segment are included in Exhibit 2B, Section E7.4, Stations Expansion, along with an analysis of cost-effectiveness.

2016 – 2017 Variance Explanation

Costs in 2017 were the same as those in 2016. Similarly, this is attributed to the lack of need for labour and operational costs for Local DR.

2017 – 2018 Variance Explanation

Costs in 2018 are expected to increase by $1.7 million over 2017 to develop program tools, contracts and marketing materials, to fund the operation of DR technologies (i.e. dispatch platforms), pay incentives to customers engaging in DR activities, and to support administrative functions.

2018 – 2019 Variance Explanation

Costs in 2019 are expected to increase by $0.6 million over 2018 to continue the functions carried out in 2018 with some minor variations in addition to expected increases in customer payments, and measurement and verification activities to assess the success of the 2015-2019 program.

2019 – 2020 Variance Explanation

Costs in 2020 are expected to decrease by $1.5 million over 2019. This is attributed to a decrease in customer payments (incentives) associated with the continuation of the Cecil TS DR related to a reduced capacity payment, and no costs required for marketing materials or contracts.

8. PROGRAM MANAGEMENT AND SUPPORT SEGMENT

8.1 Segment Description

The work in the Program Management and Support segment can be subdivided into four functional areas:

- Project Development
- Work Program Management
- Stations-Based Maintenance and Annual Feeder Scheduling
- Work Execution Support

Together, these activities enable the planning, budgeting, scheduling, resourcing, tracking and reporting of Toronto Hydro's distribution system-related programs. The segment also manages changes throughout the lifecycle of capital and maintenance projects.

Additionally, this function effectively allocates work, identifies and mitigates emerging risks, and coordinates and tracks capital projects and maintenance activities across the utility's service territory.

8.1.1 Project Development

The high level objectives for the Project Development function are to:

- Refine and finalize the scope of work of capital projects to support the generation of detailed designs for the construction of projects in the proposed project execution year.
- Ensure that the proposed work is executable before it is resourced and budgeted and prior to issuance to operations teams for detailed design and construction.
- Create budgetary estimates for capital construction projects to support budgeting and resource allocation by the work execution management team.
- Create work packages which allow construction and execution groups to prioritize, estimate and schedule work.

The Project Development process begins after receiving high-level capital project scopes of work from the System Planning function. Project Development staff then conduct field inspections, along with construction field subject matter experts, to determine project feasibility and execution risk. Project Development then produces refined scopes of work, preliminary designs, and estimates. It then aligns projects with execution work programs to allow for the most efficient use of resources. The project development team engages with internal and external stakeholders to ensure project timelines can be met and to avoid conflicts and delays when a project is undergoing construction.

Once a project is constructed, the Project Development group reviews actual scope and costs in comparison to planned estimates. Identified variance outcomes are reviewed for lessons learned to facilitate continuous improvement.

8.1.2 Work Program Management

The work program management function includes the following four activities: work allocation and resourcing for capital and maintenance projects; program and portfolio management and reporting; handling and processing customer inquiries for new connections, service repairs and service upgrades; and overseeing and supporting the customer vault access program. This coordinated approach allows Toronto Hydro to fulfill its program commitments to its customers and other stakeholders.

Part of the process of creating the execution work program is to check the resulting project labour requirements against the available labour schedules and make the appropriate resource allocations to discrete projects. Once the individual project-based analysis is complete, the combined program (i.e. a collection of individual projects) is reviewed against available resources and other relevant reference information on an aggregate level, to identify any inconsistencies, deficiencies or sub-optimal resource utilization trends.

In addition to maintaining the program-wide resource balance, Program Management staff track the status of projects in the work program and the roll-up of the projects into programs and portfolios. While tracking project execution progress, Toronto Hydro seeks to proactively identify and monitor known or emerging risks that can impact the successful delivery of the work program, and develop the appropriate mitigation strategies.

Work Program Management responds to around 46,000 customer calls per year regarding requests related to new connections, service upgrades and repairs. Additionally, staff is responsible for updating customer records, scheduling appointments, issuing customer correspondence and field orders to ensure customers' needs are met within prescribed timelines.

The Work Program Management function also includes oversight and support of the customer vault access request program and customer deficiency resolution program. This includes customer work to correct civil and electrical deficiencies in a customer owned vault that contains Toronto Hydro equipment.

8.1.3 Stations-Based Maintenance and Annual Feeder Scheduling

Many projects require feeders to be taken out of service to create a safe work zone in accordance with safety requirements and practices. Each time a feeder is taken out of service in downtown Toronto, a combination of network and customer locations need to be switched. Each of these switching steps requires a crew to visit the location and manually move switch handles. Once a feeder has been switched out, work on the system (such as maintenance or installation of new assets) can be performed.

Previously, maintenance work was executed with other work requiring a feeder outage. In some cases, this resulted in incomplete maintenance programs at year-end as certain feeders did not come out of service. Catch-up was then required in following years and maintenance of some assets was no longer within established cycles (e.g. every four years for SCADA switches, circuit breakers, overhead switches, and network protectors).

Given the resource requirements associated with switching downtown feeders, bundling work based on feeder synergies presents an opportunity for efficient work execution. A feeder "synergy" is defined as a group of jobs (e.g. planned capital, maintenance, customer, and reactive repair) executed at the same time when a feeder is taken out of service. This has increased the average number of completed jobs from 941 between 2010-2015 to 1,314 between 2016 and 2017.

Program Management and Support staff identify synergies on downtown feeders to create safety, reliability, customer, productivity and environmental benefits. From a safety perspective, some of the most significant hazards associated with switching include potential fire or explosion, electrical contact, musculoskeletal injuries, slips/falls and motor vehicle accidents driving to and from switch locations.

Other key benefits include:

- Higher attainment of capital and maintenance programs;
- Improved customer reliability due to fewer outages; and

- Enhanced system stability and flexibility with fewer feeders in an abnormal configuration.

8.1.4 Work Execution Support

During project execution, Toronto Hydro coordinates its work with the anticipated work of other utilities and City of Toronto planners. This is done iteratively, from the inception of a project to its completion. In the City of Toronto, it is especially critical to coordinate projects and obtain permits given the scale of new development, infrastructure renewal and major transit projects currently in development or construction. Work Execution staff maintain the databases and business processes necessary to coordinate the work and facilitate circulation of project data with other utilities. It seeks to maximize available synergies, prevent potential conflicts and reduce potential disruptions from construction projects to Toronto Hydro's customers.

Work Execution staff is responsible for securing timely and accurate approvals for the multiple roadway work permits Toronto Hydro requires throughout a given year. This involves coordination across Toronto Hydro engineers, designers, construction teams and City officials to ensure all relevant documentation is prepared in accordance with Municipal Consent Requirement for the installation of plant within City of Toronto streets.

Another critical function under the work execution support program is timekeeping. This entails monitoring, recording and supporting analytics of the labour efforts expended by field resources and engineering/design personnel. Such data collection allows Toronto Hydro to identify trends and adjust future planning and resource-allocation assumptions to better reflect the reality of the field conditions and increase efficiencies. Recently, operational efficiencies have been achieved through activities including the implementation of a web-based online timekeeping system for the entire organization.

Finally, the work execution support function provides oversight and governance over project and program management practices. This aims to ensure that business processes, including forecasting, risk identification, change management, progress tracking and analytics are being used for all applicable projects and programs. Given the number and variety of projects in Toronto Hydro's capital and maintenance work programs, the governance function is critical to ensure the integrity and accuracy of work plans and financial forecasts submitted to the OEB, its shareholders and other neighbouring utilities. In addition to providing oversight, it is also responsible for designing and maintaining procedural documents and project management tools in alignment with industry standards and best practices. This group also has ownership of the governance software systems that support these areas.

8.2 Program Management and Support Segment Costs

Toronto Hydro requires approximately $2.6 million each year during the 2020 to 2024 period to execute the functions in this segment. Table provides the Historical (2015-2017), Bridge (2018-2019), and Test tear (2020) expenditures for the Program Management and Support segment.

Table 7: Program Management and Support Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Program Managemnet & Support	2.0	5.3	2.0	2.6	2.6	2.6

The 2020 test year costs represent an increase of $0.6 million from the utility's last rebasing year (2015), a $0.6 million increase from the previous historical actual year (2017), and no net change from the bridge year (2019).

8.3 Program Management and Support Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

The variance of $3.3 million from 2015 to 2016 is attributable to:

- $2.8 million in write-offs for internal work execution, which were either: (i) design work for projects that may have been superseded by higher priority projects based on system or customer requirements; or (ii) urgent reactive work where replacement of major assets were expected but did not occur. After significant efforts to address these prior year projects and several related process improvements, the requirement for similar write-offs will be lower in future years covered by this rate application.
- An increase in $0.5 million as a result of the project development function being fully implemented in 2015 to enhance the sophistication of, and address certain risks associated with the delivery of the capital program.

2016 – 2017 Variance Explanation

Costs in 2017 decreased by $3.3 million over 2016 actuals, as a result of: (i) the lower requirement for write-offs due to the efforts made in 2016; and (ii) operational efficiencies achieved through software implementation as detailed in section 4.

2017 – 2018 Variance Explanation

Costs in 2018 are expected to increase by $0.6 million, driven by the transfer of employees from departments covered under other OM&A programs into the Work Program Execution program to support the formation of the Project Development function.[9]

[9] Exhibit 4A, Tab 2, Schedule 10

<u>2018 – 2019 Variance Explanation</u>

Costs in 2019 are expected to be the same as 2018, as the net result of operational efficiencies offsetting inflationary pressures.

<u>2019 – 2020 Variance Explanation</u>

Costs in 2020 are expected to be the same as 2019, as the net result of operational efficiencies offsetting inflationary pressures.

WORK PROGRAM EXECUTION

1. OVERVIEW

Table 1: Work Program Execution Program Summary

2015-2017 Average Annual Cost ($M): 19.8	**2020 Cost ($M):** 21.8
Segments: • External Work Execution • Internal Work Execution	
Outcomes: Reliability, Safety, and Financial	

The Work Program Execution program (the "Program") is responsible for oversight, administrative training, and other functions performed in the process of executing Toronto Hydro's capital and maintenance work programs, which are not eligible for capitalization in accordance with the utility's capitalization policy. The Program consists of the following two segments:

- **External Work Execution**: which covers the costs required to directly administer planning and execution of the portion of Toronto Hydro's capital and maintenance program that is completed by external contractors. This includes the issuance and oversight of capital and maintenance work to meet legislated and regulatory health and safety requirements; and
- **Internal Work Execution:** which covers the administrative and support costs for the portion of Toronto Hydro's capital and maintenance program that is completed by internal labour. This segment includes safety training costs for employees, including apprentices,[1] as well as costs for small tools issuances, Personal Protective Equipment ("PPE"), logistics, tracking, project-specific

[1] With the exception of Power System Controllers, see Exhibit 4A, Tab 2, Schedule 7.

planning, and supervisory time not directly attributable to a specific program or project.

The Program and its constituent segments are a continuation of the activities described in Operations Support – Work Program Execution in Toronto Hydro's 2015-2019 Rate Application.[2]

2. OUTCOMES AND MEASURES

Table 2: Work Program Execution Program Outcomes and Measures Summary

Reliability	• Contributes to Toronto Hydro's system reliability objectives (e.g. SAIDI, SAIFI, FESI-7) by: o Undertaking oversight, administrative training and other functions performed in the process of executing Toronto Hydro's capital and maintenance work programs; and o Managing the administration associated with external contractors who respond to outages and reactive calls.
Safety	• Contributes to Toronto Hydro's safety objectives, measured through metrics such as the Total Recordable Injury Frequency ("TRIF"), by ensuring Toronto Hydro employees receive legislated safety training and possess the requisite tools and Personal Protective Equipment ("PPE") to perform their roles in a safe manner.
Financial	• Contributes to Toronto Hydro's financial objectives by ensuring that any work completed by external contractors is allocated based on a variety of factors including safety, costs, performance and qualifications. As a result, Toronto Hydro is able to determine the most qualified and cost efficient contractor for a specific project.

[2] EB-2014-0116, Toronto Hydro-Electric System Limited Application (filed July 31, 2014, corrected February 6, 2015), Exhibit 4A, Tab 2, Schedule 9. Note that in the utility's current Application, the "Contractor Administration" segment is now called "External Work Execution."

3. PROGRAM DESCRIPTION

The Program encompasses the labour costs for oversight and training activities relating to the execution of Toronto Hydro's capital and maintenance programs. This includes coordination and support of external contractors executing a portion of Toronto Hydro's capital and maintenance programs, the utility's internal design and construction crews, and apprentices. These activities are performed through two segments:

- **External Work Execution**, which covers the costs required to directly administer planning and execution of the portion of Toronto Hydro's capital and maintenance program that is completed by external contractors. This includes the issuance and oversight of capital and maintenance work to meet legislated and regulatory health and safety requirements; and
- **Internal Work Execution**, which covers the administrative and support costs for the portion of Toronto Hydro's capital and maintenance program that is completed by internal labour.

4. PROGRAM COSTS

Toronto Hydro requires approximately $21.8 million each year during the 2020 to 2024 period to execute the functions and activities described above. Without this level of funding, Toronto Hydro could be exposed to a number of risks, including**:**

- Decreased ability to meet legislated training targets, thereby exposing Toronto Hydro to unnecessary safety and legal risk;
- Reduced productivity due to inadequate tools and equipment;
- Increased risk of injury to employees and the public resulting from the lack of requisite PPE, clothing and equipment such as pylons, barriers, and hard hats; and
- Execution risk relating to a reduced ability to perform capital and maintenance plans due to lack of support and decrease in recruitment of skilled tradespeople.

Table 3, below, displays the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for the two segments comprising the Program.

Table 3: Work Program Execution Program Expenditures by Segment ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
External Work Execution	3.6	3.5	3.2	1.5	1.5	1.6
Internal Work Execution	15.9	16.0	17.4	17.6	18.7	20.2
Total	**19.5**	**19.5**	**20.5**	**19.1**	**20.3**	**21.8**

4.1 Cost Drivers

The 2020 test year cost forecast represents an increase of $2.3 million from the utility's last rebasing actual year costs (2015), $1.3 million from the most recent historical actual year (2017), and $1.5 million from the bridge year (2019). The primary cost drivers for this Program include an increase in training costs for new hires and the cost of safety equipment and clothing.

Due to retirements and attrition, recruitment within the Program is required to ensure staffing levels necessary to safely execute Toronto Hydro's capital and maintenance programs.[3] Toronto Hydro relies on a number of key certified and skilled positions, such as Certified Power Cable Person ("CPCP"), Certified Power Line Person ("CPLP"), Distribution System Technologist ("DST"), Certified Meter Mechanic/Tester, Engineering Technologist ("ETL"), and Engineers. All of these professions require a minimum number of hours training in order to fulfill their roles. The labour costs for such training is included in the Program.

[3] See Exhibit 4A, Tab 4, Schedule 3 for a discussion of Toronto Hydro's aging workforce and recruitment efforts.

The Program also funds safety equipment and PPE that is necessary for the health and safety of employees including reducing their exposure to hazards.

4.2 Cost Control & Productivity Measures

4.2.1 Cost Management

Toronto Hydro undertakes a number of measures to control costs within this Program, some of which are aimed at reducing training costs. Through the implementation of online training modules, employees now receive a substantial portion of their requisite training online. This eliminates added costs relating to travel time, and affords employees the flexibility to view the training at times that do not interfere with operations.

In addition, in 2018, Toronto Hydro began training its operational employees in groups in order to efficiently manage training a large number of similar tradespeople at the same time. Previously, if a course was required every three years, the course would be available every month for employees in need of a refresher. Currently, all Toronto Hydro tradespeople will undergo training together in 2018 and again in 2021. In doing so, the course will not need to be offered between those years and reduce the overall burden of managing the oversight of this training.

4.2.2 Productivity

Toronto Hydro continues to look for opportunities to improve the overall productivity of this Program. Since all of Toronto Hydro’s external contractors have the requisite qualifications and experience to engage in all areas of Toronto Hydro’s capital work, Toronto Hydro has implemented a process whereby work is allocated to specific contractors based on a variety of factors including safety, costs, performance, and qualifications. As a result, Toronto Hydro is able to determine the most qualified and cost efficient contractor for a specific project.

5. EXTERNAL WORK EXECUTION SEGMENT

5.1 Segment Description

The External Work Execution segment consists of the administration of capital and maintenance work performed by external contractors. This function serves as the primary point of contact between Toronto Hydro and external contractors, including evaluating and administering competitive tenders for contractor services, providing oversight of the resulting contracts and administering support of the specific projects assigned to external contractor crews, such as:

- Job package development and issuance;
- Liaising with system planners to address specific design matters;
- Field issues management;
- Ordering of materials;
- Facilitating changing of project scopes;
- Monitoring contractor safety practices;
- Invoicing and receipting; and
- Inspection of newly constructed assets.

This segment ensures that Toronto Hydro provides the employees overseeing this function with training, safety equipment, and tools that ensure external contractors are adequately monitored and compliance with legislated and regulatory requirements is met.

Lastly, the External Work Execution segment also includes the administration costs associated with managing external contractors who respond to outages and reactive calls. Since this function is shared with Toronto Hydro employees, costs may also be included in the Internal Work Execution segment depending on the responding crew. Consequently, there are slight year-over-year cost variations depending on the identity of the response crews.

5.2 External Work Execution Segment Costs

Toronto Hydro requires approximately $1.5 million each year during the 2020 to 2024 period to to execute the functions in this segment. Table 4, below, provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for the External Work Execution segment.

Table 4: External Work Execution Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
External Work Execution	3.6	3.5	3.2	1.5	1.5	1.6

The 2020 test year costs proposed in this segment represents a decrease of $2.0 million from the utility's last rebasing actual year costs (2015), $1.6 million decrease from the most recent historical actual year (2017), and a $0.1 million increase from the bridge year (2019).

The costs for this segment can be separated into two categories:

- **Capital and Maintenance**: which includes the Program Support Office and Construction groups; and

- **Reactive Contractor Administration**: which covers the oversight of non-capital reactive work (for example, digging a splice pit to access a failed cable). In 2017 to 2020, this budget is currently under the Internal Work Execution segment and is transferred annually to account for the external assistance for reactive work.

5.3 External Work Execution Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

There is no material variance in this period.

2016 – 2017 Variance Explanation

There was a $0.3 million decrease resulting from lower oversight costs of external resources.

2017 – 2018 Variance Explanation

There is a $1.7 million decrease resulting from a budgeting practice that assumes that 100 percent of reactive work will be completed internally. Every year, reactive calls are mapped out depending on whether the work was completed internally, via the Internal Work Execution segment, or through external contractors, via the External Work Execution segment. This transfer is based on the amount of reactive work completed by either crew and the associated overhead costs. These transfers are completed yearly and reflect the relative breakdown between internal and external reactive costs. The transfer for this year has not happened yet and therefore, there is variance being reported.

2018 – 2019 Variance Explanation

There is no material variance in this period.

2019 – 2020 Variance Explanation

There is no material variance in this period.

6. INTERNAL WORK EXECUTION SEGMENT

6.1 Segment Description

The Internal Work Execution segment includes the administrative support and training costs associated with construction work performed by Toronto Hydro's internal construction and design employees. Among the costs included in this segment are small tools issuance, legislated training costs, office-related expenditures, as well as time not directly attributable to any specific capital program or project. This Program ensures that Toronto Hydro employees are receiving legislated safety training and possess the requisite tools and PPE to perform their roles in a safe and financially responsible manner.

6.1.1 Safety Training

As described in detail in the Human Resources and Safety program,[4] employee health and safety are top priorities at Toronto Hydro. Underlying this commitment is the extensive health and safety awareness and training work conducted throughout the year. Toronto Hydro certified tradespersons and apprentices participate in an average of five days of health and safety training per year. The training is aimed at providing employees with the tools and knowledge to perform their work safely and efficiently, thereby maximizing the value of their work for the utility and its customers.

In addition, due to the complexity of Toronto Hydro's distribution system and the number of legacy assets that are largely unique to the utility (e.g. Paper-Insulated Lead-

[4] Exhibit 4A, Tab 2, Schedule 15

Covered cable, Box Construction), apprentices are required to complete several years of theoretical and practical training to gain the skills and knowledge required to safely work on Toronto Hydro's distribution system.

6.1.2 Apprenticeships

The Internal Work Execution segment also includes a portion of (non-capitalized) expenditures associated with capital construction work performed by Toronto Hydro's skilled trades' apprentices. Certified and skilled trades are critical resources in the execution of Toronto Hydro's capital and maintenance programs. In light of the expected retirements over the 2020-2024 plan period, Toronto Hydro aims to maintain a sufficient complement of these key roles through recruitment into the apprenticeship training programs. As outlined in the Human Resources and Safety program, this Program includes apprentice labour costs for all classes of apprentices, with the exception of Power System Controllers.

6.2 Internal Work Execution Segment Costs

Toronto Hydro requires approximately $20.2 million in the 2020 test year to successfully execute the functions in this segment. Table 5, below, provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for the Internal Work Execution segment.

Table 5: Internal Work Execution Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Internal Work Execution	15.9	16.0	17.4	17.6	18.7	20.2

The 2020 test year cost forecast represents an increase of $4.3 million from the utility's last rebasing actual year costs (2015), $2.8 million increase from the most recent historical actual year (2017), and $1.5 increase million from the bridge year (2019). The variances are attributable to the following drivers:

- Implementation of a robust Apprentice Program in the 2020 to 2024 plan period. This strategy is to mitigate the large number of retirements expected from 2018 to 2020, specifically in the trades. See Exhibit 4A Tab 4 Schedule 3 for a discussion of Toronto Hydro's apprentice hiring efforts.
- As discussed in the External Work Execution segment, part of the costs from 2018 – 2020 from the Internal Work Execution segment will be transferred to the External Work Execution segment based on the oversight of external resources completing reactive non-capital reactive work. Based on 2015 and 2016 reconciliations, this can range from $2.0 million to $2.5 million.

6.3 Internal Work Execution Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

There is no material variance in this period.

2016 – 2017 Variance Explanation

The costs increased by $1.4 million due to a $5.3 million CWIP write-off offset by a reduction in overall head count costs and a slowdown in the apprentice hiring program for one year.

2017 – 2018 Variance Explanation

The costs increased by $0.2 million due to: (i) $5.3 million in CWIP write off in 2017; (ii) approximately $4.0 million in oversight and administration costs of reactive work currently allocated in the Internal Execution segment, that will be transferred to the External Work Execution segment; and (iii) an increase in the Apprentice Program budget of approximately $1.5 million.

2018 – 2019 Variance Explanation

There is a $1.1 million increase due to an increase in the Apprentice Program.

2019 – 2020 Variance Explanation

There is a $1.5 million increase due to an increase in the Apprentice Program.

FLEET AND EQUIPMENT SERVICES

1. OVERVIEW

Table 1: Fleet and Equipment Services Program Summary

2015-2017 Average Cost ($M): 10.3	**2020 Cost ($M):** 11.0
Segments: Fleet and Equipment Services	
Outcomes: Reliability, Environment, Safety, and Financial	

The Fleet and Equipment Services program (the "Program") encompasses the administration of the procurement, maintenance, and disposal of Toronto Hydro vehicles, associated equipment and employee personal protective gear/equipment. Functions in this Program include ensuring 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.

The Program encompasses the services that oversee Toronto Hydro's 588 vehicle fleet, including a lab which provides testing services of safety equipment. The primary objective of the Program is to ensure the safe and reliable operation of all related vehicle assets and equipment, while managing these assets to the lowest overall lifecycle costs. The Program is a continuation of the activities described in the Fleet and Equipment Services program in Toronto Hydro's 2015-2019 Rate Application.[1]
The majority of the core activities of the Program are governed by legislation administered by the Ministry of Transportation (the "MTO"), through the Electrical

[1] EB-2014-0116, Toronto Hydro-Electric System Limited Application (filed July 31, 2014, corrected February 6, 2015), Exhibit 4A, Tab 2, Schedule 10.

Utility Safety Rules ("EUSR"), and the *Occupational Health and Safety Act* (Ontario) ("OHSA"). In other words, the majority of the Program work is government mandated and non-discretionary and must be carried out by highly experienced and certified trade technicians.

2. OUTCOMES AND MEASURES

Table 2: Fleet and Equipment Services Program Outcomes and Measures Summary

Reliability	• Contributes to Toronto Hydro's system reliability objectives (e.g. SAIDI, SAIFI, FESI-7) by: o Helping to ensure work crews have the ability to perform distribution work when required; and o Ensuring that the fleet is in good working order and assets are replaced before critical equipment failures arise that necessitate lengthy and costly offsite repairs.
Environment	• Contributes to Toronto Hydro's environmental objectives by aiming to reduce greenhouse gas ("GHG") emissions associated with fleet fuel consumption by: o Utilizing hybrid and electric vehicles and biofuels where possible; and o Implementing anti-idling technology, GPS reporting used to drive changes in driver behaviour, and the use of biofuels.[2]
Safety	• Contributes to Toronto Hydro's safety objectives as measured by metrics like Total Recordable Injury Frequency ("TRIF") by helping to ensure employees are working safely with minimal exposure to hazards by completing vehicle safety inspections.

[2] The use of technology to drive these results is limited by funding and classes of vehicles where the Return on Investment is justifiable.

Financial	• Contributes to Toronto Hydro's financial objectives as measured by the total cost and efficiency measures by: ○ Managing fleet and equipment assets to the lowest overall lifecycle costs; and ○ Mitigating fuel expenses by aiming to reduce fuel consumption through a combination of utilizing hybrid and electric vehicles; idle-reduction technologies; and adhering to recommended vehicle lifespans.

3. PROGRAM DESCRIPTION

The Program manages the lifecycle of vehicle and equipment assets, and the testing of related safety equipment for work on the distribution grid. This work involves the execution of competitive bids for equipment assets and related services (e.g. fueling, telematics, washing, lab testing, onboard technology), managing subsequent contracts and vendors, and the employment of skilled fleet mechanics. To ensure employee and public safety, the Program executes, in addition to ad-hoc corrective repairs, a preventative vehicle maintenance program in accordance with MTO requirements and original equipment manufacturers' ("OEM") guidelines. To ensure operator safety, Toronto Hydro equips its fleet with the necessary onboard equipment, specific to vehicle type, which can include ruggedized laptop mounts, truck grounds, air rescue kits, safety retrieval lines, and telematics systems. Toronto Hydro also employs technologies which reduce engine idle time and wear, in compliance with idle reduction targets by-laws.[3]

Toronto Hydro's fleet mechanics require a number of specialized licenses and certifications that enable them to perform repairs on utility equipment. In addition, the Program also includes the services of a North American Independent Laboratories

[3] Toronto Municipal Code, Chapter 517, Idling of Vehicles and Boats.

certified lab that provides the acquisition, certification and testing of safety tools, implements, and employee Personal Protective Equipment ("PPE") which are mandated by law for utility work. Current lab technicians are highly experienced (with more than 20 years of experience, on average) and are certified in the test and repair of gas monitors, system network protection relays, and rubber gloves. Improper functioning or lack of availability of these safety implements would expose workers to significant risks, such as potential exposure to harmful gases within vaults and cable chambers, and electrocution. Faults and failures of this equipment could also compromise grid integrity, thereby reducing system integrity.

4. PROGRAM COSTS

Toronto Hydro requires approximately $11 million each year during the 2020 to 2024 period to execute the functions in the Program, as described above. Table 3, below, provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for the Program. Program costs have remained fairly stable since the last rebasing period.

Table 3: Fleet and Equipment Services Program Expenditures ($ Millions)

Program	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Fleet and Equipment Services	10.1	9.8	11.0	10.9	11.0	11.0

The program costs cover the labour, parts, services and fuel attributable to the core program functions. The labour costs involve technicians who maintain, repair, and test all the capital assets within the Program (vehicles, equipment, and safety tools). The volume and pace of the preventative labour, as well as the testing requirements, are dictated by the legislated and policy recommendations of several oversight bodies.

Repairs to this equipment must be completed to ensure vehicles are safe for operators and the public, and the safety tools must be consistently tested to protect field employees on the job.

External service providers are used in cases where:

- The work entails greater physical risk, such as vehicle suspension work;
- The work does not require the technical expertise of a licensed mechanic, such as tire replacement;
- The work requires specific skills or credentials that Toronto Hydro employees do not possess, such as aerial lift dielectric testing; and
- The work uses equipment not owned by, or not readily accessible by the utility, such as vehicle emissions testing.

The Program also includes the costs for fueling, parts, tools, licences and insurance associated with the operation, maintenance and repair of the fleet equipment and safety programs. These costs are non-discretionary and are required for operations. Other operating costs include the employees associated with managing the Program's employees, who perform a variety of functions, including but not limited to advising on vehicle condition, administering the centralized vehicle pool and advising on standard vehicle selections for optimal safe and technical functioning, at the lowest available cost.

Without the requested funding for the Program, Toronto Hydro could be exposed to a number of risks, including:

- Reduced ability to procure all parts, services, and fuel required for proper vehicle functioning resulting in vehicle downtime, impaired ability to perform distribution work, and potentially prolonged outages;
- Reduction in the frequency, scope, and/or timeliness of vehicle maintenance work, resulting in undetected faults and potential public safety risks;
- Reduced ability to provide constant availability of certified and tested safety implements and PPE that are legislatively required for work;
- Inability to provide technologies and programs which yield sustained reduction in GHG emissions and adherence to idling by-laws;
- Reduced ability to perform management functions related to the continuous monitoring and compliance of legislated requirements; and
- Increase in costly and complex vehicle and equipment faults as a result of reduced labour capacity to perform routine maintenance.

To mitigate some of these risks, Toronto Hydro has invested in fuel-saving technologies and opts for electric and hybrid vehicles, where possible, to further save on fuel and engine-related maintenance costs. The overall fleet size has also been decreased from 660 in 2013 to 588 in 2017, which reduces maintenance, repair, and administrative costs. However, given that the average age profile of the fleet continues to escalate, these savings do not fully offset the operating costs required to sustain the current fleet.

4.1 Cost Drivers

The test year forecast represents an increase of $0.9 million from Toronto Hydro's last rebasing year (2015), remains flat when compared to the most recent historical actual year costs (2017), and remains flat from 2019 to 2020 at $11.0 million per annum.

Over 2015-2017, costs decreased due to the elimination of two administrative roles, however, these reductions were offset by an increase in vehicle-related parts and services over the same period due to maintenance costs.

4.2 Cost Control and Productivity Measures

4.2.1 Cost Management

- **Elimination of Under-Utilized Vehicles:** Toronto Hydro has reduced its fleet size in proportion to field crew attrition. Each vehicle reduction results in cost savings by eliminating the need for maintenance, repair, licensing, insurance, and associated fuel costs. On average, each vehicle removed from the fleet reduces operating costs by $2,000 to $7,000 per year. Since 2015, Toronto Hydro's fleet size has decreased by 30 vehicles (a net 5% reduction).
- **Fuel Cost Reduction**: Toronto Hydro has reduced its total fuel costs by investing in idling reduction technology and hybrid and electric vehicles.
- **Other Continuous Improvement Efforts:** The Program's employees improve processes, evaluate service agreements, and make ongoing adjustments where cost savings can be realized without increasing labour requirements. Specifically, since 2015, Toronto Hydro has generated approximately $100,000 of savings per year from the following initiatives: (i) utilizing GPS data for daily reporting on engine issues to proactively reduce breakdowns and towing; (ii) shifting externally sourced services to internal manpower where it is proven to be more cost effective; and (iii) streamlining of administration labour and processes. Between 2018 and 2020, following the completion of existing contracts, the Program plans to further explore measures to reduce parts and external services costs through the competitive bid process.

- **GPS Upgrade:** In 2016, GPS hardware was upgraded to prevent network service outages and to provide better reporting to further drive productivity gains. Engine data from the new devices is reported daily for any warning signs so that the vehicle can be brought in and serviced proactively, thus preventing more costly future failures that could arise, such as diesel particulate filter replacements. This reporting is also used to drive improvements in driver safety through management reporting on driving behaviour, which can help minimize incident frequency and related costs.

4.2.2 Productivity

Low utilization vehicles that are not required for dedicated use are allocated to a centralized vehicle pool for shared use. Specialized equipment, such as dump trucks and trailers, are allocated to the pool to eliminate the redundancy that would result from several crews with dedicated use of a particular piece of equipment.

4.3 Fleet and Equipment Services Program Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

From 2015 to 2016, costs decreased by $0.3 million (from $10.1 million to $9.8 million). This variance is comprised of:

- A $0.3 million reduction in fuel costs resulting from the timing of fuel allocations. The Program purchases all fuel upfront for the utility's use, and subsequently allocates those costs to other departments based on consumption. In 2016, these allocations exceeded total fuel costs due to an error in timing and system issue. These issues were later corrected in 2017.

2016 – 2017 Variance Explanation

From 2016 to 2017, costs increased by $1.2 million (from $9.8 million to $11.0 million). This variance is comprised of:

- An increase of $0.9 million resulting from fuel costs. The fuel allocation timing and system issues, referenced above, were resolved in 2017, resulting in a $0.9 million charge to the Fleet and Equipment Services Department. This charge was the result of a write-off of fuel allocations that should have been removed from inventory since mid-2014, but had not been removed due to an error in timing and system issues. The fuel consumption for the Fleet and Equipment Services Department (after normal allocations) is approximately $0.2 million per annum. In 2017, it was reflected as $1.0 million due to this fuel inventory correction ($1.0 million - $0.06 million typical use = $0.9 million, the value of the fuel reconciliation charge).
- An increase of $0.2 million for a mobile washing vendor. Toronto Hydro tendered a new mobile wash provider through a competitive bid process. The mobile wash vendor was the only technically qualified vendor, able to meet a City of Toronto By-Law requiring that all wash water must be prevented from entering storm sewers, and must be collected and removed from site.
- An increase of $0.1 million resulting from vehicle transfers. Toronto Hydro closed one of its three service garages towards the end of 2016, which created a need to transfer heavy duty vehicles from the west end location (71 Rexdale Blvd) to its central location (500 Commissioners) for some repair and maintenance jobs that rely upon having a fully equipped garage. The west location is equipped with a mobile service unit to handle less complicated repair and maintenance work. This cost increase to Fleet and Equipment Services was

offset by cost savings resulting from a reduced real estate footprint reflected in the Facilities Management program.[4]

2017 – 2018 Variance Explanation

From 2017 to 2018, costs are forecasted to decrease by $0.1 million (from $11.0 million to $10.9 million) as a result of a forecast decrease in fuel consumption.

2018 – 2019 Variance Explanation

From 2018 to 2019, costs increase by $0.1 million from $10.9 million to $11.0 million. This is attributable to:

- A $0.1 million reduction in payroll and labour costs due to retirements; and
- A $0.2 million increase in net vehicle costs due to forecasted increases in vehicle age.

2019 – 2020 Variance Explanation

There is no material variance in this period.

[4] Exhibit 4A, Tab 2, Schedule 12

FACILITIES MANAGEMENT

1. OVERVIEW

Table 1: Facilities Management Program Summary

2015-2017 Average Cost ($M): 26.8	**2020 Cost ($M):** 24.0
Segments: • Facilities Maintenance Services • Rentals & Leases • Utilities & Communications • Property Taxes	
Outcomes: Public Policy, Environment, Safety, and Financial	

Toronto Hydro's Facilities Management program (the "Program") delivers the workspace and property management services that enables the utility's employees to perform their work in optimally configured safe and structurally sound surroundings. The Program aims to maintain the utility's facilities in good working order and in compliance with applicable legislation and regulations. The Program is comprised of the following four segments:

- **Facilities Maintenance Services**: Work directed at maintaining and keeping the utility's facilities in good working order and in compliance with applicable legislation and regulations;
- **Rentals and Leases**: The costs associated with Toronto Hydro's leasehold agreements. Short-term equipment requirements are included in this segment;
- **Utilities and Communications**: Enabling technologies that allow Toronto Hydro to run and operate its facilities; and
- **Property Taxes**: Municipal taxes on the value of property held by Toronto Hydro.

The Program and its constituent segments are a continuation of the activities described in the Facilities Management program in Toronto Hydro's 2015-2019 Rate Application.[1]

2. OUTCOMES AND MEASURES

Table 2: Facilities Management Program Outcomes and Measures Summary

Reliability	• Contributes to Toronto Hydro's reliability objectives (e.g. SAIDI, SAIFI, FESI-7) by executing a broad range of daily, monthly and annual maintenance activities for Toronto Hydro work centres and stations, many of which house assets critical to the proper functioning of the distribution system.
Environment	• Contributes to Toronto Hydro's environmental objectives by: ○ Conducting annual waste audits and monthly diversion reports which help Toronto Hydro comply with requirements of the *Waste Reduction and Waste Audit Work Plans* (O.Reg. 102/94) and maintain the *ISO 14001* certification for environmental management;[2] ○ Conducting Designated Substance Surveys, required under the *Occupational Health and Safety Act*, which help identify and dispose of designated substances in an environmentally compliant manner; and ○ Promoting Net Cumulative Energy Savings through efficient energy management, such as building automation and control and utilization of energy efficiency analytics and benchmarking reports.

[1] EB-2014-0116, Toronto Hydro-Electric System Limited Application (filed July 31, 2014, corrected February 6, 2015), Exhibit 4A, Tab 2, Schedule 11.
[2] International Organization for Standardization (2015). *Environmental Management Systems* (ISO/TC 14001). Retrieved from <https://www.iso.org/iso-14001-environmental-management.html>

Safety	• Contributes to Toronto Hydro's safety objectives, measured through metrics such as the Total Recordable Injury Frequency ("TRIF") by: ○ Ensuring compliance with Ontario's *Building Code*,[3] *Fire Code*,[4] and regulations under Ontario's *Environmental Protections Act,* in respect of emergency generator maintenance (O.Reg. 346/12), and the requirements contained in the *Fire Protection and Prevention Act, 1997* in respect of fire suppression certifications (O.Reg. 213/07); ○ Maintaining life safety systems (fire suppression & monitoring, first aid kits, etc.) housed within Toronto Hydro's buildings; ○ Completing prevention and routine maintenance and inspections on lighting and emergency exits; ○ Administering surveys (such as Asbestos Containing Material surveys required under OR 278/05) and sampling related to construction projects such as PCB containing caulking, lead paint, asbestos containing shingles, etc.; ○ Maintaining *OHSAS 18001* certification for Occupational Health and Safety Management using the Program's maintenance management system;[5] and ○ Managing security services such as guards, surveillance, access cards, etc., that secure and protect employees and distribution assets.

[3] S.O. 1992, c. 23 ["*Building Code Act*"].
[4] S.O. 1997, c. 4 ["*Fire Protection and Prevention Act*"].
[5] Occupational Safety and Health Administration (2018). *Occupational Health and Safety Management* (Standard No. 18001). Retrieved from <https://www.bsigroup.com/en-CA/BS-OHSAS-18001-Occupational-Health-and-Safety/>

Financial	• Contributes to Toronto Hydro's financial objectives by: ○ Utilizing a cost-effective maintenance approach involving a balance of preventative maintenance and run-to-fail strategies; ○ Avoiding monetary penalties for non-compliance with mandated legislative requirements; ○ Enhancing productivity of employees via the maintenance of optimally configured surroundings; ○ Utilizing the Facilities Asset Management Strategy to maximize the useful life of station and work centre supporting equipment; ○ Utilizing benchmarking data (e.g. *BOMA EER*) to optimize space utilization of existing footprint and control maintenance and utility costs;[6] and ○ Managing building operating costs by leveraging the added benefits (e.g. technology advancement and improved automation) of the capital modernization initiatives. The Program uses benchmarking data (e.g. *BOMA EER*) to optimize space utilization of existing footprint and control maintenance and utility costs.[6]

3. PROGRAM DESCRIPTION

Toronto Hydro's current building footprint consists of four work centres and 207 stations located throughout the City of Toronto. These buildings and stations are in various states of repair and range in age from historic sites to new buildings. Each property serves a unique function and must be maintained and serviced according to legislative and regulatory requirements, Toronto Hydro's environmental, health and safety policies, and the need to facilitate the distribution of electricity.

A subset of facilities maintenance work is driven by local and provincial government safety accessibility, emergency preparedness, and environmental regulations. Failure to

[6] BOMA Experience Exchange Report (2018).

comply with government regulations can result in temporary equipment lock out and/or fines, which may lead to costly interruptions to regular business activities that can ultimately affect Toronto Hydro's customers. In addition to this externally mandated work, the Program oversees the provision of services for Toronto Hydro buildings and stations which includes routine maintenance, preventative maintenance, office services, property maintenance, security and environmental services. These activities are undertaken through the following four segments: (i) Facilities & Maintenance Services; (ii) Rentals & Leases; (iii) Utilities & Communication; and (iv) Property Taxes.

4. PROGRAM COSTS

Toronto Hydro requires approximately $24.0 million each year during the 2020 to 2024 period to efficiently execute the activities in this Program, which are comprised of four segments: (i) Facilities Maintenance Services; (ii) Rentals and Leases; (iii) Utilities and Communications; and (iv) Property Taxes. Without adequate program funding, Toronto Hydro could be exposed to a number of risks, including, but not limited to**:**

- Fines, penalties, equipment lock out for non-compliance with the statutory and regulatory requirements;
- Service disruptions resulting from deferred maintenance at Toronto Hydro stations, which house critical distribution assets; and
- Employee and public safety risks resulting from the deferred maintenance.

Any reduction in funding levels would result in curtailment in the scope, frequency, and timeliness of maintenance activities. This could, in turn, create situations where safety issues or equipment malfunctions are not identified and rectified in a timely manner, thus imposing potential safety risks to the public and Toronto Hydro's employees or compromising the utility's ability to perform its key functions due to equipment malfunctions.

The Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for each of the Program's segments are summarized in Table 3 below.

Table 3: Facilities Management Program Expenditures by Segment ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Facilities Maintenance Services	14.6	15.4	15.3	14.1	14.7	15.1
Rentals & Leases	5.2	5.3	1.7	0.3	0.4	0.4
Utilities & Communications	2.4	2.4	2.6	3.1	3.0	3.1
Property Taxes	5.2	4.6	5.6	5.6	5.4	5.5
Total	**27.4**	**27.8**	**25.3**	**23.2**	**23.4**	**24.0**

4.1 Cost Drivers

The 2020 test year forecast costs represent a decrease of $3.4 million from the utility's last rebasing year actual costs (2015), a decrease of $1.3 million from the most recent historical actual year (2017), and an increase of $0.6 million from the bridge year (2019).

These year-over-year variances are primarily attributable to building consolidation efforts that reduced the number of operating centres from seven to four. A breakdown of this effort is provided in the Facilities Program Cost Control Measures section that follows. As for the cost increase from the Bridge Year (2019) to the Test Year (2020), this timeframe marks the end of the consolidation efforts and the subsequent inflationary escalation thereafter.

4.1.1 Facilities Services Segment Cost Drivers

These variances are attributable to the following factors:

- The operating centre consolidation effort that reduced the overall building footprint, which in turn minimized the scope of the FMO;
- The addition of Copeland TS to the stations portfolio;
- Variable reactive maintenance due to the age of facilities' assets;
- Change order management; and
- Period inflationary escalations.

4.1.2 Rentals and Leases Cost Drivers

The Test Year (2020) costs associated with this segment are projected to be $0.4 million, which represents a decrease of $4.8 million from the utility's last rebasing year actual costs (2015), a decrease of $1.3 million from the most recent historical actual year costs (2017), and no increase from the bridge year (2019). These variances are attributable to the following drivers/factors:

- The expiry of two leases related to the OCCP;
- A change to the accounting treatment of leased facilities; and
- Inflationary pressures from 2019 and onward.

4.1.3 Utilities and Telecommunication Cost Drivers

The Test Year (2020) costs associated with this segment are projected to be $3.1 million, which represents an increase of $0.7 million from the utility's last rebasing year (2015), a $0.5 million increase from the most recent historical actual year (2017), and a $0.1 million increase from the bridge year (2019). The increase since the last rebasing year (2015) is a by-product of the end of the rental lease since property ownership leads to direct responsibility for utility costs.

4.1.4 Property Tax Segment Cost Drivers

The 2020 proposed test year costs associated with this segment are projected to be $5.5 million, which represents an increase of $0.3 million from the utility's last rebasing year (2015), a $0.1 million reduction from the most recent historical actual year (2017), and a $0.1 million increase from the bridge year (2019). These variances are attributable to the following drivers/factors:

- The use of a City of Toronto Property Tax Rebate program that provides savings for unoccupied commercial property; and
- The execution of the OCCP phases.

Absent the requested level of funding for this segment, Toronto Hydro could not pay its full property tax burden. This would lead to interest payments on the deferred amount, increasing overall costs.

4.2 Cost Control and Productivity Measures

Toronto Hydro uses the following tools and initiatives to control Program costs:

4.2.1 Real Estate Management

The primary driver of cost reductions in this Program are the realization of the net benefits resulting from Toronto Hydro's approach to the management of its real estate portfolio. The Operating Centres Consolidation Program ("OCCP")[7] was a real estate initiative from 2014 to 2018 driven by three primary outcomes:

a) Ensuring security of tenure at major crew-supporting operating centres;

[7] EB-2014-0116, Toronto Hydro-Electric System Limited, Exhibit 2B, Section E8.3 (Filed July 31, 2014, Corrected: September 23, 2014).

b) Ensuring the uninterrupted continuation of critical functions (i.e. Data, Control and Call Centres) by transferring these functions to a location where vital fibre-optic communication facilities and uninterruptable power supply are available or can be installed; and

c) Achieving cost savings for ratepayers through:
   - (i) Allocation of net after-tax gains and related tax savings on sale of properties;
   - (ii) Eliminating otherwise ongoing property-related costs associated with the properties; and
   - (iii) Increasing the utilization of remaining properties.

To deliver these outcomes, the OCCP was executed in four phases, see Table 4 blow.

Table 4: Consolidation of Toronto Hydro's Operating Centres

<table>
<tr><th>Phase No.</th><th>Phase Description</th><th>Execution Timing</th><th>Financial Impact</th></tr>
<tr><td>1</td><td>Sale of 5800 Yong Street</td><td>Mid-2018</td><td>Facilities services and costs no longer incurred. Proceeds to be returned to ratepayers.</td></tr>
<tr><td>2</td><td>Transfer of staff & operations from 601 Milner to 715 Milner</td><td>Mid-2017</td><td rowspan="2">The termination of the leases presented significant savings for the 'Rentals & Leases' segment. Cost in relation to the owned facilities partially offset these benefits.</td></tr>
<tr><td>3</td><td>Transfer of staff & operations from 6 Monogram to 71 Rexdale</td><td>Q4 2016</td></tr>
<tr><td>4</td><td>Disposal of property at 28 Underwriters</td><td>Q2 2015</td><td>Facilities services and costs no longer incurred.</td></tr>
</table>

The resulting benefit of executing the phases of the OCCP translated to the year-over-year segment cost savings presented below:

Table 5: Year-Over-Year Cost Impact of the OCCP

Segment	14-15	15-16	16-17	17-18	18-19	19-20
Facilities Maintenance Services	-2.2	1.3	0.1	-1.8	0.2	0.0
Rentals & Leases	0.0	-0.1	-3.7	-1.2	0.0	0.0
Utilities & Communications	-0.6	-0.1	0.1	0.5	-0.2	0.0
Property Taxes	-0.1	0.0	0.5	-0.1	-0.3	0.0
Total Variance	**-2.9**	**1.1**	**-3.0**	**-2.6**	**-0.3**	**0.0**

In addition, in June 2017, the effectiveness of the Program's space utilization efforts allowed Toronto Hydro to dispose of an additional property at 60 Eglinton, the proceeds of which will be returned to ratepayers. The employees from 60 Eglinton were transferred to other Toronto Hydro owned-properties in June 2017, allowing for a reduction in maintenance costs, see Table 6 below.[8]

Table 6: Cost Implications of the Disposition of 60 Eglington

Segment	14-15	15-16	16-17	17-18	18-19	19-20
Facilities Maintenance Services	0.0	0.0	-0.1	-0.1	-0.1	0.0
Rentals & Leases	0.0	0.0	0.0	0.0	0.0	0.0
Utilities & Communications	0.0	0.0	0.0	-0.1	0.0	0.0
Property Taxes	0.0	0.0	0.0	0.0	0.0	0.0
Total Variance	**0.0**	**0.0**	**-0.1**	**-0.2**	**-0.1**	**0.0**

4.2.2 Hybrid Maintenance Approach

The use of a combination of internal resources and a third-party provider allows for the execution of a cost-effective maintenance approach involving a balance of preventative maintenance and run-to-fail strategies. This arrangement effectively creates a "one-window" approach for all facilities-related requests from employees and facilitates effective coordination of work.

