August 28, 2019

Ms. Kirsten Walli
Board Secretary
Ontario Energy Board
P.O. Box 2319, 27th Floor
2300 Yonge Street
Toronto, ON M4P 1E4

Re: Toronto Hydro-Electric System Limited 2020-2024 Custom Price Cap Index (PCI) Application
AMPCO's Final Submissions
Board File No. EB-2018-0165

Dear Ms. Walli:

Attached please find AMPCO's submissions in the above proceeding.

Please do not hesitate to contact me if you have any questions or require further information.

Best Regards,

(Original Signed By)

Colin Anderson
President
Association of Major Power Consumers in Ontario

Copy to: Toronto Hydro-Electric System Limited

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EB-2018-0065

Toronto Hydro-Electric System Limited

Application for electricity distribution rates
beginning January 1, 2020 until December 31, 2024

AMPCO's Final Submissions
August 28, 2019

Toronto Hydro-Electric System Limited (Toronto Hydro) filed a 5-year Custom Incentive Rate-setting (IR) application with the Ontario Energy Board (OEB) on August 15, 2018 (updated September 14, 2018) under section 78 of the *Ontario Energy Board Act*, *1998*, S.O. 1998, c. 15, (Schedule B) seeking approval for changes to its distribution rates, to be effective January 1, 2020 to December 31, 2024. This is the second five-year plan filed by Toronto Hydro.

Toronto Hydro's Custom IR application is primarily driven by its proposed $2.83 billion in capital expenditures over the five-year term of its plan, 2020 to 2024. This amount represents a 26% increase over the amount approved as part of Toronto Hydro's 2015 to 2019 Custom IR plan. Toronto Hydro seeks a Custom Capital Factor (C-factor) as part of its Custom IR. The C-factor is a rate adjustment mechanism that is directly proportional to the degree of capital investment each year.

AMPCO's submissions are largely focussed on Toronto Hydro's proposed capital spend over the test period including the following key elements that Toronto Hydro is relying on to support its requested capital investment levels: Customer Engagement, Benchmarking, new Asset Condition Assessment, Asset Management Process and Third-Party Reviews.

The two largest concerns of AMPCO members are affordability and reliability of electricity service, with affordability being paramount, given the rapid rise in industrial rates in recent years. AMPCO's submissions are focussed on these two issues as they relate to Toronto Hydro's proposed 5-year Distribution System Investment Plan.

AMPCO's principal interest is to be of assistance to the Board in determining if Toronto Hydro has struck an appropriate balance between risk, reliability, customer cost and customer outcomes in respect of both the quantum and the timing of capital spend in its investment plan. Cost containment is a central theme in AMPCO's submissions in favour of a more thoughtfully paced capital spending plan that is data driven and provides value for customers. This approach aligns with the top two priorities of Toronto Hydro's customer: price and reliable electric service.

If Toronto Hydro's five-year Plan is approved, by 2024 the distribution portion of the Large User bill will have increased by 55% since 2015. AMPCO members are sensitive to increases in the distribution portion of the bill.

As shown in the Table 1 below, the distribution bill impacts (excluding rate riders) for the Large User reflect an increase of 37% over the 2015 to 2019 period (average annual bill impact of 7.2%).[1] Over the 2020 to 2024 period, the latest projected bill increase for the Large User is an additional 17.5% (average annual of 3.5%) for a total bill increase of 37% over the past decade.

Table 1: Large User Bill Impacts (%)

Large User Bill Impacts (%)

	2015	2016	2017	2018	2019	Avg Annual Increase	2020	2021	2022	2023	2024	Avg Annual Increase
Large User	0	20.3	7.3	5.4	3.9	**7.2**	3.6	3.3	2.5	4.2	3.9	**3.5**

These are material - year after year - increases. Given the current state of Ontario electricity prices, any upward pressure on rates further reduces the competitiveness of Ontario industry as compared to neighbouring jurisdictions.

Customers are being asked to fund a significant capital plan over the term and in return Toronto Hydro is not proposing any reliability benefits. Toronto Hydro proposes to maintain SAIDI and SAIFI at current levels over the 2020 to 2024 period.[2] The value proposition for customers is pay more with no benefit.

AMPCO worked with other intervenors throughout this proceeding. Specifically. AMPCO worked closely with Consumers Council of Canada (CC) and School Energy Coalition (SEC) in developing positions on the issues. AMPCO has reviewed the submissions of Board Staff and SEC. Where AMPCO has undertaken analysis and reached the same conclusions as Board Staff and SEC or is in general agreement with the findings, AMPCO has adopted their conclusions to be efficient and avoid duplication.

Summary

AMPCO submissions reflect a minimum capital reduction of $590 million and no C-factor. Further reductions should be imposed to reflect that no explicit productivity was built into the capital plan (current and incremental).

AMPCO's proposed OM&A reduction is $18.3 million, consistent with SEC's analysis.

[1] J7.4 Large User - 9700 kVA
[2] 2B D1 P5

The OEB should direct Toronto Hydro to update the Useful Life of its assets in in advance of its next rebasing application in order to improve the accuracy of the HI results.

1.0 GENERAL

1.2 Is the proposed effective date of January 1, 2020 appropriate?

Toronto Hydro requests new rates to be effective January 1, 2020. AMPCO takes no issues with this request given that Toronto Hydro filed the application In August 2018, 16 months in advance of the requested effective date which allowed for updates to take place.

2.0 CUSTOM INCENTIVE RATE-SETTING

2.1 Are all elements of Toronto Hydro's Custom Incentive Rate-setting proposal for the determination of rates appropriate?

Toronto Hydro proposes the continuation of the Custom IR framework approved in its 2015-2019 Custom IR proceeding.

The proposed Custom IR seeks to establish 2020 distribution rates on a cost of service basis. For the years 2021-2024, the rates are to be adjusted annually by the CPCI as follows:

$$CPCI = I – X + C – g; \text{ or}$$
$$CPCI = I – X + Cn – (Scap * I) - g$$

Where:

- "I" is the OEB's inflation factor (determined annually)
- "X" is the sum of:
    - The OEB's productivity factor
    - Toronto Hydro's custom stretch factor
- "C" is the difference between:
    - "Cn" a reflection of Toronto Hydro's capital investment needs
    - "Scap (or the scaling factor) * I" is an offsetting reduction required to ensure that the capital factor provides funding only in excess of what is already provided for capital through the inflation factor
- "g" is the growth factor determined by growth in distribution revenue due to changes in load and customer count over the Custom IR term

<u>Inflation Factor</u>

Toronto Hydro proposes to use the OEB's I-factor in its CPCI. As the value for the I-factor is updated annually, Toronto Hydro proposes to incorporate the updated value into its CPCI to appropriately adjust base distribution rates for the following year. AMPCO submits Toronto Hydro's proposed inflation factor should be accepted.

Productivity Factor

The X-factor productivity component consists of a base productivity amount and a stretch factor.

Toronto Hydro proposes a base productivity amount of zero and a Stretch Factor of 0.30% based on Power System Engineering (PSE's) analysis. This results in a productivity factor (I-X) of 0.3% which reflects Toronto Hydro's productivity targets for the next 4 years of the plan. Toronto Hydro has not built additional productivity into its base budgets. Rather, Toronto Hydro's only productivity gains are tied to the rate adjustment.

In Toronto Hydro's previous Custom IR framework, the Board approved a Stretch Factor of 0.6% for Toronto Hydro.[3] The most recent OEB generic Stretch Factor assigned to Toronto Hydro was 0.6%, which places Toronto Hydro in the worst performing cohort.[4]

Toronto Hydro's proposed lower Stretch Factor results in lower productivity savings targets over the 2020-2024 compared to the 2015-2019 plan.

The evidence of both Toronto Hydro's expert PSE, and OEB Staff expert Pacific Economics Group (PEG) show that Toronto Hydro's cost performance compared to the benchmark declined during the 2015 to 2019 Custom IR term, and is forecast to continue to decline during the proposed 2020 to 2024 term.[5]

Toronto Hydro refers to the OEB's productivity factor and a custom stretch factor in the Custom Price Cap Index as the only mechanism to incent productivity. Toronto Hydro provided examples of initiatives that will support efforts to control costs but Toronto Hydro was unable to quantify the estimates of cost savings of the planned initiatives.[6]

Customers expect that over the previous Custom IR period, Toronto Hydro will have achieved significant levels of productivity and customers expect that the value proposition of the proposed Custom IR is that significant incremental levels of productivity savings will be achieved and amounts will be built into budgets at the outset. Toronto Hydro has not specifically built productivity savings into its budget. With respect to cost savings over the 2015 to 2019 period, it wasn't the oral hearing that Toronto Hydro was able to quantify productivity savings in its capital budget; a mere $26 million[7] (1.2%) on a capital budget of $2.24 billion.[8]

AMPCO submits it is insufficient for Toronto Hydro to point to the stretch factor mechanism in its Custom IR framework as the only means that productivity is to be built into its plan.

