

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

Hydro One Networks Inc. (HONI) filed a cost of service application with the Ontario Energy Board (OEB) on May 31, 2016 under section 78 of the Ontario Energy Board Act, 1998, S.O. 1998, c. 15, (Schedule B), seeking approval for changes to its transmission revenue requirement and to the Ontario Uniform Transmission Rates, to be effective January 1, 2017 and January 1, 2108.

HONI seeks approval of rates revenue requirements of \$1,487.4 million for 2017 and \$1,558.4 for 2018¹. In 2017 the increase in revenue requirement is 0.5% compared to 2016 Board Approved levels followed by a 4.8% increase in 2018.

Table 1: Revenue Requirement Comparison

\$ Million	2016 Board Approved	2017	2018
Total Revenue Requirement	\$1,567.6	\$1,588.8	\$1,660.3
Rates Revenue Requirement	\$1,480.7	\$1,487.4	\$1,588.4
Rate Increase (excluding load)		0.5%	4.8%
Estimated Load Impact		2.1%	0%
Rate Increase Required		2.6%	4.8%

HONI's transmission customers across Ontario include 47 transmission-connected local distribution companies (LDCs), 90 large industrial customers directly connected to the transmission system and HONI's distribution system.²

The increase in the total bill for a HONI general service energy (2000 kWh/month) customer was estimated to be 0.1% in 2017 and 0.2% in 2018. As for the impact on residential customers, for a HONI medium density residential (750 kWh/month) customer, the estimated bill increase was 0.1% in 2017 and 0.2% in 2018. The estimated bill impact for transmission connected-customers was 0.2% in 2017 and 0.4 % in 2018 (assuming that transmission represents 8.3% of the average transmission connected customer's total bill).

The increase in total rates revenue requirement is largely attributable to the impact of rate base growth (increase in depreciation, increase in return on capital).³

AMPCO's submissions are largely focussed on HONI's proposed capital spend over the test period, as well as the following three components that HONI is relying on to support its higher investment levels:

¹ Exhibit K6.3, Update to Exhibit A, Tab 3, Schedule 1, Page 1 December 2, 2016

² B1-2-2 Attachment #2 Slide 4

³ E1 T1 S1 Page 5

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

Reliability Risk Model; Customer Engagement Initiative and Navigant's Total Cost Benchmarking Study. AMPCO's position on each of these components is provided in Sections B, C and D below.

Many of AMPCO's members are Transmission Connected Customers. Two vital concerns of AMPCO members are affordability and reliability of electricity service. Affordability is AMPCO's paramount concern given the rapid rise in Industrial rates in recent years. AMPCO submissions are focussed on these two issues as they relate to HONI's proposed 5-year Transmission Investment Plan to be of assistance to the Board in determining if HONI has struck an appropriate balance between risk, reliability and cost in its investment plan. Cost containment is a central theme in AMPCO's submissions in favour of a more streamlined capital spending plan that preserves reliability.

A. TRANSMISSION SYSTEM PLAN

HONI proposes to spend \$2.198 billion in capital: \$1,076.1 million in 2017 and \$1,122.2 million in 2018. For the years 2019 to 2021 forecast capital spend increases each year. By 2022, HONI's capital spend is estimated to be \$1,469 million.⁴ Sustaining capital represents 72% of the budget in 2017 and 75% in 2018.

Table 2 below shows HONI's historic capital spend for the years 2012 to 2015 and forecast for the years 2016 to 2021.

Table 2 Summary of Transmission Capital Budget (\$ Millions)

Including Capitalized Overheads and Interest Capitalized*	Historic				Bridge Year	Test Years		Forecast		
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Description										
Sustaining	389.3	480.0	621.3	694.3	724.3	776.8	842.1	825.7	915.2	1118.1
Development	329.4	171.7	131.6	166.0	166.0	196.4	170.2	244.0	254.0	258.3
Operations	15.2	17.7	28.4	15.6	30.1	25.4	30.8	58.8	21.1	24.7
Common Corporate Costs Capital	42.1	49.1	63.4	67.1	83.5	77.6	79.1	79.1	78.2	73.8
Total	776.0	718.5	844.6	943.0	1003.8	1076.1	1122.2	1207.5	1268.6	1474.9
Variance %		-7.4%	17.6%	11.7%	6.4%	7.2%	4.3%	7.6%	5.1%	16.3%

*Includes AFUDC

Source: B1-T3-S1 Page 1

Compared to capital spending over the past five years (2012-2016), HONI's capital forecast spend over the next five years is 43% greater, and sustaining capital increases by 54%.⁵

⁴ J11.7

⁵ Board Staff IR#3

**Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018**

AMPCO Submissions

Reliability Business Objective

HONI's business objective for reliability is to maintain top quartile reliability relative to its transmission peers.⁶

Top quartile reliability is measured by Transmission System Average Interruption Duration Index for multi-circuit supplied delivery points (T-SAIDI-mc). The T-SAIDI-mc target for the upcoming years, based on normal operating conditions and historical peers' performance, is set to be between 10 to 13 minutes.⁷ For the past ten years HONI has achieved top quartile reliability relative to its transmission peers.⁸ HONI is proposing to spend 43% more on capital over the next 5 years compared to the previous 5 years, however there is no commitment to improve system reliability in the test period. Rather HONI's proposition is that reliability risk will improve by 2%.

HONI benchmarks well compared to other Canadian transmission peers. Based on Canadian Electricity Association (CEA) data, CEA measures indicate HONI is currently in the leading level for multi-circuit performance.⁹

HONI's reliability is improving over time. HONI's Transmission scorecard shows that for the past five years, T-SAIDI is improving, T-SAIFI-M is improving and T-SAIFI-S is stable.¹⁰ In addition, on the multi-circuit system the percentage contribution to SAIDI and SAIFI from equipment failures is improving over time.¹¹ HONI's evidence is that equipment performance is a leading indicator of future system reliability.¹²

An outage may or may not cause an interruption of service to customers. Due to the redundancy in the transmission system, the percentage of unplanned outage hours due to equipment failure (system wide) has been less than 1% since 2012 and is improving over time.

⁶ A-3-1 Page 4

⁷ AMPCO IR#3

⁸ B1 T2 S4 Page 5

⁹ B2-2-1 Attachment #1 Transmission Total Cost Benchmarking Study Figures 20 & 21

¹⁰ B2-1-1 Attachment #1 Page 2

¹¹ AMPCO IR#21

¹² B1 T1 S3 Page 27

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

Table 3: Percentage of Unplanned Outage Hours that Result in a Customer Interruption

Equipment Outages	2011	2012	2013	2014	2015
Customer Interruption Hours	1,873	1,064	973	551	658
Unplanned Hours	166,347	205,485	170,470	193,969	271,825
% Hours Resulting in Customer Interruptions	1.13%	0.52%	0.57%	0.28%	0.24%

AMPCO submits that the Board should consider HONI's reliability performance trends in determining the appropriate pacing and level of investments in the test period.

Investment Planning

HONI's investment planning includes the following steps¹³:

- *Review of the System*
(asset demographics, asset condition, reliability performance, reliability risk)
- *Consideration of Additional Factors*
(equipment performance, criticality, economics, utilization, obsolescence, environmental risks, compliance obligations, equipment defects, health and safety, customer needs and preferences)
- *Creation of a Portfolio of Potential Investment Candidates*
- *Optimization Exercise*
(Consider resource constraints, execution capability, pacing, and customer rate impacts)
- *Assessment of the Outcome (New Reliability Risk Model)*

The process concludes with an assessment of the outcome of the optimization exercise on reliability

¹³ B1 T2 S4 Page 2

**Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018**

AMPCO Submissions

risk. This is a new step in the process that HONI has introduced in this application. AMPCO's comments on the new reliability risk model are provided in Section B below.

HONI considers many factors to create a portfolio of potential investment candidates responding to multiple asset needs and risks including asset condition, demographics, criticality, performance, utilization, economics¹⁴, obsolescence, environmental risks and requirements, compliance obligations, health and safety and customer needs and preferences. An optimization exercise is then undertaken to consider resource constraints, execution capability, and customer rate impact.

AMPCO has concerns regarding the following aspects of HONI's planning process that in AMPCO's view results in a less than optimal investment plan.

Optimization

A criticism identified in HONI's Internal Audit Report on Investment Planning was inefficient investment plan optimization.

The Auditor observed that only 30% of the plans in the 2015-2019 Preliminary Investment Prioritization Plan (IIP) were optimizable within the Asset Investment Planning (AIP).¹⁵ The AIP tool was only available for a limited time resulting in planners having insufficient time to review those plans in detail. The AIP was open for planner input on April 14 and planners were given 4 weeks to complete their input into AIP and management was given 1 week to review it. As of May 15, one day before the plan approval deadline, only 49% of the plans had workflow initiated for review and approval by management. An insufficient number of optimizable plans defeat the benefits of overall plan optimization and insufficient time to provide quality input to the optimization process and to review the results of the optimization process increases the risk of having less than an optimal plan.¹⁶ The Auditor recommended that HONI increase the number of plans that are optimizable. The percentage of plans optimizable in the 2017-2021 plan is 32 or 33%¹⁷, a very modest improvement. AMPCO submits this issue persists which increases the risk of having a less than optimal plan.

A recommendation responding to an insufficient number of optimizable plans was to make the AIP tool available year around to allow the planners to input and update their plans and risk assessments throughout the year.¹⁸ Management originally indicated that plans were underway to upgrade the AIP

¹⁴ B1 T2 S5 Page 2

¹⁵ K4.4 Page 14

¹⁶ K4.4 Page 15

¹⁷ Transcript Volume 7 Page 135

¹⁸ K4.4 Page 15

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

tool to allow this to occur in 2015. This did not occur in 2015 and the AIP tool did not become available until December 2016¹⁹ so the opportunity for more time to input plans throughout the year was missed in this planning cycle. AMPCO also notes that the timeframe for planners to identify candidate investments was considerably shorter in this planning process as shown in Table 1²⁰ below from February 25, 2016 to March 3, 2016, eight days compared to four weeks in the 2015-2019 planning cycle.²¹ This reduced timeline increases the risk of having a less than optimal plan.

During the optimization process the AIP tool selects the best of the several alternatives of each investment based on the timing of investments that will maximize risk mitigation and financial benefits while satisfying pre-determined constraints and dependencies.²² The Audit Report shows that the optimization process in the 2015-2019 planning cycle lasted 14 days. It started on May 20 and a preliminary IPP was available June 2.²³ In this planning cycle, the optimization process is shown as lasting only 4 days.²⁴

9 **Table 1: Transmission Capital Expenditures**

	SM Net							
	Candidate Investments		Optimization		Internal Stakeholder Engagement		Executive Approval	
Timeline	February 25 - March 3, 2016		March 11-14, 2016		March 17– April 14, 2016		April 19, 2016	
	2017	2018	2017	2018	2017	2018	2017	2018
Sustaining	934	1,003	748	847	777	842	777	842
Development	187	186	177	164	196	170	196	170
Operating	28	37	25	31	25	31	25	31
Common Corporate	73	80	73	84	74	74	74	74
Other	4	5	4	5	4	5	4	5
Total	1,226	1,311	1,027	1,131	1,076	1,122	1,076	1,122

¹⁹ Transcript Volume 7 Page 137

²⁰ J7.2

²¹ K4.4 Page 14

²² K4.4 Page 13

²³ K4.4 Page 14

²⁴ J7.2

**Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018**

AMPCO Submissions

In considering the Auditor's comments above and Table 1 above, it seems that the AIP was available for even less time in this planning period, far less than 4 weeks, and the management review period was 4 days compared to one week last time. This suggests that planners and management did not have sufficient time to review the plans in detail.

Absence of Clearly Documented Asset Strategies

HONI indicated at the oral hearing that the Auditor's recommendation to continue to develop sufficiently detailed asset strategy documents for all asset groups against which individual asset needs are assessed remains outstanding.²⁵ The Auditor identified the absence of clearly documented asset strategies increases the risk of inconsistent need assessment and investment decisions. AMPCO submits this risk persists.²⁶

The Auditor General concluded that HONI's Asset Analytics was not considering all factors for asset replacement decisions. HONI acknowledges that its Asset Analytics' data and algorithms require refinement.²⁷

Internal Stakeholder Engagement

As part of the Internal Stakeholder Engagement phase, HONI added a Customer Engagement process that took place in March and April, in parallel with HONI's optimization and internal review. This phase added \$40 million to the optimized investment; \$24 million in sustaining capital. In AMPCO's view the timing of this initiative did not allow sufficient time for HONI to develop plans that consider customer input. AMPCO's detailed comments on the Customer Engagement process are in Section C Below.

