

file 12

K1.6

EB-2016-0160

**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**

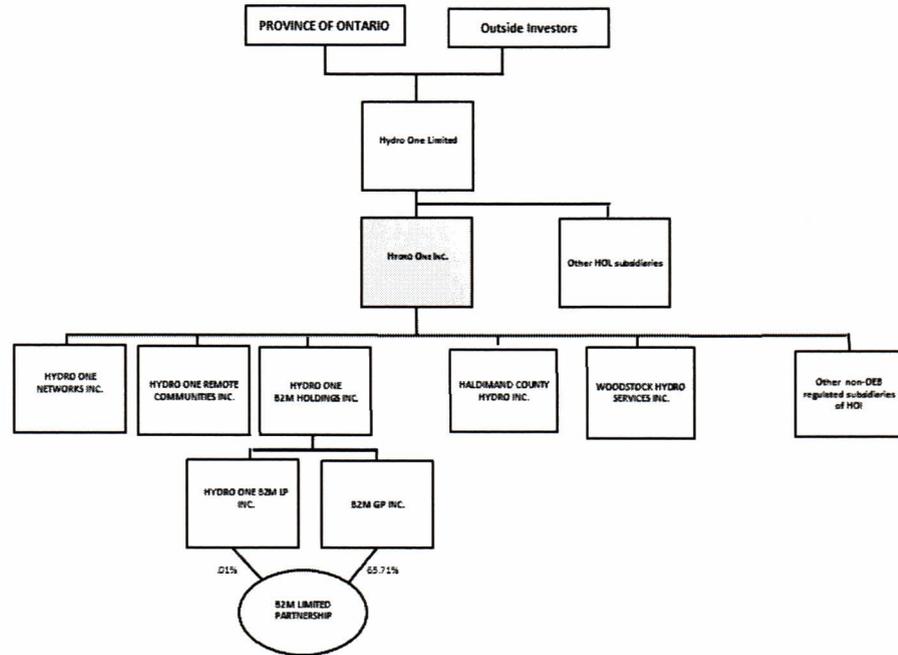
**VULNERABLE ENERGY CONSUMERS COALITION
("VECC")
CROSS-EXAMINATION
COMPENDIUM
PANEL 1**

November 24, 2016

Ontario Energy Board	
FILE No.	EB-2016-0160
EXHIBIT No.	K1.6
DATE	Nov 24/16.
08/99	

TAB 1

HYDRO ONE
ORGANIZATIONAL CHART AT February 10, 2016
Abbreviated Chart of Ontario regulated entities



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Figure 1: Hydro One Limited Corporate Structure

Hydro One Limited entered into a governance agreement with the Province dated November 5, 2015 (the “Governance Agreement”) which describes the principles that govern how Hydro One Limited will be managed and operated, including that the Province, in its capacity as a holder of voting securities, will engage in the business and affairs of Hydro One Limited as an investor and not as a manager. It also contains commitments by the Province restricting the exercise of its rights as a holder of voting securities.

The Governance Agreement specifically addresses the following matters: (i) the governance principles under which Hydro One Limited will be managed and operated; (ii) the nomination of directors, which includes: (a) the requirement for a fully

Witness: Michael Vels

1 independent board of directors (other than the Chief Executive Officer) and (b) the
2 maximum number of directors that may be nominated by the Province; (iii) the election
3 and replacement of directors; (iv) approvals requiring a special resolution of the directors;
4 (v) restrictions on the right of the Province to initiate fundamental changes; (vi) pre-
5 emptive rights provided to the Province with respect to future issuances of voting
6 securities by Hydro One Limited; and (viii) limits with respect to the Province's
7 acquisition of outstanding voting securities.

8
9 The Governance Agreement also provides that the Boards of Directors of Hydro One Inc.
10 and Hydro One Networks Inc. shall be comprised of the same directors as the Board of
11 Hydro One Limited, until the Board of Hydro One Limited determines otherwise. To
12 date, the Board of Hydro One Limited has not changed the constitution of the other
13 Boards. The Governance Agreement also specifically refers to the governance of Hydro
14 One Limited's subsidiaries, providing that the subsidiaries should be managed and
15 operated in a way that allows Hydro One Limited to comply with the governance
16 principles contained in the Governance Agreement.

17 18 **2. HYDRO ONE INC.**

19
20 Hydro One Limited's principal subsidiary, Hydro One Inc., acts as the holding company
21 of Hydro One's rate-regulated businesses under section 48.1 of the *Electricity Act, 1998*.
22 Hydro One Inc. was incorporated originally as Ontario Hydro Services Company Inc. on
23 December 1, 1998 under the OBCA and began carrying on business on May 1, 1999. On
24 May 1, 2000, it changed its name to Hydro One Inc.

25
26 Its principal subsidiary, Hydro One Networks Inc. is the largest electricity transmitter and
27 distributor in Ontario.