AMPCO submits the Board should approve a Stretch Factor of 0.60% given that Toronto Hydro continues to be a poor cost performer, and Toronto Hydro's plan does not build in productivity

[3] EB-2014-0116 Decision P15
[4] Report to the Ontario Energy Board – Empirical Research in Support of Incentive Rate-setting (2018 Update) / August 2019.
[5] K7.3 P36
[6] 1B-CCC-14
[7] J3.2
[8] U-Staff-171, Appendix C

that can be measured in actual dollars. The proposed Stretch Factor of 0.3% does not reflect adequate productivity and continuous improvement incentives.

Capital Factor

AMPCO's analysis regarding Toronto Hydro's proposed capital plan over the test period results in a determination that there should be no C-factor. Toronto Hydro's proposed asset renewal rate greatly exceeds the latest ACA results and Toronto Hydro's Asset Past Useful Life (APUL) percentage decreases from 2014 to 2018.

In the event the Board approves a CPCI framework that includes a C-factor, AMPCO supports Board Staff's and SEC's position the C-factor should be reduced by a 0.64% additional stretch factor each year, in line with the recommendation of PEG, to reflect anticipated productivity, and a deadband similar to ICM/ACM, during the Custom IR period 2020-2024.

Growth Factor

AMPCO supports Board Staff's and SEC's submissions that the growth factor should be increased to 0.25% from 0.20% to reflect rounding to two decimal places consistent with the Board's approach to the Stretch Factor.[9]

2.2 Is Toronto Hydro's proposed custom scorecard appropriate?

Toronto Hydro proposes 15 custom metrics within its Outcomes Framework that are incremental to the measures on the OEB's Electricity Distributor Scorecard, for a total of 44 measures to be reported annually. The 15 custom metrics differ from Toronto Hydro's performance metrics in its previous Custom IR framework. AMPCO has reviewed the proposed custom scorecard compared to the scorecard in the 2015-2019 Custom IR framework and makes the following comments.

Cost Efficiency Metrics

Toronto Hydro is no longer proposing to report on the following Cost Efficiency/ Effectiveness of Planning and Implementation metrics:[10]

- Planning Efficiency: Engineering, Design and Support Costs
- Supply Chain Efficiency: Materials Handling On-Cost
- Construction Efficiency: Internal vs. Contractor Cost Benchmarking
- Construction Efficiency: Standard Asset Assembly Labour Input

[9] SEC Argument P17
[10] K3.3 P7

Instead under Cost Control, Toronto Hydro has proposed two new metrics: Average Wood Pole Replacement Cost and Vegetation Management Cost per km. Toronto Hydro has not set targets for these metrics. Toronto Hydro only plans to monitor performance.

AMPCO observes that Toronto Hydro's original evidence with respect to internal controls and measures to ensure cost control and project execution monitoring/reporting throughout the project life cycle was minimal. In response to Undertaking JTC2.23, Toronto Hydro provided additional information on how it manages project performance at the 2015-to-2018 capital plan level. Toronto Hydro indicates its internal management controls focus on cost, schedule and quality performance. Cost performance is managed at the project level using variance analysis. Schedule performance at the project level is managed through design readiness and construction schedule adherence. Quality performance is managed through customer-focused outcomes and asset management indicators relating to reliability, customer connections, safety, environmental impacts.

Toronto Hydro provided the following results for the 2015 to 2018 period for Design Readiness and construction schedule adherence measures. Toronto Hydro's Construction Schedule Adherence results in 2018 are significantly lower than 2015, 2016 and 2017 results.

Performance Measure	2015	2016	2017	2018
'Next Year' Design Readiness	n/a*	70%	82%	80%
Construction Schedule Adherence (% of Planned Capital Distribution System Projects Completed On Time or Early)[1]	80%	86%	81%	71%

*The current methodology on calculating design readiness was implemented in 2016.

AMPCO submits Toronto Hydro's scorecard should include cost and schedule performance metrics. This aligns with Toronto Hydro's high level summary of asset management principles, strategies and outcomes that includes a value for money strategy to mitigate increases in capital costs by continuously improving planning estimating, procurement and project management practices.[11] Project level cost control metrics provide better outcomes for customers and support continuous improvement objectives.

For information, Alectra Utilities Inc. is proposing two cost control metrics on its custom scorecard as follows:[12]

- Cost Control (A) - Planned Capital (Actual vs Budget): % of Planned Capital Projects Completed vs. Budget
- Cost Control (B) - Planned Capital Projects Completed: % of Planned Capital Projects Completed

Alectra Utilities Inc. is also proposing two Work Execution metrics:

- Cost Performance Index (CPI)
- Schedule Performance Index (SPI)

[11] 2B D1 P11 Figure 4
[12] EB-2019-0018 Ex 4-1-1 P98

Customer-Oriented Performance Metrics

Toronto Hydro is proposing to remove the Momentary Average interruption Frequency Index (MAIFI) measure from the custom scorecard.

AMPCO submits Toronto Hydro should continue to include this measure on the scorecard. Toronto Hydro's reasons for wanting to remove the measure were not raised as an issue when Toronto Hydro introduced the measure in the 2015-2019 Custom IR framework. Avoidable momentary outages arising from defective equipment or other controllable factors are a concern for industrial customers. Tracking and reporting on momentary events over the 2020-2024 period allows Toronto Hydro to continue to work with its customers affected by momentary outages and with industry colleagues to devise more precise MAIFI reduction objectives.

System Reliability Metrics

Toronto Hydro proposes to remove the Outages Caused By Defective Equipment measure introduced as part of the 2015-2019 Custom IR Framework and add two new reliability metrics: SAIDI - Defective Equipment and SAIFI - Defective Equipment with a proposal to maintain performance.

In AMPCO's view Outages Caused by Defective Equipment and Outages Hours Caused by Defective Equipment are superior indicators that are more easily understood by customers. Equipment performance is a leading indicator of future reliability performance. As trends in major equipment performance begin to shift, there is a lagging effect on broader system reliability metrics SAIFI and SAIDI. As a result, AMPCO submits the current indicator Outages Caused By Defective Equipment better reflects system performance over time in a way that customers can understand, compared to contributions to SAIFI and SAIDI. SAIFI and SAIDI are already on the Distributor Scorecard.

Asset/System Operation Performance Metrics

As discussed on page , AMPCO submits there should be a custom operational metrics on Toronto Hydro's scorecard that tracks the percentage of P1 corrective and reactive work orders attained within the 15 day target in order to drive operational improvements that impact both operating and capital budgets and impact system performance.

Workforce Analytic Metrics

Resource Utilization rates and Vehicle Utilization rates are simple metrics that convey a lot of information about how efficient a company is in using its employees and vehicles. The Board may wish to consider developing generic calculations for these two metrics to be tracked by all distributors to allow for comparisons between distributors.

Customer Engagement

In Phase 1 of the consultation, low volume customers ranked price followed by reliable electric service as the top two priorities. For large customers with average peak loads over 1 MW (Key Accounts) the order was reversed and reliable electrical service was prioritized ahead of price.[13]

For context, these preferences were obtained without any information provided to customers on Toronto Hydro's forecast spend or resulting bill impacts.[14] In addition, customers were not told in Phase 1 or Phase 2 consultations about Toronto Hydro's reliability improvements since 2006 and more recently over the past 5 years and that this was largely due to system capital investments. AMPCO submits it would be interesting to observe if the above Large User results were maintained in Phase 2 if the proposed spending, bill impacts and reliability trends had been shared with Large Users prior to confirming customer priorities.

Mr. Lyle from Innovative Research, who conducted the Phase 1 and Phase 2 customer engagement, stated "When you are doing a consultation, you need to provide people with context….So we need to introduce the costs to them before we get into the issues."[15] In Phase 2 of the consultation customers including Large Use customers were shown that Toronto Hydro has drafted a plan totaling approximately $4.3 billion over five years under five key budget categories.[16] However, customers were not shown what the spending was for these five key budget categories in the previous five years to provide further context.[17] AMPCO sees this as a significant omission as customers do not have a sense of what the baseline is and how the proposed level of spending compares to past spending in order to have better information to assess the plan and resulting bill impacts, and with an online survey, customers do not have an opportunity to ask.

In Phase 2, Large Use customers were provided with bill impacts. Toronto Hydro claims that its "plan is supported by all customer classes."[18] AMPCO submits this is not the case for the Large User customer because they were confused by what they were agreeing to.