Evolution of Business Plan

Of great interest in this proceeding is understanding how the draft November 2015 business plan evolved into the current investment plan reflecting substantial increases in capital expenditures. HONI provided a chronology of events in the planning process that occurred over the 2013 to 2016 planning period and an explanation of the variance between the draft November 2015 capital plan for the 2017 and 2018 test years and the final capital plan in this application.²⁸

²⁵ Transcript Volume 5 Page 26

²⁶ K4.4 Page 8

²⁷ Board Staff IR#2

²⁸ J8.1 J9.2

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

As shown in the table below²⁹, between the two rate filings, capital is increasing 26.9% in 2017, 33.8% in 2018 and for 2019 the increase is 45.2%.³⁰

Capital Forecasts for 2017 and 2018 from EB-2014-0140 onward

Investment Category	EB-2014-0140 (Approved)		November 2015 (Draft)		EB-2016-0160 (Filed)	
	2017	2018	2017	2018	2017	2018
Sustaining	597	637	644	723	777	842
Development	148	116	179	140	196	170
Operating	44	25	22	33	25	31
Common Corp Costs	58	60	74	81	78	79
Total Capital	848	839	920	978	1076	1122

The variance between the November 2015 Draft Business plan and the final capital plan in this application is shown in the table below. There was no business plan or strategic plan that underpinned HONI's 5-year investment plan. Rather, a 2016 to 2022 Business Plan was recently approved by HONI's Board of Directors on December 2, 2016 that mirrors HONI's 5-year Transmission System Plan amounts in this application.

Most the \$156 million increase in capital spend in 2017 and \$145 million in 2018 (\$300 million) compared to the November 2015 draft business plan is in sustaining capital. The significant investment changes include more spending on:

- insulator replacements (\$56 million)
- line refurbishments (\$128 million)
- steel structure refurbishments (\$81 million)

Investment Category	Capital Expenditures - \$M - Net											
	November 2015				EB-2016-0160				Variance			
	2017	2018	2019	2020	2017	2018	2019	2020	2017	2018	2019	2020
Sustaining	650	731	641	640	777	842	826	915	127	112	185	275
Development	185	146	251	267	196	170	244	254	12	24	(7)	(13)
Operating	22	33	65	22	25	31	59	21	3	(2)	(6)	(0)
Common Corp Costs and Other	63	68	65	61	78	79	79	78	14	11	14	17
Total Capital Plan	920	978	1,021	989	1,076	1,122	1,208	1,269	156	145	186	279

²⁹ J8.1

³⁰ Board Staff IR#3

**Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018**

AMPCO Submissions

AMPCO's comments on the increased spending levels on insulators, lines and steel towers and other asset categories is provided below. AMPCO supports the nature of the work in HONI's investment plan but in AMPCO's view the proposed pace of many asset replacements has not been justified. In AMPCO's view, its recommended capital reductions below reflect a more streamlined capital plan that better contains costs and customer impacts.

AMPCO Comments on Asset Investments

Insulator Replacement Strategy

In 2016, HONI developed an asset management strategy for defective insulators as a result of an insulator failure that occurred in March 2015 in a commercial parking lot in Etobicoke. According to HONI, insulators manufactured by Canadian Ohio Brass (COB) and Canadian Porcelain (CP) between 1965 and 1982 suffer from cement expansion or cement growth which means some of the insulators fail prematurely. HONI estimates that approximately 34,000 circuit structures, which translates into 120,000 insulator strings, have COB or CP insulators. This represents approximately 28.6% of HONI's 420,000 insulator string population.^{31 32}

HONI has been aware of this issue for decades. In its last transmission rate application (EB-2014-0140), HONI stated in its Investment Summary Document for Insulator Replacement, "There are known manufacturing defects for string insulators both on porcelain insulators installed between the 1960s and 1980s and on polymer insulators installed between the 1980s and 1990s".³³ HONI planned to replace 1,000 insulator strings per year in 2015 and 2016 with a budget of \$3.6 million in 2015 and \$3.7 million in 2016.³⁴ However, in 2015 HONI replaced less circuit structures than any of the three previous years and less than planned, and it wasn't until the above failure in March 2015 that HONI began to ramp up replacements in 2016. AMPCO submits HONI was remiss in failing to execute a paced COB/CP insulator replacement program in high risk areas considering the defects were known.

HONI's strategy for 2017 and 2018 focuses on the polymer insulators and defective COB and CP porcelain insulators in public areas due to public safety concerns. HONI proposes to replace 15,000 insulators on circuit structures in high risk areas, estimating it will take approximately four years to complete the replacement program. HONI has an additional 15,000 circuit structures outside of high risk areas that also contain these defective insulators.³⁵ Additional insulators are also refurbished as

³¹ 120,000/420,000 insulator strings=28.6%

³² B1 T2 S6 Page 54

³³ EB-2014-0140 D2 T2 S3 ISD #S-49

³⁴ EB-2014-0140 D2 T2 S3 ISD #: S-49

³⁵ B1 T2 S6 Page 58

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

part of line refurbishment work.³⁶

The table below shows HONI's proposed insulator replacement quantities and associated expenditures for the test period compared to historical years. To our knowledge, these quantities exclude insulators replaced or removed in the course of other activities, such as line refurbishments, decommissioning, tower moves, etc.

Insulator Replacement Strategy								
	2012	2013	2014	2015	2016	2017	2018	Total 2017 to 2018
# Circuit Structures	210	433	233	155	2100	4030	3880	7,910
% of Fleet	0.15%	0.3%	0.2%	0.1%	1.4%	2.7%	2.6%	
\$ millions	\$ 3.3	\$ 6.9	\$ 3.8	\$ 2.8	\$ 26.1	\$ 63.9	\$ 61.4	\$ 125.3
Cost/Circuit Structure (\$)					\$12,429	\$15,856	\$15,825	
Variance %						28%	27%	

B1 T2 S6 Page 59

B1 T3 S2 Page 35

Given the safety issue posed by defective COB/CP insulators, AMPCO does not oppose an accelerated strategy to replace 15,000 circuit structures (60,000 insulator strings) in high risk areas over the next four years. However, the cost per structure is increasing as more structures are being replaced (2017 as compared to 2016). This appears unusual. AMPCO cannot support the forecast 28% increase in unit costs to replace a circuit structure in 2017 and 2018 as compared to 2016 costs when HONI ramped up its replacement of defective COB/CP insulators. If HONI is going to ramp up its insulator replacement rate, it needs to be planning for and developing new ways to achieve economies of scale and cost efficiencies. Unit costs should decline as more units are replaced - the proposed budget suggests the reverse is happening.

AMPCO submits that based on recent 2016 costs to replace defective COB/CP insulators, a reduction of \$17.9 million in 2017 and \$17.2 million in 2018 is warranted.

HONI retained EPRI in 2016 to undertake independent testing to confirm the condition of insulators. EPRI tested approximately 300 insulators and concluded that the quantity of insulators tested was not sufficient to perform a rigorous statistical analysis upon which to base recommendations. EPRI concludes that in order to assess the urgency of replacing insulators in non-critical locations where the

³⁶ B1 T2 S6 Page 32

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

risk to public safety is not a significant factor, HONI should perform additional testing.³⁷ AMPCO submits the results of this study should assist in the development of a technically informed, risk-based and cost-effective replacement strategy to address the pace of replacement for both the critical and non-critical strings in its next rate application. Adjustments to the pacing of the replacement program in future years may be required.

In AMPCO's view a case could be made that this work should be undertaken as part of Corrective Maintenance. HONI's evidence is that its planned corrective maintenance and projects program includes minor corrective work, larger scale projects, and technical support to resolve reliability problems with transmission line assets. HONI's planned corrective maintenance activities and projects are developed using the data collected through the patrols and asset assessment activities, as well as information on equipment reliability performance, and findings of expert analysis. HONI had EPRI perform expert analysis of the findings of tested sample insulators. HONI indicates planned corrective maintenance addresses planned defect corrections such as damaged insulator strings. Larger scale projects address wide spread design, manufacturing, or condition deficiencies; or safety and reliability concerns. Maintenance of this type is targeted to specific locations that have been identified as high risk.³⁸

It seems to AMPCO that HONI's need to replace COB/CP insulators addresses a manufacturing defect for a specific quantity of assets that are identified as high risk. Insulator replacement does not extend the life of the transmission line as the balance of the line will wear out at its normal rate. Without life extension, the line's depreciation will not be affected. AMPCO believes the proposed work to correct manufacturing defects meets the above description of Corrective Maintenance work and should be recategorized in the future.

Conductor Renewal Strategy – Circuit Replacements

HONI's transmission system consists of 30,000 circuit km of overhead transmission lines. HONI's current strategy is to replace approximately 0.6% (192 km circuit km) in 2017 and 1.5% (440 km) in 2018 to address transmission line conductors "in a manner that maintains reliability".³⁹

AMPCO notes that in EB-2014-0140, the renewal rate of lines sections proposed for 2015 and 2016 was set at 0.3% (99 km) in 2015 and 0.2% (60 km) in 2016, a slight increase over the 0.2% historical replacement rate for 2011 to 2013.⁴⁰ However, HONI ramped up its renewal rate beyond what was

³⁷ HONI_IRR_DiscloseConfMaterial_20161017

³⁸ C1 T2 S2 Page 49

³⁹ B1 T2 S6 Page 31

⁴⁰ EB-2014-0140 D1 T2 S1 Page 8

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

approved in its last application and replaced 384 circuit km in 2015 and 2016, 2.5 times what was planned.^{41 42}

Conductor Replacement Strategy									AMPCO Proposed		
30,000	2012	2013	2014	2015	2016	2017	2018	Total	2017	2018	
EB-2016-0160											
Circuit Replacement km	22	75	93	201	183	192	440	632	192	192	384
% Fleet	0.1%	0.3%	0.3%	0.7%	0.6%	0.6%	1.5%		0.6%	0.6%	
\$ millions	\$8.6	\$17.8	\$40.7	\$58.4	\$76.9	\$67.1	\$143.1	\$210.2	\$67.1	\$62.4	\$129.5
Cost per Circuit km	\$391	\$237	\$438	\$291	\$420	\$350	\$325		\$0	\$81	

30,000	2012	2013	2014	2015	2016
Proposed km EB-2014-0140			113	99	60
% Fleet			0.4%	0.3%	0.2%
Proposed \$ EB-2014-0140			\$33.2	\$36.8	\$29.3

In EB-2014-0140, 4% (1,200 km) of conductors were determined by HONI to be in high risk condition. In response to this, HONI's strategy for conductors was to replace 156 circuit km over the 2015 to 2016 period "in a manner that preserves reliability while minimizing rate impacts."⁴³ This equates to an average annual replacement rate for conductors of 78 circuit km per year in 2015 and 2016, reflecting a 15 year replacement plan.⁴⁴ AMPCO notes the statement "while minimizing rate impacts" was dropped from the latest strategy statement in this application for conductors.

In the current application, the number of conductors in high risk condition has increased from 4% (1,200) in EB-2014-0140⁴⁵ to 9% (2,700)⁴⁶. HONI's proposed strategy is to refurbish 632 circuit km over two years; an average of 316 circuit km per year which corresponds to an 8.5 year replacement plan to address these high risk conductors.

Given the improvement in equipment performance over the past ten years related to conductors⁴⁷, AMPO submits that a 15 year plan to replace high risk transmission line conductors should be maintained. The number of forced outages from conductors has declined in recent years; from five in 2011 down to two in 2015⁴⁸, noting that because of the redundancy found in the transmission system, an outage does not necessarily mean a customer interruption. In AMPCO's view, it is appropriate to

⁴¹ D1 T2 S1 Page 43

⁴² B1 T2 S6 Page 36

⁴³ EB-2014-0140 D1 T2 S1 Page 38

⁴⁴ 1,200/78 = 15

⁴⁵ EB-2014-0140 D1 T2 S1 Page 38

⁴⁶ B1 T2 S6 Page 31

⁴⁷ B1 T2 S6 Page 33

⁴⁸ B1 T2 S6 Page 31

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

increase the number of circuit km each year based on the increase in high risk condition conductors but there is no compelling reason to change the 15 year time horizon. HONI's evidence is that equipment performance is a leading indicator of future reliability performance. Maintaining a 15 year plan appropriately responds to conductor performance trends, better controls costs and minimizes rate impacts. Continued implementation of a 15 year plan reflects an average annual replacement rate of 180 circuit km per year or 0.6%⁴⁹ which is double the replacement rate approved in EB-2014-0140 and consistent with 2015 and 2016 actuals.

The refurbishment of four transmission line refurbishment projects were identified in EB-2014-0140. HONI has identified 13 key transmission line refurbishment projects in 2017 and 2018, and 4 projects have in-service dates of Q4 2018.⁵⁰ AMPCO submits that based on the equipment performance, the test period projects could be spread out over a longer timeframe. HONI proposes to maintain the 2015/2016 renewal rate in 2017 and significantly increase it in 2018.

In considering the above, AMPCO submits the Board should approve the pace for 2017 but the pace for 2018 should be set at the same level as 2017 (0.6%). This represents a capital reduction of \$81 million in 2018. AMPCO submits this approach reflects an accelerated rate of replacement over historical rates and preserves reliability while minimizing rate impacts.

