EB-2018-0165

Toronto Hydro-Electric System Limited
Application for electricity distribution rates beginning January 1, 2020 until December 31, 2024

VECC

COMPENDIUM

PANEL 1

July 4, 2018

TAB 1

OEB Appendix 2-AA
Capital Programs Table

Programs ($M)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS
Customer and Generation Connections	31.7	40.1	21.9	44.0	39.8	42.9	43.9	44.8	45.6	46.3
Externally Initiated Plant Relocations & Expansion	2.2	2.6	2.6	5.0	11.9	11.4	20.8	4.6	4.7	4.5
Generation Protection, Monitoring and Control	-	2.1	0.0	0.6	10.9	3.7	2.3	2.4	2.5	2.7
Load Demand	9.9	16.8	16.2	16.4	23.5	11.3	11.4	18.5	22.6	23.6
Metering	14.5	17.4	24.8	22.0	26.1	22.6	14.8	23.6	30.6	39.2
System Access Total	**58.3**	**79.0**	**65.5**	**88.0**	**112.1**	**91.8**	**93.3**	**93.9**	**106.0**	**116.4**
Area Conversions	46.3	28.2	26.9	34.4	36.0	41.4	47.2	46.3	50.4	35.6
Network System Renewal	10.2	16.8	14.7	18.8	32.2	18.6	19.3	18.5	17.7	18.3
Reactive and Corrective Capital	42.0	54.3	55.5	66.1	63.7	61.2	62.4	63.5	64.4	65.8
Stations Renewal	11.3	11.6	19.0	21.9	22.0	27.5	35.3	29.4	27.0	22.4
Underground Renewal - Downtown	-	-	-	(0.0)	-	15.1	22.5	23.9	30.0	30.6
Underground Renewal - Horseshoe	115.5	80.7	83.1	69.1	55.8	93.0	88.7	90.3	93.1	95.2
Overhead Infrastructure Relocation	0.9	3.1	2.6	0.3	1.6	-	-	-	-	-
SCADAMATE R1 Renewal	3.5	4.9	2.1	1.1	1.9	-	-	-	-	-
PILC Piece Outs & Leakers	6.0	5.7	1.8	0.8	0.1	-	-	-	-	-
Underground Legacy Infrastructure	7.4	9.9	9.0	2.7	6.0	-	-	-	-	-
Overhead System Renewal	61.0	51.0	35.7	30.4	24.8	49.8	50.4	51.3	56.5	57.7
System Renewal Total	**304.1**	**266.1**	**250.3**	**245.5**	**244.2**	**306.6**	**325.7**	**323.1**	**339.0**	**325.5**
Energy Storage Systems	-	-	-	0.1	7.9	1.0	3.7	3.8	1.0	1.0
Network Condition Monitoring and Control	-	-	-	-	-	7.6	10.2	12.6	15.3	17.4
Overhead Momentary Reduction	0.0	-	-	-	0.3	-	-	-	-	-
Stations Expansion	23.0	34.5	59.4	21.0	29.1	19.5	40.0	49.3	12.5	15.2
System Enhancements	7.1	17.2	12.2	9.4	4.0	6.2	6.2	5.6	4.8	4.9
Handwell Upgrades	4.7	0.8	0.8	0.0	-	-	-	-	-	-
Polymer SMD-20 Renewal	3.0	0.3	0.0	0.4	-	-	-	-	-	-
Design Enhancement	0.0	0.6	(0.0)	0.0	0.2	-	-	-	-	-
System Service Total	**37.9**	**53.3**	**72.4**	**31.0**	**41.5**	**34.2**	**60.1**	**71.3**	**33.6**	**38.5**
Facilities Management and Security	15.4	9.0	6.3	1.7	3.5	11.6	11.8	12.1	12.3	12.6
Fleet and Equipment	4.1	3.7	4.7	2.9	3.6	8.6	8.9	8.5	8.7	7.8
IT/OT Systems	28.4	48.6	55.4	53.7	39.3	54.8	55.7	49.5	56.6	64.8
Control Operations Reinforcement	-	-	-	-	-	3.9	17.4	18.9	-	-
Operating Centers Consolidation Plan	31.6	48.3	32.2	-	-	-	-	-	-	-
Program Support	-	0.0	0.4	-	-	-	-	-	-	-
General Plant Total	**79.4**	**109.5**	**98.9**	**58.4**	**46.4**	**78.8**	**93.7**	**89.0**	**77.7**	**85.2**
AFUDC	10.8	12.5	9.8	8.9	4.0	6.0	8.2	8.7	8.9	7.7
Miscellaneous	0.8	(8.8)	0.9	3.8	(5.3)	1.0	0.8	1.2	0.6	1.0
Other Total	**11.6**	**3.7**	**10.7**	**12.7**	**(1.3)**	**7.0**	**9.0**	**9.8**	**9.5**	**8.7**
Subtotal	**491.4**	**511.6**	**497.8**	**435.6**	**443.0**	**518.4**	**581.8**	**587.1**	**565.7**	**574.4**
Less Renewable Generation Facility Assets and Other Non Rate-Regulated Utility Assets (input as negative)	(0.8)	(3.2)	(1.2)	(0.7)	(17.7)	(4.4)	(3.1)	(3.2)	(3.3)	(3.5)
Total	**490.6**	**508.4**	**496.6**	**434.9**	**425.3**	**514.0**	**578.8**	**583.9**	**562.4**	**570.9**

TAB 2

5.11 Emergency Response

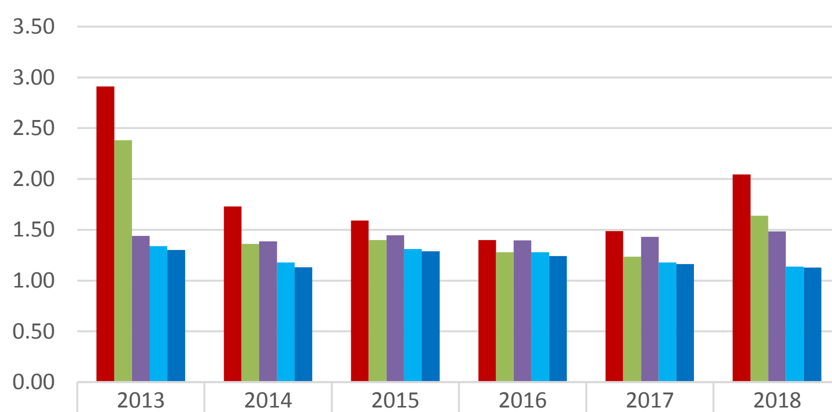
Toronto Hydro's Emergency Response performance decreased in 2018 when compared to the prior year. The 86.63 percent performance in 2018 compares to 93.6 percent in 2017. Over the course of 2018, Toronto Hydro experienced 11 significant weather events as compared to five in 2017. The total number of calls during a number of these events surpassed the number of field resources available for the company to respond within sixty minutes.

5.12 Reconnection Performance Standard

In 2018, Toronto Hydro's reconnection performance standard result was 99.65 percent, which is a slight increase from the 99.38 percent in 2017.

6. RELIABILITY PERFORMANCE

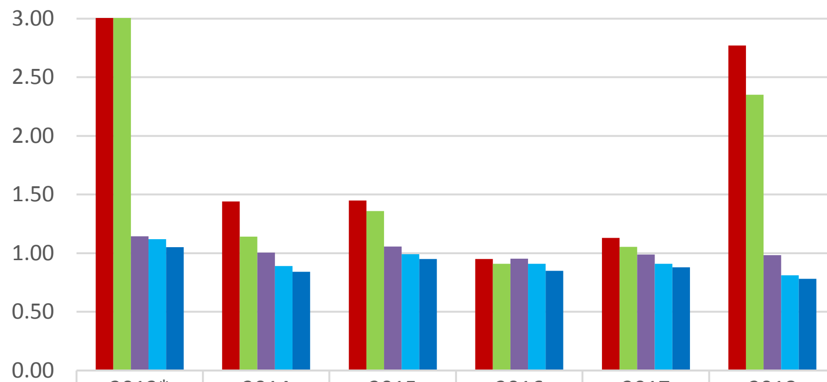
6.1 System Overview



	2013	2014	2015	2016	2017	2018
Total SAIFI	2.91	1.73	1.59	1.40	1.49	2.04
SAIFI Excluding LoS	2.38	1.36	1.40	1.28	1.24	1.64
SAIFI Excluding MED's	1.44	1.39	1.45	1.40	1.43	1.48
SAIFI Excluding MED's and LoS	1.34	1.18	1.31	1.28	1.18	1.14
SAIFI Excluding MED's, LoS and Scheduled Outages	1.30	1.13	1.29	1.24	1.16	1.13

Figure 16: System Level SAIFI

Toronto Hydro's 2018 System Level SAIFI performance decreased relative to 2017. This decrease in performance can be attributed to an increase in adverse weather events and loss of supply events.



	2013*	2014	2015	2016	2017	2018
Total SAIDI	21.07	1.44	1.45	0.95	1.13	2.77
SAIDI Excluding LoS	17.70	1.14	1.36	0.91	1.05	2.35
SAIDI Excluding MED's	1.14	1.00	1.06	0.95	0.99	0.98
SAIDI Excluding MED's and LoS	1.12	0.89	0.99	0.91	0.91	0.81
SAIDI Excluding MED's, LoS and Scheduled Outages	1.05	0.84	0.95	0.85	0.88	0.78

* 2013 Values cut off above the chart due to the high SAIFI and SAIDI values prior to excluding MEDs.

Figure 17: System Level SAIDI

Toronto Hydro's 2018 System Level SAIDI performance decreased relative to 2017. This decrease in performance can be attributed to an increase in adverse weather events and loss of supply events.