28
Witness: Michael Vels

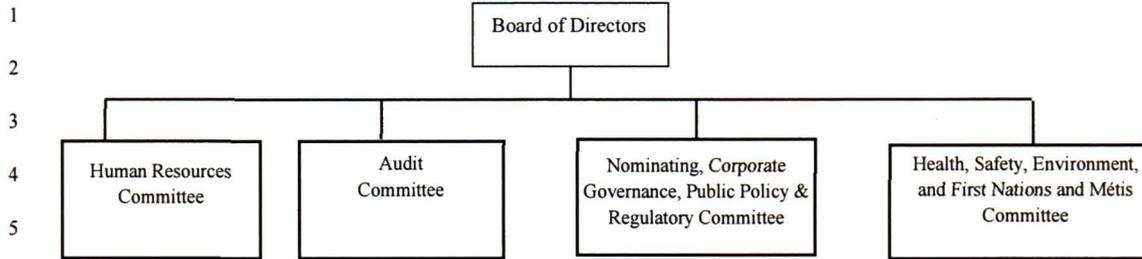


Figure 1: Hydro One Board and Board Committees

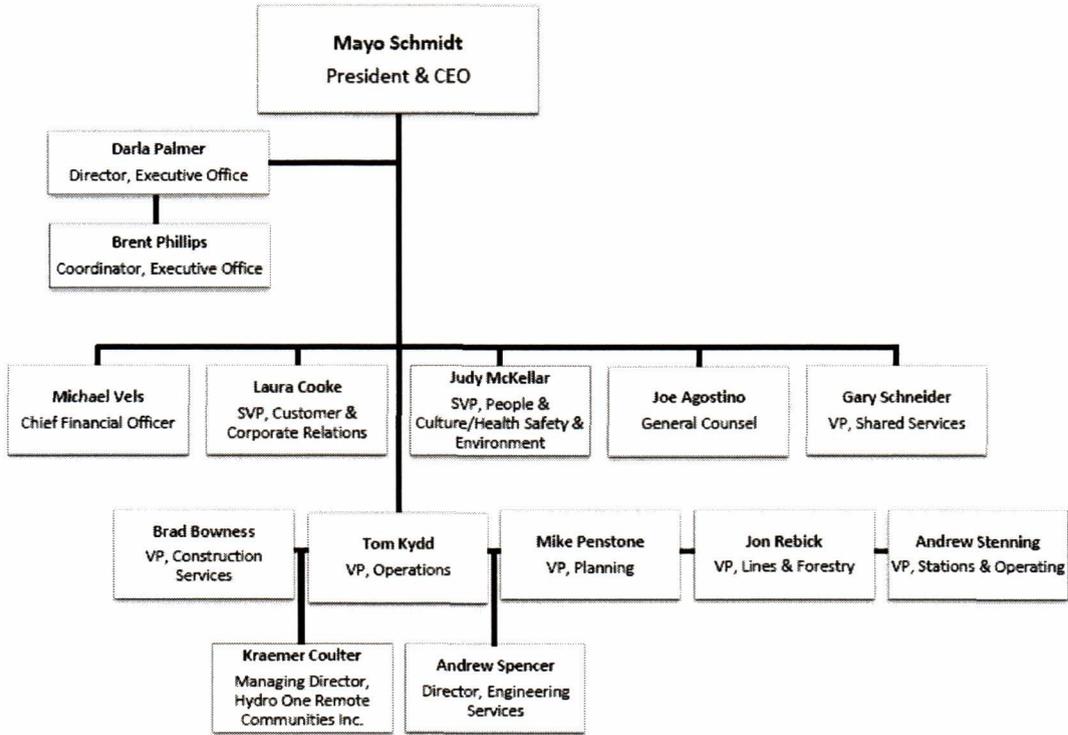
2.1 The Hydro One Board of Directors

The Board is responsible for the stewardship of the company and the supervision of management of the business and affairs of Hydro One. The Board’s accountabilities and responsibilities include approval of the company’s approach to corporate governance, having regard to the Governance Agreement between the company and the Province of Ontario (which agreement sets out the role of the Province as a holder of voting securities in the governance of the company and is described in Exhibit A, Tab 5, Schedule 1), approval of a strategic plan, oversight of corporate risk management, and oversight of the company’s pension plan. The mandate of the Board is attached hereto as Attachment 1.

Hydro One’s Board consists of 15 directors. Except for the President and Chief Executive Officer of the company, all of Hydro One’s directors are “independent” within the meaning of all Canadian securities laws governing the disclosure of corporate governance practices and stock exchange requirements imposing a number or percentage of independent directors.

The Board has separated the roles of Chair and Chief Executive Officer. The prime responsibility of the Chair of the Board is to provide leadership to the Board and to enhance Board effectiveness. As the presiding member of the Board, the Chair also

Witness: Michael Vels



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Figure 2: Hydro One Networks Inc. Organization

4. HYDRO ONE TRANSMISSION

Hydro One Networks Inc. uses a multi-skilled work force to operate both its transmission and distribution businesses, allowing it to realize efficiencies through shared facilities and equipment, where possible.

Although staff, equipment and facilities may be shared, the definition of work specific to Hydro One Transmission is undertaken annually and appropriate systems, processes and models provide for the isolation of costs related to this work. Descriptions of work and the details of Hydro One Transmission’s capital and OM&A costs are captured in in Exhibits B1 and C1, respectively.

Witness: Michael Vels

TAB 2

1

Table 1: Hydro One’s Values and Business Objectives

Customer Focus	Customer Satisfaction	<ul style="list-style-type: none"> Improve current levels of customer satisfaction
	Customer Focus	<ul style="list-style-type: none"> Engage with our customers consistently and proactively Ensure our investment plan reflects our customers’ needs and desired outcomes
Operational Effectiveness	Cost Control	<ul style="list-style-type: none"> Actively control and lower costs through OM&A and capital efficiencies
	Safety	<ul style="list-style-type: none"> Drive towards achieving an injury-free workplace
	Employee Engagement	<ul style="list-style-type: none"> Achieve and maintain employee engagement
	System Reliability	<ul style="list-style-type: none"> Maintain top quartile reliability relative to transmission peers
Public Policy Responsiveness	Public Policy Responsiveness	<ul style="list-style-type: none"> Ensure compliance with all codes, standards, and regulations Partner in the economic success of Ontario
	Environment	<ul style="list-style-type: none"> Sustainably manage our environmental footprint
Financial Performance	Financial Performance	<ul style="list-style-type: none"> Achieve the ROE allowed by the OEB

2

3

4 Hydro One submits that the forecasted expenditures and associated timing described in
 5 this Application are necessary if these objectives are to be achieved.

6

7

2.2 Customer Engagement and Needs Assessment

8

9 Hydro One's goal is to engage with customers consistently and proactively to better
 10 understand the customer and enhance the company’s ability to provide services that meet
 11 their needs and improve customers’ overall satisfaction with the service they receive.
 12 One critical element of achieving this goal is the development of an investment plan that
 13 is outcome-focused and designed to meet customers' needs and preferences.

14

15 In preparing this Application, Hydro One has engaged in an intense and focused level of
 16 customer engagement, which is detailed in Exhibit B1, Tab 2, Schedule 2. The company