Steel Tower Investment Strategy

HONI's strategy to manage its fleet of 52,000 steel structures includes a combination of planned tower coating, component refurbishments and structure replacements.⁵¹

As shown in the Table below, HONI has two steel tower programs in the test period: Steel Structure Coating and Steel Structure Foundation Refurbishment.

Tower coating involves recoating the structure to provide protection and extend the service life of the structure. Foundation Refurbishment involves coating grillage foundations to extend the life of steel structure foundations.

HONI proposes to spend \$112.5 million over the test period on these two programs, almost four times the \$29.3 million budget proposed in EB-2014-0140 for 2015 and 2016. In the last application, HONI's budget also included \$7.6 million to replace 16 steel structures. It is not clear to AMPCO if HONI proposes to replace any steel structures in the test period.

⁴⁹ 2,700 cct-km/15 years = 180 circuit km

⁵⁰ B1 T3 S2 Page 33

⁵¹ B2 T3 S2 Page 36

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

Steel Tower Strategy

52,000										
Steel Structure Coating Units		S76	2012	2013	2014	2015	2016	2017	2018	Total
			228	235	121	300	462	1250	1600	2850
% Fleet			0.4%	0.5%	0.2%	0.6%	0.9%	2.4%	3.1%	
\$ millions			\$1.6	\$5.7	\$5.1	\$4.6	\$8.8	\$42.5	\$54.4	\$96.9
Cost/structure (\$)			7018	24255	42149	15333	19048	34000	34000	
Steel Structure Foundation Refurb		S77								
# structures refurbished								700	700	
\$ millions			\$3.3	\$3.5	\$3.6	\$1.6	\$3.9	\$7.8	\$7.8	\$15.6
Cost/structure (\$)								11143	11143	
										\$112.5

EB-2014-0140 Proposed Coating Units		226	218	350	350	400		
\$ millions	\$45				\$8.8	\$10.3		\$19.1
EB-2014-0140 Proposed Replacements		0	17	4	4	12		
\$ millions	\$46				\$1.9	\$5.7	\$7.6	
Sub-total		\$8.7	\$13.3	\$11.1	\$10.7	\$16.0		
Steel Structure Foundation Refurb	\$47				1000	1000		
\$ millions					\$4.7	\$5.5		\$10.2
Cost/structure (\$)					4700	5500		\$29.3

Tower Coating

HONI's plan is to significantly ramp up its tower coating project over the next 5 years. HONI seeks \$96.9 million to coat 2,850 steel structures over the test period. HONI is seeking to increase its annual replacement rate of 0.7% rate for the period 2014 to 2016 to 2.4% in 2017 and 3.1% in 2018.

Coating steel structures is not a new capital project for HONI. What has developed in this application is a new Galvatech coating system that allows HONI to coat structures in significantly less time thereby improving the productivity, economics and efficiency of the investment.⁵²

AMPCO fully supports the continuation of HONI's steel structure coating program to extend the life of steel structures. AMPCO submits HONI has demonstrated the NPV-positive investment benefits of re-coating eligible steel towers so that corrosion is not allowed to continue leading to costly replacement. AMPCO does not dispute the value of the program however AMPCO does not support the proposed accelerated pacing of the work for the reasons discussed below.

⁵² TCJ2.3

**Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018**

AMPCO Submissions

To substantiate its proposed coating investments, HONI relies on two EPRI studies.⁵³ A study conducted by Electrical Power Research Institute (EPRI)⁵⁴ says steel towers will lose their protective zinc in 35~65 years after installation in high corrosive areas/zones in Ontario, and they would lose 10% of their metal in the following 30~60 years. At this stage, structures are no longer able to withstand the original design loads and either a major refurbishment or complete tower replacement would be required.⁵⁵ AMPCO notes that the pace at which steel towers lose their zinc coating was known in HONI's last application. The evidence in EB-2014-0140 states "based on industry experience, the expected service life of zinc coating can be anywhere from 30 to 60 years."⁵⁶ AMPCO submits corrosion zones in the Province were also known. In EB-2014-0140 HONI states "Assessment of the steel structure condition is carried out on an annual basis as part of the maintenance program, with a focus on transmission line sections that are greater than 30 years and located in highly corrosive areas or in locations where known problems exist."⁵⁷ Based on this information, which was known in EB-2014-0140, the planned coating rate was approximately 375 structures per year.

In this application, HONI proposes that 14% (7,280) of the steel structures require coating and will be addressed in the steel structure coating program.⁵⁸ HONI proposes to coat 1,250 structures in 2017 and 1,600 structures in 2018. This represents 5.5% of the asset population and 40% of the 14% target which in AMPCO's view is overly aggressive based on equipment performance and need. EPRI did not identify an urgent need to coat towers in the test period. EPRI did identify an urgent need to replace insulators.

The 14% of steel structures requiring coating is based on the EPRI study that looked at 100 structures (0.2% of asset population) and concluded that there were 10.3% of the structures with localized or pitting corrosion and the worst case was 6.9% on a diagonal member. Conversion of the pit measurements into sectional losses revealed minimal strength losses. EPRI determined that categorizing locations based upon material loss would be erroneous due to routine maintenance operations.⁵⁹

EPRI applied distributions of the findings to the overall population of structures throughout the province and determined that 13.88% of all structures require application of a coating system based upon a thickness threshold of 1.65 mils.⁶⁰ It is not clear to AMPCO from the report how EPRI landed on 13.88%

⁵³ CME IR#6 Attachments 2 & 3

⁵⁴ CME IR#6 Attachment #2

⁵⁵ B1-03-11 Reference #: S76

⁵⁶ EB-2014-0140 D1 T2 S1 Page 51

⁵⁷ EB-2014-0140 D1 T3 S2 Page 45

⁵⁸ B1 T2 S6 Page 52

⁵⁹ CME IR#6 Attachment #2 Page 28

⁶⁰ I-T9-S6 Attachment 2 Page 28 (CME IR#6)

**Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018**

AMPCO Submissions

given that only 10.3% of the structures tested had corrosion issues. However, as AMPCO understands the report, these results were intended to provide guidance for prioritizing maintenance operations and establishing inspection intervals by geographic location but there were no specific recommendations made by EPRI on the pacing of HONI's tower coating investments.⁶¹ In fact, EPRI concluded that overall all the structures have been well maintained and all are in serviceable condition despite age and some environments, such as Sarnia, that have been historically highly corrosive. Earlier surveys containing estimates of diminished service life were in error and minimal issues with the structure population are expected based upon survey results and forecasted maintenance operations.⁶² The Foster report⁶³ also shows more than 95% of all steel structures over 100yrs old are still surviving. This does not suggest to AMPCO that the current pace to coat structures is inadequate.

In terms of reliability, the number of forced outages due to steel structure failures has decreased over the past 10 years. In 2015 there were two forced outages and one outage in each of the years 2013 to 2015. The forced outage duration due to steel structure failure has been zero for the years 2011 to 2015, except for a few hours in 2014. Equipment performance, a leading indicator of future reliability, does not support an accelerated investment level.

It should also be noted that a structural failure of a steel tower does not automatically indicate a corrosion problem. For example tornadoes and ice storms can and do cause structure failures when the loading exceeds the original design capability.

⁶¹ I-T9-S6 Attachment 2 Page 33 (CME IR#6)

⁶² CME IR#6 Attachment #2 Page 28

⁶³ I-1-20 Attachment 1 Schedule C Page 47

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

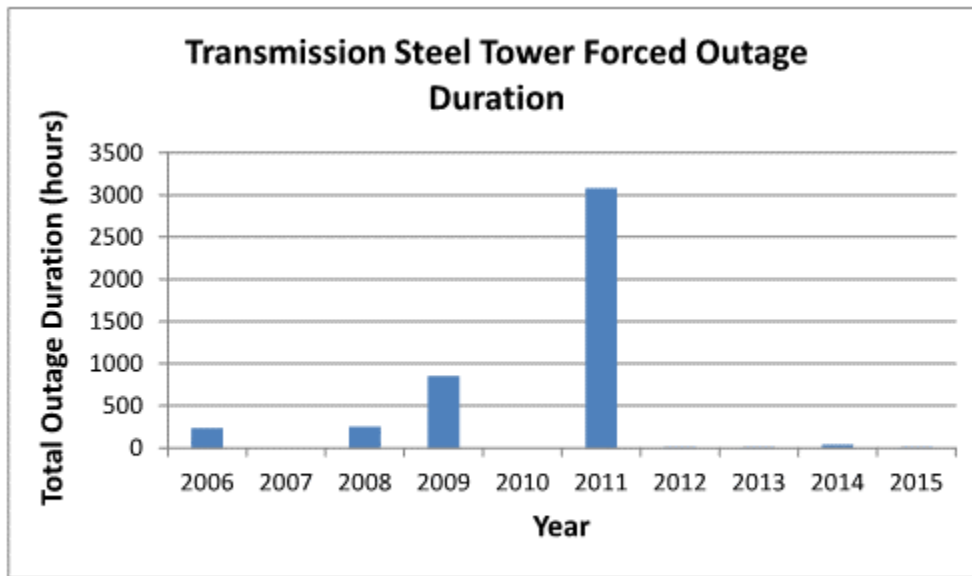


Figure 37: Forced Outage Duration due to Steel Structure Failures

AMPCO wishes to point out that corrosion and metal loss is a slow process. There is nothing in the evidence to suggest large quantities of towers are exceeding corrosion and metal loss thresholds in the near term. HONI's evidence is that the steel structure condition assessment has been initiated based on demographics, geographic zones and the result of a study conducted by industry experts over the past several years but the initial assessment results need to be verified by inspections, patrols and detail corrosion assessment. AMPCO submits that such a significant ramp up in spending is not justified at this time given that assessment results still need to be verified.

HONI is seeking seven times the amount of budget for the test period compared to 2015 and 2016 actuals (\$96.9 M vs \$13.4 M). The pacing proposed in 2015 and 2016 was already an increase over historical levels. AMPCO notes that additional refurbishment work on 285 steel structures that includes tower coating is being done as part of the C22J/C24Z/C21J/C23Z Line Refurbishment project at a project cost of \$18.5 million in 2017 and \$2.5 million in 2018.⁶⁴

In considering the above, AMPCO submits that a reduction in the tower coating program consistent with historical quantities (2016 actuals) is appropriate. On this basis, AMPCO recommends a reduction of \$27 million in 2017 and \$39 million in 2018. AMPCO supports Board Staff's analysis that tower coating

⁶⁴ B1 T3 S11 ISD #S62

**Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018**

AMPCO Submissions

work can be reduced in the test year with no near term risk to reliability or significant loss of economic benefit.⁶⁵ AMPCO submits a more even pace better controls costs and customer rate impacts.

Foundation Refurbishment

HONI plans to assess, coat and refurbish 700 grillage foundations each year over the test years at a cost of \$15.8 million over the test period; \$7.9 million each year.⁶⁶ In EB-2014-1040 HONI proposed to refurbish 1,000 grillage foundations each year at a cost of \$4.7 million in 2015 and \$5.5 million in 2016. AMPCO submits HONI has not justified the increase in cost in 2017 and 2018 to refurbish a grillage foundation. AMPCO submits this budget should be reduced by 50%. This represents a reduction of \$3.95 million in 2017 and \$3.95 million in 2018.

Circuit Breakers Replacement Strategy

HONI currently has 4,543 circuit breakers.⁶⁷ HONI's circuit breaker strategy over the test period is to accelerate the replacement of poor performing circuit breakers. The condition of circuit breakers has improved since 2014. HONI's evidence is that 11% of the circuit breaker fleet are in high risk condition (10%=454) or very high risk condition (1%=45)⁶⁸ which is an improvement over the last application where 16% (736) had very high (12%) and high (4%) condition risks.

AMPCO's understanding of the evidence is that HONI primarily plans to replace circuit breakers as part of Integrated Station Investment Projects including:

- Air Blast Circuit Breakers Replacement Projects;
- Station Reinvestment; and
- Integrated Station Component Replacements.