Climate change is a significant factor influencing Toronto Hydro's planning and operations. By the year 2050, Toronto's climate is forecast to be significantly different than the already changing climate seen today. For example, in Toronto, daily maximum temperatures over 25°C are expected to occur 106 times per year as opposed to 66 times per year currently. Daily maximum temperatures over 40°C, which have historically been an anomaly, are projected to occur up to seven times per year by 2050.[3] A warmer climate will also allow the atmosphere to hold more moisture, which is expected to lead to more frequent and severe extreme weather events such as ice storms and extreme rainfall events. These extreme events can cause major disruptions to Toronto Hydro's distribution system.

Not only are these weather conditions projected to occur more frequently and with greater severity in the future due to climate change, but trends from the past 20 years suggest that these changes are already affecting the system. Figure 4 below depicts cumulative rainfall and the number of high wind days in Toronto over the past 20 years. With respect to rainfall, seven of the 10 highest rain fall years have occurred in the last 10 years. Similarly, six of the 10 years with the greatest number of days of wind gusts above 70 kilometres per hour have also occurred in the last 10 years.

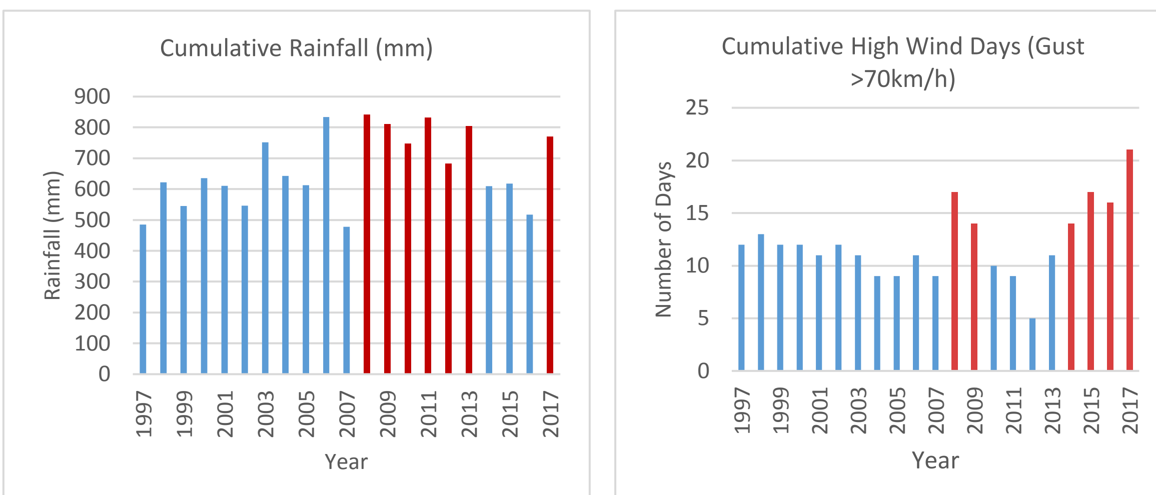


Figure 4: Cumulative Rainfall (left) and Number of High Wind Days (right) in Toronto[4]

[3] See Appendix D to Section D – Toronto Hydro-Electric System Limited Climate Change Vulnerability Assessment by AECOM (June 2015)

[4] Weather data compiled using Toronto Lester B. Pearson INTL A for January 1997 to June 2013 and Toronto INTL A for July 2013 to December 2017. Available from: Government of Canada, Weather, Climate and Hazard Historical Data online: <http://climate.weather.gc.ca/historical_data/search_historic_data_e.html>

not feasible. Restoration methods that utilities, specialized companies, and manufacturers have developed in this field were reviewed in order to restore the network as quickly and efficiently as possible. Evaluations and trials of the proposed methods will be investigated and tested prior to being implemented as a standard practice.

The following 2020-2024 program activities will contribute to Toronto Hydro's ongoing efforts to renew and enhance its system to increase resiliency to changes in the weather and climate, thereby supporting the continued delivery of outcomes expected by existing and future customers:

- As assets are replaced in the Overhead System Renewal program (Exhibit 2B, Section E6.5), Toronto Hydro will install taller poles with armless construction and tree-proof wire to reduce vegetation contact risks.
- Stainless steel submersible transformers will replace existing units as the utility carries out its Underground System Renewal – Horseshoe program (Exhibit 2B, Section E6.2).
- Underground System Renewal – Horseshoe program will also replace air-vented padmounted switches with SF_6 sealed-type padmounted switches to mitigate risk of failure due to ingress of dirt and road contaminants on the live surface.
- The Network System Renewal program (Exhibit 2B, Section E6.4) will replace non-submersible automatic transfer switches and remote power breakers with submersible equipment to tolerate flooding.
- The Network System Renewal program will also replace other end-of-life and deteriorated non-submersible protectors with submersible protectors to protect against flooding.
- The Network Condition Monitoring & Control program (Exhibit 2B, Section E7.3) will help the utility detect flooding in network vaults before it damages equipment.
- The Network Circuit Reconfiguration segment under the Network System Renewal program (Exhibit 2B, Section E6.4) will help the utility improve system restoration capabilities in the event of outages.
- Installation of flood mitigation systems at stations identified as being vulnerable to flooding will occur under the Stations Renewal program (Exhibit 2B, Section E6.6).
- New switchgear installed in the Stations Renewal or Station Expansion (Exhibit 2B, Section E6.6 and E7.4) programs will be specified to mitigate flood risk where appropriate (e.g. installing air-tight SF_6 switchgear or other engineered solutions).

One example is the City of Toronto's climate change action plan and long-term vision. A key pillar of this plan is *TransformTO*,[7] which identifies how the City plans to reduce greenhouse gas emissions, improve health, grow the economy, and improve social equity. One of the major commitments of this plan is for 100 percent of vehicles in Toronto to use low-carbon energy by 2050. As part of achieving this goal, the Toronto Transit Commission ("TTC") is planning to convert its fleet of busses from diesel hybrid to electric, which will require upgrades to the distribution feeders supplying the TTC's Arrow Road Garage.[8]

Provincial and federal policy targeting greenhouse gas reductions is also a driver of technological change. Provincial energy policy actively supports and incentivizes the connection of renewable energy projects to the local distribution system. As of the end of 2017, Toronto Hydro has connected 1,750 renewable energy projects to its system, totaling 97 MW of generation capacity. As discussed in Section E3, Toronto Hydro anticipates steady growth in generation connections going forward and is planning to invest in necessary renewable enabling improvements, including monitoring and control technologies, and energy storage systems to facilitate this growth during the 2020-2024 period.

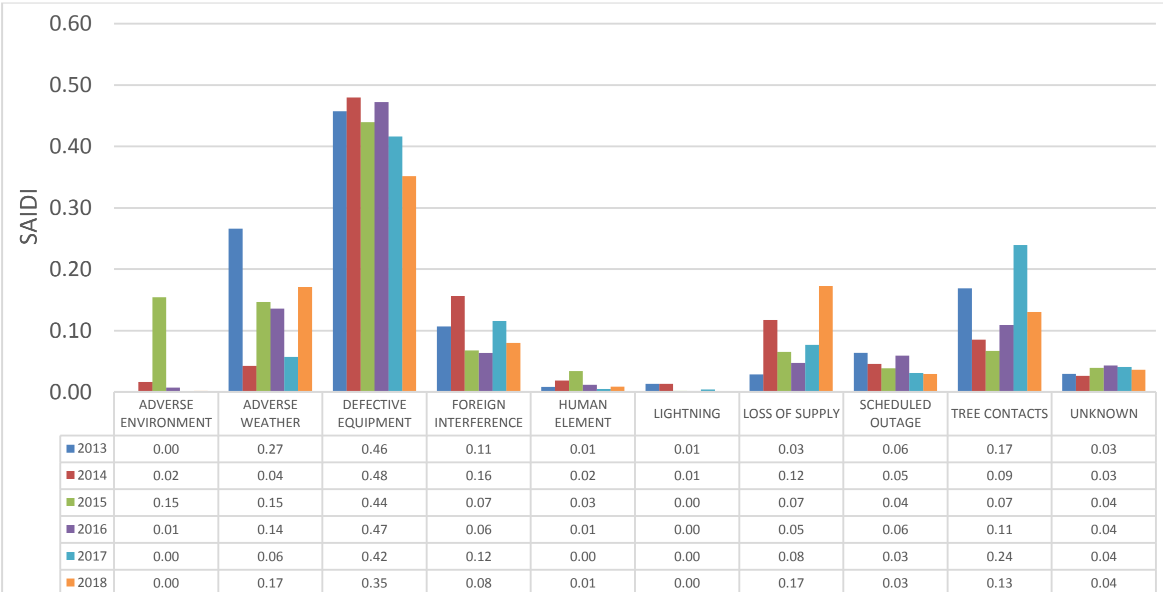
D2.2 System Demographics and Characteristics

Toronto Hydro's distribution system consists of a mix of overhead, underground, network, and stations infrastructure. This infrastructure operates at voltages of 27.6 kV, 13.8 kV, and 4.16 kV, and includes approximately 60,000 distribution transformers, 17,000 primary switches, 15,000 kilometres of overhead conductors, and 13,000 kilometres of underground cables as of 2017. Unless otherwise mentioned, asset demographic information provided herein is as of 2017.

The following sections provide details on these sub-systems and how each sub-system relates to Toronto Hydro's major asset management objectives. As discussed in Exhibit 2B, Section D3, Toronto Hydro manages its distribution infrastructure and plans capital investments and maintenance to achieve asset management objectives, specifically, the attainment of applicable outcomes. For further details on forecasted asset management measures for the 2020-2024 period, please see Exhibit 2B, Section C1.5.

