December 18, 2018

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 Interrogatories
Board File No. EB-2018-0165

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,

(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-2018-0165

Toronto Hydro-Electric System Limited

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

AMPCO Interrogatories

1A-AMPCO-1

Ref #1: 1A-3-1 P8
Ref #2: Appendix 2-K

At Ref#1, THESL provided an Organizational Chart.

a) Please provide the Organizational Structure that reflects the 67 Management positions in 2020.

1B-AMPCO-2

Ref: 1B T1 S1 P25 Figure 12

a) Please provide the number of outages for each of the years 2006 to 2018.

b) Please confirm an outage results in a customer interruption. If not, please explain.

1B-AMPCO-3

Ref: 1B T1 S1 P25 Figure 12

a) Please provide the total duration of outages in minutes for each of the years 2006 to 2018.

b) Please confirm outage minutes is the same thing as customer interruption minutes. If not, please explain.

1B-AMPCO-4

Ref: 1B T2 S4 P5

a) Please provide a copy of IEEE 1366-2012 – IEEE Guide for Electric Power Distribution Reliability Indices.

b) Please provide a copy of any reliability benchmarking reports that THESL has participated in within the last 5 years.

1B-AMPCO-5

Ref: 1B T2 S4 P7-8

a) Does THESL set annual forecast levels for number and duration of Scheduled Outages?

b) If yes to part a), please provide forecast and actuals for Scheduled Outages for the years 2013 to 2018.

1B-AMPCO-6

Ref: 1B T2 S4 P11 Table 2

a) Please confirm Table 2 excludes MEDs.

b) For each Cause Code in Table 2 plus add the cause code Major Event Days, please provide the percentage contribution to SAIFI and SAIDI for each of the years 2013 to 2018.

c) For each Cause Code in Table 2 please provide the # of interruptions and # of interruption minutes by year for each of the years 2013 to 2018 and the totals for each year.

d) For the Defective Equipment Cause Code, please provide the number of interruptions and # of interruption minutes by equipment type contributing to Defective Equipment for each of the years 2013 to 2018 and totals for each year.

e) Please discuss if the number of Defective Equipment interruptions equates to the number of asset failures each year. If not please provide the number of asset failures each year for each of the years 2013 to 2018.

f) With respect to Defective Equipment, please identify the equipment types that are the most critical when they fail and why.

g) Please discuss if the restoration approach, prioritization and timing for critical assets differs from non-critical assets.

h) Please confirm data for Major Event Days, Adverse Weather, Lightning and Tree Contacts is not included under Defective Equipment.

i) Please confirm data for Major Event Days, Adverse Weather and Lightning is not included under Tree Contacts.

1B-AMPCO-7

Ref: 1B T2 S4 P18-21

Please complete the excel spreadsheet labelled 1B-AMPCO-7.

1B-AMPCO-8

Ref: 1B T2 S4 P19 Figure 21

Please provide a breakdown of the asset types that contribute to “Others” and provide the number of customer interruptions for each asset type.

1B-AMPCO-9

Ref: 1B T2 S4 P19 Figure 22

Please provide a breakdown of the asset types that contribute to “Others” and provide the number of customer interruption minutes for each asset type.

1B-AMPCO-10

Ref: 1B T2 S5 P1 Appendix 2-G

a) Please provide the reliability chart for the years 2008-2012.

b) Please provide data for 2018.

1C-AMPCO-11

Ref: 1C T2 S1 P17

a) Please provide the charter for each the three committees (Audit Committee, Corporate Governance and Nominating Committee, Human Resources and Environment Committee).

b) Please provide the members of each of the three committees.

2A-AMPCO-12

Ref: 2A T1 S1 P4

Please provide forecast versus actual depreciation for the years 2015 to 2018.

2A-AMPCO-13

Ref: 2A T4 S1 P3

Please provide the inflationary component amounts for the CIR Filing Plan related to the System Access, System Renewal, System Service and General Plant categories included in Appendix 2-AB.

2A-AMPCO-14

Ref: 2A T4 S3 Appendix 2-AB

Please add 2015 OEB Approved to the table.

2A-AMPCO-15

Ref #1: 2A T4 S2

Ref #2: EB-2014-0116 2B-E-S6

a) Please map the Programs at Reference #1 (Appendix 2-AA) to the Program Index and Name at Reference #2.

b) Please list all programs from EB-2014-0116 that have been deferred or cancelled.

c) Appendix 2-AA: Please provide the capital contributions forecast versus actual for each of years 2015 to 2018.

d) Appendix 2-AA: Please provide the forecast capital contributions for each of years 2019 to 2024.

e) Please confirm Appendix 2-AA is net of capital contributions.

2A-AMPCO-16

Ref: 2A T4 S2

a) Please identify all programs that are new in EB-2018-0165.

b) Please provide the priority ranking for each program.

2B-AMPCO-17

Ref: Ex 2B Section A2 P5

Please define original serviceable life.

2B-AMPCO-18

Ref: Ex 2B Section C2 P20

a) Please define material deterioration condition.

b) Please define end of serviceable life condition.

2B-AMPCO-19

Ref: Ex 2B Section A4 P10

Please define Assets Past Useful Life.

2B-AMPCO-20

Ref: 2B Section A4 P10

THESL indicates the most significant driver of investment in Toronto Hydro's DSP is asset failure and failure risk due to a continuing backlog of deteriorating and obsolete assets. (other drivers)

a) Please provide the asset classes that THESL has multi-year failure data for.

b) Does THESL track the age an asset fails for all asset classes?