Witness: Oded Hubert

Table 8: Proposed Transmission Scorecard

RRFE Principle	Category	Metric	Definition
Customer Focus	Service Quality	Satisfaction with Outage Planning Procedures	<i>% satisfied in OGCC survey</i>
		Customer Delivery Point Performance Standards Outliers (as % of total delivery points)	<i>% of total delivery points designated as outliers</i>
	Customer Satisfaction	Overall % satisfied in corporate survey	<i>Transmission customers (Industrial, Generators, LDC) only</i>
Operational Effectiveness	Safety	# of recordable incidents per 200,000 hours	<i>Average # of incidents per 200K hours</i>
		Average # of sustained interruptions per delivery point	<i>T-SAIFI-S</i>
	System Reliability	Average # of momentary interruptions per delivery point	<i>T-SAIFI-M</i>
		Average minutes that power to a delivery point is interrupted	<i>T-SAIDI</i>
		System unavailability (%)	<i>% of system not available for use</i>
		Unsupplied energy (minutes)	<i>Unsupplied MW-minutes/Peak MW</i>
	Asset Management	In-service additions as % of OEB-approved plan	<i>\$ ISA as percentage of Planned \$ Amounts</i>
		Capital expenditures as % of Budget	<i>\$ Capital expenditures as % of Budgeted \$ Capital expenditures</i>
	Cost Control	Total OM&A and Capital expenditures/Gross fixed asset value	<i>OM&A and Capital expenditures/ Gross fixed assets</i>
		Sustainment capital /Gross fixed asset value	<i>Sustainment Capital expenditures/ Gross fixed assets</i>
OM&A/Gross fixed asset value		<i>OM&A/ Gross fixed assets</i>	
Policy Response	Renewables	% of new connection impact assessments completed on time	<i>Total assessments completed within expected time/Total connections requested</i>

Witness: Oded Hubert

	Regulatory Compliance	NERC & NPCC Standards Compliance – High impact issues	<i># of high impact compliance violations as defined by NERC/NPCC</i>
		NERC & NPCC Standards Compliance – Medium/low impact issues	<i># of medium/low impact compliance violations as defined by NERC/NPCC</i>
	Regional Infrastructure	Regional Infrastructure Planning progress - % Deliverables met	<i>Total deliverables met/Total deliverables expected</i>
Financial Performance	Leverage	Debt to Equity Ratio	<i>Debt (including Short & Long Term)/ Equity</i>
	Liquidity	Current Ratio (Current Assets/Current Liabilities)	<i>Current Assets/Current Liabilities</i>
	Profitability	Return on Equity (deemed)	<i>Included in rates</i>
Return on Equity (achieved)		<i>Actual return on equity</i>	

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Witness: Oded Hubert

Proposed Transmission Regulatory Scorecard - Hydro One Networks Inc.

Performance Outcomes	Performance Categories	Measures	Historical Years					Trend
			2011	2012	2013	2014	2015	
Customer Focus Services are provided in a manner that responds to identified customer preferences.	Service Quality	Satisfaction with Outage Planning Procedures (% Satisfied)	Note 1	78	Note 1	86	92	▲
		Customer Delivery Point (DP) Performance Standard Outliers as % of Total DPs	13.8	10.8	12.8	11.8	Note 2	▲
	Customer Satisfaction	Overall Customer Satisfaction in Corporate Survey (% Satisfied)	85	76	81	77	85	-
Operational Effectiveness Continuous improvement in productivity and cost performance is achieved; and distributors deliver on system reliability and quality objectives.	Safety	Recordable Incident Rate (# of recordable injuries/illnesses per 200,000 hours worked)	3.7	2.3	2.5	1.8	1.7	▲
		System Reliability	T-SAIFI-S (Ave. # Sustained Interruptions per Delivery Point)	0.60	0.61	0.57	0.60	0.59
	T-SAIFI-M (Ave. # Momentary Interruptions per Delivery Point)		0.60	0.65	0.69	0.48	0.50	▲
	T-SAIDI (Ave. Minutes of Interruptions per Delivery Point)		127.9	71.5	66.0	36.6	44.3	▲
	System Unavailability (%)		0.50	0.48	0.37	0.48	0.66	▼
	Unsupplied Energy (minutes)		21.6	14.0	20.9	12.2	11.8	▲
	Asset Management	In-Service Capital Additions (% of OEB approved plan)	95	75	90	106	85	▲
		CapEx as % of Budget	78	81	73	90	106	▲
	Cost Control	Total OM&A and Capital per Gross Fixed Asset Value (%)	9.8	8.6	7.6	8.4	9.0	▲
		Sustainment Capital per Gross Fixed Asset Value (%)	2.6	2.8	3.3	4.2	4.6	Note 3
OM&A per Gross Fixed Asset Value (%)	3.4	3.0	2.7	2.7	2.9	▲		
Public Policy Responsiveness Transmitters deliver on obligations mandated by government. (e.g. in legislation and in regulatory requirements imposed further to Ministerial directives to the Board)	Connection of Renewable Generation	% on time completion of renewables connection impact assessments	100	100	100	100	100	-
	Market Regulatory Compliance	NERC/NPCC Reliability Standards Compliance						
		- Number of High Impact Violations (Note 4)	N/A	N/A	N/A	20	2	
- Number of Medium/Low Impact Violations (Note 4)	N/A	N/A	N/A	5	10			
Regional Infrastructure	Regional Infrastructure Planning progress - % Deliverables met	N/A	N/A	N/A	100	100		
Financial Performance Financial viability is maintained; and savings from operational effectiveness are sustainable.	Financial Ratios	Liquidity: Current Ratio (Current Assets/Current Liabilities)	0.24	0.29	0.80	0.69	0.13	
		Leverage: Total Debt (includes short-term & long-term debt) to Equity Ratio	1.27	1.22	1.10	1.16	1.39	
		Profitability: Regulatory Deemed (included in rates) (%)	9.66	9.42	8.93	9.36	9.30	
		Return on Equity Achieved (%)	10.95	12.41	13.22	13.12	10.93	

Note 1: Customer Satisfaction survey not done in 2011 and 2013.

Note 2: Results will be available in July 2016.

Note 3: In 2014 strategic decision made to increase sustainment capital.

Note 4: Results from 2011 to 2013 are excluded due to a lack of consistent data compared to 2014 and 2015.

Legend:
 ▲ up
 ▼ down
 - flat

TAB 3

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November 23, 2016

VIA RESS AND COURIER

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

Dear Ms. Walli:

RE: EB-2016-0160 Hydro One Networks Inc. ("Hydro One") Transmission Rates Application – Actual 3rd Quarter ROE

In its Decision on Motions for Full and Adequate Responses to Interrogatories and Technical Conference Questions released on November 1, 2016, the Board requested Hydro One to file:

"the actual 3rd quarter ROE (once available) along with the type of analysis that accompanied BOMA IR #30 explaining the reasons for any variance in actual ROE to date compared to the forecast ROE to date embedded in Hydro One's 2016 OEB approved revenue requirement."

