October 15, 2014

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 2015-2019 Electricity Rate Application
AMPCO's Interrogatories
Board File No. EB-2014-0116

Dear Ms. Walli:

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

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

Sincerely yours,

Adam White
President
Association of Major Power Consumers in Ontario

Encl.

Copies to: THESL
Intervenors

Association of Major Power Consumers in Ontario
www.ampco.org
65 Queen Street West, Suite 1510
Toronto, Ontario M5H 2M5
P. 416-260-0280
F. 416-260-0442

Toronto Hydro-Electric System Limited (THESL)
2015-2019 Electricity Rate Application
AMPCO Interrogatories

2B THESL Distribution System Plan (DSP) 2015-2019

2-AMPC0-1

Ref: Exhibit 2B

It is noted that expected rate impacts to Intermediate and Large Users are running at or below projected CPI over the application period.[1] It is also noted that projects that significantly enhance reliability measures can have a profound effect on reduced outage costs to high usage customer operations. This is conveyed by a number of Toronto Hydro's largest customer class who were invited to write in to support THESL's DSP, particularly underlining concerns over the cost of reliability and power quality events.[2]

The PSE reliability Benchmarking Study commissioned by THESL generally indicates while THESL's SAIDI performance is generally less than half the benchmark, SAIFI performance is significantly worse. As such, capital programs that address duration (response time, sectionalizing response improvements, contingency enhancement etc) rather than frequency (generally age related replacements) would be more discretionary when comparing THESL's current and projected performance against benchmarks. A table from that report [3] is provided below to illustrate this. (Note the spike in SAIDI and SAIFI due to the Dec 2013 ice storm).

[1] EB-2014-0116 Exhibit 1A Tab 2 Schedule 1 Table 8
[2] EB-2014-0116 Appendix A to Exhibit 1B, Tab 2, Schedule 7
[3] EB-2014-0116 Exhibit 1B Tab 2 Schedule 5 Appendix B Page 126 of 582

Toronto Hydro-Electric System Limited (THESL)
2015-2019 Electricity Rate Application
AMPCO Interrogatories

Table 15 Combined Sample: Econometric Reliability vs. Actual and Projected Reliability

Year	SAIDI (Econometric Benchmark)	SAIDI (THESL Value)	SAIDI (% Difference)	SAIFI (Econometric Benchmark)	SAIFI (THESL Value)	SAIFI (% Difference)
2005	124.13	104.89	-17%	0.77	2.01	+96%
2006	126.75	94.06	-30%	0.79	2.17	+101%
2007	129.43	117.00	-10%	0.80	2.27	+104%
2008	132.23	74.40	-58%	0.81	1.76	+78%
2009	134.30	174.17	+26%	0.81	1.86	+83%
2010	135.97	99.60	-31%	0.81	1.95	+88%
2011	148.96	85.80	-55%	0.82	1.62	+68%
2012	162.18	90.00	-59%	0.84	1.60	+64%
2013	166.50	1271.40	+203%	0.87	2.91	+121%
2014	169.34	71.40	-86%	0.87	1.58	+60%
2015	171.13	73.80	-84%	0.88	1.55	+57%
2016	172.81	70.20	-90%	0.89	1.44	+48%
2017	174.92	67.20	-96%	0.90	1.36	+42%
2018	177.04	64.80	-101%	0.91	1.27	+34%
2019	179.14	61.20	-107%	0.92	1.19	+26%

The same benchmarking study also indicated that "total *cost econometric benchmarking results indicate the following findings.*

1. The historical total cost levels of Toronto Hydro are below benchmark expectations at a 90% confidence level when using a dataset that includes both Ontario and U.S. utilities.

2. the projected total cost levels during the Custom IR period remain below the benchmark predictions, although they do converge towards benchmark expectations, and the "statistically below expectations" conclusion is no longer applicable at a 90% confidence level."[4]

For these reasons, constraints of time, and the fact most of the System Renewal Investment programs were deliberated at length during EB -2012-0064 System Renewal Investments was not review.