2B-AMPCO-21

Ref: 2B Section A4 P10 Figure 3

THESL indicates that as of the end of 2017, approximately 24 percent of assets will be in-service past their useful life, as shown in Figure 3 below.

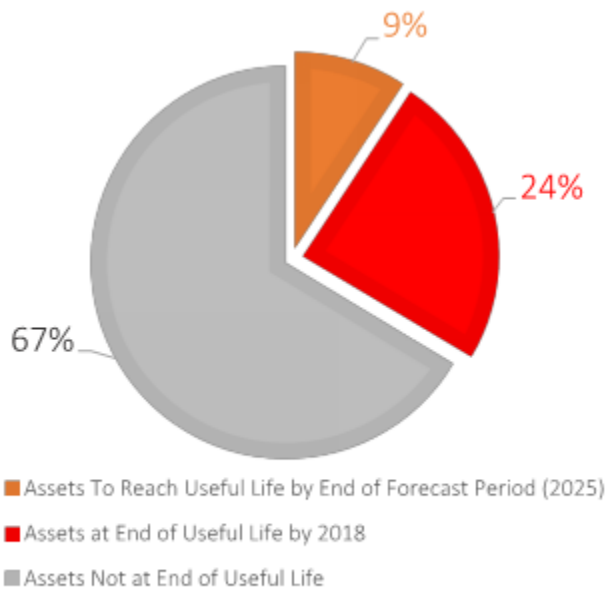

Figure 3: Percentage of Assets Past Useful Life

a) Please provide the calculation that underpins the percentages in Figure 3.

b) Please provide a pie chart that shows the Percentage of Assets with Health Index Scores of H14 and HI5 by 2018; Percentage of Assets with Health Index Scores of H14 and HI5 at the end of Forecast Period (2025); and Percentage of Assets that do not have a Health Index Score of H14 or HI5.

c) Please provide the calculation that underpins part b).

2B-AMPCO-22

Ref: 2B Section A6 P33 Table 7

a) Please provide the percentage of capital that is undertaken by external contractors for each of the years 2015 to 2018 and forecast for 2019 to 2024.

b) Please provide the percentage of planned capital budget compared to reactive capital budget for each of the years 2015 to 2018 and forecast for 2019 to 2024.

c) Please provide the percentage of planned capital work executed as planned for each of the years 2015 to 2018.

2B-AMPCO-23

2B Section A6 P33 to P41

a) Please list the programs where the pace of work is being maintained.

b) Please list the programs where the pace of work is being accelerated.

c) Please list the programs where the pace of work is being scaled back.

2B-AMPCO-24

Ref:2B Section C2 P10

a) Please provide the number of box construction poles replaced for each of the years 2013 to 2018 and forecast to be replaced for each of the years 2019 to 2024.

b) Please provide the cost to replace box construction poles for each of the years 2013 to 2018 period and the forecast cost for the years 2019 to 2024.

c) Please calculate the improvements expected in the average outage restoration time for 22,700 downtown residential and small business customers.

2B-AMPCO-25

Ref:2B Section C2 P11

a) Please provide the original number of network units in its downtown secondary distribution network that are not water tight.

b) Please provide the cost to replace 225 non-submersible protectors during the 2015-2019 period.

c) Please provide the forecast of the number of network units in its downtown secondary distribution network that are not water tight at the end of 2019 and 2024.

d) Please provide the cost to replace 240 non-submersible protectors during the 2020-2024 period.

2B-AMPCO-26

Ref:2B Section C2 P23

Please provide the cost per km of trimming and clearing vegetation located near overhead feeders for the years 2015 to 2018 and provide the calculation.

2B-AMPCO-27

Ref: 2B Section D1 P13

THESL indicates age and ACA are leading indicators of failure.

Please provide the asset classes where THESL has determined from the data that the majority of units at or past useful life have condition ratings of H14 or H15.

2B-AMPCO-28

Ref: 2B Section D2 P12 Table 1

a) Under the Condition Column, please provide the number of assets that correspond to Overhead (11%), Underground (3%), Network (5%), and Stations (8%) and Total (9%).

b) Please provide the Condition asset numbers and percentages at the end of 2024 for Overhead, Underground, Network, Stations and Total.

c) Under the Age Column, please provide the number of assets that correspond to Overhead (17%), Underground (25%), Network (24%), and Stations (37%) and Total (24%).

d) Please complete Table 1 Asset Management Performance Indicators by System Type based on the data that underpins the capital plan in EB-2014-0116.

2B-AMPCO-29

Ref: 2B Section D2 P21

Please provide the cost impact of new and revised standards over the 2015 to 2019 period.

2B-AMPCO-30

Ref: 2B Section D1 P25

Please provide a copy of ISO55000, the International Standard for Asset Management.

2B-AMPCO-31

Ref: 2B Section D2 P44 Figure 26 & Figure 27

a) Please identify the one station in Figure 26 that is forecast to be near capacity in 2020 and provide the forecast date it will be at capacity.

2B-AMPCO-32

Ref: 2B Section D3 P4 Table 1

For each Planned Maintenance Activity:

a) Provide the OEB's Minimum Requirements.

b) Identify changes in the cycle from EB-2014-0116.

c) For each change in part b) please provide an explanation and the expected outcome of the change.