⁶⁵ Board Staff Submission Page 7

⁶⁶ B1 T3 S11 ISD #76

⁶⁷ B1 T2 S6 Page 10

⁶⁸ B1 T2 S6 Page 16

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

Table 3: Integrated Station Investment Projects (\$ Millions)

Description	Historic Years				Bridge Year	Test Years	
	2012	2013	2014	2015	2016	2017	2018
Air Blast Circuit Breaker Replacement Projects	22.4	17.9	28.0	80.5	95.9	95.1	109.4
Station Reinvestment	27.0	39.7	31.1	61.5	61.4	101.5	109.5
Integrated Station Component Replacements	(3.3)	30.6	97.7	229.2	297.1	261.3	185.7
Other Historical Projects	16.0	0.8	0.5	3.0	0.0	0.0	0.0
Total	62.1	89.0	157.3	374.2	454.4	457.8	404.7

Integrated Station Investment Projects have increased substantially from \$157.3 million in 2014 to \$457.8 million in 2017 and \$404.7 million in 2018. AMPCO submits a significant amount of the proposed costs are related to circuit breaker replacements. AMPCO has reviewed the Investment Summary Documents (S01 to S50) and calculates that 273 circuit breakers are scheduled for replacement under these projects; 98 of them ABCBs.⁶⁹

In 2017 and 2018, HONI proposes to replace 66 and 132 circuit breakers, respectively, for a total of 198.⁷⁰ Of the number that are being replaced, only 12 are in very high (3) or high (9) risk condition.⁷¹

⁶⁹ ISD S01 to S07

⁷⁰ B1 T2 S6 Page 17

⁷¹ J7.2

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

Circuit Breaker Replacement Strategy							
4,543	2012	2013	2014	2015	2016	2017	2018
EB-2016-0160							
Circuit Breaker Replacement		57	83	31	43	66	132
% Fleet		1.2%	1.8%	0.7%	0.9%	1.5%	2.9%
\$ millions			\$58.1	\$21.7	\$30.1	\$46.2	\$92.4
Cost/Circuit Breaker (\$)			\$700,000	\$700,000	\$700,000	\$700,000	\$700,000
3-year Average Cost/Circuit Breaker (\$)					\$700,000		

B1 T2 S6 Page 17, SEC#20

EB-2014-0140

4,604

Circuit Breaker Replacement	2012	2013	2014	2015	2016
Proposed Units	55	57	125	150	147
% Fleet	1.2%	1.2%	2.7%	3.3%	3.2%
Proposed \$ Millions	\$39.7	\$54.5	\$68.9	\$82.7	\$83.2
Cost/Circuit Breaker (\$)	\$721,818	\$956,140	\$551,200	\$551,333	\$565,986
5-year Average Cost/Circuit Breaker (\$)					\$669,296

EB-2014-0140 D1 T2 S1 Page 24

As shown in the above table, HONI forecast to replace 297 circuit breakers over the period 2015 to 2016 at a cost of \$165.98 million to address breakers that are performing poorly. HONI's request for an accelerated renewal rate in 2015 and 2016 was based in part on an increase in circuit breaker failures in 2013.⁷² In the end HONI replaced only 74 circuit breakers, 25% of the forecast. Although the projects and budget were approved in the last application and HONI's need for an accelerated renewal rate of 3.2% was approved, HONI replaced circuit breakers at a much slower pace (0.8%), significantly less than the 2011 to 2013 historic renewal rate of 1.5%.⁷³ In AMPCO's view, this suggests that there is no sense of urgency to replace circuit breakers.

⁷² D1 T2 S1 Page 22

⁷³ EB-2014-0140 D1 T2 S1 Page 8

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

In addition, AMPCO notes that some of the same projects that appear as investments in 2017 and 2018 were also included in EB-2012-0031 as follows:

Project	EB-2012-0031	EB-2016-0160	Cost (\$M)
	D2-2-2	B1-03-11	
Kenilworth TS	S05	S14	18.6
Richview TS	S07	S09	95.5
Beck #2 TS	S02	S10	90.7
Bruce A TS	S11	S03	104.9
Beck #1 SS	S01	S14	24.1
Gage TS	S16	S13	36.0
NRC	S18	S43	30.8

The estimated total cost for these 7 projects is just over \$400M. The Richview TS and Beck #1 SS projects appear to have been proposed and approved in EB-2010-0002 (D2-2-3, S8 and S4 respectively) for execution in 2011 and 2012. In this light, it is challenging to completely accept the urgent necessity for all of HONI's proposed projects.

Given that the forced outage frequency has improved in 2014 and 2015 compared to 2013 even though HONI did not undertake the work it deemed critical in EB-2014-0140 and asset condition has improved, AMPCO does not support ramping up the renewal rate of circuit breakers as proposed. In addition, AMPCO's confidence that HONI will execute an accelerated replacement of circuit breakers in 2017 and 2018 work as planned is low given recent history. AMPCO submits the Board should approve the proposed quantities for 2017 but not the doubling of circuit breaker replacements in 2018. AMPCO submits 2018 quantities should be consistent with 2017. This represents a consistent asset renewal rate of 1.5% in 2017 and 2018 which is an increase over 2016 actuals. AMPCO submits this pace appropriately responds to equipment performance and condition trends but is paced to better control costs and minimize customer impact. This approach results in a \$46.2 million capital reduction in 2018.

**Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018**

AMPCO Submissions

Wood Pole Replacement Strategy

HONI has 42,000 wood pole structures. HONI's replacement strategy focuses on wood poles that are at end of life, and defective 230 kV Gulfport type structures with known wood pole deficiencies.

Approximately 5,800 defective Gulfport wood poles were installed on the transmission system beginning in the mid 1960's. In EB-2014-0140 HONI stated that its replacement plan over the past 10 years has been focussed on eliminating these from the system.⁷⁴ To date, approximately 80% of the Gulfport structures have been removed from the system⁷⁵ (average 464 per year over 10 years)⁷⁶ and the remaining 20% of defective Gulfport structures will be addressed within the next 4 years, 2015 to 2018 (average 290 per year).^{77 78}

Based on the current condition assessment, 3% (1,260) of HONI's wood pole population are high risk.⁷⁹ This is an improvement over the last application (EB-2014-0140) where 9% (3,780) of wood poles were in high risk condition.⁸⁰ Between 2014 and 2016, HONI replaced 2,592 poles at a cost of \$120.4 million. This level of renewal has contributed to improvements in equipment performance, a leading indicator of future reliability performance.

Over the past 10 years the frequency of forced outages for wood poles has shown improvement and the number of outages has decreased from ten outages in 2011 to four in 2015. The forced outage duration due to wood pole failures also demonstrates significant improvement over the past 10 years and over the past 5 years has decreased from close to 500 hours in 2011 to under 100 hours in 2015.⁸¹ AMPCO believes that the reduced failure rates over time are in part due to the replacement of defective Gulfport structures on the system.

HONI proposes to continue its historical replacement rate of 2% per year: 850 in 2017 and 850 in 2018.

⁷⁴ EB-2014-0140 D1 T2 S1 Page 44

⁷⁵ 80% of 5,800 Gulfport poles/10 years = 464 year

⁷⁶ Estimated by AMPCO

⁷⁷ EB-2014-0140 D2-2-3 Reference #: S-44

⁷⁸ 20% of 5,800 Gulfport poles/4 = 290

⁷⁹ B1 T2 S6 Page 43

⁸⁰ EB-2014-0140 D1 T2 S1 Page 50

⁸¹ B1 T2 S6 Page 41

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

Wood Pole Replacement Strategy

42,000	2012	2013	2014	2015	2016	2017	2018
EB-2016-0160							
Wood Pole Replacements	763	480	897	845	850	850	850
% Fleet	1.8%	1.1%	2.1%	2.0%	2.0%	2.0%	2.0%
\$ millions	\$29.6	\$32.7	\$43.6	\$38.5	\$38.3	\$35.3	\$35.3
Unit Cost (\$)	\$38,794	\$68,125	\$48,606	\$45,562	\$45,059	\$41,529	\$41,529
5-year Average Unit Cost (\$)					\$49,229		

B1 T2 S6 Page 43

EB-2014-0140

Wood Pole Replacements	2012	2013	2014	2015	2016
EB-2014-0140 Proposed Units	763	830	850	850	850
	2.1%	1.8%	2.0%	2.0%	2.0%
EB-2014-0140 Proposed \$ Millions	\$27.2	\$32.7	\$27.2	\$27.7	\$28.2
Proposed Unit Costs	\$35,649	\$39,398	\$32,000	\$32,588	\$33,176
5-year Average Unit Cost (\$)					\$34,562

EB-2014-0140 D1 T2 S1 Page 50

AMPCO' view is that the current asset renewal rate is no longer required considering the remaining quantities of Gulfport wood poles left to be replaced, the improved condition of wood poles over time, and the improved failure rate over time, which is a leading indicator of future reliability performance⁸².

At a minimum, the proposed asset quantity should be reduced to reflect the decrease in defective Gulfport poles left to be replaced under the 4-year replacement plan, from the current average annual replacement of 464 per year to 290 per year; a reduction of 174 per year, to 676 per year.

Overall, however, HONI plans to replace 40% more wood poles over the test period than the current number of high risk wood poles (1,700 vs 1,260). AMPCO submits a slower renewal rate is more appropriate. Based on 3,780 wood poles in high risk condition in 2014 and a renewal rate of 850 wood poles per year, HONI's renewal strategy spanned 4.5 years. AMPCO submits a strategy with a timeframe consistent with HONI's last application provides a better pace. On this basis AMPCO proposes an annual decrease of 375 in the annual quantities of wood pole replacements from 850 per year to 440 per year.⁸³

Based on 2017 and 2018 costs to replace a wood pole, AMPCO proposes a reduction in costs of \$15.5 million per year for a total of \$31 million.⁸⁴ AMPCO submits it is appropriate to adjust the wood pole

⁸² Transcript Volume 5 Page

⁸³ 1260 high risk – 290 (Gulfport) x 2 years = 680/4.5 years = 151 per year (add back 290 Gulfports per year) = 440 per year

⁸⁴ (815-440)*avg unit cost = 375*\$41,529=\$15.5 million/year reduction

**Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018**

AMPCO Submissions

replacement strategy now with an approach that better controls costs and customer impacts over the test period.

AMPCO notes that HONI's actual 5-year average unit cost (2012 to 2016) exceeded the forecast by 30%. AMPCO acknowledges that there are varying degrees of complexity in wood pole replacement but averaging over 5 years accounts for these differing conditions. AMPCO submits this may be an area where HONI can look to for further identify capital productivity improvements.

Transformer Replacement Strategy

HONI currently has 721 transformers.⁸⁵ HONI's evidence is that 15% of transformers are in very high risk condition (2%) and high risk condition (13%). The number of transformers in high risk condition has improved since the last application where 4% were in very high risk condition risk and 4% had high condition risks.

In EB-2014-0140, HONI proposed to replace 52 transformers over the period 2014 to 2016; 26 per year. HONI accomplished the replacement of 40 transformers, an average of 20 per year. HONI put forward an accelerated asset replacement rate of 3.6% each year that was approved, however, HONI's replacement pace was slower; 2.9% in 2015 and 2.6% in 2016.

HONI proposes to replace 27 transformers in 2017 and 22 in 2018. Given that the number of assets in very high risk condition has been reduced by 50% to 14, and the forced outage frequency and duration of transformers are relatively stable over the past 10 years⁸⁶, AMPCO submits that the replacement rate over the test period should be consistent with the average accomplishment in 2015 and 2016, i.e. 20 per year). This approach reduces spending over the test period by \$38.5 million in 2017 and \$11 million in 2018.

Protection System Replacement Strategy

HONI currently has 12,100 protection systems in service.⁸⁷ HONI's evidence is that 27% of the protection system population present high or very high risk conditions.⁸⁸ This is consistent with the last application where 11% of protection systems were in very high risk condition and 15% in high risk. HONI proposes protection replacements of 449 in 2017 and 528 in 2018.

⁸⁵ B1 T2 S6 Page 20

⁸⁶ B1 T2 S6 page 6

⁸⁷ B1 T2 S6 Page 2

⁸⁸ B1 T2 S6 Page 22

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

Protection Systems Portfolio		2014	2015	2016	2017	2018
EB-2014-0140	# Replacements	350	365	450		
	% of Fleet	2.9%	3.0%	3.7%		
	Capital (\$M)	\$56.3	\$57.9	\$70.5		
	Unit Cost	\$160,857	\$158,630	\$156,667		
EB-2016-0160	# Replacements	610	266	367	449	528
	% of Fleet	5.0%	2.2%	3.0%	3.7%	4.4%
	Capital (\$M)	\$76.3	\$33.3	\$45.9	\$56.1	\$66.0
	Unit Cost	\$125,000	\$125,000	\$125,000	\$125,000	\$125,000

In EB-2014-0140, HONI proposed to replace 815 protection systems over the period 2015 to 2016. HONI accomplished the replacement of 633 protection systems. HONI put forward an accelerated asset replacement rate of 3.0% in 2016 and 3.7% in 2018 protection systems. HONI's accomplishment rate was 2.2% in 2015 and 3.0% in 2016. The proposed projects and accelerated replacement rates were approved, however, HONI adopted a slower pace.

The forced outage frequency of equipment caused by protection systems has been declining for lines equipment and a relatively stable trend for station equipment over the past 10 years.⁸⁹ Given the stable asset condition and equipment performance, AMPCO submits that the replacement rate over the test period should not be accelerated but held consistent with the average accomplishment rate in 2015 and 2016. AMPCO submits this pace better controls costs and customer impacts. This approach reduces spending over the test period by \$16.6 million in 2017 and \$26.5 million in 2018.