Hydro One's actual 3rd quarter ROE and the accompanying explanation as requested by the Board is as follows:

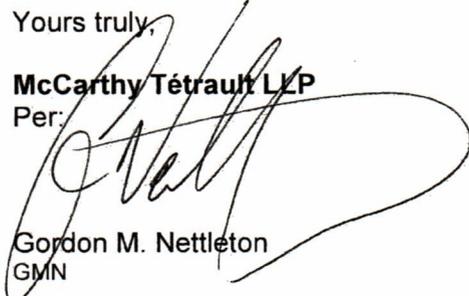
Year-to-date actual ROE for the third quarter of 2016 is approximately 8.8% or 11.7% annualized.

Higher demand, experienced during a warmer than normal summer, contributed 0.8% annualized to the ROE. After adjusting for weather, the achieved annualized ROE is 10.9%, which is approximately 1.7% above the allowed ROE of 9.19%.

It is important to note that extrapolating OM&A expenses for the full year is not appropriate given fluctuations in spending patterns between quarters. In addition, the application of the half year rule results in greater depreciation expense as the year progresses. As a result, nine-month year-to-date depreciation expenses cannot be extrapolated for the full year given fluctuations between quarters.

Yours truly,

McCarthy Tétrault LLP
Per:


Gordon M. Nettleton
GMN

1 **Building Owners and Managers Association (BOMA) INTERROGATORY #030**

2
 3 **Reference:**

4 Cost of Capital

5
 6 **Interrogatory:**

7 Please explain why Hydro One Transmission's actual ROEs have exceeded its allowed ROE by
 8 at least 200 basis points over each of the last several years.

9
 10 **Response:**

11 Hydro One Transmission's actual ROE have exceeded the allowed ROE by at least 200 basis
 12 points in 2012-2014, but not in 2015, as outlined below.

13

	2012	2013	2014	2015
Allowed ROE	9.42%	8.93%	9.36%	9.30%
Actual ROE	12.41%	13.22%	13.12%	10.93%
Variance	2.99%	4.29%	3.76%	1.63%

14
 15 Actual ROE has exceeded allowed ROE by more than 200 basis points for the following major
 16 reasons.

17
 18 In each of 2012-2014, favourable weather resulted in attaining a higher than planned peak
 19 demand and thus greater than expected revenues. In addition, over the course of 2012-2014,
 20 cumulative in-service additions were less than planned. This resulted in lower depreciation
 21 expense and rate base, which respectively affect the numerator and denominator of the
 22 calculation of actual ROE.

23
 24 Specific to 2013, lower OM&A was mainly a result of the company recognizing a one-time
 25 property tax rebate. For 2014, lower OM&A was associated with receipt of insurance proceeds
 26 for the 2013 flooding at Richview TS and Manby TS.

27
 28 2015 actual ROE did not exceed allowed ROE by more than 200 basis points.

Witness: Glenn Scott

TAB 4

1 **Vulnerable Energy Consumers Coalition (VECC) INTERROGATORY #012**

2
3 **Reference:**

4 Exhibit B2/T1/S1/
5

6 **Interrogatory:**

7 a) Please explain what mechanisms (incentives) are in place which would incent the
8 lowering of the implementation (actual vs forecast) costs of the proposed capital budget.
9

10 **Response:**

11 a) Hydro One does not have any formal incentives in place to bring costs in lower than
12 budgeted/estimated; however, it does drive a culture of cost control. As stated in the Cost
13 Efficiencies, Productivity and Key Performance Indicators evidence (Exhibit B2, Tab 1,
14 Schedule 1); Hydro One has developed a transmission scorecard and key performance
15 indicators, several of which focus on cost control, in an effort to drive a culture of continuous
16 improvement and excellence in execution. Hydro One also has a robust variance
17 identification and approval process that governs both spending and schedule variances
18 against approved budget as described in Exhibit B1, Tab 2, Schedule 7.
19

20 Hydro One is also evaluating different delivery and contract models for the work that is
21 externally constructed to evaluate if it may result in increased cost efficiencies for rate
22 payers. For more information on enhanced delivery and contract models please refer to
23 Exhibit B1, Tab 4, Schedule 1.

1 **5. KPI SELECTION (TIER 2 AND 3 METRICS)**

2

3 As part of the scorecard development process, Hydro One took the opportunity to re-
4 evaluate the use of KPIs in measuring performance across the organization. In doing so,
5 the company considered the results of the Transmission Total Cost Benchmarking Study,
6 which included a recommendation to develop more robust KPIs to facilitate performance
7 management. Hydro One will continue to develop a performance management system in
8 which KPIs for the lines of business are aligned with the OEB scorecard and business
9 objectives, to actively drive cost reductions and productivity improvement.

10

11 The company has the basic metrics in place that are expected from any well-functioning
12 transmission company. Hydro One is in the process of considering a variety of
13 incremental metrics, and supporting systems that will increase the measurability of
14 outcomes and identify the required changes to processes and activities to enhance
15 productivity, reliability, customer service customer satisfaction and other critical
16 deliverables.

17

18 In the selection of KPIs, Hydro One identified two sets of lower-level drivers of the top-
19 level metrics that were included in the proposed transmission scorecard. Tier 2 metrics
20 were identified as primary drivers of scorecard metrics and outcomes. Tier 3 metrics are
21 measured at an additional level of granularity and focus on secondary drivers of the top
22 level metrics. The identification of these drivers of scorecard performance, will allow
23 Hydro One to recognize trends and identify and investigate underlying reasons for
24 changes in the scorecard metrics. Mitigation plans will be developed where a scorecard
25 metric is not on track for a successful outcome.

26

Witness: Michael Vels

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Table 2: Tier 2 and Tier 3 Metrics

2

Performance Categories	Scorecard Metric	Preliminary Tier 2 Metrics	Preliminary Tier 3 Metrics
Service Quality	% Satisfaction with Outage Planning Procedures	% of outages cancelled Planned outages per Delivery Point	
Customer Satisfaction	Overall % satisfied in customer survey		Customer satisfaction with Price (%) Customer Satisfaction with Relationship (%) Product Quality / Reliability Satisfaction (%) Customer Service
		OGCC Transmission Customer Satisfaction (%)	
Safety	Recordable Incidents per 200,000 hours	Recordable Motor Vehicle Accidents (#/1,000,000 km driven)	
System Reliability	T-SAIFI	Interruption frequency for multi-circuit delivery points	Frequency of Momentary Delivery Point Interruptions (MC only) Frequency of Sustained Delivery Point Interruptions (MC only)
		Interruption frequency for single-circuit delivery points	Frequency of Momentary Delivery Point Interruptions (SC only) Frequency of Sustained Delivery Point Interruptions (SC only)
	T-SAIDI	Interruption minutes for multi-circuit delivery points Interruption minutes per single circuit delivery point	
	System Unavailability	Lines Unavailability Stations Unavailability	% of Forced outages caused by equipment type