2B-AMPCO-33

Ref: 2B Section D3 P8 Figure 1

a) For each of the years 2015 to 2018, please provide the number of deficiencies per year from Preventative & Predictive Maintenance; Field Operations & Customer Communications; and Emergency Response.

2B-AMPCO-34

Ref: 2B Section D3 P9 Figure 2

THES indicates work requests are classified into P1 (15 days to resolve), P2 (60 days to resolve) and P3 (180 days to resolve).

a) How does THESL track completion of these work requests?

b) Please provide the accomplishment rate of work requests for 2015 to 2018.

c) How does THESL use this data in its ACA?

2B-AMPCO-35

Ref: 2B Section D3 P9

Please complete the attached excel spreadsheet.

2B-AMPCO-36

Ref: 2B Section D3 P10

THESL does not anticipate a decline in corrective maintenance, emergency maintenance or reactive capital in the forecast period.

Does THESL anticipate a decline in preventative maintenance or predictive maintenance? Please explain.

2B-AMPCO-37

Ref: 2B Section D3 P13 to P19

a) For each of the asset categories in Tables 2, 3,4,5 and 6, please advise of any changes in Asset Replacement Practices since 2014.

b) Please provide the number of poles replaced on an individual basis by pole type for each of the years 2013 to 2018 and forecast for each of the years 2019 to 2024.

c) Please provide the number of poles replaced as part of area rebuilds for each of the years 2013 to 2018 and forecast for each of the years 2019 to 2024.

2B-AMPCO-38

For each of the asset categories in Tables 2 to Table 6, please provide the asset renewal rate by asset class for each of the years 2015 to 2019 and forecast for 2020 to 2024.

2B-AMPCO-39

Ref: 2B Section D Appendix C P2

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

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

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

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

2B-AMPCO-40

Ref: 2B Section D Appendix C P3

THESL indicates "Asset age is also typically a significant factor in the calculation of HI scores, partly due to the fact that age bears a strong statistical relationship with probability of failure."

Ref 2: EB-2016-0025 LDC Co_Business Plan Appendix 9-B (Attached as Appendix A)

As part of the amalgamation of Horizon, PowerStream, Enersource and Hydro One Brampton, Vanry & Associates (Vanry) was retained to undertake a Distribution Assets Due Diligence Review of the four utilities. The report is filed as Appendix A to AMPCO's interrogatories. Vanry was required to undertake an assessment of each of the four utilities best practices in the areas of ACA (HI) and capital investment planning. The assessment was based on Vanry's set of criteria that it believed represented best performance in the areas of ACA and investment optimization.

At Page 15 of the report, Vanry provides the criterion definition for Condition Assessment that it believes represents best practice. The assessment against the criterion relates to PowerStream. Vanry indicates best practice is that factors related to criticality and obsolescence are excluded and age is not included as a condition criterion.

Condition Assessment Asset conditions are assessed relative to end-of-life failure criteria (i.e. Health Index). Health Index includes relevant parameters for predicting failure based on known degradation processes, and excludes other factors such as those related to criticality or obsolescence. Age is not included as a condition criterion.	Health Indices are based on major degradation processes and end of life criteria. The formulations are generally within the range of best practice, although recent improvements in the industry (e.g. multiplicative formulation) have not been applied. PowerStream has a strong testing and inspection program with good data availability. The multiplicative approach to health indexing is in contrast to the additive approach used by all four utilities in this review. It is a recent industry innovation wherein condition parameters are multiplied together rather than added. It avoids some of the common problems: "masking," where a bad test result is hidden amid several good ones, and validity, where there are not enough data available to calculate a valid health index. Age is excluded from most formulations. Factors related to obsolescence or consequences (e.g. oil circuit breakers, PCB transformers) are excluded from the formulations.

a) Please discuss if THESL's ACA methodology includes criticality or obsolescence.

b) Please confirm THESL's new ACA methodology includes age as a condition criterion.

c) Vanry indicates there have been recent improvements in the industry that includes a multiplicative approach to health indexing as opposed to the additive approach. THESL previously used the additive approach. Please discuss if THESL considered adopting this new industry innovation of the current methodology prior to adopting a new ACA methodology in 2016. If not, why not?

d) On page 43 of the report, Vanry states "All four utilities use health to modify effective age which is appropriate." Please discuss THESL's awareness of this approach.

e) Please discuss how THESL has calibrated its failure probability estimates to actual failure rates.

2B-AMPCO-41

Ref #1: 2B Section D Appendix C P2
Ref #2: 2B Section D Appendix C P4

At Reference #1, THESL indicates with the CNAIM it uses inspection data and individual HI scores, in combination with other information and professional judgement to prioritize assets for tactical intervention in the short to medium term.

At Reference #2, THESL indicates that using its previous ACA methodology, assets were placed into five condition categories based on the HI, from best condition to worst condition, and while these different asset categories could be assigned a suggested range in time to replacement (e.g. an asset in very poor condition may generally need to be addressed in one to two years), these ranges were based primarily on engineering judgment and did not provide a precise analytical basis for assessing asset risk and more precise replacement needs based on condition.

a) Please explain the similarities and differences in the level of use of professional and engineering judgment between the two ACA methodologies to prioritize assets for intervention.

b) Please discuss if the current matching of projects to the recommended/projected spending levels requires significant judgment or is it systematic.