[8] Toronto Hydro retains a lease for the property until June 2018 to provide the requisite time to decommission assets.

4.2.3 Performance Benchmarking

Leveraging parametric data received through membership in industry associations such as the Building Owners and Managers Association ("BOMA") to improve Toronto Hydro's operating efficiency. For instance, the regional BOMA Experience Exchange Reports ("EER") measures the cost per square-foot of key FMP functions against other peer utilities. In addition, performance is also tracked using benchmarking data retrieved from the Energy Star Portfolio Manager, an online tool to measure and track energy and water consumption against other commercial and institutional buildings. Toronto Hydro uses this data to analyze its performance and make recommendations for improvements to areas such as energy and utilities conservation.

4.2.4 Data Driven Decision Making

Toronto Hydro utilizes a comprehensive management system (CMMS) that tracks and schedules maintenance work and manages records. This database contains, among other things, historical data on the types of requests from each operating centre, and provides the ability to query the work order data related to sub-programs within this segment (e.g. repair and maintenance, cleaning, exterior grounds, etc.). The ability to differentiate the time spent on these different activity types allows for the related resource costs to be measured. This, in conjunction with departmental performance measures tracking the percentage of labour utilization, maximizes the time spent performing actual maintenance and repair work.

4.3 Segment-Specific Cost Control Measures

4.3.1 Rentals and Leases Segment Cost Control Measures

Toronto Hydro minimizes costs within this segment by working with commercial brokerage companies to secure appropriate office spaces, when needed, at fair market value with favourable contractual arrangements. Currently, the utility has 12,000 square-feet of leased space and the rental costs are determined via existing agreements with owners of properties. However, Toronto Hydro's focus on utilizing owned rather than leased properties has led to some cost savings within this segment. Since the last rebasing year, Toronto Hydro eliminated 1.0 million square-feet of leased property.

4.3.2 Utilities and Telecommunication Segment Cost Control Measures

To mitigate the cost escalation, Toronto Hydro works to improve its energy efficiency performance (i.e. electricity, natural gas and water consumption) by progressively upgrading the equipment standards used across its facilities, where justifiable. These improvements allow Toronto Hydro to partially control/offset the pace and scale of externally driven escalations. Further, Toronto Hydro has begun enrolling its operating centres in the BOMA Best program, which provides visual reporting (e.g. dashboard, time plotted data, etc.) for electricity, gas and water consumption. This feature will aid performance tracking, allowing the FMP to control operating expenditures by stretching performance measures such as the Equivalent kilowatt hours per square-foot (ekWh/ft^2) on an annual basis (see Outcomes and Measures section above).

4.3.3 Property Tax Segment Cost Control Measures

Following the recent consolidation initiatives to reduce the number of Toronto Hydro's properties, the primary cost control measures are space management and tax rebate programs when available. An example of a tax rebate program that has been utilized to control costs is the "Vacant Commercial & Industrial Unit Tax Rebate Program", which provides savings of 30 percent for vacant properties.[9] Through this Program Toronto

[9] Vacant Commercial & Industrial Unit Tax Rebate Program (2017). Retrieved from <https://www.toronto.ca/services-payments/property-taxes-utilities/property-tax/property-tax-rebates-and-relief-programs/vacancy-rebate-program/.>

Hydro has reduced its property tax burden (See 2015-2016 variance explanation) by having its Stations properties reassessed by MPAC to reflect current occupancy.

5. FACILITIES MAINTENANCE SERVICES SEGMENT

5.1 Segment Description

Toronto Hydro's Facilities Maintenance Segment covers a broad range of daily, monthly, and annual maintenance activities that are driven by statutory and regulatory requirements, internal health and safety policies, building and asset condition reports, and industry best practices. The focus of this segment 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 ensure employee and public safety.

Failure to comply with government regulations can result in temporary equipment lock out and/or fines, which may lead to costly interruptions to regular business activities that can ultimately affect Toronto Hydro's customers. In addition to the externally mandated work, the Program oversees the provision of services for Toronto Hydro buildings and stations.

Toronto Hydro relies on a combination of internal resources and a third-party service provider to execute the Program functions.[10] This arrangement allows Toronto Hydro to react to issues sooner, track data on reoccurring problems in a systematic manner, and formulate improved planning activities. These planning activities include all the

---

[10] Please refer to EB-2014-0116, Toronto Hydro-Electric System Limited Application (filed July 31, 2014, corrected February 6, 2015), Exhibit 4A, Tab 2, Schedule 11 for a detailed discussion of this arrangement.

necessary tasks and services to maintain the properties, including offices, work centres and the buildings housing the utility's Transformer and Municipal stations ("TS" and "MS", respectively). Toronto Hydro's attention to regular preventative maintenance of its office buildings, work centres, and stations contributes to the utility's safety record. Toronto Hydro utilizes a cost-effective maintenance approach involving a balance of preventative maintenance and run-to-fail strategies. Run-to-fail strategies apply to low impact and low cost equipment that have readily available parts or replacements, and for which the cost of preventative work would be wasteful. Balancing the two methods keeps vital building systems operable while allowing technicians' capacity for proactive and reactive work. The CMMS schedules and tracks this approach through the following maintenance activities:

- **Preventative Maintenance**: Routine inspections and tasks to ensure that equipment, systems, and their respective components are fully operational. This includes activities such as periodic inspections of magnetic locks on all of Toronto Hydro's emergency exits, to prevent unauthorized entry and release when a fire alarm is activated.
- **Corrective Maintenance**: Through its routine preventative inspections, Toronto Hydro identifies the systems and equipment requiring corrective work, ensuring that any malfunctions are proactively rectified.
- **Reactive Maintenance**: Involves response to reports and requests to address any specific issues that arise from time to time. Examples of reactive work include repairs of run-to-fail assets, adjustments of building temperatures to meet the requirements of the *Occupational Health and Safety Act*,[11] lighting replacements, and repairs to parking gates.

[11] R.S.O. 1990, c. O.1 ["*Occupational Health and Safety Act*"].

5.2 Facilities Maintenance Services Segment Costs

The Test Year (2020) costs associated with this segment are projected to be $15.1 million. These costs include both internal and external work, vehicle costs for travel between sites and other related expenses. Table 7, below, provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for the Facilities Maintenance Services Segment.

Table 7: Facilities Maintenance Services Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Facilities Maintenance Services	14.6	15.4	15.3	14.1	14.7	15.1

The 2020 test year costs represent an increase of $0.5 million from the utility's last rebasing year (2015) actuals, a $0.2 million reduction from the most recent historical actual year (2017), and a $0.4 million increase from the bridge year (2019).

5.3 Facilities Maintenance Services Segment Year-over-Year Variance Analysis

This section provides a variance explanation for the year-over-year changes to the Facilities Maintenance Service Segment dating back to the last rebasing period (2015).

Table 8: Attribution of Year-over-Year Cost Variance ($ Millions)

Facilities & Maintenance Services	15-16	16-17	17-18	18-19	19-20
OCCP	1.3	0.1	-1.8	0.2	0.0
Other Consolidation	0.0	-0.1	-0.1	-0.1	0.0
Copeland TS			0.4		
Reporting Change	-1.1				
Reactive Work	0.3	-0.3	0.0	0.2	0.0
Escalation(s)	0.3	0.2	0.3	0.3	0.4
Total Variance	**0.8**	**-0.1**	**-1.2**	**0.6**	**0.4**

2015 – 2016 Variance Explanation

The $0.8 million increase from 2015 to 2016 is attributable to:

- A $1.3 million increase resulting from move-related costs related to the OCCP;
- A $1.1 million decrease, resulting from one-time environmental remediation costs being incurred 2015;
- A $0.3 million increase resulting from more reactive maintenance activities; and
- A $0.3 million increase resulting from inflationary pressures, such as material prices and compensation.

2016 – 2017 Variance Explanation

The $0.1 million reduction from 2016 to 2017 is attributable to:

- A $0.1 million increase resulting from the OCCP;
- A $0.1 million decrease resulting from maintenance scope reduction for the property at 60 Eglinton Avenue;
- $0.3 million decrease resulting from a decrease in reactive work; and
- A $0.2 million increase resulting from inflationary pressures, such as material prices and compensation.

2017 – 2018 Variance Explanation

The $1.2 million reduction from 2017 to 2018 is attributable to:

- A $1.8 million decrease resulting from the net impact of a property disposition, and incurring final consolidation-related costs in 2017;
- A $0.1 million forecasted decrease in costs resulting from the lease termination of 60 Eglinton in June 2018;
- A $0.4 million increase resulting from the expected increase in maintenance costs for a newly commissioned substation (i.e. Copeland TS); and
- A $0.3 million increase resulting from inflationary pressures, such as material prices and compensation.

2018 – 2019 Variance Explanation

The $0.6 million increase from 2018 to 2019 is attributable to:

- A $0.2 million increase resulting from lagging maintenance costs related to building systems and equipment coming off warranty at the newly constructed owned facilities;
- A $0.1 million decrease resulting from the disposal of 60 Eglinton in June 2018;
- A $0.2 million increase resulting from anticipated reactive maintenance work based on the existing condition assessments; and
- A $0.3 million increase resulting from inflationary pressures, such as material prices and compensation.

2019 – 2020 Variance Explanation

The $0.4 million increase from 2018 to 2019 is attributable to inflationary pressures.

6. RENTALS AND LEASES SEGMENT

6.1 Segment Description

The utility's rentals and leases expenditures are driven by the need for sufficient, properly configured, and cost-effective office and work centre spaces. Over the current rate period, Toronto Hydro eliminated 1.5 million square-feet of leased property. The residual lease costs are for office spaces located near Toronto Hydro's main owned facilities and are required for staff for whom there is insufficient space within those owned facilities.

6.2 Rentals and Leases Segment Costs

Table 9 below provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for the Rentals and Leases segment.

Table 9: Rentals and Leases Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Rentals & Leases	5.2	5.3	1.7	0.3	0.4	0.4

The 2020 test year costs represent an decrease of $4.8 million from the utility's last rebasing year (2015) actuals, a $1.3 million reduction from the most recent historical actual year (2017), and no change from the bridge year (2019).

6.3 Rentals and Leases Segment Year-over-Year Variance Analysis

This section provides a variance explanation for the year-over-year changes to the Rentals and Leases Segment going back to the last rebasing period (2015).

Table 10: Attribution of Year-over-Year Cost Variance ($ Millions)

Rentals & Leases	15-16	16-17	17-18	18-19	19-20
OCCP	-0.1	-3.7	-1.2	0.0	0.0
Accounting Treatment	0.0	0.0	-0.3	0.0	0.0
Escalation(s)	0.2	0.1	0.1	0.1	0.0
Total Variance	**0.1**	**-3.6**	**-1.4**	**0.1**	**0.0**

2015 – 2016 Variance Explanation

The increase of $0.1 million from 2015 to 2016 is attributable to:

- A $0.1 million decrease resulting from the OCCP i.e. termination of an operating centre lease in November 2016; and
- A $0.2 million increase resulting from contractual escalations.

2016 – 2017 Variance Explanation

The decrease of $3.6 million from 2016 to 2017 was attributable to:

- A decrease of $3.7 million relating to the OCCP. The residual benefit of the lease terminated November 2016 was realized since the expenditure was eliminated. Phase 2 of the OCCP was completed July 2017, which presented an additional five months of savings for 2017; and
- A $0.1 million increase resulting from contractual escalations.

2017 – 2018 Variance Explanation

The decrease of $1.4 million from 2017 to 2018 was attributable to:

- A $1.2 million decrease resulting from Phase 2 of the OCCP i.e. the 7 months of rent incurred during the 2017 period was removed from the 2018 budget;
- A $0.3 million decrease related to a new accounting treatment for leases (i.e. IFRS 16), which treats the base rent as capital expenditure; and

- A $0.1 million increase resulting from contractual escalations.

2018 – 2019 Variance Explanation

The increase of $0.1 million from 2018 to 2019 is attributable to contractual escalations.

2019 – 2020 Variance Explanation

Negligible contract escalations.

7. UTILITIES AND COMMUNICATIONS SEGMENT

7.1 Segment Description

The Utilities and Communications segment encompasses the costs of providing water, electricity, natural gas, and related services to Toronto Hydro's office buildings, work centres, and stations. The utility's costs for this segment are driven by the costs charged by various 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.

Toronto Hydro works to manage its costs by promoting conservation and improving the energy efficiency of its facilities. To facilitate consistent implementation of energy efficiency standards, Toronto Hydro developed standards that outline the relevant energy, water, and gas efficiency criteria that the utility's new and renovated work spaces must 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 other utilities, telecommunications are another key component of this Program's expenditures. Desk phones, cell phones, internet access and other wireless communication equipment and services are vital tools for the day-to-day operations. 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 Centre.

7.2 Utilities and Communications Segment Costs

Table 11 below provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures relating to Utilities and Communications.

Table 11: Utilities and Communications Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Utilities & Communications	2.4	2.4	2.6	3.1	3.0	3.1

The 2020 test year costs represent an increase of $0.7 million from the utility's last rebasing year (2015) actuals, a $0.5 million increase from the most recent historical actual year (2017), and a $0.1 million increase from the bridge year (2019).

7.3 Utilities and Communications Segment Year-over-Year Variance Analysis

This section provides a variance explanation for the year-over-year changes to the Utilities and Communications Segment dating back to the last rebasing period (2015).

Table 12: Attribution of the Year-over-Year Cost Variance ($ Millions)

Utilities & Communications	15-16	16-17	17-18	18-19	19-20
OCCP	-0.1	0.1	0.5	-0.2	0.0
Other Consolidation	0.0	0.0	-0.1	0.0	0.0
Escalation(s)	0.1	0.1	0.1	0.1	0.1
Total Variance	**0.0**	**0.2**	**0.5**	**-0.1**	**0.1**

2015 – 2016 Variance Explanation

The negligible change from 2015 to 2016 was attributable to:

- A $0.1 million decrease resulting from the disposition of 28 Underwriters (as part of the OCCP); and
- A $0.1 million increase resulting from the annual increase of utility and communication rates.

2016 – 2017 Variance Explanation

The $0.2 million increase from 2016 to 2017 was attributable to:

- A $0.1 million increase resulting from the OCCP, which added incremental ownership costs to the segment. Previously, the leasehold arrangements included the utility costs in the rent payments; and
- A $0.1 million increase resulting from the annual increase of utility and communication rates.

2017 – 2018 Variance Explanation

The $0.5 million increase from 2017 to 2018 was attributable to:

- A $0.5 million increase resulting from the OCCP. The sale of 5800 Yonge, was completed in April 2018 reducing the annual expenditure. Offsetting this reduction was the full annual expenditure related to the new property coming online July 2017; and

- A $0.1 million decrease related to the additional disposition of the property at 60 Eglinton due to the effectiveness of the OCCP.
- A $0.1 million increase resulting from the annual increase of utility and communication rates.

2018 – 2019 Variance Explanation

The $0.1 million decrease from 2018 to 2029 was attributable to:

- A $0.2 million decrease resulting from the reduction in annual expenditures for 2019 due to the sale of 5800 Yonge in Q2 2018.
- A $0.1 million increase resulting from the annual increase of utility and communication rates.

2019 – 2020 Variance Explanation

The $0.1 million increase from 2019 to 2020 was attributable to:

- Inflationary cost escalation resulting from the annual rate increases.

8. PROPERTY TAXES SEGMENT

8.1 Segment Description

Property taxes are based on the amount of the property owned by Toronto Hydro, the municipal tax rates and any applicable credits. With more than 5,000,000 square feet of property in the City of Toronto, property taxes are a significant expense for Toronto Hydro. Historically, Toronto Hydro’s property taxes have increased at the rate of inflation. Toronto Hydro expects a similar trend to continue through the Test Year, which is reflected in the utility’s forecasts.

8.2 Property Taxes Segment Costs

Table 13 below provides the Historical (2015-2017), Bridge (2018-2019) and Test Year (2020) expenditures relating to Property Taxes.

Table 13: Property Taxes Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Property Taxes	5.2	4.6	5.6	5.6	5.4	5.5

The 2020 test year costs represent an increase of $0.3 million from the utility's last rebasing year (2015) actuals, a $0.1 million reduction from the most recent historical actual year (2017), and a $0.1 million increase from the bridge year (2019).

8.3 Property Taxes Segment Year-over-Year Variance Analysis

This section provides a variance explanation for the year-over-year changes to the Property Tax Segment going back to the last rebasing period (2015).

Table 14: Attribution of the Year-over-Year Cost Variance ($ Millions)

Property Taxes	15-16	16-17	17-18	18-19	19-20
OCCP	0.0	0.5	-0.1	-0.3	0.0
Other Consolidation	0.0	0.0	0.0	0.0	0.0
Tax Rebate Initiative	-0.7	n/a	n/a	n/a	n/a
Escalations	0.1	0.5	0.1	0.1	0.1
Total Variance	**-0.6**	**1.0**	**0.0**	**-0.2**	**0.1**

2015 – 2016 Variance Explanation

The $0.6 million reduction from 2015 to 2016 is attributable to:

- A $0.7 million decrease resulting from the Vacant Commercial & Industrial Unit Tax Rebate Program described above as a cost control measure; and
- A $0.1 million increase resulting from inflationary pressure on the prescribed commercial rates.

<u>2016 – 2017 Variance Explanation</u>

The $1.0 million increase from 2016 to 2017 is attributable to:

- A $0.5 million increase resulting from the OCCP. The occupancy of the newly constructed owned properties introduced costs previously embedded in the rent payments; and
- A $0.5 million increase resulting from MPAC reassessments of Toronto Hydro-owned properties and rate increases.

<u>2017 – 2018 Variance Explanation</u>

The negligible change between these periods is attributable to:

- A $0.1 million decrease resulting from the completion of the OCCP. The transition from 601 Milner to 715 Milner was completed in July of 2017, offset by the sale of 5800 Yonge, which completed in April 2018; and
- A $0.1 million increase resulting from inflationary pressure on the prescribed commercial rates.

<u>2018 – 2019 Variance Explanation</u>

The $0.2 million reduction from 2018 to 2019 is attributable to:

- A $0.3 million reduction representing continued benefit realization from the OCCP. The property tax expenditure incurred for 5800 Yonge in 2017 was eliminated for 2018; and

- A $0.1 million increase resulting from inflationary pressure on the prescribed commercial rates.

__2019 – 2020 Variance Explanation__

The increase of $0.1 million from 2019 to 2020 is attributable to A $0.1 million increase resulting from inflationary pressure on the prescribed commercial rates.

SUPPLY CHAIN SERVICES

1. OVERVIEW

Table 1: Supply Chain Services Program Summary

2015-2017 Average Cost ($M): 11.7	**2020 Cost ($M):** 12.6
Segments: Supply Chain Services	
Outcomes: Reliability, Environment, and Financial	

The Supply Chain Services program (the "Program") supports the execution of Toronto Hydro's capital and operating programs that rely on procurement and warehousing activities. The objectives of the Program are to facilitate timely and cost-effective acquisition of services, materials and equipment, maintain sufficient inventory to support uninterrupted work execution, and manage material handling costs.

The Program consists of two interrelated functions: (i) Demand and Acquisition Services; and (ii) Warehouse and Logistics. The Demand and Acquisition Services function secures the requisite equipment, materials and services for Toronto Hydro within specified timelines and at an optimal cost. It also monitors vendor performance to ensure that the goods and services acquired are being delivered to Toronto Hydro in an efficient and effective manner. The Warehouse and Logistics function facilitates coordinated, cost-effective and timely receiving, stocking and distribution of materials and equipment required to execute Toronto Hydro's capital and maintenance work programs. The Program and its activities are a continuation of the Supply Chain Services program described in Toronto Hydro's 2015-2019 Rate Application.[1]

[1] EB-2014-0116, Toronto Hydro-Electric System Limited Application (filed July 31, 2014, corrected February 6, 2015), Exhibit 4A, Tab 2, Schedule 12.

2. OUTCOMES AND MEASURES

Table 2: Supply Chain Services Program Outcomes and Measures Summary

Reliability	• Contributes to Toronto Hydro's system reliability objectives (e.g. SAIDI, SAIFI, FESI-7) by: o Supporting the effective execution of capital and maintenance programs by fulfilling warehouse orders and fulfilling supplier deliveries; and o Supporting Toronto Hydro's ability to respond to outages promptly and restore power through effective management of inventory.
Environment	• Contributes to Toronto Hydro's environmental objectives by ensuring Toronto Hydro meets all Municipal, Provincial and Federal regulations related to managing hazardous materials by safely collecting, storing, and removing hazardous waste from work sites.
Financial	• Contributes to Toronto Hydro's financial objectives as measured by the total cost and efficiency measures by: o Implementing processes such as automating the disbursement of certain inventory stock and purchasing certain equipment directly from the manufacturer; and o Maintaining an optimal level of inventory of materials and equipment to support uninterrupted work execution with minimal carrying cost.

3. PROGRAM DESCRIPTION

The Program is comprised of two interrelated functions: Demand and Acquisition Services and Warehouse and Logistics, each of which are described in the sections below.

3.1 Demand and Acquisition Services

The Demand and Acquisition Services function supports Toronto Hydro's capital and maintenance work programs, and enables the utility's day-to-day operations, by providing the goods and services required to perform the work. The employees who deliver this function require 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.

3.1.1 Procurement and Vendor Performance Management

Demand and Acquisition Services' activities involve sourcing of reputable and reliable suppliers, monitoring their performance to ensure that they meet their contractual obligations, and generating the purchase orders that underlie each agreement. Working with the various parts of the utility's operations, Demand and Acquisition Services lead the competitive bid generation and evaluation processes, and conduct market trend analysis to identify emerging industry trends and locate suitable suppliers.

Toronto Hydro's competitive bid selection process is based on pre-established selection criteria that balance the quantitative and qualitative aspects of each desired proposal. The proposals and the criteria are developed in collaboration with internal business units that require the goods or services in question.

After the supplier is chosen, Toronto Hydro negotiates the contract terms and conditions relevant to the goods or services provided. Demand and Acquisition Services monitor supplier performance through collaboration with other departments and regularly meeting with the supplier.

3.1.2 Material Requirements Planning

The Demand and Acquisition Services function manages inventory levels in Toronto Hydro's warehouses in support of the utility's capital and maintenance programs. This involves reviewing historic use trends and known work projects to develop planned work requirement forecasts and supplier orders.

In addition, Demand and Acquisition Services oversees materials and equipment inventory for reactive work driven by adverse weather, system contingencies and other unforeseen events. To facilitate efficient and expedient execution of reactive work, Toronto Hydro establishes minimum and maximum inventory settings for each warehouse location, and determines appropriate material re-order points and quantities that trigger purchase order generation as inventories are gradually depleted. Late shipments that can affect available inventory for either planned or reactive work are expedited with suppliers, and optimal delivery dates are ascertained and communicated to warehouses and requesting areas of the utility.

Unplanned extreme weather events present a significant challenge to the execution of the Program. The volumes of certain materials, such as overhead wire and associated hardware, required in the aftermath of major storms often exceed all normal inventory levels, contingency stocks held by vendors, and forecasted reactive work requirements. When major weather events occur, Toronto Hydro works with suppliers to immediately acquire all materials necessary to support power restoration activities.

For example, in the summer of 2017, the City of Toronto experienced record breaking levels of rainfall. Persistent downpour caused flooding, road closures, and power outages. As a result, the overall annual demand for sump pumps increased by 87 percent when compared to the previous three year average demand. May and September had the sharpest increase in demand for sump pumps from an average of 31 and 14 to 70 and 50, respectively. To support Toronto Hydro's efforts in restoring power, Demand and Acquisition Services began sourcing additional sump pumps from multiple vendors, but only one was able to meet required specifications. The surge in demand was rapidly depleting the vendor's inventory. To ensure uninterrupted supply of sump pumps, Toronto Hydro worked closely with the vendor to secure approximately 100 units originally destined for US markets and ramped up European factory production. As a result of these efforts, Toronto Hydro successfully reduced the risk of equipment damage caused by water intrusion.

Demand and Acquisition Services also works with other operational groups at Toronto Hydro to identify certain materials and equipment that are critical to the ongoing operation of the distribution network (e.g. various models and vintages of pad mounted switchgear and transformers). Once identified, these inventory items are flagged as critical spares and segregated from general stock for specific use in reactive situations. Where materials and equipment at the end of their useful lives are replaced with alternatives built to newer technical standards, Toronto Hydro ensures that the existing stock of the obsolete parts are used up first to minimize any residual inventory. In certain cases, Toronto Hydro may also return remaining quantities of the obsolete equipment to the supplier, or sell them for scrap.

3.1.3 Third-Party Procurement Provider

To support the long-term goal of improving customer service at a reduced cost, in 2015, Toronto Hydro sourced a Third-Party Procurement ("3PP") provider. The purpose was to decrease operating costs and improve productivity by outsourcing the function of

Demand and Acquisition Services employees as they retire. Using the 3PP provider is expected to:

- Reduce the overhead cost per purchase order;
- Provide better operational cost certainty; and
- Provide more operational flexibility to meet Toronto Hydro's varying operational requirements consisting of managing 10,340 active inventory codes linked to individual assets, issuing 14,700 purchase orders, and executing 133 solicitations annually.

To facilitate a smooth transition of responsibilities, the 3PP provider has been engaged to work alongside the Program's Demand and Acquisition Services employees to gain experience in dealing with Toronto Hydro's procurement and inventory needs. The 3PP provider's employees are fully integrated and act as an extension of the core Demand and Acquisition Services team by performing the full range of Procurement and Vendor Performance Management and Inventory Management activities. The goal is to gradually transition the majority of operational responsibilities to the 3PP provider as Demand and Acquisition Services employees retire.

3.2 Warehouse and Logistics

3.2.1 Inventory Management

The Warehousing and Logistics function receives, stocks, and supplies all inventory materials to Toronto Hydro's capital and other operating program requirements. Field crews receive the requisite equipment and materials from any of the four warehouse locations which are strategically situated across the City, including one managed by a third-party supplier, as described in more detail below.

The typical activities of the Warehousing and Logistics function includes:

- Unloading, visually inspecting, receiving, and storing materials and supplies from vendor vehicles to issue to crews;
- Picking, staging, and loading electric distribution material onto crew vehicles to facilitate a quick exit from the work centres at the beginning of each work day;
- Delivering and distributing requisite materials to and from job sites and between warehouses to facilitate faster and more efficient materials distribution;
- Issuing miscellaneous (over-the-counter) items such as tools, clothing and safety equipment to crews so they continue to have the mandatory safety equipment and necessary tools to perform work;
- Handling excess materials returned from the field upon work completion, such as partial cable reels which can be re-entered into inventory and issued to other jobs;
- Arranging for field equipment slated for repairs or replacement to be returned to vendors and suppliers;
- Establishing and maintaining appropriate minimum and maximum inventory levels at each warehouse to assure appropriate product mix is available to support the type of work being conducted by the crews serviced by each work centre; and
- Performing daily inventory cycle count activities to facilitate the accuracy of Toronto Hydro’s financial reporting, and reconcile physical inventory on the shelf with records.

3.2.2 Third-Party Logistics Provider

In 2013, in an effort to support the scale of Toronto Hydro’s capital program in a flexible and sustainable manner, the utility engaged a Third-Party Logistics (“3PL”) warehousing services provider. This was discussed in detail in the utility's 2015-2019 Rate Application.[2] The 3PL provider uses Toronto Hydro's Warehouse Management System ("WMS") software and provides services at competitive market rates.

The 3PL provider owns and operates a warehouse located just north of Toronto as an addition to the three existing Toronto Hydro warehouses. While the 3PL provider has assumed a significant portion of Toronto Hydro's warehousing duties, the internal work centres continue to play a key operational role by facilitating prompt materials issuance to the crews departing from the three work centres, and facilitating timely response to reactive requirements. Toronto Hydro crews are able to reach job sites faster, by being able to pick up materials from the warehouses across the City. This creates greater efficiency and execution of planned work and faster power restoration during reactive assignments.

3.3 On-Cost

The cost of Warehouse and Logistics function and a portion of the Acquisition and Demand Services function are recovered internally through the materials on-cost rate, which is applied to the value of the goods issued to crews for specific projects, and ultimately reflected in the projects' overall capital costs.[3]

On-cost rates shown in Table 3, below, reflect a temporary increase in short-term operating costs and a decrease starting in 2020. The 2017 decrease in the on-cost rate is attributable to the 15 percent increase of material usage during the year.

[2] EB-2014-0116, Toronto Hydro-Electric System Limited, Exhibit 4A, Tab 2, Schedule 12 (Filed July 31, 2014, corrected February 13, 2015), pages 9-10.

[3] Toronto Hydro calculates the annual rate by dividing the applicable 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.

Table 3: On-Cost Rate (2015-2020)

Year	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Test	2020 Test
On-Cost Rate	10.79%	11.30%	9.64%	13.01%	13.08%	12.2%

4. PROGRAM COSTS

Toronto Hydro requires approximately $12.6 million each year during the 2020 to 2024 period to execute the functions of the Program functions described above. Without this level of funding, Toronto Hydro could be exposed to a number of risks, including:

- Delayed or inefficient procurement of goods, which could affect quality of equipment installed in the field and lead to more frequent outages for customers;
- Delayed or inefficient procurement of services, which could affect the cost of third-party resources and increase overall operating costs;
- Unavailability of stock for both planned and reactive work, which could lead to prolonged outages for customers; and
- Absent a proper and adequately supported warehouse function, inventory could be misplaced, issued incorrectly, or damaged thus increasing the overall operating costs.

Table 4, below, provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for the Program.

Table 4: Supply Chain Services Program Expenditures ($ Millions)

Program	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Supply Chain Services	10.4	13.4	11.4	11.7	12.3	12.6

4.1 Cost Drivers

The 2020 test year cost forecast represents an increase of $2.2 million from the utility's last rebasing year actual costs (2015), $1.2 million increase from the most recent historical actual year (2017), and $0.3 million from the bridge year (2019). The variances are attributable to the following drivers:

- **Engagement of a 3PP provider**: As Acquisition and Demand Services' employees retire, their function will be performed by a 3PP provider, which is fully recovered through the materials on-cost rate (i.e. can be entirely allocated to capital projects). However, even though this function is to be outsourced, Toronto Hydro will still incur temporary costs associated with overlapping employees for knowledge transfer. In the future, the engagement of a 3PP provider is expected to provide cost savings.
- **Purchase of industrial vending machines:** The Program purchased vending machines to automate bin inventory and provide Toronto Hydro crew with self-service disbursement of warehouse material. The vending machines have been purchased by Toronto Hydro and replenished by its existing 3PL provider.
- **Increase in requests for materials:** increasing requests for materials contributes to the overall Program costs as the pricing model is based on the amount of materials issued through the 3PL service provider. For example, in 2017, there was an increase of 18.4 percent in materials issued through the 3PL service provider, which led to the corresponding increase in service fees by 5 percent.
- **Loss of transformer rebate:** In 2017, Toronto Hydro began to directly purchase transformers from a manufacturer instead of a distributor. This saved Toronto Hydro approximately $900,000 in the cost of transformers. However, the utility lost the rebate previously provided by the distributor in the amount of $300,000.

This rebate was reflected as an increase in the Program's costs, despite the fact that the utility saved approximately $600,000 in transformer costs.

4.2 Cost Control and Productivity Measures

Toronto Hydro will continue to manage costs in this Program by leveraging the 3PP provider to:

- Balance workload as internal headcounts within this Program decline;
- Support the utility's capital program; and
- Streamlining operations through 3PP, and reducing costs in the Vendor Managed Inventory Initiative. Suppliers are responsible for maintaining an appropriate level of inventory to ensure material is always ready for pick up. Once an order is placed, inventory is transferred from the vendor managed portion of the warehouse into the main warehouse. This reduces lead time and provides cost savings by engaging suppliers directly instead of distributers.

Toronto Hydro will also continue to manage costs in this Program by leveraging the 3PL provider to:

- To streamline field operations, transformers are packaged on skids along with auxiliary components needed for installation, known as transformer kits. Prior to 2016, these kits were assembled by the transformer manufacturer who purchased the auxiliary components from the same suppliers as Toronto Hydro. In order to reduce costs, Toronto Hydro began to purchase all components separately and assemble transformer kits via the 3PL service provider. This creates an average net savings of approximately $1.6 million over a five year period.

- To improve vendor performance, Demand and Acquisition Services has been continuously improving the vendor relationship function by introducing new metrics and adjusting existing measurement criteria. In 2018, the utility plans to expand this approach to non-inventory items.
- In 2016, Toronto Hydro installed two industrial vending machines, one at 500 Commissioners, and another at 71 Rexdale. In 2017, an additional vending machine was installed at 715 Milner. These machines stock inventory and provide self-service disbursement of warehouse material. Crews now have quick access to the most commonly used items at any time. The use of the vending machines has lowered labour costs and increased productivity via quicker access to materials.
- The WMS software and hardware solutions utilize barcode technology and provide real-time visibility over inventory, adding efficiency to the receiving and picking functions. Warehouse transactions are centrally prioritized and assigned to warehouse employees by queuing tasks to the employees' hand-held barcode guns. Tasks such as receiving, picking, and cycle counting are carried out by scanning the product bar code affixed to all incoming materials. This technological improvement significantly speeds up the previously manual tasks of keying in the entries for every incoming packing slip, outgoing picking slip, or cycle count entry. The use of this technology allows the warehouse to continue to provide and improve on expected service levels to Toronto Hydro crews. As shown in Figure 1, below, Warehouse and Logistics successfully fulfilled material requirements On Time and in Full ("OTIF") at an average rate of 96 percent.

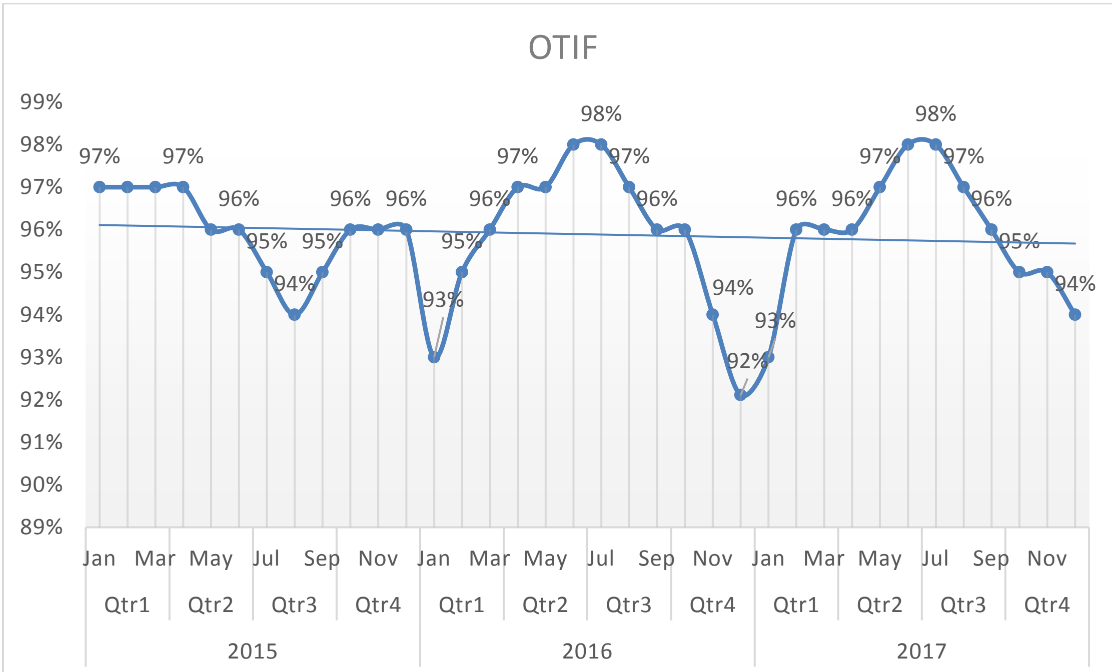


Figure 1: Warehouse OTIF Rate

4.3 Supply Chain Services Program Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

The Program experienced a $3.0 million increase from 2015 to 2016. This increase was due to the following factors: (i) a one-time inventory write off of $2.7 million in 2016, resulting from revised standards, obsolete materials, and the expiration of medications; (ii) an increase of $0.4 million driven by 3PP engagement; (iii) an increase of $0.3 million from 3PL due to the inventory management of two Vending Machines; (iv) an increase of $0.3 million from additional labour related expenditures due to compensation and salary inflationary increases; (v) an increase of $0.3 million resulting from loss of transformer rebates; (vi) a $0.5 million decrease from material returns to general inventory; (vii) a $0.2 million decrease associated with revisions to the clothing order process and buyback of inventory by the supplier; and (viii) a $0.3 million decrease resulting from changes to the transformer kit assembly process.

2016 – 2017 Variance Explanation

The Program experienced a $2.0 million decrease from 2016 to 2017. This decline was due to the following factors: (i) a $0.7 million increase driven by 3PP engagement; (ii) a $0.4 million increase in general inventory returns associated with a one-time return and revisions to process; (iii) a $0.3 million increase associated one-time reduction in spending resulting from changes in the transformer kit assembly process; (iv) a $0.2 million increase due to the installation of an additional industrial vending machine; (v) a $2.7 million reduction due to a one-time write off; (vi) a $0.7 million reduction in labour related expenses due to attrition and a one-time compensation expense; and (vii) a $0.2 million rebate associated with pole line hardware.

2017 – 2018 Variance Explanation

The Program experienced a $0.3 million increase from 2017 to 2018. This rise was primarily due to: (i) a $0.4 million increase driven by 3PL engagement; (ii) a $0.2 million increase driven by 3PP engagement; (iii) a $0.1 million increase associated with inflationary pressure on miscellaneous operating expenses; and (iv) a decrease of $0.4 million in labour related expenses.

2018– 2019 Variance Explanation

The Program is forecasted to experience an increase of $0.6 million from 2018 to 2019. This increase is due to: (i) a $0.4 million increase driven by 3PL engagement; and (ii) a $0.2 increase driven by additional labour related expenditures due to compensation and salary inflationary increases.

2019– 2020 Variance Explanation

The Program is forecasted to experience an increase of $0.3 million from 2019 to 2020. This increase is attributable to: (i) a $0.4 million increase driven by 3PL engagement; and (ii) a $0.1 million decrease in labour related expenses.

CUSTOMER CARE

1. OVERVIEW

Table 1: Customer Care Program Summary

2015-2017 Average Cost ($M): 39.5	**2020 Cost ($M):** 49.4
Segments: • Billing, Remittance, and Meter Data Management • Collections • Customer Relationship Management • Communications and Public Affairs	
Outcomes: Customer Service, Public Policy, and Financial	

The Customer Care program (the “Program”) addresses the direct interactions between the utility and its approximately 768,000 customers, and the work required to support these interactions, including customer communications, relationship management, billing, metering and collections functions. Providing excellent customer service is at the core of Toronto Hydro’s corporate priorities, and the utility is consistently seeking new ways to foster meaningful two-way communication, expand the range of service offerings to meet evolving customer needs, improve service convenience, and integrate new technological advancements to drive improvement and productivity.

The Program is comprised of the following four segments: (i) Billing, Remittance, and Meter Data Management, which handles the reading of customer meters, upkeep associated with infrastructure and metering data management, preparation of customer bills and payments; (ii) Collections, which handles all activities associated with unpaid accounts; (iii) Customer Relationship Management, which involves activities related to customer interactions; and (iv) Communications and Public Affairs, which involves community outreach, media relations, municipal government interactions and other aspects of public communications. The Program and its constituent segments are a continuation of the activities described in the Customer Care program in Toronto Hydro's 2015-2019 Rate Application.[1]

2. OUTCOMES AND MEASURES

Table 2: Customer Care Program Outcomes and Measures Summary

Customer Service	• Contributes to Toronto Hydro's customer service objectives by: ○ Answering telephone calls within 30 seconds at least 65 percent of the time (on average) over the 2020-2024 plan period, as measured by the OEB's Telephone Calls Answered On Time metric; ○ Providing written responses to qualified inquiries within 10 business days at least 80 percent of the time (on average), as measured by the OEB Written Correspondence metric; ○ Aiming to address customers' needs in the first instance they contact the utility, as measured via the OEB's First Call Resolution measure; ○ Achieving a bill accuracy rate of at least 98 percent over the 2020-2024 plan period; ○ Increasing the usage of electronic billing to approximately 347,000 customers through the 2020-2024 plan period; ○ Meeting or exceeding the Reconnection Performance OEB standard of 85 percent; and ○ Ensuring no more than 10 percent of calls are abandoned, as measured by the OEB's Telephone Call Abandon Rate.
Public Policy	• Contributes to Toronto Hydro's public policy objectives by implementing legislative and regulatory initiatives within the mandated timelines over the 2020-2024 plan period.

[1] EB-2014-0116, Toronto Hydro-Electric System Limited Application (filed July 31, 2014, corrected February 6, 2015), Exhibit 4A, Tab 2, Schedule 13.

Financial	• Contributes to Toronto Hydro's financial objectives as measured by the total cost and efficiency metrics by: ○ Ensuring financial stability and revenue generation capabilities via issuance of customer bills on schedule; and ○ Investing in process improvements that eliminate manual efforts and promote customer self-service.

3. PROGRAM DESCRIPTION

The Program is composed of four segments covering most direct interactions between the utility and its customers and the work required to support these interactions:

- **Billing, Remittance, and Meter Data Management:** involves the reading of customer meters, upkeep of the associated infrastructure, management of meter data, preparation of customer bills, and processing of customer payments;
- **Collections**: involves activities to collect money associated with unpaid customer accounts;
- **Customer Relationship Management:** involves activities related to the utility's interactions with its customers; and
- **Communications and Public Affairs:** involves activities to perform community outreach, media relations, municipal government interactions and other aspects of public communications.

4. PROGRAM COSTS

Toronto Hydro requires approximately $49.4 million each year over the 2020-2024 plan period to execute the functions in the Customer Care program, as described above. Without this level of funding, Toronto Hydro could be exposed to a number of risks, including, but not limited to:

- Issuance of less timely and less accurate bills on a more frequent basis;

- Reduced ability to implement public policy changes in accordance with required timelines or in the most cost effective manner;
- Failure to attain full revenue collection and therefore experience higher levels of bad debt, affecting the financial stability of the utility;
- Decrease in timely responses to customer requests;
- Reduced ability to respond to market changes or changes in customer preferences; and
- Customer service challenges that may impact brand and result in reputational damage.

Table 3, below, provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for each of the four segments.

Table 3: Customer Care Program Expenditures by Segment ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Billing, Remittance & Meter Data Management	15.7	13.4	15.5	15.9	16.2	20.7
Collections	10.8	10.3	9.2	12.1	12.4	12.6
Customer Relationship Management	11.4	11.6	11.5	10.4	10.6	11.3
Communications & Public Affairs	3.1	2.9	3.3	4.6	4.7	4.9
Total	**41.0**	**38.1**	**39.6**	**43.0**	**44.0**	**49.4**

4.1 Cost Drivers

The 2020 test year cost forecast represents an increase of $8.4 million from the utility's last rebasing year actual costs (2015), $9.8 million from the most recent historical actual year (2017), and $5.4 million from the bridge year (2019). The cost drivers for this Program are primarily attributable to the following:

- Operational costs associated with the ongoing monthly billing transition. As discussed in Exhibit 9, Tab 1, Schedule 1, Toronto Hydro tracks, in a deferral account, the net costs of its 2016 mandatory transition to monthly billing. However, beginning in 2020, the ongoing incremental costs associated with monthly billing must be funded through base distribution rates;

- Standard labour rate increases;
- Transferred payroll costs due to an organizational realignment which centralized the Customer Operations Communications Office from the Engineering and Construction group into the Communications and Public Affairs Segment in 2017;
- An increase in costs for external service providers, and a forecast increase in costs relating to clerical and field collection activities;
- An increase in external clerical and customer service resources due to the increase in minimum wage and extension of Contact Centre and Collections operating hours; and
- Ongoing implementation of public policy initiatives which necessitate additional customer service, collections, and field resources, including: (i) the Ontario Electricity Support Program (“OESP”); (ii) the expiry of the Ontario Clean Energy Benefit (“OCEB”) and Debt Retirement Charges (“DRC”); (iii) the introduction of the Ontario Rebate for Electricity Consumers (“OREC”) and the Fair Hydro Plan (“FHP”); (iv) new service level requirements for bill accuracy; (v) MDM/R integration; (vi) initiatives in support of the *Energy Consumer Protection Act, 2010*; (vii) the Large Building Energy and Water Reporting and Benchmarking Initiative (“EWRB”); and (viii) the mandatory winter reconnection/non-disconnection of residential customers.

4.2 Cost Control and Productivity Measures

Toronto Hydro continues to actively look for efficiencies and productivity opportunities throughout its Customer Care operations. The public policy initiatives described in the

Cost Drivers section, above, would normally have required an expansion of the workforce to execute. For example, the OESP program requires additional customer service and billing resources to ensure appropriate application of credits, and to address any issues with customer applications, renewals, and exception handling. However, Toronto Hydro was able to implement these policies internally by managing costs and offsetting the incremental resource requirements through implementation of the following initiatives:

- In 2017, Toronto Hydro invested in process optimization and technological solutions to reduce the number of estimated meter reads and the need for bill corrections, which corresponded to a reduction in meter reading labour costs. This resulted in a 99.2 percent billing accuracy average for the year;
- Installations of new meters facilitated the ability of meters to communicate wirelessly, reducing delays in billing and manual meter reading costs;
- Invested in automation of the meter exchange program to eliminate the manual work effort to update the Customer Information System ("CIS") with new meter information, and reduce the lag time that creates manual exception work;
- Reduced paper, printing and postage costs by driving electronic billing adoption to 224,420 enrolled customers, as at end of 2017, which saves $9.52 per electronically billed customer per year;
- Invested in and encouraged the use of customer self-service features on Toronto Hydro's website to provide easier customer access to information and to reduce the need for customer contact. For instance, Toronto Hydro's portal reduces the manual processing of customer move-ins and move-outs;
- Merging of standby roles for Key Accounts and Municipal Relations (within the Communication and Public Affairs segment) to reduce standby and overtime costs; and

- Optimized the use of lower cost outsourced labour. As an example, since business hours were expanded to 8:00 p.m., Toronto Hydro's third-party service provider has been used exclusively to provide call handling resources, optimizing costs and customer service.

The Program has also implemented a number of productivity and process improvements, including:

- Elimination of a number of processes that required manual work, including: (i) manual processing and recording field activities and updating the CIS via implementation of an automated mobile workforce management system for residential meter exchanges; (ii) manual billing adjustment work required to offset the creation of billing error conditions resulting from the overlap between the Ontario Rebate for Consumers Act (8 percent rebate) and the Ontario Electricity Support Program rules; and (iii) manual steps in the retail settlement process;
- During the 2016-2017 period, Toronto Hydro improved its analytics capability, providing more timely and relevant metrics on operational efficiency and effectiveness of collections steps, and better insight into the drivers of bad debt. This has resulted in more targeted collections strategies being put in place along with future plans for process improvements, such as revising the customer moves process to limit the number of times a customer move results in a premise with an unidentified account holder;
- By working with its vendor to streamline operations the utility improved the success rate of accessing meters at difficult to access premises. This reduced the amount of re-work and reduced outstanding account balances;

- In order to improve productivity in the Customer Relationship Management segment, the Program automated and streamlined call and email response processes through better workflow management, pre-defined tasks to respond to common customer requests and automation of process controls; and
- In order to improve productivity in the Communication and Public Affairs segment, the Program increased use of technology to track and manage escalated issues, reducing manual tracking and follow-up efforts and automating measurement and reporting of media relations effectiveness.

5. BILLING, REMITTANCE, AND METER DATA MANAGEMENT SEGMENT

5.1 Segment Description

The Billing, Remittance, and Meter Data Management segment involves the reading of electricity meters, validation and management of meter data, preparation of customer bills, processing of payments and refunding of credits balances.

Over the historical period, Toronto Hydro has enhanced its automated meter data collection and verification capabilities, increased billing accuracy to 99.2 percent in 2017, expanded its offerings of online and self-serve tools, and implemented numerous public policy initiatives (see Section 4, below).