General

"Non-renewal programs are also expected to improve system and operational performance during storm events. For example, Feeder Automation (E7.3) is expected to significantly improve fault isolation, location and restoration on feeder trunks, simplifying restoration efforts during certain types of major

[4] EB-2014-0116 Exhibit 1B Tab 2 Schedule 5 Appendix B Page 81 of 582

Toronto Hydro-Electric System Limited (THESL)
2015-2019 Electricity Rate Application
AMPCO Interrogatories

storm events and freeing up resources for reactive repairs on lateral sections of feeders. Targeted, high-value programs such as Contingency Enhancement (E7.1), Downtown Contingency (E7.7) and Design Enhancement (E7.2) are expected to improve system performance during storms by ensuring that operators and crews have full flexibility to transfer and restore load and by hardening vulnerable parts of the system with more optimal fusing arrangements and the installation of assets such as tree-proof overhead conductors" [5] All of these stated benefits improve SAIDI . They are primarily designed to facilitate rapid response after the event has occurred .

a) Please identify which Capital Investments have reliability as their primary or secondary drivers where that reliability improvement directly affects SIADI?

b) Figure 1 and Figure 4 Page 8 Section 2B- Original – SAIDI and SAIFI Projections of a Run to Failure Approach.

   a. Please provide comparison forecasts for each reliability metric for the proposed CIR without the impacts due to Feeder Automation (E7.3), Contingency Enhancement (E7.1), Downtown Contingency (E7.7) and Design Enhancement (E7.2)

   b. Please identify the total man hour commitment for the total capital project program[6] in each of the application years.

2-AMPC0-2

Ref: System Pressures Critical Issues: Climate Change

"An AECOM-Toronto Hydro report entitled Future Impacts of Climate Change on Toronto Hydro's Distribution System (E8.8, Appendix A) concludes that weather and climate change can be expected to impact the reliability of the distribution system going forward, and that Toronto Hydro will be required to manage assets that may not have been designed for future climate conditions. " [7]

I think we can all agree with that statement however the extension of this critical issue to THESL's distribution system may be premature. Consider the following….

[5] EB-2014-0116 Exhibit 2B Section 00 Page 11 Lines 8-16
[6] EB-2014-0116 Exhibit 2A Tab 6 Schedule 2

[7] EB-2014-0116 Exhibit 2B Section 0.0 page 10

Toronto Hydro-Electric System Limited (THESL)
2015-2019 Electricity Rate Application
AMPCO Interrogatories

The Report goes on to states in the Section on Toronto Hydro Actions to Date – Further Work that "*However, better projections of the likely frequency and intensity of major storm events, freezing rain, and wind are required to better define the magnitude of the likely impacts on the distribution system;"*[8]

The AECOM report also states *"Toronto Hydro has taken the initial steps in its journey toward building a resilient network which supports the broader resilience of the City of Toronto. However, there are limitations in Toronto Hydro's current understanding of its potential network vulnerabilities in the face of climate change. Notably, much of the work to date* ***remains at a preliminary phase*** *, and further work is still required to understand the impacts of a changing climate, including how the course of climate change will evolve, as well as developing, prioritizing, costing and financing the potential adaptation solutions to enhance the resilience of the electrical distribution system to climate change."*[9] *(My emphasis)*

For its part THESL indicates that it will undertake engineering studies *"to focus specifically on identifying areas of the distribution system that are vulnerable to extreme weather and climate change …."*[10]

a) In light of the above please explain why any program drivers to improve the systems weather response and/or incremental expenditures made in advance of follow up studies are not premature?

b) Please identify any program or incremental capital that is being used to "harden" THESL's distribution System in response to the "Critical Issue of Climate Change" over the application period.

2.0-AMPCO-3

Ref: E5.5 System Access Investments, Accommodating DG

"*Toronto Hydro projects that 626MW of DG will connect to the distribution system by the end of 2019"* [11]
Has this forecast been endorsed by the OPA?

a) Please identify any THESL capital contributions required for the elimination of Transmission Constraints[12] for DG by Hydro One at the relevant TS's supplying THESL?