Witness: Michael Vels

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 Exhibit B2
 Tab 1
 Schedule 1
 Page 10 of 25

Asset Management	In-service Additions as % of OEB-approved plan	% of budgeted work completed on or ahead of schedule	Km of line refurbished versus plan Number of transformers replaced versus plan Number of breakers replaced versus plan
	Capital Expenditures as % of budget	ECS Capital Expenditures/Project Management FTE Engineering Costs/ECS Capital \$ ECS CapEx/Construction FTE	
Performance Categories	Scorecard Metric	Preliminary Tier 2 Metrics	Preliminary Tier 3 Metrics
Cost Control	Total Capital and OM&A/Gross Fixed Assets	Supply Chain Value Realization % (Ratio of supply chain savings to procurement operations cost)	Sum of discounts and savings from strategic sourcing (\$) Sum of Costs of procurement operations (\$)
		Facilities & Real Estate value realization (Ratio of facility savings and revenues to real estate operations cost)	Sum of revenues and savings from real estate initiatives (\$) Sum of costs of real estate operations (\$)
	Overhead as % of net Capital Expenditures		
	Administrative Costs as % of OM&A & Capital Expenditures		Fleet utilization (%)
Sustainment Capital/Gross Fixed Assets	Actual costs versus estimated costs for completed capital projects (%)		Transmission Wood Structure Condition Assessment (\$/pole) Transmission Wood Structure Replacement (\$/structure) Transmission Brush Control Cost per Hectares (\$/hectare) Transmission Line Clearing Cost per Km (\$/Km) Cost per 115kV Tower Coated (\$/tower) Cost per 230kV Tower Coated (\$/tower) Cost per Transmission Cable Locate (\$/locate, network operating only)
OM&A/Gross Fixed Asset Values		Lines RCE Stations RCE	Ratio of unplanned work to planned work

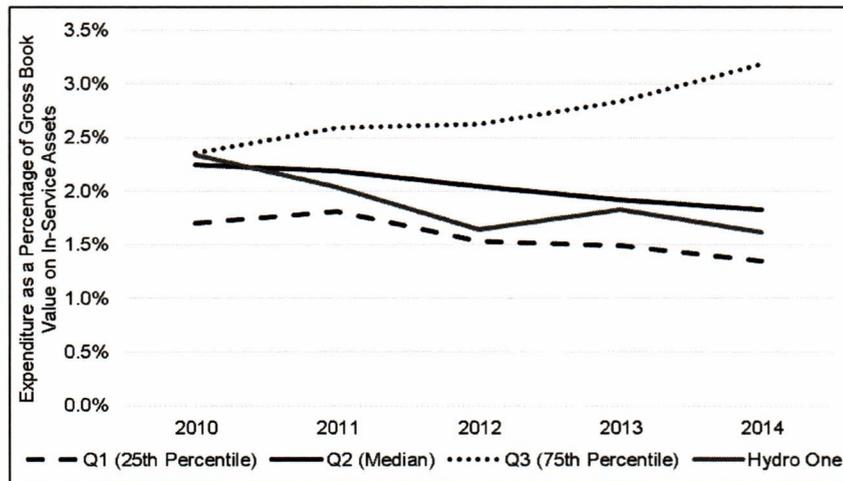
Witness: Michael Vels

1 **7.3 Total O&M Expenditures**

2

3 Hydro One's total O&M expenditures per asset value have also lagged its peers as shown
4 in Figure 4. On an O&M and total cost basis, the company expects to remain below
5 median levels based on its focus on opportunities to become more efficient in the
6 deployment of capital and in managing its O&M budget.

7



8

9 **Figure 4: Transmission Lines and Substations Direct O&M per Asset Value**

10

11 **8. UNIT COST METRICS**

12

13 To facilitate the measurement of productivity in its work programs, Hydro One has
14 identified additional metrics that focus on unit costs, reliability and cost efficiency and
15 work program productivity to supplement analysis of efficiency performance.

16

17 Where possible, Hydro One has captured activity-based unit cost metrics. Unit cost
18 metrics work well for high volume activities that have relatively consistent work
19 components. Unit costs, however, have limitations for some of Hydro One's work

Witness: Michael Vels

1 programs. Elements of the business such as engineering, stations, and construction, are
2 lower volume and more customised, making unit costs more difficult to apply and of
3 lesser value in managing the business due to the inherent variability. In these situations,
4 to perform the work in the most cost effective and productive manner, the condition of
5 the assets in a transmission station will determine what assets are maintained or replaced,
6 creating significant variation from station to station. In new construction, the asset or
7 station configuration is designed to address the unique local load profile requirements of
8 the station, again making it difficult to compare costs across construction sites. As
9 tracking unit costs in these cases would not provide additional management visibility that
10 would enable improved productivity, Hydro One has applied alternative Tier 2 and Tier 3
11 metrics, which are detailed in the following section.

12

13 In other elements of the business, Hydro One has identified several activities where unit
14 costs are relevant given the volume and nature of the activities. These activities are
15 primarily performed in the Provincial Lines and Forestry elements. In 2015 these
16 activities account for approximately 38% of the Provincial Lines and 94% of the Forestry
17 budgets; unit costs are calculated by dividing the annual expenditure on a given program
18 by the number of units completed in that year.

19

20 However, as these metrics are presented at a program level and have not been
21 normalized, some variations in the annual unit costs may be affected by the mix of work
22 undertaken throughout the year. For example, the brush control \$/hectare cleared can be
23 affected by the density of the vegetation and \$/wood structure replacement can be
24 affected by the type of structure as well as the topography.

25

26 Hydro One currently tracks data for forestry, vegetation management and wood structure
27 replacement activities, which provides useful information on year over year trends and
28 efficiency performance. In the future, Hydro One will also begin tracking the cost and

Witness: Michael Vels

Ontario Energy Board (Board Staff) INTERROGATORY #093

Reference:

Exhibit B2/Tab 1/Sch1 – Section 5: KPI Selection, Table 2 – Tier 2 and Tier 3 Metrics, pg. 10

Performance Categories	% Satisfaction with Outage Planning Procedures	Preliminary Tier 2 Metrics
<i>Cost Control</i>	<i>Sustainment Capital/Gross Fixed Assets</i>	<i>Actual cost versus estimated costs for completed capital projects (%)</i>

Interrogatory:

- a) Please explain in detail how Hydro One evaluates the quality of its project cost estimates when measured against actual project cost performance.
- b) Is it considered good industry practice for project actual costs to consistently fall significantly below estimated costs?
- i. If yes, please provide references from established estimating industry groups such as the Association of the Advancement of Cost Engineering (“AACE”).
- ii. What does an ongoing pattern of actual project costs consistently falling significantly short of estimated costs potentially indicate (e.g.: that contingency allowances are excessive)?