[7] City of Toronto, TransformTO, (2017), online: <https://www.toronto.ca/services-payments/water-environment/environmentally-friendly-city-initiatives/transformto>. ["TransformTO"].
[8] See Section E

TAB 3



	ADVERSE ENVIRONMENT	ADVERSE WEATHER	DEFECTIVE EQUIPMENT	FOREIGN INTERFERENCE	HUMAN ELEMENT	LIGHTNING	LOSS OF SUPPLY	SCHEDULED OUTAGE	TREE CONTACTS	UNKNOWN
2013	0.00	0.27	0.46	0.11	0.01	0.01	0.03	0.06	0.17	0.03
2014	0.02	0.04	0.48	0.16	0.02	0.01	0.12	0.05	0.09	0.03
2015	0.15	0.15	0.44	0.07	0.03	0.00	0.07	0.04	0.07	0.04
2016	0.01	0.14	0.47	0.06	0.01	0.00	0.05	0.06	0.11	0.04
2017	0.00	0.06	0.42	0.12	0.00	0.00	0.08	0.03	0.24	0.04
2018	0.00	0.17	0.35	0.08	0.01	0.00	0.17	0.03	0.13	0.04

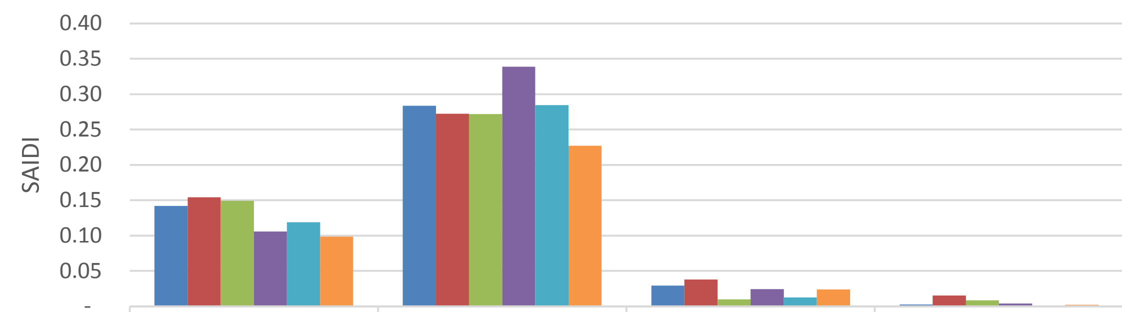
Figure 27: SAIDI Cause Code Breakdown (Excluding MEDs)

6.7 Weather Impacts

Figures 28 and 29 below illustrate the cumulative weather reliability impacts on the system. Of note is the continuing impact of weather on Toronto Hydro's SAIDI and SAIFI performance.

	2013	2014	2015	2016	2017	2018
SAIFI	0.38	0.21	0.19	0.24	0.26	0.27

Figure 28: Weather Impacts to SAIFI

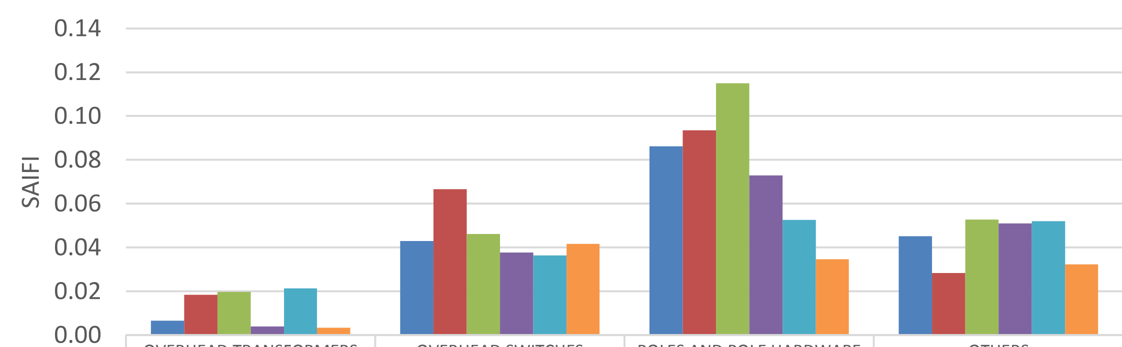


	OVERHEAD EQUIPMENT	UNDERGROUND EQUIPMENT	STATION EQUIPMENT	OTHERS
2013	0.14	0.28	0.03	0.00
2014	0.15	0.27	0.04	0.02
2015	0.15	0.27	0.01	0.01
2016	0.11	0.34	0.02	0.00
2017	0.12	0.28	0.01	0.00
2018	0.10	0.23	0.02	0.00

Figure 35: Defective Equipment SAIDI

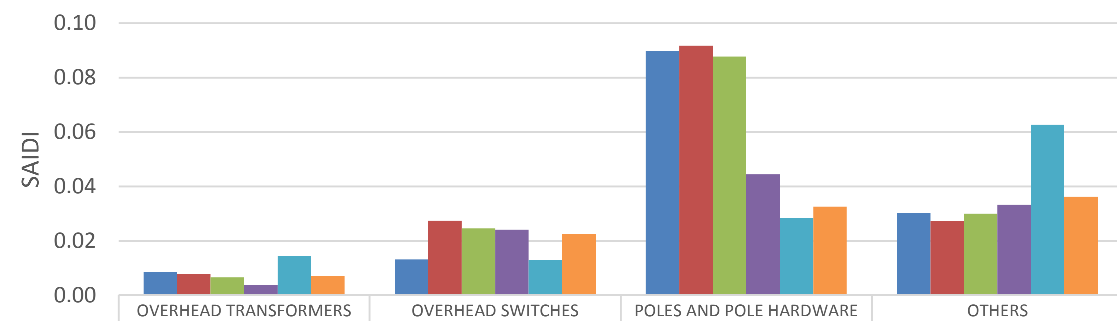
6.10.1 Overhead Defective Equipment

Figures 36 and 37 illustrate the trend of stable or improving outcomes continuing under most of the categories of Overhead Defective Equipment.



	OVERHEAD TRANSFORMERS	OVERHEAD SWITCHES	POLES AND POLE HARDWARE	OTHERS
2013	0.01	0.04	0.09	0.05
2014	0.02	0.07	0.09	0.03
2015	0.02	0.05	0.12	0.05
2016	0.00	0.04	0.07	0.05
2017	0.02	0.04	0.05	0.05
2018	0.00	0.04	0.03	0.03

Figure 36: Defective Equipment SAIFI – Overhead

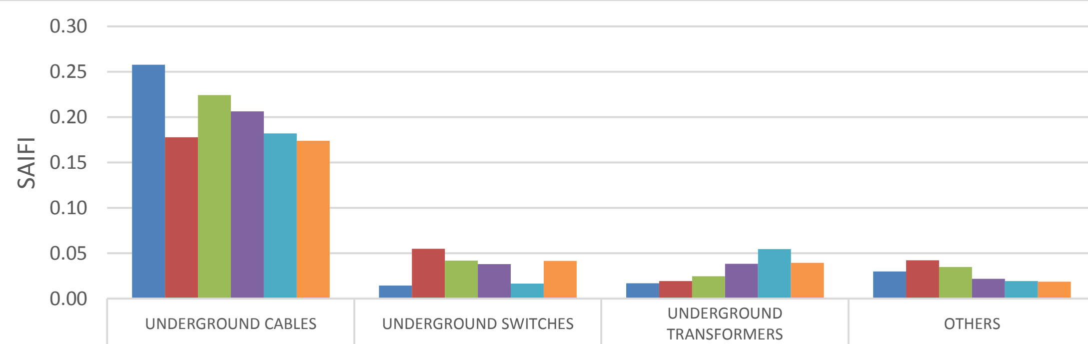


	OVERHEAD TRANSFORMERS	OVERHEAD SWITCHES	POLES AND POLE HARDWARE	OTHERS
2013	0.01	0.01	0.09	0.03
2014	0.01	0.03	0.09	0.03
2015	0.01	0.02	0.09	0.03
2016	0.00	0.02	0.04	0.03
2017	0.01	0.01	0.03	0.06
2018	0.01	0.02	0.03	0.04

Figure 37: Defective Equipment SAIDI – Overhead

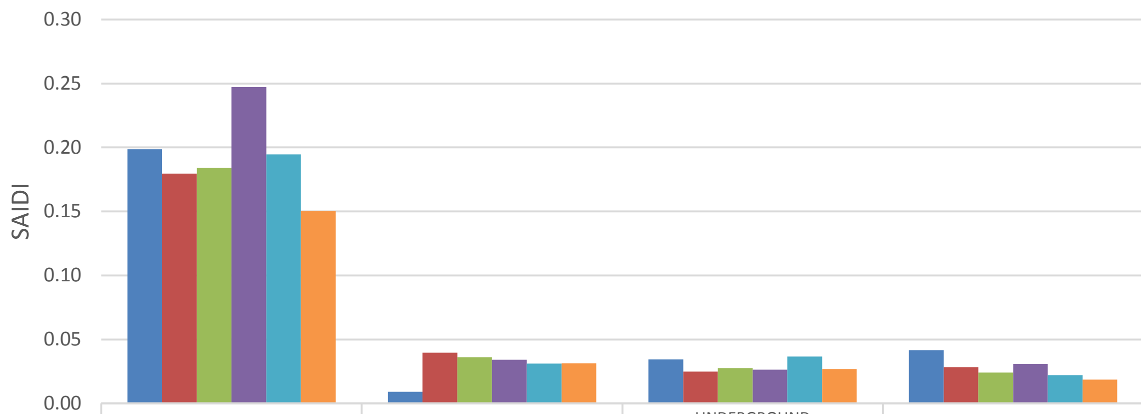
6.10.2 Underground Defective Equipment

Figures 38 and 39, the cause codes for Underground Defective Equipment, illustrate the continuing stable or improving outcomes across all categories, with the exception of underground transformers, which have demonstrated a slight worsening trend in SAIFI.