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

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

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

2B-AMPCO-42

Ref: 2B Section D Appendix C P4

a) Please provide a copy of the ACA THESL used to underpin the capital plan in EB-2014-0116 application.

b) Please provide a copy of THESL's most recent ACA prior to the change in methodology in 2016 to CNAIM.

2B-AMPCO-43

Ref: 2B Section D Appendix C P5

THESL indicates it is continuously improving its asset condition inspection data.

a) Please identify the asset classes with significant gaps in industry best practice collection of inspection data.

b) Please provide THESL's plans to close these gaps.

2B-AMPCO-44

Ref: 2B Section D Appendix C P7 Table 1

a) Please add a column to Table 1 – Recommended Timeline for Intervention.

b) Please compare and contrast the relative meaning of the Health Index Bands H1 to H5 to the previous Health Index categories of very good, good, fair, poor and very poor and recommended

timelines for intervention.

c) Please provide THESL's recommended timeline for intervention for the previous Health Index categories of very good, good, fair, poor and very poor.

2B-AMPCO-45

Ref: 2B Section D Appendix C P8

THESL indicates it retained the U.K. firm EA technology to review its newly developed asset health models, recommended areas for improvement, and provide guidance and training to ensure organizational alignment with the asset management philosophy, principles and practices underpinning the CNAIM approach. Toronto Hydro selected EA Technology for this task as they are the foremost experts in the CNAIM model, having provided support for the development of the original methodology as well as the delivery and implementation of the common models to all U.K. distribution network operators.

a) Please provide a copy of the EA technology report.

2B-AMPCO-46

Ref: 2B Section D Appendix C P9

THESL indicates it determined the condition variables for each asset class based on the following criteria: deficiencies that lead to an asset failure; deficiencies that lead to a component of the asset failing; and deficiencies that degrade the performance of an asset but do not lead to an immediate asset or component failure. The utility performed a comparative analysis of these condition points and assigned appropriate calibration values.

a) Please provide the comparative analysis.

2B-AMPCO-47

Ref: 2B Section D Appendix C P9

RCM was critical to Toronto Hydro's determination of minimum health score limits in CNAIM, known as "collars." If a deficiency that has a collar is noted during an inspection, the CNAIM algorithm checks to the final health score value is above the collar value. If the value is not above the collar value, then the health score is replaced with the collar value.

Please indicate if THESL has the data on the assets with health scores replaced with the collar value. If yes, please discuss any trends in the data.

2B-AMPCO-48

Ref: 2B Section D Appendix C P10 Table 2

a) Please confirm the vintage of the data.

b) Please identify key assets beyond underground cables and pole top transformers that are not included in Table 2.

c) Please identify the assets where age is the only determinant of condition.

d) Please add the following Columns to Table 1: “Asset Population”; “% Availability of Condition Data”; “Number of asset in very poor/poor condition from EB-2014-0116”.

e) Please provide an excel version of Table 2.

2B-AMPCO-49

Ref: 2B Section D Appendix C P11 Table 3

a) Please add the following Columns to Table 3: “Asset Population”; % Availability of Condition Data” if different than Table 2.

b) Please provide an excel version of Table 3.

2B-AMPCO-50

Ref: 2B Section D Appendix C P12

Over time, THESL has made minor adjustments to asset useful life values (i.e. minimum expected useful life, maximum expected useful life, and typical useful life for each asset class type) based on utility experience, but has not performed a full review of its useful values (including review of the derivation methodology) since the Kinectrics study performed in 2010. THESL intends to update its useful life values and age-based probability of failure curves in the future.

a) Please provide THESL’s current asset useful life values in comparison to Kinectrics.

b) Please indicate when THESL plans to update its useful life values.

2B-AMPCO-51

Ref: 2B Section D Appendix C P3

THESL indicates asset age is also typically a significant factor in the calculation of HI scores, partly due to the fact that age bears a strong statistical relationship with the probability of failure. The extent to which a utility can monitor significant degradation characteristics that are predictive of asset failure varies depending on the type of asset. Even when the utility is able to monitor a number of condition variables that are strongly predictive of an asset’s remaining life, it remains necessary to include age as an ACA variable.

a) Please discuss directionally how the results of the ACA would differ if age was not used as an ACA variable.

2B-AMPCO-52

Please complete the excel spreadsheet 2B-AMPCO-52.

2B-AMPCO-53

Please complete the excel spreadsheet 2B-AMPCO-53.

2B-AMPCO-54

Ref: 2B Section E6.1

a) Page 17 Figure 11: Please provide the Historical Reliability of Feeders Proposed for Conversion in Figure 11 in terms of Average Outage Duration Excluding Major Event Days.

b) Page 17: Please provide the number of outages (excluding MEDs) for each of the years 2012 to 2017 and 2018 to date, for the 4.16kV Downtown Core compared to each of the 4.16kV and 13.8kV Systems.

c) Page 18: Please provide the total number of Box Construction assets i.e. transformers, switches and poles.

d) Page 18: Please provide the number of Box Construction assets i.e. transformers, switches and poles with a Health Index Score of HI4 and HI5.

e) Page 20: For Rear Lot Conversion, please provide the number of forecast customer conversions compared to actuals for each of the years 2015 to 2019.

f) Page 20: For Rear Lot Conversion, please provide the number of forecast customer conversions for each of the years 2020 to 2024.