Customers who responded that the rate increase was reasonable as long as service quality can be maintained, thought the proposed 3.9% rate increase was over four years and not an annual increase. One customer said "The increase of 3.9 percent over four years is appropriate as long as service and reliability is not reduced." Another customer said "I agree that the service should be at least maintained or even improved even if we have to pay the related cost with an increase in distribution charges of maximum up to 4%".[19] Mr. Lyle from Innovative Research

[13] Ex 1B T3 S1 P2
[14] Transcript Vol 7 P94-95
[15] Transcript Vol 7 P56
[16] Ex 1B T3 S1 Appendix A Appendix 2.5 P26
[17] Transcript Vol 7 P100
[18] Toronto Hydro AIC P1
[19] Exhibit 7.2 P18

agreed that it was possible that Large Use customers could have been confused by the statement that they were responding to, in terms of what the increases were.[20]

3.0 RATE BASE AND CAPITAL PLAN

3.2 Is the level of proposed 2020-2024 capital expenditures and capital in-service additions arising from the distribution system plan appropriate, and is the rationale for planning and pacing choices, including trade-offs between capital and operating costs, appropriate and adequately explained?

5-year Capital Plan

Toronto Hydro proposes to spend $2.83 billion in capital over the 2020 to 2024 period.[21] This represents a 26% increase or $590 million more than the Board-approved capital expenditures for the 2015-2019 period of $2.24 billion.[22]

Table 2: Capital Expenditure Plan 2015 to 2024

Category	2015	2016	2017	2018	2019	2015-2019	2015-2019	2020	2021	2022	2023	2024	2020-2024	2020-2024
	Actual	Actual	Actual	Actual	Bridge	Total	Average	Forecast	Forecast	Forecast	Forecast	Forecast	Total	Average
	$ M	$ M	$ M	$ M	$ M	$ M	$ M	$ M	$ M	$ M	$ M	$ M	$ M	$ M
System Access	97.4	113.0	113.0	153.0	236.0	712.3	142.5	160.4	189.6	181.3	193.8	207.2	932.4	186.5
		16.0%	*0.0%*	*35.4%*	*54.3%*			*-32.0%*	*18.2%*	*-4.4%*	*6.9%*	*6.9%*		
System Renewal	304.1	266.1	250.3	245.5	244.2	1,310.2	262.0	306.6	325.7	323.1	339.0	325.5	1,619.9	324.0
		-12.5%	*-5.9%*	*-1.9%*	*-0.5%*			*25.5%*	*6.2%*	*-0.8%*	*4.9%*	*-4.0%*		
System Service	37.9	53.3	72.4	31.0	41.5	236.2	47.2	58.5	72.2	77.1	33.6	38.5	280.0	56.0
		40.6%	*35.9%*	*-57.2%*	*33.9%*			*40.9%*	*23.4%*	*6.8%*	*-56.4%*	*14.7%*		
General Plant	79.4	109.5	98.9	58.4	46.4	392.7	78.5	78.8	93.7	89.0	77.7	85.2	424.4	84.9
		37.9%	*-9.7%*	*-41.0%*	*-20.5%*			*69.8%*	*18.9%*	*-5.1%*	*-12.7%*	*9.7%*		
Other	13.5	3.7	10.7	13.0	(1.3)	39.6	7.9	7.0	9.0	9.8	9.5	8.7	44.1	8.8
GROSS TOTAL EXPENDITURE	532.3	545.6	545.3	500.9	566.9	2,691.0	538.2	611.3	690.2	680.4	653.6	665.2	3,300.8	660.2
Capital Contributions Received	(40.9)	(34.0)	(47.5)	(65.3)	(123.9)	(311.6)	(62.3)	(92.9)	(108.4)	(93.2)	(87.8)	(90.9)	(473.3)	(94.7)
NET TOTAL EXPENDITURE	491.4	511.6	497.8	435.6	443.0	2,379.4	475.9	518.4	581.8	587.1	565.7	574.4	2,827.4	565.5
System O&M	116.1	126.5	126.3	139.6	131.0	639.5	127.9	130.4						

In the past five years, Toronto Hydro spent on average $476 million per year on capital. For the 2012 to 2014 period, the average annual capital spend was $440 million.[23] For the next five years Toronto Hydro proposes to spend significantly more, on average of $566 million per year.

Of the four categories of capital spend, System Renewal is the largest category at 57% of the total.[24] Close to 70% of the increase in capital spend over 2015-2019 is due to an increase in System Renewal investments.[25] Over the 2020 to 2024 period Toronto Hydro proposes to increase spending on System Renewal by $309 million or 24% compared to the 2015 to 2019

[20] Transcript Vol 7 P106
[21] U-Staff-171 Appendix A (net of capital contributions).
[22] U-Staff-171 / Appendix A.
[23] EB-2014-0116 Application E 1B/T2/S4/p. 6 Filed 2014 Jul 31 Corrected 2015 Feb 6
[24] $1.619 B/$2.827 B
[25] $309 M/$448 M = 69%

period: $1.62 billion compared to $1.31 billion. Toronto Hydro proposes to put $2.78 billion[26] worth of assets in service over the 2020 to 2024 period compared to $2.47 billion over the previous five years, 2015 to 2019.[27]

AMPCO is of the view that Toronto Hydro has not adequately justified the proposed $590 million (26%) increase in capital spending and AMPCO does not support this accelerated investment pace. For the reasons discussed below, AMPCO submits the Board should reduce the proposed capital expenditures by $590M and approve a capital budget consistent with current levels. The Board should not approve Toronto Hydro's C-factor. Toronto Hydro's capital should be managed within the IRM framework.

- Toronto Hydro's transition to a new Asset Condition Assessment (ACA) methodology is not ready to be relied upon to drive capital investment decisions
- The ACA results prior to the change in ACA methodology showed that asset condition was improving over time
- Toronto Hydro's Expected Useful Life (EUL) predictions need to be updated and for some assets are too pessimistic, resulting in premature asset replacements
- Toronto Hydro is still relying too much on the age of the asset and its APUL measure as a primary driver for asset replacement
- Productivity not built into plan
- No value for money
- UMS Review of Toronto Hydro's DSP Asset Management Practices concludes Toronto Hydro has not yet reached Competence Level
- Reliability has been steadily improving since 2006

<u>Change in ACA Methodology</u>

In Toronto Hydro's last CIR application, Toronto Hydro sought an average capital spend of $550 million per year or $2.5 billion for the 2015 to 2019 period. The Board did not accept Toronto Hydro's plan as requested and made an annual reduction of 10% to the proposed capital spending.[28]

[26] Undertaking J1.7.
[27] U T2 S2 Appendix A
[28] EB-2014-0116 THESL Decision and Order dated December 29, 2015 P21

This determination was made in part because the Board was of the view that actual asset condition rather than calculated "end of life" should be the primary determining factor when an asset should be replaced. In its Decision, the Board found that Toronto Hydro's approach should include more emphasis on asset condition in the assessment of when a steady state of asset renewal should be achieved.[29]

In response to the Board's Decision, Toronto Hydro changed its ACA methodology, even though the Board's instruction was to use asset condition more in making asset replacement decisions. The Board did not direct Toronto Hydro to change its ACA methodology.

In 2016, Toronto Hydro made the decision to proactively change its ACA methodology originally adopted in 2008, from the Kinectrics Methodology to the Common Network Asset Indices Methodology (CNAIM), which was developed and adopted by major utilities in the United Kingdom (UK) in collaboration with the regulator Ofgem.[30]

Both methodologies have five health categories that are intended to track the condition-based probability of failure of an asset, but they are underpinned by different calculations. The Kinectrics methodology expresses asset health as very good, good, fair, poor or very poor condition. Whereas, the CNAIM methodology uses Health Index (HI) bands HI1 to HI5. Assets in the HI4 and HI5 bands reflect material deterioration and end of serviceable life, respectively.

The impact of changing the ACA methodology makes Toronto Hydro's asset condition appear considerably worse in 2017 under the new methodology compared to the previous methodology.[31]

To be of assistance to the Board, AMPCO prepared a table in this proceeding[32] that was provided to Toronto Hydro to show the change in ACA results over time using the Kinectrics methodology, comparing the 2014 ACA data that underpinned Toronto Hydro's 2015 to 2019 Custom IR application and the latest ACA results in 2016 before Toronto Hydro transitioned to the new CNAIM methodology.

AMPCO's original table showed that the condition of Toronto Hydro's assets improved from 7% in very poor and poor condition in 2014 to 2% in 2016. To assist the Board AMPCO has filed its original spreadsheet as Appendix A .

Toronto Hydro pointed out at the oral hearing that there was a calculation error in AMPCO's table and Toronto Hydro corrected the table in J4.8. Toronto Hydro's correction changed the percentage of total assets in very poor and poor condition in 2014 from 7% to 3% and the 2% in

[29] EB-2014-0116 THESL Decision and Order dated December 29, 2015 P24-25
[30] Ex 2B D1 P26
[31] K1.1 P46
[32] K3.3 P40

2016 was unchanged.[33] This recalculation of the 2014 value (from 7% to 3%) also impacts the relative comparison of 2014 (3%) versus 2016 (2%).