	UNDERGROUND CABLES	UNDERGROUND SWITCHES	UNDERGROUND TRANSFORMERS	OTHERS
2013	0.26	0.01	0.02	0.03
2014	0.18	0.05	0.02	0.04
2015	0.22	0.04	0.02	0.03
2016	0.21	0.04	0.04	0.02
2017	0.18	0.02	0.05	0.02
2018	0.17	0.04	0.04	0.02

Figure 38: Defective Equipment SAIFI – Underground



	UNDERGROUND CABLES	UNDERGROUND SWITCHES	UNDERGROUND TRANSFORMERS	OTHERS
2013	0.20	0.01	0.03	0.04
2014	0.18	0.04	0.02	0.03
2015	0.18	0.04	0.03	0.02
2016	0.25	0.03	0.03	0.03
2017	0.19	0.03	0.04	0.02
2018	0.15	0.03	0.03	0.02

Figure 39: Defective Equipment SAIDI – Underground

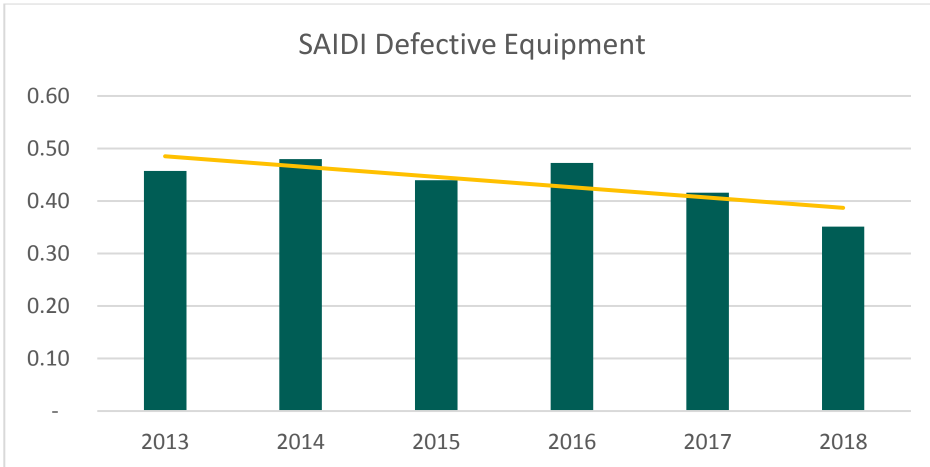


Figure 5: SAIDI (Defective Equipment) Performance 2013-2018

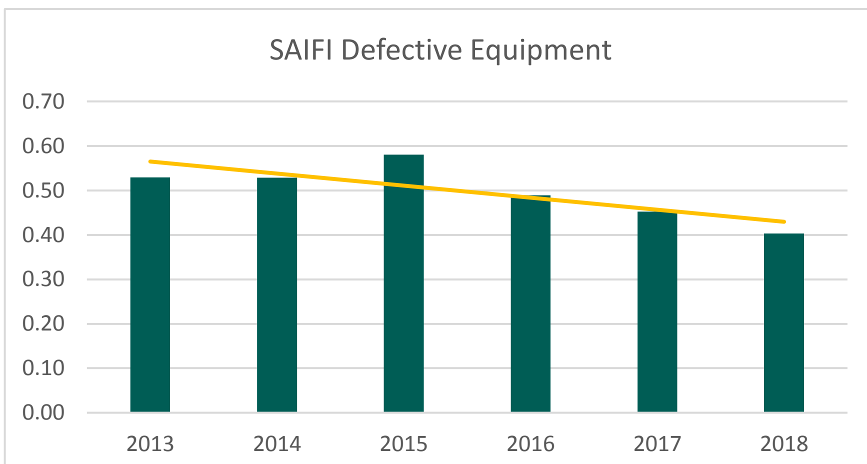


Figure 6: SAIFI (Defective Equipment) Performance 2013-2018

3.3.2 Feeders Experiencing Sustained Interruptions (FESI-7/6) - Worst Performing Feeders

FESI-7 System and FESI-6 Large Customer measures track the performance of feeders that experience the highest number of outages.[3] Between 2013 and 2018, FESI-7 System and

[3] These measures exclude interruptions caused by Major Event Days, Loss of Supply, scheduled outages, station bus-level interruptions and on the secondary side of the distribution transformer (e.g. on service wires or secondary bus).

TAB 4

RESPONSES TO SCHOOL ENERGY COALITION INTERROGATORIES

INTERROGATORY 105:

Reference(s): Evidence Overview Presentation, p. 15

a) Please expand the SAIFI chart to include (a) 2018 data, and b) forecast 2019 to 2022 SAIFI levels.

b) Please provide a similar chart as requested in part (a) for SAIDI.

c) Please provide a table showing numerical values for the charts requested in parts (a) and (b).

RESPONSE:

a) Please see the chart below with a projection for 2019-2024.

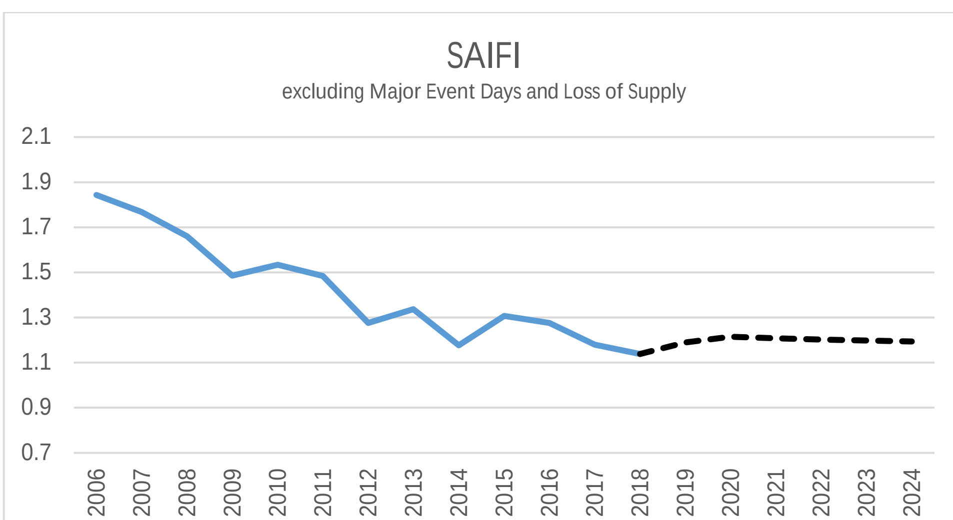


Figure 1: SAIFI Projections for 2019-2024 (excluding MED and LoS)

b) Please see the chart below with a projection for 2019-2024.

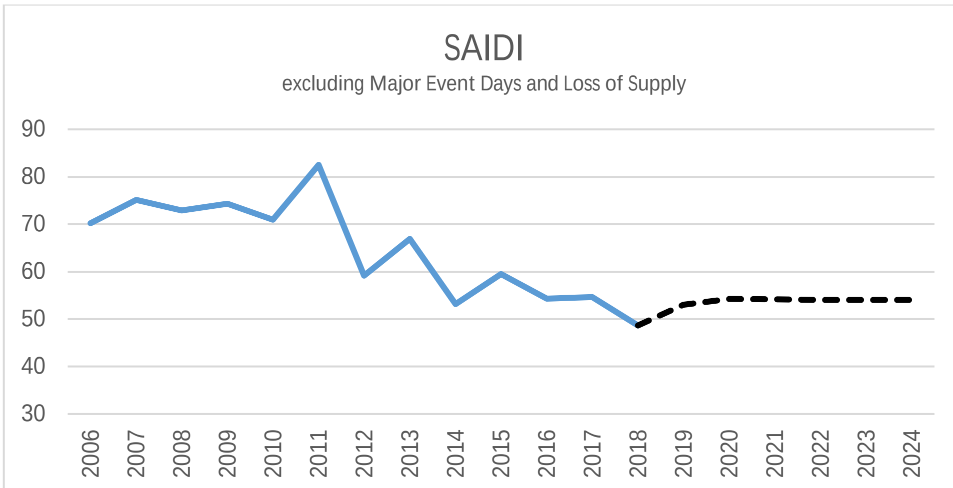


Figure 2: SAIDI Projections for 2019-2024 (excluding MED and LoS)

c) Please see Table 1. Please note that:

1. 2018 performance is considered to be an outlier due to performance in some cause codes (e.g. Lightning and Scheduled Outages for SAIFI) and the exclusion of five major event days (i.e. 1.4 percent of the year) from the statistics.

2. The projections reflect expected trends for performance and are not intended to be targets. Toronto Hydro's experience has been that due to considerable volatility from one year to the next with specific cause codes – including Tree Contacts, Adverse Weather, Foreign Interference, Human Element, and Unknown – it is very likely that actual performance will fall within a broader band than illustrated by the charts in part (a) and (b). For example, volatility experienced between 2015 and 2018 suggests that performance may vary by as much as, or more than, 10 percent from one year to the next. Please see

TAB 5

5. SERVICE QUALITY PERFORMANCE

As stated in Exhibit 1B, Tab 2, Schedule 3, Toronto Hydro monitors and reports its performance results for the Electricity Service Quality Requirements ("ESQRs") in accordance with the OEB's Reporting and Record-keeping Requirements ("RRR"). This section provides the reported Service Quality Requirements for the last six years (2013 - 2018).

Table 3: Summary of Toronto Hydro's ESQR Performance

ESQR	OEB Standard	Avg. 2014-2018	2013	2014	2015	2016	2017	2018
Connection of New Services-Low Voltage ("LV")	90	96.8	94.2	91.5	96.9	97.7	98.3	99.8
Connection of New Service-High Voltage ("HV")	90	99.7	100.0	100.0	100.0	100.0	98.4	100.0
Micro Embedded Generation Facilities	90	98.5	100.0	100.0	100.0	100.0	92.4	100.0
Appointment Scheduling	90	84.2	96.6	96.2	89.0	72.0	81.8	82.4
Appointment Met	90	99.7	99.6	99.8	99.9	99.5	99.4	99.7
Rescheduling a Missed Appointment	100	98.9	98.4	94.6	100.0	100.0	100.0	100.0
Telephone Accessibility	65	74.3	82.0	71.9	76.8	64.7	77.9	80.2
Telephone Call Abandon Rate	10	1.9	1.2	1.7	1.6	3.1	1.9	1.4
Written Response to Enquires	80	94.7	98.9	85.8	97.5	93.1	99.0	98.30
Billing Accuracy	98	98.3	NA	96.6	97.5	98.9	99.2	99.3
Emergency Response (Urban)	80	90.3	74.4	92.0	87.2	91.8	93.6	88.6
Reconnection Performance Standard	85	99.8	100.0	100.0	100.0	99.7	99.4	99.7

7. 2018 CORPORATE SCORECARD UPDATE

In response to interrogatories 1B-SEC-8 and 4A-AMPCO-96, Toronto Hydro committed to providing the 2018 Corporate Scorecard. Table 5 below is the 2018 Corporate Scorecard updated to include 2018 results.