The Billing, Remittance, and Meter Data Management segment is at the core of Toronto Hydro's "meter-to-cash" process that transforms customer consumption and other billable activities into customer bills, facilitates accuracy of bills, and processes customer payments and refunds. During the fourth quarter of 2016, Toronto Hydro converted all customers to monthly billing, and by the end of 2019 expects to issue over 9.4 million bills annually for a projected 780,000 customers. In performing this work, Toronto

Hydro provides its customers with a variety of billing and payment options that address their particular needs and preferences. Many of these options support higher levels of automation than traditional methods, lending themselves to faster receipt of payments and easier customer communication, helping to reduce costs and optimize cash flow while increasing customer satisfaction. As well, the automated nature of the majority of the utility's data collection and verification processes facilitates timely and accurate billing practices.

5.1.1 Billing and Remittance (Payment) Services

The utility prepares over nine million bills annually and offers its customers several delivery options, including standard paper-based bills, electronic bills ("eBills") and ePost billing services. For customers with specific accessibility needs, Toronto Hydro provides additional accommodation options, including bills with increased text size and audio playback. As of 2017, over 224,000 Toronto Hydro customers elected to receive their bills through an electronic method ("eBill"), which represents an increase of 250 percent in the last four years. This is the result of a targeted strategy to increase the eBill adoption, resulting in cost savings as well as convenience and accessibility for customers.

In addition to issuing electricity bills, Toronto Hydro prepares and issues 10,000 customer bills annually for non-electricity services, such as customer-driven electricity connection projects.

As part of this segment, the utility tracks and processes customer-move-ins and outs so that correct meter data is obtained, account holders are identified, and first bills and final bills are addressed correctly and issued without delay. In 2017, Toronto Hydro processed over 100,000 customer moves, 24 percent of which were processed through an online self-serve channel. Total customer moves typically amount to over 13 percent of the utility's total customer base each year.

Toronto Hydro reviews each non-residential customer's account annually to validate the customer's rate classification. Where changes to a customer's annual consumption and/or monthly average peak demand justify a reclassification, Toronto Hydro assigns the customer to the appropriate rate class. As part of the rate classification review, Toronto Hydro also reviews any pricing plan elections and self-declarations that the customer has made to date in order to verify that the customer's account is billed on the appropriate pricing plan and correctly enrolled in programs for which the customer is eligible, such as the Ontario Rebate for Electricity Consumers. This process ensures the timely and accurate classification and billing of non-residential customers, and correct calculation of revenue.

To maximize cash flow and minimize bad debt, Toronto Hydro encourages customers to adopt a pre-authorized debit payment plan. However, the utility provides its customers with various other bill payment options. Customers may also choose to smooth out their payments through an equal monthly billing or payment plan with an annual reconciliation.

To ensure proper functionality and compliance with relevant legislative and regulatory requirements of the meter-to-cash process, Toronto Hydro maintains a system of internal controls for all systems and processes, and reviews these on an annual basis.

5.1.2 Meter Data Management

As of December 31, 2017, Toronto Hydro had over 773,000 installed meters, of which over 764,000 are read remotely on a daily basis. The automated meter data is retrieved by one of Toronto Hydro's three data collection systems. Each data collection system serves different meter types/customer classes and requires specialized skills to maintain acceptable data collection standards. These data collection systems further pass the data to two meter data management systems (Itron Enterprise Edition ("IEE") and Operational Data Store ("ODS")) for validation. Meter data management systems validate the data for consistency, accuracy, and readiness for billing. Where values are not successfully validated, the systems will automatically attempt to estimate the correct reading. If the systems cannot develop an estimate for the missing data the entry is directed to staff to be manually assessed and entered.

The expansion of automated meter data collection and verification has reduced the number of residential and small commercial bills issued with estimated readings to less than 0.5 percent. Automating the data collection of electricity meters also allows customers to view and extract their hourly electricity consumption via Toronto Hydro's web portals and use a customized energy management tool to help control their costs. In 2017, Toronto Hydro reduced the number of manual meter reads by 5,000, primarily through enhancements to data collection technology and processing capabilities.

Toronto Hydro is working to further maximize the efficiency of data collection by modernizing collection systems, enhancing the communication networks, and improving system processing capabilities to increase the amount of meter data that is retrieved automatically. Examples of this include replacement of older meters with newer meters that have more powerful data transmitters, and upgrades to Toronto Hydro's meter data collection systems.

In addition to metered customers, Toronto Hydro has approximately 18,600 Unmetered Scattered Load ("USL") connections, which include service to bus shelters, cable television boosters, telephone booths, traffic and park lighting, and signs. These unmetered devices typically consume the same amount of electricity each month and bills are based on the technical consumption parameters of the device. The Billing, Remittance and Meter Data Management segment is responsible for keeping an up-to-date list of all service locations and updating usage calculations when customers make changes. To ensure USL billing accuracy, Toronto Hydro periodically conducts random field audits and reconciliation exercises with its customers.

5.2 Billing, Remittance, and Meter Data Management Segment Costs

Toronto Hydro requires approximately $20.7 million per year over the 2020-2024 plan period to execute the functions in the Billing, Remittance and Meter Data Management segment, as described above. Table 4, below, provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for the Billing, Remittance and Meter Data Management segment.

Table 4: Billing, Remittance, and Meter Data Management Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Billing, Remittance & Meter Data Management	15.7	13.4	15.5	15.9	16.2	20.7

The 2020 test year costs proposed in this segment represent an increase of $5.0 million from the utility's last rebasing year actual costs (2015), $5.2 million from the most recent historical actual year (2017), and $4.5 million from the bridge year (2019).

The mandatory implementation of monthly billing is the primary cost driver for the increase in costs between 2015 and 2020. The net incremental costs in this segment associated with this initiative are approximately $4.6 million per year. These costs are primarily attributable to postage and printing costs, along with additional resources required to support the increased volume of bills issued by Toronto Hydro. Please refer to Exhibit 9, Tab 1, Schedule 1 for a detailed breakdown of Toronto Hydro's incremental monthly billing costs.

Toronto Hydro's costs in this segment have been and are expected to continue to be relatively flat. When normalized for the monthly billing initiative, the increase from 2015 to 2020 is expected to be $0.6 million. Despite the various cost pressures faced in this segment (i.e. annual compensation increases, minimum wage increases impacting outsourced telephone and clerical work, incremental requirements related to customer growth, mandatory legal and regulatory obligations, etc.), Toronto Hydro has managed to keep the costs relatively flat and expects to continue to do so in the 2020 test year through a number of cost management and productivity initiatives (see section above).

Without this level of Program funding, Toronto Hydro could be exposed to the following segment-level risks, including**:**

- Cash flow could be negatively affected and working capital costs could increase;
- Electricity consumption may not be billed in an accurate and timely manner, resulting in uncollected revenue, revenue loss and customer dissatisfaction;

- Meters may not be read in a timely or effective manner increasing the frequency of billing delays, inaccurate bills, collection of account challenges and customer dissatisfaction;
- Non-residential customers' accounts may not be moved to the appropriate rate class in a timely manner, requiring subsequent billing adjustments;
- Payments, credits and refunds may not be processed in a timely and accurate manner, causing delays in cheques issued to customers;
- Changes in public policy may not be implemented in accordance with required timelines or in the most cost effective manner;
- The ability to maintain efficient operations could be jeopardized and continuous improvement efforts would be curtailed; and
- Toronto Hydro's ability to keep pace with evolving customer expectations could be limited.

5.3 Billing, Remittance, and Meter Data Management Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

Costs decreased by $2.3 million between 2015 and 2016 as a result of the following factors, which offset a $0.3 million increase in annual compensation for existing employees:

- $2.2 million decrease in the accounting provision for bad debt. $1.6 million of the decrease was due to a change in the accounting treatment and reporting of non-electricity claims invoices.
- $0.3 million decrease in contracted clerical resources as a result of realignment of work between segments; and
- $0.1 million decrease relating to manual meter reading services.

2016 – 2017 Variance Explanation

Costs increased by $2.1 million between 2016 and 2017 as a result of the following:

- $0.2 million decrease in labour costs due to higher recoveries from several capital projects;
- $2.3 million increase in the accounting provision for bad debt. $1.6 million of the increase reflects the change in the accounting treatment in 2016 for bad debt provisioning of non-electricity claims invoices.

2017 – 2018 Variance Explanation

From 2017 to 2018, the costs are forecast to increase by $0.4 million as a result of the following:

- $0.4 million increase in annual compensation for existing employees;
- $0.1 million increase in external clerical contract costs as a result of the minimum wage increase;
- $0.1 million increase in a cash processing fee due to a forecasted increase in payment processing fees and customer base driven volume increases;
- $0.1 million increase in postage costs as a result of a Canada Post rate increase; and
- $0.3 million decrease in the accounting provision for bad debt.

2018 – 2019 Variance Explanation

From 2018 to 2019, the costs in this segment are forecast to increase by $0.3 million, as a result of an increase in annual compensation for existing employees.

2019 – 2020 Variance Explanation

From 2018 to 2019, the costs in this segment are forecast to increase by $4.5 million. The increase is primarily attributable to the inclusion of approximately $4.6 million of incremental costs associated with converting from bi-monthly to monthly billing into the regular budget. These incremental monthly billing costs, as well as the annual compensation increases, are forecasted to be offset by a $0.1 million reduction in outsourced resources.

6. COLLECTIONS SEGMENT

6.1 Segment Description

The Collections segment involves work related to tracking and collecting amounts owing on customer accounts and administering low income programs. Toronto Hydro's collections procedures must meet all Ontario Energy Board ("OEB") and other applicable regulations and legislative requirements. These procedures work to minimize the bad debt expenses incurred by the utility, while providing customers various options to pay outstanding accounts.

For a utility with approximately 768,000 customers and over 100,000 customer moves annually, the collections function plays a key role in enabling Toronto Hydro to receive required revenue while minimizing bad debt expenditures, which would otherwise increase costs paid by all customers. In 2017, Toronto Hydro extended the availability of dedicated collections Customer Relations Representatives from 8:00 a.m. to 4:30 p.m. to 8:00 a.m. to 8:00 p.m. Customers also have 24/7 access to collections information through an Interactive Voice Response ("IVR") system and an online portal. The IVR and online technology assists customers with their account management inquiries by providing updated account balances, payment option information, bill amount predictors and other related tools.

To facilitate stable and predictable cash flows and manage emerging arrears, Toronto Hydro proactively mails overdue payment reminder letters and places reminder phone calls to its customers, with over approximately 650,000 letters and 300,000 phone calls placed each year. To manage the costs of these high-volume activities while maintaining the efficiency and timeliness of reminders, Toronto Hydro deploys automated systems for both letter preparation and phone call placement.

In the event that regular reminders are unsuccessful, Toronto Hydro initiates a series of severance activities. Toronto Hydro's field collections contractors and internal field staff collect over $7 million in outstanding payments per year while delivering disconnection notices or when attending a premise to perform the disconnection.

As at the end of 2017, the utility had over 48,000 smart meters capable of remote disconnection, reconnection, and intermittent disconnection. This enables Toronto Hydro to reduce the potential impact on bad debt by resolving problems, such as an inability to gain access to meters at some premises, as well as providing power based on a pre-determined schedule to ensure that customers have enough power for essential household activities and cooling/heating their homes, while still motivating the customer to pay the arrears and limiting bad debt. Remotely disconnecting meters also improves the service Toronto Hydro can provide customers since power can be restored almost immediately upon receipt of payment on an overdue account, without needing to schedule a crew for reconnection. As Toronto Hydro upgrades its smart meters to remotely controlled models, remote disconnections, reconnections, and timed load interruption will become more commonplace.

To comply with the OEB's winter disconnection moratorium that came into effect in 2017,[2] Toronto Hydro adapted its processes to rapidly contact customers previously disconnected for non-payment, process reconnections, provide information on financial assistance programs, and record and report on the status of affected customers.

To encourage timely payments, proactively identify at-risk accounts, and otherwise facilitate the collection of outstanding payments, Toronto Hydro undertakes a range of activities, including:

- Managing and monitoring about 19,000 commercial accounts with security deposits and overseeing the annual process of security deposit refunds;
- Preparing and sending over 14,000 inactive unpaid accounts per year to external collection agencies for follow up and collection;
- Implementing arrears payment arrangements and customized payment plans to assist customers with clearing their outstanding balances; and
- Educating customers on and overseeing the administration of financial assistance programs (e.g. Low-Income Energy Assistance Program, Ontario Electricity Support Program).

6.2 Collections Segment Costs

Toronto Hydro needs approximately $12.6 million per year over the 2020-2024 plan period to execute the functions in the Collections segment, as described above. Table 5,

[2] EB-2002-0497, Toronto Hydro-Electric System Limited Electricity Distribution License (Valid until October 16, 2023), s. 23.

below, provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures relating to the Collections segment.

Table 5: Collections Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Collections	10.8	10.3	9.2	12.1	12.4	12.6

The 2020 test year costs proposed in this segment represent an increase of $1.8 million from the utility's last rebasing year actual costs (2015), $3.4 million from the most recent historical actual year (2017), and $0.2 million from the bridge year (2019).

Toronto Hydro's costs in this segment have been and are expected to continue to be relatively flat. The $2.9 million increase in 2018 compared to 2017 is primarily due to an expected accounting provision adjustment for bad debt for electricity accounts as a result of the anticipated impact of the OEB's Winter Disconnection moratorium, as well as a forecasted increase in costs associated with collection related field and clerical activities.

Generally, the volume of collections-related work and the success of collecting delinquent accounts is heavily influenced by the number of customer visits made, the number of low income customers and the associated programs available to administer, collection tools available to address certain circumstances (such as the ability to disconnect certain premises), the number of customers who move out and receive a final bill in any given year, economic conditions, industry disruptions causing bankruptcies, and regulatory changes impacting customer behaviour and collections tools. Toronto Hydro monitors trends and implements strategies to minimize the cost of bad debt to the utility. For example, the OEB's 2017 winter disconnections moratorium altered Toronto Hydro's strategy of using timed load interrupter devices during the winter months, necessitating that alternate strategies be created and deployed to control unpaid account balances.

Without this level of Program funding, Toronto Hydro could be exposed to the following segment-level risks, including:

- The volume and dollars associated with uncollectable accounts could increase, causing upwards pressure on rates for all customers;
- The ability to effectively communicate and deliver low income customer assistance programs could lead to customer hardship and disconnection risk; and
- Cash flow could be adversely impacted and working capital costs could increase.

6.3 Collections Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

From 2015 to 2016, the costs in this segment decreased by $0.5 million as a result of the following:

- $1.4 million decrease in an accounting provision adjustment for bad debt for electricity accounts;
- $0.1 million increase in temporary labour costs to backfill for vacant full-time positions;
- $0.6 million increase in collections related field and clerical activities; and
- $0.3 million increase in external clerical costs due to a realignment of costs between segments.

2016 – 2017 Variance Explanation

From 2016 to 2017, the costs in this segment decreased by $1.1 million as a result of the following:

- $0.1 million decrease in internal labour costs due to forecasted vacancies;
- $0.25 million decrease due to restricted collection activities as a result of the OEB's winter disconnection moratorium;
- $0.1 million decrease due to sufficiency of inventory of materials required for collection activities; and
- $0.5 million decrease in the accounting provision for bad debt to reflect a stronger than forecasted resolution of accounts in arrears and lower overall balances owing due to the Fair Hydro Plan.

2017 – 2018 Variance Explanation

From 2017 to 2018, the costs in this segment are forecast to increase by $2.9 million, primarily as a result of the OEB's winter disconnection moratorium:

- $1.0 million increase due to a forecasted increase in collection related field and clerical activities and cost; and
- $1.8 million increase in the accounting provision for electricity accounts bad debt.

2018 – 2019 Variance Explanation

From 2018 to 2019, the costs in this segment are forecast to increase by $0.3 million as a result of the following cost factors:

- $ 0.1 million increase in annual compensation for existing employees; and
- $ 0.1 million increase resulting from a forecasted accounting provision adjustment for bad debt for electricity accounts.

2019 – 2020 Variance Explanation

From 2019 to 2020, the costs in this segment are forecast to increase by $0.2 million as a result of the following cost factors:

- $ 0.1 million increase due to increases in annual compensation and external field collection contract costs; and
- $ 0.1 million increase resulting from a forecasted accounting provision adjustment for bad debt for electricity accounts.

7. CUSTOMER RELATIONSHIP MANAGEMENT SEGMENT

7.1 Segment Description

The Customer Relationship Management segment involves Toronto Hydro's communication interactions with its customers. Toronto Hydro aims to build trusted relationships by engaging customers at the right time, with the right information, and through the right channel to meet their needs. This approach delivers customer value by providing efficient and timely responses to all enquiries, building awareness of available low-income programs, and educating customers on how to better manage their electricity usage.

The segment includes the following functional areas: Contact Centre, Escalations, Key Accounts, Customer Experience, and Quality Assurance. These functions are designed to meet customer needs and improve operational efficiencies identified through the tracking and analysis of inbound customer inquiries, transactional surveys, focus groups, and other means of soliciting customer feedback.

In addition to the functional areas noted above, the segment also includes an area tasked with designing and overseeing critical technology projects for the Program, as well as optimizing processes to increase efficiencies through ongoing process analysis and measurement activities.

7.1.1 Contact Centre

Toronto Hydro's Contact Centre is the primary functional area of the Customer Relationship Management segment. The Contact Centre receives and addresses an average of 96,000 written inquiries and 527,000 telephone calls per year. Customers engage with the Contact Centre to inquire about Toronto Hydro's business practices, including, but not limited to, payment options, electricity consumption, and collections.

Toronto Hydro closely monitors the quality and efficiency of its customer contact activities using a combination of OEB-mandated, common industry and internally developed measures. Toronto Hydro performs well against the OEB's performance targets in the areas of telephone and written response, consistently exceeding the required service standards. On average, over the 2015-2017 period, the contact centre answered 73 percent of calls within 30 seconds, and responded to 94 percent of written inquiries within ten days. To further support the utility's customer service objectives, the Contact Centre has extended its hours from 8:00 a.m. to 4:30 p.m. to 8:00 a.m. to 8:00 p.m.

7.1.2 Escalations and Special Investigations

The Escalations and Special Investigations area resolves specific concerns that require complex or lengthy analysis. The most frequently occurring concerns are related to energy and bill management, including high bill issues, energy management education, and payment challenges. The Escalations and Special Investigations function receives its requests through a variety of channels, including approximately 320 through the

Contact Centre, 190 through Toronto Hydro's Office of the President, and 115 through the OEB.

The Escalations and Special Investigations function is responsible for resolving these issues and deploys field resources to investigate power quality or billing issues when necessary. In 2017, the area resolved 98 percent of escalated customer inquiries within 10 business days or less.

7.1.3 Key Accounts

The Key Accounts function 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 expedite workable solutions. 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 energy efficiencies;
- Providing business-specific updates during unplanned outages;
- Providing account and sector specific information through various channels such as direct mail, newsletters, workshops, and association outreach;
- Acting as a single point of contact within Toronto Hydro to facilitate and coordinate work related to large C&I customers; and

- Building and maintaining positive relationships with Toronto's business community.

7.1.4 Customer Experience

The Customer Experience function manages research and works to achieve engagement and consistency across all customer interactions. Customer engagement activities allow Toronto Hydro to gain insights into how current services, processes, and communications align with customer views and experiences, while identifying ongoing opportunities for improvement of current programs and the development of new programs.

Customer engagement plays a significant role in Toronto Hydro's decision making and helps inform and guide overall business planning processes. In 2017, in support of this objective, Toronto Hydro established a Customer Advisory Panel ("CAP"). The CAP includes six sub-panels chosen through a multi-step process to ensure representation from a diverse cross-section of customers. The CAP is engaged to provide ongoing feedback on a variety of topics through a mix of focus groups, surveys, and workshop sessions for both residential and business customers.

One increasingly popular method of engagement continues to be Toronto Hydro's customized self-service portal (MyTorontoHydro). It offers automated move-in/move-out capability, eBill and pre-authorized payment enrolment, and the ability to view bill and payment histories. In addition, through the Independent Electricity System Operator's ("IESO") residential conservation program, Toronto Hydro expanded the functionality of its PowerLens portal to include a variety of electricity management tools and educational information such as usage breakdowns, kWh reduction goal setting, consumption and cost alerts, disaggregation charts, home assessments, and customized tips and recommendations to reduce consumption. The portal is available online or via mobile devices, further enhancing the customer experience. The adoption of this service continues to be driven through marketing campaigns and the Contact Centre since it supports Toronto Hydro's customer service and financial stability outcomes.

Additional offerings will continue to be incorporated based on customer research and feedback to identify opportunities to bolster usage of the self-service portal. This includes offering MyTorontoHydro account management services to commercial customers, as well as expanding capabilities on PowerLens for electric vehicle usage.

Customer communication efforts continue to expand due to the ongoing changes in public policy affecting Ontario's electricity environment including the introduction of monthly billing and low income programs.

7.1.5 Quality Assurance

The Quality Assurance function manages the development and distribution of training materials for internal and external resources. It is also engaged in knowledge and service quality management, analyzing staff performance, escalation trends, and post-call customer surveys, to identify training gaps as well as process technology improvement opportunities. The function is responsible for maintaining tools that provide staff with information on current policies, procedures, and regulatory changes to better serve customers.

7.2 Customer Relationship Management Segment Costs

Toronto Hydro needs approximately $11.3 million per year over the 2020-2024 plan period to execute the functions in the Customer Relationship Management segment, as described above. Table 6, below, presents Toronto Hydro's Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) costs relating to the Customer Relationship Management Segment.

Table 6: Customer Relationship Management Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Customer Relationship Management	11.4	11.6	11.5	10.4	10.6	11.3

The 2020 test year costs represent a decrease of $0.1 million from the utility's last rebasing year actual costs (2015), a $0.2 million decrease from the most recent historical actual year (2017), and $0.7 million increase from the bridge year (2019).

Without this level of Program funding, Toronto Hydro could be exposed to the following segment-level risks, including:

- Changes to customer accounts may not be made in a timely fashion, resulting in billing errors and delays in issuing bills;
- Ongoing interactions and collaborative relationships with the utility's customer base could be limited; and
- Customers could experience longer wait times to resolve inquiries, potentially leading to erosion of service level standards and customer satisfaction.

Over the previous and current plan period, costs in this segment have been and are expected to remain relatively flat. The slight variances are attributable to inflation adjustments to standard labour costs and contractual rate increases over the 2020-2024 plan period.

7.3 Customer Relationship Management Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

From 2015 to 2016, the costs in this segment have increased by $0.2 million as a result of the increase in marketing for executing a campaign related to the transition to monthly billing.

2016 – 2017 Variance Explanation

From 2016 to 2017, the costs in this segment decreased by $0.1 million as a result of the following:

- $0.3 million increase in annual compensation for existing employees, and deferred capitalization of projects to 2018; which was partially offset by reduction in temporary resources;
- $0.1 million increase in outsourcing due to increase in customer base; and
- $0.5 million decrease in marketing costs due to required customer satisfaction research and the non-reoccurring monthly billing project communication expenses in 2016.

2017 – 2018 Variance Explanation

From 2017 to 2018, the costs in this segment decreased by $1.1 million as a result of the following:

- $1.2 million decrease due to capitalization of business labour to projects, which also offset the inflationary increase in compensation;

- $0.3 million increase due to an anticipated increase in outsourcing cost resulting from the increase in the provincial minimum wage; and
- $0.3 million decrease in marketing and printing costs due to a change in marketing material vendor strategies.

<u>2018 – 2019 Variance Explanation</u>

From 2018 to 2019, the costs in this segment are forecast to increase by $0.2 million as a result of the following:

- $0.1 million decrease in labour cost due to capitalization of business labour to projects; and
- $0.3 million increase in call centre outsourcing due to an anticipated change in contracts resulting from the increase in the provincial minimum wage.

<u>2019 – 2020 Variance Explanation</u>

From 2019 to 2020, the costs in this segment are forecast to increase by $0.7 million as a result of the following:

- $0.5 million increase in annual compensation for existing employees, and the requirement for additional temporary staff to manage forecasted projects; and
- $0.2 million increase in contractual cost to manage marketing campaigns and customer satisfaction research;

8. COMMUNICATIONS AND PUBLIC AFFAIRS SEGMENT

8.1 Segment Description

The Communications and Public Affairs segment delivers high-quality, practical and timely information about Toronto Hydro's operations and programs to the general public and other interested parties. The work functions in the segment include:

Communications and Public Relations, Marketing, Municipal Relations/Office of the President, and Community Relations and Customer Operations Communications. To perform the activities in this segment, Toronto Hydro uses a number of communication channels, including

- Engagements with local media;
- Contact with local business improvement organizations, community groups and ratepayer associations;
- Toronto Hydro owned channels such as the utility's website;
- Social media, including Twitter and Facebook;
- Proactive outreach to City Councillors, the Mayor's office and City staff;
- Community events;
- Market analysis and customer analysis supporting business development and corporate strategy;
- Marketing campaigns;
- Direct-to-customer communications; and
- Capital program and planned outage communications through the Customer Operations and Communications Office.

Effective and timely communication within each work function is helpful to customers and other stakeholders as it increases their awareness about matters of interest such as the location and the anticipated restoration of outages, capital projects, and emergency preparedness. Particularly during outages, statistics (e.g. J.D. Power survey results and Third Party Audit following the 2013 Ice Storm) show that outage communication is a key driver of customer satisfaction. Increasingly, there is customer demand on digital channels to provide real-time or short interval information via social media, online outage maps, outage alerts to email and online report and outage. During major instances it is not uncommon for 100+ social media inquiries and dozens of inquiries through the Office of the President — these demands increase the need for information and resources. By communicating key information proactively, stakeholders and customers may also have fewer reasons to contact Toronto Hydro, which reduces overall operating costs.

8.1.1 Communications and Public Relations

The Communications and Public Relations function includes all external communications from Toronto Hydro, whether direct-to-customer (e.g. bill inserts and newsletters), digital communications (e.g. website and social media), and corporate communications (e.g. news releases, project communications, annual reporting) not performed by the Municipal Relations or Customer Operations areas. Of particular importance to brand and reputation are media and social media communications and public relations events.

The media are an important conduit between Toronto Hydro and its customers and other stakeholders. The segment's media relations function proactively communicates accurate and timely information about power outages, electrical safety, consumer issues, and local investments in the distribution system and other corporate programs.

Media relations has a significant role to play during emergency outage situations. Throughout the duration of these outages, communications staff remain in contact with media outlets until services are restored. Media representatives receive up-to-date information on suspected outage causes, likely duration, and if necessary, appropriate measures to be taken for public safety and protection of Toronto Hydro's and customer-owned equipment. These efforts help disseminate key information to customers at a time when they are most likely to be looking for it.

Dedicated media relations personnel engage reporters directly on all matters, which allows the dispatched crews and other employees to proceed with their work without interruption. Media Relations officers and government relations staff provide timely information to local and provincial emergency management personnel, City councillors and social service agencies that may require such information in order to take appropriate action in the interests of public safety.

Increasingly, social media and the online outage map are becoming the preferred source of information for customers experiencing an outage. The digital team focuses on engaging the public through these channels and actively messages those who engage Toronto Hydro's Twitter feed during outages (Toronto Hydro has over 100,000 followers as of November 2017). Media are also gaining information from this channel, increasing its importance. In terms of public safety, the digital team also responds immediately to safety issues and reports them to the appropriate operational teams.

For both media relations and social media, Toronto Hydro has after-hours standby and 24/7 support during significant outages.

8.1.2 Marketing

The Marketing function focuses on supporting corporate strategy and business development through comprehensive market analysis and customer analysis, in order to inform strategy development and decision making regarding business cases and implementation plans. Marketing also focuses on promoting Toronto Hydro programs and services as well as the Toronto Hydro brand to improve its relationship with customers and build brand trust. This is accomplished through marketing campaigns (e.g. core brand campaigns, eBill campaigns to save costs and provide convenience), marketing materials (e.g. spring and fall booklets, in-bill promotions), and community events to engage customers and promote programs and services. The marketing emphasis is on cultivating a better brand and promoting core Toronto Hydro corporate programs and services. Failure to do so may weaken Toronto Hydro's brand and reputation, position in the marketplace, and negatively affect adoption of programs and services designed to help customers and create efficiencies at Toronto Hydro (e.g. eBill campaigns).

8.1.3 Municipal Government Relations/Office of the President

Building, maintaining and enhancing relationships with the municipal government is critical 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 Office of the President handles over 1,500 issues per year directed to it from councillors or as the second level in the customer complaint process. The most frequent concerns involve customers' inquiries regarding street lighting, capital projects, and power outage-related issues. The Municipal Relations team takes a strategic approach to shareholder management, building relationships, monitoring and responding to issues while actively participating in committees and working groups. The team also leverages councillors as key influencers in their community to provide communications and information to residents.

8.1.4 Community Relations and Customer Operations Communications

Toronto Hydro has comprehensive processes and protocols for communicating information to customers concerning planned capital work and planned outages, in order to provide a better understanding around the capital program and prepare the customer for work at or near their property. Toronto Hydro has a customer inquiry line and escalation process for customers and staff will be dispatched on-site, when needed, to liaise with customers. This process is important for customer relations, branding and reputation management.

Toronto Hydro maintains productive relationships with public interest groups and agencies involved in commerce, social services, environmental protection, and education. Stakeholder outreach commonly takes the form of one-on-one contact with customers, community town hall meetings, special information sessions, and a variety of online content. Using a variety of communication channels allows Toronto Hydro to engage customers with varying needs, concerns, and preferences, with the goal of giving appropriate attention to all customer segments.

The community relations function also supports the utility's most vulnerable customers through the management of the Low-Income Energy Assistance Program ("LEAP"), which helps eligible customers avoid disconnection and process the re-payment of arrears.[3] Toronto Hydro actively promotes LEAP using various communication channels such as posters, e-newsletters to United Way agencies, face-to-face meetings at community outreach events, and through news releases.

[3] Exhibit 4A, Tab 2, Schedule 19.

8.2 Communications and Public Affairs Segment Costs

Toronto Hydro needs $4.9 million per year over the 2020-2024 plan period to execute the functions in the Communications and Public Affairs segment as described above.

Table 7, below, presents Toronto Hydro's Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) costs relating to the Communications and Public Affairs segment.

Table 7: Communications and Public Affairs Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Communications & Public Affairs	3.1	2.9	3.3	4.6	4.7	4.9

The 2020 test year costs proposed in this segment represent an increase of $1.8 million from the utility's last rebasing year (2015), $1.6 million from the most recent historical actual year (2017), and $0.2 million from the bridge year (2019).

This increase is driven by an organizational realignment which moved the Customer Operations Communications Office from the Engineering and Construction division. This unit manages all communications relating to capital projects and has a role in reactive customer engagement. Additional increases to the budget were due to the Marketing and Communications team assuming full responsibility for Customer Care communications.

Without this level of Program funding, Toronto Hydro could be exposed to the following segment-level risks, including:

- Increased frequency of inaccurate or delayed outage information resulting in customer confusion and dissatisfaction;

- Reduced ability to announce the timing and scope of Toronto Hydro's capital projects, resulting in resident confusion;
- Increased number of customer escalations, with overall diminished customer satisfaction;
- Reduced uptake in key corporate and CDM programs due to lack of awareness/marketing; and
- Owing to the above, an increased potential for brand and reputation decline, resulting in loss of trust and faith in Toronto Hydro and diminished customer satisfaction.

8.3 Communications and Public Affairs Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

From 2015 to 2016, the costs in this segment have decreased by $0.2 million as a result of a decrease in marketing and event expenses, due to the delay of a planned marketing/public relations campaign into the following year to improve its effectiveness.

2016 – 2017 Variance Explanation

From 2016 to 2017, the costs in this segment have increased by $0.4 million as a result of the following cost factors:

- $ 0.1 million increase in annual compensation for existing employees, which was partially offset by labour recovery from CDM projects; and
- $ 0.3 million increase in advertising, marketing, and event expenses due to a delayed marketing/public relations campaign that was moved from 2016.

2017 – 2018 Variance Explanation

From 2017 to 2018, the costs in this segment are forecast to increase by $1.3 million as a result of the following:

- $1.0 million increase in annual compensation for existing employees and an organizational realignment, which moved the Customer Operations Communications Office into this segment; and
- $0.3 million increase to manage forecasted advertising, marketing campaigns, and events.

2018 – 2019 Variance Explanation

From 2018 to 2019, the costs in this segment are forecast to increase by $0.1 million as a result of the annual compensation increases for existing employees.

2019 – 2020 Variance Explanation

From 2019 to 2020, the costs in this segment are forecast to increase by $0.2 million as a result of annual compensation increases for existing employees.

HUMAN RESOURCES AND SAFETY

1. OVERVIEW

Table 1: Human Resources and Safety Program Summary

2015-2017 Average Cost ($M): 14.7	**2020 Cost ($M):** 15.9
Segments: • Environment, Health, and Safety • Human Resources Services and Employee Labour Relations • Talent Management and Organizational Effectiveness	
Outcomes: Environment, Safety, Public Policy, and Financial	

The Human Resources ("HR") and Safety program (the "Program") provides broad human resource management services to Toronto Hydro in various areas, 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. These activities are delivered within the utility's complex operating environment characterized by unique operation conditions, organized labour dynamics, and aging workforce.

The work listed above is accomplished through the following three segments: (i) Environment, Health, and Safety; (ii) Human Resources Services and Employee Labour Relations; and (iii) Talent Management and Organizational Effectiveness. These segments operate in tandem to contribute to a safe and healthy work environment. The Environment, Health and Safety segment encompasses the standards and initiatives needed to ensure a safe work environment for Toronto Hydro employees, such as inspections, audits, training, as well as compliance with statutory health and safety requirements. The Human Resources Services and Employee Labour Relations segment governs the effective management of employee and labour interactions, including the administration of collective agreements, employee claims, and compensation and benefits. Lastly, the Talent Management segment handles both internal and external staffing needs. This function allows Toronto Hydro to successfully recruit and develop a skilled and specialized workforce while maintaining its exceptional safety performance. The Program and its constituent segments are a continuation of the activities described in the Human Resources and Safety program in Toronto Hydro's 2015-2019 Rate Application.[1]

2. OUTCOMES AND MEASURES

Table 2: Human Resources and Safety Program Outcomes and Measures Summary

Public Policy	• Contributes to Toronto Hydro's public policy objectives by ensuring regulatory and legislative requirements are met in relation to employee training, collective bargaining and the development of utility-wide policies.

Environment	• Contributes to Toronto Hydro's environmental objectives by:
	  ○ Integrating environmental, social and economic issues in planning; and
	  ○ Measuring waste reduction, and promoting recycling and a culture of conservation.

Safety	• Contributes to Toronto Hydro's safety objectives, measured through metrics like the Total Recordable Injury Frequency ("TRIF") by:
	  ○ Ensuring employees are working safely with minimal exposure to hazards;
	  ○ Providing training to employees on safety in the work place; and
	  ○ Remaining compliant with safety and audit findings.

[1] EB-2014-0116, Toronto Hydro-Electric System Limited Application (filed July 31, 2014, corrected February 6, 2015), Exhibit 4A, Tab 2, Schedule 14.

Financial	• Contributes to Toronto Hydro's financial objectives as measured by the total cost and efficiency measures by reducing reliance on external services via development and delivery of internal training and session facilitation, and promoting processes that decrease the Workplace Safety Insurance Board annual premium.

3. PROGRAM DESCRIPTION

The Program provides human resource management services to Toronto Hydro, including: environment, health and safety management; employee and labour relations; compensation and benefits management; corporate and individual performance management; change management; productivity and continuous improvement; employee engagement; organization and job design; recruitment; and training and development.

Toronto Hydro operates in a mature and dense urban environment of a scale and nature that is unique from other Ontario electricity distributors. This creates a number of distinct challenges for the Program, including:

- A complex and rapidly evolving 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 Lead-Covered cable);
- Unique safety challenges associated with densely populated urban environment, 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 underscore the need to develop and maintain health and safety rules, provisions for comprehensive training and apprenticeship programs for new and existing employees. They also emphasize the need to actively identify talent, ensure succession planning, and undertake recruitment activities.

At the core of the Program is a commitment to maintaining and continuously improving a robust and effective environment, health, and safety management system ("EHSMS"). The Program supports prioritizing and promoting sustainability, employee safety, and wellness, fostering optimal working conditions to increase job satisfaction, facilitating productivity, and promoting innovation, while accommodating specific needs and responding to emerging trends.

The Program supports the achievement of key operational goals by reducing employee risks to injury through the development and implementation of programs and procedures, and enhancing productivity through the application of risk based management system standards, effective training, diligent inspections, and thorough investigations into incidents and near misses.

The Program includes three segments: (i) Environment, Health and Safety; (ii) Human Resources Services and Employee Labour Relations; and (iii) Talent Management and Organizational Effectiveness.

The Environment, Health, and Safety ("EHS") segment's objective is to ensure that Toronto Hydro works in an environmentally safe manner and provides a safe working environment for the employees through the implementation of safe work practices, engineering controls and adherence to legislative and regulatory requirements relating to occupational health and safety, environmental protection, and sustainability while striving for continual improvement.

The Human Resources Services and Employee Labour Relations segment, is responsible for effective management of all employee and labour relations, including the interpretation and administration of the collective agreement provisions, non-occupational and occupational illness or injury employee claims, case management, design and administration of the compensation and benefits program, and associated technology systems and solutions. Employee Labour Relations supports both unionized and non-unionized work groups to ensure workplace issues are addressed promptly and appropriately, and in line with legislation, policies, and collective agreement procedures.

The Talent Management and Organizational Effectiveness segment develops and executes the workforce staffing plan, organization and job design, succession planning, employee engagement and communication, performance and productivity, and employee development strategies and programs. The Talent Management team is responsible for internal and external staffing selection. The Organizational Effectiveness stream creates and implements a variety of training, development, and change management initiatives to ensure Toronto Hydro employees are qualified and have the necessary skills, resources, and tools to successfully execute their role.

4. PROGRAM COSTS

Toronto Hydro requires $15.9 million per year over the 2020 to 2024 plan period to execute the segments in this Program. Without this level of funding, the Program could be exposed to a number of risks, including:

- Increased likelihood of safety-related incidents to the public and Toronto Hydro employees;
- Lower environmental performance;
- Inability to effectively acquire and retain talent;
- An erosion of technical and leadership skills through decreased investment in training; and,
- Legislative or regulatory non-compliance as a result of inadequate resources to provide advice, consultation, and research on matters relating to employment/labour relations, safety, and environmental legislation.

Table 3, below, provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for each of the Program's segments.

Table 3: Human Resource and Safety Program Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Environment Health and Safety	2.5	2.7	2.5	2.7	2.8	2.9
Human Resource Services and Employee Labour Relations	4.6	5.2	5.1	4.8	4.8	5.0
Talent Management & Organizational Effectiveness	7.0	7.3	7.0	7.8	7.9	8.1
Total	**14.1**	**15.2**	**14.7**	**15.2**	**15.5**	**15.9**

4.1 Cost Drivers

The 2020 test year cost represents an increase of $1.8 million from the last rebasing year actuals (2015), $1.2 million from the most recent historical actual year (2017), and $0.4 million from the bridge year (2019). These changes are attributable to the following cost drivers:

4.1.1 Compensation and Inflationary Increases

In 2019 and 2020, costs associated with the delivery of the functions within the Human Resources and Safety segment are expected to remain relatively stable. However, it is expected that overall program costs will increase slightly due to inflation and market compensation adjustments.

4.1.2 Projects that require increased support

In order to support projects and to fill vacancies, staffing changes have had an impact on year–over-year variances in actual and budgeted segment costs. These are outlined in the sections below. For instance, in 2017 and 2018, a number of employees from the Human Resources and Safety segment were seconded to support other corporate activities resulting in lower payroll costs until additional resources were hired as backfills.

4.1.3 Legal and arbitration related expenses

Legal expenses associated with grievance arbitrations, and other employment related legal matters can drive costs for this Program. These costs are often difficult to predict. Therefore, the costs of these expenses will fluctuate depending on the complexity of arbitration, the number internal and external witnesses, and the degree of preparation and legal research.

4.2 Cost Control and Productivity Measures

4.2.1 Cost Management

The Program has undertaken or plans to undertake the following initiatives to control and/or manage costs during the plan period:

1) Increase the use of specialized services including specialized software to collect and report on incidents, inspections, audits, etc., and use contractor prequalification services to eliminate the need for internal resources to manage systems and information. This function historically required three full time employees to perform similar services.
2) Assist in the development and delivery of internal training and session facilitation, leveraging internal resources and equipment to complete testing, audits, completion of applications, and authoring of reports.
3) Internally develop and distribute EHS related communications materials including posters, safety meeting materials, etc., thereby reducing reliance on external services with a corresponding savings to the utility.
4) Developed an online EHS training models throughout 2016 and 2017 that included a revised focus on Ergonomics and Workplace Hazardous Materials Information System. This investment in online training programs has saved external training vendor costs.
5) In 2017, Toronto Hydro conducted a benefits provider market review, which resulted in annual savings in premiums with no coverage impact for employees.
6) The Government of Ontario has recognized Toronto Hydro's curriculum for the Certified Power Line Person ("CPLP") as equivalent to the in-school requirements for Power Line Technician Trade. This accreditation and resulting ability to train its own apprentices has led to significant savings per apprentice.

4.2.2 Productivity

The Program has undertaken or plans to undertake the following productivity initiatives during the plan period:

Safety and Attendance

Toronto Hydro has achieved notable improvements with respect to the following safety indicators:

- A 57 percent decrease in the number of Workplace Safety and Insurance Board ("WSIB") claims;
- An 82 percent decrease in WSIB New Experimental Experience Rating ("NEER") costs, due to less incidents; and
- WSIB rebates of approximately $2.2 million from 2013 to 2017.

As a result of diligent case management efforts, Toronto Hydro has lower NEER costs. NEER is a mandatory program administered by the WSIB that provides financial incentives to employers to eliminate injuries and illnesses in the workplace.

In addition, from 2011 to 2016, Toronto Hydro achieved significant and sustained improvement relating to occupational safety, including:

- 68 percent decrease in total recordable injury frequency;
- 96 percent decrease in lost time injury severity;
- 63 percent decrease in lost time injury frequency; and
- 87 percent decrease in restricted workdays.

The performance improvements noted above are a testament to the effectiveness of the Program's related policies, programs, and procedures.

From 2013 to 2017, the corporate attendance number improved by 32 percent.

Improved Processes and Systems

New systems applied in recent years including a Learning Management System ("LMS") in 2016, which streamlines processes for training administration, documentation, tracking, reporting, and delivery. In 2017, the talent recruitment process was streamlined with the introduction of an Applicant Tracking System. This tool will improve productivity by streamlining the recruitment process, support the creation of qualified and diverse candidate pools thereby reducing costs associated with recruitment agencies, and enhance the candidate experience.

The Program has also implemented the Management Control and Reporting System ("MCRS") to manage divisional processes (e.g. performance management). MCRS helps to ensure continuous improvement through proper forecasting, planning, executing/controlling, and reporting on key processes. These approaches aim to improve productivity by streamlining work and eliminate waste in business processes.

5. ENVIRONMENT, HEALTH, AND SAFETY SEGMENT

5.1 Segment Description

The Environment, Health, and Safety ("EHS") segment ensures that Toronto Hydro works in an environmentally conscious manner and provides a safe working environment for the employees through the implementation of safe work practices, engineering controls and adherence to legislative and regulatory requirements.

The EHS segment includes the execution of operational activities, preparation of plans and delivery of targeted initiatives, while adhering to the applicable internal and external reporting requirements. The activities performed as part of this segment are instrumental to ensuring that the utility complies with its mandated obligations.

Consistent with Toronto Hydro's service obligations, the work performed within this segment is carried out 24 hours a day, 7 days a week.

EHS activities are integrated within the utility's strategic planning and execution of operational and capital work programs, and are comprised of the following activities:

- **Environment, Health, and Safety Management Systems ("EHSMS"):** The EHSMS system improves efficiency and efficacy of EHS activities through the joint delivery of common activities such as inspections, audits, reporting, investigations, annual planning, training, and management review meetings. The EHSMS also facilitates Toronto Hydro's compliance with the Distribution System Code, Electrical Utility Safety Rules, *Occupational Health & Safety Act* ("OHSA"),[2] and various other legislated requirements. In addition, the EHSMS also provides a mechanism for mitigating the risk in achieving corporate objectives relating to health, safety, and environmental performance. Lastly, the EHSMA exchanges safety information with other utilities and collaborates with its peers on public safety initiatives.
- **EHS Framework:** Toronto Hydro plans, organizes, and coordinates all EHS activities in accordance with internationally recognized standards.[3]
- **Occupational Health and Safety Activities:** Toronto Hydro develops, maintains, inspects, and audits occupational health practices as well as facilitates safety training programs. These programs ensure the long-term health and wellness of the utility's workforce. The Canadian Electricity Association has recognized the utility for its superior performance in occupational health and safety for 2015 and 2016 by being recognized as best in its peer group.

[2] R.S.O. 1990, c. O.1. ["*OHSA*"].

[3] Toronto Hydro is registered with ISO 14001:2015 and OHSAS 18001:2007, both internationally recognized standards in EHS. Together, they establish a framework that incorporates effective risk management, emphasizes continual improvement and achieves operational efficiencies.

- **Sustainable Development:** Toronto Hydro uses an internationally recognized standard, ISO 26000, as a structured approach to promoting sustainable development and integrating social responsibility into the utility's core values, processes, and operations.[4]
- EHS administers its **Environmental Policy** by delivering a number of environmental protection and compliance programs, such as: Management of non–hazardous and hazardous wastes, including:
    - Polychlorinated Bi-Phenyls ("PCBs") and PCB-containing equipment;
    - Environmental spill response, cleanup, investigation and reporting;
    - Delivery of prescribed environmental training (e.g. Transportation of Dangerous Goods);
    - Maintenance of environmental permits for equipment that discharge contaminants into the atmosphere;
    - Completion of annual and ad hoc reporting to federal, provincial, and municipal agencies; and
    - Hazardous waste streams registrations with the Ontario Ministry of the Environment, Conservation, and Parks.
- EHS is also responsible for responding to public concerns about the environmental effects of Toronto Hydro's activities (e.g. electromagnetic fields ("EMF"), presence of PCBs, contaminated soil).
- **Internal and External Reporting:** Toronto Hydro regularly reports on internal and external EHS performance. External reporting includes mandatory reports and notifications to the City of Toronto, the Ministry of Labour, the WSIB, the Ontario Ministry of the Environment, Conservation and Parks, and Environment and Climate Change Canada.

[4] Adherence to this ISO 26000 standard is required for the utility's continued maintenance of its Sustainable Electricity Company designation from the Canadian Electricity Association.

5.2 Environment, Health, and Safety Segment Costs

Toronto Hydro requires approximately $2.9 million per year over the 2020-2024 plan period to perform the EHS functions described above. If the utility does not receive the funding it requires to execute this segment as described, Toronto Hydro could be exposed to a number of risks, including:

- Injuries and illness to employees due to occupational health and safety hazards;
- Fines and penalties related to legislative and regulatory non-compliance; and,
- Stop work orders, which will halt execution of the utility's capital, work program.

Table 4, below, provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for the EHS segment.

Table 4: Environment, Health, and Safety Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Environment Health and Safety	2.5	2.7	2.5	2.7	2.8	2.9

The 2020 test year costs represent an increase of $0.4 million from the utility's last rebasing year actuals (2015), $0.4 million from the most recent historical actual year (2017), and $0.1 million from the bridge year (2019). Overall, the variances are mainly attributable to filling vacancies that existed in the previous test year, incremental external contractor costs required to support the safe execution of the utility's capital work program, and inflationary pressures.

5.3 Environment, Health, and Safety Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

From 2015 to 2016, costs increased by $0.2 million, the effect of filling prior vacancies.

2016 – 2017 Variance Explanation

From 2016 to 2017, costs decreased by $0.2 million. This was primarily due to a decrease in payroll costs related to resources being transferred to the Employee Labour Relations and Human Resources Services segment and in-year vacancies. There were a few employees who left the company during 2016-2017, these roles were either not filled immediately, or were not filled by the end of the year.

2017 – 2018 Variance Explanation

From 2017 actual to 2018 budgeted, costs are expected to increase by $0.2 million, the effect of filling prior vacancies.

2018 – 2019 Variance Explanation

From 2018 to 2019, costs are expected to increase by $0.1 million to account for inflationary pressures.

2019 – 2020 Variance Explanation

From 2019 to 2020, costs are expected to increase by $0.1 million to account for inflationary increases.