Underground Cable Replacement

HONI's proposal to replace 5.5 km of underground cable in 2015 and 2.0 km in 2016 at a cost of \$43.2 million was approved in EB-2014-0140⁹⁰ but HONI did not undertake the work.

⁸⁹ B1 T2 S6 Page 25

⁹⁰ EB-2014-0140 D1 T2 S1 Page 67

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

In this application, HONI is again seeking funding for one of the projects from EB-2014-0140 to replace 4.8 km of underground cable in 2018 at cost of \$24.8 million as part of the H7L/H11L cable Replacement Project. \$28.8 million was previously approved.⁹¹

AMPCO submits this is another example where HONI received funding to undertake specific projects that were not done and then HONI is asking for new funding to do the same work again.

Total Proposed Reductions

As shown in the table below, AMPCO's proposed capital reductions are \$119.4 million in 2017 and \$240.3 million in 2018, for a total of \$359.7 million.

AMPCO's Proposed Capital Reductions					
Investments	Category	2017	2018	Total	
Insulator Replacement	Lines	\$17.9	\$17.2		
Conductor Replacement	Lines	\$0.0	\$81.0		
Steel Structure Coating	Lines	\$27.0	\$39.0		
Steel Structure Foundation Refurbishment	Lines	\$3.9	\$3.9		
Circuit Breaker Replacement	Stations		\$46.2		
Wood Pole Replacement	Lines	\$15.5	\$15.5		
Transformer Replacement	Stations	\$38.5	\$11.0		
Protection System Replacement	Stations	\$16.6	\$26.5		
		\$119.4	\$240.3	\$359.7	

History of Underspending

Historically, HONI has underspent on the delivery of its capital program for the years 2011 to 2014 compared to Board Approved amounts.⁹² In 2015 and 2016, HONI overspent by \$43.6 million in 2015 and \$137.5 million, respectively. In AMPCO's view if the company needs to deviate substantially from its approved investment plan and alter its course such that capital spending and in-service additions are affected by more than 10%, the company should be required to notify the Board of the circumstances that give rise to such changes.

⁹¹ EB-2014-0140 D1 T3 S2 Page 53

⁹² AMPCO IR#46

**Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018**

AMPCO Submissions

Third Party Review of Capital Plan

In the HONI Distribution rates decision (EB-2013-0416) the OEB indicated at page 35, that it “....also expects that Hydro One will consider the merits of having its DSP reviewed by an independent third party and, if done, to file that review in its next rates application. If not done, an explanation of that choice must be filed with the DSP.”

HONI indicates it considered the merits of a third party review for its Transmission System Plan, however, it had to forgo a third party review in favour of conducting a Customer Engagement prior to developing the Investment Plan. Once the plan was completed, there was insufficient time for a meaningful review to occur before the filing date of May 31, 2016.⁹³

AMPCO submits an independent review of HONI’s Transmission Investment Plan to assess the level, timing and prioritization of the work would have been a useful tool in this proceeding, and more valuable than its Customer Engagement initiative in validating the proposed spend given that HONI routinely meets with its customers. For the reasons discussed below, AMPCO submits the Customer Engagement initiative has little merit in validating HONI’s expenditure levels.

AMPCO submits the Board should require that HONI have an independent third party expert review of its Transmission System Investment Plan as part of its next application.

Third Party Review of Asset Condition

The last third party asset condition assessment was performed by Hatch Acres in 2008.⁹⁴ AMPCO submits a third party review of HONI’s asset condition would be a valuable input to its next Transmission rate application to validate the prioritization of assets for replacement/refurbishment and the optimization of an investment plan.

⁹³ Board Staff IR#8

⁹⁴ J7.1

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

B. RELIABILITY RISK MODEL

HONI modified its asset management approach to include “reliability risk” to gauge the expected reduction in risk due to planned sustainment capital investments in 2017 and 2018 relative to a baseline.

The risk model focused on three investment categories: lines, transformers and breakers, primarily because of their large contribution to interruption duration which together accounts for 85%. In terms of each of their equipment % contribution to interruption duration, the % for lines, transformers and breakers is 69%, 9% and 6%, respectively. As shown in the table below, HONI calculates the relative change in reliability risk from January 2017 to December 2018 associated with the proposed investment plan as a 2% improvement.

Historically, HONI has taken a risk management approach to preventing equipment failure but has not quantified reliability risk. AMPCO has several concerns regarding HONI’s approach to quantifying risk in this application. Firstly, as shown in the table below HONI compared the overall reliability risk improvement of the planned investments to “without investment”, meaning no investment whatsoever over the course of the two years.⁹⁵ Without any investments, overall reliability risk would deteriorate by 10%.

AMPCO submits this approach is flawed. AMPCO submits providing “a without investment” comparison to customers is misleading as it overstates the deterioration of reliability. A comparison to HONI’s 2017 and 2018 forecast spend from the last application would have been more meaningful to customers.

Table 2: Relative Change in Reliability Risk

	Relative Change in Risk from Jan. 1, 2017 to Dec. 31, 2018, as per proposed investment	Relative Change in Risk from Jan. 1, 2017 to Dec. 31, 2018, <u>without</u> investment	% of Interruption Duration*
Lines	-2%	11%	69%
Transformers	-9%	14%	9%
Breakers	1%	17%	6%
Other ¹	-	-	16%
Total*	-2%	10%	

* Total is calculated by weighting the change in risk by the asset class’ contribution to interruption duration.

Secondly, HONI confirmed at the oral hearing that “lines” includes several sub-equipment categories that make up the 69% contribution to interruption duration. At the oral hearing HONI confirmed that

⁹⁵ Transcript Volume 2 Page 134

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

only conductor data was input into the model so lines should be taken to mean conductors. The contribution from conductors to the 69% interruption duration is 15%.⁹⁶ The other sub-equipment categories make up the rest.

LINES SUB-EQUIPMENT CATEGORIES	Contribution to LINES CATEGORY
INSULATOR FAILURE	26%
STEEL CROSS ARM FAILURE	19%
CONDUCTOR FAILURE	15%
WOOD CROSS ARM FAILURE	13%
SKYWIRE FAILURE	12%
WOOD STRUCTURE FAILURE	7%
HARDWARE FAILURE	3%
OTHER	3%
STEEL STRUCTURE FAILURE	1%

As shown in the Table below, AMPCO recalculated the relative change in reliability risk using conductors as a 15% contribution to the lines 69% contribution to interruption duration. This decreases the % of total system interruption duration due to equipment failure represented in the model from 85% to 25.35%. When the % for lines is adjusted from 69% to 10.35%⁹⁷ to account for conductors only, the relative change in reliability risk is a 3.8% improvement.

⁹⁶ J6.1

⁹⁷ 15% of 69% = 10.35%

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

Change in Reliability Risk of Proposed Investment Plan					
Hydro One			AMPCO Corrected		
	Relative Change in Reliability Risk	% of Total System Interruptions Duration Due to Equipment Failure		Relative Change in Reliability Risk	% of Total System Interruptions Duration Due to Equipment Failure
Lines	-2%	69%	Breakers	-2%	10.35%
Transformers	-9%	9%	Transformers	-9%	9%
Breakers	1%	6%	Breakers	1%	6%
Other			Other		
Total	-2%	84%	Total	-3.8%	25.4%

This demonstrates that the model requires further refinement before it can be relied upon as a new directional indicator to support the significant capital increases proposed for 2017 and 2018.

Existing Directional Indicators

HONI currently looks at both system reliability (T-SAIFI and T-SAIDI) and asset reliability by asset group to understand performance trends and developing risk, however as discussed below, T-SAIFI and T-SAIDI are considered lagging indicators of system reliability performance. HONI's evidence is that asset condition is insufficient to predict future reliability as it provides a static view.⁹⁸

Historically, HONI has considered "equipment performance" to be a leading indicator of future reliability performance.⁹⁹ The equipment performance perspective enables HONI to assess past and future operational performance of specific transmission assets. Equipment condition and defects is considered to be a leading indicator of major equipment performance as defects evolve to major equipment outages that can impact delivery¹⁰⁰. HONI explains that as trends in major equipment performance begin to shift, there is a lagging effect on HONI's broader system reliability metrics T-SAIFI and T-SAIDI.

Throughout the sustaining capital exhibits, HONI expresses the impact of a particular asset on system reliability expressed as frequency and duration of forced power interruptions over the past 10 years. AMPCO submits unplanned equipment performance trends over time should be targeted in this application as the leading indicator to assess future reliability performance to assist the Board in determining the appropriate levels and pacing of investments for each major asset category; not the outcome of the reliability risk model.

⁹⁸ B1 T2 S4 Page 6

⁹⁹ B1 T1 S3 Page 27

¹⁰⁰ EB-2014-0140 D1 T2 S1 Page 4

**Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018**

AMPCO Submissions

Other Considerations

AMPCO submits the model could be enhanced if data from more asset categories been included. The Foster Associates 2014 Failure Analysis Report used in the risk model had data for many other asset categories with investments in HONI's 5-year Transmission Plan including wood poles, steel structures and underground cable. The three classes used were selected because together they contribute 85% to the interruption duration hours but as pointed out above the three asset classes only contribute 25.4%.

HONI indicates its reliability risk approach has been informed by the development of this approach in other jurisdictions. At the oral hearing HONI clarified that "jurisdictions" is singular.¹⁰¹ HONI is only aware of one other jurisdiction, Office of Gas and Electricity Markets (OFGEM), that has used a similar type of reliability risk model however, HONI has not provided any useful details through interrogatories, the Technical Conference or the oral hearing to assist in understanding details of the OFGEM and how it validates HONI's reliance on a similar model.

HONI has not back-tested or back casted its reliability risk model, indicating in its Argument-In Chief this is because the predictive basis for any back cast would have to take into account the then prevailing actual conditions of the transmission system necessary to forecast the forward-looking level of reliability risk. A far better validation approach will be to consider outcome measures calculated now and then testing these results against actual future baseline levels going forward. AMPCO disagrees with HONI and submits this future validation approach is too risky for customers to accept.

HONI admits these two models (HONI & OFGEM) are in their nascent stages and are expected to develop with time as historical records are built. AMPCO submits until HONI's reliability risk model is further developed and includes more asset groups and criteria such as asset condition, and a thorough testing of the results is undertaken it is premature to rely on the outcome of the model as a leading predictive indicator of future reliability and a tool to set investment levels for 2017 and 2018. AMPCO submits the Board should base its determination of investment levels and pacing on HONI's current asset investment process that considers many factors including asset condition, demographics and equipment performance as a leading indicator of future reliability performance.

¹⁰¹ Transcript Volume 2 Page 135

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

C. CUSTOMER FEEDBACK

HONI has regular communications with customers conducted through its customer business relations group, the OGCC's customer operating support group, customer account executives, and planning activities undertaken by its asset managers.¹⁰² As part of everyday operations, HONI engages with customers and collects information on customer needs and preferences and this information is regularly used by HONI to inform past and future investment planning.

To be consistent with the Board's Renewed Regulatory Framework for Electricity (RRFE), HONI undertook a further customer engagement initiative in March 2016 to formulate its 5-year transmission investment plan (2017 – 2021). HONI already had a preliminary optimized investment plan that needed customer buy in. Customer engagement added \$24 million¹⁰³ to the preliminary investment plan. AMPCO member companies participated in this add on Customer Engagement initiative.

For each of the three consultation waves, 23 presentation slides were provided to customers. AMPCO has concerns regarding the information customers were given related to reliability performance and the three illustrative investment scenarios and its resulting impact on customers' perception of system performance and proposed spending levels.

Reliability Performance

HONI's presentation to customers included a summary of system reliability performance.¹⁰⁴ Exploration of the information presented in this presentation was a focal point at the hearing as HONI relies significantly on the outcome of its Customer Engagement initiative as a major validation of its proposed increase in capital spend. AMPCO submits the system reliability information provided to customers that they then used to inform their comments on three illustrative scenarios of proposed investment levels does not tell the full story of HONI's reliability trends. As discussed below, AMPCO submits there is missing information that tells more about HONI's overall transmission system and asset performance that the Board needs to take into consideration in setting investment levels for 2017 and 2018.

As a starting point, AMPCO submits that given the number of similar questions by other parties on the presentation to customers, it was not easy to understand how all of the slides on reliability fit together (slides 9 to 16) and what the actual impact on customers is from equipment outages. In reviewing the Ipsos Report, it seems several participants had the same issue.

¹⁰² B1-2-2 Page 2

¹⁰³

¹⁰⁴ B1-2-2 Attachment #2 Slides 9-15

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

At Slide 9, HONI states:

*"Evidence suggests that underlying reliability risk is increasing: Equipment outages³ caused by failure or necessary repairs/replacements increased ~300% from 2011 –2015."*¹⁰⁵

The derivation of the 300% includes both unplanned outages caused by equipment failure as well as planned equipment outages initiated and scheduled by HONI for repairs/replacements on the system. As capital work increases, particularly sustainment capital, the number of planned outages increases. This does not mean the transmission system is deteriorating. As shown in the table below, planned outage hours scheduled by HONI due to HONI's increasing sustainment CAPEX work accounts for most of the increase in equipment outage hours, not unplanned equipment failure. Planned outage hours increase by 1530% from 2011 to 2015.