Table 5: 2018 Corporate Scorecard

<table>
<tr><th>Key Performance Indicator</th><th colspan="2">2018 Target</th><th>2018 Result</th></tr>
<tr><td>New Services Connected on Time</td><td colspan="2">96.5%</td><td>99.8%</td></tr>
<tr><td>Bill Accuracy</td><td colspan="2">98.8%</td><td>99.3%</td></tr>
<tr><td>First Contact Resolution</td><td colspan="2">86%</td><td>89%</td></tr>
<tr><td>Total Recordable Injury Frequency (TRIF)</td><td colspan="2">1.45</td><td>0.83</td></tr>
<tr><td>Employee Engagement</td><td colspan="2">6.0</td><td>7.1</td></tr>
<tr><td>SAIFI (# - Defective Equipment Only)</td><td colspan="2">0.54</td><td>0.40</td></tr>
<tr><td>SAIDI (Minutes - Defective Equipment Only)</td><td colspan="2">29.00</td><td>21.08</td></tr>
<tr><td rowspan="2">1-Year Distribution System Plan Investment ($M)</td><td>Lower Target</td><td>Upper Target</td><td rowspan="2">435.8</td></tr>
<tr><td>418.0</td><td>451.0</td></tr>
<tr><td rowspan="2">5-Year CIR Distribution System Plan Investment ($M)</td><td>Lower Target</td><td>Upper Target</td><td rowspan="2">1943.8</td></tr>
<tr><td>1928.0</td><td>1957.2</td></tr>
<tr><td>Consolidated Net Income ($M)</td><td colspan="2">148.0</td><td>167.3</td></tr>
</table>

TAB 6

Ontario Energy Board
Commission de l'énergie de l'Ontario

DECISION AND ORDER

EB-2014-0116

TORONTO HYDRO-ELECTRIC SYSTEM LIMITED

Application for electricity distribution rates effective from May 1, 2015 and for each following year effective January 1 through to December 31, 2019

BEFORE: Christine Long
Presiding Member

Ken Quesnelle
Vice Chair and Member

Cathy Spoel
Member

December 29, 2015

Findings

Toronto Hydro's rate framework proposal incorporates features that are aligned with the RRFE's objectives. Toronto Hydro will be incented to achieve improved performance over the life of the plan. Its "C factor" method of funding its capital plan is intended to correspond to its capital program execution over the life of the plan and is a customized solution to its business needs. The OEB has determined that Toronto Hydro's rates will be set on a 5 year Custom IR basis. The OEB accepts that Toronto Hydro's rate framework is structured so as to support the achievement of RRFE objectives but, as discussed later in the Decision, finds that Toronto Hydro's evidence does not fully support its proposed spending levels.

The OEB has determined that it cannot fully rely on Toronto Hydro's approach to establishing its spending proposals in determining if the outcome of that spending is desirable for ratepayers. It is not clear that Toronto Hydro's proposals are necessarily aligned with the interests of its customers, as they are largely supported by an asset condition analysis rather than the impact of the proposed work on the reliability of the system. The approach used by Toronto Hydro does not give a clear indication of how the overall spending is related to customer experience such as reliability.

The Application lacks evidence of corporate policy guiding Toronto Hydro staff to focus on impacts on customers when developing spending proposals. The focus overall is on the need for work based on asset condition assessment without a clear understanding of the results expected to be achieved through the work. Continuous improvement measurements are lacking, as discussed in the section of the Decision dealing with reporting requirements.

There does not appear to be any measurement of units of activity and their costs that would allow for year over year assessment of improvement in Toronto Hydro's proposed metrics. The OEB agrees with the parties which suggested that reporting measures such as specific performance improvements sought and achieved per asset class, tie-ins of capital program spending to the dollar value of OM&A savings achieved and how program spending specifically impacts the reliability and quality of service are desirable under the RRFE. However, as the RRFE is relatively new, the OEB does not expect all such measures to be implemented at once.

Toronto Hydro does not monitor whether or not it has optimized the manner in which it tenders the work but instead relies heavily on the fact that it goes to market to perform over 80%[2] of its work. It has no comparisons of a holistic project RFP approach versus

[2] Argument In Chief Compendium Tab 1 Table of Contents, p.1 and discussed in Transcript, Volume 4, p. 87 L23 to p.88 L17,

TAB 7

inspection forms, is continuously improving its asset condition inspection data, the utility nonetheless needs to be able to have a maximally comprehensive view of the condition of its assets based on available data.

d. Decision to Adopt a New ACA Approach

Toronto Hydro continuously seeks opportunities to improve its analytical capabilities and to progress towards best-in-class asset management practices. Due to the limitations discussed above, Toronto Hydro decided in 2016 to take the next step with its ACA by moving to a new methodology. The need to prioritize ACA enhancements was further underscored by the increasing regulatory emphasis on the link between asset condition, probability of failure, and longer-term system investment needs as expressed in five-year utility system plans. The following section discusses Toronto Hydro's selection of the CNAIM and the benefits of that model.

3. Selection of CNAIM for ACA

Toronto Hydro reviewed the ACA methodologies used in Ontario and confirmed that utilities continue to rely mainly on the weighted arithmetic summation methodology, with slight variations in approach. Looking outside of Ontario, Toronto Hydro ultimately gravitated to the CNAIM used by the Office of Gas and Electricity Markets ("Ofgem") and the United Kingdom's distribution network operators. This methodology was developed collaboratively by the network operators regulated by Ofgem and other industry experts, and benefited from the sponsorship and guidance of Ofgem. The methodology was submitted to Ofgem for initial approval in July 2015 and was further refined following public consultation. In February 2016, Ofgem approved the model and directed all network operators to use CNAIM in the 2015-2023 rate-setting period. Additional refinements and enhancements have occurred since this time.

Ofgem describes CNAIM as "a common framework of definitions, principles and calculation methodologies […] for the assessment, forecasting and regulatory reporting of Asset Risk."1 Toronto Hydro took particular interest in this model specifically because it was developed collaboratively by large, mature and heavily urbanized utilities, in consultation with their regulator and the public, in an advanced performance-based regulatory jurisdiction with an even longer rate-setting period than that of Ontario. The methodology's ability to support rigorous assessment of condition-based probability of failure over an eight-year horizon was appealing to Toronto Hydro for a number of reasons, including the Ontario Energy Board's increasing emphasis on similar evaluation frameworks and principles as a means of supporting Renewed Regulatory Framework objectives and outcomes.

[1] Ofgem. (2017, January 30). *DNO Common Network Asset Indices Methodology Version 1.1.* Online https://www.ofgem.gov.uk/system/files/docs/2017/05/dno_common_network_asset_indices_methodology_v1.1.pdf

The primary benefits of CNAIM with respect to assessing asset health and probability of failure are expected to be as follows:

i. a robust scoring methodology that emphasizes deficiencies which directly impact equipment failure;
ii. fewer asset exclusions due to data availability;
iii. a stronger and more objective relationship between condition and probability of failure; and
iv. the ability to project future asset health scores, providing strategic insight into longer-term investment strategies using forecasted HI demographics.

To date, Toronto Hydro has implemented the aspects of CNAIM necessary to immediately achieve the benefits described in items (i), (ii) and (iv) above. For item (iii), Toronto Hydro is currently in the process of developing the formulas required to convert an HI score produced by CNAIM into a probability of failure.

Asset health and probability of failure are only one part of the CNAIM. The full methodology also addresses consequences of failure and asset criticality. This includes a common methodology for assigning monetized risk values to assets based on consequences of failure – a concept that is analogous to the avoided risk cost methodology in Toronto Hydro's existing Feeder Investment Model ("FIM").

Toronto Hydro's immediate objective in moving to CNAIM was to replace the functionality of the previous ACA, which did not include a consequence of failure or asset criticality component. Going forward, in addition to developing the incremental capability to convert an HI score to probability of failure, Toronto Hydro intends to explore the consequence of failure and criticality aspects of CNAIM. It will also examine opportunities to derive additional value from the existing FIM by connecting it with, or subsuming it within, the CNAIM approach to asset risk evaluation.

The following section describes Toronto Hydro's implementation of the CNAIM to date.

4. Toronto Hydro's Implementation of CNAIM

a. Formulation of ACA

1. Formulas

To date, Toronto Hydro's implementation of CNAIM has covered the derivation of current and future health calculations. Using the CNAIM framework, the current health of an asset is represented by a health score using a continuous scale between 0.5 and 10 (extended up to 15 for forecasting of future health), where 0.5 represents the condition expected of a new asset. A health score of 5.5 represents the point in

RESPONSES TO ASSOCIATION OF MAJOR POWER CONSUMERS IN ONTARIO INTERROGATORIES

INTERROGATORY 39:

Reference(s): Exhibit 2B, Section D, Appendix C, p. 2

a) Please provide a copy or link to the reference materials utilized by THESL to implement the Common Networks Asset Indices Methodology (CNAIM).

b) Page 2: Please define "remaining serviceable life of physical assets".

c) Page 2: THESL indicates it uses condition information to support tactical and strategic investment planning decisions.

Please discuss if and how THESL utilizes maintenance records to support tactical and strategic investment planning decisions.