Although Toronto Hydro did not provide any explanations in J4.8 as to the corrections it made to AMPCO's table, it appears to AMPCO that the correction Toronto Hydro made was to multiply the total asset population for each asset class by the sample size to reflect the percentage of assets that Toronto Hydro has condition data for as Toronto Hydro does not have condition data for 100% of the asset population for each asset class.[34]

For example, in 2014 Toronto Hydro did not have condition data for 100% of the wood pole population of 123,280. The sample size was only 37.66%. So in order to determine the quantities that flow from the percentage of wood poles in very poor, poor, fair, good and very good condition from the 2014 ACA, the wood pole population in AMPCO's table should have been multiplied by the sample size percentage to get the population of assets with data in order to convert the ACA condition percentages into quantities. For example, AMPCO's original table (line 16)[35] showed 12,303 wood poles in very poor and poor condition in 2014 (2,885 in very poor condition and 9,419 in poor condition). In this proceeding, Toronto Hydro corrected AMPCO's table by multiplying asset population by sample size. The corrected data now shows that in 2014 only 4,633 wood poles were in very poor and poor condition in 2014, 60% less.[36] To assist the Board, AMPCO has included a live excel spreadsheet as Appendix B that mirrors J4.8 to show the change in the calculation.

Why AMPCO raises this issue in this proceeding is as follows. The change is significant because Toronto Hydro did not correct this same table prepared by AMPCO in the EB-2014-0116 proceeding[37] and the Board at that time relied in part on the quantities of assets in very poor and poor condition in the table to assess the asset renewal pace and set the capital budget for the 2015 to 2019 period. The table was referenced in the Board's Decision in EB-2014-0116.[38] This means that the quantities of assets in very poor and poor condition were overstated in the table because the asset population was not adjusted for the sample size.

Toronto Hydro's correction to AMPCO's table reduces the total number of assets in very poor and poor condition in 2014 from 12,907[39] to 5,047.[40] In other words, the number of very poor and poor condition assets before the Board at that time was overstated by 2.5 times.

Toronto Hydro did not flow through the correction it made in the table to correct AMPCO's calculation of the percentage of assets in very poor and poor condition, adjusted for sample

[33] J4.8
[34] Transcript Volume 3 P128
[35] Appendix A Line 16
[36] 1,086 in very poor condition and 3,547 in poor condition
[37] EB-2014-0116 Kl.l Page 100
[38] EB-2014-0116 THESL Decision and Order dated December 29, 2015 P24
[39] Appendix A
[40] Appendix B Line 22

size. AMPCO's original calculation used the total asset population (174,139)[41] to determine the percentage of assets in very poor and poor condition but based on Toronto Hydro's correction, the total asset population adjusted for sample size of 85,267[42] should be used.

On this basis, AMPCO believes the correct percentage of assets in very poor and poor condition is 6% in 2014 and 2% in 2016. Table 3 below provides AMPCO's view of the outcome of Toronto Hydro's changes:

Table 3: Outcome of Corrections to J4.8

	Outcome of Corrections to AMPCO Table J4.8	2014	2016
A	Total number of Assets	174,139	176,654
B	Total Number of Assets Adjusted for Sample Size	85,267	128,286
C	Total number of assets in very poor & poor condition	5,046	2,904
D	Percentage of Total Assets in very poor & poor condition (C/A)	3%	2%
E	**Percentage of Sample Size Assets in very poor & poor condition (C/B**	**6%**	**2%**

The above analysis fully aligns with Toronto Hydro's response to JTC2.16 to provide the percentage of assets with Health Index scores of very poor and poor condition at the time of the last application. The response indicates that 6% of assets in 2014 had Health Index scores of very poor and poor, based on an asset population of 85,271.[43] AMPCO's calculation reaches this same conclusion.

Summary

Kinectrics' ACA methodology shows that Toronto Hydro's asset condition improved from 6% of assets in very poor and poor condition in 2014 to 2% in 2016.

This trend does not support the increase in asset renewal quantities and capital spend that is being requested by the Applicant.

As a result of a change in ACA methodology, Toronto Hydro's assets now look worse. Based on 2017 year end asset data, 13,606 assets or 9% of assets[44] are in the worst health index bands (HI4 and HI5),[45] as shown in Table 4 below.

Table 4: CNAIM ACA Methodology - Current Asset Health Scores (2017)[46]

[41] Appendix A Line 22
[42] Appendix B Line 22
[43] JTC2.16
[44] 2B-AMPC0-48 Appendix A
[45] HI4 =12,050 assets; HI5= 1,556 assets
[46] 2B D Appendix C P64

Asset Class	2017 ACA Results [AMPCO-48] [New Methodology]					Population
	HI1	HI2	HI3	HI4	HI5	
Over Head Gang Operated Switches	854	27	76	3	9	969
SCADAMATE Switches	1084	1	26	0	8	1119
Wood Pole	68425	5777	20915	10877	1074	107068
4kV Oil Circuit Breaker (MS)	36	4	123	24	0	187
KSO Circuit Breakers (TS)	10	7	11	11	1	40
SF6 Circuit Breakers (TS)	130	6	18	3	3	160
Vacuum Circuit Breaker (MS & TS)	578	46	13	2	29	668
Air Magnetic Circuit Breaker (MS & TS)	145	90	247	21	53	556
Airblast Circuit Breaker (MS & TS)	15	9	206	1	3	234
Station Power Transformers	83	77	61	13	8	242
Network Transformers	1334	255	166	60	7	1822
Network Protectors	1086	185	319	74	26	1690
Cable Chambers	8112	1162	1350	398	89	11111
Submersible Transformers	7816	588	271	172	55	8902
Air-Insulated Padmount Switches	404	20	73	30	45	572
Vault Transformers	6807	4315	450	214	45	11831
Underground Vaults (combined)	1017	186	72	12	29	1316
ATS Vaults	8					8
CLD Vaults	21					21
CRD Vaults	9		1			10
Network Vaults	322	120	63	11	29	545
Submersible Switch Vaults	115	5				120
URD Vaults	542	61	8	1		612
Padmount Transformers	5547	656	283	113	18	6617
SF6-Insulated Padmount Switches	402		2		6	410
SF6 insulated Submersible Switches	353	14	7	3	19	396
Air Insulated Submersible Switches	755	79	27	7	0	868
TOTAL BY HEALTH INDEX	106010	13690	24788	12050	1556	158094
TOTAL ASSETS in HI4 & HI5					13606	9%

Forecast Asset Replacement

Toronto Hydro proposes to replace almost 20% more assets over the 2020 to 2024 five-year period compared to the 2015-2019 five-year period; 25,349 assets in 2020 to 2024 compared to 21,284 in 2015 to 2019[47] and these quantities greatly exceed to CNAIM output of 13,606 assets in the worst condition.

Table 4: Asset Replacement Quantities 2015 to 2019 Actuals, 2020 to 2024 Forecast

[47] U-AMPCO-132 Appendix A

U-AMPCO-132 Appendix A

	Assets Replaced	# units replaced						# units replaced					
	Asset Class	2015	2016	2017	2018	2019	2015-2019 Total	2020	2021	2022	2023	2024	2020-2024 Total
1	Air Insulated Submersible Switches												
2	SF-6 Insulated Submersible Switches												
3	SF-6 Insulated Padmount Switches	47	79	87	39	28	280	49	45	45	46	46	231
13	Air -Insulated Padmount Switches												
5	URD Vaults												
6	Submersible Switch Vaults												
7	Network Vaults	34			11	18	63	33					33
8	CRD Vaults												
9	CLD Vaults												
10	ATS Vaults												
11	Underground Vaults (combined)												
4	Padmount Transformers	105	710	740	251	264	2070	407	380	380	387	387	1941
12	Vault Transfomers												
14	Submersible Transformers												
15	Cable Chambers												
16	Network Protectors	17	25	21	11	18	92	40	40	40	40	40	200
17	Network Transfomers												
18	Station Power Transfomers	2	0	6	3	5	16	2	2	2	2	2	10
19	Air Blast Circuit Breaker (MS & TS)	0	0	8	13	20	41	0	0	9	12	28	49
20	Air Magnetic Circuit Breaker (MS & TS)	2	0	2	0	0	4	2	0	2	11	0	15
21	Vacuum Circuit Breaker (MS & TS)	0	0	0	0	0	0	0	0	0	0	0	0
22	Sf6 Circuit Breakers (TS)	0	0	0	0	0	0	0	0	0	0	0	0
23	KSO Circuit Breaker	4	2	5	8	7	26	1	1	2	2	3	9
24	4kV Oil Circuit Breaker (MS)	10	0	10	14	4	38	11	17	8	6	10	52
25	Wood Pole	10283			2096	2390	14769	15,590					15590
26	SCADAMATE Switches												
27	Overhead Gang Operated Switches												
28	Underground Cable	107	444	175	156	131	1013	105.9	101.1	101.3	105.1	105.1	519
29	Pole Mounted Transformer	940	769	441	412	310	2872	1300	1300	1300	1400	1400	6700
	TOTAL						21284						25349
													119%

The 2015 to 2019 asset replacement levels (21, 284) greatly exceed the 2014 and 2016 Kinectrics ACA results - 5,046 assets in very poor and poor condition in 2014 and only 2,904 assets in very poor and poor condition in 2016.[48] Further, it's not clear from the evidence whether these replacements target the worst condition assets.