[8] EB-2014-0116 Exhibit 2B E8.8 Appendix A AECOM Report Page 32
[9] EB-2014-0116 Exhibit 2B E8.8 Appendix A AECOM Report Page 32
[10] EB-2014-0116 Exhibit 2B Section 0.0 page 11 Lines 19, 20 21
[11] EB-2014-0116 Exhibit 2B Section E 3.3.3 page 5
[12] EB-2014-0116 Exhibit 2B E3.3.2.1 – Transmission Constraints – page 5

Toronto Hydro-Electric System Limited (THESL)
2015-2019 Electricity Rate Application
AMPCO Interrogatories

b) Will future DG connections be required to install proposed SCADA and monitoring equipment at their site at their cost as part of THESL connection requirements? If not, why not?

c) Will the "bus–tie reactor "upgrades to address short circuit issues at Richview TS require any capital contribution from DG proponents? If not, why not? Does this project meet the DSC requirements Section 3.3.2 of the code to qualify as Renewable Enabling Improvements?

d) Where load generation ratios have increased beyond the one third rule does THESL plan to recover any anti- islanding protection modification costs from the existing DG's? If not, why not.

2.0-AMPCO-4

Ref: E7.1 System Service Investments, Contingency Enhancement

a) Preferred Alternative (i)[13]- Please clarify if the do nothing option changes if reliability due to aging assets is addressed in other capex programs.

b) Please clarify the basis for expectations in frequency of major storms and impact to distribution system given the previous concerns regarding premature conclusions on the effect of climate change on the distribution system.

c) Please clarify whether contingency issues related to sufficient tie and sectionalizing , upgrading under-sized loop conductors and upgrading undersized trunk egress cable could be addressed independent of SCADA control. If so why is this option not considered?

d) What is the expected impact to SAIDI metrics from this program?

2.0-AMPCO-5

Ref: E7.2 Design Enhancement

a) E7.2.1- Preferred Alternatives[14] - Why is tree trimming not a costed option and instead dismissed out of hand as not customer value driven?

b) What is the impact on tree related outages due to the ice storm in 2013 on the outage rates and trending in Figure 5 and Figure 6 on page 15 Exhibit 2B Section E7.2

[13] EB-2014-0116 Exhibit 2B Section E7.1 Lines 4 ,5
[14] EB-2014-0116 Exhibit 2B Section E7.2.1 page 3 Lines 6-12

Toronto Hydro-Electric System Limited (THESL)
2015-2019 Electricity Rate Application
AMPCO Interrogatories

2.0-AMPCO-6

Ref: E7.3 Feeder Automation

a) What is the expected impact to THESL SAIDI and SAIFI metrics following implementation of this program particularly with respect to SAIDI benchmark figures presented by the PSE Benchmarking study?[15]

b) Could you please provide figures on the percentage contribution of non asset related outages to the total figures for CI and CHI presented over the application years for both the Horseshoe and Downtown areas?

c) Please clarify the basis for expectations in frequency [16] of major storms and impact to distribution system given the previous concerns regarding premature conclusions on the effect of climate change on the distribution system.

d) As the feeder automation system mitigates impacts of defective equipment reducing the rate of asset replacements and to maintain a moderate pace of system renewal [17] can a paced execution strategy for the DSP still be attainable without this program without significantly impacting SAIFI and SAIDI?
(Typo in labelling preferred alternatives - Exhibit 2B E7.3.1 page 3 Line 10 is not an option, Line 4 then makes sense.

e) Will the feeder automation system address feeder restoration issues identified in the DG Section 5.5 related to net feeder loading on feeders[18] with a heavy ratio of load to DG capacity?

f) Please provide statistics related to accidents or near misses that would support inferred Safety improvement from the elimination of "risky" manual switching.[19]

2.0-AMPCO-7

Ref: E7.4 Overhead Momentary Reduction

[15] EB-2014-0116 Exhibit 1A Tab 2 Schedule 1
[16] EB-2014-0116 Exhibit 2B E7.3 page 2 Lines 1,2
[17] EB-2014-0116 Exhibit 2B E7.3.3.1 Page 19 table 4
[18] EB-2014-0116 Exhibit 2B E5.5 Page 10 Lines 27-29, Page 11 Lines 1-5
[19] EB-2014-0116 Exhibit 2B E7.3.3.1 Page 18 table 3

Toronto Hydro-Electric System Limited (THESL)
2015-2019 Electricity Rate Application
AMPCO Interrogatories

a) Please provide the root cause analysis identifying the cause of feeder interruptions impacted by this program.