g) Page 23 Table 10: For each of the Rear Lot Projects please provide the Station and Feeder.

h) Page 23 Table 10: For each of the planned rear lot area projects, please provide the assets to be replaced by asset class.

i) Page 23 Table 10: For each of the 8 rear lot areas in Table 10, please provide the number of PCB at-risk transformers.

j) Please provide the total number of planned rear lot conversion projects completed for the years 2015 to 2018 compared to planned.

k) For each of the years 2015 to 2018, please provide an excel spreadsheet that sets out the planned Rear Lot projects from EB-2014-0116 that includes Project Number, Project Name, Forecast Cost ($M), Forecast Start Date and Forecast Completion Date compared to the Actual Cost, Actual Start

Date and Actual Completion Date.

l) In part (k) please identify and explain all planned projects that were cancelled or deferred.

m) In Part (k) please identify any new projects added for the 2016 to 2019 period.

2B-AMPCO-55

Please complete the following table to show the number of projects by year:

# projects	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Rear Lot Conversion										
Box Construction Conversion										

2B-AMPCO-56

Ref: 2B Section E6.4

a) Page 6: Please provide the number of ATS and RPB units replaced in 2018 and 2019.

b) Page 11 Figure 6: Please explain how THESL determined its forecast of 102 HI4 units and 165 HI5 units by 2024.

c) Page 15: Please provide the number of network vaults replaced in 2018 and 2019.

d) Page 23: THESL plans to spend $5.1 million to replace 13 units in 2020 to 2014. In 2018 to 2019, THESL expects to spend $3.2 million to replace 26 units. Please explain the increase in unit costs over the test period.

e) Page 28: Please provide the forecast cost of Option 1 for Legacy Network Equipment Renewal.

f) Page 28: Please provide the number of ATS and RPB units replaced on a reactive basis over the 2015 to 2018 period.

g) Page 29: Please provide the number of network units replaced on a reactive basis over the 2015 to 2018 period.

2B-AMPCO-57

Ref: 2B Section E6.5

a) Page 5 Figure 2: Please add 2018 data to Figure 2.

b) Page 6 Table 4: Please provide the asset population for each of the asset categories in Table 4 as of 2017 and forecast for 2024.

c) Page 6 Table 5: Please provide the condition of wood poles in 2015.

d) Page 8 Figure 4: Please define forced outages.

e) Page 8: Please provide the number of pole transformer failures for each of the years 2013 to 2018.

f) Page 11 Figure 9: Of the 6,400 transformers that contain or are at risk of containing PCBs, please provide the confirmed number of overhead transformers that contain PCBs.

g) Page 11: Of the overhead transformers confirmed with PCBs in part k), please provide the number leaking oil.

h) Page 14: Please provide the number of pole failures for each of the years 2013 to 2018.

i) Page 14: Please provide the reactive work requests for pole accessories for the years 2013 to 2018.

j) Page 14: Please provide the number of pole accessory failures for each of the years 2013 to 2018.

k) Page 16: Please provide the number of switch failures for each of the years 2013 to 2018.

l) Page 16: Please provide the number of HI4 switches and HI5 switches.

m) Page 18 Table 7: For each of the asset classes in Table 7, please provide the number of HI4 and HI5 assets to be replaced.

n) Page 19: Please provide the number of Voltage Conversion projects, Feeder Rebuild projects and Spot Replacements for each of the years 2013 to 2018 and forecast for each of the years 2019 to 2024.

o) Page 20: Please provide the cost of Option #1.

p) Page 21: Please provide the cost of Option #3.

2B-AMPCO-58

Ref: 2B Section E6.6

a) Page 5 Table 4: Please add a column that shows the % of Assets in HI4 or H15 condition.

b) Page 9 Table 5: Please provide the Health Index rating for each TS Switchgear proposed for replacement. Please provide the Health Index rating for each TS Switchgear from EB-2014-0116.

c) Page 9 Table 6: Please add a column that shows the % of Assets in HI4 or H15 condition. at the end of 2024 without investment.

d) Page 11 Table 7: Please add a column that shows the % of Assets in HI4 or H15 condition.

e) Page 14 Table 8: Please provide the Health Index rating for each TS Outdoor Breaker proposed for replacement. Please provide the Health Index for each TS Outdoor Breaker rating from EB-2014-0116.

f) Page 18 Table 10: Please provide the Health Index rating for each TS Outdoor Switch proposed for replacement. Please provide the Health Index for each TS Outdoor Switch rating from EB-2014-0116.

g) Page 20 Table 11: Please provide the Health Index rating for each MS Switchgear proposed for replacement. Please provide the Health Index for each MS Switchgear rating from EB-2014-0116.

h) Page 23 Table 12: Please provide the Health Index rating for each Power Transformer proposed for replacement. Please provide the Health Index for each Power Transformer rating from EB-2014-0116.

i) Page 26 Table 13: Please provide the Health Index rating for each MS Primary Supply proposed for replacement.

j) Page 30 Table 15: Please add a column that shows the % of Assets in HI4 or H15 condition.

k) Page 31: THESL plans to replace 14 DACSAN RTUs, 15 MOSCAD RTUs and 10 D20 RTU's over the 2020-2024 period. Please provide the Health Index rating for each RTU.

l) Page 40 Table 21: Please add a column that shows the % of Assets in HI4 or H15 condition.

m) Page 30 Table 15: Please provide the Health Index rating for each RTU.

n) Page 42 Table 22: Please provide the Health Index rating for each SST Proposed Replacement.