6. HUMAN RESOURCES SERVICES AND EMPLOYEE LABOUR RELATIONS SEGMENT

6.1 Segment Description

This segment is focused on management of all employee and labour relations, including the interpretation and administration of the collective agreement provisions, non-occupational and occupational illness or injury employee claims, case management, design and administration of the compensation and benefits program, and associated technology systems and solutions. Segment activities also include drafting, maintaining and enforcing policies and legislative requirements, and providing corporate-wide human resource support in the execution of business deliverables. The key operational dimensions of the HR Services and Employee Labour Relations segment are:

- Employee and Labour Management;
- Employee Labour Relations; and
- Compensation and Benefits.

6.1.1 Employee and Labour Management

Employee and Labour Management ("ELM") focuses on the prevention, monitoring, mitigation, and resolution of specific issues relating to employee and labour relations, attendance, health, short and long-term disability, employee compliance with legislation, corporate policies, and practices and collective agreement provisions. Within the Employee and Labour Management area, health services processes and monitors occupational and non-occupational health and injury claims on behalf of Toronto Hydro. Health services assists injured employees through appropriate treatment and recovery measures to encourage their participation in the workplace within their prescribed restrictions until they can safely return to their pre-injury role.

6.1.2 Employee Labour Relations

Toronto Hydro has a diverse workforce in a variety of roles and functions including certified and skilled trades, and designated and technical professionals. Toronto Hydro also operates within a dynamic labour environment, as approximately 58 percent of its employees belong to a union. Unionized employees are organized into three bargaining units (inside workers, outside workers, and professional engineers) and are represented by sophisticated and established labour unions, the Power Workers' Union ("PWU") and the Society of Energy Professionals.

6.1.3 Employee and Labour Management

Employee Labour Relations ("ELR") supports Toronto Hydro's unionized and non-unionized work groups by ensuring workplace issues are addressed promptly and appropriately, and that the utility follows all applicable labour and employment related legislation, policies, and collective agreement requirements.

This work requires labour relations and legal professionals to provide advice, guidance, and support on how to address challenges, and where necessary, assist in preparing for litigation. Litigation can include grievance arbitration, civil employment claims, Ontario Labour Relations Board matters, and human rights claims. ELR also provides legal advice and assistance in regards to privacy matters and freedom of information requests that pertain to employees of the organization.

6.1.4 Compensation and Benefits

This function oversees and administers Toronto Hydro's workforce compensation strategy and practices.[5] The services provided through this function are critical to the utility's ability to secure and maintain a workforce that is skilled, adaptable, committed, and performance-driven. Toronto Hydro strives to achieve these key outcomes in a financially responsible manner by providing wages and benefits in the markets where Toronto Hydro competes for talent, and by recognizing employee contributions in achieving individual, divisional, and corporate performance goals.

6.2 Human Resources Services and Employee Labour Relations Segment Costs

Toronto Hydro requires approximately $5 million per year over the 2020-2024 plan period to perform the Human Resources Services and Employee Relations functions

[5] Exhibit 4A, Tab 4, Schedule 4.

described above. If the utility does not receive the funding it requires to execute this segment as described, Toronto Hydro's employees could be exposed to a number of risks, including:

- Legislative or regulatory non-compliance as a result of having insufficient resources to monitor, advise, and enforce compliance with the utility's statutory and regulatory obligations;
- Lower levels of productivity across the organization due to the inability to investigate and remedy employment issues such as attendance management; and
- Other miscellaneous risks, such as the inability to defend itself against employment related claims, or to pursue further efficiencies and cost-saving opportunities.

Table 5, below, provides the Historical (2015-2017), Bridge (2019), and Test Year (2020) expenditures for the Human Resource Services and Employee Relations segment.

Table 5: Human Resources Services and Employee Labour Relations Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Human Resource Services and Employee Labour Relations	4.6	5.2	5.1	4.8	4.8	5.0

The 2020 test year costs represent an increase of $0.4 million from the utility's last rebasing year actuals (2015), $1.0 million decrease from the utility's most recent historical actual year (2017), and $0.2 million increase from the bridge year (2019).

6.3 Human Resources Services and Employee Labour Relations Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

From 2015 to 2016, costs increased by $0.6 million. This was primarily due to an increase in legal fees and arbitration services related to employee relations cases and collective bargaining with the Society of Energy Professionals.

2016 – 2017 Variance Explanation

From 2016 to 2017, costs decreased by $0.1 million. A portion of the segment's resources was temporarily allocated to the ERP project, reducing the costs of this segment. Partially offsetting this temporary increase was an increase in resources added from the Organizational Effectiveness segment and the Environment, Health, and Safety segment.

2017 – 2018 Variance Explanation

From 2017 actual to 2018 budgeted, costs decreased by $0.3 million. This was a result of headcount and operating budget being transferred out of Human Resources Services and Employee Labour Relations segment to training initiatives during a reorganization of the division. The employees transferred to training initiatives are captured in the variance analysis in the next segment.

2018 – 2019 Variance Explanation

From 2018 to 2019, costs are expected to remain stable.

2019 – 2020 Variance Explanation

From 2019 to 2020, costs are expected to increase by $0.2 million to account for inflationary pressures.

7. TALENT MANAGEMENT AND ORGANIZATIONAL EFFECTIVENESS SEGMENT

7.1 Segment Description

The Talent Management and Organizational Effectiveness segment is focused on the development and execution of the workforce staffing plan, career succession, employee engagement and communication, performance and productivity, and employee development strategies and programs. The primary objective of this segment is to attract and maintain a skilled, productive, and adaptable workforce that Toronto Hydro requires to execute its programs and deliver safe and reliable services to its customer. Functions that allow Toronto Hydro to achieve these objectives include:

- Short and long term workforce staffing and planning;
- Career succession planning; job and organizational design;
- Attraction, recruitment and selection of new employees;
- Employee orientation, employee engagement and communication;
- Performance and change management systems; training and development; and
- Employee retention.

These functions are described in the sections below.

7.1.1 Talent Management

The Talent Management function plans and executes the utility's short and long-term staffing strategy, which includes:[6] (i) the resources that the utility needs to execute its

[6] Exhibit 4A, Tab 4, Schedule 3.

capital plans and operational programs; (ii) the availability of talent within the utility and in external market; and (iii) the actual and projected turnover rates. This segment is also responsible for establishing and administering industry specific collaborations with colleges and universities, attraction strategies, and the recruitment and selection processes.

Talent Management guides and executes both the internal and external recruiting and selection process, ensuring that it is fair, unbiased, and barrier free. Toronto Hydro relies on a number of approaches to attract highly skilled and diverse candidates from the external market. Toronto Hydro uses a competency-based selection process to fill vacancies, whereby candidates are evaluated on both behavioural corporate competencies and technical job specific requirements.

Collaborations with educational institutions allow Toronto Hydro to spread awareness about its human resource requirements, build recruitment relationships with future graduates and influence and shape the programs and curriculum offered to students with the utility's strategic goals and long-term needs. Through these partnerships, Toronto Hydro has hired a number of full time employees into the certified and skilled trades and designated and technical professional positions between 2014 and 2017.

7.1.2 Organization Design

Organization Design assesses the functionality of Toronto Hydro's business departments and operational divisions by reviewing each business units' functional responsibilities and associated processes for meeting those responsibilities. Organization Design also plans for long-term goals and objectives, considers succession opportunities, and devises the appropriate short-term and long-term workforce requirements for meeting those goals and objectives. In addition, organizational structure is reviewed in order to identify strategies that enhance existing processes, achieve operational efficiencies and cost savings, and improve overall organization performance. This review ensures that job roles are clearly defined, that performance is adequately measured and that employees are compensated based on the appropriate job evaluation.

7.1.3 Change Management

Employees responsible for this function collaborate with other parts of the utility to support the successful implementation of large, cross-functional projects. Change Management helps to design and administer new systems and processes in relation to those projects, and to increase employee engagement and participation in order to maintain or increase productivity during and after the project's implementation.

7.1.4 Training and Development

In order to develop and sustain a qualified and competent workforce, Toronto Hydro provides a variety of training and development programs, including an onboarding program to support their transition to their new role, apprenticeship training, leadership, technical, legislative, and Toronto Hydro specific compliance programs. For instance, in 2017, the Training and Development team organized and successfully delivered 157 training programs. Designing and delivering these programs in-house provides for greater benefits to the utility's employees, along with cost-savings to the organization. External designers are now only used for complex legislative compliance matters.

Effective leadership and succession planning are essential to the utility's success and provide value to Toronto Hydro's customers by driving productivity and efficiency, and protecting the continuity of the utility's operations. Training and Development facilitates these objectives, in conjunction with the performance management program, which allows employees to identify career development goals, specific interests, and any skill or knowledge gaps that they would like to fill. This information is critical to recognizing and developing potential leaders and successors from within the utility and to delivering Toronto Hydro's staffing strategy.[7] Leadership training is provided to employees at all levels of the organization.

Toronto Hydro's technical training and development programs are an essential resource for meeting all legislative, compliance and utility specific training requirements. 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.

Toronto Hydro admnisters five certified apprenticeship training programs :

- Certified power line persons ("CPLP");
- Certified power cable persons ("CPCP");
- Distribution system technologists ("DST");
- Power system controllers ("PSC"); and
- Certified meter mechanics ("CMM").

Toronto Hydro also admnisters two technical training programs: (i) Engineering Technologists; and (ii) Engineers.

[7] Exhibit 4A, Tab 4, Schedule 3.

Together, these programs play a key role in facilitating the development and transfer of core knowledge about the complexities of Toronto Hydro's distribution system and in maintaining the specialized work skills which are critical at Toronto Hydro (e.g. network switching, positive identification of underground cable and lead cable splicing in the underground system), to allow experienced employees an opportunity to share the complexities of the utility's assets and mentor new employees.

As previously stated, Toronto Hydro is accredited with Training Delivery Agent status to provide training for Power Line Technicians. The other four apprenticeship programs are designed with the objective of developing and maintaining the specialized skills and knowledge that certified and skilled trades and designated and technical professionals require to work on Toronto Hydro's distribution system safely and efficiently.

7.1.5 Performance Management

Toronto Hydro employees are evaluated on specific competencies and results through the performance management program. The process establishes the ability for employees and supervisors to set goals throughout the year that are aligned with corporate objectives and outcomes, ensuring employees know what is expected of them and how their roles support the strategic objectives of the utility.[8] There is ongoing feedback to ensure project deadlines and goals are achieved. In addition to mobilizing Toronto Hydro's workforce to achieve the core objectives outlined in the corporate strategy, the performance management cycle facilitates career development and contributes to employee engagement and enrichment. All new employees are coached on aligning individual and organizational outcomes.

[8] Exhibit 1B, Tab 2, Schedule 1.

7.2 Talent Management and Organizational Effectiveness Segment Costs

Toronto Hydro requires approximately $8.1 million per year over the 2020-2024 plan period to perform the functions in the Talent Management and Organization Effectiveness segment, described above. If Toronto Hydro does not receive the requested level of funding to perform the functions and satisfy the responsibilities identified in this segment, the utility could be exposed to a number of risks, including but not limited to, a reduced ability to successfully recruit and develop the skilled and specialized resources that Toronto Hydro requires in the next five years. This, in turn, would impact Toronto Hydro's safety performance. It may also lead to an increase in WSIB premium rates and/or fines and penalties associated with non-compliance.

Table 6, below, provides the Historical (2015-2017), Bridge (2019), and Test Year (2020) expenditures associated with the Talent Management and Organizational Effectiveness segment.

Table 6: Talent Management and Organizational Effectiveness Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Talent Management & Organizational Development	7.0	7.3	7.0	7.8	7.9	8.1

The 2020 test year costs represent an increase of $1.1 million from the utility's last rebasing year actuals (2015), $1.1 million from the most recent historical actual year (2017), and $0.2 million from the bridge year (2019). The variances are primarily attributable to the addition of resources in 2018 to support the attraction and recruitment of employees to address planned retirements in all workforce segments.

7.3 Talent Management and Organizational Effectiveness Segment Year-over-Year Variance Analysis

<u>2015 – 2016 Variance Explanation</u>

From 2015 to 2016, costs increased by $0.3 million as a result of new collaborations with colleges and universities to build recruitment relationships with future graduates, and an online leadership development program targeting organization's senior leadership.

<u>2016 – 2017 Variance Explanation</u>

From 2016 to 2017, costs decreased by $0.3 million. This was a result of transferring resources from the Talent Management and Organizational Effectiveness segment to the Human Resources Services and Employee Labour Relations Segment.

<u>2017 – 2018 Variance Explanation</u>

From 2017 actual to 2018 budgeted, costs are expected to increase by $0.8 million. This was a result of headcount and operating budget being reallocated from the Human Resources Services and Employee Labour Relations Segment to training initiatives.

<u>2018 – 2019 Variance Explanation</u>

From 2018 to 2019, costs are expected to increase by $0.1 million to account for inflationary pressures.

<u>2019 – 2020 Variance Explanation</u>

From 2019 to 2020, costs are expected to increase by $0.2 million to account for inflationary pressures.

FINANCE

1. OVERVIEW

Table 1: Finance Program Summary

2015-2017 Average Annual Cost ($M): 14.9	**2020 Cost ($M):** 16.2
Segments: • Controllership • Financial Services • External Reporting	
Outcomes: Public Policy, Financial	

The Finance program (the "Program") supports Toronto Hydro's operations through financial planning, management reporting, capital planning and reporting, payroll and disbursements, corporate tax, treasury, insurance and internal audit as well as external reporting and financial regulatory and revenue management.

The Program provides value to customers through the oversight of financial planning activities which support the utility's ability to execute long-term and short-term strategic plans and facilitates the appropriate governance of key performance measures such as operating expenses, regulated capital, in-service assets, net income and investor and stakeholder engagement as well as meeting its financial compliance requirements with the respective statutory and regulatory bodies.

The Program includes the following three segments:

- **Controllership**: encompasses oversight and governance of Toronto Hydro's financial activities. This includes financial planning, management reporting, capital planning, and payroll and disbursements.

- **Financial Services:** governs the activities permitting Toronto Hydro to meet its financial obligations. This includes Treasury activities, Insurance, Corporate Taxation, and Internal Audit. These functions are integral to contributing to financial compliance and solvency.
- **External Reporting:** oversees preparation and compilation of financial reporting materials for external parties, including, but not limited to, the Ontario Energy Board ("OEB"), Independent Electricity System Operator ("IESO"), and the Ontario Securities Commission ("OSC").

The Program and its constituent segments are a continuation of the activities described in the Finance program in Toronto Hydro's 2015-2019 Rate Application.[1]

Functionally, these segments work to support Toronto Hydro's operations through diligent financial planning, management reporting, capital activities, payroll and disbursements, corporate tax, treasury, insurance and abiding by internal and external auditing standards.

---

[1] EB-2014-0116, Toronto Hydro-Electric System Limited Application (filed July 31, 2014, corrected February 6, 2015), Exhibit 4A, Tab 2, Schedule 15.

2. OUTCOMES AND MEASURES

Table 2: Finance Program Outcomes and Measures Summary

Public Policy	• Contributes to Toronto Hydro's public policy objectives by: ○ Providing accurate and timely OEB's Electricity Record Keeping Requirements (the "RRR") reporting by maintaining the necessary processes and controls; ○ Preparing and issuing quarterly and audited annual financial statements, including the Management Discussion & Analysis ("MD&A") and Annual Information Form ("AIF") as required by the Ontario Securities Commission ("OSC") and the Canada Revenue Agency ("CRA"); and ○ Completing regulatory financial reporting required by the Ontario Energy Board ("OEB") including 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").
Financial	• Contributes to Toronto Hydro's financial objectives by: ○ Leading the governance of the DSP Implementation Progress Metric and Financial Ratios as annually reported via the OEB Distributor Scorecard; and ○ Meeting the financial obligations and maintenance of compliance requirements imposed by the relevant regulatory bodies and debt holder.

3. PROGRAM DESCRIPTION

The Program provides financial support to every aspect of Toronto Hydro's operations through business planning activities, management reporting, capital planning, payroll services, accounts payable, internal audits, and other issue-specific functions. It also enables the satisfaction of statutory and regulatory reporting obligations. These reporting requirements primarily relate to the preparation and issuance of securities law related continuous disclosure information completed on a consolidated basis.

Regulatory financial reporting required by the OEB includes quarterly and annual reporting under the OEB's RRR and compliance with the OEB's APH.

The Program also delivers traditional finance functions such as payroll and disbursement services, treasury, corporate tax, and internal audit that allow Toronto Hydro to meet its short and long-term financial, legal, and legislative obligations to its employees, external suppliers, service providers, debt holders, government agencies, board of directors, and its external auditors. In addition, the Program oversees a number of operational processes (i.e. management reporting and analysis and capital planning and reporting) that monitor the utility's financial performance and support management's ability to make informed, strategic decisions.

The Program also provides oversight and governance of the utility's business planning activities through the financial planning function which is responsible for the assessment and recommendation of short and long-term strategic plans and integration of operational, financial and regulatory plans. The Program also manages the co-ordination and consolidation of the annual budget.

The activities described above are accomplished via the following three segments:

- **Controllership**: Includes functions such as Financial Planning, Management Reporting and Analysis, Capital Planning and Reporting, and Payroll and Disbursements;
- **Financial Services**: Includes functions such as Corporate Tax, Treasury, Insurance, and Internal Audit; and
- **External Reporting**: Includes statutory and regulatory reporting functions such as External Reporting and Financial Regulatory and Revenue Management.

4. PROGRAM COSTS

Toronto Hydro requires approximately $16.2 million per year over the 2020-2024 plan period to execute the functions described above. Without this level of funding, the Program could be exposed to a number of risks, including:

- Reduced oversight and management functions that can negatively impact operational decisions and compromise the achievement of strategic objectives;
- Decreased ability to comply with statutory and regulatory reporting requirements;
- Inability to satisfy financial, legal and legislative obligations to its employees, external suppliers, service providers, debt holders, government agencies, Board of Directors and external auditors; and
- A compromised ability to secure funding to finance the Capital and OM&A programs and/or risk of violation of the covenants contained in the existing debt issuances.

Table 3, below, provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for each of the Program's segments.

Table 3: Finance Program Expenditures by Segment ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Controllership	8.4	7.3	6.4	7.2	7.2	7.0
External Reporting	2.5	2.7	2.7	3.0	3.1	3.2
Financial Services	5.2	5.0	4.6	5.7	5.9	6.1
Total	**16.1**	**15.0**	**13.6**	**15.9**	**16.2**	**16.2**

4.1 Cost Drivers

The Program's proposed 2020 test year costs represent an increase of $0.1 million from the utility's last rebasing year actual costs (2015), $2.6 million from the most recent historical actual year (2017), and no change from the bridge year (2019). These variances are attributable to the following drivers: compensation cost increases, higher insurance premiums, and System for Electronic Document Analysis and Retrieval ("SEDAR") fees, partially offset by expected cost savings resulting from departmental efficiencies and process improvements.

4.2 Cost Control and Productivity Measures

The Program has undertaken certain measures over the 2015-2019 plan period to control costs. In 2016, the Finance program engaged in an assessment of its functions, responsibilities and resources which resulted in a redesign of the Program, amalgamation of roles, and the streamlining of processes across the Controllership, Financial Services, and External Reporting Segments. Specifically:

- The amalgamation of Financial Planning and Management Reporting functions creating internal efficiencies within the Controllership segment;
- Re-allocation of the Financial Regulatory and Revenue management function to the External Reporting segment to streamline roles and responsibilities; and
- Re-allocation of resources to the Legal and Regulatory program.

Within the Controllership segment, additional cost savings of $0.9 million are forecasted for the 2019 Bridge and 2020 Test Year. These savings are related to departmental efficiencies through the streamlining of functions and process improvements resulting in the elimination of manual processes.

In 2017, within the Financial Services segment, Toronto Hydro took active measures to re-negotiate its insurance policies to drive down the property insurance premiums, resulting in annual savings of $0.4 million.

Lastly, over the 2015-2019 plan period, External Reporting is expected audit fees flat, and maintain current staffing levels.

5. CONTROLLERSHIP SEGMENT

5.1 Segment Description

The Controllership segment provides oversight and governance of Toronto Hydro's financial planning activities, timely and accurate financial information and support to Toronto Hydro's senior management and operational business units, and allows the utility's financial reports to meet both statutory and regulatory financial reporting requirements. The Controllership segment leverages knowledge of operational processes to produce accurate and relevant financial information, and provides appropriate financial context for decision making by the operational business units and senior management. This segment is crucial in assisting senior management make informed decisions, and for monitoring and analyzing the utility's financial performance against short-term goals, long-term plans and regulatory filings. The activities comprising this segment encompass the following functions: (i) Financial Planning; (ii) Management Reporting and Analysis; (iii) Capital Planning and Reporting; and (iv) Payroll and Disbursements. Further details of these activities are below.

5.1.1 Financial Planning

The Financial Planning function provides centralized oversight and governance of the utility's financial planning activities including the assessment and recommendation of long-term strategic plans and integration of operational, financial, and regulatory plans. This function co-ordinates the development and execution of the utility's budget, financial projections, and support for electricity distribution rate applications. The group leverages the analysis provided through the Management Reporting and Analysis function described below to identify issues that may impact Toronto Hydro's ability to achieve its financial objectives. Financial planning allows the utility to make effective decisions that enable the achievement of the company's strategic goals and objectives while ensuring governance and oversight of all financial planning activities.

5.1.2 Management Reporting and Analysis

The Management Reporting function oversees internal management reporting and supports operational groups through month-end activities and financial analysis for decision making and achievement of strategic objectives. Responsibilities of this function include: (i) managing financial systems and processes to effectively deliver timely reports and outlooks; (ii) reviewing, consolidating and preparing analyses for management reports to enable timely decision making; (iii) providing support for external reporting and disclosure; and (iv) reviewing and consolidating monthly financial outlooks.

5.1.3 Capital Planning and Reporting

The Capital Planning function oversees the development of the utility's annual capital expenditure budget and long-term capital expenditure projections. The Capital Reporting function records capital projects in the fixed asset register, and maintains tangible, intangible, regulatory and statutory assets, and financial data under both Modified IFRS and IFRS. The team provides 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, OEB and audit 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.

5.1.4 Payroll and Disbursements

The Payroll function ensures that Toronto Hydro employees are compensated for their services in a timely and accurate manner, consistent with relevant time-keeping and other records. The function also ensures that all relevant legislative requirements and statutory deductions are appropriately applied to employee payments and that payroll withholdings amounts are remitted on a timely basis. In addition, the function maintains accurate OMERS pension fund records for participating employees.

The Disbursements function facilitates timely and accurate payment of valid vendor invoices. It also processes payments for eligible customer refunds initiated by Toronto Hydro’s Customer Care Department. In performing these tasks, the Disbursements function utilizes financial software to validate and/or correct the amounts and timing of payment of supplier invoices. In addition, it reviews software generated payment files and approves the resulting bank transfer files or cheque runs.

5.2 Controllership Segment Costs

Toronto Hydro requires approximately $7 million per year over the 2020-2024 plan period to execute the functions in the Controllership segment, as described above. Without this level funding, Toronto Hydro could be exposed to a number of risks:

- Compromised month-end and financial analyses for management reports to enable timely decision making;
- Reduced management of fixed assets and oversight of capital program spending and ISAs that can impact approved commitments in prior OEB decisions and compromise the achievement of strategic and financial objectives; and
- Reduced governance and oversight of financial planning activities that can limit the organization's ability to execute its long-term strategic vision and plans.

Table 4, below, provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for the Controllership segment.

Table 4: Controllership Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Controllership	8.4	7.3	6.4	7.2	7.2	7.0

The 2020 proposed test year costs represent a decrease of $1.4 million from the utility's last rebasing year actual costs (2015), an increase of $0.6 million from the most recent historical actual year (2017), and a decrease of $0.2 million from the bridge year (2019).

5.3 Controllership Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

A decrease of $1.1 million resulting from an organizational re-design of the Program due to the amalgamation of roles and streamlining of processes creating efficiencies within the segment as well as transfer of resources.

2016 – 2017 Variance Explanation

A decrease of $0.9 million due to headcount vacancies and additional capitalization of labour to the ERP project.

2017 – 2018 Variance Explanation

An increase of $0.8 million is due to headcount vacancies in 2017 which are expected to be filled in 2018.

2018 – 2019 Variance Explanation

There is no forecasted variance. Forecasted salary and other inflationary increases are expected to be offset by departmental efficiencies and streamlining of functions and process improvements resulting from the elimination of manual processes.

2019 – 2020 Variance Explanation

Forecasted decrease of $0.2 million due to capitalization of labour for internal projects

6. FINANCIAL SERVICES SEGMENT

6.1 Segment Description

The Financial Services segment encompasses the functions that enable Toronto Hydro to meet its regular and long-term financial obligations to its external suppliers and service providers, Toronto Hydro's debt holders and the government. It also allows the utility to plan for, secure and provide timely payments for market-competitive debt instruments that it needs to finance its capital work program.

The Financial Services segment provides Toronto Hydro with a means to objectively evaluate the accuracy, consistency and efficiency of its core functions and processes to ensure compliance to internal and external policies and facilitate transparency in all corporate activities. The scope of activities comprising this segment includes the following functions: (i) Corporate Tax; (ii) Treasury; (iii) Insurance; and (iv) Internal Audit.

6.1.1 Corporate Tax

The Corporate Tax function facilitates the utility's compliance with all relevant tax laws and regulations. In addition, it ensures that taxes are appropriately recorded and reflected in accounting records and external financial statements. The function is responsible for preparing and submitting timely tax filings and applicable payments that include corporate income taxes, harmonized sales tax, the debt retirement charge, and non-resident withholding tax. The group executes tax-related financial planning activities, performs tax-related monitoring and reporting work, and supports both internal and external compliance tax audit activities as required by applicable legislation and internal policies. Corporate Tax is also responsible for regulatory tax reporting and compliance, such as the Payment in Lieu of Taxes ("PILs") calculations for the purposes of rate filings.[2]

---

[2] Exhibit 4B, Tab 2.

6.1.2 Treasury

The Treasury function oversees Toronto Hydro's cash management, debt management, and investor relations activities. Cash management activities include: (i) borrowing to provide the utility with adequate funds to meet its financial obligations, or investing any excess funds on hand; (ii) risk controls including segregation of duties and independent verification and approval of borrowing activities; and (iii) daily reporting and reconciliation of Toronto Hydro's cash position and general ledger and sub-ledger accounts. Debt management activities include the issuance of both long-term and short-term debt instruments to fund the capital programs and for general corporate purposes. Investor relations activities include developing and managing relationships with bank lenders, bond investors, independent financial and credit analysts, and the credit rating agencies in order to optimize the cost of funding. The activities performed by this function help facilitate access to the debt capital markets from which Toronto Hydro accesses funds to carry out its operations and fund its long term capital program.

6.1.3 Insurance

The Financial Services function also oversees the utility's comprehensive insurance requirements, the purpose of which are to provide Toronto Hydro protection for asset exposure, corporate liability and other activities which may expose the utility to a financial loss. Current insurance policies administered by this group provide coverage for a variety of losses and expenses, including comprehensive general liability, all risk property and boiler and machinery insurance, liabilities of directors and officers, automobile liability, professional liability, and crime and cyber insurance.

6.1.4 Internal Audit

Internal Audit provides independent and objective reporting to Toronto Hydro Corporation's Audit Committee 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 or the Audit Committee.

6.2 Financial Services Segment Costs

Toronto Hydro requires approximately $6.1 million per year over the 2020-2024 plan period to execute the functions in the Financial Services segment, as described above. Without this level of funding, Toronto Hydro could be exposed to a number of risks, including**:**

- Compromised ability to secure funding to finance the capital programs and/or risk of violation of the covenants contained in the existing debt issuances;
- Increased difficulty maintaining compliance with relevant tax laws, rules, regulations and appropriate tax reporting and disclosure requirements, which could cause an increase in tax risks and related costs;
- Reduced ability to ensure operational compliance and performance due to lack of design, implementation and maintenance of internal controls and reporting systems, governance activities and fraud detection procedures; and
- Inability to protect the utility against a variety of financial risks and losses due to lack of oversight of insurance policies.

Table 5, below, provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for the Financial Services segment.

Table 5: Financial Services Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Financial Services	5.2	5.0	4.6	5.7	5.9	6.1

The 2020 proposed test year costs represent an increase of $0.9 million from the utility's last rebasing year actual costs (2015), $1.5 million from the most recent historical actual year (2017), and $0.2 million from the bridge year (2019).

6.3 Financial Services Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

A decrease of $0.2 million is primarily due to lower consulting costs in the Treasury and Internal Audit functions, partially offset by compensation cost increases.

2016 – 2017 Variance Explanation

A decrease of $0.4 million is primarily due to headcount vacancies resulting from the organizational re-design of the Program.

2017 – 2018 Variance Explanation

An increase of $1.1 million is primarily due to headcount vacancies expected to be filled in 2018, compensation cost increases and higher forecasted insurance premiums due to recent lost experience by the underwriters being pushed to policy holders.

2018 – 2019 Variance Explanation

A forecasted increase of $0.2 million is due to compensation cost increases.

2019 – 2020 Variance Explanation

A forecasted increase of $0.2 million is due to compensation cost increases and higher forecasted insurance premiums due to recent lost experience by the underwriters being pushed to policy holders.

7. EXTERNAL REPORTING SEGMENT

7.1 Segment Description

The External Reporting segment oversees the preparation and compilation of external financial reporting materials, such as those required by the OSC. Among other things, this function requires preparation of publically filed annual and interim financial statements and disclosures and reporting to the Board Audit Committee. The segment is also responsible for assessing, reviewing, documenting and communicating all changes in accounting standards to relevant stakeholders, and assessing the accounting treatment for new or complex transactions.

The specific activities and internal controls underlying Toronto Hydro's external reporting processes are subject to regular reviews by independent internal and external auditors.

To enable timely and accurate execution of its core functions, the segment undertakes two sets of primary activities. First, the segment performs central accounting functions such as consolidation entries, intercompany settlements and eliminations, accounting for post-employment benefits, and other account reconciliation and management activities. Second, it uses information in the company's accounting systems to prepare all required financial filings. These filings include the audited annual financial statements and notes (consolidated and for each legal entity separately), the MD&A, the AIF and other reporting requirements from time to time. With the exception of the AIF, the above documents are filed quarterly.

In addition the External Reporting segment is responsible for the Financial Regulatory and Revenue Management function which oversees financial activities associated with the OEB and is responsible for the accounting in relation to Toronto Hydro's transactions with the IESO and other suppliers for cost of power expenses and other related regulatory settlements. Other responsibilities include budgeting, forecasting, financial analysis and related preparation of information for reporting under the OEB's RRR and for the purpose of rate applications. This function also supports OEB audits, enables compliance with the OEB financial and regulatory accounting procedures outlined in the APH, and supports the external reporting, management reporting and analysis and financial planning functions in relation to regulatory assets and liabilities.

7.2 External Reporting Segment Costs

Toronto Hydro requires approximately $3.2 million per year over the 2020-2024 plan period to execute the functions in the External Reporting segment, as described above. Without this level funding, Toronto Hydro could be exposed to a number of risks, including**:**

- Increased risk of reporting errors and material misstatements for financial reporting purposes;
- Compromised ability for the preparation and compilation of external financial reporting materials, such as those required by the OSC;

- Lack of appropriate governance to support Board of Directors responsibilities for financial and audit matters; and
- Lack of regulatory and revenue management leading to material misstatements and inability to comply with the OEB's financial and regulatory accounting procedures.

Table 6, below, provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for the External Reporting segment.

Table 6: External Reporting Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
External Reporting	2.5	2.7	2.7	3.0	3.1	3.2

The 2020 proposed test year costs represent an increase of $0.7 million from the utility's last rebasing year actual costs (2015), $0.5 million from the most recent historical actual year (2017), and $0.1 million from the bridge year (2019).

7.3 External Reporting Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

An increase of $0.2 million is due to compensation increases.

2016 – 2017 Variance Explanation

There is no variance.

2017 – 2018 Variance Explanation

An increase of $0.3 million is primarily due to mandated SEDAR fees related to financial reporting obligations made on a consolidated basis.

2018 – 2019 Variance Explanation

A forecasted increase of $0.1 million is due to compensation increases.

2019 – 2020 Variance Explanation

A forecasted increase of $0.1 million is due to compensation increases.

INFORMATION TECHNOLOGY

1. OVERVIEW

Table 1: Information Technology Program Summary

2015-2017 Average Cost ($M): 35.9	**2020 Cost ($M):** 44.0
Segments: • Security & Enterprise Architecture • IT Operations • Project Execution • IT Governance	
Outcomes: Customer Service, Reliability, Public Policy, Safety, and Financial	

The Information Technology ("IT") program (the "Program") supports all aspects of Toronto Hydro's business. The IT infrastructure and applications maintained by this Program and the IT services provided through it, enable and support the efficient operations of the utility and play a critical role in achieving Toronto Hydro's objective to provide safe, secure and reliable electricity.

The 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 mix of end point devices (laptops, tablets, and printers), communications hardware and software and storage infrastructure, user-facing applications and core infrastructure software. Toronto Hydro performs this work under clearly defined architectural standards and governance frameworks.

The Program consists of the following four segments:

- **Security and Enterprise Architecture*:*** Defines and implements utility-wide IT strategy, develops and oversees corporate IT policies and standards, security operations and manages enterprise IT risks including cyber security***.***
- **IT Operations**: Supports the day-to-day operation of Toronto Hydro's IT assets, including core back-end infrastructure and end-user applications.
- **Project Execution:** Facilitates the development and manages the implementation of new IT solutions (projects, programs and applications) required to achieve Toronto Hydro's strategic objectives.
- **IT Governance:** Provides program governance, budget control, contract and vendor management, records management, audit services and program planning. This segment is further responsible for prioritizing program execution, setting IT policies and goals, developing and analyzing program and project business cases.

The Program and its constituent segments are a continuation of the activities described in the Information Technology program (OM&A) in Toronto Hydro's 2015-2019 Rate Application.[1]

[1] EB-2014-0116, Toronto Hydro-Electric System Limited Application (filed July 31, 2014, corrected February 6, 2015), Exhibit 4A, Tab 2, Schedule 16.

2. OUTCOMES AND MEASURES

Table 2: Information Technology Program Outcomes and Measures Summary

Customer Service	• Contributes to Toronto Hydro's customer service objectives by:
	    ○ Ensuring that IT assets which support Toronto Hydro's customer-interfacing systems (including timely communication with customers during prolonged power outages) are effective and available; and
	    ○ Maintaining the integrity and availability of key customer facing applications such as the Customer Self-Serve Web Portal and the Outage Map, a map of Toronto Hydro's coverage area displaying outage zones.

Reliability	• Contributes to Toronto Hydro's system reliability objectives (e.g. SAIDI, SAIFI, FESI-7) objectives by:
	    ○ Maintaining the availability of modern, reliable and secure enterprise-wide IT/OT systems that monitor and control the performance of distribution assets (ex. SCADA), and by providing system operators timely and accurate information about these assets; and
	    ○ Supporting outage restoration efforts by ensuring that system operators have the necessary IT/OT System tools to promptly identify incidents, develop effective resolution plans and communicate them to operational teams.

Public Policy	• Contributes to Toronto Hydro's public policy objectives by: o Enabling the efficient implementation of new policy initiatives and compliance with regulatory requirements passed by Regulatory authorities such as Measurement Canada, the OEB and the IESO; o Enabling the attainment of Ontario's Long Term Energy Plan objectives by providing the technological infrastructure framework required to achieve conservation and demand management targets, enable grid-modernization, and support the proliferation of energy storage and distributed energy resources; and o Increase protection against cyber security threats by maintaining compliance with the OEB's Cyber Security Framework.
Safety	• Contributes to Toronto Hydro's safety objectives, measured through metrics like the Total Recordable Injury Frequency ("TRIF") by: o Enabling more substation and field assets to be constantly monitored; o Ensuring underlying IT/OT Systems such as SCADA are functioning properly and are consistently available; and o Driving safety performance using software systems such as automated vehicle location (GPS), Intelex, LMS, SCADA, and NMS.
Financial	• Contributes to Toronto Hydro's financial objectives by ensuring that core systems are operational with high reliability and availability supporting all areas of Toronto Hydro's business, including operations, customer service, and regulatory, management, and internal and external financial reporting.

3. PROGRAM DESCRIPTION

The Program provides technology solutions to Toronto Hydro and its customers in a secure, timely, and cost-effective manner. It does this by implementing products that meet Toronto Hydro's evolving operational requirements (including security), customer need and preferences, and support continuous improvement across the utility. Timely technical maintenance and support from vendor or internal resources ensure ongoing reliability and operability of key business applications and underlying IT infrastructure. The Program also continues to ensure preventative and detective system controls are aligned with industry best practices including the National Institute of Standards and Technology Cybersecurity Framework, and the OEB's Cybersecurity Framework. Toronto Hydro relies on IT to satisfy its obligations to customers, maintain system reliability and safety, and to comply with existing and emerging requirements of the various regulatory bodies that govern the utility's operations.

IT infrastructure and applications must be periodically refreshed or enhanced to maintain the availability of systems to support core operations and to minimize risk of failure. Accompanying these infrastructure and software capital expenditures is the associated support in the form of maintenance and licensing costs as well as the internal resources required to maintain these assets. IT infrastructure and software applications must be kept current to mitigate the risk of malicious cyber-attacks that can compromise sensitive customer data, operational and employee information, as well as the integrity of the distribution system.

IT supports the automation of core processes and functions, such as customer billing and outage management. It enables the utility to manage new business objectives and requirements, such as the need for additional data storage and processing capabilities to respond to customer growth demands or to respond to changing requirements of the industry or business units. These activities are provided through the Program's four constituent segments: (i) Security & Enterprise Architecture; (ii) IT Operations; (iii) Project Execution; and (iv) IT Governance.

4. PROGRAM COSTS

Toronto Hydro requires approximately $44.1 million per year over the 2020-2024 plan period to execute the Program functions, as described above. Without this level of funding, Toronto Hydro could be exposed to a number of risks, including**:**

- Increase the risk of cyber security attacks which would compromise customer and operational data;
- Increase the number of service outages and duration of outages if critical systems (SCADA, Outage Management, Metering, and Customer Care applications) are not adequately maintained;
- Lead to a delay or failure to provide required support for IT capital programs, including initiatives related to safety, regulatory compliance, and customer service;[2]
- Increased financial risk due to inadequate oversight of operational budgets, project budgets, and maintenance contract negotiations; and
- Reduced ability to meet the utility's regulatory and legal obligations with respect to records management and data governance.

Table 3, below, provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for each of the Program's segments.

[2] Please see the Information Technology and Operational Technology Systems program at Exhibit 2B, Section 8.4.

Table 3: Information Technology Program Expenditures by Segment ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
IT Governance	2.7	2.9	3.0	3.2	3.3	3.4
IT Operations	27.9	28.3	30.9	33.8	35.3	35.6
Project Execution	1.2	1.4	1.6	1.6	1.6	1.7
Security & Enterprise Architecture	2.7	2.4	2.9	3.0	3.3	3.4
Total	**34.4**	**35.0**	**38.4**	**41.7**	**43.5**	**44.0**

4.1 Cost Drivers

The 2020 test year forecast represents an increase of $9.6 million from the utility's last rebasing year actual costs (2015), $5.6 million from the most recent historical budget year (2017), and $0.5 million from the bridge year (2019).

Maintenance costs and subscription fees account for the majority of the expected increase. Software licenses and hardware require ongoing maintenance contracts ranging from simple patches and updates to targeted problem resolution. These contracts allow Toronto Hydro to maintain the integrity, reliability, availability, and security of Toronto Hydro's IT systems.

Factors driving the expected increase in maintenance costs and subscriptions fees include:

- New, recent applications such as SCADA upgrades, Engineering Analytics, and Power Monitoring Expert that were implemented to support reliability outcomes;
- A forecasted increase to infrastructure systems in support of systems such as Outage Management and Smart Metering or Suite Metering Advanced Metering Infrastructure;

- The implementation of upgrades to meter services such as Metering Data Collection contributed to the increased software license base, which is subject to support and maintenance costs;
- Enterprise-wide systems such as the Learning Management System and Applicant Tracking System were recently implemented. The most significant increase in the enterprise-wide systems is the upgrade of the Operating System resulting in additional maintenance licensing costs beginning in 2016;
- Investments in Operational Technology, such as the Radio Program which addresses safety and reliability concerns;
- Enterprise Resource Planning ("ERP") subscription services and related hardware upgrades; and
- On aggregate, all maintenance costs have increased as a result of inflationary contract escalation increases and changes in the USD to CAD exchange rate.

Segment specific cost drivers are summarized below:

- **Security and Enterprise Architecture:** To address risks of cyber-attacks, preventative and detective controls aligned with industry best practices, including the National Institute of Standards and Technology Cybersecurity Framework were implemented. This resulted in a requisite increase in employees.
- **IT Operations:** The expected variance is primarily attributable to expected increases in maintenance and licensing costs and subscription fees.
- **Project Execution**: The expected variance is primarily attributable to an increase in employees to assist with projects, such as the ERP, in relation to implementation and training.

- **IT Governance:** The expected variance is primarily attributable to an increase in program costs in the areas of data governance and incident, problem and change management, including the implementation and oversight of Toronto Hydro's evolving data management standards, practices, process, and technologies.

4.2 Cost Control and Productivity Measures

Toronto Hydro works to ensure that costs are contained. To this end, the Program employs several strategies, including: (i) working directly with internal clients to limit the number of licenses that are purchased and maintained; and (ii) in contracting external services, Toronto Hydro will go to market, where possible. For example, an additional $0.5 million in savings were realized in the telecom maintenance contract when Toronto Hydro changed vendors and was able to negotiate more favourable terms.

In addition, for the period 2016 through 2018, employee costs are expected to remain relatively stable and increase at a rate less than inflation. A number of employees who depart from the utility (whether through retirements or attrition) will not be replaced.

5. SECURITY AND ENTERPRISE ARCHITECTURE SEGMENT

5.1 Segment Description

The Security and 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 threats to cyber security. The segment performs several key functions:

- Establishes 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; and
- Drives operational cost efficiencies and business process streamlining.

Security and Enterprise Architecture defines and integrates the elements of Toronto Hydro's IT infrastructure operations strategy, application support strategy, and project delivery strategy to enable compliance with technical standards, corporate policies, and practices**.** The work includes ongoing assessment of business requirements, future state forecasts, and IT industry trends and opportunities.

Lastly, the Security and Enterprise Architecture team also addresses cybersecurity at Toronto Hydro by implementing preventative and detective controls aligned with industry best practices including the National Institute of Standards and Technology Cybersecurity Framework. Distributors are vulnerable to cyber-attacks that could result in business or service disruption. The OEB's new Cyber Security Framework acknowledges the criticality of this emerging threat to utility operations, and prescribes regulatory requirements to address the risks.[3] The thwarted cyber-attack on Metrolinx in January 2018 highlights the need for ongoing vigilance to protect the privacy of Toronto Hydro's customers and maintain grid reliability.[4] The Security & Enterprise Architecture team's primary focus is to ensure the confidentiality, integrity, and availability of the utility's information assets, including the protection of customer information. This segment also addresses an increasing amount of targeted and emerging threats to the energy sector including but not limited to file-less malware, advanced persistent threats, and artificial intelligence.

---

[3] Ontario Cyber Security Framework (December 6, 2017), available at: <https://www.oeb.ca/sites/default/files/Ontario-Cyber-Security-Framework-20171206.pdf>.

[4] Toronto Star, Metrolinx Targeted by North Korean Cyberattack (January 23, 2018) <https://www.thestar.com/news/gta/2018/01/23/metrolinx-targeted-by-north-korean-cyberattack.html>.

5.2 Security and Enterprise Architecture Segment Costs

Toronto Hydro requires approximately $3.4 million each year during the 2020 and 2024 period to execute the functions in this segment. Table 4, below, provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for the IT Security & Enterprise Architecture segment.

Table 4: Security and Enterprise Architecture Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Security & Enterprise Architecture	2.7	2.4	2.9	3.0	3.3	3.4

The 2020 test year costs in this segment represent an increase of $0.7 million from the utility's last rebasing year actual costs (2015), $0.5 million from the most recent historical budget year (2017), and $0.1 million from the bridge year (2019).

A lower level of spending would place undue pressure on infrastructure reliability, create challenges to fulfilling business requirements, increase the risk of service outages due to a lack of IT architecture and governance, and ultimately result in end-customer impacts such as web services issues or potential billing system malfunctions. In addition, Toronto Hydro would be at greater risk of cyber-attacks that may compromise customer, employee, and operational data, and negatively impact the distribution system.

5.3 Security and Enterprise Architecture Segment Year-over-Year Variance Analysis

<u>2015 – 2016 Variance Explanation</u>

Spending between 2015 and 2016 decreased by $0.3 million, due to a one-time cost reduction of $0.2 million for services related to closing gaps following a security audit completed in 2014. The remaining cost reduction of $0.1 million was the result of temporary vacancies in internal positions that were not filled until late in 2016.

<u>2016 – 2017 Variance Explanation</u>

Costs between 2016 and 2017 increased by $0.5 million. A one-time cost for an IT security study accounts for $0.2 million of this variance. The security study enables Toronto Hydro to identify and guard against potential security threats by testing and evaluating any potential physical, system and network security vulnerabilities. The remaining $0.3 million represents the full-year effect of the filled vacancies from late in the previous year.

<u>2017 – 2018 Variance Explanation</u>

The increase of $0.1 million between 2017 and 2018 reflects standard inflationary pressures.

<u>2018 – 2019 Variance Explanation</u>

The forecast increase of $0.3 million between 2018 and 2019 is attributable to the addition of labour resources required to address cyber security risks.

<u>2019 – 2020 Variance Explanation</u>

The forecast cost increase of $0.1 million between 2019 and 2020 is attributable to standard inflationary pressures.

6. IT OPERATIONS SEGMENT

6.1 Segment Description

The IT 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 and availability of all corporate data, ensuring adequate end user devices and servers 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 continued operation of these and other systems, the segment includes a 24/7 monitoring and response structure to ensure timely resolution of incidents and problems to prevent or quickly address major system outages.

The IT Operations segment includes maintenance contracts, which provide technology and performance fixes (i.e. patches), and new features and functionality. The IT operations segment also administers upgrade patches to the utility's technology assets on an ongoing basis as they are released by vendors, thereby mitigating cyber and system performance risks.

The IT Operations segment consists of two core functions: (i) Hardware; and (ii) Software and Service Management.

The Hardware function is responsible for the deployment and management of the following asset components and services:

- Data and voice networks, fibre optic and radio infrastructure, telephony and communication infrastructure;
- Advanced Metering Infrastructure and grid management networks;
- Servers and operating system infrastructure;
- Data storage and backup environments; and
- Physical data centre infrastructure (cabling and racking).

The Software and Service Management function is responsible for the introduction and continuous operation of the following asset components and services:

- Client-facing software assets;
- Database and middleware software assets such as Oracle and Microsoft SQL;
- End user devices, including desktops, laptops, phones, printers, as well as services such as the upcoming deployment of Operating System software applications; and
- End user application development and reporting software assets and services.

6.2 IT Operations Segment Costs

Toronto Hydro requires approximately $35.5 million each year over the 2020 to 2024 period to execute the functions in this segment. Table 5, below, provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for the IT Operations Segment.

Table 5: IT Operations Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
IT Operations	27.9	28.3	30.9	33.8	35.3	35.6

The 2020 test year costs in this segment represent an increase of $7.7 million from the utility's last rebasing year actual costs (2015), $4.7 million from the most recent historical actual year (2017), and $0.3 million from the bridge year (2019).

Reductions to this budget would likely put at risk the utility's ability to adequately maintain and support critical systems, processes, and functions such as security systems, metering, stations and SCADA communications and business and customer applications services.

6.3 IT Operations Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

Between 2015 and 2016, the IT Operations segment experienced a net increase of $0.4 million due to the following factors:

- Increase of $0.8 million due to maintenance contracts increases greater than inflation, some of which were also subject to the US Dollar exchange rate fluctuations;
- Increase of $0.9 million related to Microsoft licensing costs;
- Increase of $0.4 million due to the addition of new maintenance and licensing requirements;
- Decrease of $0.6 million related to storage costs through efficiencies gained from Toronto Hydro's core backend infrastructure replacement program;
- Decrease of $0.6 million due to a reduction in the number of contract employees resulting from a change in infrastructure towards more capital intensive work, such as the radio upgrade project and fibre optic installation; and
- Decrease of $0.5 million in savings realized in the telecom maintenance contract when Toronto Hydro changed vendors and negotiated more favourable terms.