Equipment Performance

Equipment Outages¹⁰⁶	2011	2012	2013	2014	2015
Unplanned Hours	166,347	205,485	170,470	193,969	271,825
Planned Hours	17,265	28,708	148,567	356,275	264,307
Total	183,612	234,193	319,037	550,244	536,132

AMPCO submits that outages that HONI has control over should not have been combined with unplanned outages when discussing reliability risk with customers as it greatly exaggerates the risk and leaves the impression that equipment failure rates have skyrocketed over the past 5 years when in fact unplanned outages due to equipment failure have only increased by 16.6% from 2011 to 2014¹⁰⁷.

As discussed on page 4 (Table 3), because of the built-in redundancy in HONI's transmission system, a very small percentage of unplanned outage hours due to equipment failure (system wide) actually result in a customer interruption (0.24% in 2015) and the trend is improving over time.¹⁰⁸ AMPCO submits this information should have been shared with customers as it appropriately adjusts the sense of urgency portrayed on the slides.

Percentage of Unplanned Outage Hours that Result in a Customer Interruption

¹⁰⁵ B1-2-2 Attachment #2 Slide 9

¹⁰⁶ J4.5

¹⁰⁷ J4.5: 193,969 in 2014/166,347 in 2011 = 16.6%

¹⁰⁸ J7.4

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

Equipment Outages	2011	2012	2013	2014	2015
Customer Interruption Hours	1,873	1,064	973	551	658
Unplanned Hours	166,347	205,485	170,470	193,969	271,825
% Hours Resulting in Customer Interruptions	1.13%	0.52%	0.57%	0.28%	0.24%

AMPCO notes the following transmission system reliability information that is part of HONI's rate application was not included in the customer slide deck:

- HONI is consistently in the top quartile top quartile reliability relative to transmission peers based on T-SAIDI multi-circuit.¹⁰⁹
- Canadian Electricity Association (ECA) measures indicate HONI is currently in the leading level for multi-circuit performance.¹¹⁰
- HONI's T-SAIDI is improving over the period¹¹¹; HONI's T-SAIFI-M is improving; and T-SAIFI-S is stable
- The percentage contribution of equipment failures to SAIDI and SAIFI is improving over time.¹¹² This is important because over the same timeframe HONI has spent \$2,363.7 million in sustainment capital.¹¹³

Several customers inquired as to whether HONI has historical data going back more than the five years shown on the number of unplanned outage hours due to equipment failure. They would like the opportunity to review the trend in unplanned outage hours due to equipment failure in the context of historical capital expenditure on sustainment.¹¹⁴

The Ipsos Report states "While there was general acceptance that Hydro One's assets appear to be

¹⁰⁹ AMPCO IR#3

¹¹⁰ B1 T1 S1 Page 18

¹¹¹ Transmission Scorecard 2011 to 2015

¹¹² AMPCO IR#21

¹¹³ K6.1 Page 2

¹¹⁴ B1-2-2 Attachment #1 Page 22

**Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018**

AMPCO Submissions

aged, some stated that they did not have enough information on asset age and performance, or the methodology of condition assessment and maintenance to confidently provide an opinion on the extent to which Hydro One should be more proactive in addressing current and emerging reliability risks now, rather than deferring investments.”¹¹⁵

Slide 14 identifies provides a snapshot of the asset condition of conductors, steel towers, transformers, breakers and insulators but does not provide asset condition trends over time.

AMPCO submits the above reliability information should have been shared with customers in the presentation as it appropriately adjusts the sense of urgency portrayed on the slides.

2015 Data Concerns

AMPCO has concerns regarding information on Slide 15 regarding the unplanned outage hours due to equipment failure (272,000 hours) in 2015¹¹⁶, an increase of 40% compared to 2014 (194,000 hours).

In response to AMPCO IR #23, HONI explains that 20-25% (54,000-68,000 minutes) of the 272,000 unplanned outage hours is due to capacitor banks being out of service for long durations that were initially caused by equipment failures. In cases where local reactive power was need to support peak load, capacitors were returned to service. In cases where voltage support was not immediately required, resources were allocated to more critical sustainment or capital work on the transmission network. HONI clarified at the oral hearing that this is not an isolated incident and hours are included in other years for similar events. HONI also explained that this event did not result in any customer interruptions.¹¹⁷

AMPCO is concerned that a significant percentage of unplanned outage minutes in 2015 is due to equipment that is deliberately left out of service. AMPCO submits that including the outage hours for these types of situations distorts the actual amount of outage hours.

AMPCO submits that a further review by the OEB may be warranted to look at the types of outage hours that should be included when reporting on unplanned outage hours due to equipment failure given the significance it holds in assessing asset condition and system performance and setting investment levels in rate applications.

If this incident is removed from 2015, the number of unplanned outage hours due to equipment failure in 2015 is not abnormal and more consistent with historical amounts.

¹¹⁵

¹¹⁶ B1-2-2 Attachment #2 Slide 15

¹¹⁷ Transcript Volume

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

Investment Scenarios

HONI provided 3 illustrative investment scenarios to customers with average sustainment amounts of \$700 million, \$800 million and \$920 million under scenarios 1, 2 and 3, respectively. Each scenario included reliability risk predictions and potential rate consequences as shown in the table below.¹¹⁸

3 Illustrative Scenarios 5-year Investment Plan 2016 to 2020				
\$ B	Scenario 1	Scenario 2	Scenario 3	
Sustainment	3.5	4	4.6	
Development	1.1	1.1	1.1	
Other	0.5	0.5	0.5	
	5.1	5.6	6.2	
5 year sustainment				
Average (\$ M)	700	800	920	
Reliability Risk	increase	unchanged	decrease	
Rate Impact %	5.8	6.3	6.8	

The Board Approved amount for sustaining capital in 2016 was \$581.9 in EB-2014-0140 and the average forecast for 2017 and 2018 was \$617 million.¹¹⁹ By setting Scenario 1 at almost \$100 million more than the last sustaining capital forecast, customers unknowingly are being asked to accept the level of increase already built into Scenario 1. AMPCO argues that a better starting point from the customer perspective would have been to set Scenario 1 at \$600 million so that alternative spending levels were compared to the current level of approved spending. Scenario 2 spending is very close to the sustaining amounts proposed in the application.

The concern over the starting point was expressed in the consultation, “I’m having a hard time understanding the starting point in Scenario 1. Your rate increase has been on par with inflation. Why is

¹¹⁸ B1-2-2 Attachment 2 Slide 23

¹¹⁹ K6.1 Page 2

**Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018**

AMPCO Submissions

the starting point rate increase so high?¹²⁰ Other comments are “ We do not accept the premise that a rate increase will address reliability risk, or indeed that a rate increase is justified at all.”¹²¹

Slide 19 of the customer presentation says “We do not have a recommended scenario, nor are we asking you to choose from the scenarios”. Yet the Ipsos report concludes that the general sentiment, overall, was that the right balance between reliability risk and rates is somewhere between Illustrative Scenario 2 and Scenario 3.¹²² Some discussion on choosing an investment scenario must have taken place.

The online questionnaire asks “If you could create the ideal aggregate/composite Scenario using elements of all three, what would it be?”¹²³ Some of the responses recommended investment Scenarios.

With respect to Scenario 3, customers expect to see an improvement in actual reliability performance, not necessarily only a reduced reliability risk for this level of investment.¹²⁴ A few customers indicated that the illustrative scenarios did not provide enough information about how the investments would be allocated or sufficient evidence that a rate increase is necessary.¹²⁵

In considering the above, AMPCO submits customers did not receive sufficient information from HONI on system performance to allow customers to fully form an opinion on HONI’s illustrative investment scenarios. AMPCO’s previous comments on the flaws in the Reliability Risk Model brings into question the validity of the reliability risk information provided to customers. AMPCO submits the Board should not place a lot of weight on HONI’s Customer Engagement Initiative as a means to enable customer needs and preferences to be considered in the formulation of its proposed spending.

¹²⁰ B1-2-2 Attachment #1 Page 26

¹²¹ B1-2-2 Attachment #1 Page 27

¹²² B1-2-2 Attachment #1 Page 14

¹²³ J4.7

¹²⁴ B1-2-2 Attachment #1 Page 14

¹²⁵ B1-2-2 Attachment #1 Page 27

**Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018**

AMPCO Submissions

D. TRANSMISSION TOTAL COST BENCHMARKING

In response to the Settlement Agreement in HONI's 2015-2016 Transmission Rate Application, EB-2014-0140, HONI retained Navigant Consulting (Navigant's) and First Quartile Consulting to undertake an independent Transmission Cost Benchmarking Study which was completed in May 2016.¹²⁶

The Transmission Total Cost Benchmarking Study looks at cost and performance, reliability, project management, safety and staffing. With respect to costs, the study compares overall cost performance of HONI's transmission lines and substations looking at 5 years (2010 to 2014) of historical levels of capital and OM&A investments against peer transmission companies across North America.

HONI's evidence is that the benchmarking suggests that HONI's total spending on its transmission system (stations and lines) has been less than its comparators. In finalizing its investment plan, HONI used the total cost benchmarking study as a reference tool to further validate the proposed increases in spending.¹²⁷

AMPCO makes the following comments regarding Navigant's Transmission Total Cost Benchmarking Study as follows:

- Spending on sustaining capital shows that HONI's spending on lines and stations is consistent with and greater than its comparators in 2014
- The study did not look at future capital spending patterns of comparator transmission companies which would have assisted in understanding HONI position in relation to future trends
- The study did not account for the age and condition of the assets of peer companies
- HONI's demographics makes it an outlier in the study
- Final TADS reliability data in the study is incomplete as the study did not provide results that account for circuit length of each peer company which is an important consideration as it moves HONI from the highest to close to the median

¹²⁶ B2-2-1 Attachment #1 Transmission Total Cost Benchmarking Study

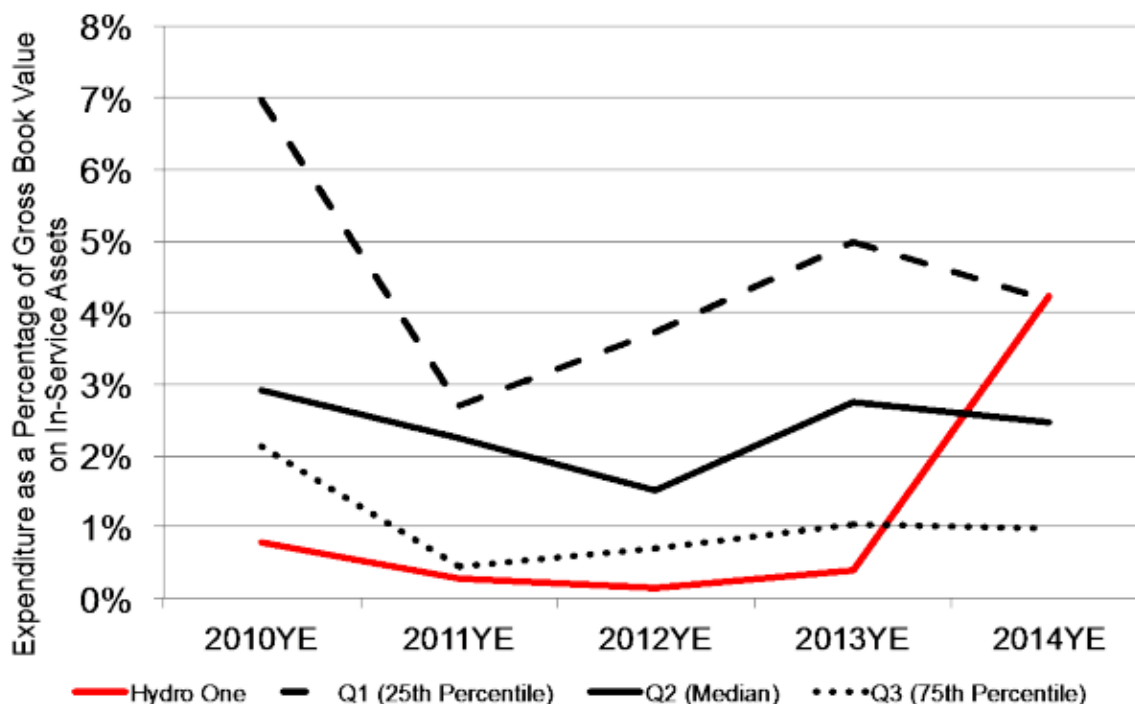
¹²⁷ B1-3-1 Page 3

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

- The key cost driver of HONI's transmission investment plan is sustaining capital. In response to Undertaking J3.3, HONI recast Figures 10 and 15 of the Navigant Report, to show sustaining lines CAPEX spending only instead of total transmission lines CAPEX per asset (Figure 10) and total substations CAPEX per asset (Figure 15) for the years 2010 to 2014.
- J3.3 shows that for the years 2010 to 2012 HONI's sustaining spending on transmission lines is below its peers, however, by 2014 this trend has reversed and HONI's sustaining spending is at the highest level, noting that the spending trend for peer transmission utilities shows a decline between 2013 and 2014.