2B-AMPCO-59

Ref: 2B Section E6.7 P1

a) Please provide the number of asset failures addressed for each of the years 2015 to 2018.

b) Please provide the number of high risk asset deficiencies addressed for each of the years 2015 to 2018.

2B-AMPCO-60

Ref: 2B Section E6.7 P4 Table 4

Table 4: Average CI and CHI Associated with Failures of Major Assets from 2013 - 2017

Asset	Customer Interruptions (CI)	Customer Hours Interrupted (CHI)
Overhead Switches	805	359
Overhead Transformers	190	112
Poles	770	739
Underground Cables	766	729
Underground Transformers	302	292

a) Please provide the number of CI and CHI by asset in Table 4 for each of the years 2015 to 2018.

b) Please confirm Poles includes pole hardware. If yes, please separate the CI and CHI results in Table 4 for poles and pole hardware.

c) Please rank the assets in Table 4 in terms of criticality when they fail.

d) For each asset type in Table 4, please provide the percentage in HI4 or HI5.

e) Please provide the CI and CHI for each of the years 2015 to 2018 for the Secondary Network.

2B-AMPCO-61

Ref: 2B Section E6.7 Page 8 Figure 3

Please complete the following table to show the source of Reactive Capital Deficiencies

Source of Reactive Capital Deficiencies

# Deficiencies	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Preventative & Predictive Maintenance						
Field Operations & Customer Communications						
Emergency Response						
TOTAL						

2B-AMPCO-62

Ref: 2B Section E6.7 Page 9 Figure 4

a) Please provide the values for the number of work requests for underground, overhead and station work and the totals for each year 2013 to 2018.

b) Please provide the number of work requests for the secondary network.

c) Please provide a breakdown of the number of underground assets replaced by asset type for each of the years 2013 to 2018.

d) Please provide a breakdown of the number of overhead assets replaced by asset type for each of the years 2013 to 2018.

e) Please provide a breakdown of the number of station assets replaced by asset type for each of the years 2013 to 2018.

2B-AMPCO-63

Ref: 2B Section E6.7 Page 11 Figure 5

49% of sustained feeder outages are caused by Defective Equipment.

Please provide a breakdown of the contribution to Defective Equipment by equipment type.

2B-AMPCO-64

Ref: 2B Section E6.7 Page 15 Table 6

a) Please provide a breakdown of Reactive Capital spending for the years 2013 to 2018 by major asset type.

b) Please provide a breakdown of Reactive Capital spending for the years 2015 to 2018 based on overhead, underground, secondary network, stations and metering assets.

2B-AMPCO-65

Ref: 2B Section E6.7 Page 16 Figure 11

a) Please discuss if the forecast trends assume same levels of work volume requests for underground, overhead, secondary network and metering work.

3-AMPCO-66

Ref: Ex 3 T2 S1 P1 Table 1

Please add 2013 and 2014 Actuals to the Table 1.

3-AMPCO-67

Ref: Ex 3 T2 S1 P1 Table 1

a) Please provide the % of OM&A budget that is contracted out each year.

b) Please summarize the forecast work to be undertaken by external contractors in 2020 and explain any changes since 2015.

c) Please add two columns to Table 1 to show the number of FTEs in each program in 2015 compared to 2020.

3-AMPCO-68

Ref: Ex 3 T2 S1 P1

a) Please discuss any significant challenges in the last 5-years related to execution of the OM&A plan.

b) Please discuss any new initiatives underway to address these challenges.

4A-AMPCO-69

Ref: Ex 4A T1 S1 P1

a) THESL indicates the compound growth rate in OM&A costs per customers when normalized for customer count is 1.6% over the rate period. Please provide this calculation.

b) When normalized for full time equivalent, the compound growth rate is 2.5%. Please provide this calculation.

4A-AMPCO-70

Ref: Ex 4A T1 S1 P2 Table 1

Please add 2013 and 2014 Actuals to Table 1.

4A-AMPCO-71

Ref: Ex 4A T1 S1 P4

THESL has applied a general inflation factor of 2% in its forecast of 2020 costs. The OEB has calculated the value of the inflation factor for incentive rate setting for rate changes effective in 2019, to be 1.5%.

Please provide the impact on OM&A costs if a general inflation factor of 1.5% is used to forecast 2020 costs.

4A-AMPCO-72

Ref: Ex 4A T1 S1 P6

Please provide the total capitalized OM&A for each of the years 2015 to 2020.

4A-AMPCO-73

Ref: Ex 4A T1 S2 Appendix 2-JA

a) Please add 2015 Board Approved amounts to Appendix 2-JA.

4A-AMPCO-74

Ref: Ex 4A T1 S3 Appendix 2-JB

a) Please add 2015 Actuals to Appendix 2-JB

4A-AMPCO-75

Ref: Ex 4A T1 S4 Appendix 2-JC

b) Please add 2015 Board Approved to Appendix 2-JC.

4A-AMPCO-76

Ref #1: Ex 4A T2 S1

Please complete the excel spreadsheet titled 4A-AMPCO-76.

4A-AMPCO-77

Ref: Ex 4A T2 S1

a) Please provide the number of deficiencies addressed on the spot for each of the years 2015 to 2018 and forecast for 2019 and 2024.

b) Does THESL have unit cost inspection and maintenance targets for overhead work? If yes, please provide.