RESPONSE:

a) Please use the link below for the DNO Common Network Asset Indices Methodology: https://www.ofgem.gov.uk/system/files/docs/2017/05/dno_common_network_asset_indices_methodology_v1.1.pdf

b) Remaining serviceable life is not a technical term. It was used to describe the period where an asset progresses from its current state to one where the asset is deemed to require intervention. The ACA methodology has a forecasting module which is used to predict the future health score of an asset. The time taken for an asset to progress to

c) Please summarize the other information used in the CNAIM to prioritize assets for tactical intervention in the short to medium term.

d) With respect to Ref #2, please explain why the previous ACA methodology did not provide a precise analytical basis for assessing asset risk and more precise replacement needs based on condition.

e) Please explain further how the CNAIM methodology provides a more precise analytical basis for assessing asset risk and more precise replacement needs based on condition.

RESPONSE:

a) The new ACA methodology based on the CNAIM Algorithm is a more mature and advanced methodology which emphasizes deficiencies that directly impact equipment failure. Therefore, Toronto Hydro can place more confidence in the analytical results it provides when compared to the previous ACA methodology (weighted arithmetic mean algorithm). As with any analytical tool or process, engineering judgement plays a role, to ensure that decisions being recommended by these tools are efficient and effective at the time of execution.

b) Toronto Hydro uses a systematic approach which includes various tools and processes to identify and develop investment programs and projects. For an explanation of Toronto Hydro's Asset Management Process, please refer to Exhibit 2B, Section D1. As stated in part a), engineering judgement will play a role throughout the process, in order to ensure that the decisions being made are efficient and effective. For more details on the systematic process of identifying investment opportunities within the distribution system, please refer to Toronto Hydro's response to interrogatory 2B-Staff-67 (e).

c) To clarify, "other information" mentioned in Exhibit 2B, Section D, Appendix C, Page 2, Line 23 is meant to refer to information that is outside of the CNAIM methodology. This information includes the various tools mentioned in Exhibit 2B, Section D3 to prioritise assets for tactical intervention in the short to medium term.

d) The old ACA algorithm had a number of limitations which are mentioned in Exhibit 2B, Section D, Appendix C, pages 3- 5. The most important issue was masking of critical conditions that lead to total asset failure by all other benign condition attributes.

e) Please refer to Exhibit 2B, section D, Appendix C, pages 6-7 for how the CNAIM methodology provides a more precise analytical basis for assessing asset risk and more precise replacement needs based on condition.

DNO COMMON NETWORK ASSET INDICES METHODOLOGY

30/01/2017

Health & Criticality - Version 1.1

A common framework of definitions, principles and calculation methodologies, adopted across all GB Distribution Network Operators, for the assessment, forecasting and regulatory reporting of Asset Risk.

Contents

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6. PROBABILITY OF FAILURE

6.1 PoF Calculation (General)

6.1.1 Overview

The Health Index (HI) is derived from the Health Score and PoF. The PoF of an asset is a function of the asset's Health Score, with the Health Score being a function of Normal Expected Life, location, duty, reliability, observed condition and measured condition.

For the majority of assets a single Health Score is calculated, which is then converted into a PoF. However for EHV and 132kV Transformers and steel Towers it is necessary to calculate a Health Score for each component and then combine these into an overall Health Score. These multi-component assets are special cases which are covered in more detail in Sections 6.2 and 6.3. Figure 5 shows the process to be followed in order to calculate the PoF of an asset (or component):-

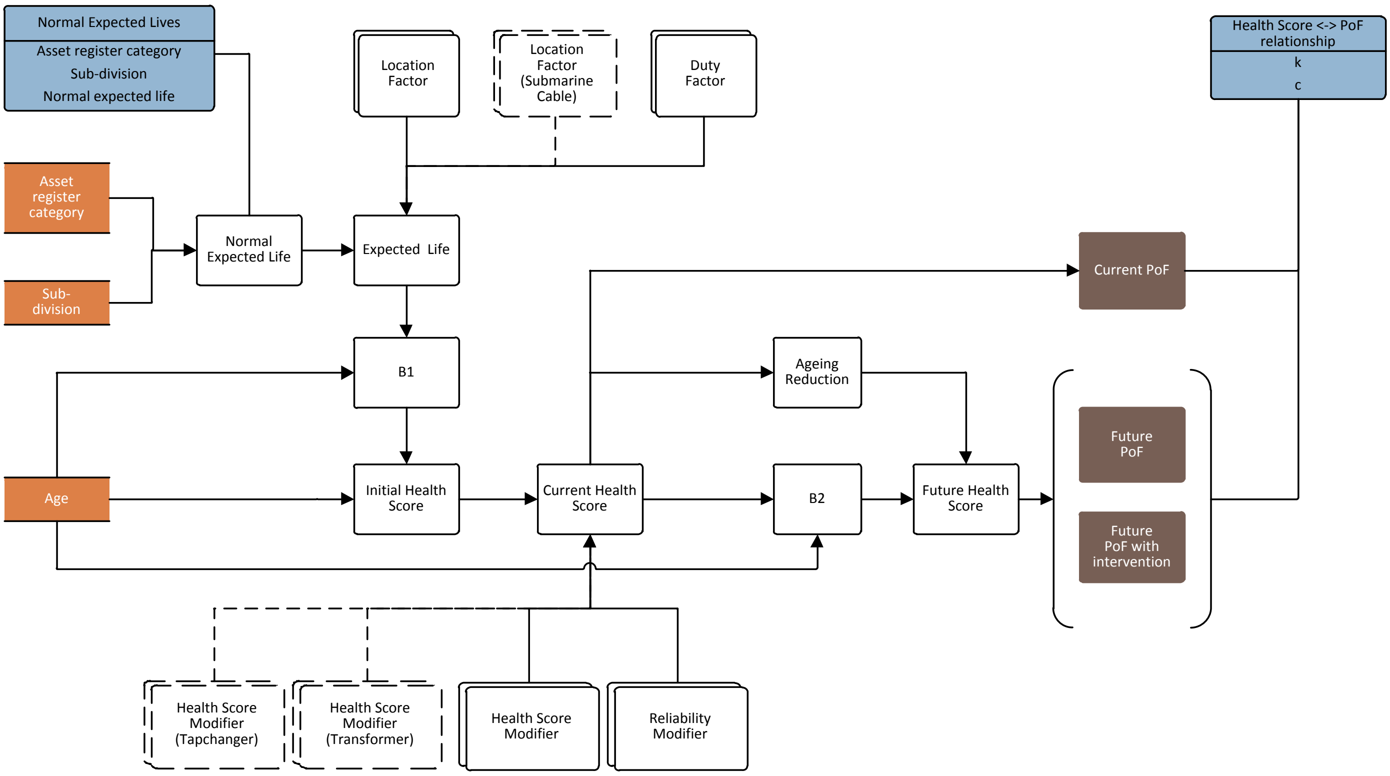

FIGURE 5: PROBABILITY OF FAILURE

The PoF per annum shall be calculated using the cubic curve shown in Eq. 1. This is based on the first three terms of the Taylor series for an exponential function. This implementation has the benefit of being able to describe a situation where the PoF rises more rapidly as asset health degrades, but at a more controlled rate than a full exponential function would describe.

$$\mathrm{PoF} = \mathrm{K} \times \left[1 + (\mathrm{C} \times \mathrm{H}) + \frac{(\mathrm{C} \times \mathrm{H})^2}{2!} + \frac{(\mathrm{C} \times \mathrm{H})^3}{3!}\right] \qquad \text{(Eq. 1)}$$

Where:

To electricity distribution
companies and other interested
parties

Direct Dial: 020 3263 9839
Email: Kiran.Turner@ofgem.gov.uk

Date: 2 May 2017

Decision to approve modifications to the Common Network Asset Indices Methodology v1.1

On 3 February 2017, the distribution network operators (DNOs) consulted upon modifications to the Common Network Asset Indices Methodology ('Common Methodology')[1]. On 20 April 2017, the DNOs submitted the revised Common Methodology to Ofgem for approval. We have decided to approve these changes and this letter explains the reasons for our decision.

1. Background

As part of the RIIO-ED1 price control review, DNOs provided forecasts of their asset health and criticality positions 'with intervention' and 'without intervention'. We used these to create secondary deliverable targets[2], setting out the required improvements in asset health, criticality and monetised risk.

SLC 51 of the Licence requires the DNOs to have a Common Methodology for asset health, criticality and monetised risk. The DNOs have worked together to develop the Common Methodology and following a series of consultations, we approved v1.0 on 21 October 2016[3].

During the rebasing of the Network Asset Secondary Deliverables (NASD) targets, the DNOs identified changes to the Common Methodology v1.0 to address the overstatement of the perceived risk for specific asset categories. The DNOs consulted on the Common Methodology v1.1 on the Energy Networks Association (ENA) website from 3 February 2017 to 3 March 2017[4]. One respondent considered that they were unable to properly respond on the basis that there was insufficient detail provided. Therefore, the DNOs published additional information on the ENA website to allow for further representations.

A single response was received to this supplementary consultation and the DNOs have submitted their report under SLC 51.25 on 20 April 2017. Both reports and the responses are published alongside this approval letter.

1 pursuant to Standard Licence Condition ('SLC') 51.24 of the Electricity Distribution Licence (the 'Licence')
2 Secondary Deliverables sit under the Reliability and Safety Outputs of the RIIO framework. They enable us to monitor companies' performance and are leading indicators to ensure long-term delivery and value for money.
3 https://www.ofgem.gov.uk/publications-and-updates/decision-distribution-network-operators-common-network-asset-indices-methodology
4 http://www.energynetworks.org/news/publications/consultations-and-responses/

2. Common Methodology requirements

SLC 51.11 contains the key objectives for the Common Methodology. It should enable:

'(a) the comparative analysis of network asset performance between DNOs over time;

(b) the assessment of the licensee's performance against the Network Asset Secondary Deliverables; and

(c) the communication of information affecting the Network Asset Secondary Deliverables between the DNO, Ofgem and, as appropriate, other interested parties in a transparent manner.'