Response:

- a) Hydro One evaluates the quality of its project cost estimates by identifying the original approved estimate, adjusting for approved scope or contract changes, and comparing these against actual project costs. The percentage variance is reviewed to determine if this percentage falls within the range of accuracy of the estimate. If this percentage falls within the range of the estimate accuracy, it is deemed to be of an acceptable quality. This evaluation is completed as part of the project closure process for all projects with budgeted costs greater than \$5M. Any estimates with significant deviations are reviewed and captured as part of the lessons learned process. Hydro One also has improvement initiatives underway to improve the relationship between the estimate and actual by aligning the work/cost breakdown structures. For more information on improvement initiatives please see Exhibit B1, Tab 4, Schedule 1.

Witness: Michael Vels

- 1 b) No. The objective of a cost estimate is to predict the total cost of the identified scope of work
- 2 for a project; the accuracy of the estimate is a reflection of the level of project definition and
- 3 the information and data available at the time the estimate is compiled.
- 4
- 5 i) See above.
- 6
- 7 ii) A pattern of actual project costs falling significantly short of estimated costs could be an
- 8 indicator of several causes including risks and associated contingency allocation not
- 9 materializing, productivity gains, as well as deviations in commodity prices and labour
- 10 escalation rates. Hydro One recognizes that its past escalation and contingency rates
- 11 were too high and potentially contributed to the deviation between budgets and actual
- 12 costs. Hydro One has set an annual escalation rate of 2.3% for 2017 and 2.5% for 2018
- 13 and a maximum contingency rate of 10% of a project's estimate. These thresholds are in
- 14 line with the industry norms, and are an improvement from prior practices. Hydro One
- 15 has advanced several activities into the project definition stage including additional
- 16 engineering to minimize the need for assumptions during the estimating phase.

1 So my question is really, what are you seeking
2 approval of from the Board in this case? Is it the
3 scorecard that you have in the evidence, is it approval to
4 proceed with these other metrics, that some of them are
5 fixed and some of them aren't? Can you help me with that?

6 MR. HUBERT: Certainly. What we're seeking for
7 approval for is the proposed scorecard as per the filing
8 requirements. In fact, when we had our presentation day I
9 noted Mr. Quesnelle made a comment about whether in fact
10 the Board needs to approve the scorecard, but at this
11 moment prior to a hearing our view is this is perhaps
12 subject to Board approval.

13 As for the tier 2 and tier 3 metrics, we're not
14 seeking approval of them, but we are sharing with the Board
15 and with all parties our proposed metrics, and those are
16 the ones that we expect to evolve over time.

17 Some of those may actually gain some prominence and
18 evolve into future generations of the scorecard. Is that
19 helpful?

20 MS. GIRVAN: Yes, and another question on the
21 scorecard that's before us on the screen is, why don't you
22 set targets for '17 and '18 with respect to these items?

23 MR. HUBERT: So simply put, this is a "walk before you
24 can run" exercise. This is the first time that there's a
25 requirement for a transmitter to put forward a transmission
26 scorecard, and as such we would like to gain some
27 experience with these measures. We have stakeholdered
28 them, and we believe they are the right ones, but in terms

TAB 5

1 **Vulnerable Energy Consumers Coalition (VECC) INTERROGATORY #013**

2
3 **Reference:**

4 Exhibit B2/T1/S1/
5

6 **Interrogatory:**

7 a) Why has Hydro One not included the RCE as part of its new scorecard?
8

9 **Response:**

10 a) The RCE is a relatively new metric to Hydro One. Hydro One is currently refining its
11 proposed scorecard metrics to ensure they are driving behaviours that are consistent with
12 Hydro One's goals and business objectives as a newly commercial entity and aligned with
13 the RRFE. The RCE metric is being used as a Tier 2 metric under OM&A/Gross Fixed Asset
14 within the Cost Control performance category.

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 Exhibit B2
 Tab 1
 Schedule 1
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1 unit data for the relatively newly initiated steel tower coating program in order to track
 2 productivity improvement.

3
 4

Table 3: Unit Cost Metrics

Line of Bus.	Unit Metric	2012	2013	2014	2015
Forestry	\$/ brush control costs per hectare cleared	1,392	1,703	1,624	1,566
	\$/ line km cleared	1,896	1,805	2,495	2,234
Provincial Lines	\$/ wood structure condition assessment	510	410	400	486
	\$/ wood structure replacement	40,432	44,158	56,370	49,806
	\$/ 115 kV tower coated	<i>To be measured going forward</i>			
	\$/230kV tower coated				
Network Operating (only)	\$/Cable Locate	18	18	16	16

5
 6

7 **9. RELIABILITY AND COST EFFICIENCY METRICS**

8

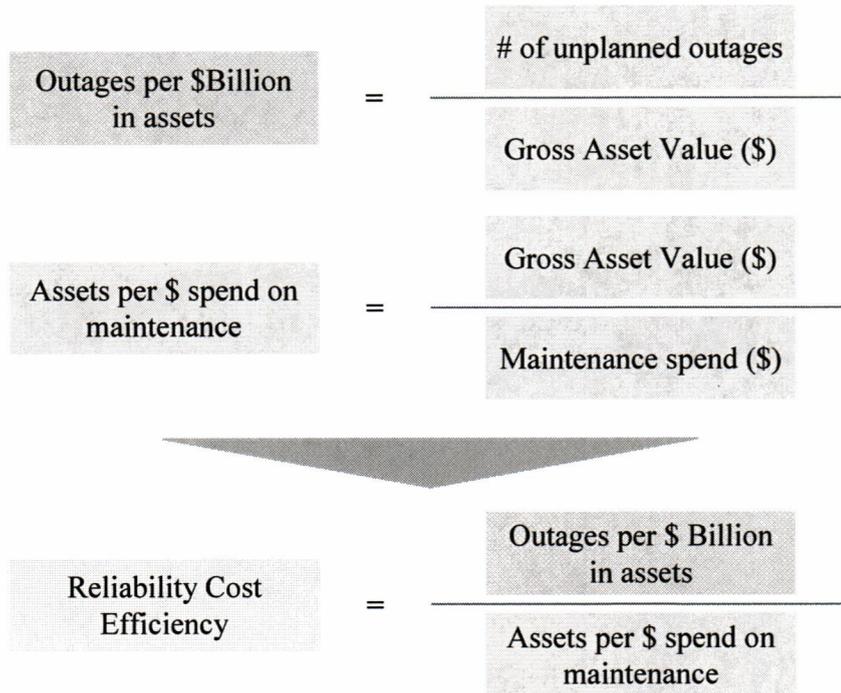
9 Where appropriate data can be measured and tracked for comparison, Hydro One plans to
 10 expand its unit cost data going forward. However, for those parts of the business where
 11 unit costs are not currently available, Hydro One has selected productivity metrics to
 12 facilitate measurement of efficiency and productivity improvements. One of these
 13 measures is Reliability and Cost Efficiency (RCE), a metric that links reliability
 14 outcomes to maintenance spend. RCE enables measurement of productivity
 15 improvements over time for both lines and stations maintenance work.