4A-AMPCO-78

Ref: Ex 4A T2 S2

Please complete the excel spreadsheet titled 4A-AMPCO-78.

4A-AMPCO-79

Ref: Ex 4A T2 S2

a) Please provide the number of deficiencies addressed on the spot for each of the years 2015 to 2018 and forecast for 2020.

b) Does THESL have unit cost inspection and maintenance targets for underground work? If yes, please provide.

4A-AMPCO-80

Ref: Ex 4A T2 S2

Please complete the excel spreadsheet titled 4A-AMPCO-80.

4A-AMPCO-81

Ref: Ex 4A T2 S4 P3 Figure 1

a) Please complete the following table to show the source of deficiencies directed to Corrective Maintenance.

# of Deficiencies to Corrective Maintenance	**2015**	**2016**	**2017**	**2018**
Preventative & Predictive Maintenance				
Field Operations & Customer Communications				
Emergency Response				
TOTAL				

4A-AMPCO-82

Ref: Ex 4A T2 S4 P6 Figure 2

a) Please provide the numerical values of the Corrective Maintenance Work Requests for the years 2015 to 2018 for Overhead, Station and Underground.

b) Please add 2018 data to the table.

4A-AMPCO-83

Ref: Ex 4A T2 S4 P10 Table 3

a) Please provide a breakdown of Corrective Maintenance costs to overhead, underground and station maintenance.

b) Please explain the cause of the backlog of issues across the system in 2017.

4A-AMPCO-84

Ref: Ex 4A T2 S5

Please provide the number of deficiencies generated from Emergency Response for each of the years 2015 to 2018.

4A-AMPCO-85

Ref: Ex 4A T2 S5 P3

a) Please provide the Storm and Major Event Restoration costs for each of the years 2015 to 2020.

4A-AMPCO-86

Ref: Ex 4A T2 S5 P3

a) Please provide the number of responses to power quality issues for each of the years 2015 to 2018.

4A-AMPCO-87

Ref: Ex 4A T2 S5 P15 Table 3

a) Please provide a breakdown of Emergency Response costs.

4A-AMPCO-88

Ref: Ex 4A T2 S7

a) Page 3: Please provide the number of trouble calls for each of the years 2013 to 2018.

b) Page 6: Please discuss any data integrity issues with respect to Grid Analytics over the past 5 years.

4A-AMPCO-89

Ref: Ex 4A T2 S8

c) Please provide the number of deficiencies generated from Customer Emergency Response for each of the years 2015 to 2018.

4A-AMPCO-90

Ref: Ex 4A T2 S9

a) Please provide the organization chart for Asset and Program Management.

b) Please discuss if there are any new activities being performed under the Asset and Program Management segments.

c) Page 7 Table 3: Please provide the percentage of budget that is capitalized for each of the years 2015 to 2020.

d) Page 8: Please provide the number of Standards Change Requests for each of the years 2015 to 2018.

e) Page 9: Please explain the new analytics tool and data warehouse and how it will reduce the amount of time it takes to prepare and analyze data for reliability, condition and other risk analyses.

f) Page 15 Figure 1: Scoped work is declining from 2015 to 2018. Please explain the increase in scoped work for the years 2019 to 2024.

g) Page 15: Please explain the nature of the updates to the Reliability Centred Maintenance framework in 2011 and 2016.

h) Page 20: Please provide the CWIP write-offs for each of the years 2015 to 2020.

i) Page 22 Figure 4: Please provide a breakdown of the types of standards change requests processed.

j) Page 23 Figure 5: Please explain if failed equipment returned contributes to reliability data or if it is removed.

k) Page 32: Please provide the number of jobs completed in 2018 and forecast to be completed for each of the years 2019 to 2024.

l) Page 36: Please provide the write-offs for internal work execution for each of the years 2015 to 2018 and forecast for 2019 and 2020.

4A-AMPCO-91

Ref: Ex 4A T2 S9 P5-6

a) With respect to system planning risks, please discuss if THESL has been directly exposed to any of these risks since 2015 and provide THESL's response.

4A-AMPCO-92

Ref: Ex 4A T2 S9 P35

THESL indicates its work execution support function provides oversight and governance over project and program management practices.

a) Please provide the project management tools used by THESL.

b) Please discuss the internal controls THESL uses to track project estimating and execution performance.

c) Please provide the project management metrics used by THESL and recent project performance results.

d) Please discuss any recent issues with respect to project performance.

e) Please discuss how THESL tracks project cost and schedule overruns and what thresholds exist for variance reports.

4A-AMPCO-93

Ref: Ex 4A T2 S10

a) Please provide the organizational chart for Work Program Execution program.

b) Page 1: Please provide the percentage of capital and maintenance programs undertaken by external contractors for each for each of the years 2013 to 2018 and forecast for 2019 to 2024.

4A-AMPCO-94

Ref: Ex 4A T2 S11

a) Page 4 Table 3: Please provide a breakdown of Fleet and Equipment Services costs.

b) Page 7: Please provide THESL's vehicle utilization rate for each of the years 2015 to 2020.

c) Page 7: Please provide THESL's fleet size for each of the years 2015 to 2020.