2.0-AMPCO-8

Ref: E7.7 Downtown Contingency

a) Has any mitigation activity taken place to address any of the Downtown Contingency Outages listed.[20] If so how is that accounted for in the estimation of improvement in reliability for this program?

2.0-AMPCO-9

Ref: E7.8 Customer Owned Station Protection

a) Please explain THESL's rationale for proceeding with Program E.7.8 – Customer Owned Substation Protection in light of Section 4.1.7 and 4.1.8 of the DSC that indicates that it is the customer responsibility for correction of adverse impacts to the Distribution System?

b) Please comment on the potential for THESL liability under the Audit Phase of the COSP program involving customer owned , operated and maintained equipment for unidentified deficiencies that end up failing.

c) *"The failure of customer-owned equipment resulted in approximately 17 interruptions per year."*[21] Was any corrective action ordered of the customers related to these incidents under Section 4.1.7 of the DSC. If not, why not?

d) *"Currently, 22% of the visited customer-owned substations in Horseshoe area were identified as being poorly maintained or past their useful life. These substations can create safety hazards for both the general public and Toronto Hydro employees"*[22] Where any safety hazards identified by THESL staff that required notice to ESA? If not, is it overstating the secondary driver of this program to include "public safety" .

[20] EB-2014-0116 Exhibit 2B E7.7 Page 11 table 5
[21] EB-2014-0116 Exhibit 2B E7.8 page 3
[22] EB-2014-0116 Exhibit 2B E7.8 page 3

Toronto Hydro-Electric System Limited (THESL)
2015-2019 Electricity Rate Application
AMPCO Interrogatories

2.0-AMPCO-10

Ref: E7.9 Stations Expansion

a) Please identify any capital contribution amounts anticipated to be received by THESL or paid to HONI as a result of the stations expansion program.

2.0-AMPCO-11

Ref: E7.11 Energy Storage Systems

a) What are the environmental risks, if any, associated with each type of storage technology contemplated?

b) What is the anticipated cost of addressing the system benefits in a more conventional manner?

c) What is the level of risk associated with the technology and technical resources required?

d) Please clarify whether incremental land costs are included in the total project costs?

e) Where Power Quality problems are mitigated from the program is THESL currently meeting PQ standards in this area? If so will there be any capital contributions from PQ impacted customers who experience improvement of PQ beyond standard?

f) What assumptions where made with respect to reliability impacts to CI and CHI in the program cost analysis?

2.0-AMPCO-12

Ref: E6.20.1 System Renewal Investments Reactive Capital

a) Please provide the analysis that led to your forecast prediction for the number and cost of corrective work requests in the application years, particularly in light of the need to increase program dollars over the forecast years despite a substantial system renewal program over these same years. [23]

2.0-AMPCO-13

[23] EB-2014-0116 Exhibit 2B Section E6.2 Page 6 Table 3

Toronto Hydro-Electric System Limited (THESL)
2015-2019 Electricity Rate Application
AMPCO Interrogatories

Ref: D3 FIM Model

a) Footnote Reference[24]-Please discuss THESL's interpretation of the OEB Decision and Order referenced in the footnote - "FIM Inputs may only come at significant cost. "

b) Please itemize any changes or refinement to the FIM input and algorithm calculation of net benefit and net avoided risk cost from Not in Kind and Like for Life situations over that presented in the FIM model in EB-2012-0064.

c) Has THESL researched any new evidence since EB-2012-0064 related to the estimation of customer interruption costs used in the FIM model? If so please state the reference and applicability to the selection of THESL's CIC values within the FIM.

d) Please confirm the asset groups where the FIM model is used in the current application and note any changes in asset groups since EB-2012-0064.