2016 – 2017 Variance Explanation

Between 2016 and 2017, costs increased by $2.6 million due to the following factors:

- Increase of $1.6 million due to incremental licenses and maintenance costs;
- increase of $0.6 million in volume-dependant licensing costs due to additional smart meters installations; and
- Increase of $0.4 million in labour costs, representing inflationary pressures on salaries.

2017 – 2018 Variance Explanation

Between 2017 and 2018, costs increased by $2.9 million due to the following:

- Increase of $2.1 million for net new maintenance corresponding to the implementation of capital investments in new and upgraded systems;
- Increase of $0.5 million for new managed services to support the operationalization of the ERP system in 2018; and
- Increase of $0.3 million resulting from inflationary pressures.

2018 – 2019 Variance Explanation

Between 2018 and 2019, costs are forecast to increase by $1.5 million, due to the following factors:

- Maintenance contract costs are expected to have a net increase of $0.6 million, with infrastructure maintenance increases of $1.0 million offset by savings of $0.4 million due to the decommissioning of legacy software made obsolete with the introduction of the ERP system; and
- Purchased services contracts are expected to increase by a net amount $0.8 million, with a contract increase of $1.0 million partially offset by an expected decrease in temporary staffing of $0.2 million. The decrease relates to staff

supporting legacy applications no longer required following the deployment of the ERP system.

2019 – 2020 Variance Explanation

Between 2019 and 2020, costs are forecast to increase by $0.3 million as a result of the following:

- Maintenance contracts are forecast to increase by $0.7 million to reflect expected increases in existing contracts of approximately $0.3 million, and $0.4 million for new contracts; and
- The increase in maintenance is expected to be offset by a reduction in temporary labour resources of $0.4 million, which currently support legacy applications that Toronto Hydro plans to decommission.

7. PROJECT EXECUTION SEGMENT

7.1 Segment Description

The Project Execution segment is responsible for the execution of Toronto Hydro's IT programs. In addition, the segment is responsible for continuous improvement of various project processes such as communication procedures and execution strategies.

Toronto Hydro's IT Project Execution practices are consistent with industry standards of project management frameworks, such as the Project Management Body of Knowledge ("PMBOK").[5] Since 2015, the Project Execution segment has managed anywhere from 10-20 complex projects per year, which represent approximately $12-15 million in annual capital expenditures.

[5] <https://www.pmi.org/pmbok-guide-standards>

7.2 Project Execution Segment Costs

Toronto Hydro requires approximately $1.7 million each year over the 2020 to 2024 period to execute the functions in this segment. Table 6, below, provides the Historical (2015-2017), Bridge (2018-2019) and Test Year (2020) expenditures for this segment.

Table 6: Project Execution Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Project Execution	1.2	1.4	1.6	1.6	1.6	1.7

The 2020 test year costs represent an increase of $0.5 million from the utility's last rebasing year actual costs (2015), a $0.1 million increase from the most recent historical actual year (2017), and a $0.1 million increase from the bridge year (2019).

A reduction of the proposed budget would reduce Toronto Hydro's ability to identify and execute IT projects to support the utility's operations. The Project Execution segment is essential to support new projects and program development, and to facilitate customer-facing products such as the Toronto Hydro customer internet portal. Reductions to the Program could place the successful execution of ongoing and planned IT capital programs at risk, including initiatives related to safety, regulatory compliance, or customer service.[6]

[6] *Supra* note 2.

7.3 Project Execution Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

The costs between 2015 and 2016 have increased by $0.2 million. This increase reflects additional labour requirements as a result of corresponding increases in capital spending.

2016 – 2017 Variance Explanation

The costs between 2015 and 2016 increased by $0.2 million due to additional labour resources required as a result of corresponding increases in capital spending and the needs of the ERP project in relation to implementation and training.

2017 – 2018 Variance Explanation

There is no variance over this time period.

2018 – 2019 Variance Explanation

There is no expected variance over this time period.

2019 – 2020 Variance Explanation

The costs between 2019 and 2020 are forecast to increase by $0.1 million as a result of standard inflationary pressures.

8. IT GOVERNANCE SEGMENT

8.1 Segment Description

The IT Governance segment provides oversight, capital planning, budget control, contract and vendor management, records management, compliance and audit services for Toronto Hydro's IT projects and services. The segment also facilitates the implementation of the IT capital portfolio. This includes activities such as compliance review, project review and prioritization, project status monitoring/reporting, and benefit attainment monitoring/reporting. IT Governance also houses all project and portfolio documentation as the official enterprise custodian. By continuously monitoring the IT portfolio through the above-mentioned tools and processes, the IT Governance segment facilitates timely, cost effective, and successful delivery of IT projects.

The IT Governance segment performs a number of operational functions. It provides project governance by performing the necessary oversight, tracking, and reporting associated with the IT-based portfolio of programs and projects. The scope of this work also includes project reviews, status and change control reviews, project prioritization and benefit attainment monitoring. Administratively, it oversees the administration of external IT vendors, internal work order setup and purchase requisitions. This involves monitoring contract expiry dates and vendor negotiations, service level analysis and vendor consolidation work to drive savings.

From a records management perspective, it supports the enterprise-wide tracking and reporting requirements needed to comply with Toronto Hydro's Records Management Policy. This enables Toronto Hydro to meet its regulatory and legal obligations for the retention and destruction of records, and to educate employees on the utility's Records Retention Schedule, policy, and program guidelines.

Financially, the segment provides budget control and oversight to track and report 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.

The segment also provides strategic solutions by developing and implementing the IT program strategy, defining and managing program- and segment-level performance expectations, and facilitating the development of business plans for new technological solutions.

On an ongoing basis, the work in this segment includes incident, problem and change management functions to ensure that normal service operation is restored as quickly as possible and business impact is minimized during an unplanned interruption to an IT service or system or a change (modification, addition or removal) of an IT service or system.

8.2 IT Governance Segment Costs

Toronto Hydro requires approximately $3.4 million each year over the 2020 to 20204 period to execute the functions in this segment. Table 7, below, provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for the IT Governance segment.

Table 7: IT Governance Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
IT Governance	2.7	2.9	3.0	3.2	3.3	3.4

The 2020 test year costs represent an increase of $0.7 million from the utility's last rebasing year actual costs (2015) and $0.4 million from the most recent budget year (2017), and a $0.1 million increase from the bridge year (2019).

The absence of a strong governance framework would expose Toronto Hydro to increased financial risk without intervention and oversight on operational budgets, project budgets, and maintenance contract negotiations. This segment is also responsible for prioritizing program execution, setting IT policies and goals, and developing and analyzing program and project business cases. Without these functions, Toronto Hydro could fail to meet its regulatory and legal obligations with respect to records management and data governance, and compromise its ability to ensure timely resolution of incidents and problems to prevent outages to critical systems.

8.3 IT Governance Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

The increase in costs of $0.2 million between 2015 and 2016 reflects additional employees hired in 2016 to backfill for prior year retirements and parental leaves.

2016 – 2017 Variance Explanation

The $0.1 million increase reflects standard inflationary cost pressures.

2017 – 2018 Variance Explanation

Between 2017 and 2018 costs increased by $0.2 million, which is driven by the requirements of data governance and change management.

2018 – 2019 Variance Explanation

The expected $0.1 million increase reflects standard inflationary cost pressures.

2019 – 2020 Variance Explanation

The expected $0.1 million increase reflects standard inflationary cost pressures.

LEGAL AND REGULATORY

1. OVERVIEW

Table 1: Legal and Regulatory Program Summary

2015-2017 Average Cost ($M): 13.2	**2020 Cost ($M):** 15.9
Segments: • Legal Services • Regulatory Affairs	
Outcomes: Customer Service, Public Policy, and Financial	

The Legal and Regulatory program ("Program") is a corporate services function providing specialized professional services to the utility. The Program responds to Toronto Hydro's legal and regulatory needs; being those of a large Ontario electricity distributor operating in the country's largest urban centre and seat of the Provincial Government. The Program covers many activities from detailed routine tasks, such as preparing customer connection agreements, processing legal claims, performing Independent Electricity System Operator ("IESO") wholesale market settlement, and filing regulatory reports with the Ontario Energy Board ("OEB"), to strategic advisory tasks, such as working with utility operations to improve decision-making by analysing legal and regulatory parameters and implications. The Program's objective is to sustain and improve utility performance through expert management of the ongoing and evolving external demands and expectations associated with the legal, regulatory, and other public policy drivers.

Through the Program, Toronto Hydro manages its corporate governance, securities and disclosure, commercial law matters, real property, litigation, claims, privacy, regulatory reporting and compliance, energy policy and stakeholder relations, regulatory applications, regulatory law matters, load forecasting, wholesale settlement and rates calculations. This work is accomplished through two Program segments: (i) Legal Services; and (ii) Regulatory Affairs.

The Program costs include the fees remitted to the OEB and amortized costs of rate rebasing applications.

2. OUTCOMES AND MEASURES

Table 2: Legal and Regulatory Program Outcomes and Measures Summary

Public Policy	• Contributes to Toronto Hydro's public policy objectives by: ○ Measuring the percentage of OEB policy proceedings on which Toronto Hydro provides comments, either individually or through an industry organization; ○ Measuring the percentage of OEB policy working groups on which Toronto Hydro requests to participate; and, ○ Responding to Electricity Reporting & Recordkeeping Requirements ("RRR") and other required regulatory submissions in accordance with OEB requirements on time; and ○ Responding to freedom of information requests and appeals in accordance with the *Municipal Freedom of Information and Protection of Privacy Act*.
Financial	• Contributes to Toronto Hydro's financial objectives by: ○ Preparing and filing distribution rate rebasing applications in accordance with OEB requirements; and ○ Minimizing legal liability, recouping damages, and providing strong defenses against claims.

Customer Service	• Contributes to Toronto Hydro's customer service objectives by supporting operations in addressing easement inquiries, customer connection requests, claims and legal disputes and customer and stakeholder-facing issues governed by legislation, regulations and codes.

3. PROGRAM DESCRIPTION

The Legal and Regulatory program consists of two segments:

1) Legal Services
2) Regulatory Affairs

Legal Services provides Toronto Hydro with timely, accessible, and specialized legal advice and support. In alignment with the utility's corporate and operational strategy, Legal Services ensure Toronto Hydro is able to meet legal requirements and operate in an efficient and compliant manner. It also provides dispute resolution services, designs, effects commercial, and real property transactions with necessary legal protections and due diligence, and structures corporate governance processes to meet legal standards and best practices.

Regulatory Affairs supports the utility's ability to meet its obligations to the Government of Ontario, OEB, IESO, and other regulatory and public policy stakeholders. The main services provided by the segment include the development and execution of rate rebasing applications and other matters before the OEB, regulatory legal and advisory services, energy policy stakeholder relations, advocacy and implementation, regulatory compliance monitoring, regulatory reporting, load forecasting, wholesale market settlement, and rate design. Quarterly fees remitted to the OEB are also included in this segment. Costs pertaining to this rate rebasing application are also included, but presented separately, with the full amount of these costs proposed to be recovered on an amortized basis from 2020-2024.

Personnel in the Program are highly-trained and experienced, with education, professional designations and skills in areas as such as law, public policy, engineering, economics, and accounting, reflective of both the breadth and depth of the issues that arise in the regulated utility industry. The Program processes a large workload year-round, every year. There are a variety of one-time and reoccurring projects and processes.

4. PROGRAM COSTS

Toronto Hydro needs $15.9 million in 2020 to perform the functions in the Legal and Regulatory program. Without this level of funding, Toronto Hydro could be exposed to a number of risks with financial consequences and/or reputational harm. Those include:

- Within the Legal Services Segment:
  - Failure to maintain compliance with all applicable laws;
  - Vendor non-compliance with Toronto Hydro policies and procedures;
  - An inability to effectively address privacy issues;
  - Ineffective or unfavourable contract terms, resulting in substandard performance by contracted parties or foregone recourse to appropriate remedies;
  - An inability to effectively recover amounts owing to the company from damages caused by third parties, or respond to third party claims or litigation;

    - Dissatisfied customers and other stakeholders due to delays in completing planned and externally-driven capital work (e.g. not achieving customer connection timelines);
    - Failure to obtain or protect adequate real property access rights for infrastructure, additional costs, and project delays; and
    - An erosion in the utility's corporate governance performance and adherence to securities law and principles.
- Within the Regulatory Affairs Segment:
    - Incorrect wholesale settlement filings, which would adversely affect the cash flow of the utility or the IESO;
    - Errors in the Tariff of Rates and Charges that would result in under or over billing customers;
    - Non-compliance or incorrect implementation of energy policies and programs due to inadequate analysis of new or amended regulatory requirements;
    - More costly and less effective energy policies due to Toronto Hydro not being sufficiently engaged in public policy development processes;
    - Unmet OEB evidentiary requirements thereby hindering regulator's and stakeholders' reviews of Toronto Hydro's plans; and
    - Failure to meet important regulatory requirements, such as the OEB Scorecard or RRR filings.

Table 3 provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for each of the Program's segments.

Table 3: Legal Services and Regulatory Affairs Program Expenditures by Segment ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Legal Services	4.5	4.7	5.4	5.2	5.1	5.3
Regulatory Affairs	6.7	7.5	7.6	9.1	9.1	8.8
Amortized Costs of 2015-2019 CIR Application	0.9	1.1	1.0	1.0	1.0	-
Amortized Costs of 2020-2024 CIR Application	-	-	-	-	-	1.7
Total	**12.1**	**13.4**	**14.0**	**15.3**	**15.1**	**15.9**

4.1 Cost Drivers

The 2020 test year cost forecast represents an increase of $3.8 million from the utility's last rebasing year (2015), an increase of $1.9 million from the most recent historical actual year (2017), and an increase of $0.8 million from the final bridge year (2019).

4.1.1 Volume and Complexity of the Capital Program

Construction of new condominiums and other major developments in the City is projected to continue to increase in 2020-2024, which directly impacts the volume of offers to connect, other arrangements with developers, suite metering agreements, easements, relocation agreements, operating agreements and innovative services arrangements, as well as the number of third party damage incidents, which are expected.

4.1.2 Major External Transit Projects

A number of large transit projects are scheduled to commence or continue over the next five years (e.g. Metrolinx Light Rail Transit, Metrolinx Regional Express Rail, Toronto Transit Commission extensions, Ministry of Ontario bridge renovations, etc.). These third party initiated projects require large scale relocation of Toronto Hydro's assets, as well as energization of new assets. This involves the negotiation of complex relocation agreements as well as the preparation of offers to connect and customer contribution agreements. Expanded development also entails a greater risk of third party damage incidents.

4.1.3 Nature of Claims

An increasing volume of complex claims, and larger claims payouts, is driving costs in the Legal Services Segment. Toronto Hydro's exposure to third party claims is generally correlated to factors such as the company's capital budget, economic conditions, third party infrastructure development, climate change, and adverse weather. While the size and volume of individual claims can be highly variable, the overall trend is an increase.

4.1.4 Legal, Regulatory and Policy Requirements

Changes in the energy sector reflected in technological, customer preference and public policy evolutions require new levels of support from the full range of services provided by the Legal and Regulatory program, such as, policy advocacy and implementation, commercial transaction support, legal and regulatory reporting and compliance. The Long Term Energy Plan, and the Implementation Plans of both the IESO and OEB, point to a continuation of intensive policy development for the foreseeable future with respect to a wide range of public policy priorities.

4.1.5 OEB Invoiced Costs

OEB costs invoiced to Toronto Hydro are a condition of its distribution licence. Pursuant to the 2018-2021 OEB Business Plan and the OEB's Annual Reports for prior years, the OEB's General Cost Recovery compound annual growth rate is forecast to be 5.8 percent between 2015 actuals and 2020 budget and 6.4 percent from 2017 actuals.

4.1.6 Distribution Rate Applications

The cost of preparing and prosecuting distribution rate rebasing applications has increased. The development of this application began in 2016, nearly 4 years in advance of the proposed effective date for rebased rates. Beginning to prepare these applications at an early date is necessary in order to ensure that the utility has adequate time to incorporate lessons from the OEB's prior rebasing decision, adapt to the emerging evolutions in the regulatory policy framework, and obtain and incorporate customer feedback in advance of business planning. For example, in addition to the ongoing growth in volume and detail of filing requirements, the OEB issued incremental guidance for rate applications through the 2016 Rate Handbook and 2017 Strategic Blueprint. Appendix 2-M provides the breakdown of the actual and anticipated 2020-2024 CIR application costs.

4.1.7 Compensation and Inflationary Increases

Over the historic period and through the bridge years and forecast period, Toronto Hydro expects that overall Program costs will increase slightly due to inflation and market compensation adjustments.

4.2 Cost Control and Productivity Measures

4.2.1 Cost Management

There have been significant past and ongoing efforts to minimize the cost of the Legal and Regulatory program and offset, in part, the external factors driving legal and regulatory cost increases. These efforts focus on building a strong model of internal resources (which are generally more cost-effective than external resources), reducing the cost of external resources, or finding alternative, lower-cost means of accomplishing the work.

Specific cost control measures employed include:

- Reducing and freezing external law firm hourly rates through a request for proposal ("RFP") process. The RFP also resulted in additional benefits at no incremental cost, such as temporary staff lawyer backfilling and articling student secondments, which further reduce the need to rely on external legal services;
- Negotiating alternative fee arrangement to cap costs on certain types of files;
- Negotiating additional contractual indemnities and insurance to reduce legal costs and payable claims in order to protect the utility and its ratepayers;
- Working within industry consortiums and associations to collaborate on common interest files, thus allowing Toronto Hydro to dedicate fewer resources to those files while maintaining high quality engagements in energy policy development; and
- Proactively working with stakeholders on energy policy design and implementation, reporting and compliance activities to build awareness of more efficient and effective solutions and mitigate risks and future costs, including those associated with potential non-compliance.

4.2.2 Productivity

Productivity enhancements in the Legal and Regulatory program are improving the output of the current complement of staffing resources. These include:

- Adopting new software that reduces the need for an administrative resource by approximately 50 percent;
- Developing and delivering internal training and education sessions that improve adherence to legal and regulatory requirements, thus reducing the costs of substandard performance and non-compliance;

- Developing legal and regulatory knowledge management databases, including document precedents, samples, clauses, research, and training materials, to prevent duplication of effort and improve work efficiency;
- In-housing the legal work for customer connections and making process improvements that allow the utility to meet its OEB-required timelines and reduce overall costs;
- Attending continuing professional development sessions offered by external law firms, consultant firms and legal organizations, to expand the scope of internal legal and regulatory expertise relating to issues that can be addressed without engaging external resources;
- Reducing processing time for procurement-related requests (e.g. RFP reviews, contract negotiations) by approximately one day; and
- Standardizing processes to minimize the personnel time required to process third party requests such as claims and freedom of information requests.

5. LEGAL SERVICES SEGMENT

5.1 Segment Description

Legal Services provides legal services to Toronto Hydro in support of a wide-range of utility activities.

Services in the segment cover day-to-day legal advice to internal clients, the review, negotiation, and drafting of commercial agreements, and completion of corporate, financial, and commercial transactions. It also includes the corporate secretariat function, which supports governance matters and compliance with corporate statutes and related rules and best practice guidelines. A key objective of these services is to ensure the utility functions within existing laws and to work with the affected parts of the utility to ensure new policy and legal requirements are properly implemented.

Legal advice on real estate matters includes reviewing, negotiating and drafting legal documents relating to real property, such as customer connection agreements, easements, as well as real property dispositions and acquisitions and leasing arrangements. The legal staff supporting the real property function work closely with the construction, asset management, stations and facilities operational units in their activities to help ensure compliance with the requirements of the utility and its counterparties related to property access, maintenance and repair. New access rights are obtained where necessary, in particular for new infrastructure builds or connections. This allows capital projects to move forward efficiently. It also ensures penalties and damages relating to non-compliance with legislative restrictions or contractual obligations are avoided.

Claims professionals provide pre-litigation defense and response to claims made against the company, through the investigation of incidents, engagement with customers and insurers, and supervision of external adjustment service providers. This part of the segment's function manages and settles matters prior to them proceeding to litigation. In addition to resolving claims brought against the utility, claims professionals also support the recovery of invoiced claims when the utility's plant is damaged (e.g. poles hit by cars). By pursuing demands and legal actions, Legal Services recovers damages suffered by Toronto Hydro which otherwise would be unrecovered losses. Responding to claims and inquiries by customers, while still advocating the legal rights of the utility, is essential to positive customer service.

Litigation staff in Legal Services both respond to legal proceedings brought against Toronto Hydro and advance legal proceedings to assert the utility's legal rights. This involves the preparation and filing of statements of claim, statements of defence and related documentation. It also involves undertaking or working with external counsel in respect of, the defence and prosecution of personal injury and property damage matters and commercial disputes as they proceed to formal litigation. For most matters covered by the organization's insurance policies, Legal Services oversees external counsel approved by Toronto Hydro's insurers.

Legal Services also manages issues relating to privacy compliance and protection of personal information. This includes legal support in response to access to information requests, customer privacy complaints, or internal privacy inquiries. Toronto Hydro takes a pro-active approach to compliance with privacy best practices, with an emphasis on providing optimal, proactive customer service.

5.2 Legal Services Segment Costs

Toronto Hydro requires approximately $5.3 million per year over the 2020-2024 plan period to execute the functions in this segment. Table 4 provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for the Legal Services segment.

Table 4: Legal Services Segment Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Legal Services	4.5	4.7	5.4	5.2	5.1	5.3

The 2020 test year costs represent an increase of $0.8 million from the utility's last rebasing year (2015), a $0.1 million decrease from previous historical actual year (2017), and an increase of $0.2 million from the bridge year (2019)

5.3 Legal Services Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

Costs in 2016 increased by $0.2 million over 2015 actuals. This was largely due to claims costs increasing by $0.3 million as a result of higher volumes of complex claims received and handled. This amount was partially offset by the effect of cost control measures in the segment, as discussed above.

2016 – 2017 Variance Explanation

The variance of $0.7 million from 2016 to 2017 is attributable to:

- The legal services required to support the emergence of more complex, novel, multi-year, transit-related and station projects, a number of key governance-related projects related to external requirements, and an increasing number of major infrastructure projects such as those with transit authorities.
- An increase of $0.3 million in claims costs driven by higher volumes of complex claims.

2017 – 2018 Variance Explanation

Costs in 2018 are expected to decrease by $0.2 million, with the net result of cost controls more than offsetting inflationary pressures.

2018 – 2019 Variance Explanation

Costs in 2019 are expected to decrease by $0.1 million, with the net results of cost controls more than offsetting inflationary pressures.

2019 – 2020 Variance Explanation

Costs in 2020 are expected to increase by $0.2 million over 2019, driven by a combination of inflationary pressures and a projected small increase in the volume of complex claims.

6. REGULATORY AFFAIRS SEGMENT

6.1 Segment Description

Regulatory Affairs manages the regulatory affairs of the utility to help mitigate financial risks and improve public policy outcomes.

Regulatory Affairs works with external stakeholders and internal subject matter experts on energy policy files, including policy development by the Government, OEB, and IESO. Externally, the objective is to fully inform policy-makers with respect to the effects of prospective legislation, regulations, codes, and other rules and guidelines. Internally, the objective is to ready the utility for potential energy policy changes and work with the affected parts of the utility to ensure new requirements are properly implemented.

Regulatory Affairs professionals provide advice and support to the utility in decision-making processes and promoting compliance with regulatory requirements. Since Toronto Hydro's last rebasing, two additional staff were reallocated from the Finance program to the Regulatory Affairs segment to enhance this function. This is a reflection of both the need to meet incremental performance monitoring requirements and the importance Toronto Hydro places on fulfilling its responsibilities and obligations in this regard.

Regulatory reporting staff in this segment gather and report information to the OEB through quarterly and annual RRR and other filings (e.g. winter disconnections, major outage events, cyber security), and facilitate the interpretation of and responses to new requirements. Continually evolving regulatory requirements (e.g. Ontario Clean Energy Benefit, Class A global adjustment, updated OEB codes, Distributor Scorecard, etc.) require significant effort in co-ordinating with affected parts of the utility and the OEB.

Regulatory Affairs also manages wholesale market settlement, retail settlement and related transactions and reporting in relation to the Government, IESO, and OEB. The nature of these activities and associated governing rules continue to evolve as a result of significant changes in government policy (e.g. feed-in-tariffs, net metering, bill rebate/reduction programs). These activities affect the accuracy of not only Toronto Hydro's financials, but also the financials of the IESO.

Regulatory Affairs prepares Toronto Hydro's applications to the OEB for rates and other regulatory approvals. The most significant of these are rebasing applications, which have most recently been large, complex CIR applications. Over the span of a 5-year rate cycle, approximately 3.5 years are spent preparing and prosecuting the CIR application. During the most intensive periods of CIR-related activities, Regulatory Affairs staff are temporarily reallocated from other functions within the segment to focus on these major projects. In the period between the issuance of a CIR Rate Order and the start of the next CIR, staff focus on assisting the utility with the implementation of the Decision and Rate Order, including helping to infuse utility decision-making with the parameters and guidance of the OEB Decision. Regulatory Affairs also uses these "between CIR" periods to file annual rate updates, monitor other utility applications, prepare internal regulatory educational materials, and heighten attention to other regulatory functions that were temporarily understaffed during intensive periods of rate application activity.

In addition to the preparation of rate applications, Regulatory Affairs performs other rates-related functions, including: developing annual forecasts of the utility's load and customers; processing semi-annual commodity rate changes and other regulated rate updates (e.g. RRRP, WMSC, and RTSRs); and updating and testing in Toronto Hydro's billing system to ensure that the correct tariff rates are charged.

6.1.1 Distribution Rate Rebasing Applications

As discussed above, Regulatory Affairs is responsible for preparing and prosecuting Toronto Hydro's distribution rate rebasing applications. The costs of the 2015-2019 CIR and this Application are included in this segment. Unlike the costs in other OM&A programs, the OEB rate-making process requires special treatment for the costs of rebasing applications. Toronto Hydro sought recovery of the costs of the 2015-2019 CIR on an amortized basis over the 2015-2019 period. Toronto Hydro requests recovery of the costs of this Application on the same amortized basis over the 2020-2024 period.

In its Decision in EB-2014-0116, the OEB recognized that:

> "Toronto Hydro is larger and has more complex issues than most if not all distributors in Ontario, and the Application involves billions of dollars of spending. The RRFE requires distributors to prepare and support their applications, particularly Custom IRs, in a very thorough way."[1]

[1] EB-2014-0116 Decision and Order (December 29, 2015), pp. 12-13.

In preparing and prosecuting this Application, Toronto Hydro continues to engage in considerable background work and bears other costs, mindful of the critical issues that the OEB must carefully consider on an evidentiary basis. As with the 2015-2019 CIR, the regulatory costs of the 2020-2024 CIR are expected to be approximately 0.2 percent of the total applied for revenue requirement. Amortized over the duration of the rate period, the cost provides value to ratepayers, enabling Toronto Hydro to put forward a more thorough, thoughtful and customer-responsive application.

Toronto Hydro's costs of this Application are set out in Appendix 2-M. Toronto Hydro's own costs as well as the OEB's and intervenors' costs of this proceeding are included in the $8.7 million proposed for recovery.

6.2 Regulatory Affairs Segment Costs

Toronto Hydro requires approximately $10.6 million per year over the 2020-2024 plan period to execute the functions in this segment, which includes the amortized annual amount for this Application. Table 5 provides the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) expenditures for this segment.

Table 5: Regulatory Affairs Segment and CIR Program Expenditures ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Regulatory Affairs	6.7	7.5	7.6	9.1	9.1	8.8
Amortized Costs of 2015-2019 CIR Application	0.9	1.1	1.0	1.0	1.0	-
Amortized Costs of 2020-2024 CIR Application	-	-	-	-	-	1.7
Total	**7.6**	**8.7**	**8.6**	**10.1**	**10.1**	**10.6**

The Regulatory Affairs segment 2020 test year cost forecast represents an increase of $1.9 million from the utility's last rebasing year (2015), an increase of $1.2 million from the most recent historical actual year (2017), and a decrease of $0.3 million from the bridge year (2019). The amortized cost of this Application represents a $0.8 million increase over the prior rebasing application.

6.3 Regulatory Affairs Segment Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

From 2015 to 2016, segment costs increased by $0.9 million, driven primarily by the effect of transferring resources from the Finance program to establish a new regulatory reporting and compliance team. The other main drivers of the variance relate to the filling of vacancies and an increase in OEB fees.

2016 – 2017 Variance Explanation

From 2016 to 2017, costs decreased by $0.1 million. Increases in the regulatory reporting and compliance function, including the full-year effect of the transferred resources, were more than offset by new vacancies and a decrease in OEB fees.

2017 – 2018 Variance Explanation

From 2017 to 2018, costs are expected to increase by $1.5 million. Approximately half of this amount is due to an expected increase in OEB fees as set out in the OEB's most recent Business Plan, with the remaining increase being attributed to filling vacant positions and a temporary increase in external services to support non-rate rebasing application activities while internal staff are reallocated to CIR-related activities.

2018 – 2019 Variance Explanation

From 2018 to 2019, costs are expected to stay the same, with an increase to OEB fees being offset through less use of external resources as internal staff who were temporarily assigned to the CIR are reallocated back to their core regulatory functions part way through the year.

2019 – 2020 Variance Explanation

From 2019 to 2020, costs are expected to increase by $0.5 million, primarily due to the amortized costs of this Application being greater than those of the prior CIR. The OEB's filing requirements have increased and adjudicative process has expanded (e.g. community meetings), which are expected to increase Toronto Hydro, OEB, and intervenor costs. These higher costs will be partially offset by significant expected reductions in external services and staffing changes.

OEB Appendix 2-M
Regulatory Cost Schedule

TO BE UPDATED AT THE DRAFT RATE ORDER STAGE

	Regulatory Cost Category	USoA Account	USoA Account Balance	Last Rebasing Year (2015 Board Approved)	Last Rebasing Year (2015 Actual)	Most Current Actuals Year 2017	2018 Bridge Year	Annual % Change	2020 Test Year	Annual % Change	
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)=[(G)-(F)]/(F)	(I)	(J) = [(I)-(G)]/(G)	
	Regulatory Costs (Ongoing)										
1	OEB Annual Assessment			$ 3,270,672	$ 3,169,065	$ 3,415,249	$ 4,007,971	17.36%	$ 4,297,340	7.22%	
2	OEB Section 30 Costs (OEB-initiated)			$ 200,658	$ 268,638	$ 54,909	$ 150,000	173.18%	$ 156,060	4.04%	
3	Expert Witness costs for regulatory matters										
4	Legal costs for regulatory matters										
5	Consultants' costs for regulatory matters										
6	Operating expenses associated with staff resources allocated to regulatory matters										
7	Operating expenses associated with other resources allocated to regulatory matters [1]										
8	Other regulatory agency fees or assessments			$ 800	$ 800	$ 800	$ 800	0.00%	$ 800	0.00%	
9	Any other costs for regulatory matters (please define)										
10	Intervenor costs										
11											
12											
	Regulatory Costs (One-Time)										
1	Expert Witness costs			note 4	note 4				note 4		
2	Legal costs			$ 2,738,150	$ 1,842,785				$ 3,055,015		/C
3	Consultants' costs			$ 2,583,178	$ 2,773,742				$ 3,522,100		/C
4	Incremental operating expenses associated with staff resources allocated to this application.										
5	Incremental operating expenses associated with other resources allocated to this application. [1]										
6	Intervenor costs			$ 650,000	$ 837,076				$ 1,200,000		
7	OEB Section 30 Costs (application-related)				$ 438,714				$ 700,000		
8	Operating Expenses - Printing				$ 167,845				$ 154,534		
9	Operating Expenses - Miscellaneous				$ 7,596				$ 14,416		
10											
1	Sub-total - Ongoing Costs [2]		$ -	$ 3,472,130	$ 3,438,503	$ 3,470,958	$ 4,158,771	19.82%	$ 4,454,200	7.10%	
2	Sub-total - One-time Costs [3]		$ -	$ 5,971,328	$ 6,067,757	$ -	$ -		$ 8,646,065		
3	Total		$ -	$ 9,443,458	$ 9,506,261	$ 3,470,958	$ 4,158,771	19.82%	$ 6,183,413	48.68%	

Application-Related One-Time Costs	Total
Total One-Time Costs Related to Application to be Amortized over IRM Period	$ 8,646,065
1/5 of Total One-Time Costs	$ 1,729,213

Notes:

[1] Please identify the resources involved.

[2] Sum of all ongoing costs.

[3] Sum of all one-time costs.

[4] Expert Witness and Consulting costs are aggregated.

CHARITABLE DONATIONS AND LOW-INCOME ENERGY ASSISTANCE PROGRAM (“LEAP”)

1. CHARITABLE DONATIONS

Toronto Hydro is an important corporate contributor in the City of Toronto and supports outreach events that engage with the community, advances energy related issues of public importance (such as safety and sustainable energy), and promotes programs and services that help customers, particularly those that are most vulnerable.

Table 1, below, provides Toronto Hydro’s Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) charitable contributions.

Table 1: Charitable Contributions Summary ($ Millions)

	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Rate Recoverable	0.7	0.9	0.8	0.8	0.8	0.9
Non-Rate Recoverable	0.2	0.2	0.3	0.3	0.3	0.3

Toronto Hydro’s sole rate recoverable charitable contributions for the 2020-2024 plan period are its payments towards the OEB’s Low-Income Energy Assistance Program (“LEAP”), which it continues to promote and operate for the benefit of its low-income customers and in full compliance with all governing OEB rules and guidelines.

Toronto Hydro’s non-rate recoverable charitable contributions are comprised of multiple minor sponsorships of community not-for-profits, industry associations, and City entities or events of strategic alignment. The following are examples of causes the utility has made contributions to:

- Not-for-profit entities (e.g. Local Enhancement of Appreciation of Forests and Fatal Light Awareness Program, which support tree canopy and light pollution issues, respectively);
- Industry associations (e.g. Ontario Energy Association and Ontario Energy Network, which provide a voice to the energy industry, an opportunity to network and share best practices, and the furthering of industry issues publicly and at various levels of government); and
- City entities or events of strategic alignment (e.g. Live Green Toronto and Cavalcade of Lights, which provide opportunities to engage with communities regarding issues that align with Toronto Hydro's Corporate Social Responsibility Strategy and promote programs and services).

Sponsorships can be used to align with business development strategies to further Toronto Hydro's network and presence in areas of interest to the public (e.g. Electric Vehicles). Each sponsorship is reviewed according to an established process and matrix to gauge appropriateness and optimal level of support.

2. POLITICAL CONTRIBUTIONS

Toronto Hydro does not make political contributions of any kind.

3. LOW-INCOME ENERGY ASSISTANCE PROGRAM ("LEAP")

In accordance with the OEB's directives concerning LEAP funding, Toronto Hydro has allocated 0.12 percent of its total (service) distribution revenue requirement towards LEAP. This amounts to approximately $0.9 million disbursed annually over the 2020-2024 plan period.

Toronto Hydro continues to rely on the Neighbourhood Information Post (“NIP”) as its designated LEAP agency. NIP has been responsible for operating Toronto Hydro’s LEAP program since 2011, and is the United Way’s designated agency for the Toronto area. The extended working relationship with NIP has allowed Toronto Hydro to establish operational efficiencies in qualifying low income customers, processing approved grants, and resolving any potential operational issues.

3.1 LEAP Expenditure Summary

Table 2, below, illustrates Toronto Hydro’s annual LEAP contributions and grants:

Table 2: Toronto Hydro LEAP Program Disbursement Summary ($000s)

	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Annual Contribution	710	810	810	810	810	900
Carryover from Prior Years	0	0	0	49	N/A	N/A
One-Time Contribution	0	100[1]	0	10[2]	0	0
Total Available[3]	**710**	**910**	**810**	**869**	**N/A**	N/A
Total Dispersed (including admin fees)[4]	710	910	761	N/A	N/A	N/A
Total Unused	0	0	49	N/A	N/A	N/A

Demand for the LEAP program held steady over 2015 and 2016, with Toronto Hydro exhausting its allocated rate funding in the third quarter of each year, but grants to

[1] Given the timing of Toronto Hydro’s EB-2014-0116 Decision, the utility was only able to provide an estimated donation amount in 2015. Since this turned out to be less than the required donation amount based on its approved service revenue requirement, Toronto Hydro provided the under-contribution as a one-time donation in 2016.
[2] As part of its EB-2014-0116 proceeding, Toronto Hydro proposed to transfer legacy late payment reversal credits owing to inactive customers to the LEAP program. The outstanding balance of these credits totaling $9,887 was transferred to the LEAP program as part of the 2018 funding year.
[3] Calculations exclude funding and grants from the Garland Settlement funds, which are administered by the United Way (see details below).
[4] Calculations exclude funding and grants from the Garland Settlement funds, which are administered by the United Way (see details below).

individual customers continued to be processed through the use of Garland Settlement funds during the remainder of each of those years.

The introduction of the Ontario Electricity Support Program and the Ontario Fair Hydro Plan has significantly reduced, on average, low-income customer bills, lowering demand for the program. The OEB's Winter Disconnection Moratorium has coincided with this period of falling demand. These factors have led to a reduced demand for LEAP in 2017, with unused funding of approximately $49,000 carrying forward into 2018.

While the overall impact on demand in future periods is difficult to assess at this time, Toronto Hydro expects that the Winter Disconnection Moratorium will continue to alter the timing of potential LEAP applications, with significantly lower demand during the moratorium period, followed by a higher volume of higher than average arrears applications being filed in the late spring and early summer months.

Toronto Hydro continues to monitor the demand for the program in order to provide assistance to its customers in the most efficient and effective manner, while respecting the current parameters governing LEAP eligibility. In the near term, in conjunction with NIP, Toronto Hydro intends to address the reduced program demand through more extensive and targeted customer communication and engagement.

Given the information above, Toronto Hydro expects that its new annual contribution level of $0.9 million per year, in combination with available Settlement Funds (discussed below), will be sufficient to meet the demand of its low income customers over the 2020-2024 plan period.

3.2 Settlement Funds

Toronto Hydro was subject to the 2010 Garland Settlement related to billing of late payment charges that were authorized, but in conflict with Federal legislation. Through this settlement, a total of $4.4 million was entrusted to the United Way in 2012 for the purposes of energy assistance to Toronto customers. As of the end of 2017, approximately $2 million of the original fund amount remains undisbursed, and the United Way continues to collaborate with Toronto Hydro on the most efficient way to make use of this funding.

In the event that Toronto Hydro's annual OEB-directed LEAP funds are insufficient to cover demand throughout the entire year (as was the case in 2015 and 2016), Toronto Hydro relies on the available United Way Settlement Funds to cover the shortfall in funding, which is made available to NIP once Toronto Hydro's annual LEAP fund allocation is expended.

COMMON COSTS AND ADJUSTMENTS

1. OVERVIEW

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 schedule are comprised of ongoing or recurring costs and adjustments.

Table 1: Common Costs and Adjustments ($ Millions)

	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Ongoing or Recurring	1.1	(0.1)	1.6	(0.7)	(1.3)	0.8
Total	**1.1**	**(0.1)**	**1.6**	**(0.7)**	**(1.3)**	**0.8**

2. ONGOING OR RECURRING COSTS AND ADJUSTMENTS[1]

Ongoing or recurring costs and adjustments are comprised of the following expenditures described in further detail in the sections below.

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 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 and the actual benefit costs incurred by the utility remains in this schedule.

[1] The utility has not included any one-time costs for recovery in its test year.

2.2 Other Post-Employment Benefits ("OPEBs")

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.[2] Differences in the budgeted employee future benefits cost and the final valuation are accounted for in this schedule.

In the 2015-2019 plan period, Toronto Hydro accounts for OPEBs on a cash rather than on an accrual basis for rate making purposes as directed by the OEB.[3] The difference between the actual cash payments and the forecasted OPEB costs related to its OM&A programs using the accounting accrual method is tracked in Account 1508 Other Regulatory Assets – Sub-account: OPEB Cash vs Accrual Variance Account[4] and this portion of OPEB costs is deferred and excluded from OM&A for the 2015-2019 plan period.

On September 14, 2017, the OEB issued its final report on the regulatory treatment of pension and OPEB costs and established the use of accrual accounting as the default method on which to set rates for pension and OPEB amounts in cost-based applications, unless that method does not result in just and reasonable rates.[5] Toronto Hydro's proposal for the 2020 test year is to account for OPEBs on an accrual basis for rate making purposes. Therefore, these costs are included in OM&A as explained in the 2019-2020 variance section below.

---

[2] See Exhibit 4A, Tab 4, Schedules 4 and 6 for more information.
[3] EB-2014-0116, Toronto Hydro-Electric System Limited Decision and Rate Order (March 1, 2016), Appendix E, p. 81.
[4] See Exhibit 9, Tab 1, Schedule 1
[5] EB-2015-0040, Ontario Energy Board Final Report on Consultation on the Regulatory Treatment of Pension and Other Post-Employment Benefit Costs and Notice of Hearing for Cost Awards (September 14, 2017).

2.3 Investment Tax Credits ("ITC")

The Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) costs reflect both refundable and non-refundable ITCs in compliance with International Financial Reporting Standards ("IFRS").[6]

2.4 Corporate Risk and Compliance

This category includes the costs that the utility incurs for the development, implementation and monitoring of the Enterprise Risk Management Program and the Corporate Compliance Policy Program.

2.5 Financing Costs

Financing costs are made up of standby fees, the amortization of the upfront and arrangement fees for Toronto Hydro's revolving credit facility and letters of credit fees.

2.6 Common Costs and Adjustments Year-over-Year Variance Analysis

2015 – 2016 Variance Explanation

Decrease of $1.2 million is primarily due to a difference in forecast and actual employee benefits costs, partially offset by OPEBs recognized on a cash rather than accrual basis.

2016 – 2017 Variance Explanation

Increase of $1.7 million is primarily due to difference in forecast and actual employee benefits costs, partially offset by OPEBs recognized on a cash rather than accrual basis, and municipal tax credits.

---

[6] Exhibit 4B, Tab 2.

2017 – 2018 Variance Explanation

Decrease of $2.3 million is primarily due to a difference in forecast and actual employee benefits costs and OPEBs recognized on a cash rather than accrual basis.

2018 – 2019 Variance Explanation

Forecasted decrease of $0.8 million is primarily due to investment tax credits and financing costs related to the credit facility.

2019 – 2020 Variance Explanation

Forecasted increase of $2.1 million is primarily due to Toronto Hydro's proposal to account for OPEBs on an accrual basis in the 2020 test year. These costs are included in OM&A in the 2020 test year, as compared to being deferred in a variance account for the 2015-2019 plan period.

ALLOCATIONS AND RECOVERIES

1. OVERVIEW

This schedule discusses the adjustments to Toronto Hydro's total Operations, Maintenance, and Administration ("OM&A") costs to reflect the recovery of certain expenditures such as Warehousing, Facilities, Fleet and Equipment, and Information Technology ("IT") from the internal user departments through other OM&A and/or capital programs and Shared Services.

2. DESCRIPTION

Table 1, below, provides a breakdown of the Historical (2015-2017), Bridge (2018-2019), and Test Year (2020) Allocations and Recoveries adjustments to Toronto Hydro's OM&A expenditures. The manner of allocating each individual component is discussed in detail below.

Table 1: Allocations and Recoveries Adjustments to OM&A ($ Millions)

Segment	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
On-cost Recovery	(10.6)	(11.5)	(11.3)	(11.9)	(11.8)	(11.8)
Fleet Recovery Offset	(12.5)	(12.4)	(11.5)	(11.4)	(11.4)	(11.6)
IT and Occupancy Charges	(0.7)	(1.1)	(1.0)	(1.0)	(1.0)	(1.0)
Shared Services	4.8	2.9	4.8	4.3	4.4	4.6
Other Allocated Costs	0.0	0.1	0.2	(0.1)	(0.1)	(0.1)
Total	**(19.0)**	**(21.9)**	**(18.9)**	**(20.1)**	**(20.0)**	**(19.9)**

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

[1] Exhibit 4A, Tab 2, Schedule 13.

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
- Other warehouse costs (e.g. rental and leases, warehouse maintenance costs, etc.).

4. FLEET RECOVERY

The allocation of fleet costs to other programs provides for a transfer of operating costs to maintenance or capital projects. The allocation is based on the number and type of vehicles. This helps to maintain an optimal number of vehicles in the Fleet and Equipment Services Program.[2] In the case of maintenance projects, the allocation provides for a transfer of operating costs from the Fleet and Equipment Services Program to other programs using the service. In the case of capital projects, the allocation provides for a transfer of operating costs to capital projects. 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 department compensation costs;
- Parts and material;
- Vehicle insurance, licensing, and registration; and

[2] Exhibit 4A, Tab 2, Schedule 11.

- Other Fleet costs.

The Fleet and Equipment Services Program 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 2,500 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 charges to the non-rate regulated business 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 program to the non-rate regulated business.[3]

The costs included in the IT allocation are comprised mainly of:

- Compensation costs; and
- Directly attributable support costs.

The allocation of occupancy charges and facilities costs that are charged 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 Management program to the business units.[4]

[3] Exhibit 4A, Tab 2, Schedule 17.
[4] Exhibit 4A, Tab 2, Schedule 12.

The costs included in the Occupancy/Facilities allocation primarily consist of:

- Compensation costs;
- Maintenance costs;
- Facilities costs;
- Utilities costs;
- Property taxes; and
- Property lease.

6. SHARED SERVICES[5]

Shared services included in OM&A represent the cost of services received by Toronto Hydro from the non-rate regulated business. Toronto Hydro receives services primarily from Toronto Hydro Corporation ("THC") which provides strategic direction, corporate governance, and financial stewardship to the utility.[6]

7. OTHER ALLOCATED COSTS

Other allocated costs represent costs which are not specifically attributed to an OM&A program.

[5] Refer to Exhibit 4A, Tab 5 for more information about Toronto Hydro's shared services.
[6] Refer to Exhibit 1C, Tab 2, Schedule 1 for more information about Toronto Hydro's corporate structure and governance.

PURCHASES OF NON-AFFILIATE SERVICES

Toronto Hydro's Procurement Policy (the "Policy") establishes processes and protocols for obtaining services, equipment and materials that satisfy the operational needs of the utility in a manner that appropriately balances cost and value. Toronto Hydro relies on a comprehensive governance framework for its procurement activities. The Policy is set out at Appendix A.

Procurement contracts with a value exceeding $25,000 are sourced in accordance with Toronto Hydro's competitive procurement procedure, which outlines the general competitive bid process and sets out various rules with respect to communications, negotiations, bid reviews and conflicts of interest. This formalized competitive bidding process helps ensure that the procurement process remains fair, transparent, efficient and consistent.

1. SOLE SOURCING

Where procurement is related to, amongst other things, unforeseeable circumstances or where there is only one vendor uniquely qualified to deliver goods or services, Toronto Hydro may use sole source procedures as described in the Policy.[1] When exercising the option to perform sole source procurement, Toronto Hydro is often able to reduce the cost of goods or services or improve the value proposition in other ways.

Before executing sole source procurements, Toronto Hydro conducts due diligence reviews of the sole source purchase request. The reviews determine if the sole source

[1] See Appendix A for Procurement Policy (Exception 4).

purchase is warranted, and include a review of the proposed contract's specifications, scope, definition, commercial terms, liabilities, and insurance requirements.

Proposed sole source procurements that pass the review process are finalized through contract negotiations with the vendor. At that point a purchase order is issued.

2. PRE-QUALIFICATIONS FOR CONSTRUCTION CONTRACTS

When Toronto Hydro contemplates a civil or electrical construction project, potential contractors are pre-qualified in accordance with Toronto Hydro's pre-qualification procedure. A contractor's pre-qualification signifies that the contractor has met the minimum requirements established by Toronto Hydro for the purposes of a project. The factors used for evaluating contractors at this stage include, but are not limited to, technical skill and competence, experience, financial viability, health and safety record, reputation, work load, and any previous relationship with Toronto Hydro.

All contracts are authorized and executed in accordance with Toronto Hydro's Signing Policy. Toronto Hydro's signing authorization levels are approved by the Board of Directors and delegated to individual members of the executive and senior management of the utility to facilitate the day-to-day running of the business. Contracts must be signed by an authorized person who is directly responsible for the budget related to the subject area of the contract. Toronto Hydro's signing authorization levels for procurement contracts are shown in Table 1, below.