The 2020 to 2024 proposed asset replacement levels greatly exceed the 13,606 HI4 and HI5 assets[49] identified from the new CNAIMN methodology. AMPCO submits the level of asset replacement proposed (25,349 assets) is not validated by any ACA.

[48] Appendix B Line 22

[49] 2B-AMPCO-48 Appendix A

Review of ACA Methodology

Toronto Hydro's view is that its enhanced ACA methodology improved the accuracy of its Health Index (HI) scores.[50] In AMPCO's view, there are shortcomings in Toronto Hydro's implementation of the new methodology discussed below that need to be considered by the Board before accepting that it has improved the accuracy of the HI scores and can be relied upon to support tactical, strategic and accelerated investment planning decisions over the test period.

1. Toronto Hydro has not yet implemented all of the components of the CNAIM. At the time of the DSP, Toronto Hydro had only calculated the first element of the CNAIM, the Current and Future Health Scores of the 26 asset groups evaluated[51] and as discussed below, refinements are needed to these calculations by asset group to improve accuracy. The full CNAIM methodology addresses probability of failure, consequence of failure and asset criticality. Toronto Hydro has not yet developed these elements and incremental capability.[52] The Current Health Score replaces the capability of the Kinectrics methodology.[53]

   Within the Health Index calculations some of the modifiers important to the calculations have not yet been derived and have been set to a default value of one (Location Modifier, Reliability Modifier). As discussed below, inclusion of these modifiers improves the accuracy of the Health Index results which Toronto Hydro has not done.[54]

2. By not implementing all of the aspects of CNAIM, Toronto Hydro has not achieved all of the benefits of CNAIM with respect to assessing asset health and probability of failure. Toronto Hydro is currently in the process of developing formulas required to convert an HI score produced by CNAIM into a probability of failure. As such, the benefit of a stronger and more objective relationship between condition and probability of failure has not yet been realized.[55]

3. Only one year of asset condition information using the CNAIM methodology was available in developing the DSP. AMPCO submits one year of asset condition provides a static view (i.e. no trends can be inferred) and is not sufficient. The OEB would need to see a few years of CNAIM results for Toronto Hydro's asset groups before being able to adequately assess asset health trends and be able rely on the results to drive investment decisions. The change in asset condition over time by asset class gives the best view of overall asset condition for planning purposes. One of the benefits of using the Kinectrics methodology is that the majority of distributors in Ontario follow the Kinectrics methodology which allows

[50] AIC P28
[51] P10 & P11
[52] Transcript Volume 3 P129, P133
[53] Transcript Volume 3 P132
[54] Transcript Volume 3 P131-132
[55] Ex 2B D Appendix C P6

for comparisons between utilities. CNAIM is used by all Distribution Network Operators (DNOs) in Great Britain to report asset health and criticality as part of their regulatory reporting requirement to Ofgem. By having all of its DNOs use the same methodology, Ofgem is able to make comparisons between DNOs. At the oral hearing Toronto Hydro was unable to confirm if the CNAIM methodology is being used anywhere else in North America.[56]

In its evidence, Toronto Hydro states "The ACA output is essential in two respects. First, the ACA produces a relative outlook of the population's condition for each individual asset class within the program. Second, the ACA program highlights trends in the condition of asset classes. These trends can highlight issues that are specific to particular asset classes or subtypes such as manufacturer defects, or design practices. For system planners, these insights along with the health band of an asset provide an indication of the probability of failure of an asset."[57] AMPCO submits with only one year of data, Toronto Hydro was only able to compare one set of current and future health scores as year over year trends of current health scores are not yet available.

4. Third-party support and reviews by UK firm EA Technology of Toronto Hydro's new CNAIM Methodology, at various stages of development[58] revealed several areas for improvement.[59] EA Technology observed that the rollout phase of the project have been vulnerable to poor input data quality. EA Technology concludes the inclusion of some of the refinements identified will increase the accuracy of the Health Index derivation and will allow more differentiation between assets.[60] These refinements are useful when determining the aging rate of the assets, their performance (probability of failure), the level of risk associated with different assets and, ultimately determining the optimum intervention programme based on risk".[61] This demonstrates the new methodology requires further testing, refinement and calibration.

   EA Technology pointed out that the Expected Useful Life (EUL) used in the CNAIM methodology may be too low for some of Toronto Hydro's assets and not defendable. The normal expected useful life values used by Toronto Hydro in the new ACA are based on the 2009 Toronto Hydro specific Kinectrics Useful Life report.[62] Toronto Hydro uses the mid-point between the Kinectrics Minimum Useful Life and Maximum Useful Life for a specific asset type to determine the useful life of an asset. For some assets, the EUL values utilized by Toronto Hydro are below the ranges utilized by other distributors in Ontario. EA Technology pointed out asset classes where Toronto Hydro was taking too pessimistic a view based on the EULs used by Toronto Hydro. EUL is an important consideration in the

[56] Transcript Volume 1 P60
[57] 2B D3 P23
[58] Q3 2017 to Q1 2018 when ACA Models Frozen
[59] Transcript Volume 3 P136 to 145
[60] Ibid. P18
[61] Ibid. P18
[62] 2009 Kinectrics Report "Toronto Hydro-Electric System Useful Life of Assets (see 2B-SEC-38 Appendix A)

CNAIM methodology, as age and normal expected useful are the starting points to calculate the Initial Health Score of an asset. EA Technology recommends Toronto Hydro review the useful life of its assets. EA Technology points out that the normal expected service life needs to be relevant to the current asset population which remain in service[63] and using an expected service life that is too low given the age and population of the assets still in service can distort the Health Index results and is not defendable.

AMPCO submits the OEB should direct Toronto Hydro to update the Useful Life of its assets in in advance of its next rebasing application in order to improve the accuracy of the HI results.

5. Toronto Hydro indicates that the CNAIM methodology overcomes a number of limitations observed with the Kincetrics methodology. It's AMPCO's understanding that the Kinectrics methodology has been recently adjusted to align with recent improvements in the industry. For example, condition multipliers are included in the formulation and condition parameters are now multiplied together to avoid some the masking problems where a bad test result is hidden amid several good ones.[64]

In AMPCO's view, the above observations, recommendations and suggested refinements to the CNAIM highlight that Toronto Hydro's new ACA methodology is in the early development stage and is not yet ready for "prime time." Toronto Hydro indicates it plans to further refine and continuously test the methodologies and its calibrations by validating the results against field data (i.e. inspections). EA Technology expects a period of time in which the new methodology beds-in (matures) within the existing organization. AMPCO submits it is too soon for the Board to rely on the CNAIM results to drive investment pacing decisions.

Toronto Hydro indicates its new ACA is a significant part of its 2020-2024 DSP and that it has leveraged the improved information, including asset condition projections, to help demonstrate the appropriate pacing of planned asset replacement strategies over the forecast period. AMPCO agrees a robust ACA can serve as a strong leading indicator of future system performance. However, given the nascent stage of Toronto Hydro's development and experience with this new methodology, and need to further build and calibrate the model, combined with the fact that the previous ACA results tell a different asset condition story, Toronto Hydro's useful life is too pessimistic for some assets, and many components of the CNAIM have not yet been implemented, AMPCO submits the ACA is not ready to be used to drive asset replacement rates and validate and refine expenditure plans at this time. AMPCO's view is that more assets were replaced over the 2015 to 2020 period than were needed and planned asset replacements over the 2020 to 2024 period are overstated.

[63] 2B-SEC-44 (e) Appendix P
[64] EB-2019-0118 Alectra Utilities Inc. Exhibit 4 Appendix D P16

Asset Age Continues to Drive Investment Decisions

The Board's Decision in the last application highlighted that "Toronto Hydro concedes that age of the asset is the primary driver with respect to asset replacement." [65] The OEB took the view that actual asset condition rather than calculated "end of life" should be the primary determining factor when an asset should be replaced.[66] Based on AMPCO's review of the evidence, it seems to AMPCO, that asset age is still an internal focus at Toronto Hydro and continues to be the primary driver that sets the strategic pace of asset replacement. AMPCO takes this view for the following reasons:

1. In reviewing the capital budget changes that occurred between the Initial Plan, Penultimate Plan and Final Plan it is unclear how the ACA results informed the level of spending at the Initial Plan and Penultimate Plan stage, particularly when the 2016 ACA results available at the time of the Initial Plan developed in Q1 2017 show that only 2% of the assets are in very poor and poor condition. The Initial Plan budget amount derived in Q1 2017 was $2.703 billion,[67] an increase over the amount spent in 2015 to 2020 that was based on 2014 ACA results showing assets in worse condition.