2.0-AMPCO-14

Ref: Exhibit 2B - Section D3 Page 14

Preamble: Customer Interruption Costs (CIC) values are calculated in two parts: the Event cost and the Duration cost. The Event cost represents the impact due to the occurrence of the outage whereas the Duration cost represents the costs incurred as the length of the outage increases. Toronto Hydro adopted $30 per kVA (peak load) as the Event cost to represent the CIC value due to the initial period of the outage, and $15 per kVA (peak load) per hour to represent the CIC value due to the increasing duration of the outage. These values, which were discussed at length in Toronto Hydro's 2012-2014 rates application, are established through work with consultants as well as the analysis of results from reliability valuation studies.

a) Below (Table 1 – Customer interruption cost breakdown) is list of studies referred to in Toronto Hydro's 2012-2014 rates application (Ex-2012-064 Tab 6F, Schedule I-27). Please confirm if these studies are still relied on in representing the Event and Duration costs for CIC in this application?

b) If yes, please provide a full copy of each of the Study reports. If no, please provide a list and copy of the studies used in determining THESL Duration and Event cost for this application.

[24] EB-2014-0116 Exhibit 2b Section D3 Footnote 2 Page 14

Toronto Hydro-Electric System Limited (THESL)
2015-2019 Electricity Rate Application
AMPCO Interrogatories

Table 1 – Customer Interruption Cost Breakdown

	Study Name	Duration Cost ($/kVA)	Event Cost ($/kVA)	Reference	Page Number on PDF
A	Interruption Costs Netherlands	8.721	6.579	N/A	4
B	THESL	15	30	N/A	N/A
C	The Use of Customer Outage Cost Surveys in Policy Decision-Making	14.436	35.982	N/A	5
D	Consumer Expectations of DNOs and WTP for Improvements in Service	22.539	8.769	Table 29	35
E	Economic Valuation of Electrical Service Reliability	17.631	86.652	N/A	9
F	How to Estimate the Value of Service Reliability Improvements	50.94	42.93	Table 1	3

c) Please confirm if THESL is aware of any other utilities that have derived customer interruption costs values for project evaluation purposes. If yes, please provide a list of these utilities?

d) Please provide customer interruption cost values derived by these other utilities and include supporting evidence.

e) Please confirm, the studies quoted in the table in part (b) use peak load as a proxy for the number of connected customers? If yes, please provide the supporting evidence. If no, please discuss the methodology used in the studies use and include supporting evidence.

2.0-AMPCO-14

Ref: Exhibit 2B - Section D3 page 14

Preamble: As part of on-going enhancements to the Feeder Investment Model, Toronto Hydro is planning to conduct a CIC study to provide more specific breakdown of CIC values within the FIM.

Toronto Hydro-Electric System Limited (THESL)
2015-2019 Electricity Rate Application
AMPCO Interrogatories

a) Please provide an estimate of timing when Toronto Hydro will be conducting a CIC study? When will this study be completed?

b) Has Toronto Hydro conducted any CIC studies after Ex-2012-0064 and up to this point in time? If yes, please provide a copy of such studies. If no, why not?

c) Has Toronto Hydro conducted any refining of the FIM inputs from Ex-2012-0064 and up to this point in time? If so, please provide the changes and explain?

2.0-AMPCO-16

Ref: Exhibit 2B - Section D3 page 14

Preamble: In these values [customer interruption costs] on a kVa and kVA-hour basis, no distinctions are made between customer by customer classes.

a) Please discuss why no distinctions are made between customer classes when determining customer interruption costs?

2.0-AMPCO-17

Ref: Exhibit 2B – Section D3 page 14 and Section 1E page 4

a) Please update Table 1 (Exhibit 2B - Section 1E) if the peak value used as the proxy for number of connected customers was reduced by 25%.

b) Please update Table 1 (Exhibit 2B - Section 1E) if average peak period load was used as the proxy for number of connected customers.