Table 1: Toronto Hydro's signing Authorization Levels for Procurement Contracts

Category	President and CEO	CFO	Responsible Officer	Controller	General Manager	Director	Person who is a Direct Report of an Officer
Procurement Signing Limit	Up to $30M	Up to $5M	Up to $5M	Up to $1M	Up to $500,000	Up to $250,000	Up to $250,000

3. COMPLIANCE CONFIRMATION

Toronto Hydro confirms that its non-affiliate purchases are in compliance with the utility's Policy. Appendix B identifies non-affiliate services that were procured in 2015, 2016 and 2017 under the exceptions to the general procurement rules contemplated within the Policy. These engagements did not originate from a competitive procurement process and surpass the utility's materiality threshold of $1 million.

POLICY

PROCUREMENT	**Policy Owner:** **Executive Vice President & Chief Electric Operations & Procurement Officer (THESL)**
	Policy Approver: **Policy Administration Steering Committee**
	Version Approval Date: **V5.0 2017-10-16**
	Last Reviewed by PASC: **V5.0 2017-10-16**
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.	

TABLE OF CONTENTS

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	V3.1 approved by PASC
V4.0	2015-06-09	PASC	Administrative Changes V4.0 approved by PASC
V5.0	2017-10-16	PASC	Administrative Changes. Additional changes to align with new THESL Signing Policy. Added standards section regarding conflicts with other corporate policies and tracking policy compliance.

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/
V3.1	2013-12-09	Toronto Hydro Intranet Plugged In at: http://pluggedin.torontohydro.com/policy/Pages/
V4.0	2015-06-09	Toronto Hydro Intranet Plugged In at: http://pluggedin.torontohydro.com/policy/Pages/
V5.0	2017-10-16	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

TERM or ACRONYM	DESCRIPTION
Subsidiary	Toronto Hydro-Electric System Limited, Toronto Hydro Energy Services Inc. and any other direct or indirect subsidiary 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 Subsidiary as may be applicable.
Business Unit	The Toronto Hydro Corporation or Subsidiary 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, o Including all years of a multi-year term and all years of all possible contract renewals, o 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. For Contracts to be signed by the CEO, the Contract Amount shall exclude the value of any optional Contract renewal years where this option is exercised at the Corporation's discretion.
Senior Management	The Manager, Director, or General Manager of any Business Unit with responsibility for an approved budget for the Procurement in question.
Executives	The Vice President, Executive Vice President and/or CXO of Toronto Hydro Corporation or of any Subsidiary as may be applicable.
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.
Supply Chain Services Department	The department responsible for all the Procurements within THESL and its subsidiaries.
Senior Management, Supply Chain Services	The Senior Management responsible for the operation of the Supply Chain Services Department.

TERM or ACRONYM	DESCRIPTION
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 Subsidiaries, as approved by the Policy Administration Steering Committee.
THESL	Toronto Hydro-Electric System Limited.
Toronto Hydro / the Company	Toronto Hydro Corporation and all of its Subsidiaries

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.

5.1 This Policy is designed to augment other corporate policies and is not intended to replace or preclude them. Should an overlap arise between the application of this Policy and any other Policy, the Policy most specific to the situation will apply.

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 Supply Chain Services Department and authorized by the Senior Management Supply Chain 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 Senior Management Supply Chain 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, Chief Electric Operations & Procurement Officer (THESL)**.**

8.2 The Executive Vice President, Chief Electric Operations & Procurement Officer 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 bi-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 bi-annually

Designated Responsible Person (DRP)

8.5 This policy is managed by the Senior Management Supply Chain Services.

8.6 The Senior Management Supply Chain Services is responsible for:

- Immediately communicating any exceptions or violations of this policy to the Executive Vice President, Chief Electric Operations & Procurement Officer
- Reviewing this policy bi-annually and communicating any proposed amendments to the Executive Vice President, Chief Electric Operations & Procurement Officer
- 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

TYPE OF COMMUNICATION	COMMUNICATION TRIGGER	PARTY RESPONSIBLE FOR POLICY COMMUNICATION	AUDIENCE	ACKNOWLEDGEMENT?
E-mail	Policy Revision	Senior Management Supply Chain Services	All Business Unit employees involved in any Procurement	No
Presentation	Policy Revision	Senior Management Supply Chain 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.

Compliance Monitoring

10.3 Upon request of the Company's General Counsel, Senior Management of Supply Chain Services is responsible for tracking and collecting applicable data measuring compliance and reporting upon the same to the General Counsel in such format as he/she may require.

11 RELATED LAWS, REGULATIONS AND DOCUMENTATION

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 Procurement*
- *Competitive Procurement Request Form*
- *Competitive Procurement Evaluation Recommendation Form*
- *Sole Source Justification Form*
- *Extending Existing Contract Justification Form*
- *Procedure to Document Approved Procurements*
- *Non-Discretionary Providers List*
- *Contractor Pre-Qualification Application*

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 value below $25,000 need not be sourced via the competitive procedures described in Rules 7.2 or 7.3 of the Procurement Policy unless the Procurement is environment or construction in nature, or requires a contract. Instead, a member of Senior Management may, in his/her discretion, approve Procurements not exceeding $25,000 in 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 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 member of Senior Management, 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 *Sole Source Justification Report* to the Operation Support Services Department. The *Sole Source Justification Report* will require appropriate signing authority in accordance with the Authorization Level Document and must be signed by the divisional Executive. (ii) Upon receiving a completed *Sole Source Justification Report*, 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 *Procedure to Document Approved Procurements*.
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 *Non-Discretionary Providers List.* *The Non-Discretionary Providers List* shall be updated on an bi-annual basis. Any proposed amendments to such list shall be reviewed by the Executive Vice President, Chief Electric Operations & Procurement Officer, 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 *Extending Existing Contract Justification Report* to the Operation Support Services Department. The *Extending Existing Contract Justification Report* will require appropriate signing authority in accordance with the Authorization Level Document. (ii) Upon receiving a completed *Extending Existing Contract Justification Report*, the Operation Support Services Department in consultation with Toronto Hydro's Legal Department 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 *Procedure to Document Approved Procurements*.
Exception 7 – Non-Order Invoice	Payments that are legally required to be made to specific entities and organizations that, cannot be sourced via the competitive procedures described in Rules 7.2 and 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 payments, up to their authorized expenditure limit, without receiving any competitive bids or submitting a Request for Sole Source Procurement so long as the category/organization/entity appears on the Non-Order Invoice List. Such

	payments to Non-Order Invoice Providers shall be strictly limited to ensure the principles of the Procurement Policy are not violated. The *Non-Order Invoice List* shall be reviewed and updated on an annual basis. *Any proposed amendments to the Non-Order Invoice List shall be reviewed by the Executive Vice-President, Chief Electric Operations & Procurement Officer, and subject to the approval of the Policy Administration Steering Committee.*

Appendix B
Engagements Not Originating from a Competitive Procurement Process

Vendor	Summary of Nature of the Transaction	Year	Cost ($M)	Methodology used for Selection
Schneider Electric	Upgrade of SCADA equipment	2015	4,500,000.00	Sole Source
Itron	Upgrade of the legacy system components of the Advanced Metering Infrastructure	2016	4,300,000.00	Sole Source
Itron	Purchase of 4G LTE meters	2016	4,750,000.00	Sole Source
SAP Canada	Purchase of SAP software	2016	6,070,000.00	Sole Source
SAP Canada	Maintenance, licensing, and support services for SAP software applications	2016	3,560,000.00	Sole Source
Toronto Waterfront Revitalization Corporation	Completing infrastructure upgrades as part of the Waterfront Toronto Queens Quay project	2016	1,525,496.01	Sole Source
Honeywell Elster Solutions	Purchase of replacement meters	2016	6,750,000.00	Sole Source
S&C Electric	Purchase of electric power equipment directly from the manufacturer	2016	2,275,955.00	Sole Source
K-Line Insulators	Purchase of insulators directly from the manufacturer	2017	7,658,729.00	Sole Source
Albarrie Geocomposites	Purchase of oil containment system	2017	2,500,000.00	Sole Source
Hubbell Power Systems	Purchase of various types of small materials for overhead infrastructure (e.g. fuses, brackets, bolts) directly from the manufacturer	2017	13,653,874.00	Sole Source

WORKFORCE STAFFING AND COMPENSATION - EXECUTIVE SUMMARY

Exhibit 4A, Tab 4 discusses Toronto Hydro's workforce staffing plans and associated challenges, compensation strategies and costs, as detailed in Schedules 2 to 6.

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 outcomes (e.g. reliability), and satisfying external obligations and legal requirement in a timely and cost-effective manner;
- mitigate the risks associated with the projected retirement of approximately 23 percent of Toronto Hydro's workforce over the 2020 to 2024 period by investing in training and development programs that facilitate knowledge transfer and enable new hires to acquire the specialized skills required perform utility operations 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 wages; and
- continue to prudently manage the workforce complement and costs over the course of the 2020 to 2024 period.

1. EMPLOYEE COST BREAKDOWN (OEB APPENDIX 2-K)

A copy of OEB Appendix 2-K, which summarizes Toronto Hydro's historical and forecast staffing levels and compensation costs, is filed at Exhibit 4A, Tab 4, Schedule 2. That shows the following:

- the number of full-time equivalent employees ("FTEs") is expected to increase from approximately 1,483 in 2015 to 1,517 in 2020; and
- total compensation costs[1] are expected to increase from approximately $211.1 million in 2015, to $244.2 million in 2020. This is equivalent to compounded annual growth of 1.6 percent since the utility's corporate downsizing and restructuring in 2012.

2. STAFFING PLAN AND CHALLENGES

Toronto Hydro relies on a highly skilled and dedicated workforce to provide safe and reliable electricity service to its customers. The utility's response to the many weather-related major events since the 2013 ice storm highlight the dedication and commitment of its employees. During recent ice and wind storms that affected tens of thousands of customers, Toronto Hydro's crews worked around the clock to restore electricity service, communicate with customers about the restoration efforts, and ensure public safety. Despite extreme working conditions, not a single Toronto Hydro employee suffered a serious injury or fatality.

Toronto Hydro employees also play an essential role in the execution of planned work programs that are necessary to maintain the distribution system's integrity, mitigate unacceptable reliability and safety risks, and operate the system effectively. As detailed in the Distribution System Plan ("DSP") filed at Exhibit 2B, between 2020 and 2024, the

[1] Total compensation costs include: salary, wages, overtime, incentive pay, and benefits.

utility plans to continue executing the largest capital investment program in its history, renewing critical parts of its aging infrastructure and meeting the needs of the growing City of Toronto. To succeed in these endeavours the utility must maintain a workforce that is dependable, adaptable, highly skilled and knowledgeable.

2.1 Workforce Segmentation

In 2017, Toronto Hydro employed approximately 1,473 FTEs. As illustrated in Figure 1 below, Toronto Hydro's workforce can be broken down into the following segments:

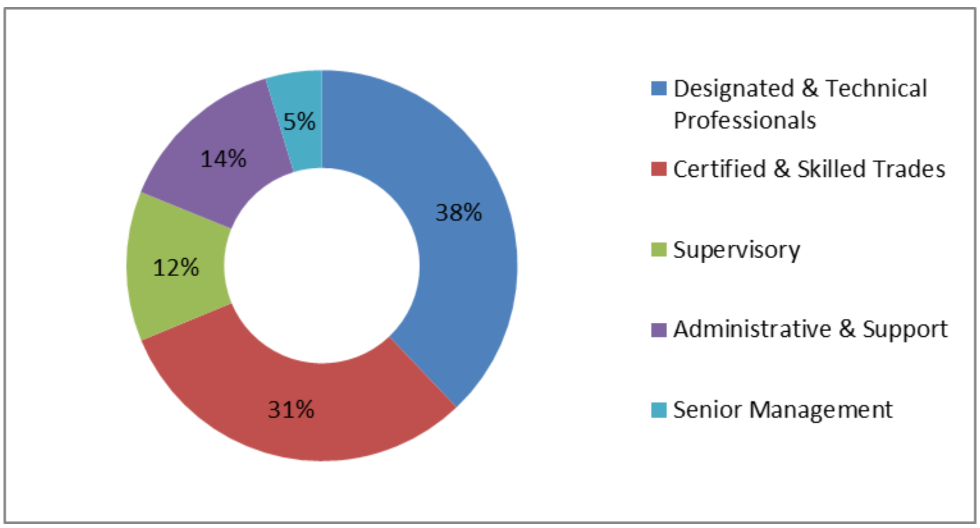


Figure 1: Toronto Hydro's Workforce Segments

- **Certified & Skilled Trades** are critical for executing the utility's capital and maintenance programs. Without funding to maintain the core staffing levels, Toronto Hydro will not be able to execute its work plan and its ability to respond to customer needs may be compromised.
- **Designated & Technical Professionals** include engineering technologists, engineers, and corporate professionals. These employees are required to ensure

Toronto Hydro is compliant with mandatory standards and best practices. They are essential to designing and planning a safe, secure, and reliable grid.

- **Supervisors** are trained and developed internally to oversee the safe and efficient design and execution of the work plan. They perform inspections, audits, investigations, training, role-modeling, performance and case management, and are instrumental to the safe and cost efficient delivery of service and operations.
- **Administrative and Support staff** perform important functions that enable operations, customer care, and corporate functions to operate efficiently.
- **Senior Management (including the executive team)** provides the strategic leadership and guidance required to effectively operate the utility. They have extensive accountabilities and oversee multiple subject portfolios, enhancing organizational productivity.

2.2 Aging Workforce Challenge and Mitigation Strategy

Toronto Hydro is in the midst of a significant renewal of its workforce, where approximately 23 percent of its workforce (or approximately 340 FTEs) are expected to retire between 2020 and 2024. Of that number, approximately 80 percent are from the staffing categories (certified and skilled trades, designated and technical professionals, and supervisory positions) that directly maintain and operate the distribution system.

Toronto Hydro plans to use an integrated, multi-faceted staffing model to fulfill its human resource requirements over the 2020 to 2024 period, consisting of the following approaches:

- **Hire new graduates and train them in a staged manner**: Toronto Hydro plans to admit 191 individuals to its in-house apprentice and technical programs over the

2020 to 2024 period. This approach 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 system.

- **Promote from within**: Between 2015 and 2017 approximately 40 percent of vacancies were filled internally, three quarters of which were internal promotions into more senior leadership roles. This cost-effective approach 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.
- **Hire skilled labour from the external market**: This approach is used when there is an insufficient pool 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 infrastructure. In addition, the external labour market for certified and skilled trades is constrained by aging workforce challenges.
- **Rely on third-party service providers**: This option provides Toronto Hydro flexibility to cost-effectively procure resources for peak demands, while maintaining a stable complement of employees.

3. COMPENSATION COSTS AND STRATEGIES

Toronto Hydro expects compensation costs to increase from $211.1 million in its last re-basing year (2015) to $244.2 million in the 2020 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 capital 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. A Compensation and Benefits Benchmarking Report prepared by Mercer (Schedule 5) shows that Toronto Hydro's compensation levels are generally aligned with the market.

Toronto Hydro also offers 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 2020 and 2024, 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 upcoming rate cycle.

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 with salary ranges. Salaries are set and adjusted with regard to external market benchmarking.

3.3 Bargaining Unit Employees

Approximately two-thirds of Toronto Hydro's employees are represented by the following bargaining units pursuant to collective agreements:

- Power Workers' Union: collective agreement effective February 1, 2018 to January 31, 2022.
- The Society of United Professionals (formerly The Society of Energy Professionals): collective agreement effective January 1, 2016 to December 31, 2019.

3.4 Benefits and Pensions

Full-time employees are entitled to medical and dental benefits, short- and long-term disability income protection, life insurance, and accidental death and dismemberment insurance. Employees are also eligible to participate in the Ontario Municipal Employees Retirement System ("OMERS") pension plan and receive post-retirement benefits. The cost of employee benefits is expected to increase from $52.8 million in 2015 to $64.8 million in 2020.

OEB Appendix 2-K
EMPLOYEE COSTS /COMPENSATION TABLE

	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Number of Employees (FTEs including Part-Time)1						
Management (including executive)	61	69	69	68	68	67
Non-Management (union and non-union)	1,422	1,415	1,403	1,431	1,455	1,450
Total	**1,483**	**1,484**	**1,473**	**1,499**	**1,523**	**1,517**
Total Salary and Wages (including ovetime and incentive pay)						
Management (including executive)	$ 12,292,778	$ 14,152,809	$ 14,971,880	$ 15,015,969	$ 15,478,739	$ 15,719,811
Non-Management (union and non-union)	$ 145,975,363	$ 146,148,053	$ 148,139,852	$ 155,158,699	$ 160,518,242	$ 163,720,633
Total	**$ 158,268,141**	**$ 160,300,862**	**$ 163,111,731**	**$ 170,174,668**	**$ 175,996,982**	**$ 179,440,444**
Total Benefits (Current + Accrued)						
Management (including executive)	$ 3,573,323	$ 3,919,134	$ 4,202,856	$ 4,576,375	$ 4,844,923	$ 5,260,044
Non-Management (union and non-union)	$ 49,254,110	$ 48,138,488	$ 49,111,532	$ 51,162,437	$ 54,655,848	$ 59,509,241
Total	**$ 52,827,432**	**$ 52,057,622**	**$ 53,314,387**	**$ 55,738,811**	**$ 59,500,771**	**$ 64,769,286**
Total Compensation (Salary, Wages, & Benefits)						
Management (including executive)	$ 15,866,100	$ 18,071,943	$ 19,174,735	$ 19,592,344	$ 20,323,662	$ 20,979,856
Non-Management (union and non-union)	$ 195,229,473	$ 194,286,540	$ 197,251,383	$ 206,321,136	$ 215,174,090	$ 223,229,874
Total	**$ 211,095,573**	**$ 212,358,484**	**$ 216,426,119**	**$ 225,913,479**	**$ 235,497,752**	**$ 244,209,730**

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 OEB Appendix 2-K – Employee Cost (Exhibit 4A, Tab 4, Schedule 2).

The schedule also discusses the challenges associated with Toronto Hydro's aging workforce and the staffing and development strategy that the utility has adopted to respond to such challenges over the 2020-2024 rate period. The evidence is organized as follows:

1) Introduction
2) Toronto Hydro's Workforce Segments
3) Workforce Complement: Past and Present
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 Operations, Maintenance, and Administration ("OM&A") 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, and leadership staff. The current and forecast size of the utility's workforce continues to be commensurate with the magnitude and complexity of the work program, while maintaining efficiencies achieved in previous years.

Toronto Hydro is proposing to increase its workforce by approximately 2 percent in 2020 compared to 2015 levels. This modest increase in proposed staffing levels is necessary to secure the specific knowledge and talent that the utility requires to meet current and future operational and customer requirements. The utility's progress in filling and replenishing talent in key areas contributed to improvements in safety, customer response, reliability, and productivity, while achieving capital and operating needs. With the continuing trend of projected retirements over the next five to ten years, and the long training lead-times required for new entrants to the workforce, strategic staffing decisions are necessary in critical areas to balance work program execution and funding levels.

To deliver its programs, Toronto Hydro relies on a number of key Certified & Skilled Trades and Designated & Technical Professional positions, such as Certified Power Cable Person ("CPCP"), Certified Power Line Person ("CPLP"), Distribution System Technologist ("DST"), Certified Meter Mechanic/Tester, Power System Controller ("PSC"), Engineering Technologist ("ETL"), and Engineers. Detailed descriptions of Toronto Hydro's workforce segments are set out in section 2 of this schedule.

Toronto Hydro's task of maintaining the necessary complement of employees is made more difficult because of the significant number of actual and expected retirements. Toronto Hydro's plans are successfully responding to that challenge, particularly among the Designated & Technical Professionals, Certified & Skilled Trades, and Supervisory talent. In those segments, the number of 25-44-year-olds increased by approximately 10 percent, whereas 45-54-year-olds decreased by approximately 15 percent. Toronto Hydro plans to continue to invest in workforce renewal, and training and development of talent in these key areas of its operations.

Toronto Hydro takes a conservative approach to hiring to minimize the cost of its workforce. This is accomplished by planning for the minimum amount of training overlap to achieve a continuity of skills. A successful transfer of knowledge and skills is necessary to ensure the safe and efficient execution of the utility's work programs. Accordingly hiring is done in advance to provide the lead time necessary to train apprentices. Through longer-term workforce staffing planning within certified and skilled trades and designated and technical professional positions, this conservative approach maintains the required competencies and integrates talent at a pace that manages costs and prioritizes worker safety. As an example, between 2015 and 2017 the utility hired additional Power System Controller resources to reduce knowledge and skills gaps and have competent employees ready to take on the work as retiring employees leave. The work done by these employees is increasingly complex, due to the volume and nature of work undertaken by the utility, both in planned and emergency response situations.

Through resource optimization strategies, Toronto Hydro replenished talent in critical areas of its business, while managing overall staffing levels and compensation costs effectively. These strategies include supplementing the internal workforce with contracted resources; contracted resources selected using an optimization model to assess suitability to perform work aligned to factors such as previous experience, safety performance, and cost.

2. TORONTO HYDRO'S WORKFORCE SEGMENTS

Toronto Hydro employs a workforce of skilled employees who serve customers, allow the utility to satisfy its legal and regulatory obligations, safely maintain and operate the distribution system and execute the utility's plans**.** The major segments of the workforce include certified and skilled trades, designated and technical professionals, supervisory staff, administrative and support staff, and senior management.

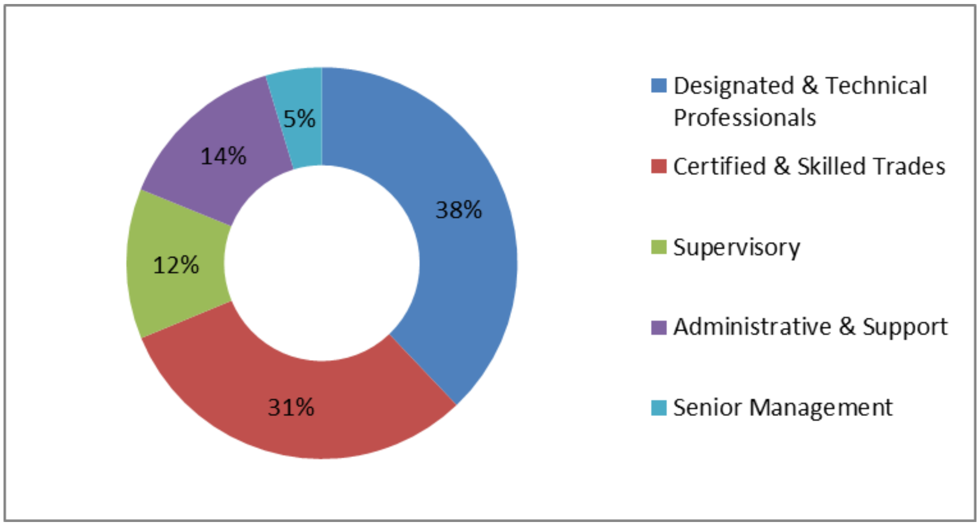


Figure 1: Toronto Hydro's Workforce Segments

2.1 Certified and Skilled Trades

As of the end of 2017, approximately 31 percent of Toronto Hydro's workforce was comprised of certified and skilled trades. These positions are critical for executing the primary activities and programs that enable the utility to construct and maintain the distribution system, deliver safe and reliable power to its customers, and respond to trouble calls and emergency situations.

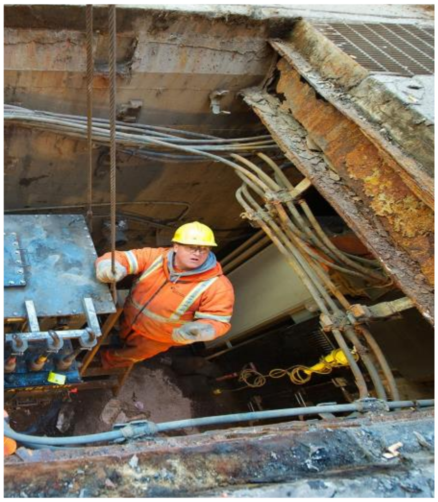
Toronto Hydro operates in a uniquely complex and dense urban landscape, and its distribution system consists of a wide range of design standards, including legacy underground and overhead systems. This operating environment heightens the importance of Toronto Hydro's certified and skilled trades. Developing talent with these specialized knowledge and skills to build, operate, and maintain underground assets is a focus of the internal workforce renewal strategy.

Below is an overview of the roles and responsibilities of the key certified and skilled trades:

- **Power System Controller**: 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, PSCs 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, tests, and calibrates all types of meters and metering equipment and troubleshoots faults in meters, metering equipment, and test boards.
- **Distribution System Technologist:** Operates, installs, commissions, constructs, repairs, maintains, and decommissions all types of substation equipment, protective relay and control systems, station metering, distribution automation equipment, and SCADA systems, including completion of all associated work orders, specifications, engineering drawings, reports, and work procedures.
- **Certified Power Line Person**: Responsible for the construction and maintenance of the overhead and underground distribution systems of all voltage levels in a safe and efficient manner; constructs, maintains, operates, and troubleshoots the overhead and underground distribution plant, including emergency repairs and switching operations; and performs line clearing duties as required.
- **Certified Power Cable Person**: Responsible for maintaining, operating, and troubleshooting the underground distribution systems of all voltage levels. Installs, removes, constructs, alters, operates, inspects, and maintains

equipment associated with the underground distribution system, including transformers, switchgear, protectors, primary switches, cables, and related equipment located in cable chambers, transformer vaults, etc., containing energized circuits.

For the above noted positions, it is crucial that talent be cultivated internally, which not only ensures that the skills developed by these employees are tailored to the unique challenges of Toronto Hydro's overhead and underground systems, but also helps to overcome the limitation that these skills generally are not readily available in the marketplace (meaning hiring externally is not a reliable strategy for this segment).



CPCP - Underground Plant

CPLP - Overhead Plant

Figure 2: CPCP and CPLP Employees at Work

Over the next five years, Toronto Hydro plans to continue making significant investments in the distribution system to achieve the outcomes proposed in this application that meet customers' needs and address known investment drivers. A stable complement of certified and skilled trades is critical to the execution of Toronto

Hydro's capital and OM&A programs. The table below provides examples of the capital and operational work programs executed by certified and skilled trades. For more information about these programs, please refer to the Distribution System Plan ("DSP") filed at Exhibit 2B, and the Maintenance Programs filed at Exhibit 4A, Tab 2.

Table 1: Examples of Work Programs Executed by Certified and Skilled Trades

Capital Program (Exhibit 2B)	**Type of Resources Required**
System Enhancements (Section E7.1)	CPLP and DST
Area Conversations (Section E6.1)	CPCP, CPLP, and DST
Underground System Renewal - Horseshoe (Section E6.2)	CPCP and CPLP
Overhead System Renewal (Section E6.5)	CPLP
Stations Renewal (Section E6.6)	DST, CPCP, and DST
Reactive and Corrective Capital (Section E6.7)	CPCP, CPLP, and DST
Maintenance Programs (Exhibit 4A, Tab 2)	**Type of Resources Required**
Preventative and Predictive Overhead Line Maintenance (Schedule 1)	CPCP
Preventative and Predictive Underground Line Maintenance (Schedule 2)	CPCP
Preventative and Predictive Station Maintenance (Schedule 3)	DST
Corrective Maintenance (Schedule 4)	CPCP, CPLP and DST
Emergency Response (Schedule 5)	CPCP, CPLP and DST

Without the funding required to maintain core staffing levels in the key areas described, Toronto Hydro's ability to execute the work plan and maintenance programs and deliver on the outcomes proposed in this application could be compromised. Potential negative impacts on customers include increased frequency and duration of power outages as a result of insufficient resources to respond to trouble calls or to renew aging infrastructure.

2.2 Designated and Technical Professionals

As of the end of 2017, approximately 38 percent of Toronto Hydro's workforce was employed in designated and technical professional positions (e.g. 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.

Below is an overview of the roles and responsibilities of the key Designated & Technical Professionals:

- **Engineer**: Participates in short- and long-range strategic asset planning to ensure technical soundness, reliability, cost effectiveness, and safety for the utility; prepares engineering reports and studies; performs engineering analysis and evaluations; provides timely technical support/consultation, project management, and testing; develops proposals and plans; and prepares and/or reviews methods, procedures (process re-engineering), and designs. Engineers are accountable, and legally responsible, for personal engineering work product (e.g. drawings, calculations, documents, and the work of others which the engineer has signed).
- **Engineering Technologist:** Supports the formulation of electric system plans and co-ordinates system operation services with the control centre; develops distribution plans by calculating load forecasts; prepares conceptual and detailed 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; and prepares, reviews, and maintains project schedules.

In addition to the above-noted technical professionals, corporate professionals in this segment enable the utility to satisfy a variety of external obligations and internal responsibilities in the areas of Finance (Exhibit 4A, Tab 2, Schedule 16), Information Technology (Exhibit 4A, Tab 2, Schedule 17), Legal and Regulatory (Exhibit 4A, Tab 2, Schedule 18), and Human Resources and Safety (Exhibit 4A, Tab 2, Schedule 15). 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 the required staffing levels of designated and technical professionals, Toronto Hydro will not have the necessary resources to design and plan for a safe, secure and reliable distribution system in compliance with legislative and regulatory requirements, applicable standards, and best practices.

2.3 Supervisory

As of the end of 2017, approximately 12 percent of Toronto Hydro's workforce supervises the design and execution of the work plan. The supervisory 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 inspections, audits, investigations, training, role modeling, performance management and coaching, and development.

The supervisory segment is critical to the work program delivery and ensures that employees work in a safe and productive manner. Toronto Hydro attributes much of its performance in safety and attendance improvements to the work performed by supervisors. The utility's achievements in this respect include:

- From 2011 to 2016, a 68 percent improvement in Total Recordable Injury Frequency ("TRIF"). Toronto Hydro employees worked over 5 million hours without a lost time injury.
- From 2013 to 2017, a 32 percent improvement in corporate attendance, from 5.23 days in 2013 to 3.54 days in 2017.
- From 2011 to 2016, an 87 percent reduction in restricted work days. In 2017, 130 employees returned to their positions faster than was otherwise possible through the Early and Safe Return to Work process.
- An 82 percent reduction in Workplace Safety and Insurance Board costs in relation to New Experimental Experience Rating ("NEER").

Without an appropriate complement of supervisory positions, Toronto Hydro would be at risk of experiencing reduced productivity and declining safety performance. For more details on Toronto Hydro's employee safety, see the Human Resources and Safety Program (Exhibit 4A, Tab 2, Schedule 15).

2.4 Administrative and Support

As of the end of 2017, approximately 14 percent of Toronto Hydro's workforce provides support to operations, customer care, and corporate functions in the delivery of the work plan. Administrative and support employees also play an important role in enabling the utility to satisfy a variety of external obligations and internal responsibilities, such as scheduling and timekeeping, invoicing, project coordination, tracking and reporting, and research. Without appropriate staffing levels in these positions, Toronto Hydro would risk a reduction in productivity as a result of higher cost resources having to perform this type of work.

2.5 Senior Management

Senior management employees represented approximately 5 percent of the utility's workforce at the end of 2017. These individuals provide the leadership and strategic guidance necessary to achieve Toronto Hydro's core objectives in a complex and highly regulated environment. Their accountabilities are extensive, with many senior management positions providing oversight to multiple subject portfolios. Without a capable senior management team, Toronto Hydro would experience the risks noted in the previous sections, as well as the risk of not meeting its core objectives.

3. WORKFORCE COMPLEMENT: PAST AND PRESENT

In 1998, after Toronto Hydro was formed through the amalgamation of six former utilities, the utility's workforce was comprised of approximately 2,400 employees. Over a period of four years (i.e. 1998-2001), the workforce was reduced to approximately 1,550 employees. This reduction in headcount was achieved as a result of a voluntary retirement program and a voluntary separation program in 2001 that resulted in the loss of critical positions for the utility (such as those in the certified and skilled trades).

Over time, Toronto Hydro strengthened its workforce in these critical positions to prepare for continued retirements and unplanned exits that may occur over the following five to ten years, as necessary to support capital infrastructure renewal, and allow for the lead-time required to safely train new workforce entrants.

From 2011 to 2013, Toronto Hydro experienced another notable reduction in the size of its workforce, from approximately 1,737 full time equivalent ("FTE") employees in 2011 to 1,527 FTEs in 2013. This reduction was a result of: (i) rebalancing of critical positions (such as certified and skilled trades and designated and technical professional) through a voluntary exit program[1] and workforce downsizing; and (ii) organizational and job design.

Since 2013, Toronto Hydro's workforce further decreased in size. As discussed in more detail below, this is primarily a result of the age demographics of Toronto Hydro's workforce and significant levels of retirement-eligible employees leaving the organization. To manage costs during the upcoming rate period, Toronto Hydro is proposing a conservative staffing plan that would adequately support the proposed capital and operations plans. This calls for a slight increase to Toronto Hydro's current workforce by 2020, to a level consistent with 2013.

Toronto Hydro has a multi-faceted staffing strategy to maintain quality service and value to ratepayers, and to plan for continued retirements. Toronto Hydro's Workforce Renewal Strategy is discussed in more detail in section 5 below.

4. AGING WORKFORCE CHALLENGE

The Canadian utility industry continues to face a major workforce renewal challenge as the wave of baby-boomer retirements crests.[2] Compared to the Canadian workforce, Table 2 demonstrates that Toronto Hydro's employee complement is much more

---

[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] The term "baby boomers" refers to those individuals that were born between 1947 and 1965.

heavily weighted to workers in the 45-54 and 55-64 age cohorts, which constitute employees that are about to be, or are already, eligible for retirement.

Table 2: Population by Age Group (Canada and Toronto Hydro)

Demographic Cohorts	Statistics Canada % of Workforce[3]	Toronto Hydro % of Workforce[4]
Age <25	14.38%	3.70%
Age 25-34	21.79%	27.35%
Age 35-44	21.16%	20.15%
Age 45-54	22.15%	26.53%
Age 55-64	16.49%	21.25%
Age >65	4.03%	1.03%

Figure 3 below illustrates Toronto Hydro's demographic challenge. In 2013, the utility had a number of large age cohorts nearing retirement age.[5] At that time, the seven largest age groups, each constituting more than 4 percent of Toronto Hydro's workforce, were found in consecutive cohorts: 48 to 54 years of age. At the time, these were the next seven age groups to reach retirement eligibility.

[3] Statistics Canada data is current as of 2016.
[4] Based on December 31, 2017 year-end headcount.
[5] EB-2014-0116, UT J7.8, Filed 27 Feb 2015

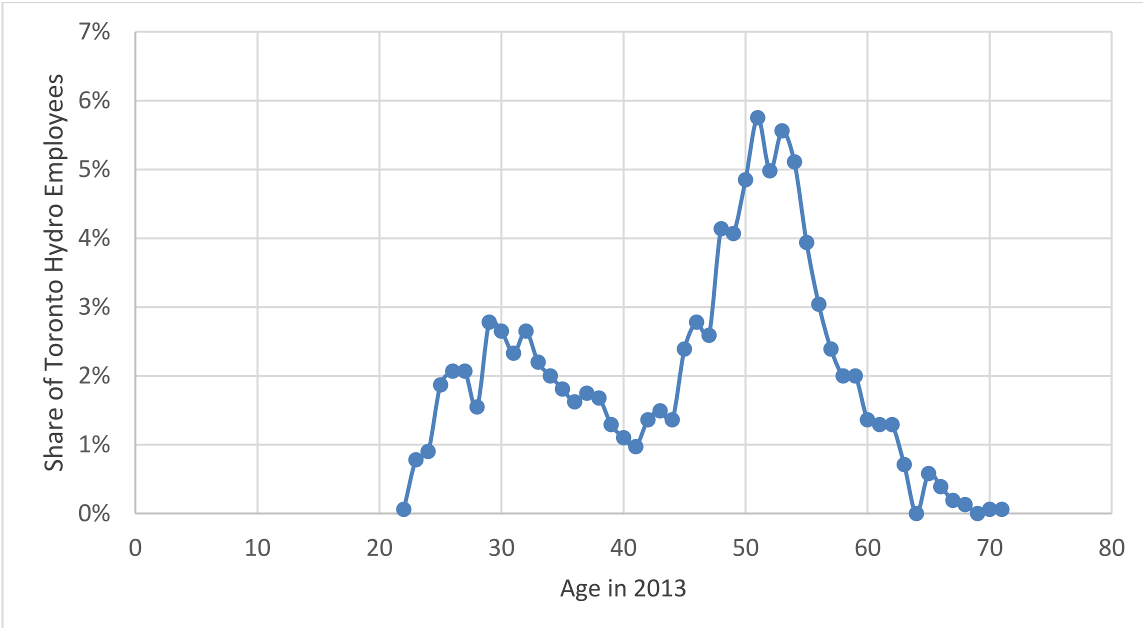


Figure 3: Toronto Hydro Workforce Demographics in 2013

Previous Toronto Hydro staffing strategies showed significant success in managing this demographic challenge. Figure 4 below overlays Toronto Hydro's age group demographics at the end of 2017, normalized to show employee age in 2013. New talent entering the organization is offsetting the wave of retirements to a significant extent. As a result, the median age of a Toronto Hydro employee was 43 at the end of 2017, down from 48 just four years prior.

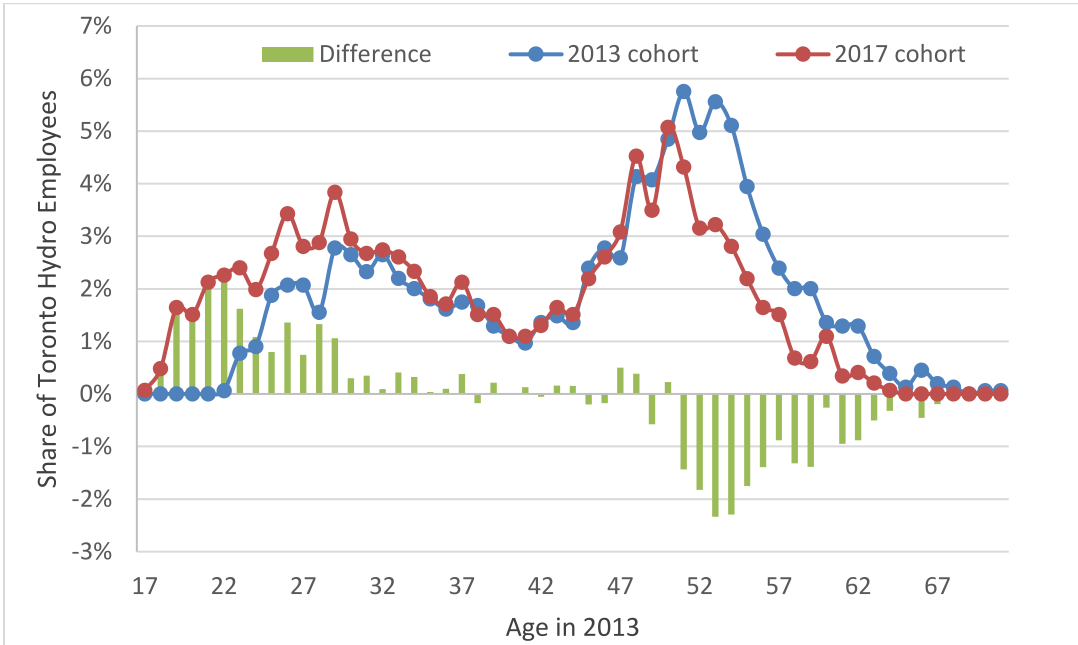


Figure 4: Toronto Hydro Workforce Demographics in 2013 and 2017, Normalized

Toronto Hydro expects a significant rate of employee retirements to continue over the next five to ten years, including the period of this 2020 to 2024 CIR Application. Employees reaching retirement age in 2020 and 2021 are currently the second and ninth largest age cohorts of Toronto Hydro's workforce. Approximately 27 percent of the utility's workforce are between 45 and 54 years old, and 21 percent are between 55 and 64. This means that over the next decade (i.e. by 2028), more than 37 percent of Toronto Hydro's workforce is expected to be eligible for retirement.

In addition to demographic-related challenges, Toronto Hydro employees are often sought after by other organizations that may offer similar roles in neighbouring geographic regions. While average voluntary turnover has remained below 5 percent, a competitive labour market challenges the utility to maintain market competitiveness of its compensation and benefits programs to attract and retain employees to work in the City of Toronto.

To manage these challenges, Toronto Hydro requires funding to invest in hiring new entrants and facilitating apprenticeships, co-op programs, leadership development, and in-house training. Toronto Hydro must pursue these investments now to account for the lead time to train new employees and transfer corporate and technical knowledge to them from senior employees.

The potential consequences of delays in hiring and lack of funding to administer training programs include not having adequate resources to maintain and operate the systems or relying on an inexperienced or inadequately trained workforce to perform highly complex, safety-sensitive tasks. After each retirement, the organization must deal with not only a loss of knowledge and experience, but also a need to train and develop the individuals that have been promoted or newly hired to fill critical positions. As Figures 5 to 7 illustrate, the aging workforce challenge is even more acute for those segments of the workforce that are instrumental to executing the utility's capital programs, maintaining existing infrastructure, and sustaining safe and reliable operations into the future.

If the above-noted adverse consequences materialize, they could have significant effects on all critical aspects of the utility's business, including customer experience, reliability, safety, and financial performance.

4.1 Segment Demographics

The progress achieved so far in renewing Toronto Hydro's workforce is evident in the demographics of workforce segments. Focused hiring in certified and skilled trades and designated and technical professional segments was a contributor to this improvement. The promotion of internal talent also contributed considerably to renewal in the supervisory segment. The 45 to 54 age group, which includes the youngest baby boomers, is the focus of the utility's strategy to deal with the aging workforce, as these employees represent approximately 27 percent of Toronto Hydro's workforce.

As seen in the figures below, over the past three years, the utility made strides to rebalance its workforce in critical segments. For designated and technical professionals, certified and skilled trades and supervisors, the 25 to 34 age cohort experienced proportionate increases, while the 45 to 54 age cohort shrunk.

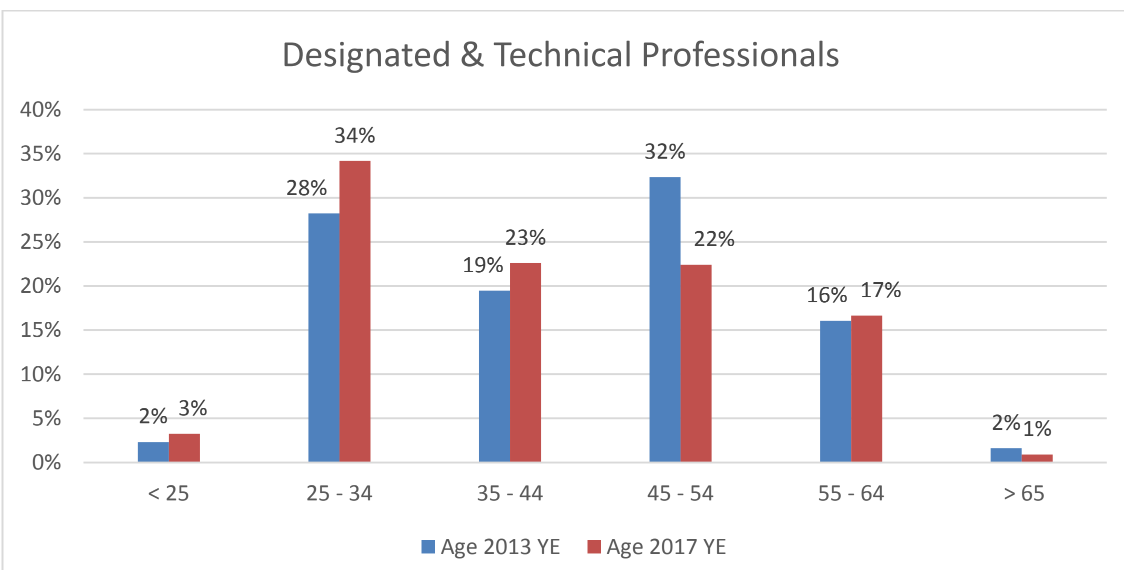


Figure 5: Toronto Hydro Workforce Demographic Profile – Designated & Technical Professionals

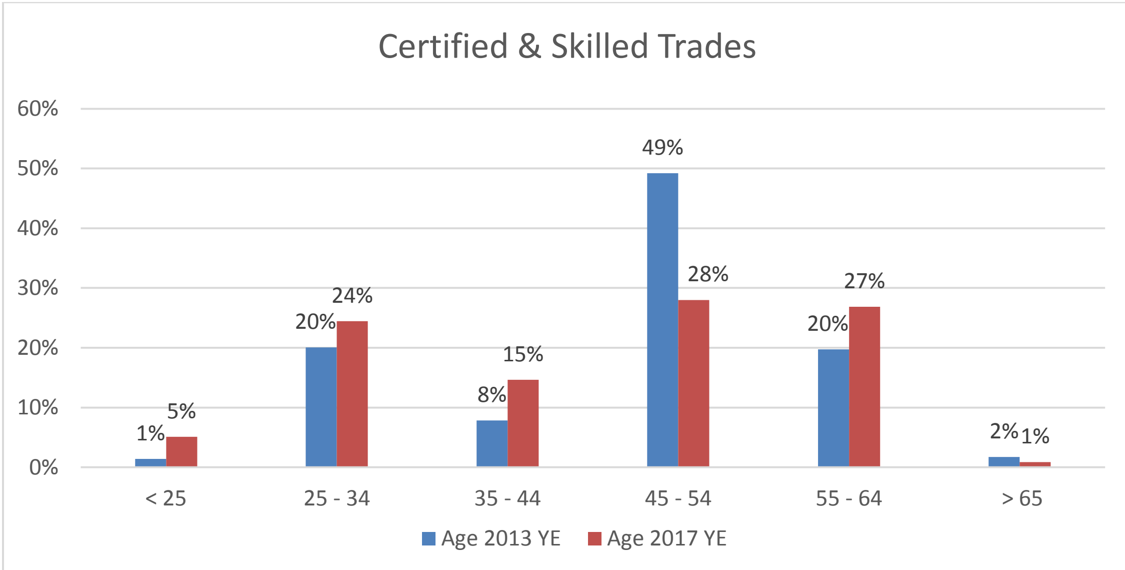


Figure 6: Toronto Hydro Workforce Demographic Profile – Certified & Skilled Trades

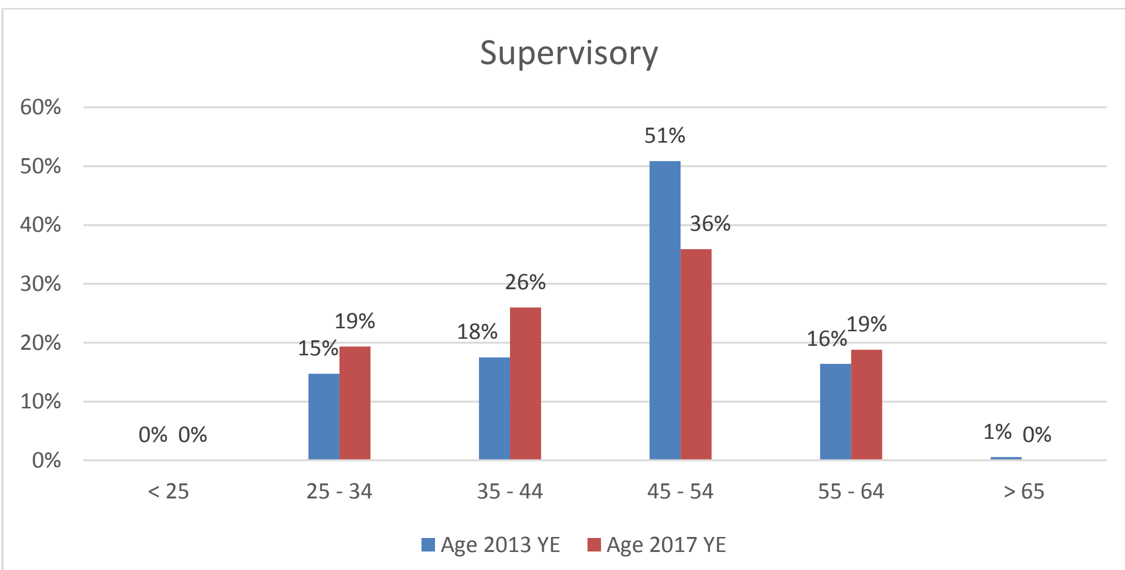


Figure 7: Toronto Hydro Workforce Demographic Profile - Supervisory

Given the physical demands associated with certain positions, particularly in the certified and skilled trades segment, retaining employees beyond their retirement date can be challenging. Training new employees in targeted segments just in advance of retirement allows for an effective transition of knowledge and skills, while maintaining the organizational headcount. This allows the utility to invest in talent in the most critical areas while controlling costs.