The Common Methodology should enable the evaluation of risk 'trade-offs' between asset categories and the delivery of a risk profile within a single asset category that is different to the target profile, to clearly define the level of under- or over-delivery achieved. It should also facilitate the increase in the scope of assets covered by the framework to eventually include all asset categories in the asset register.

We set out criteria by which to assess the Common Methodology, and shared these with the DNOs through the Common Framework Working Group in December 2014. We have used these to guide our consideration of whether the revised methodology meets the Licence requirements.

3. Responses

A single response was received from British Gas to the DNO's initial consultation and this is published alongside this approval letter.

British Gas raised two points:

1. it made a comment on the ability of consultees to fully understand the background and logic of the proposed changes based on the information presented, although it also stated that the changes look sensible in isolation; and

2. it stated its opinion that it is inappropriate to adopt the Common Methodology at this time. It considered that the DNOs should be held to the original targets established via their legacy methodologies as part of the RIIO-ED1 price control process.

In order to address the first of these points, the DNOs agreed to publish supplementary information on the reasons for the proposed changes and to allow interested parties an additional appropriate period of time in which to make representations. A single response to the DNOs supplementary consultation was received from the same respondent, British Gas, and this is also published alongside this approval letter.

British Gas raised three key points:

1. the additional information provided as a result of the supplementary consultation has improved the respondent's understanding of the proposed changes and therefore permits it to present an opinion on the changes.
2. it is concerned that the removal of outliers and averaging of data in the calculation of parameters will create systematic over or under estimation of risk relative to individual licensee experience and hence create sub-optimal asset management practices.

3. it continues to emphasise its view that it is inappropriate to adopt the Common Methodology at this time and that the DNOs should be held to the original targets established via their legacy methodologies as part of the RIIO-ED1 price control process.

The additional information published in the supplementary consultation has addressed the first point and the respondent stated that its understanding of the proposals has improved. Our view is that the additional information allowed interested parties to make an informed representation and enhanced the transparency and robustness of the Common Methodology.

For the second point raised on the supplementary consultation, we accept the DNOs response that it is appropriate to use data averages given this was a key principle during the development of the Common Methodology and was subsequently approved. The DNOs also confirm that the outliers excluded are mostly unreliable historical data. Hence, we agree that it is appropriate to remove such outliers to ensure that the parameters used are representative of the industry average.

With regard to the third point, British Gas previously raised this during the original consultation on the Common Methodology. Our decision on 23 October 2015[5] sets out our response and we are still of the same view given the consultation on the NASD Rebasing[6].

4. Our decision

We have considered the Common Methodology v1.1 in line with the various criteria outlined above and the responses received during the DNOs consultation and have decided, pursuant to SLC 51.27, not to object to implementation of the proposed modifications. We have decided to approve the Common Methodology in its current version. This approved Methodology is published alongside this letter.

Under SLC 51.26, the licensees may notify the Authority that the implementation of any modifications may require a change to the licensees' Network Asset Indices Methodology, or Network Asset Workbook, or may require a restatement of data previously reported. The licensees have confirmed that they do not propose to submit any such notice to the Authority as the modifications have already been incorporated in their Network Asset Secondary Deliverables Rebasing submission[7].

Yours faithfully,

Min Zhu
Associate Partner Networks Analysis

5 https://www.ofgem.gov.uk/publications-and-updates/dno-common-network-asset-indices-methodology
6 https://www.ofgem.gov.uk/publications-and-updates/network-asset-secondary-deliverables-rebasing-consultation
7 https://www.ofgem.gov.uk/publications-and-updates/network-asset-secondary-deliverables-rebasing-consultation

TAB 8

RESPONSES TO OEB STAFF INTERROGATORIES

INTERROGATORY 71:

Reference(s): Exhibit 2B, Section D, Appendix C, p. 9, 11-13

If available, please provide the future health scores in the same format as Table 3 (Exhibit 2B / Section D / Appendix C / p. 11) under the assumption that the DSP (and associated spending) is approved as filed.

Please provide a list of major asset classes for which health score information is not currently available (Exhibit 2B / Section D / Appendix C / p. 12). Please advise whether Toronto Hydro is working towards gathering the necessary information in order to calculate the health score information for these major asset classes in the future.

Please advise whether Toronto Hydro plans to add new measures, similar to the System Health – Asset Condition (Poles), to its performance measures in the future (Exhibit 2B / Section D / Appendix C / p. 12).

Toronto Hydro notes that it intends to update its useful life values and age-based probability of failure curves in the future (Exhibit 2B / Section D / Appendix C / p. 13). Please advise whether Toronto Hydro is intending to file this information in its next rebasing proceeding.

RESPONSE:

a) This information is not available at this time. Conceptually, there are two ways to generate future health score profiles taking into account planned investment levels.

The first is to identify the specific assets the utility plans to replace over the entire investment period. This approach is not feasible over a five-year planning horizon. The second approach is to develop a model that uses allocative assumptions and projected failure rates to apportion different amounts of planned spending across the five asset health bands. Toronto Hydro intends to explore this type of modelling as it gains experience with its new Asset Condition Assessment methodology.

b)

- **Underground Cables:** As mentioned in Exhibit 2B, Section D, Appendix C, on page 11-12, Toronto Hydro does not have an ACA methodology for underground cables, but is currently implementing a new cable testing approach that could potentially support the development of an ACA.

- **Pole Top Transformers**: Toronto Hydro does not have an ACA methodology for pole top transformers. The utility is exploring leveraging loading information and location information to develop an ACA using the new methodology.

- **Station Switchgear**: Toronto Hydro does not have enough data to establish a health score algorithm for this asset. The utility's recent Reliability Centered Maintenance (RCM) analysis identified additional data that Toronto Hydro could consider collecting on its switchgear assets to support the creation of a condition algorithm. Toronto Hydro intends to evaluate the costs and benefits of collecting this additional information.

- Toronto Hydro has not developed a health score algorithm for **Automatic Transfer Switches** and **Reverse Power Breakers** as these are obsolete assets that the utility is in the process of phasing out.

TAB 9

Ontario

ONTARIO ENERGY BOARD

FILE NO.:	**EB-2018-0165**	**Toronto Hydro Electric System Limited**

VOLUME:	**1**	
DATE:	**June 27, 2019**	
BEFORE:	**Lynne Anderson**	**Presiding Member**
	Michael Janigan	**Member**
	Susan Frank	**Member**

MR. RUBENSTEIN: So that's saying you are accounting for it in the context of the stretch factor. I understand that.

But I am asking in the base budgets, which come before you do the stretch factor, have you built in any productivity improvements?

MS. CIPOLLA: What I would speak to is our business planning process, and specifically the activity we did around the programs.

One of the key elements that Mr. Lyberogiannis walked you through was what we did when we were designing through our capital program.

Part of that process was working with our business unit leaders as they developed each of the programs, and the elements of that included understanding the scope of the work, understanding the need, how it related back to our customer needs, how it tied back to the outcomes framework that we spoke to in those six categories, and what element in there was about productivity and how were you going to achieve productivity.

And then in addition to that, we looked at external factors and other considerations, and risks.

So productivity was ingrained in our entire process around how we looked at each of those programs, and we looked at sort of a historical look back around considerations of the actual execution of the program.

So it was ingrained within our whole process around how to execute productivity through that, and then in addition to that review of that program, there was obviously, as I noted, the consideration of the capital stretch.

MR. RUBENSTEIN: Essentially you have costed the program by, as we were talking about, generally 2 percent escalators per year.

Where is the productivity? How are you building in the productivity?

MS. CIPOLLA: I think the key points I would make to that is our costs are higher than that inflationary rate. We talk about, in one of the responses to the interrogatory, in the city of Toronto specifically inflation is at 2.2 percent.

Yes, specifically to some of the capital programs we are at 2 percent. But costs are increasing greater than that in some of our areas.

So we have actually been able to maintain and reduce down our budget to stay within those parameters and have cost containment, although we see increases greater than 2 percent in many areas.

MR. RUBENSTEIN: Is there somewhere in the evidence where you are showing what your actual -- if the 2 percent isn't actually not reflective of what a base cost estimate increase -- budget increase is. Is there somewhere in the evidence where you are showing what you actually expect rates to increase, or escalation to actually be without productivity improvements?

[Witness panel confers]

TAB 10

SPECIFIC SERVICE CHARGES

Toronto Hydro charges user fees for certain non-distribution services.[1] Some of these services, such as duplicate invoices, are provided at customers' request. Others result from Toronto Hydro's business operations, such as collection fees resulting from customers' non-payment of bills.

Toronto Hydro last updated its Specific Service Charges in EB-2014-0116. For this application, Toronto Hydro proposes to leave these rates unchanged, with the exception of the Wireline Pole attachment rate. A summary of the proposed Specific Service Charges is shown in Table 1. Historic and forecast revenues from these service charges, and their inclusion as Other Revenue, are further described in Exhibit 3, Tab 2.

Table 1: Updated Specific Service Charges 2020-2024

Specific Service Charge	Existing Rates ($)	Proposed Rates ($)	Existing Versus Proposed Variance ($)
Duplicate invoices for previous billing	25.00	25.00	$0
Request for other billing or system information	25.00	25.00	$0
Easement letter	25.00	25.00	$0
Income tax letter	25.00	25.00	$0
Account history	25.00	25.00	$0
Returned cheque charge (plus bank charges)	25.00	25.00	$0
Account set up charge/change of occupancy charge	35.00	35.00	$0
Special meter reads	55.00	55.00	$0
Collection of account charge - no disconnection	55.00	55.00	$0
Disconnect/Reconnect at meter -during regular hours	120.00	120.00	$0
Install/Remove load control device - during regular hours	120.00	120.00	$0
Disconnect/Reconnect at meter -after regular hours	400.00	400.00	$0

[1] In accordance with the Distribution Rate Handbook ("DRH"), all other services provided to customers are billed on an actual-cost basis.