Figure 1: Transmission Lines Sustaining CAPEX per Asset



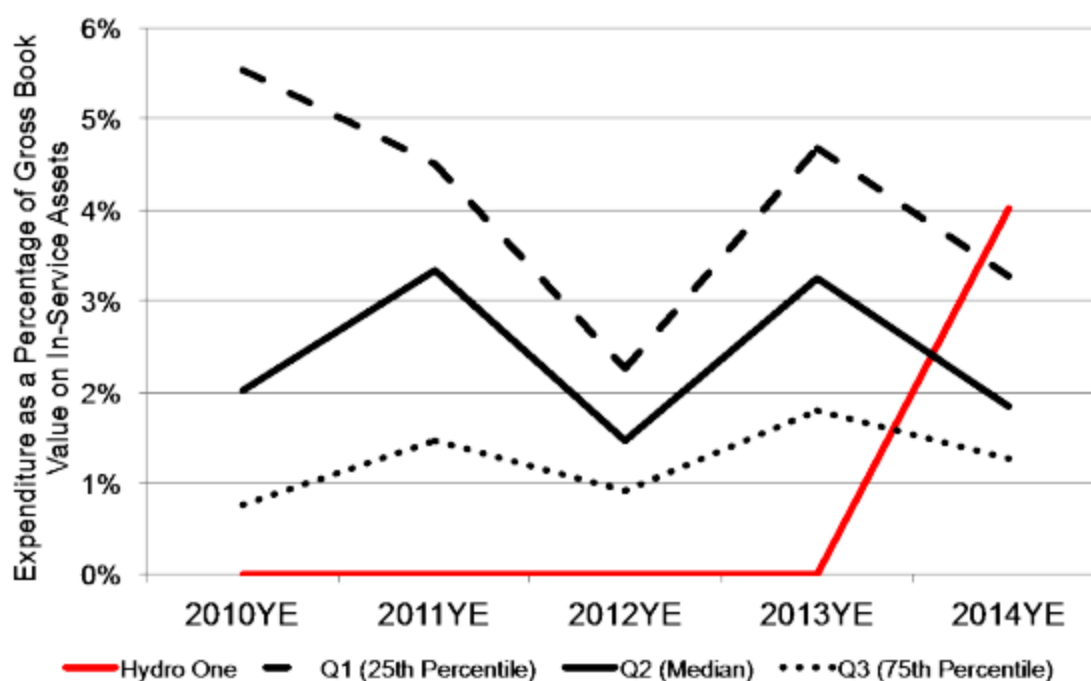
The result for substation spending is similar. By 2014, HONI is the highest of its peers in substation sustaining spending reflecting a sharp spending increase beginning in 2013 compared to peer companies that show a declining trend between 2013 and 2014. In 2014, HONI's sustaining capital spending is the

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

highest in the peer group.¹²⁸ It is unclear to AMPCO why 0% is shown for the years 2010 to 2013.

Figure 2: Substations Sustaining CAPEX per Asset



Given that the key driver for HONI's proposed increase in capital spending is related to sustaining capital, AMPCO submits the Board should place more weight on the sustaining capital investment trends than total CAPEX. As such, AMPCO submits that the sustaining CAPEX trends do not show that HONI's spending on its sustaining capital (stations and lines) is less than comparators beginning in 2014.

Further AMPCO submits that the study would have been improved had it looked at the next 5 to 10 years of forecast spending of the transmission peer companies in addition to the last 5 years. If the declining trend in sustaining capital spending (lines and stations) of the peer companies continues beyond 2014 compared to HONI's significant increase in sustaining spending over the period 2015 to

¹²⁸ Transcript Volume 3 Page

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

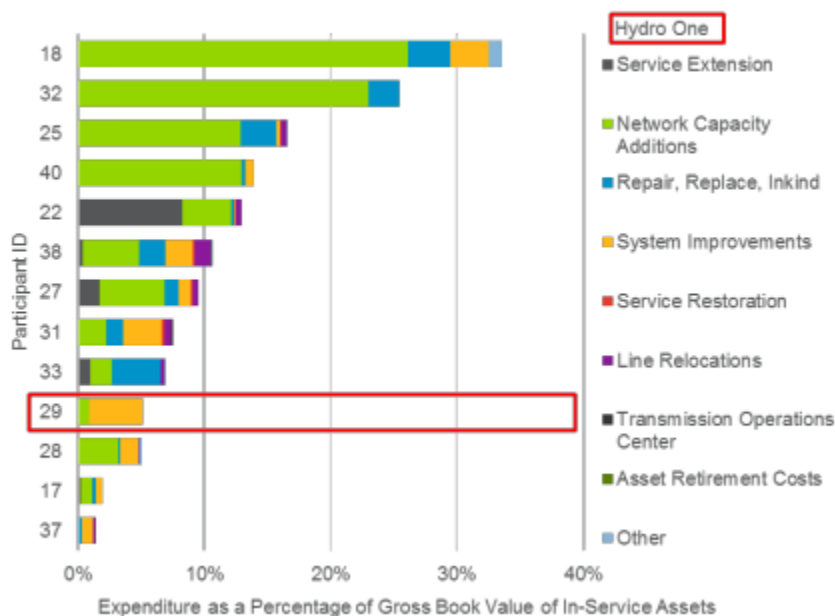
AMPCO Submissions

2022, the outcome would be that HONI's sustaining capital investment level is notably higher than its comparators.

This point was made during the customer engagement initiative. A few customers across Wave One and Two inquired about how HONI's capital expenditure associated with each scenario compares against other transmission utilities. In these cases, customers were not looking for benchmarking of historical expenditure but rather for comparative information relating to future capital investment plans of comparator utilities.¹²⁹

Sustaining capital is approximately 80% of HONI's total capital investment for transmission lines.¹³⁰ Figure 11 from the benchmarking study shows that relative to the peer group HONI is spending more of its capital on sustaining than any of its peers who are largely spending on network capacity additions. Capacity additions is generally a response to either increases in system demand or additions of new transmission customers that do not have ready access to existing facilities. HONI's demand has been stable for years and still below 2006 levels so it is logical to expect that HONI would have a lower cost structure than its peers.

Figure 11. Transmission Lines CAPEX (Activity-Based) per Asset



¹²⁹ B2-2-1 Attachment #1 Page 28

¹³⁰ B2-2-1 Attachment #1 Page 17

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

Navigant adjusted for gross asset value but not for age. The Navigant Study did not perform a direct comparison of asset age (HONI compared to peer transmission companies).¹³¹ Navigant confirmed at the oral hearing that the age of assets is a major factor in transmission companies in sustaining capital investments. AMPCO submits that looking at comparative system age demographics among the peer group would have assisted in assessing whether the level of sustaining capital is appropriate. Navigant did not perform a direct comparison of the condition of the assets of each peer company. AMPCO submits the study should have looked at the weighted average age of all transmission assets of the companies in the peer group. By not accounting for age and condition of the transmission assets of each peer company, AMPCO submits there is an inherent bias in the results.

Of the 16 Canadian and US transmission utilities included in the peer group, HONI is the largest in terms of gross transmission assets (\$), length of lines, and throughput. Based on 2014 data HONI has gross transmission assets total \$13.2 billion, line length of 29,080 km, and a throughput of 139.8 TWh. HONI is second largest for service territory at 640,000 km², next to Manitoba with a service territory of 650,000 km².¹³² HONI is significantly larger than the smallest utilities in the study: Tucson Electric Power and Baltimore Gas and Electric.

In order to compare cost and performance across the 16 utilities, Navigant normalized the data according to asset such as the number of substations and line length; activity such as annual spending; and FERC reported data such as plant in-service costs, as these factors had the greatest amount of data available. Navigant indicates that gross assets is the best predictor of costs. Figure 36 in the report¹³³ (updated below to include HONI) shows the total costs predicted by gross asset value for each of the peer group companies. AMPCO notes that HONI is an outlier (shown in red) in terms of total costs predicted by gross asset value.¹³⁴ AMPCO submits this brings into question the ability of asset data to predict costs for HONI compared to the peer group?

¹³¹ AMPCO IR#64

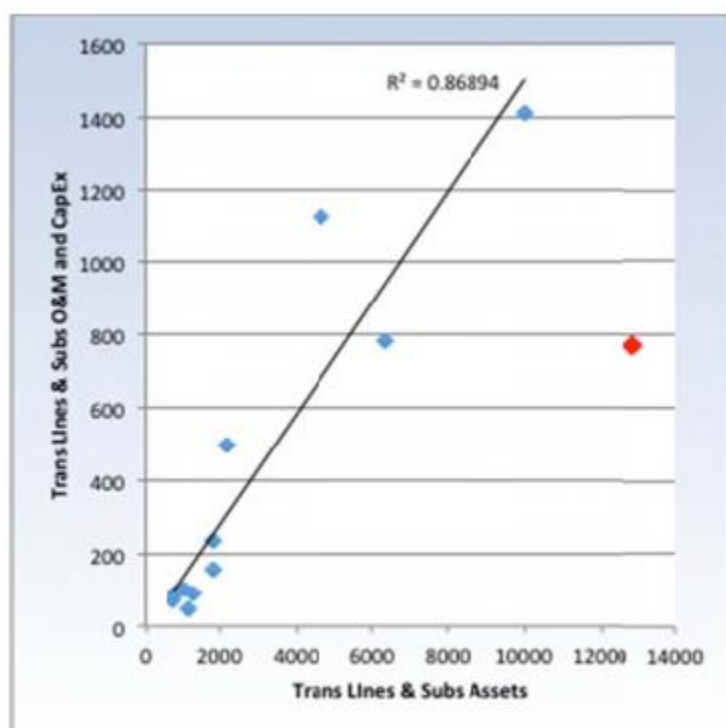
¹³² B2-2-1 Attachment #1 Transmission Total Cost Benchmarking Study Page 33

¹³³ B2-2-1 Attachment #1 Page 35

¹³⁴ SEC IR# 42 (I)

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions



Reliability Benchmarking

The benchmarking study also looked at reliability data from the CEA and the Transmission Availability Data System (TADS) that tell very different stories about reliability. If the TADS data is adjusted for circuit length, the reliability results of the two studies are more in line with one another and HONI is not the highest in the peer group but near the median.

The CEA study concludes that T-SAIDI and T-SAIFI metrics for HONI are leading among Canadian utilities.

Based on the TADS metrics, the benchmarking study stated that HONI's sustained outage frequency for the lower voltage lines (less than 200kV) was the highest in the peer group. AMPCO wishes to point out that the study does not adjust for the length of the spans between breakers, which is different for each company based on their varying demographics.¹³⁵

Among the peer group, the size of HONI's service territory drives a longer average circuit length. This is important because the longer the spans the greater your exposure.¹³⁶ AMPCO submits that by not

¹³⁵ Page 21

¹³⁶ Transcript Volume 3 Page XX

**Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018**

AMPCO Submissions

adjusting for circuit length makes HONI look worse in terms of reliability compared to its peers and leads to bias results.

When the TADS metrics are adjusted for circuit length, HONI's sustained outage frequency is closer to the average for the peer group.¹³⁷ For the higher voltage transmission lines (greater than 200kV), when adjusted for circuit length, HONI has mostly been near the median of the peer group in terms of frequency of sustained outages.¹³⁸ The adjusted TADS reliability metrics show that HONI's reliability is not the highest in the peer group.

AMPCO notes the information on mileage adjusted TADS metrics did not make its way onto Navigant's final report but was provided in presentation materials at the Stakeholder Consultation held on January 11, 2016.

In considering the above, AMPCO submits Navigant Transmission Total Cost Benchmarking Study does not validate the proposed Transmission System Plan and related cost forecasts.

¹³⁷ Attachment #4 Page 37

¹³⁸ Attachment #4 Page 38

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

E. LOAD REVENUE FORECAST

HONI's transmission forecast of average 12-month peak load for 2017 and 2018 for Ontario as a whole and for HONI's three rate categories is shown below.¹³⁹

Table 1: Hydro One's 2017-2018 Load Forecast
(12-Month Average Peak in MW)

	Ontario Demand	Hydro One Rate Categories (Charge Determinants)		
		Network Connection	Line Connection	Transformation Connection
2017	20,373	20,405	19,741	16,872
2018	20,378	20,410	19,746	16,876

HONI's forecast base year load forecast is corrected for abnormal weather conditions and the forecast growth rates are applied to the normalized base year value. The load impacts of CDM and embedded generation are added back to the historical values during the modelling process.