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 considers legislative training requirements. Toronto Hydro compliance training is based on operational requirements and best practices, and apprenticeship training (technical trades training) and testing requirements. 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	20	13	44	77
Year 2	1	1	20	22
Year 3	2	1	15	18
Year 4	14	7	13	34
Total Courses	**37**	**22**	**92**	**151**

Starting 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, in-class training-time for apprentices decreased by 13 percent allowing them to start working 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.

4.2 Retirements

In the 2020 to 2024 period, approximately 23 percent of Toronto Hydro's current workforce, or approximately 340 employees, will be eligible for retirement (as detailed in Table 4 below). Of the projected retirements, approximately 80 percent are expected to be from the certified and skilled trades, designated and technical professionals, and supervisory segments, which are critical to maintaining and operating the distribution system. At the end of 2017, 81 employees retired and 45 additional employees have notified the utility of their intention to retire or initiated retirement planning. Table 4 summarizes Toronto Hydro's retirement projections up to the end of 2024.

Table 4: Toronto Hydro Retirement Projections (2018-2024)

Year	2018	2019	2020	2021	2022	2023	2024
Annual	80	42	70	86	64	71	47
Cumulative	80	122	192	278	342	413	460

For the 2020 to 2024 rate period, Toronto Hydro forecasts long-term staffing needs using a combination of age and years of service (reaching the threshold of 92 when added) to estimate the timing of retirements.[6] Historical data indicate that years of service tends to drive retirement timing amongst longer tenured but relatively younger employees. This led to higher than projected retirements in both a given year and cumulatively over the 2015 to 2017 period (as demonstrated in Table 5), underscoring

[6] Based on 2015-2019 annual retirement projections, which used the Ontario Municipal Employees Retirement System ("OMERS") pension eligibility criteria for an unreduced pension, which stipulates 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 totalling 90, or
- OMERS normal retirement age 65.

the need to increase Toronto Hydro's internal staff complement over current levels by 2020.

Table 5: Toronto Hydro Retirement Projection Accuracy

Year	2015	2016	2017
Actual/Projected Retirees	103%	164%	137%

5. STAFFING AND DEVELOPMENT STRATEGY

Between 2020 and 2024, Toronto Hydro plans to execute a large capital work program (as outlined in the DSP, at Exhibit 2B), using approximately the same number of internal resources as it did in the 2015 to 2019 period. One of the greatest risks to the safe and responsible execution of this work program is maintaining an internal knowledge base to support the specialized knowledge and skills needed to address projected employee exits in the next five to ten years.

Workforce planning is a continuous process aimed at ensuring that the organization has sufficient talent to meet its human resource needs. The process is forward-looking and considers various sources of talent including permanent employment, contracted resources, and partnerships. The appropriate mix of talent is determined by examining various factors including changing utility operations requirements, actual resource availabilities and utilization, projected and actual loss of knowledge (e.g. retirements, attrition), and the results of recruitment, training, development, and other initiatives (e.g. job harmonization). Prudent workforce planning enables the utility to have a cost-effective and sustainable workforce, and facilitates continuous improvements over time. For example, through responsible workforce planning Toronto Hydro consolidated 41 job classifications into ten since 2007.

The overarching principles of Toronto Hydro's staffing strategy are to:

1) provide flexibility in the allocation of resources (both internal resources and external contractors) to complete the approved work program at the greatest long-term value to customers;
2) align future professional trades and technical hiring with capital and maintenance program volumes; and
3) continually review requirements to drive decision-making for effective resource cost management.

As discussed in the Aging Workforce Challenges section above, Toronto Hydro is proposing a staffing plan that addresses the utility's projected retirements and the resources it requires to deliver its programs and satisfy its mandatory obligations over the next five years. Failing to do so could expose the utility to a multitude of operational and financial risks, such as not having the resources required to provide safe and reliable electricity service to its customers, and not being able to fulfill legal and regulatory requirements.

Toronto Hydro uses a number of staffing approaches, including: (i) promoting from within the utility; (ii) hiring skilled labour from the external market; (iii) acquiring and training new graduates; and (iv) using third-party service providers. As explained in more detail below, Toronto Hydro relies on all four approaches to meet human resource requirements, leveraging the relative strengths of each of these options as appropriate in a given set of circumstances.

Toronto Hydro uses a multi-faceted staffing strategy because it provides the flexibility to staff up or down as required to effectively plan and manage its staffing needs over the next five years and beyond. Given the breadth and complexity of the utility's operations, and the rate at which the City of Toronto is growing and expanding, flexibility is particularly important for Toronto Hydro. Toronto Hydro also considers a multi-faceted approach to be a more effective and cost-efficient solution than a single or double-pronged strategy to address the aging workforce challenge that the utility faces, and replenish talent at a pace that is cost-effective and aligned to critical resource areas (as discussed in section 1).

5.1 Hire from Within

Hiring from within the utility allows Toronto Hydro to recognize and advance those employees that demonstrate exceptional skills, knowledge and leadership qualities. These individuals are critical to training the new generation of employees and overseeing the key functions of the utility. Toronto Hydro relies on this strategy to fill supervisory positions, and for senior certified and skilled trades and designated and technical professionals positions. Despite the advantages of hiring from within (particularly to support succession planning), Toronto Hydro cannot rely on this strategy for entry level positions, and cannot rely on this option alone to fulfill retirement vacancies because the utility does not have a sufficient pool of employees. Between 2015 and 2017, approximately 40 percent of vacancies were filled internally, 75 percent of which were internal promotions to more senior leadership roles.

5.2 Hire from the External Market

This approach entails going to market to hire the skilled and experienced resources that the utility requires over the next five to ten years. To the extent that the external market has an available pool of qualified candidates, this option would allow the utility to meet its human resource needs. However, because of the complexity of its distribution plant and dynamic operating conditions, it is challenging for Toronto Hydro to hire skilled labour without investing in training and development. For example, an experienced CPLP from the external market would require one year of additional on-the-job training to become fully competent to work on Toronto Hydro's plant. Due to the lack of qualified candidates in the job market, hiring skilled labour is not an optimal strategy in and of itself, especially for Certified and Skilled Trades positions.

5.3 Hire New Graduates

The third option is to hire new graduates and rely on the utility's training and apprenticeship programs to instill the specialized skills and knowledge that they require to safely work on the distribution system. This is a reliable source for skilled entry level positions. Further, it allows Toronto Hydro to develop and maintain a dependable workforce that is capable of servicing the operational needs well into the future. However, the utility cannot rely on this option alone, as the utility is limited by the ability to safely absorb and integrate apprentices in practice.

Toronto Hydro collaborates with colleges and universities (e.g. Ryerson University and Georgian College) that offer academic programs aligned to entry level qualifications for Certified and Skilled Trades and Designated and Technical professionals. Investments continue in these areas with a focus on institutions within Toronto to develop a pipeline of talent situated within the utility's geographic service territory and to mitigate risks of talent loss to neighbouring comparators. Such collaborations are valuable because they allow Toronto Hydro to:

- influence and shape the programs and curricula to better match the utility's strategic goals and long-term needs;

- spread awareness about the utility’s career prospect and human resource requirements; and
- build recruitment relationships with future graduates.

As an example, Toronto Hydro’s partnership with Georgian College yielded 53 recruits since its inception in 2011 (including 32 certified and skilled trades, 18 designated and technical professionals and three administrative and support). Toronto Hydro expects to continue to leverage it alliances with universities and colleges to recruit new graduates in the coming years.

Toronto Hydro’s commitment to hiring apprentices requires careful planning to enable efficient and effective execution. This includes hiring proactively to ensure that apprenticeships, which can be as long as six years, are completed in time to replace expected retirements or other exits. To minimize the total cost of the apprenticeship process, recruits are typically hired in cohorts. From a talent attraction perspective, aligning recruitment activities with post-secondary graduation cycles ensures the utility access to the broadest range of qualified applicants to fill available opportunities.

5.4 Use Third-Party Service Providers

Outsourcing Toronto Hydro’s workforce requirements to third-party service providers is another approach employed by the utility. In many cases, third-party service providers enable the utility to cost-effectively ensure resource availability to meet peak demands, maintain flexibility in operations, and gain access to specialized expertise. The utility endeavours to optimize the selection of third-party services providers by assessing overall value and performance, looking to cost, safety, skills, and experience as some of the factors in selecting the provider for a given program or project.

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 the utility's distribution system, the aging workforce challenges over the next five to ten years, and the need for sustained capital investment to renew its infrastructure, Toronto Hydro must resource these positions from within. To do so, the utility relies on 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, fulfill future leadership requirements and satisfy key obligations.

As summarized in Table 6 below, from 2015 to 2017, Toronto Hydro administered more than 400 training and development programs. 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 and compliance programs. For more information about these initiatives, refer to the Human Resources and Safety Program at Exhibit 4A, Tab 2, Schedule 15.

Table 6: Training and Development Programs (2015-2017)

Area	2015 Courses	2016 Courses	2017 Courses
Compliance (e.g. Environmental and Safety legislative training, EUSA and ESA Rules, Confined Space, Work Protection Code, Network Switching)	63	41	49
Legislative (e.g. WHMIS, Defensive Driving, Forklift Training)	44	33	48
Apprentice	30	42	22

Area	2015 Courses	2016 Courses	2017 Courses
(e.g. Distribution Systems Technologist, Power Systems Controllers, Certified Power Cable Persons, Certified Power Line Persons, Meter Mechanics)			
Leadership (e.g. Safety Leadership, Performance Management, Management Control & Reporting System, Project Management, Policy Administration)	9	4	6
Technical & Customer Service Training (e.g. Engineering Technicians, Electrical Awareness, Project Execution, Customer Education Training)	28	30	32
Total	**174**	**150**	**157**

The apprenticeship program is a key aspect of the Toronto Hydro's workforce development strategy because it enables the utility to train and develop employees with required specialized skills including Certified Power Cable Persons, who work on the underground system (see Figure 8 below), and Distribution Station Technologists, who operate and maintain equipment in the stations.

Figure 8: Underground Cable Chamber in Toronto Hydro's System.

Toronto Hydro initiated the apprenticeship program in 2003, when the utility recognized that basic training acquired externally by crews was insufficient to enable them to work safely and efficiently in Toronto Hydro's system. For example, Figure 8 shows a complex underground cable chamber that is common in Toronto Hydro's distribution system.

Between 2003 and 2017, Toronto Hydro admitted over 300 apprentices to the program and retained approximately 80 percent of these individuals as full-time employees. Table 7 summarizes the number of certified and skilled trades, as well as Engineering Technologists and Engineers that the utility developed through its apprenticeship programs, and retained as full-time employees, as of year-end 2017.

Table 7: Apprenticeship Program Summary (as of December 31, 2017)

	CPLP	DST	Meter Mechanic	PSC	CPCP	ETL	Engineer	Total
Apprentices	122	49	14	50	77	115	80	**507**
# Retained	91	45	11	35	63	97	63	**405**
% Retained	74.6	91.8	78.6	70.0	81.8	84.3	78.8	**79.9**

To prepare for expected retirements over the next five to ten years, Toronto Hydro plans to admit over 100 individuals to the apprenticeship program during the 2018-2020 timeframe. It plans to hire apprentices in a staged approach (as outlined in Table 8 below), 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 workforce with the appropriate training, supervision and mentoring on Toronto Hydro with respect to the utility's practices, procedures, and standards. It also allows for supervision and mentoring practices to be undertaken without jeopardizing the utility's objectives or ability to safely and effectively deliver its capital and maintenance work programs.

Table 8: Apprenticeship and Technical Hiring Plan (2020-2024)

Apprentice Group	2020	2021	2022	2023	2024	Total
CPCP/CPLP	32	20	18	20	18	**108**
DST	2	5	5	5	5	**22**
PSC	3	5	5	5	5	**23**
Certified Meter Mechanic	4	2	2	2	2	**12**
Engineering Technologist	2	5	5	5	5	**22**
Engineer	0	1	2	0	1	**4**
Total	**43**	**38**	**37**	**37**	**36**	**191**

COMPENSATION STRATEGY AND WORKFORCE GOVERNANCE

This schedule discusses Toronto Hydro's compensation strategy and workforce governance practices. Further to the information outlined in OEB Appendix 2-K (Employee Costs/Compensation Table) at 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: Total Compensation ($ Millions)

Year	2015 Actual	2016 Actual	2017 Actual	2018 Test	2019 Test	2020 Test
Management (including executive)	15.9	18.1	19.2	19.6	20.3	21.0
Non-Management (union and non-union)	195.2	194.3	197.3	206.3	215.2	223.2
Total	**211.1**	**212.4**	**216.4**	**225.9**	**235.5**	**244.2**

Over the 2015 to 2020 period, Toronto Hydro is making measured investments to continue its workforce renewal in the face of demographic challenges and in the context of its proposed capital and operational plans. The utility is facing a significant wave of retirements into the 2020 to 2024 period (see Exhibit 4A, Tab 4, Schedule 3). It is also proposing to continue with significant capital program investments from 2020 to 2024. For more information on Toronto Hydro's workforce challenges and capital work program, refer to Exhibit 4A, Tab 4, Schedule 3 and Exhibit 2B, respectively.

Underpinning the utility's compensation costs is a compensation strategy that balances cost-effectiveness and the need to attain and retain the talent required to operate the utility in an increasingly complex and dynamic industry. According to Mercer, Toronto Hydro's total compensation is, on aggregate, below the general industry market and aligned with its energy sector peers.

Toronto Hydro's forecast compensation costs for 2020 are consistent with recent historical actuals prior to 2015, demonstrating its ability to manage costs in a financially responsible manner over the longer term. Compared to 2011, when total compensation costs were $234.6 million, the forecast for 2020 represents a compounded annual growth rate of 0.4 percent.[1] Relative to 2012 costs (i.e. following Toronto Hydro's corporate downsizing and restructuring), that rate is 1.6 percent.

As part of its workforce renewal efforts, Toronto Hydro continues to manage compensation costs to support Operations, Maintenance, and Administration ("OM&A") and capital programs. From 2015 to 2020, the utility's total cash compensation costs are increasing by a compounded annual growth rate of 2.5 percent, in line with findings

[1] EB-2014-0116, Toronto Hydro-Electric System Limited Application (filed July 31, 2014, corrected February 6, 2015), Exhibit 4A, Tab 4, Schedule 5.

from the recent Mercer Canadian Compensation Planning Survey.[2] Inclusive of benefits, which are discussed later in this schedule, the annual growth rate is 3.0 percent.

Both of the aforementioned annual growth rates are lower once normalized for changes in full time equivalent ("FTE") count. Over the same period, Toronto Hydro's workforce is expected to grow on average by 0.5 percent annually. As a result, the compounded annual growth rate in total cash compensation per FTE is 2.1 percent, and total compensation (inclusive of benefits) per FTE is 2.5 percent.

In preparing its 2018 to 2020 forecasts, Toronto Hydro considered the inflation rates set out in its collective agreements, as well as relevant labour market data. Toronto Hydro also considered other factors, such as the increasing scope and complexity of the utility's work plan over the next five years.

2. COMPENSATION STRATEGY AND WORKFORCE GOVERNACE

Toronto Hydro's workforce is the means by which the utility delivers service and value to its customers, carries out its objectives, and complies with mandatory obligations. The utility strives to secure and maintain a workforce that is skilled, adaptable, committed, and performance-driven. To achieve these key outcomes in a cost-effective manner, Toronto Hydro's strategy is to provide wages and benefits that are competitive in the markets where Toronto Hydro competes for talent. 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 utility's compensation program is therefore an important tool for communicating performance expectations, fostering productivity, and rewarding employees for their contributions.

[2] Mercer, 2017/18 CA Compensation Planning Survey Report (August, 2017).

2.1 Market-Competitive

Toronto Hydro's compensation strategy aims to strike a balance between controlling costs and providing market-competitive compensation. In doing so, the utility examines the reasonableness and effectiveness of its compensation program in alignment with industry peers and relevant labour markets. Mercer defines "market-competitive" in its Non-Executive Compensation and Benefits Review as "within 10 percent of the target market positioning on a position-by-position basis."[3] Providing value to customers requires the utility to maintain the ability to attract, motivate, and retain employees who have the knowledge, skills, and ability that are critical to the utility's success.

Maintaining a market-competitive compensation program is essential to the utility's ability to complete its proposed work plan, achieve its performance objectives, and otherwise meet its obligations. The uniqueness and complexity of Toronto Hydro's distribution plant makes it challenging to hire skilled labour. The utility competes with other industries and organizations such as Alectra Utilities, Ontario Power Generation, and Hydro One, which also have a high demand for certified and skilled trades, designated and technical professionals, and supervisory and leadership positions.

Over the 2020 to 2024 period, Toronto Hydro expects to encounter additional constraints on the eligible and qualified talent pool and its retention capabilities as a result of a number of factors, including demographic trends and ongoing construction activity in the City of Toronto that could draw upon the same pool of qualified candidates (see Exhibit 4A, Tab 4, Schedule 3).

[3] *Supra* note 1, page 1.

The utility periodically reviews the external competitiveness of its compensation programs to help ensure that the level, form, and mix of compensation offered by Toronto Hydro is competitive with those provided for comparable jobs in the markets where the utility competes for talent. For example, in 2017, Toronto Hydro engaged an independent human resources consulting firm, Mercer, to undertake a detailed compensation and benefits benchmarking study**.** The results of the study indicate that the utility's cash compensation (base salary and performance pay) is generally aligned with the relevant markets (see Exhibit 4A, Tab 4, Schedule 5).

Toronto Hydro reviews the market-competitiveness of its compensation packages for non-union employees as part of its annual business planning and budgeting process. This can include participating in compensation salary surveys offered through independent consulting firms that specialize in the compilation of aggregate compensation data.

2.2 Performance-Based Compensation

Part of Toronto Hydro's strategy is to compensate employees based on their actual performance outcomes. In particular, Toronto Hydro's performance management program aligns the capabilities and competencies of its workforce with the core objectives and goals of the utility, which are embodied in the four pillars outlined in Figure 1 below. Based on its corporate competencies (see Table 2 below), Toronto Hydro's philosophy is to direct its workforce in an integrated fashion, and encourage employees to demonstrate certain behaviours and achieve defined performance expectations. Over the past ten years, this philosophy has underpinned Toronto Hydro's achievements in areas such as customer energy savings and safety.

The utility's performance pay model includes individual, divisional, and corporate components. Performance measures are developed annually and reviewed regularly to ensure alignment and achievement of objectives. Table 2 below lists the competencies and descriptors that the utility relies upon to attain these core objectives.

Figure 1: Toronto Hydro's Corporate Areas of Focus

Table 2: Toronto Hydro's Workforce Competencies and Descriptors

Workforce Competencies	Workforce Descriptors
Drives Results & Accountability	• Has a clear sense of corporate direction and expectations, and holds self and others accountable to achieve objectives.
Demonstrates Customer-Focus	• Models customer-focussed approach in all decisions and actions.
Builds Strong Relationships	• Builds valuable relationships across the organization and externally to support the future of Toronto Hydro.
Develops Culture & People	• Recognizes personal development and a strong organizational culture as integral components of an effective organization.

Workforce Competencies	Workforce Descriptors
Champions Change, Productivity & Innovation	• Prioritizes in innovation, continuous improvement, and productivity as essential drivers of long-term sustainability.
Demonstrates Commitment to Environment, Health & Safety	• Manages risks to protect the health and safety of employees and the public, and shows commitment to sustainability.

Toronto Hydro's corporate competencies guide all areas of human resource management:

- **Recruitment and Selection**: Toronto Hydro uses the corporate competencies in developing the recruitment process for a particular position and takes the competencies into consideration as part of the selection criteria.
- **Training and Development**: The corporate competencies underpin the utility's training initiatives. As an example, if Toronto Hydro determines through the performance management process that an individual or team lacks in the customer focus competencies, an assessment of training needs would be performed. Based on the results, an appropriate customer awareness training program would be implemented to assist in closing this gap.
- **Performance Management and Compensation**: The corporate competencies are integrated with Toronto Hydro's compensation practices. For non-union employees, this occurs through the assignment of performance ratings, which evaluate employees' performance in relation to the corporate competencies. The performance rating is one of the components that determine the base salary increase. For unionized employees, Toronto Hydro uses performance assessments to determine base step increases for employees with a solid performance rating that are not at the top of the defined salary range.

- **Succession Planning and Promotion**: Decisions on succession planning and promotion focus on developing employees who consistently meet the corporate competencies, as indicated by their annual performance ratings.

3. COMPENSATION PRACTICES FOR NON-UNION EMPLOYEES

Toronto Hydro provides non-unionized employees with a total cash compensation package comprised of two elements: base salary and variable performance pay. Base salary compensates an employee for meeting the expectations related to their responsibilities, accountabilities, and technical skills, while variable performance pay rewards employees for their contribution to the achievement of goals and objectives tied to the utility's strategic pillars in combination with their successful demonstration of corporate competencies.

Each non-union position at Toronto Hydro has a salary grade/level with a corresponding salary range. To maintain alignment with the competitive labour market, the utility adjusts salary ranges based on annual market reviews.

Non-union employees receive a portion of their annual compensation through the variable performance pay program. This program is an incentive performance-based compensation tool designed to retain, motivate, and reward employees for reaching performance objectives, which are established at the beginning of each calendar year. Each employee's variable performance pay is based on a weighting of performance objectives, which are measured by Key Performance Indicators, and by individual goals set out in the employee's annual performance contract.

4. COMPENSATION PRACTICES FOR BARGAINING UNIT EMPLOYEES

Approximately two-thirds of Toronto Hydro's employees belong to collective bargaining units represented by the Power Workers' Union ("PWU") or the Society of Professional Engineers ("Society"). Toronto Hydro's compensation costs with respect to these employees are negotiated through periodic collective bargaining. The utility is obligated to bargain in good faith with the unions, pursuant to section 17 of the *Ontario Labour Relations Act, 1995*,[4] and has a contractual and statutory obligation[5] to honour the terms of its collective bargaining agreements.

Toronto Hydro's bargaining interests are focused on changes that support the organization's ability to safely execute capital and operational programs in an efficient and cost effective manner while preserving management's rights to manage and direct the workforce. The most recent round of bargaining that the utility engaged in with PWU resulted in a 2.3 percent average wage increase over four years. Toronto Hydro focused on achieving a negotiated settlement that was fair and reasonable for its employees, while continuing to provide safe, efficient service to its customers.

The utility regularly reviews external compensation data to understand the compensation landscape both at the time of negotiation and in the years preceding and following bargaining. In doing so, the utility monitors bargaining trends and reviews past settlements. In preparation for the most recent round of bargaining with PWU, the utility also commissioned a compensation study by an independent third party, Mercer. For the results of this study, refer to the report filed at Exhibit 4A, Tab 4, Schedule 5.

---

[4] S.O. 1995, C. 1, Sched. A, section 17. ["*Ontario Labour Relations Act*"]
[5] *Ontario Labour Relations Act,* section 56.

4.1 PWU Collective Agreement

The current collective agreement with PWU was effective as of February 1, 2018 and is valid until January 31, 2022. Table 3 below summarizes the year-over-year percentage increases in base salary under the previous (i.e. CUPE) and current collective agreement.

Table 3: CUPE/PWU Base Salary Increases (2015-2020)

2015	2016	2017	2018*	2019	2020
1.75%	1.75%	2.0%	2.3%	2.3%	2.3%

*New collective agreement effective February 1, 2018 until January 31, 2022.

Toronto Hydro achieved stability through a long-term agreement, maintaining management's right to manage and direct the workforce. In negotiating the wage rate increases outlined above, Toronto Hydro considered: (i) the OEB's fourth Generation IRM inflation parameters, which were released in November 2013 and are updated annually;[6] and (ii) the Mercer Non-Executive Compensation and Benefits Review (Exhibit 4A, Tab 4, Schedule 5). Based on these key considerations, Toronto Hydro's bargaining position was to maintain market positioning.

4.2 Society Collective Agreement

The utility's current collective agreement with the Society came into effect January 1, 2016 and is valid until December 31, 2019. Table 4 below summarizes the year-over-year base salary percentage increases for Society employees.

Table 4: Society Base Salary Increases (2016-2020)

2016	2017	2018	2019	2020
1.25%	1.25%	1.50%	2.0%	N/A

[6] 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).

Toronto Hydro was able to achieve the following objectives during its 2016 negotiations with the Society:

- Ensure workforce stability and productivity through a long term agreement;
- Contain current and future costs through modest wage rate increases;
- Continue the development of employees;
- Maintain management's right to manage and direct the workforce; and
- Clarify the contractual process that applied to wage scale progression.

For the purpose of these negotiations, Toronto Hydro considered comparable market data, which was collected through a review of external surveys and external compensation data. Toronto Hydro compared base salary and variable performance pay against information from companies within the utility sector. As a result of these analyses, Toronto Hydro's position was that year-over-year increases had to stay close to inflation in order to maintain alignment with the market.

Employees who are part of the Society are also eligible for variable performance pay based on their achievement of the deliverables outlined in their annual performance contract, as well as the achievement of the utility's performance objectives.

5. BENEFITS AND PENSIONS

Toronto Hydro's employee benefits include the following:

- Medical insurance, including vision care, prescription drugs, and paramedical services;
- Dental insurance, including major dental and orthodontic services;
- Short-term disability ("STD") and long-term disability ("LTD") income protection;

- Life insurance and accidental death and dismemberment ("AD&D") insurance; and
- Refundable expenses, such as the fitness reimbursement program;

Related benefits costs paid by Toronto Hydro include employer contributions for the following:

- Workplace Safety and Insurance Board ("WSIB") premiums;
- Pension contributions;
- Canadian Pension Plan contributions;
- Employment Insurance contributions; and
- Employer Health Tax contributions.

All contributions aside from pensions are required under Canadian law.

The historical and forecasted cost of employee benefits are summarized in Table 5.

Table 5: Employee Benefit Costs (2015-2020) ($ Millions)

	2015	2016	2017	2018	2019	2020
Employee Benefit Total Cost	52.8	52.1	53.3	55.7	59.5	64.8

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 the program is aligned with the relevant labour markets.

In 2017, Toronto Hydro retained Mercer to conduct a review of its compensation and benefits programs (see Exhibit 4A, Tab 4, Schedule 5). In this study, Toronto Hydro's market position for employer paid benefits was reviewed in two parts: active benefits (e.g. life insurance, AD&D, STD, LTD, Health and Dental, Health Care Spending Account) and employer pension contributions. Mercer found that both of these components are generally aligned to the energy peer group. When looking at Toronto Hydro's positioning for employer pension contributions, the overall market (which includes Defined Benefit and Defined Contribution plans) should be considered since many of the comparators have Defined Contribution plans. Relative to the overall market, Toronto Hydro is positioned more competitively than against the subset of peers with Defined Contribution plans.

Toronto Hydro strives to minimize the cost of its benefit offerings. For example, in 2017, Toronto Hydro conducted a benefits provider market review, which resulted in an estimated annual savings of over $250,000 in premiums with no coverage impact for employees. The team continues to negotiate with benefit providers to effectively manage costs while continuing to provide a market-competitive program and ensuring awareness by plan members regarding their benefits plan.

In addition to the benefits program, Toronto Hydro has a number of Health and Wellness initiatives, including an Employee Assistance Program that provides employees and their dependents with access to work-life/wellness resources (e.g. support for mental health, financial planning, and relationship counselling). Through these initiatives, Toronto Hydro aims to promote employee health and well-being, increase productivity in the workplace, and minimize healthcare costs. These initiatives contribute to Toronto Hydro's corporate attendance (which improved by 32 percent from 2013 to 2017) and safety performance (which improved by 68 percent from 2011 to 2016 as measured by total recordable injury frequency).

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. Both participating employers and their employees are required 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 relative to the assets and obligations of the plan.

Decisions on contribution rates are guided by the Funding Management Strategy developed by OMERS Sponsors Corporation. Table 6 below summarizes the contribution rates (historical and forecasted) over the 2015 to 2020 period. OMERS has confirmed that the contribution rates for 2019 will remain unchanged, but has not yet determined the 2020 contribution rates. Toronto Hydro expects that there will be no changes to the contribution rates for 2020, which will be confirmed.

Table 6: OMERS Contribution Rates (2015-2020)

	2015	2016	2017	2018	2019	2020
Employer Rate	9.0% up to YMPE 14.6% over YMPE	9.0% up to YMPE 14.6% over YMPE	9.0% up to YMPE 14.6% over YMPE	9.0% up to YMPE 14.6% over YMPE	9.0% up to YMPE 14.6% over YMPE	9.0% up to YMPE 14.6% over YMPE
Employee Rate	9.0% up to YMPE 14.6% over YMPE	9.0% up to YMPE 14.6% over YMPE	9.0% up to YMPE 14.6% over YMPE	9.0% up to YMPE 14.6% over YMPE	9.0% up to YMPE 14.6% over YMPE	9.0% up to YMPE 14.6% over YMPE

Participating employees and employers contribute to OMERS at a lower tier rate on earnings up to the Yearly Maximum Pensionable Earnings ("YMPE"), and a higher tier rate on earnings above the YMPE. The YMPE is the Canada Pension Plan ("CPP") earnings limit (i.e. contributions to the CPP are made on earnings up to this limit). The

OMERS contribution rate is lower up to the YMPE because OMERS is designed to work together with CPP to provide combined pension benefits.

Table 7 below summarizes Toronto Hydro's historical (2015-2017) and forecasted (2018-2020) pension costs, including capitalized and expensed amounts each year.

Table 7: Pension Costs (2015-2020) ($ Millions)

	2015	2016	2017	2018	2019	2020
Pension Contributions	16.9	16.8	16.9	18.4	19.2	19.6
Less: Amount Capitalized	7.3	7.1	7.7	8.1	8.5	8.7
Amount Expensed in Each Year	9.5	9.8	9.2	10.3	10.7	10.9

In addition to pension benefits, Toronto Hydro pays certain medical, dental, and life insurance benefits on behalf of its retired employees. An actuarial analysis using the projected unit credit method determines the cost of these benefits. This method incorporates Toronto Hydro's best estimate of future salary levels, retirement ages of employees, health care costs, and other actuarial factors. The latest actuarial valuation was performed by Willis Towers Watson based on information current as if January 1, 2016, and forecasts of post-employment benefit costs are based on extrapolations of those results (see Exhibit 4A, Tab 4, Schedule 6).

Table 8 below presents Toronto Hydro's historical (2015-2017) and forecasted (2018-2020) post-employment benefit costs, including capitalized and expensed amounts.

1 **Table 8: Post-employment Benefit Costs (2015-2020) ($ Millions)**

	2015	2016	2017	2018	2019	2020
Benefit Costs	17.7	15.3	18.0	15.3	15.7	16.0
Capitalized Amounts	7.7	6.4	8.1	6.9	7.0	7.2
Expensed Amounts	10.0	8.9	9.9	8.4	8.7	8.8

Toronto Hydro-Electric System Limited
EB-2018-0165
Exhibit 4A
Tab 4
Schedule 5
ORIGINAL
(11 pages)

HEALTH WEALTH CAREER

NON-EXECUTIVE COMPENSATION AND BENEFITS REVIEW

JANUARY 2018

Toronto Hydro-Electric Systems Limited

CONFIDENTIAL – NOT FOR DISTRIBUTION

INTRODUCTION AND EXECUTIVE SUMMARY

Mercer Canada Limited ("Mercer") has been engaged by Toronto Hydro-Electric Systems Limited ("Toronto Hydro") to complete a market review of compensation and benefits program competitiveness for non-executive management, non-union professional and union positions within Toronto Hydro.

The purpose of this review is to provide an independent, market-based assessment of the market positioning of Toronto Hydro's non-executive total remuneration that includes base salary, short-term incentives, total cash compensation, active employee benefits, and pensions relative to the markets Toronto Hydro competes with for talent. Toronto Hydro employee groups considered include non-executive management and non-union professionals, as well as those positions represented by the Power Workers Union ("PWU") and the Society of Professional Engineers ("Society").

EXECUTIVE SUMMARY

This review approach is consistent with Mercer's standard market benchmarking methodologies, and relies on compensation and benefits practices information provided by Toronto Hydro, in addition to Mercer's proprietary compensation databases. Market comparisons are made to a group of peer organizations, selected by Mercer and confirmed by Toronto Hydro, that are representative of the energy and general industry sectors Toronto Hydro competes with for talent.

In conducting the compensation analysis, Mercer worked together with Toronto Hydro to identify benchmark positions to compare to market that represent a valid cross sample of the organization's functions and levels. The breadth of benchmark positions selected is within the range of 50% to 75% of employees considered best practice when benchmarking on an organization basis. The benchmarking includes positions that represent approximately 56% of employees at Toronto Hydro.

On an overall organization basis, Toronto Hydro's total remuneration, including the value of all cash compensation, benefit and pension plans are positioned within a market competitive range relative to the 50th percentile of the energy market, and are below the general industry market. The general industry market is generally representative of publicly traded, for-profit organizations. Competitive positioning varies by job and by level within Toronto Hydro. Management and professional positions are generally positioned competitively against the 50th percentile of the energy sector and at or below the market 50th percentile against the general industry due to the availability of long-term incentives and higher short-term incentives in the general industry. Society and PWU represented roles are generally positioned competitively against the energy sector, and are reflective of energy sector specific positions.

Mercer considers compensation levels to be within a "competitive range" if they fall within 10% of the target market positioning on a position-by-position basis (where you have a smaller sample size and higher variability in observations) and 5% on an overall organization basis (where you have a larger sample size and smaller variability in observations) when compared to target positioning (e.g., the 50^{th} percentile).

METHODOLOGY

Mercer worked with Toronto Hydro to determine the appropriate markets and organizations for comparison given the organizations they compete with for talent (i.e., organizations that Toronto Hydro might reasonably recruit employees from or lose employees to) and that are comparable in scope or type of operations. Two specific peer groups were identified for the purposes of the compensation and benefits review:

- **Energy Peer Group**
  - Reflects select Canadian organizations from Mercer's Total Compensation Survey ("MTCS") and proprietary custom surveys with energy industry-specific roles
  - Organizations were selected considering the comparability of their operations, relative size of revenues and full-time employee equivalents when compared to Toronto Hydro, resulting in a peer group primarily consisting of other energy utilities
- **General Industry Peer Group**
  - Reflects select for-profit Canadian Organizations from Mercer's Benchmark Database ("MBD") that includes general industry roles and organizations located in the Greater Toronto Area ("GTA")
  - Aligned with Mercer's standard benchmarking methodology, organizations are generally within ½ to 2x the size of Toronto Hydro on the basis of annual revenue
  - Where required to provide statistically significant market information for a specific position, the peer group is expanded to include Canadian general industry.

A listing of organizations that belong to each of these peer groups for the purposes of either cash compensation, benefits or pension benchmarking is presented in ***Appendix A****.*

A sample of Toronto Hydro's jobs across all grades was benchmarked against equivalent roles within organizations from the defined peer groups. Equivalences were determined on the basis of overlaps in responsibilities between Toronto Hydro and survey position descriptions.

- 49 management jobs at Toronto Hydro were matched to equivalent survey jobs and levels in the two peer groups.
- 10 collective bargaining jobs were matched to equivalent survey jobs and levels in the energy peer group, as positions are generally energy industry specific in their responsibilities

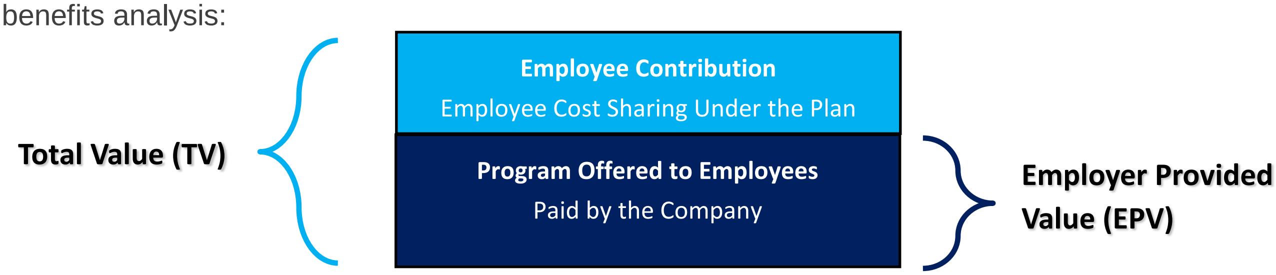
Mercer's benchmarking objective with this review is to map a reasonable sample of Toronto Hydro's positions that best represent the total employee population across the different job levels in the organization. With this approach, our analysis includes 265 of the 582 management and professional employees and 531 of the 850 bargaining unit positions to make up 56% of the total population considered in-scope for this review. Mercer believes this to be a statistically reliable and representative sample for assessing the competitive levels of total remuneration for Toronto Hydro's employees.

*A listing of the specific Toronto Hydro benchmark positions matched to market as part of this review is presented in **Appendix B**.*

Cash compensation levels tend to be aligned with the scope and complexity of the individual position and as such, to the extent possible, Mercer analyzed market data specific to the individual position. Benefit and pension programs tend to be common to all participants within a defined group and, as such comparisons to market are made on a plan or aggregate basis for each employee group (e.g., management, Society, PWU, etc.).

For the retirement and benefits program review, Mercer similarly benchmarked Toronto Hydro against the energy peer group and general industry peer groups for organizations available in the Mercer Plan Design databases considering their relative **employer provided value** ("EPV"). Relative value analysis focuses only on the plan design as it sets all other cost drivers at a common level and is more consistent when comparing the value of the benefit programs of several organizations.

We note how benchmarking Total Value (TV) compares to Employer Provided Value (EPV) for the benefits analysis:



The relative value benchmarking results are presented as a percentage of base salary using a base salary of $100,000 and bonus of 10% of base salary. Plans for all comparator organizations have been valued using the same earnings information and composite workforce profile. Using different earnings levels would change the dollar value of the benefit, but any change in relative value of the plan amongst the participants would not, in Mercer's opinion, be material.

As each element of the total remuneration package serves a different role, and companies may choose to offer a different pay mix in order to accomplish different objectives, Mercer recommends Toronto Hydro consider the competitiveness of its total remuneration package as a whole (considering total remuneration) rather than the competitiveness of each individual compensation element. In order to provide a complete picture, report findings and observations are presented for separate compensation elements as well as aggregate total remuneration.

All compensation data is reflective of the most recently available data as of the completion of the analysis, and is presented effective for 2017.

SUMMARY OF FINDINGS

Our commentary describes the competitiveness of Toronto Hydro's base salary, short-term incentive, total cash compensation and total remuneration at an aggregate level for each grade in the organization, relative to the 50th percentile of the respective market. Based on Mercer's compensation practices and policy research, the majority of organizations target compensation at the 50th percentile of their competitive market, which balances fiduciary and cost considerations with the need to attract and retain talent.

- As discussed above, Mercer considers Toronto Hydro to be within the competitive range if they fall within 10% of the target market positioning on a position-by-position basis and 5% on the overall organization basis.
- Market figures are presented where there is sufficient data to show the 50th percentile (Conversely, insufficient data is denoted by a "-").

The table below presents Toronto Hydro's **base salaries, target STI, target total cash compensation (TTC)** and **total remuneration (TRem)** at an aggregate level, compared to the market 50th percentile across the two peer groups:

All dollar figures presented in $000's

Toronto Hydro					Energy Peer Group				General Industry Peer Group			
Grade	Base Salary ($)[1]	Target STI (%)	TTC ($)[2]	TRem ($)[3]	Base Salary ($)[1]	Target STI (%)	TTC ($)[2]	TRem ($)[3]	Base Salary ($)[1]	Target STI (%)	TTC ($)[2]	TRem ($)[3]
Z	$197	25%	$246	$291	$183	20%	$198	$232	$232	30%	$307	$411
					8%	5%	25%	26%	-15%	-5%	-20%	-29%
Y3	$162	25%	$203	$240	$199	23%	$247	$301	$211	20%	$249	$316
					-19%	3%	-18%	-20%	-23%	5%	-18%	-24%
Y2	$147	20%	$177	$210	$148	15%	$165	$194	$167	22%	$207	$256
					-1%	6%	7%	8%	-12%	-2%	-14%	-18%
Y1	$133	13%	$150	$178	$147	14%	$169	$184	$156	20%	$180	$202
					-10%	0%	-11%	-3%	-15%	-6%	-17%	-12%
W4	$121	10%	$133	$159	$131	13%	$150	$171	$153	19%	$187	$223
					-7%	-3%	-11%	-7%	-21%	-9%	-29%	-29%
W3	$114	10%	$125	$150	$131	15%	$146	$170	$124	16%	$139	$154
					-13%	-5%	-14%	-12%	-8%	-6%	-10%	-2%
W2	$104	8%	$112	$136	$86	-	$96	$116	$87	8%	$94	$109
					22%	-	17%	18%	20%	0%	19%	25%
V4	$117	8%	$126	$150	$123	-	$136	$156	$114	15%	$128	$142
					-5%	-	-7%	-4%	2%	-7%	-1%	5%
V3	$110	8%	$119	$141	$105	9%	$117	$140	$107	14%	$117	$132
					5%	-1%	2%	1%	3%	-6%	1%	7%
V2	$101	8%	$109	$131	$94	10%	$102	$121	$103	13%	$112	$126
					8%	-2%	7%	8%	-2%	-5%	-2%	4%
V1	$91	8%	$98	$118	$91	8%	$98	$115	$93	11%	$101	$113
					0%	0%	0%	3%	-2%	-3%	-3%	4%
U3	$81	6%	$85	$103	$86	-	$86	$101	$77	10%	$79	$91
					-7%	-	-1%	2%	4%	-4%	8%	13%
U2	$73	6%	$78	$94	$78	7%	$82	$97	$71	7%	$79	$91
					-5%	-1%	-5%	-4%	3%	-1%	-1%	3%
U1	$66	6%	$70	$85	$74	7%	$79	$93	$74	9%	$78	$88
					-11%	-1%	-12%	-9%	-11%	-3%	-10%	-3%
T1	$52	6%	$55	$67	$64	7%	$69	$80	$57	8%	$60	$70
					-18%	-1%	-20%	-16%	-8%	-2%	-8%	-3%
SOCIETY	$114	8%	$123	$146	$99	-	$106	$129	-	-	-	-
					15%	-	16%	13%	-	-	-	-
PWU	$97	-	$97	$116	$89	-	$90	$105	-	-	-	-
					9%	-	8%	10%	-	-	-	-
Overall					98%		99%	100%	91%		89%	89%

(1) Toronto Hydro base salary reflects salary structure job rates
(2) Toronto Hydro target total cash ("TCC") reflects salary structure job rates plus target short-term incentives
(3) Total remuneration ("TRem") reflects target total cash compensation plus the value of long-term incentives, pensions and benefits
Note: Figures are rounded to the nearest thousand (dollars) or percent

Overall, Toronto Hydro's compensation program, on a **total remuneration** basis, is closely aligned with the 50th percentile market pay levels of the energy peer group, the most comparable peer group given relative roles and responsibilities, and is at or below a market competitive level relative to the general industry peer group. Few grades, including Y3 and W2, are consistently outside of the competitive range relative to both the energy peer group and general industry peer group.

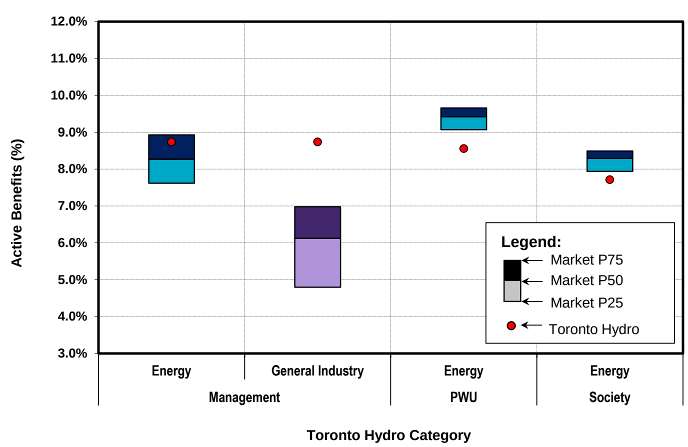
On **base salaries** for union and non-unionized positions, Toronto Hydro is generally competitive, except for the Y3, Y1, W2 and U1 salary grades that are outside of the competitive range relative to both the energy peer group and general industry peer group. The W2 salary grade with the supervisory positions exceeds the market median due to upward pay pressures between management and directly supervised unionized positions. Society represented positions roles are paid above the competitive range relative to the energy peer group.

Market eligibility for **short-term incentives** ("**STI")** is generally more prevalent for positions on the team lead level and above (i.e., close to 100% eligibility for jobs benchmarked to the W4 grade level and above). In comparison, Toronto Hydro offers incentive pay for all positions, except for the PWU represented positions. On STI, Toronto Hydro is slightly below market competitiveness.

Overall, on **total cash compensation**, Toronto Hydro remains within the range of market competitiveness for the energy peer group but shifts lower in the general industry peer group due to below-market STI. Grades Y3, Y1, W4, W3, W2 and U1 are outside of a competitive range relative to both the energy peer group and general industry peer group. W2 grade total cash compensation continues to exceed the market median due to upward pay pressures between management and directly supervised unionized positions. Society represented positions roles are paid above the competitive range relative to the energy peer group.

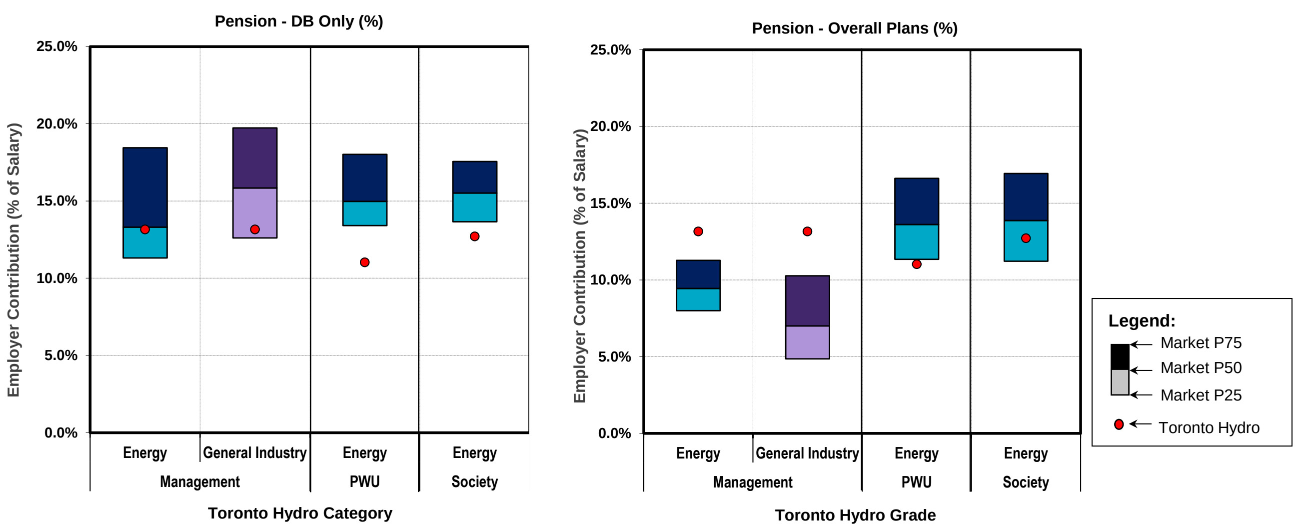
To illustrate the impact of the benefits element on total remuneration, the tables below present Toronto Hydro's **active benefits (Table 1)** and **pension (Table 2)** value for each employee group considering employer-provided value, compared to the market 50th percentile across the two peer groups. We note that for pension value we focus on an employer-provided basis given a 50% cost share in the OMERS pension plan that impacts the actual value paid by the company.

Table 1
Benefit Value (% of Salary)



When compared to the energy peer group, Toronto Hydro is generally within 2% of the market 50th percentile considering the overall value of active benefits (including life insurance, accidental death and dismemberment, short-term disability, long-term disability, health, dental and health-care spending accounts) across all employee groups. When compared to the general industry peer group, Toronto Hydro provides a top quartile active benefits plan.

Table 2



Toronto Hydro pension arrangements for management employees through OMERS are aligned with the 50th percentile of the employer provided value of other defined benefits (DB) plans among energy peer group companies. Many comparators have a fixed employee contribution, with the employer contributing the balance, positioning PWU and Society employer provided benefits in the first market quartile (up to the 25th percentile) relative to other organizations that provide a defined benefit plan among the energy peer group.