2.0-AMPCO-18

Ref: Exhibit 2B – D3 Page 14

Preamble: THESL states the peak load is used as a proxy for the number of connected customers as it represents the full number of customers that may have needed power during an outage.

Toronto Hydro-Electric System Limited (THESL)
2015-2019 Electricity Rate Application
AMPCO Interrogatories

a) Please provide the total number of outages (due to equipment failure) that occurred in the on-peak period, and the total number of outages (due to equipment failure) that occurred off- Peak. Please provide average on-peak outage duration, average off-peak outage duration, and overall average outage duration. Please complete the table provided below.

Line No.	Description	2009 Actual	2010 Actual	2011 Actual	2012 Actual	2013 Actual	2014 Budget
		(a)	(b)	(c)	(d)	(e)	(f)
	Due to Equipment Failure						
1	**Outages during On-Peak**						
2	**Outage during Off-Peak**						
3	**Total Outages**(line 1 + line 2)						
4	**Percent Outage during On-Peak** (line 1) / (line 3)						
5	**Percent Outage during Off-Peak** (line 2) / (Line 3)						
6	**Average Duration of Outages On-Peak**						
7	**Average Duration of Outages Off-Peak**						
8	**Average Duration of Outages Overall**						

b) Please update Table 1 “Capital Investment by Categories” (Exhibit 2B - Section E1) if the peak value used as proxy for number of connected customers in the FIM was multiplied by the percent of outages that occurred during on-peak in 2013 (Column e line 4 from part a)

Toronto Hydro-Electric System Limited (THESL)
2015-2019 Electricity Rate Application
AMPCO Interrogatories

2.0-AMPCO-19

Ref: Exhibit 2B – D3 Page 14

Preamble: THESL states the peak load is used as a proxy for the number of connected customers as it represents the full number of customers that may have needed power during an outage. The Interruption Tracking Information System stores historical information and provides insight into the number of customers affected by an outage event and the duration of each event.

a) Please provide the number of customers that were affected by outages (due to equipment failure) that occurred On-peak and the number of customers affected by outages due to equipment failure that occurred off-Peak for periods 2009-2014. Please also provide the peak load proxy for number of customer affected by the outages for periods 2009-2014. Table below provided, please complete.

Line No.	Description	2009 Actual	2010 Actual	2011 Actual	2012 Actual	2013 Actual	2014 Budget
		(a)	(b)	(c)	(d)	(e)	(f)
	Due to Equipment Failure						
1	Customer affected by Outage On-Peak						
2	Customer affected by Outage Off-Peak						
3	Total Customer affected by Outage (line 1 + line 2)						
4	Percent Customer affected by outage On-Peak (line 1) / (line 3)						
5	Percent Customer affected by outage Off-Peak (line 2) / (line 3)						

Toronto Hydro-Electric System Limited (THESL)
2015-2019 Electricity Rate Application
AMPCO Interrogatories

2.0-AMPCO-20

Ref: Exhibit 2B – D3 Page 14 and page 19

Preamble: The Interruption Tracking Information System stores historical information and provides insight into the number of customers affected by an outage event and the duration of each event.

a) Given the Interruption Tracking Information System (IT IS) provided insight into the actual number of customers affected by an outage event, why does THESL use the peak load as a proxy for the number of connected customers as an input for the FIM? Please explain.

2.0-AMPCO-21

Ref: Exhibit 2A, Tab 10, Schedule 2 Page 11 Table 2

Preamble: Table 2 provides the percentage contribution of Defective Equipment to SAIFI & SAIDI.

a) Please provide a further breakdown of the causes of Defective Equipment that make up the percentages shown in Table 2.

2.0-AMPCO-21

Ref: Exhibit 2A, Tab 10, Schedule 2

a) Please complete the following table excluding loss of supply.

	2009	2010	2011	2012	2013	2014
# Interruptions						
# Customers Interrupted						
Customer Hours Interrupted						

b) Please provide THESL's SAIDI and SAIFI targets for the 2015 to 2019 period.