16

17 RCE is a metric that relates outages to maintenance spend, normalized by asset values.
 18 The RCE metric measures the effectiveness and efficiency of maintenance programs.
 19 Although this is a new measure, Hydro One has found RCE to be a useful metric, as it

Witness: Michael Vels

1 demonstrates how efficient the company is at maintaining and replacing critical assets in
2 order to reduce unplanned outages, while adjusting for the size of the asset base. By
3 linking outages to maintenance and gross asset value, RCE demonstrates how
4 maintenance programs drive critical outcomes for customers in the form of greater
5 reliability and reduced reliability risk. The RCE calculation is outlined below:
6



7
8
9 A RCE metric using a three year average is also calculated to mitigate the effects of an
10 abnormal number of unplanned outages due to weather related incidents. RCE metrics
11 have been improving over time as maintenance efforts have helped to reduce the
12 frequency of unplanned outages.

Witness: Michael Vels

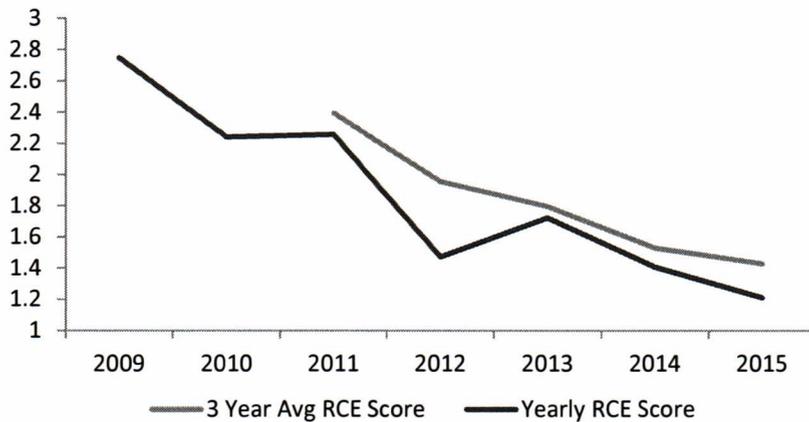
1

Table 4: Historical and Projected RCE Metrics

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
Stations	Outages/Assets	117.0	105.7	103.9	85.6	98.0	87.7	80.8	74.8	70.0	63.7
	Assets/Maintenance	42.6	47.2	46.0	58.2	56.9	62.3	66.8	76.6	72.1	81.4
	RCE	2.7	2.2	2.3	1.5	1.7	1.4	1.2	1.0	1.0	0.8
	RCE (3 year average)			2.4	2.0	1.8	1.5	1.4	1.2	1.0	0.9
Lines & Forestry	Outages/Assets	132.4	139.5	132.3	115.8	120.2	78.8	88.8	108.4	101.0	94.7
	Assets/Maintenance	86.0	98.4	94.8	109.4	100.3	92.9	101.7	71.2	75.4	79.0
	RCE	1.5	1.4	1.4	1.1	1.2	0.8	0.9	0.8	0.8	0.8
	RCE (3 year average)			1.5	1.3	1.2	1.0	1.0	0.8	0.8	0.8

2

3 RCE trends have been favourable over time, particularly for lines and stations, and Hydro
 4 One expects the trend to continue as maintenance programs continue to contribute to
 5 improved reliability.



6

7

Figure 5: Stations RCE

8

TAB 6

application used to obtain rate increases, and instead replaced other old transformers rated in better condition. These transformers are at a higher risk to fail, and we found two power transformers rated as being in very poor condition that failed and resulted in outages to customers lasting 200 minutes in 2013 and 220 minutes in 2015. Hydro One's transmission system rate application for the two-year period 2015-2016 listed 34 power transformers as rated "very high risk" for failure; however, the application did not indicate that Hydro One was planning to replace only eight of these over this period. In choosing not to use the additional funds from rate increases approved by the OEB to replace 26 transformers in very poor condition, Hydro One will have to seek \$148 million again in the future to carry out the overdue replacement.

- **Significant transmission assets that are beyond their expected service life still in use:** Hydro One's risk of power failures can increase if it does not have an effective program for replacing transmission assets that have exceeded their planned useful service life. The number of key transmission assets, such as transformers, circuit breakers, and wood poles, in service beyond their normal replacement date ranged from 8% to 26% for all types of assets in service. Replacing these assets will eventually cost Hydro One an estimated \$4.472 billion, or over 600% more than its \$621-million capital sustainment expenditure for 2014.
- **Funding requests made to Ontario Energy Board not supported by reliable data:** The asset condition ratings provided by Hydro One in its 2013-2014 and 2015-2016 rate applications to the OEB were inaccurate and contained errors because of unreliable internal systems for reporting on the condition of assets. We found that 27 of the 41 transformers replaced in 2013 or 2014 had been wrongly identified in the rate applications as being in

good or very good condition, yet Hydro One had plans at the time to replace several of these transformers due to their old age or poor condition. Similarly, we noted that 24 of the 43 transformers inaccurately reported in the 2015-2016 rate application as having a low or very low risk of failure were already scheduled to be replaced during this period.