   Toronto Hydro's evidence is that it began business planning by engaging customers and using the feedback received and various other qualitative and quantitative inputs to set the initial strategic parameters that included an upper price limit (3.5%) and an upper capital budget limit ($560 million).[68] It seems to AMPCO that the high level assessment of necessary operational and capital expenditures used to develop the Initial Plan budget is driven by asset age and assets past useful life not asset condition, as asset condition assessment data at that time did not support an increased capital plan.

   The new ACA methodology was finalized in March/April of 2018[69] and there would not have been sufficient and accurate asset condition data from the new CNAIM methodology under development at the time to be a key driver in the expenditure level in the Q3 2017 Penultimate Plan. EA Technology's detailed review of the 21 new asset health models are dated either December 2017 or January 2018.[70]

   It's AMPCO's view, asset age, not asset condition, drove the strategic parameters and expenditure levels in the Initial Capital Plan in Q1 2017 and Penultimate Capital Plan in November 2017.[71]

[65] Decision P23
[66] Decision P24
[67] 2B-Staff-73 - Figures include gross Renewable Enabling Improvement expenditures
[68] 2B A3 P7
[69] Transcript Volume 3 P123
[70] 2B-SEC-44 Appendix C to Appendix W
[71] 1A-CCC-1 Appendix A Slide 11

2. In the presentation to Toronto Hydro's Board of Directors on November 23, 2017 regarding the 2018 to 2020 Business Plan, aging assets was put forward as the first Capital Expenditure driver (along with City Growth and Climate Change Action Plan).[72] Deteriorating asset condition was not cited as a key driver to support Toronto Hydro's $2.75 billion Penultimate Capital Plan over the 2020 to 2024 period, with a 3.5% ceiling on the average annual distribution rate increase.[73] One possibility for not highlighting asset condition to the Board of Directors is that the ACA results at that time did not support an increase in capital spending. As discussed previously, the percentage of assets in very poor and poor condition at the end of 2016 (2%), compared to the 2014 ACA results that underpinned the 2015-2019 capital plan (6%) show that asset condition had substantially improved two years into the five-year capital plan. As discussed above, only partial information from the new ACA was available at this time.

3. In the 2015-2019 application (EB-2014-0116), Toronto Hydro emphasized age, specifically that 26% of Toronto Hydro assets are beyond their useful lives. Toronto Hydro's objective at that time was to reduce the backlog so that it can achieve a "steady state" where the percentage of assets beyond useful lives does not increase.[74]

   In the current application based on data at the end of 2017, 24% of Toronto Hydro's assets continue to operate beyond expected useful life and an estimated 9% will reach that point by 2025[75] assuming no planned or reactive capital investments.[76] As shown in Table 5 below[77], at the end of 2018, with planned and reactive capital investments since 2015, there is a further improvement to 23%.[78]

   Table 5 : Percentage of Assets Past Useful Life (APUL)

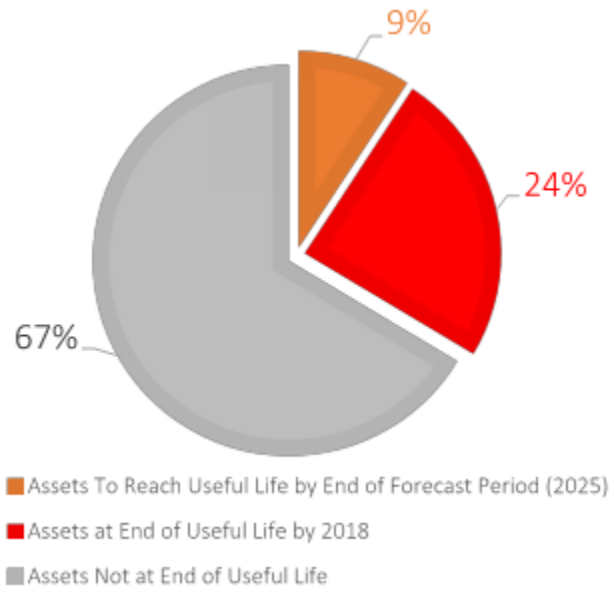
	2014	2017	2018
% Assets Past Useful Life	26%	24%	23%

   In its Argument in Chief in EB-2014-0116, Toronto Hydro argues that asset age drives the need for replacement as the percentage of assets beyond useful life increased from 22% in 2011 to 26% in 2014.[79] The opposite is true at this time. The percentage of assets beyond useful life has improved 3% since 2014.

[72] 1A-CCC-1 Appendix A Slide 29
[73] 1A-CCC-1 Appendix A Slide 11
[74] EB-2014-0116 2B E2 P21
[75] 1B-1-1 P11
[76] Transcript Volume 3 P125
[77] Year End Percentages
[78] U-AMPCO-133
[79] EB-2014-0116 Toronto Hydro AIC P7

Toronto Hydro identifies the percentage of assets that are at or past their useful life (24% at the end of 2017) and then translates that into a dollar asset replacement value.[80] The total asset population is also translated to a replacement value in order to establish a system level metric for use as a strategic indicator.[81]

The denominator used to calculate the percentage of assets past useful life is approximately $9.5 billion (two times the value of Toronto Hydro's 2020 rate base). The value of assets at end of useful life (numerator) is approximately $2.3 billion. This results in the 24% of assets at end of useful life by 2018 which is used to derive the APUL figure below.[82]



Based on the 2017 APUL data, Toronto Hydro's view in this application is that a significant proactive renewal program is necessary to prevent investment backlog from increasing.[83]

$2.3 billion is consistent with historical capital spending. AMPCO sees a direct link between the assets past useful life calculation and capital spend as it relates to development of the strategic parameters.

UMS Review of DSP Asset Management Practices

Toronto Hydro engaged UMS to perform a focused review and evaluation of the its asset

[80] Transcript Volume 3 P126
[81] JTC2.14
[82] JTC2.14
[83] Ex 1B T1 S1 P11

management practices as they relate to the formulation and execution of its DSP.[84] UMS assessed Toronto against the industry standard for asset maturity (ISO 55001) for 11 of the 24 ISO 55001 domains related to Operating Model, Processes and Enabling Technology.[85]

UMS completed personnel interviews and reviewed sections of Toronto Hydro's DSP. UMS did not directly examine Toronto Hydro's data.

UMS compared Toronto Hydro to a group of 14 electric utility business units on their asset management maturity per the ISO 550001 standard. The data for the comparator group was from work that UMS undertook from previous asset management assessments of North American utilities within the last five years. UMS did not undertake a comparator study for this review.

UMS concludes that against the 11 domains assessed, Toronto Hydro's average maturity level is a 2.1 out of a score of 4.[86] In order to be certified as compliant with the ISO 55001 standard a maturity level of 3 must be achieved across every ISO 55001 domain. Toronto Hydro did not achieve a maturity level of 3 (considered competence) on any of the 11 ISO 550001 domains.

UMS pointed out that Toronto Hydro's current optimization approach is manual, while the industry is moving to using tools which can provide a more comprehensive, programmatic optimization analysis that would be considered best practice.[87] As part of the manual process, different planners are placing incremental weights on different tools when developing portfolio and program capital expenditure proposals.[88]

AMPCO submits Toronto Hydro has more work to do to demonstrate to the Board that it is controlling costs through optimization, prioritization and pacing of capital-related expenditures using an optimization methodology that provides greater transparency and trade-offs.

Other Considerations

System Reliability is Improving Over Time

Since 2006, Toronto Hydro has invested almost $5 billion to modernize its grid.[89] Over the same period, Toronto Hydro's system reliability has significantly improved and continues to improve.