HONI's weather-normalization methodology to correct for abnormal weather conditions is based on using 31 years of weather data to define normal weather conditions. As part of the settlement in HONI's last transmission rate submission (EB-2014-0140), HONI agreed to use the mid-point between its conventional weather-normal forecast and an alternative based on a 20-year temperature trend.

In this proceeding, HONI submits that the 20-year "trend" has been broken since 2014 as the actual maximum average daily temperatures figures fall significantly below the normal line in both 2014 and 2015 rather than being close to the 20-year line somewhere above the normal line.¹⁴⁰ In this proceeding, HONI's proposed load forecast is based on using 31 years of data to define normal weather conditions.

AMPCO does not agree the trend in maximum average daily temperatures has been broken since 2014. In response to AMPCO undertaking, JC1.14, HONI provided additional average daily temperature data to September 30, 2016 on Figure 3 (Maximum of Average Daily Temperature) which shows that the trend line is above the average line in 2016 reflecting record high temperatures in 2016. AMPCO notes average daily temperatures by nature fluctuate up and down but for the past 20 years temperatures

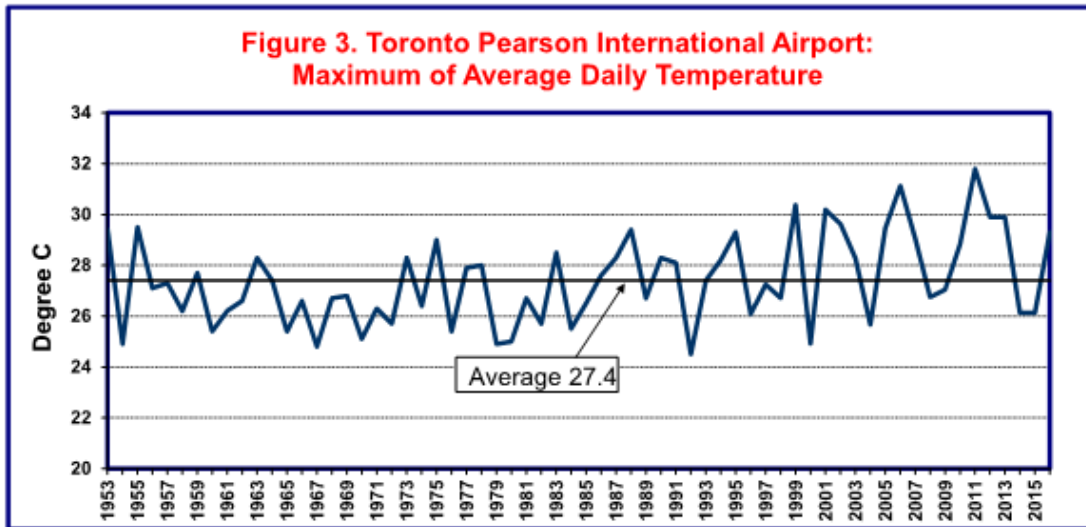
¹³⁹ E1-3-1 Page 1 Table 1

¹⁴⁰ E1-3-1 Page 13

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

have steadily been going up. The 20-year trend suggests that there is an upward sloping trend line reflecting warmer and warmer temperature over the past 20 years.



Weather correction analysis removes the abnormal or extreme weather effects from the load data to yield average conditions that reflect the more normal or expected weather that is used in the forecast. AMPCO submits the 31-year trend proposed by HONI has the effect of producing a lower than expected demand forecast. AMPCO submits that the 20-year trend should be used in developing HONI's 2017 and 2018 load forecast as it better reflects the more normal or expected weather conditions in the test period and therefore provides a better estimate of normal load. AMPCO wishes to point out that in the last transmission application where it was agreed that the mid-point between HONI's conventional weather-normal forecast (31-year) and an alternative based on a 20-year temperature trend would be used, HONI's actual load was 2.49% below forecast.¹⁴¹ AMPCO submits this variance would have been greater had the 31-year trend been used and less had the 20-year trend been used.

AMPCO wishes to point out that historically since 2007, HONI has consistently under-forecast its non-weather corrected load forecast every year; on average -3.1% for the Network Connection, -1.15% for the Line Connection and -1.21% for the Transformation Connection over the 2007 to 2016 period.¹⁴²

¹⁴¹ AMPCO IR#69

¹⁴² AMPCO IR#69

**Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018**

AMPCO Submissions

Whatever the cause, there is strong evidence of a systemic bias in the whole process. From this perspective, the move to a 20yr normal is a suggestion to provide some mitigation of the error.

If the most current 20-year trend is used, the charge determinants and, therefore, the revenue increases by 0.03% in 2017 and 0.07% in 2018, and revenue deficiency decreases.¹⁴³ AMPCO acknowledges that with this change, the increase in charge determinants is not large in this application but the variance may be significant in future applications.¹⁴⁴

In summary, AMPCO submits that the 20-year trend has not been broken and should be used in this application to define normal weather conditions as it provides a better estimate of normal load.

Should the Board determine that HONI's proposed 31-year trend is appropriate, AMPCO submits that the Board should require that as part of HONI's next Transmission application, it file its load forecast on the basis of a 31-year trend and 20-year trend so the impact on charge determinants of the two approaches can be further evaluated.

¹⁴³ LPMA #42(b)

¹⁴⁴ J12.9B

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

F. OPERATING, MAINTENANCE & ADMINISTRATION (OM&A) EXPENDITURES

HONI's OM&A expenditures for the test year are forecast to be \$412.7 million in 2017 and \$409.3 million in 2018.¹⁴⁵ This represents a decrease compared to 2015 actuals and 2016 forecast. AMPCO notes the original 2016 forecast of \$432.1 million shown in Table 9 below has been updated to \$420.7 million.¹⁴⁶

¹⁵ **Table 9: Summary of Transmission OM&A Budget (\$ Millions)**

Description	Historic				Bridge	Test	
	2012	2013	2014	2015	2016	2017	2018
Sustaining	204.7	221.0	228.6	233.6	227.5	241.2	238.5
Development	8.5	8.6	7.5	6.1	5.3	4.8	5.0
Operations	54.8	56.7	56.6	59.0	60.0	61.3	62.1
Customer Care	4.4	5.3	5.4	5.1	4.1	4.0	3.9
Common Corporate and Other OM&A	80.7	75.8	37.2	73.9	72.3	49.9	47.5
Taxes Other Than Income Taxes	62.1	21.2	64.1	63.9	62.9	63.6	64.3
Pension Adjustment*	-	-	-	-	-	-11.4	-9.9
B2M LP Adjustment*	-	-	-	-	-	-0.8	-2.1
Total	415.2	388.4	399.5	441.6	432.1	412.7	409.3

¹⁶ *See Exhibit C1, Tab 2, Schedule 1 for further details.

AMPCO wishes to point out that the above table excludes the amount of OM&A that is capitalized. In the table prepared by AMPCO below, these amounts have been included to show gross OM&A costs. Gross OM&A costs show that the actual OM&A increases are higher than they first seem. 2017 reflects an increase in OM&A costs not a decrease as the above table in evidence portrays.

OM&A

	2012	2013	2014	2015	2016	2017	2018
Total	\$415.2	\$388.4	\$399.5	\$441.6	\$420.7	\$412.7	\$409.3
Capitalization	\$106.9	\$109.3	\$124.3	\$116.9	\$122.0	\$133.2	\$134.7
Gross OM&A	\$522.1	\$497.7	\$523.8	\$558.5	\$542.7	\$545.9	\$544.0
% variance		-4.7%	5.2%	6.6%	-2.8%	0.6%	-0.3%

Note1: Update to 2016 forecast J12.1

Note 2: Update to 2017 & 2018 re: pension update (\$0.4 M in 2017; \$1.9 M in 2018)

¹⁴⁵ HONI December 2, 2016 Cost of Capital Update Table 9

¹⁴⁶ J12.1

**Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018**

AMPCO Submissions

Sustaining OM&A

AMPCO supports Board Staff's submissions that as capital spending increases a decline in OM&A costs is expected.¹⁴⁷ HONI's sustaining OM&A costs rise steadily over the 2012 to 2017 period except for 2016. AMPCO agrees a reduction in OM&A is warranted over the test period to account for this. Board Staff proposes a 5% (\$12 million) reduction in sustaining OM&A for each year of the test years to address this issue. AMPCO submits Board Staff's reduction is reasonable.

Underspending

HONI has a history of underspending on OM&A. For the years 2012 to 2015, the total underspend is \$63.6 million. In 2016 the underspend has been updated from \$4.7 million to \$11.4 million.¹⁴⁸ Over the past 5 years the total underspend is \$75 million; an average of \$15 million per year. AMPCO submits that a reduction of \$15 million in each of the test years is appropriate.

Compensation

HONI provided payroll tables in its evidence. Through the oral hearing HONI clarified that its Payroll Table 2013 to 2018¹⁴⁹ included both distribution and transmission costs.¹⁵⁰ As part of undertaking J10.2 HONI, on a best efforts basis, revised and recalculated the total compensation payroll table to reflect total transmission costs only. Unfortunately, the information on the total number of employees by representation and average base pay was excluded. AMPCO submits an incomplete picture of compensation costs was provided in this proceeding. AMPCO submits that HONI should provide a complete compensation record in its next Transmission rate application that allows for proper review of its compensation costs and trends. AMPCO suggests that using the format of the Appendix 2-K form that is used in distribution applications would be helpful.

AMPCO sought to understand HONI's trends regarding overtime spend historically and for the test period through interrogatories, the Technical Conference, and undertaking at the oral hearing that resulted in information that was based on a 60%/40% split between distribution and transmission and then on a best efforts basis as part of Undertaking J10.1. HONI's overtime forecast for 2017 and 2018 is \$32.96 million and \$33.02 million, respectively.¹⁵¹

¹⁴⁷ Board Staff Submission Page 24

¹⁴⁸ J12.1

¹⁴⁹ C1 T4 S1 Attachment #1

¹⁵⁰ C1

¹⁵¹ J9.8

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

HONI is focusing on reducing overtime by tightening controls and implementing more stringent approval methods.¹⁵² Given the difficulty in producing overtime data during this proceeding, it is unclear to AMPCO how HONI has the ability to track and measure transmission overtime trends and other Human Resources metrics and report any savings.

HONI's evidence included the results of three Mercer total compensation studies in 2008, 2011 and 2013. The 2013 results show that on an overall weighted average HONI is approximately 10% above the median which is an improvement relative to the 2008 Mercer study where HONI was 17% above market median. In response to undertaking TCJ1.6, the difference between Management pay bands and market median was provided in the table below. The total compensation above P50 is \$6.3 million.

Bands Above P50	# of Hydro One Benchmarked Incumbents	Avg. Hydro One total	Avg. P50 total	Total Compensation Amount Above P50 (\$)
Band 5	35	\$240,000	\$208,000	1,120,000
Band 6	54	\$180,000	\$138,000	2,268,000
Band 7	104	\$144,000	\$116,000	2,912,000

P50 is HONI's target for compensation. AMPCO submits HONI's management compensation costs should be reduced by the amount above P50, i.e. \$6.3 million.

HONI also provided results of the 2016 Mercer update which showed that HONI's overall weighted average declined from 10% in 2013 to 14% in 2016¹⁵³, reversing the current trend that improved from 17% in 2008 to 13% in 2011 to 10% in 2013.¹⁵⁴ AMPCO submits additional compensation reductions are warranted.

Summary

AMPCO's proposed OM&A reductions for the test period are shown in the table below. AMPCO notes that any reductions in OM&A will impact the forecast capitalized amounts.

¹⁵² C1 T2 S6 Page 8

¹⁵³ K9.8

¹⁵⁴ C1 T4 S1 Page 27

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

AMPCO's Proposed OM&A Reductions		
	2017	2018
Reduction in Sustaining OM&A	\$5.00	\$5.00
Underspending	\$15.00	\$15.00
Reduction above P50	\$6.30	\$6.30
	\$26.30	\$26.30

Hydro One Networks Inc. Transmission
Application for electricity transmission revenue requirement and related changes to the Uniform
Transmission Rates beginning January 1, 2017 and January 1, 2018

AMPCO Submissions

G. PRODUCTIVITY IMPROVEMENT AND PERFORMANCE SCORECARD

Currently embedded in the investment plan are the following savings:

In \$M	2017	2018
Procurement		
OM&A	2.1	2.8
Capital	11.2	21.4
Information Solutions Division (ISD)		
OM&A	3.4	4.5
Stations		
OM&A	2.9	3.5
Total		
OM&A	8.4	10.8
Capital	11.2	21.4

AMPCO submits that there may be opportunities for additional productivity savings if the Board approves increased asset replacement quantities over the test period, to be achieved through economies of scale and new efficiencies in completing the work.

AMPCO supports HONI's preliminary Tier 2 and Tier 3 metrics, particularly those related to system reliability. AMPCO submits it may be worthwhile for HONI to consider the development of a metric that tracks the % of outages caused by equipment type that result in a customer interruption given that not all outages interrupt electricity service to the customer.