4A-AMPCO-95

Ref: Ex 4A T2 S14

a) Page 6: Please define standby costs.

b) Page 22: Please provide the organizational chart for Customer Relationship Management.

c) Please discuss THESL's strategy to address power quality issues for Large Customers.

d) Please provide the OM&A spending related to power quality issues in the test period.

e) Please discuss if THESL has any metrics related to power quality.

f) Please identify the program where the Engineering and Construction division is located.

4A-AMPCO-96

Ref: Ex 4A T2 S15

a) THESL indicates the corporate attendance number has improved by 32% from 2013 to 2017. Please define the corporate attendance number and provide the calculation. Please provide the data for 2018.

a) Please provide the Human Resource metrics utilized by Hydro One to manage its workforce and include the data for each metric for the years 2013 to 2018.

b) Please identify any new Human Resource metrics proposed over the test period.

4A-AMPCO-97

Ref: Ex 4A T2 S16

a) Please provide the most recent internal audit plan.

b) Please provide a listing of all internal audits undertaken since 2015 that relate to this application.

4A-AMPCO-98

Ref: Ex 4A T2 S18

a) Please provide intervenor costs, forecast versus actual, for each of the years 2015 to 2018.

4A-AMPCO-99

Ref: Ex 4A T4 S1

a) Page 3 Figure 1: Please provide Figure 1 for 2020.

b) Please provide further details on THESL's third-party service providers.

c) Based on the Mercer Benchmarking Report, please provide the compensation amounts in 2020 that are above P50.

d) Based on the Mercer Benchmarking Report, please provide the benefit amounts in 2020 that are above P50.

e) Page 7: Please provide the percentage of employees that are PWU.

f) Page 7: Please provide the percentage of employees that are SUP.

g) Page 7: Please provide the percentage of compensation allocated to benefits and pensions for the years 2015 to 2020.

4A-AMPCO-100

Ref: Ex 4A T4 S2 Appendix 2-K

a) Please update Appendix 2-K to reflect 2018 actuals.

b) Please recast Appendix 2-K to reflect the following breakdown: Executive Management, Non-Executive Management, Non-Union Professional, PWU and SUP.

c) Please provide the number of temporary FTES in each of the above FTE categories for each of the years 2015 to 2020.

d) Please provide the % of compensation capitalized for each of the years 2015 to 2020.

e) Please provide the forecast versus actual overtime amounts for the years 2015 to 2020.

f) Please provide the number of overtime hours, forecast versus actual for each of the years 2015 to 2020.

g) Please explain how overtime is used.

h) Please provide the number of hours worked (excluding overtime), forecast versus actual for each of the years 2015 to 2020.

i) Please provide standby costs for the years 2015 to 2020.

4A-AMPCO-101

Ref: Ex 4A T4 S3

a) Page 10: Please define restricted work days.

b) Page 21 Table 5: Please provide the Retirement Projection calculation and provide the data for 2018.

c) Page 21: Please provide a chart that shows THESL's resource mix for each of the years 2015 to 2024.

d) Page 23: Please provide the total number of vacancies for each of the years 2015 to 2018.

e) Please provide the average number of days to fill a vacancy in 2018.

f) Does THESL account for vacancies in its budget forecast for 2020?

g) Please provide THESL's turnover rate for each of the years 2015 to 2018 and provide the calculation.

h) Please provide THESL's resource utilization data for the years 2015 to 2018 and discuss any trends.

4A-AMPCO-102

Ref: Ex 4A T4 S4 P3

Page 3: Please THESL indicates it considered other factors such as increasing scope and complexity of the utility's work plan over the next five years.

a) Please summarize the key areas of the work plan with increased scope.

b) Please discuss any other key factors THESL considered in setting 2018 to 2020 forecasts.

4A-AMPCO-103

Ref: Ex 4A T4 S4 P13

a) Please provide the employer/employee split for pension contributions for the years 2015 to 2020.

4A-AMPCO-104

Ref: Ex 4A T4 S4 P15 Table 7

a) Please explain the forecast increase in 2018 pension costs.

b) Please provide 2018 actuals.

4A-AMPCO-105

Ref: Ex 4A T4 S4 P15 Table 8

a) Please provide 2018 actuals.

4A-AMPCO-106

Ref: Ex 4A T4 S5

a) Please provide the Terms of Reference for the Mercer Report.

b) Please provide the elements included in total cash compensation.

c) Please discuss if overtime cost are included in total cash compensation. If not, please explain.

d) Page 4 Table: Please provide the results for THESL compared to the market 50th percentile.

e) Please list the Compensation and Benefits Reviews previously conducted by Mercer for THESL and provide a copy of the Review prior to the January 2018 Review.

f) Please discuss THESL's change/progress over time with respect to compensation and benefits relative to the energy peer group and general industry peer group.

8-AMPCO-107

Ref: Ex 8 T1 S1 P2 Table 1

Please recast Table 1 to show the Distribution only Bill Impacts.

8-AMPCO-108

Ref: Ex 8 T1 S1 P3

THESL indicates in order to maintain the revenue-to-cost ratio at exactly 1.0 for the CSMUR class, rates are adjusted downwards for this class and the extra revenue requirement is allocated to those classes with revenue-to-cost ratios below 1.0 proportionally to the amounts those classes were below their allocated costs.

Please provide the extra revenue amounts allocated to each rate class below their allocated costs.

8-AMPCO-109

Ref: Ex 8 T1 S1 P5 Table 2

Please explain the negative CA Model Floor and CA Model Ceiling values for the Large Use class.