[84] Ex 2B, Section D, Appendix A P5
[85] Ex 2B, Section D, Appendix A 10
[86] Ex 2B, Section D, Appendix A P7
[87] Transcript Volume 9 P34-35
[88] 2B-Staff-67
[89] Toronto Hydro website – Reliability

The total number of outages on Toronto Hydro's system has decreased from 1,247,848 outages in 2006[90] to 869,713 outages in 2018.[91]

The frequency and duration of outages as measured by SAIFI and SAIDI has declined since 2006[92] as shown in Figures 1 and 2 below, and further declines in 2018.[93]

Figure 1: Historical SAIFI (Excluding Major Event Days and Loss of Supply)

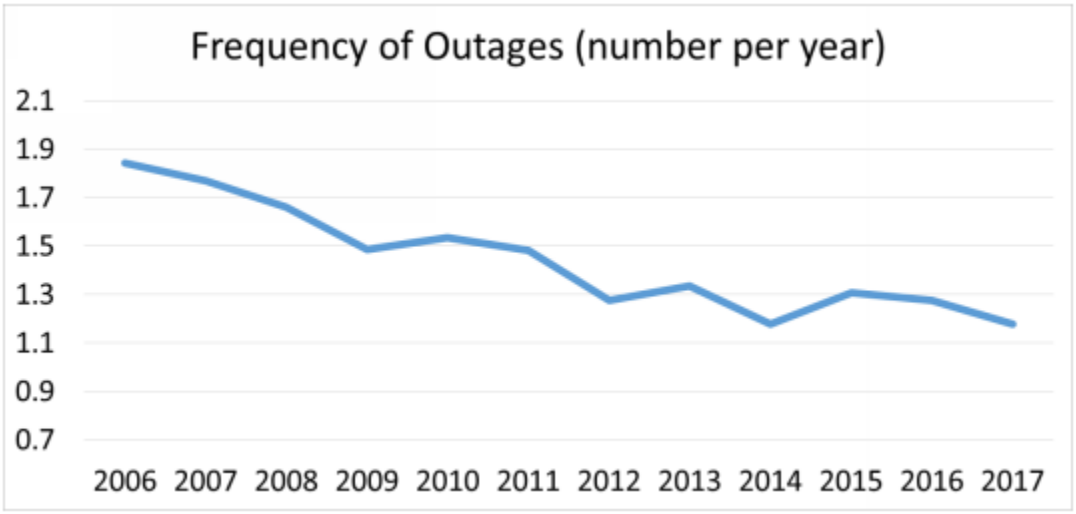
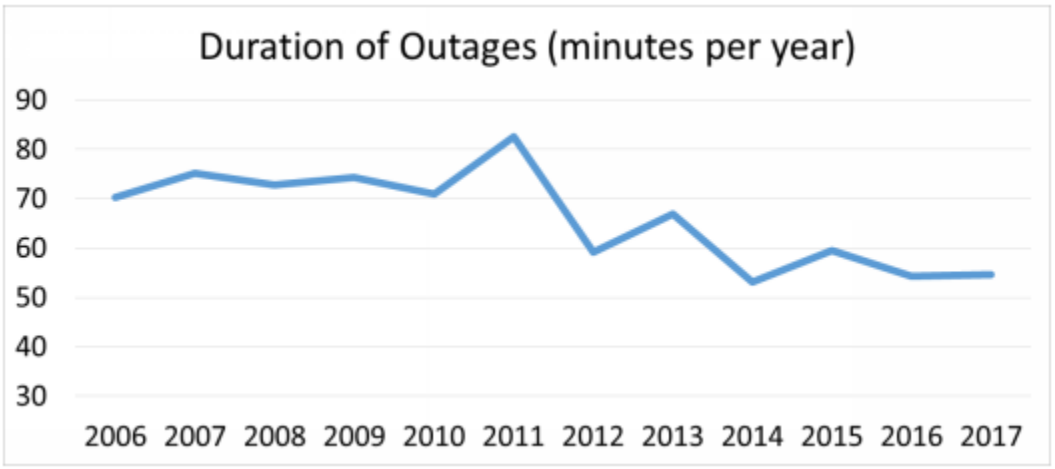


Figure 2: Historical SAIDI (Excluding Major Event Days and Loss of Supply)



[90] 1B-AMPCO-2
[91] JTC2.18
[92] Ex B T1 S1 P25 Figure 12 & P26 Figure 13
[93] U-1B-1 P23-24

In addition, based on CEA industry benchmarking, Toronto Hydro compares favourably to other LDCs on SAIDI, SAIFI and CAIDI for the years 2016, 2017 and 2018.[9495]

AMPCO submits the OEB needs to take Toronto Hydro's material reliability improvements since 2006 and the continued improvements over the past five years into consideration when setting investment levels for the 2020 to 2024 period.

Priority Defective Work Order Requests Not Accomplished on Time

Toronto Hydro prioritizes asset deficiencies identified as part of the work request process based on the urgency of the work and how quickly it needs to be resolved usually through asset repair or replacement. The work requests are classified into three categories (P1, P2, and P3). P1 requires resolution within 15 days; (ii) P2 requires resolution within 60 days; (iii) P3 requires resolutions within 180 days.

An audit of Maintenance and Stations Capital processes[96] identified that there were delays in addressing high priority P1 work orders in 2017 and this audit issue was assigned an Impact/Severity level of Medium. Specifically, the audit observed that only 27% of the P1 corrective/reactive work order requests were attained within the suggested timeline of 15 days, and the average attainment time of the remaining 73% of P1 work orders was 100 days[97], clearly exceeding Toronto Hydro's resolution timelines.

The audit indicates that the delay in resolution may have the following outcomes:

- potential to result in incidents
- such incidents may cost Toronto Hydro more than the maintenance activity originally planned to mitigate the issue
- may potentially cause disruptions to the capital program
- may result in outages to customers

There have been relative improvements for 2018 to 2019 to the percentage of P1 work requests that are attained within 15 days.[98] Toronto Hydro indicates it has placed additional emphasis on work request attainment, through its resources, management processes, measures, reporting, and short-interval controls.[99]

Given that defects can evolve to major asset outages that can impact delivery and there is a directional relationship between deficiencies, asset replacement and planned maintenance and outcomes for customers, AMPCO submits there should be custom operational/asset

[94] U-AMPCO-124
[95] 1C-3-6 P14
[96] K3.3 P56-63
[97] K3.3 P62
[98] J6.4
[99] J6.4

performance metric on Toronto Hydro's custom scorecard that tracks the percentage of P1 corrective/reactive work orders attained within the 15 day target and targets should be set for this metrics.

Consequence of Failure

Toronto Hydro utilizes customer interruption costs (CICs) which represent a measure of monetary losses for customers due to an interruption. AMPCO agrees with Board Staff that Toronto Hydro should be directed to complete the CIC study that it had intended to complete in advance of the current proceeding prior to its next cost-based application and how the outputs of the CIC study are used in the context of the CNAIM methodology.[100]

Risk Assessment - Probability of Failure

Toronto Hydro's probability of failure analysis includes ACA and Predictive Failure Modelling. Predictive failure modelling involves the derivation of hazard curves for each asset class.[101]

For Toronto Hydro, asset age is used as an input into the hazard rate calculation and Toronto Hydro's hazard rate distribution functions are calibrated to mean useful life values as defined in the 2009 Kinectrics Useful Life of Assets Report.[102] Mean Useful life values are also used separately as part of the APUL calculation. Toronto Hydro uses information from the predictive failure modelling combined with the APUL calculation to determine levels of expenditures.

AMPCO has already stated its concerns with the expected useful life values used by Toronto Hydro in that for some assets they are too low and give too pessimistic a view of when an asset needs to replaced. Best practice would be for Toronto Hydro's failure probability functions to be calculated or correlated with available historical failure data as the current hazard curves may suggest significantly higher failure rates at older ages compared to what is happening in the filed. Toronto Hydro does not track the age an asset fails.[103] Until Toronto Hydro reality checks its failure projections against recent failure history and recalibrates, more assets than necessary may be identified for replacement.

Project Related Comments

Underground System Renewal – Horseshoe

Toronto Hydro proposes to increase spending on the Underground System Renewal - Horseshoe[104] program from $420.65 million over the 2015 to 2019 period to $460.28 million over the 2020 to 2024 period, an increase of approximately $40 million.

[100] Board Staff Submission P73
[101] 2B D3 P23
[102] 2B-AMPCO-40
[103] 2B-AMPCO-20
[104] E6.2

Toronto Hydro indicates this pace of investment is necessary to maintain current average reliability on the underground system, sustain improvements in the number of feeders experiencing seven or more interruptions a year, continuously reduce the risk of PCB-contaminated oil leaks into the environment, and prevent asset-related risk on the underground system from increasing in an unsustainable manner over the long-term.[105]

Board Staff and SEC provided analysis showing that the quantity of assets Toronto Hydro proposes to replace as part of Underground System renewal - Horseshoe are beyond those that are in the HI4 and HI5 categories and this reflects an overstatement of the capital needs of the utility during the 2020-2024 Custom IR term.[106]

From a reliability perspective AMPCO submits an accelerated renewal rate pace is not justified. As shown below, reliability data does not support a 9.5% increase in spending over the test period. Specifically, the number of Customer Interruptions and Customer interruption minutes related to Underground Equipment has decreased by 7% and 20%, respectively, comparing 2018 data to the average over the 2013 to 2017 period. An investment pace consistent with the 2015 to 2019 period meets the project objectives and better controls costs and customer rate impacts.