Many of the comparators provide a defined contribution plan. When defined contribution plans are taken into account to determine the overall market, Toronto Hydro pension arrangements for management, PWU and Society employee groups are positioned more competitively.

APPENDIX A

The following companies comprise the **energy peer group** used for the purposes of the review:

ENERGY INDUSTRY COMPARATOR COMPANIES	
AltaGas, Ltd. *	Hydro One Inc. *
AltaLink L.P. *	Manitoba Hydro *
ATCO Electric *	NB Power *
BC Hydro Power & Authority *	Newfoundland & Labrador Hydro Electric Corporation *
Bruce Power L.P. *	Nova Scotia Power (Emera, Inc.)
City of Medicine Hat (Hydro Division) *	Ontario Power Generation *
Enbridge Gas Distribution *	SaskEnergy Incorporated *
ENMAX Corporation *	SaskPower *
EPCOR Utilities *	Spectra Energy Transmission *
Fortis Inc.	TransAlta Corporation *
FortisAlberta Inc. *	TransCanada Corporation - Energy Group *
FortisBC Energy Inc. *	TransCanada Corporation - Pipelines Group *
FortisBC Inc. *	

(*) Energy companies from the Mercer Plan Design databases used in the benefits analysis

The following companies comprise the **general industry peer group** used in the review:

GENERAL INDUSTRY COMPARATOR COMPANIES	
3M Canada Company	General Dynamics Land Systems - Canada
Agrium, Inc. - Wholesale Group	La Coop fédérée
AltaGas, Ltd.	NOVA Chemicals Corporation
Bombardier Recreational Products, Inc.	Pacific Exploration & Production Corporation
CAE, Inc.	Parkland Fuel Corporation
Canadian Natural Resources, Ltd. - Horizon Oil Sands	Pembina Pipeline Corporation
ConocoPhillips Canada	Procter & Gamble, Inc.
Crescent Point Energy Corp.	Repsol Oil & Gas Canada Inc.
Dow Chemical Canada, Inc.	TransAlta Corporation
Encana Corporation	TransCanada Corporation - Pipelines Group
Encana Corporation - Encana Services Company, Ltd.	Volvo Group Canada, Inc.
ENMAX Corporation	Workers' Compensation Board - Alberta
GE Energy - GE Oil & Gas Drilling & Production Services	

APPENDIX B

Mercer worked closely with Toronto Hydro to select jobs that best represent the total employee population across the different job levels in the organization. The following 49 non-bargaining positions were included within the scope of the review:

#	TORONTO HYDRO POSITION	GRADE	#	TORONTO HYDRO POSITION	GRADE
1	General Manager, Design & Construction	Z	26	IT Architect, Database & Reporting	V4
2	Controller	Z	27	Strategic Planning Consultant	V3
3	Director, Regulatory Affairs	Y3	28	Senior Internal Auditor	V3
4	Director, Power System Services	Y3	29	Senior Financial Analyst	V3
5	Director, Legal Services & Corporate Secretary	Y3	30	Regulatory Counsel	V3
6	Director, IT Security & Ent Architecture	Y3	31	IT Technical Consultant	V3
7	Director, Environmental Health & Safety	Y3	32	Strategy & Enterprise Risk Management Consultant	V3
8	Manager, Rates	Y2	33	Employee/Labour Relations Consultant	V3
9	Manager, Project Management	Y2	34	EHS Consultant	V3
10	Manager, Program Support Office	Y2	35	Program Management Consultant	V2
11	Manager, Internal Audit	Y2	36	Communications Specialist	V2
12	Manager, Finance Services & Systems	Y2	37	Recruitment Consultant	V1
13	Manager, Commercial & Real Property Legal Services	Y2	38	Financial Analyst	V1
14	Manager, Call Centre	Y2	39	Quality Assurance Associate	U3
15	Manager, Regulatory Law	Y1	40	EHS Associate	U3
16	Manager, Facility & Building Security Operations	Y1	41	Payroll & Disbursements Analyst	U2
17	Supervisor, Control Centre	W4	42	Executive Assistant	U2
18	Supervisor, Project Execution	W4	43	ERM & Policy Administrative Analyst	U2
19	Lead, Project Management	W4	44	Law Clerk, Real Property	U1
20	Lead, Legal Services, Commercial	W4	45	IT Technical Support Analyst	U1
21	Supervisor, Supply Chain Services	W3	46	Communications Coordinator	U1
22	Supervisor, Facilities	W3	47	OD Administrator	T1
23	Supervisor, Design	W3	48	Claims Administrator	T1
24	Supervisor, Construction & Maintenance	W3	49	Administrative Assistant	T1
25	Supervisor, Call Centre	W2			

The following 10 bargaining positions were included within the scope of the review:

#	TORONTO HYDRO POSITION	UNION
50	Engineering Technologist Level 1	PWU
51	Engineering Technologist Level 2	PWU
52	Customer Relations Representative	PWU
53	Distribution System Technologist	PWU
54	Cert Meter Mechanic / Tester	PWU
55	Cert Power Line Person	PWU
56	Cert Power Cable Person	PWU
57	Power System Controller	PWU
58	Cert Crew Leader, Power Cable Person	PWU
59	Engineer	SOCIETY

MERCER (CANADA) LIMITED
120 Bremner Boulevard, Suite 800
Toronto, Ontario M5J 0A8
www.mercer.ca

Private and Confidential

January 15, 2018

Ms. Janandre Lamprecht
Toronto Hydro Corporation
14 Carlton Street
Toronto, ON
M5B 1K5

Dear Janandre:

POST-EMPLOYMENT BENEFITS FOR EMPLOYEES OF TORONTO HYDRO
2017 YEAR-END DISCLOSURES AND ESTIMATED 2018 AND 2019 BENEFIT EXPENSE UNDER INTERNATIONAL ACCOUNTING STANDARDS

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-retirement and post-employment benefits plans ("the Plans"):

- Extended health benefits for retirees and members on disability;
- Dental benefits for retirees and members on disability;
- Life insurance benefits for retirees;
- Vested and non-vested sick leave benefits;
- OMERS top up pension; and
- Executive retirement allowances.

This letter and appendices have been prepared for the Company and its external reporting, for the following purposes:

- Determining the final calculation of the 2017 benefit expense under International Financial Reporting Standards (IFRS) in accordance with International Accounting Standards Section 19 revised in 2011,

175 Bloor Street East
South Tower
Suite 1701
Toronto, Ontario
M4W 3T6

T +1 416 960.2700
W willistowerswatson.com

Towers Watson Canada Inc.

- Providing the required information for year-end disclosure purposes as of December 31, 2017 under IAS 19 rev. 2011,

- Determining an estimate of 2018 and 2019 benefit expense under IAS 19 rev. 2011.

The information contained in this letter and appendices are presented in thousands of Canadian dollars, and are in respect of the benefits mentioned above only.

The 2017 year-end disclosure results and extrapolations for 2018 and 2019 are based on the results of the January 1, 2016 actuarial valuation.

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, 2016 actuarial valuation reports presented by Willis Towers Watson on November 18, 2016, 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 2017 year-end financial reporting is December 31, 2017.

- The 2017 benefit expense is based on a discount rate of 4.00% per annum and the defined benefit obligation ("DBO") at December 31, 2017 is based on a discount rate of 3.50% per annum, as instructed by the Company. The discount rates are based on long-term high-quality Canadian corporate bond yields at December 31, 2016 and December 31, 2017 respectively.

- In September 2017, the Canadian Institute of Actuaries published the MI-2017 mortality improvement scale that reflects mortality improvement experience data from the Human Mortality Database to 2011, supplemented by OAS data to 2015. The new scale uses a long-term improvement rate factor of 1.0% (compared to a long-term improvement rate factor of 0.8% under the CPM-B scale). The Canadian Institute of Actuaries is currently working on guidance for actuaries relating to the MI-2017 scale. It is still uncertain whether the new MI-2017 scale will be prevalent and used across Canadian plan sponsors at year-end 2017, but we expect materiality to be a key consideration when deciding whether to move to MI-2017. Based on our discussion with the Toronto Hydro, the Company decided not to adopt the MI-2017 projection scale for year-end 2017.

- Other than those noted in this letter, the actuarial methods and assumptions used for the determination of the 2017 net periodic benefit cost are consistent with those used for the 2016 year-end disclosures and the actuarial methods and assumptions used for the December 31, 2017 obligation are consistent with those used for the January 1, 2016 actuarial valuation.

- The obligation as of December 31, 2017 and the 2018 and 2019 expense estimates are based on extrapolations from the January 1, 2016 valuation results for the medical, dental, life insurance, sick leave, OMERS and retirement allowance benefit plans, assuming that there are no experience gains or 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.

Accounting Methods

- As directed by the Company, Appendix A includes an exhibit that assumes the transition date to IAS 19 rev. 2011 of January 1, 2014.
- Under IAS 19 rev. 2011, we understand that Toronto Hydro has determined that both the non-vested sick leave benefit program and the vested sick leave benefit program should be included for post-employment benefits reporting. As such, these benefits are included in the financial information under IAS 19 rev. 2011 presented in this letter.
- On an ongoing basis, actuarial gains and losses for all benefit plans other than the sick leave benefits plan and the incentive plan retirement allowance will be immediately recognized in other comprehensive income. Actuarial gains and losses for the sick leave benefit plan and the incentive plan retirement allowance will be recognized immediately in expense.
- On an ongoing basis, the impact of plan changes will be immediately recognized in benefit expense.

Summary of Financial Results

The summary of Fiscal 2017 benefit expense, the defined benefit liability and the DBO as at December 31, 2017, under IAS 19 rev. 2011 is as follows (in $ 000s):

		Fiscal 2017 Net Periodic Benefit Costs		**Defined Benefit Asset/(Liability) at December 31, 2017**		**DBO at December 31, 2017**
Electric System Limited	$	17,978	$	(307,147)	$	307,147
Toronto Hydro Corporation		283		(2,296)		2,296
Energy Service Incorporated		74		(2,117)		2,117
LDC Unregulated		97		(1,410)		1,410
Consolidated	$	18,432	$	(312,970)	$	312,970

- Actual benefit payments for 2017 of $11,040,000 are based on information provided by the Company on January 5, 2018. We have projected 2018 and 2019 benefit payments based on the valuation assumptions.

Other Comments

- The Company informed us that effective January 1, 2017 they transferred 22 active employees from Energy Services Incorporated (ESI) division to Electric System Limited (ESL) division. Of the 22 affected members, we found 17 in our January 1, 2016 actuarial valuation census data. As directed by the Company, we transferred $1.3 million of obligation as of January 1, 2017 and $0.1 million of the 2017 service cost from ESI to ESL. As a result, the 2017 benefit expense and December 31, 2017 obligations for ESI and ESL were revised to reflect these changes. However, there was no impact at the Consolidated level.

- We understand that the post-employment benefits plans are not pre-funded, and therefore our accounting results do not consider any expected investment income on plan assets.

- As directed by the Company, the full defined benefit liability has been classified as a non-current liability.

- 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, 2016 for all benefit plans, that would materially affect the results of our valuations.

* * * * *

Actuarial Certification

The Company may make a copy of this report available to its auditors, but we make no representation as to the suitability of this report for any purpose other than that for which it was originally provided and accept no responsibility or liability to the Company's auditors in this regard. We are aware that the information contained in this report will be used to support the audit of the Company's financial statements. Except where we expressly agree in writing, this report should not be disclosed or provided to any third party, other than as provided above. Willis Towers Watson accepts no responsibility for any consequences arising from any other party relying on this report or any advice relating to its contents.

In preparing these results, we have relied upon information and data provided to us orally, electronically and/or in writing by the Company and other persons or organizations designated by the Company. We have relied on all the data and information provided, including plan provisions and membership data as being complete and accurate. Based on discussions with and concurrence by the plan sponsor, assumptions or estimates may have been made if data were not available. We have not independently verified the accuracy or completeness of the data or information provided, but we have performed limited checks for consistency.

We are not aware of any errors or omissions in the data that would have a significant effect on the results of our calculations.

The results presented in this report are directly dependent upon the accuracy and completeness of the underlying data and information. Any material inaccuracy in the data, plan provisions or other information provided to us may have produced results that are not suitable for the purposes of this report and such inaccuracies may produce materially different results that could require that a revised report be issued.

The results summarized in this report involve actuarial calculations that require assumptions about future events. The Company is responsible for the selection of the assumptions, as required by IAS 19. Other assumptions may also be reasonable and appropriate and their use would produce different results.

The expense and obligation levels will change in the future as a result of future changes in the actuarial methods and assumptions, the membership data, the plan provisions, accounting rules, legislature, and the government health care programs, or as a result of future experience gains or losses. None of these changes has been anticipated at this time, but will be revealed in future accounting valuations.

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.

In our opinion:

- the membership data on which the valuation is based are sufficient and reliable for purposes of the valuation;
- the assumptions are appropriate for the purposes of the valuation(s);
- the methods employed in the valuation are appropriate for the purposes of the valuation(s);
- the calculations have been made in accordance with our understanding of the requirements of IAS 19 and the Company's accounting policies.

This report has been prepared, and our opinions given, in accordance with accepted actuarial practice in Canada.

We are pleased to provide you with this year-end disclosure report. Please contact us if you need any additional information.

Willis Towers Watson

Andrea Firmani, FCIA, FSA
Mobile: (416) 258-0987

Olga Baliakina, FCIA, FSA
Direct Dial: (416) 960-7094

Enclosures

cc: Claudia Oancea — Toronto Hydro Corporation
Cindy Dieng — Toronto Hydro Corporation
Winnie Cheng – Toronto Hydro Corporation

Post-Employment Benefits Plan - IFRS (rev. 2011) - 2017 Year-End Disclosure Information ($ 000's)

	Electric System Limited	Toronto Hydro Corporation	Energy Services Incorporated	LDC Unregulated	Consolidated
Statement of Financial Position at Beginning of Period			**January 01, 2017**		
Defined Benefit Asset/(Liability) at Beginning of Period	(274,171)	(1,909)	(3,210)	(1,195)	(280,485)
Reconciliation of Defined Benefit Obligation			**2017**		
Defined Benefit Obligation at Beginning of Period	274,171	1,909	3,210	1,195	280,485
Employer Service Cost at Beginning of Period	3,839	182	12	48	4,081
Interest Cost	10,994	82	74	49	11,199
Net Actuarial (Gain) or Loss					
Sick Leave Plan	*3,145*	-	*(12)*	-	*3,133*
Retirement Allowance Benefit #1	-	*19*	-	-	*19*
Other Plans	*25,881*	*113*	*(1,046)*	*145*	*25,093*
Total Net Actuarial (Gain) or Loss	29,026	132	(1,058)	145	28,245
Benefits Paid Directly by the Employer	(10,883)	(9)	(121)	(27)	(11,040)
Defined Benefit Obligation at Current Period End	307,147	2,296	2,117	1,410	312,970
Change in Plan Assets			**2017**		
Fair Value of Plan Assets at Prior Period End	-	-	-	-	-
Employer Contributions	10,883	9	121	27	11,040
Benefits Paid	(10,883)	(9)	(121)	(27)	(11,040)
Fair Value of Plan Assets at Current Period End	-	-	-	-	-
Total Benefit (Expense)/Income for Period			**2017**		
Employer Service Cost at Beginning of Period	3,839	182	12	48	4,081
Interest Cost	10,994	82	74	49	11,199
Actuarial (Gain)/Loss Recognized in Expense	3,145	19	(12)	-	3,152
Total Benefit Expense/(Income)	17,978	283	74	97	18,432
Reconciliation of Balance Sheet			**2017**		
Defined Benefit Asset/(Liability) at Prior Period End	(274,171)	(1,909)	(3,210)	(1,195)	(280,485)
Total Benefit (Expense)/Income for Period	(17,978)	(283)	(74)	(97)	(18,432)
Benefits Paid Directly by the Employer	10,883	9	121	27	11,040
Gain/(Loss) Recognized via OCI	(25,881)	(113)	1,046	(145)	(25,093)
Defined Benefit Asset/(Liability) at Current Period End	(307,147)	(2,296)	(2,117)	(1,410)	(312,970)
Change in Accumulated Other Comprehensive Income			**2017**		
Cumulative Actuarial (Gain)/Loss Recognized via OCI at Prior Period End	26,533	(1,212)	(180)	(33)	25,108
Actuarial (Gain)/Loss Recognized via OCI for Period	25,881	113	(1,046)	145	25,093
Cumulative Actuarial (Gain)/Loss Recognized via OCI at Current Period End	52,414	(1,099)	(1,226)	112	50,201
Statement of Financial Position at End of Period			**December 31, 2017**		
Defined Benefit Asset/(Liability) at Current Period End	(307,147)	(2,296)	(2,117)	(1,410)	(312,970)
Breakdown of Defined Benefit Obligation: Current and Non-Current			**December 31, 2017**		
Current Liabilities	-	-	-	-	-
Non-Current Asset/(Liability)	(307,147)	(2,296)	(2,117)	(1,410)	(312,970)
Defined Benefit Asset/(Liability) at Current Period End	(307,147)	(2,296)	(2,117)	(1,410)	(312,970)

Post-Employment Benefits Plan - IFRS (rev. 2011) - 2017 Year-End Disclosure Information ($ 000's)

	Electric System Limited	Toronto Hydro Corporation	Energy Services Incorporated	LDC Unregulated	Consolidated
Sensitivity to Changes in Medical and Dental Trend Rate Assumption					
Effect on total of service and interest cost for 2017					
1% point increase	2,135	8	14	18	2,175
1% point decrease	(1,906)	(6)	(13)	(14)	(1,939)
Effect on accrued benefit obligation at December 31, 2017					
1% point increase	39,463	178	340	220	40,201
1% point decrease	(35,376)	(159)	(305)	(191)	(36,031)
Sensitivity to Changes in Discount Rate Assumption					
Effect on total of service and interest cost for 2017					
1% point increase	(223)	(9)	(1)	(9)	(242)
1% point decrease	79	9	(1)	13	100
Effect on accrued benefit obligation at December 31, 2017					
1% point increase	(45,889)	(324)	(372)	(246)	(46,831)
1% point decrease	58,970	410	489	322	60,191
Sensitivity to Changes in Mortality Rates Assumption					
Effect on accrued benefit obligation at December 31, 2017					
Set back 1 year	11,071	45	80	54	11,250
Set forward 1 year	(10,828)	(44)	(79)	(53)	(11,004)
Key Assumptions					
Discount rate at Dec 31/17 (used for Dec 31/17 obligation)	3.50%	3.50%	3.50%	3.50%	3.50%
Discount rate at Dec 31/16 (used for 2017 Benefit Costs)	4.00%	4.00%	4.00%	4.00%	4.00%
Assumed medical and dental cost trend rate at December 31, 2017					
Dental care cost trend rate assumed for next year	4.00%	4.00%	4.00%	4.00%	4.00%
For pre July 2000 retirements:					
Health care cost trend rate assumed for next year	5.00%	5.00%	5.00%	5.00%	5.00%
Rate that the cost trend gradually declines to	5.00%	5.00%	5.00%	5.00%	5.00%
Year that the rate reaches the ultimate rate	2015	2015	2015	2015	2015
For other retirements:					
Health care cost trend rate assumed for next year	5.00%	5.00%	5.00%	5.00%	5.50%
Rate that the cost trend gradually declines to	5.00%	5.00%	5.00%	5.00%	5.00%
Year that the rate reaches the ultimate rate	2018	2018	2018	2018	2018
Expected Benefit Payments					
Following Year	9,293	224	50	21	9,588
Following Year +1	9,868	152	55	22	10,097
Following Year +2	9,982	124	64	23	10,193
Following Year +3	10,535	135	64	27	10,761
Following Year +4	11,171	139	81	33	11,424
Modified Duration at the end of the year	16.8	11.5	19.7	19.5	16.7
Breakdown of actuarial (gain)/loss at December 31, 2017					
Demographic assumptions:	0	0	0	0	0
Economic assumptions:					
Updated discount rate assumption	25,821	181	209	138	26,349
Plan Experience:					
Transfers 1.1.2017	1,344	-	(1,344)	-	-
Actual versus expected benefit payments	1,861	(49)	77	7	1,896
Total net actuarial (gain)/loss	**29,026**	**132**	**(1,058)**	**145**	**28,245**

Post-Employment Benefits Plan - IFRS (rev. 2011) - 2018 Expense Estimate ($ 000's)

	Electric System Limited	Toronto Hydro Corporation	Energy Services Incorporated	LDC Unregulated	Consolidated
Statement of Financial Position at Beginning of Period			**January 01, 2018**		
Defined Benefit Asset/(Liability) at Beginning of Period	(307,147)	(2,296)	(2,117)	(1,410)	(312,970)
Reconciliation of Defined Benefit Obligation			**2018**		
Defined Benefit Obligation at Beginning of Period	307,147	2,296	2,117	1,410	312,970
Employer Service Cost at Beginning of Period	4,554	197	14	57	4,822
Interest Cost	10,747	83	74	51	10,955
Net Actuarial (Gain) or Loss	-	-	-	-	-
Benefits Paid Directly by the Employer	(9,293)	(224)	(50)	(21)	(9,588)
Defined Benefit Obligation at Current Period End	313,155	2,352	2,155	1,497	319,159
Change in Plan Assets			**2018**		
Fair Value of Plan Assets at Prior Period End	-	-	-	-	-
Employer Contributions	9,293	224	50	21	9,588
Benefits Paid	(9,293)	(224)	(50)	(21)	(9,588)
Fair Value of Plan Assets at Current Period End	-	-	-	-	-
Total Benefit (Expense)/Income for Period			**2018**		
Employer Service Cost at Beginning of Period	4,554	197	14	57	4,822
Interest Cost	10,747	83	74	51	10,955
Total Benefit Expense/(Income)	15,301	280	88	108	15,777
Reconciliation of Balance Sheet			**2018**		
Defined Benefit Asset/(Liability) at Prior Period End	(307,147)	(2,296)	(2,117)	(1,410)	(312,970)
Total Benefit (Expense)/Income for Period	(15,301)	(280)	(88)	(108)	(15,777)
Benefits Paid Directly by the Employer	9,293	224	50	21	9,588
Gain/(Loss) Recognized via OCI	-	-	-	-	-
Defined Benefit Asset/(Liability) at Current Period End	(313,155)	(2,352)	(2,155)	(1,497)	(319,159)
Change in Accumulated Other Comprehensive Income			**2018**		
Cumulative Actuarial (Gain)/Loss Recognized via OCI at Prior Period End	26,533	(1,212)	(180)	(33)	25,108
Actuarial (Gain)/Loss Recognized via OCI for Period	-	-	-	-	-
Cumulative Actuarial (Gain)/Loss Recognized via OCI at Current Period End	26,533	(1,212)	(180)	(33)	25,108
Statement of Financial Position at End of Period			**December 31, 2018**		
Defined Benefit Asset/(Liability) at Current Period End	(313,155)	(2,352)	(2,155)	(1,497)	(319,159)
Breakdown of Defined Benefit Obligation: Current and Non-Current			**December 31, 2018**		
Current Liabilities	-	-	-	-	-
Non-Current Asset/(Liability)	(313,155)	(2,352)	(2,155)	(1,497)	(319,159)
Defined Benefit Asset/(Liability) at Current Period End	(313,155)	(2,352)	(2,155)	(1,497)	(319,159)
Key Assumptions					
Discount rate at Dec 31/17 (used for Dec 31/18 obligation)	3.50%	3.50%	3.50%	3.50%	3.50%
Discount rate at Dec 31/17 (used for 2018 Benefit Costs)	3.50%	3.50%	3.50%	3.50%	3.50%
Assumed medical and dental cost trend rate at December 31, 2018					
Dental care cost trend rate assumed for next year	4.00%	4.00%	4.00%	4.00%	4.00%
For pre July 2000 retirements:					
Health care cost trend rate assumed for next year	5.00%	5.00%	5.00%	5.00%	5.00%
Rate that the cost trend gradually declines to	5.00%	5.00%	5.00%	5.00%	5.00%
Year that the rate reaches the ultimate rate	2015	2015	2015	2015	2015
For other retirements:					
Health care cost trend rate assumed for next year	5.00%	5.00%	5.00%	5.00%	5.00%
Rate that the cost trend gradually declines to	5.00%	5.00%	5.00%	5.00%	5.00%
Year that the rate reaches the ultimate rate	2018	2018	2018	2018	2018
Expected Benefit Payments for Following Year	9,868	152	55	22	10,097

Post-Employment Benefits Plan - IFRS (rev. 2011) - 2019 Expense Estimate ($ 000's)

	Electric System Limited	Toronto Hydro Corporation	Energy Services Incorporated	LDC Unregulated	Consolidated
Statement of Financial Position at Beginning of Period			**January 01, 2019**		
Defined Benefit Asset/(Liability) at Beginning of Period	(313,155)	(2,352)	(2,155)	(1,497)	(319,159)
Reconciliation of Defined Benefit Obligation			**2019**		
Defined Benefit Obligation at Beginning of Period	313,155	2,352	2,155	1,497	319,159
Employer Service Cost at Beginning of Period	4,713	204	14	59	4,990
Interest Cost	10,953	87	75	54	11,169
Net Actuarial (Gain) or Loss	-	-	-	-	-
Benefits Paid Directly by the Employer	(9,868)	(152)	(55)	(22)	(10,097)
Defined Benefit Obligation at Current Period End	318,953	2,491	2,189	1,588	325,221
Change in Plan Assets			**2019**		
Fair Value of Plan Assets at Prior Period End	-	-	-	-	-
Employer Contributions	9,868	152	55	22	10,097
Benefits Paid	(9,868)	(152)	(55)	(22)	(10,097)
Fair Value of Plan Assets at Current Period End	-	-	-	-	-
Total Benefit (Expense)/Income for Period			**2019**		
Employer Service Cost at Beginning of Period	4,713	204	14	59	4,990
Interest Cost	10,953	87	75	54	11,169
Total Benefit Expense/(Income)	15,666	291	89	113	16,159
Reconciliation of Balance Sheet			**2019**		
Defined Benefit Asset/(Liability) at Prior Period End	(313,155)	(2,352)	(2,155)	(1,497)	(319,159)
Total Benefit (Expense)/Income for Period	(15,666)	(291)	(89)	(113)	(16,159)
Benefits Paid Directly by the Employer	9,868	152	55	22	10,097
Gain/(Loss) Recognized via OCI	-	-	-	-	-
Defined Benefit Asset/(Liability) at Current Period End	(318,953)	(2,491)	(2,189)	(1,588)	(325,221)
Change in Accumulated Other Comprehensive Income			**2019**		
Cumulative Actuarial (Gain)/Loss Recognized via OCI at Prior Period End	26,533	(1,212)	(180)	(33)	25,108
Actuarial (Gain)/Loss Recognized via OCI for Period	-	-	-	-	-
Cumulative Actuarial (Gain)/Loss Recognized via OCI at Current Period End	26,533	(1,212)	(180)	(33)	25,108
Statement of Financial Position at End of Period			**December 31, 2019**		
Defined Benefit Asset/(Liability) at Current Period End	(318,953)	(2,491)	(2,189)	(1,588)	(325,221)
Breakdown of Defined Benefit Obligation: Current and Non-Current			**December 31, 2019**		
Current Liabilities	-	-	-	-	-
Non-Current Asset/(Liability)	(318,953)	(2,491)	(2,189)	(1,588)	(325,221)
Defined Benefit Asset/(Liability) at Current Period End	(318,953)	(2,491)	(2,189)	(1,588)	(325,221)
Key Assumptions					
Discount rate at Dec 31/17 (used for Dec 31/19 obligation)	3.50%	3.50%	3.50%	3.50%	3.50%
Discount rate at Dec 31/17 (used for 2019 Benefit Costs)	3.50%	3.50%	3.50%	3.50%	3.50%
Assumed medical and dental cost trend rate at December 31, 2019					
Dental care cost trend rate assumed for next year	4.00%	4.00%	4.00%	4.00%	4.00%
For pre July 2000 retirements:					
Health care cost trend rate assumed for next year	5.00%	5.00%	5.00%	5.00%	5.00%
Rate that the cost trend gradually declines to	5.00%	5.00%	5.00%	5.00%	5.00%
Year that the rate reaches the ultimate rate	2015	2015	2015	2015	2015
For other retirements:					
Health care cost trend rate assumed for next year	5.00%	5.00%	5.00%	5.00%	5.00%
Rate that the cost trend gradually declines to	5.00%	5.00%	5.00%	5.00%	5.00%
Year that the rate reaches the ultimate rate	2018	2018	2018	2018	2018
Expected Benefit Payments for Following Year	9,982	124	64	23	10,193

SHARED SERVICES AND CORPORATE COST ALLOCATIONS

1. OVERVIEW

This schedule provides information about shared services and corporate costs allocations between Toronto Hydro and the affiliated corporate entities described below:

- **Toronto Hydro Corporation ("THC"):** THC provides strategic direction, corporate governance, and financial stewardship to Toronto Hydro and Toronto Hydro Energy Services Inc. ("TH Energy"). Toronto Hydro is wholly-owned by Toronto Hydro Corporation. THC receives shared corporate services from Toronto Hydro, and provides such services to Toronto Hydro as described below.
- **TH Energy:** TH Energy's primary line of business is the provision of street lighting and expressway lighting services to the City of Toronto. TH Energy receives shared corporate services from Toronto Hydro, and provides Toronto Hydro with emergency services for storm damage response.

For more information about these entities and their relationship to Toronto Hydro, please refer to Corporate Structure and Governance evidence at Exhibit 1C, Tab 2, Schedule 1.

This schedule provides information about corporate cost allocations to the non-rate regulated aspects of Toronto Hydro's business (referred to as "THESU"), including Conservation and Demand Management ("CDM") and generation activities.

2. 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 (2015 to 2017), the bridge years (2018 and 2019) and the test year (2020). The Board of Directors related costs included in THC's cost allocation to Toronto Hydro is also provided in this appendix.

3. SHARED SERVICE MODEL

Toronto Hydro's shared services methodology has not changed since the utility's last rebasing application.[1]

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 the actual cost and any differences are settled.

Table 1, below, provides a description of Toronto Hydro's corporate cost allocators by each functional service.

[1] EB-2014-0116, Toronto Hydro-Electric System Limited Application, Exhibit 4A, Tab 5, Schedule 1.

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.
Legal	Billable hours	Legal services and support for some affiliates are more labour intensive than others.
Human Resources (“HR”) (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.
HR – 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.
Office of the President	Time allocation	Services provided related to Councillor administration and requests
THC – CEO, CFO, Board of Directors	Time allocation	Services provided to certain affiliates are more labour intensive than others.

For other services, Toronto Hydro uses market price, if a reasonably competitive market exists for the service, and if it is practicable and cost efficient to undertake a market value assessment for the service.

If market price can be determined, Toronto Hydro charges the higher of fully-allocated cost or market price for any non-shared corporate services that it provides to the affiliated entities, and pays the lower of fully-allocated cost or market price for any such services 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.

4. VARIANCE ANALYSIS

4.1 TH Energy

Further to Appendix 2-N, Table 2, below, provides a summary of the cost of shared service provided by and received by Toronto Hydro to or from TH Energy. A variance analysis between 2015 actuals and 2020 test year amounts, as well as 2017 actuals and 2020 test year amounts is included after the table.

Table 2: Summary of the Cost of Shared Services Provided by and Received by Toronto Hydro to/from TH Energy ($ Millions)

	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Services Provided by Toronto Hydro	2.0	2.1	1.1	1.6	1.6	1.6
Services Received by Toronto Hydro	1.9	2.6	0.3	0.0	0.0	0.0

2015 Actual versus 2020 Test Year

- **Services Provided by Toronto Hydro:** The $0.4 million variance between 2015 actual and the 2020 test year is primarily attributable to lower allocated fleet services costs as a result of the transfer of all employees from TH Energy to Toronto Hydro. This transfer came into effect in 2017 and was budgeted accordingly in the 2018-19 Bridge years and 2020 Test year.
- **Services Received by Toronto Hydro:** The $1.9 million variance between 2015 actual and the 2020 test year is primarily attributable to the transfer of all employees from TH Energy to Toronto Hydro.

2017 Actual versus 2020 Test Year

- **Services Provided by Toronto Hydro:** The $0.5 million variance from the 2017 actual amounts and the 2020 test year forecasted amounts is primarily attributable to higher estimated spend to support street lighting projects.
- **Services Received by Toronto Hydro:** The $0.3 million variance from the 2017 actual and the 2020 test year is primarily attributable to contractor costs in TH Energy.

4.2 Non-Rate Regulated Toronto Hydro Activities

Further to Appendix 2-N, Table 3, below, provides a summary of the cost of shared service relating to Toronto Hydro's non-rate regulated activities (i.e. CDM, generation from 2015 to 2020). A variance analysis between 2015 actuals and 2020 test year amounts, as well as 2017 actuals and 2020 test year amounts is included after the table.

Table 3: Summary of the Cost of Services relating to Non-Rate Regulated Toronto Hydro activities ($ Millions)

	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Services Provided by Toronto Hydro	1.3	1.7	1.9	1.6	1.6	1.7

2015 Actual versus 2020 Test Year

For non-rate regulated Toronto Hydro activities, the variance in the shared corporate services allocation between 2015 actual and 2020 test year is primarily due to increased IT requirements resulting from incremental activities in 2020.

2017 Actual versus 2020 Test Year

The $0.2 million variance between the 2017 actual and 2020 test year is attributable to a transfer of employees from the regulated entity to the unregulated business.

4.3 THC

Further to Appendix 2-N, Table 4, below, provides a summary of the cost of shared service provided by and received by Toronto Hydro to or from THC. A variance analysis between 2015 actuals and 2020 test year amounts, as well as 2017 actuals and 2020 test year amounts is included after the table.

Table 4: Summary of the Cost of Shared Services Provided by and Received by Toronto Hydro to/from THC ($ Millions)

	2015 Actual	2016 Actual	2017 Actual	2018 Bridge	2019 Bridge	2020 Test
Services Provided by Toronto Hydro	1.2	1.3	3.2	3.9	3.9	3.9
Services Received by Toronto Hydro	4.8	2.9	4.8	4.3	4.4	4.6

2015 Actual versus 2020 Test Year

- **Services Provided by Toronto Hydro:** The $2.7 million variance between 2015 actual and the 2020 test year is due to increased services related to councillor administration and requests, and redesign of corporate risk, disaster planning and compliance function in 2020.
- **Services Received by Toronto Hydro:** The $0.2 million variance from the 2015 actual and the 2020 test year is due to lower expected stewardship costs allocated to the regulated business.

2017 Actual versus 2020 Test Year

- **Services Provided by Toronto Hydro:** The $0.7 million variance from the 2017 actual and the 2020 test year is due to the redesign of corporate risk, disaster planning and compliance function in 2020.
- **Services Received by Toronto Hydro:** The $0.2 million variance from the 2017 actual and the 2020 test year is due to lower expected stewardship costs allocated to the regulated business.

OEB Appendix 2-N
Shared Services and Corporate Cost Allocation

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	0.38	0.38
THESL	THESI	Emergency Calls / Streetlighting Relamping	Market**	0.52	0.48
THESI	THESL	Emergency/Field Work	Market**	0.04	0.04
THESI	THESL	Design	Market**	1.82	1.59

* 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	Fully allocated-cost	2.9%	0.49
THESL	THESI	EHS	Fully allocated-cost	0.4%	0.01
THESL	THESI	Legal/Insurance	Fully allocated-cost	3.6%	0.18
THESL	THESI	HR&OE	Fully allocated-cost	1.3%	0.17
THESL	THESI	Procurement	Fully allocated-cost	1.7%	0.04
THESL	THESI	Consolidated Billing	Fully allocated-cost	0.0%	-
THESL	THESI	IT&S	Fully allocated-cost	0.8%	0.06
THESL	THESI	Facilities	Fully allocated-cost	0.5%	0.11
THESL	THESU	Finance/Treasury	Fully allocated-cost	2.3%	0.39
THESL	THESU	Legal/Insurance	Fully allocated-cost	0.6%	0.03
THESL	THESU	HR&OE	Fully allocated-cost	2.5%	0.37
THESL	THESU	Procurement	Fully allocated-cost	5.4%	0.12
THESL	THESU	IT&S	Fully allocated-cost	0.9%	0.07
THESL	THESU	Facilities	Fully allocated-cost	1.6%	0.37
THESL	THC	Finance/Treasury	Fully allocated-cost	2.8%	0.47
THESL	THC	Legal/Insurance	Fully allocated-cost	13.9%	0.71
THESL	THC	HR&OE	Fully allocated-cost	0.1%	0.01
THESL	THC	Procurement	Fully allocated-cost	0.2%	0.01
THESL	THC	IT&S	Fully allocated-cost	0.1%	0.01
THESL	THC	Facilities	Fully allocated-cost	0.2%	0.04
THC	THESL	Corporate Stewardship - CEO	Fully allocated-cost	95.0%	2.71
THC	THESL	Corporate Governance - Board of Directors	Fully allocated-cost	90.0%	0.22
THC	THESL	Finance Stewardship - CFO	Fully allocated-cost	95.0%	1.89
THC	THESI	Corporate Governance - Board of Directors	Fully allocated-cost	5.0%	0.01

Year: **2016**

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	0.43	0.43
THESL	THESI	Emergency Calls / Streetlighting Relamping	Market**	0.46	0.38
THESI	THESL	Emergency/Field Work	Market**	2.39	2.07
THESI	THESL	Design	Market**	0.19	0.16

* 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	3.0%	0.480
THESL	THESI	EHS	Fully allocated-cost	0.3%	0.006
THESL	THESI	Legal	Fully allocated-cost	4.6%	0.244
THESL	THESI	HR&OE	Fully allocated-cost	1.2%	0.163
THESL	THESI	Procurement	Fully allocated-cost	1.3%	0.075
THESL	THESI	Billing and Settlement Services	Fully allocated-cost	11.1%	0.049
THESL	THESI	IT&S	Fully allocated-cost	0.3%	0.11
THESL	THESI	Facilities	Fully allocated-cost	0.4%	0.11
THESL	THESU	Finance/Treasury/Insurance	Fully allocated-cost	2.3%	0.369
THESL	THESU	Legal	Fully allocated-cost	1.0%	0.056
THESL	THESU	HR&OE	Fully allocated-cost	2.4%	0.320
THESL	THESU	Procurement	Fully allocated-cost	3.7%	0.212
THESL	THESU	IT&S	Fully allocated-cost	0.7%	0.26
THESL	THESU	Facilities	Fully allocated-cost	2.0%	0.50
THESL	THC	Finance/Treasury/Insurance	Fully allocated-cost	2.5%	0.393
THESL	THC	Legal	Fully allocated-cost	15.4%	0.824
THESL	THC	HR&OE	Fully allocated-cost	0.0%	0.006
THESL	THC	Procurement	Fully allocated-cost	0.3%	0.014
THESL	THC	IT&S	Fully allocated-cost	0.0%	0.01
THESL	THC	Facilities	Fully allocated-cost	0.3%	0.07
THC	THESL	Corporate Stewardship - CEO	Fully allocated-cost	95.0%	1.88
THC	THESL	Corporate Governance - Board of Directors	Fully allocated-cost	90.0%	0.29
THC	THESL	Finance Stewardship - CFO	Fully allocated-cost	95.0%	0.69
THC	THESI	Corporate Governance - Board of Directors	Fully allocated-cost	5.0%	0.02

Year: 2017

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	-	-
THESL	THESI	Emergency Calls / Streetlighting Relamping	Market**	0.33	0.30
THESI	THESL	Emergency/Field Work	Market**	0.21	0.21
THESI	THESL	Design	Market**	0.07	0.07

* 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	2.3%	0.32
THESL	THESI	EHS	Fully allocated-cost	0.3%	0.01
THESL	THESI	Legal	Fully allocated-cost	5.7%	0.33
THESL	THESI	HR&OE	Fully allocated-cost	0.0%	-
THESL	THESI	Procurement	Fully allocated-cost	1.1%	0.04
THESL	THESI	Billing and Settlement Services	Fully allocated-cost	5.0%	0.05
THESL	THESI	IT&S	Fully allocated-cost		-
THESL	THESI	Facilities	Fully allocated-cost		-
THESL	THESU	Finance/Treasury/Insurance	Fully allocated-cost	4.3%	0.61
THESL	THESU	Legal	Fully allocated-cost	1.9%	0.11
THESL	THESU	HR&OE	Fully allocated-cost	1.5%	0.21
THESL	THESU	Procurement	Fully allocated-cost	5.6%	0.21
THESL	THESU	IT&S	Fully allocated-cost	0.6%	0.25
THESL	THESU	Facilities	Fully allocated-cost	2.3%	0.54
THESL	THC	Finance/Treasury/Insurance	Fully allocated-cost	2.6%	0.37
THESL	THC	Legal	Fully allocated-cost	14.0%	0.82
THESL	THC	HR&OE	Fully allocated-cost	0.2%	0.03
THESL	THC	Office of the President	Fully allocated-cost	***	1.70
THESL	THC	Procurement	Fully allocated-cost	0.2%	0.01
THESL	THC	IT&S	Fully allocated-cost	0.03%	0.01
THESL	THC	Facilities	Fully allocated-cost	1.0%	0.22
THC	THESL	Corporate Stewardship - CEO	Fully allocated-cost	95.0%	3.02
THC	THESL	Corporate Governance - Board of Directors	Fully allocated-cost	90.0%	0.27
THC	THESL	Finance Stewardship - CFO	Fully allocated-cost	90.0%	1.47
THC	THESI	Corporate Governance - Board of Directors	Fully allocated-cost	5.0%	0.02

***Based on time allocation of multiple functions across the organization.

Year: **2018**

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	-	-
THESL	THESI	Emergency Calls / Streetlighting Relamping	Market**	0.67	0.57
THESI	THESL	Emergency/Field Work	Market**	-	-
THESI	THESL	Design	Market**	-	-

* 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	2.3%	0.40
THESL	THESI	EHS	Fully allocated-cost	0.3%	0.01
THESL	THESI	Legal	Fully allocated-cost	5.7%	0.32
THESL	THESI	HR&OE	Fully allocated-cost	0.0%	0.14
THESL	THESI	Procurement	Fully allocated-cost	1.1%	0.04
THESL	THESI	Billing and Settlement Services	Fully allocated-cost	5.0%	0.05
THESL	THESI	IT&S	Fully allocated-cost		
THESL	THESI	Facilities	Fully allocated-cost		
THESL	THESU	Finance/Treasury/Insurance	Fully allocated-cost	4.3%	0.35
THESL	THESU	Legal	Fully allocated-cost	1.9%	0.06
THESL	THESU	HR&OE	Fully allocated-cost	1.5%	0.36
THESL	THESU	Procurement	Fully allocated-cost	5.6%	0.13
THESL	THESU	IT&S	Fully allocated-cost	0.6%	0.35
THESL	THESU	Facilities	Fully allocated-cost	2.3%	0.36
THESL	THC	Finance/Treasury/Insurance	Fully allocated-cost	2.6%	1.04
THESL	THC	Legal	Fully allocated-cost	14.0%	0.83
THESL	THC	HR&OE	Fully allocated-cost	0.2%	0.01
THESL	THC	Office of the President	Fully allocated-cost	***	1.70
THESL	THC	Procurement	Fully allocated-cost	0.2%	0.01
THESL	THC	IT&S	Fully allocated-cost	0.03%	0.04
THESL	THC	Facilities	Fully allocated-cost	1.0%	0.23
THC	THESL	Corporate Stewardship - CEO	Fully allocated-cost	95.0%	2.68
THC	THESL	Corporate Governance - Board of Directors	Fully allocated-cost	90.0%	0.36
THC	THESL	Finance Stewardship - CFO	Fully allocated-cost	95.0%	1.29
THC	THESI	Corporate Governance - Board of Directors	Fully allocated-cost	5.0%	0.02

***Based on time allocation of multiple functions across the organization.

Year: **2019**

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	-	-
THESL	THESI	Emergency Calls / Streetlighting Relamping	Market**	0.67	0.57
THESI	THESL	Emergency/Field Work	Market**	-	-
THESI	THESL	Design	Market**	-	-

* 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	2.2%	0.40
THESL	THESI	EHS	Fully allocated-cost	0.3%	0.01
THESL	THESI	Legal	Fully allocated-cost	5.8%	0.32
THESL	THESI	HR&OE	Fully allocated-cost	1.0%	0.13
THESL	THESI	Billing and Settlement Services	Fully allocated-cost	5.3%	0.05
THESL	THESI	Procurement	Fully allocated-cost	1.3%	0.05
THESL	THESI	IT&S	Fully allocated-cost		
THESL	THESI	Facilities	Fully allocated-cost		
THESL	THESU	Finance/Treasury/Insurance	Fully allocated-cost	1.9%	0.35
THESL	THESU	Legal	Fully allocated-cost	1.1%	0.06
THESL	THESU	HR&OE	Fully allocated-cost	2.7%	0.37
THESL	THESU	Procurement	Fully allocated-cost	3.7%	0.13
THESL	THESU	IT&S	Fully allocated-cost	0.8%	0.36
THESL	THESU	Facilities	Fully allocated-cost	1.3%	0.37
THESL	THC	Finance/Treasury/Insurance	Fully allocated-cost	5.9%	1.07
THESL	THC	Legal	Fully allocated-cost	15.4%	0.85
THESL	THC	HR&OE	Fully allocated-cost	0.1%	0.01
THESL	THC	Office of the President	Fully allocated-cost	***	1.70
THESL	THC	Procurement	Fully allocated-cost	0.3%	0.01
THESL	THC	IT&S	Fully allocated-cost	0.03%	0.04
THESL	THC	Facilities	Fully allocated-cost	1.4%	0.24
THC	THESL	Corporate Stewardship - CEO	Fully allocated-cost	95.0%	2.76
THC	THESL	Corporate Governance - Board of Directors	Fully allocated-cost	90.0%	0.36
THC	THESL	Finance Stewardship - CFO	Fully allocated-cost	95.0%	1.32
THC	THESI	Corporate Governance - Board of Directors	Fully allocated-cost	5.0%	0.02

***Based on time allocation of multiple functions across the organization.

Year: **2020**

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	-	-
THESL	THESI	Emergency Calls / Streetlighting Relamping	Market**	0.67	0.57
THESI	THESL	Emergency/Field Work	Market**	-	-
THESI	THESL	Design	Market**	-	-

* 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	2.2%	0.40
THESL	THESI	EHS	Fully allocated-cost	0.3%	0.01
THESL	THESI	Legal	Fully allocated-cost	5.8%	0.33
THESL	THESI	HR&OE	Fully allocated-cost	0.9%	0.13
THESL	THESI	Billing and Settlement Services	Fully allocated-cost	5.4%	0.05
THESL	THESI	Procurement	Fully allocated-cost	1.3%	0.05
THESL	THESI	IT&S	Fully allocated-cost		
THESL	THESI	Facilities	Fully allocated-cost		
THESL	THESU	Finance/Treasury/Insurance	Fully allocated-cost	1.9%	0.35
THESL	THESU	Legal	Fully allocated-cost	1.1%	0.06
THESL	THESU	HR&OE	Fully allocated-cost	2.7%	0.38
THESL	THESU	Procurement	Fully allocated-cost	3.7%	0.13
THESL	THESU	IT&S	Fully allocated-cost	0.8%	0.37
THESL	THESU	Facilities	Fully allocated-cost	3.7%	0.38
THESL	THC	Finance/Treasury/Insurance	Fully allocated-cost	5.6%	1.01
THESL	THC	Legal	Fully allocated-cost	15.4%	0.89
THESL	THC	HR&OE	Fully allocated-cost	0.1%	0.01
THESL	THC	Office of the President	Fully allocated-cost	***	1.70
THESL	THC	Procurement	Fully allocated-cost	0.3%	0.01
THESL	THC	IT&S	Fully allocated-cost	0.03%	0.04
THESL	THC	Facilities	Fully allocated-cost	1.4%	0.24
THC	THESL	Corporate Stewardship - CEO	Fully allocated-cost	95.0%	2.86
THC	THESL	Corporate Governance - Board of Directors	Fully allocated-cost	90.0%	0.36
THC	THESL	Finance Stewardship - CFO	Fully allocated-cost	95.0%	1.35
THC	THESI	Corporate Governance - Board of Directors	Fully allocated-cost	5.0%	0.02

***Based on time allocation of multiple functions across the organization.

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.

2 The above tables include the costs included in Toronto Hydro's OM&A expenses, as per the Filing Requirement reference 2.4.3.2, Shared Services and Corporate Cost Allocation