Specific Service Charge	Existing Rates ($)	Proposed Rates ($)	Existing Versus Proposed Variance ($)
Install/Remove load control device - after regular hours	400.00	400.00	$0
Disconnect/Reconnect at pole - during regular hours	300.00	300.00	$0
Disconnect/Reconnect at pole - after regular hours	820.00	820.00	$0
Meter dispute charge plus Measurement Canada fees	55.00	55.00	$0
Service call - customer owned equipment	55.00	Remove	Not Applicable
Temporary service install & remove – overhead - no transformer	2,040.00	2,040.00	$0
Specific Charge for Access to Power Poles (Wireline Attachments) ($/pole/year)	42.00	44.15	$2.15

1. REMOVAL OF SELECT APPROVED SPECIFIC SERVICE CHARGES

1.1 Service Call - Customer-Owned Equipment

Toronto Hydro requests to remove the “Service Call – Customer-Owned Equipment” charge from its Schedule of Rates and Charges. The charge, “Service Call – Customer Owned Equipment or Missed Appointments”, was initially requested as part of Toronto Hydro’s 2015 CIR application to recover the costs of missed appointments as well as basic level service calls related to customer owned equipment. In its Decision, however, the OEB did not approve the “Missed Appointments” component of the charge, leaving only the “Service Call – Customer Owned Equipment” charge component in effect. Toronto Hydro believes the scope of work that could be perceived to fall under this charge description is too broad with a high degree of cost variation. As such, it proposes to recover the costs associated with these services through a demand billable charge structure.

RESPONSES TO CONSUMERS COUNCIL OF CANADA INTERROGATORIES

INTERROGATORY 6:

Reference(s): Exhibit 1A, Tab 3, Schedule 1, p. 7

Please specifically identify any changes to THESL's Conditions of Service from the last Application. Please provide the rationale for any changes.

RESPONSE:

Please find attached the following summaries of changes that have been made to the Toronto Hydro's Conditions of Service since the utility's last rebasing application (EB-2014-0116):

- Appendix A – Revision Summary 14, effective March 2, 2015;
- Appendix B – Revision Summary 15, effective March 7, 2016;
- Appendix C – Revision Summary 16, effective February 15, 2017;
- Appendix D – Revision Summary 17, effective January 1, 2018; and
- Appendix E – Revision Summary 18, effective January 1, 2019.

In addition to the changes summarized in the appendices, on December 24, 2018, Toronto Hydro posted for public comment Revision Summary 18.1, which includes a proposed change to section 1.7.5 of its Conditions of Service.[1]

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[1] The proposed change is: For Customer-Owned vaults that contain Toronto Hydro equipment, Customers requiring vault access shall pay a fair and reasonable charge based on cost recovery principles for a Toronto Hydro Person-in-Attendance. Where a Customer requires vault access solely for the purpose of completing any fire equipment inspections required by applicable law, Toronto Hydro will provide one Person-in-Attendance for a maximum of two hours once every 12 months at no charge to the Customer. If the Customer is not present at the scheduled time, Toronto Hydro shall charge the Customer for the attendance by the Person-in-Attendance.

APPENDIX B

CONDITIONS OF SERVICE Revision #15 REVISION SUMMARY		
Section	Section Title	Summary of Changes to Toronto Hydro's Conditions of Service
1.1.1	Distribution Overview	Added statement which reserves the right for Toronto Hydro to select the Customer's type of supply connection.
2.2	Disconnection	Added additional conditions where Toronto Hydro may disconnect the supply of electricity without notice to its Customers.
2.4.3	Deposits	Added statement that Toronto Hydro will not waive a security deposit irrespective of common ownership or affiliation.
2.4.4	Billing	Revised the frequency which Toronto Hydro renders electricity bills to its Customers. Added statement which describes how electricity bills are determined if no metered consumption data is available.
3.1.1.1	Minimum Requirements	Revised the horizontal clearance requirements such that a person cannot reach out and touch service conductors. Added a minimum vertical clearance requirement for service conductors passing over a readily accessible surface.
4	Glossary of Terms	Revised the term "eligible low-income customer" defined as a residential Customer who is approved for the Ontario Electricity Support Program or the Low-Income Energy Assistance Program.
Section 6 – References	Toronto Hydro Distributed Generation Requirements	Updated reference document #3 (Revision #5, dated November 30, 2015). Added statements to the following sections: - 2.7 Distributed Generation Connections and Metering; added metering option (c), - 2.9 Warning Signs and Labels; requirement for posting warning signs and labels. Revised content to the following sections: - The Ontario Power Authority (OPA), merged with the Independent Electricity System Operator on January 1, 2015, into a new organization that

APPENDIX D

CONDITIONS OF SERVICE Revision #17 REVISION SUMMARY		
Section	Section Title	Summary of Changes to Toronto Hydro's Conditions of Service
1.2	Related Codes and Governing Laws	Revised to indicate O. Reg. 213/91: Construction Projects under the OHSA, and the Electrical Utility Safety Rules published by the Infrastructure Health and Safety Association (IHSA).
1.5	Contact Information	Added contact information for customers to speak to a Customer Care representative.
1.7.2	Safety of Equipment	Added by providing examples of customer structures and objects, and conditions that may be affected.
1.7.5	Customer-Owned Equipment, Infrastructure, and Property	Added customers are liable for any damages or losses sustained to Toronto Hydro resulting from customer neglect to their equipment, infrastructure or property.
1.8	Disputes	Added contact information for customers to submit complaints regarding services provided by Toronto Hydro.
2.1.5	Relocation of Plant	Revised from "shall" to "may" for customers requiring to pay for any incremental costs incurred by Toronto Hydro.
3.2	General Service	Revised bullet (g) customer "may" rather than "shall" be required to pay the incremental costs incurred by Toronto Hydro when a customer requests the work be done outside normal business hours. Revised bullet (j) Toronto Hydro is not held liable if customer equipment becomes inoperative or damaged during switching activities, and customer may be required to sign a waiver form acknowledging Toronto Hydro's limited liability.
Section 6 - References	Toronto Hydro Requirements for the Design and Construction of Customer-Owned High Voltage Substations	Updated reference document #4 (Revision #9, dated August 28, 2017) Added statements to the following sections: - 7.1 Substation Drawing; added bullet (b) Distribution Power Riser diagram to indicate location of indoor substation, - 7.4 Switchgear Assembly Drawings; added bullet (k) provision for faulted circuit indicators (FCI),

APPENDIX C

CONDITIONS OF SERVICE Revision #16 REVISION SUMMARY		
Section	Section Title	Summary of Changes to Toronto Hydro's Conditions of Service
1.1.1	Distribution Overview	Added the 347/600 voltage as a secondary network source of supply.
1.7.3	Tree and Vegetation Management	Revised the condition to when to charge a customer that requires a disconnection of their overhead lines.
1.7.5	Customer-Owned Equipment, Infrastructure, and Property	Added a statement that Toronto Hydro will provide a customer with one vault access at no charge.
2.1.2.3	Expansion Deposit	Revised the expansion deposit amount.
2.1.5	Relocation of Plant	Added the requirements that a Coordination Agreement may be required to execute a relocation, and Toronto Hydro may collect a Design Pre-payment from the customer.
2.2.1	Disconnection & Reconnection – Process and Charges	Revised by removing the condition of allowing customers to work within the limits of approach to overhead lines. Revised customer charges for a disconnection and reconnection of electricity.
2.3.2.1	Power Quality Testing	Added a statement of where power quality monitoring will be conducted.
2.3.2.2	Prevention of Distortion on the Distribution System	Revised the corrective measures to be placed on customers having a non-liner load.
2.3.2.2.1	Voltage Distortion	Added new section, indicating voltage distortion limits.
2.3.2.2.2	Current Distortion	Added new section, indicating current distortion limits.
2.3.2.3	Obligation to Help in the Investigation	Added a statement that a list of vendors can be provided who are qualified to perform an investigation, and to supply and install corrective equipment.
2.3.2.4	Timely Correction of Deficiencies	Added reasons for having to disconnect the supply of electricity.
2.3.4.2	Supply Voltage	Added under the heading "when a transformer vault is used", the availability to connect to the 347/600 volt network system.

Section 1 – INTRODUCTION

damage to facilities arising directly from entry on the Customer's property. Toronto Hydro's policies and procedures with respect to the disconnection process are further described in these Conditions of Service.

Notwithstanding the above, the Customer shall be liable for any damages or losses sustained by Toronto Hydro, including damages to Toronto Hydro equipment and infrastructure that is installed either within the public road allowance or private property, resulting from:

- the operation or failure of Customer-Owned equipment,
- the Customer not adequately maintaining, repairing, or replacing their infrastructure,
- the Customer not adequately maintaining or repairing their property.

1.8 Disputes

Any dispute between Customers or Retailers and the Distributor shall be settled according to the dispute resolution process specified in the Distributor Licence.
In this section, the Distributor should outline the Customer Complaint and Dispute Resolution process that has been established as a condition of licence.

If a Customer, Consumer or other market participant has a complaint about Toronto Hydro regarding services provided by Toronto Hydro under its Electricity Distribution License, the Consumer may contact Toronto Hydro's Customer Care Department by telephone at 416-542-8000 Monday to Friday from 8:00 a.m. – 8:00 p.m., or by email through the Contact section of Toronto Hydro's website (www.torontohydro.com), or through a fax at 416-542-3429, or in writing at:

Toronto Hydro
Attn: Customer Care
500 Commissioners Street
Toronto, ON
M4M 3N7

Upon receipt of a complaint, a Toronto Hydro Customer Care representative will contact the Customer, Consumer or other market participant to acknowledge receipt of the complaint and, if possible, to resolve the complaint. If a Customer, Consumer or other market participant is not satisfied with the resolution, they may follow the Dispute Resolution process described on Toronto Hydro's website (http://www.torontohydro.com/sites/electricsystem/residential/customercare/Pages/DisputeResolutionProcess.aspx).