1 **Defective Equipment - # Customer Interruptions**

Asset Class	2013	2014	2015	2016	2017	Avg 2013 to 2017	2018	Variance 2018 to Avg	Variance %
Overhead Equipment	130,781	151,656	174,224	125,565	123,765	141,198	85,490	- 55,708	-39%
Underground Equipment	230,893	215,884	243,577	231,043	207,357	225,751	209,134	- 16,617	-7%
Station Equipment	14,650	16,856	6,746	12,832	11,917	12,600	13,166	566	4%
Others	6,584	3,123	8,777	1,461	1,814	4,352	274	- 4,078	-94%
						383,901	308,064	- 75,837	-20%

2 **Defective Equipment - # Customer Interruption Minutes**

Asset Class	2013	2014	2015	2016	2017	Avg 2013 to 2017	2018	Variance 2018 to Avg	Variance %
Overhead Equipment	6,148,482	6,778,851	6,664,511	4,809,672	5,428,760	5,966,055	4,515,516	- 1,450,539	-24%
Underground Equipment	12,306,818	11,992,555	12,182,926	15,417,445	12,999,800	12,979,909	10,412,220	- 2,567,689	-20%
Station Equipment	1,270,515	1,661,919	445,515	1,108,094	578,333	1,012,875	1,091,387	78,512	8%
Others	111,306	679,034	377,888	173,181	11,930	270,668	88,025	- 182,643	-67%
						20,229,507	16,107,148	- 4,122,359	-20%

Overhead System Renewal

Toronto Hydro proposes to increase spending on the Overhead System Renewal[107] program from $190.63 million over the 2015 to 2019 period (including Overhead Infrastructure Relocation) to $265.67 million[108] over the 2020 to 2024 period, an increase of approximately $75 million.

Toronto Hydro replaced 14,155 overhead assets over the 2015 to 2019 period (10,701 poles, 582 overhead switches and 2,872 overhead transformers).[109] Toronto Hydro proposes to replace 18,940 overhead assets over the 2020 to 2024 period (11,530 poles, 710 overhead switches, and 6,700

[105] 2B-E6.2 P3
[106] Board Staff Submission P75-77
[107] 2B-E6.5 P3
[108] Overhead Infrastructure Relocation part of Overhead Circuit Renewal in 2020-2024
[109] U-AMPCO-130

overhead transformers).[110] AMPCO submits the total quantity of assets proposed are beyond those that are in the HI4 and HI5 categories resulting in an overstatement of capital needs.[111]

As shown below, reliability data does not support a 40% increase in spending over the test period. Specifically, the number of Customer Interruptions and Customer interruption minutes related to Overhead Equipment has decreased by 39% and 24%, respectively, comparing 2018 data to the average over the 2013 to 2017 period.[112] Specifically, reliability data for poles and overhead transformers does not support an accelerated renewal rate. AMPCO submits an investment pace consistent with the 2015 to 2019 period better aligns with customer preferences.

Overhead Defective Equipment - # Customer Interruptions

Asset Class	2013	2014	2015	2016	2017	Avg 2013 to 2017	2018	Variance 2018 to Avg	Variance %
Overhead Transformers	4,762	13,488	14,698	3,008	16,203	10,432	2,617	- 7,815	-75%
Overhead Switches	30,973	48,844	34,413	28,612	27,736	34,116	31,766	- 2,350	-7%
Poles	7,987	8,241	18,576	1,632	537	7,395	4,243	- 3,152	-43%
Pole Hardware	54,364	60,304	67,272	53,614	39,589	55,029	22,244	- 32,785	-60%
Others	32,695	20,779	39,265	38,699	39,700	34,228	24,620	- 9,608	-28%
						141,198	85,490	- 55,708	-39%

Overhead Defective Equipment - # Customer Interruption Minutes

Asset Class	2013	2014	2015	2016	2017	Avg 2013 to 2017	2018	Variance 2018 to Avg	Variance %
Overhead Transformers	375,465	344,721	296,073	171,421	661,599	369,856	331,914	- 37,942	-10%
Overhead Switches	570,616	1,202,851	1,103,537	1,096,546	593,341	913,378	1,029,739	116,361	13%
Poles	449,856	560,368	881,059	104,467	133,000	425,750	241,911	- 183,839	-43%
Pole Hardware	3,440,598	3,472,004	3,039,814	1,919,494	1,172,345	2,608,851	1,252,047	- 1,356,804	-52%
Others	1,311,947	1,198,907	1,344,028	1,517,744	2,868,475	1,648,220	1,659,905	11,685	1%
						5,966,055	4,515,516	- 1,450,539	-24%

Underground System Renewal – Downtown

Toronto Hydro has changed its asset replacement strategy for underground cables on the downtown underground distribution system from a reactive program to a proactive program. Toronto Hydro has implemented a new program, Underground System Renewal – Downtown, in its 2020-2024 capital budget with a 5-year capital budget of $122 million, on average $24.4 million per year. Toronto Hydro has not proposed a relative reduction in its Reactive Capital budget.

Copeland TS and ERP Disallowances

AMPCO supports SEC's analysis that determination that opening 2020 rate base should be reduced by $17.8M, reflecting a disallowance of the impact of cost certain overruns on the Copeland TS Phase 1 project ($9M) and the Enterprise Resource Planning (ERP) Phase 1 project (8.8M).[113]

The new ERP system was supposed to go live in 2016, but did not get done until late 2018.[114]One outcome of the project was that the existing enterprise systems were to be consolidated into one

[110] 2B-SEC-51
[111] 2B D1 Appendix C P64 Table C1
[112] 1B-AMPCO-7
[113] SEC Argument P
[114] Transcript Volume 5 P111

system so that data integrity can be improved and provide teams across Toronto Hydro access to one system with accurate and up-to-date information.[115] Inputs such as asset inspection data, nameplate details, location and duty information provided to the ACA algorithm, come from Toronto Hydro's ERP system and GIS databases. Toronto Hydro's delay in implementing the new ERP system means that improved data integrity was not achieved prior to the development of Toronto Hydro's $4.2 billion plan.

Fleet Utilization Rate for 2020 is Too Low

Toronto Hydro's fleet utilization rates are as follows:[116]

- 2015 Actual – 52%
- 2016 Actual – 49%
- 2017 Actual – 45%
- 2018 Bridge – 44%
- 2019 Bridge – 47%
- 2020 Forecast – 50%

Fleet Vehicle Utilization is tracked in terms of "standard working hours", defined as: the total hours the vehicle is outside its home zone during standard hours, divided by the total number of standard hours per work day. "Standard Hours" are between 7:30am – 3:30 pm during weekdays (excluding Statutory Holidays).

AMPCO does not agree with Toronto Hydro that its vehicle utilization rates are reasonable. The 2020 forecast of 50% is below 2015 actuals of 52%. Toronto Hydro has not undertaken any benchmarking of its fleet utilization to compare itself against other utilities or its own contractors.[117]

AMPCO agrees with Board Staff's conclusion that vehicles being in their home zone for half of a standard workday, does not reflect optimal utilization of its assets and if Toronto Hydro were to increase its utilization rate it would be able to manage with fewer vehicles over time. AMPCO supports Board Staff's 10% reduction ($4.2 million) to the fleet and equipment services $42.5 million budget.

Earnings Sharing Mechanism (ESM)

AMPCO supports the analysis of Board Staff that Toronto Hydro's ESM should be re-designed. The ESM should be asymmetrical and the methodology for determining whether there are earnings to share with ratepayers should result from a comparison of actual to deemed ROE.[118]

[115] 2B-D1-P27
[116] 4A-AMPCO-94
[117] Transcript Volume 6 P9-10
[118] Board Staff Submission P50

5.0 OPERATIONS, MAINTENANCE AND ADMINISTRATION (OM&A) COSTS, DEPRECIATION EXPENSES AND PAYMENTS IN LIEU OF TAXES (PILs) AMOUNTS

5.1 Is the level of proposed 2020 OM&A expenditures appropriate and is the rationale for planning choices appropriate and adequately explained?

Toronto Hydro has not included productivity savings of OM&A investments during its current plan into its 2020 test year OM&A. Toronto Hydro has not built in any productivity benefits from any new initiatives in its 2020 test year OM&A. Updated staffing information[119] shows a reduction in 2020 FTEs from 1517 to 1491, reflecting a reduction in compensation costs of approximately $3.2M.

AMPCO supports the analysis of SEC related to OM&A costs and agrees the OM&A forecast for 2020 should be reduced by at least $18.3M to reflect the impact of hiring delays ($3.2 M/$1.7M in OM&A), bad debt expenses ($2.4M), and an amount to reflect both annual productivity and efficiencies during the current Custom IR period, and incremental amounts that were not built into the 2020 test year budget ($14.2 M).

ALL OF WHICH IS RESPECFULLY SUBMITTED.

[119] J5.2 Appendix A