- **Asset Analytics System not accurately considering all factors related to asset replacement decisions:** Key information is often not included, or incorrectly weighted, in the Asset Analytics system, Hydro One's new asset investment planning IT system implemented in 2012 to replace older systems. As a result, assets that need replacing are not being accurately identified. We found that the Asset Analytics database does not incorporate qualitative factors, such as technological or manufacturer obsolescence information, known asset defects and health and safety concerns. For example, oil leaks are one of the leading reasons for replacing a transformer. However, this information has only a minor impact in Asset Analytics for determining the risk of the asset failing and the need to replace it. In its reporting to OEB, Hydro One assigns oil leaks an impact on a transformer's condition rating of only 15% in determining whether an asset is classified as being in very good to very poor condition overall.
- **Limited security for electronic devices increases risk of power outages:** Hydro One's approach to ensuring proper security over transmission system electronic devices did not ensure a robust, high level of security for all of its electronic devices. Only certain devices in its transmission system receive higher levels of security in order for it to meet North American Electricity Reliability Corporation (NERC) standards for the bulk electricity system, which includes those major transmission lines and transformer stations that are linked to other states and provinces.

Ontario Energy Board (Board Staff) INTERROGATORY #002

Reference:

Exhibit A and Auditor General’s Report, Fall 2015

Interrogatory:

The 2015 Ontario Auditor General’s report identified a number of areas of concern for Hydro One and in particular, the transmission system. The most significant concerns cited by the auditor general were:

- Deterioration of system reliability
- Backlogs of preventative maintenance
- High risk assets not being replaced
- Significant assets beyond expected life still in use
- Asset analytics not considering all factors for asset replacement decisions.
- Inaccurate data in OEB funding requests
- Limited security for electronic devices.

Please provide a summary of how the areas of concern cited by the Auditor General were addressed in this application.

Response:

Deterioration of System Reliability

The Auditor General evaluated the reliability trend based upon two distinct data points; 2010 and 2014. Due to annual variations caused by weather and major or force majeure events, determination of trends in reliability is meaningful using 3 or 5 year rolling averages, which normalize these variations. Based on this industry accepted approach, Hydro One’s transmission reliability has remained relatively constant as indicated by the reliability performance metrics provided in Exhibit B1, Tab 1, Schedule 3 of the application.

To improve its ability to more accurately measure the effect of system investment on reliability Hydro One has done the following:

- Supplemented its existing analysis with an additional model to quantify reliability risk which provides a directional indication of the effect of system investment on future transmission system reliability.

Witness: Mike Penstone

- 1 • Continued initiatives to reduce the number of planned outages by combining, and better
2 scheduling, capital and maintenance activities undertaken during outages.
- 3 • Improved the performance of single circuit delivery points, which by design are not as
4 reliable as delivery points served by multiple circuits. Single-circuit delivery point
5 reliability has increased over the 2010 to 2014 period, as shown by the improved SAIDI
6 and SAIFI results and lower planned outages.

7 8 **Backlogs of Preventative Maintenance**

9 In regard to backlogs of preventative maintenance, Hydro One's practice is to release more
10 maintenance orders than available execution resources. This strategy provides execution
11 scheduling flexibility and enables work bundling and crew redeployment in the event of outage
12 cancellations. In addition, in 2014, a large amount of work orders for PCB testing, needed to
13 ensure compliance with federal regulations, was released to enable efficient scheduling and
14 bundling of this work. Hydro One expected this volume of PCB related work orders to be
15 completed by 2020, and does not consider these to be a backlog of incomplete work due to poor
16 planning, rather a conscious decision to add these work orders to improve the visibility of this
17 long-term initiative.

18
19 Although Hydro One does not believe this practice has negatively affected system reliability, it
20 has addressed this issue by recently developing a process to help asset planners better monitor
21 the status of preventative maintenance orders and maintenance spending to aid them in
22 identifying and prioritizing equipment that should be replaced due to poor performance or
23 excessive maintenance costs.

24 25 **High Risk Assets**

26 The Auditor General made conclusions regarding the deferral or delay in replacing
27 transformers. -This conclusion was solely based on asset condition information but without the
28 benefit of the full information that Hydro One uses in determining asset replacement. Overall
29 fleet condition informs the capital spending level but cannot be used to determine the specific
30 asset replacements. Asset Condition is not the sole consideration in determining the need to
31 replace an asset. These replacement decisions take into account other factors as described in
32 Exhibit B1, Tab 2, Schedule 5. Conversely, assets in good condition may need replacement
33 based on other factors such as environmental, health and safety, inadequate capacity and
34 customer needs and preferences, while assets that are deteriorated may be deprioritized due to
35 their having a less material impact on the system.

36
Witness: Mike Penstone

1 Hydro One has addressed these concerns by ensuring all transformers selected for replacement in
2 2017 and 2018 are supported by detailed assessments based on the factors described in Exhibit
3 B1, Tab 2, Schedule 5. As part of the process Hydro One also engaged a reputable third party,
4 Electric Power Research Institute (EPRI) to assess overall transformer fleet health based on
5 dissolved gas analysis.

6 7 **Significant assets beyond Expected Useful Life still in use**

8 As defined in Exhibit B1, Tab 3, Schedule 2, the expected service life is the average time in
9 years that an asset can be expected to operate under normal system conditions. It does not imply
10 the asset will need immediate replacement beyond this period of time. Hydro One operates a
11 fleet of transmission assets that are beyond expected service life. However, Hydro One's asset
12 management objective is to maintain asset performance while minimizing full life cycle costs.
13 This is accomplished through proper maintenance and timely replacement which are detailed in
14 our application. This approach benefits ratepayers by minimizing rate increases.

15 16 **Asset Analytics not considering all factors for asset replacement decisions**

17 Hydro One acknowledges Asset Analytics' data and algorithms require refinement, and Hydro
18 One continues to take steps to implement such improvements. The purpose of Asset Analytics
19 is to provide asset planners with convenient access to asset data and assess emerging risk factors
20 in an efficient manner. Decisions to replace assets are made by the asset planners in part based
21 on Asset Analytics output and also based on other factors fully described in Exhibit B1, Tab 2,
22 Schedule 5. Asset Analytics is one tool to aid in decision making, but it is not the only factor
23 considered.

24
25 To address this issue, Hydro One intends to continue improving Asset Analytics, including
26 addressing data gaps, improving functionality and refining the algorithms used. However Hydro
27 One does not intend that it become the sole source of decision making for asset replacement.

28 29 **Inaccurate Data in OEB Funding Requests**

30 Hydro One endeavors to ensure all data submitted to the OEB for rate setting purposes
31 accurately reflects its forward test year plans. In making this statement, the Auditor General
32 appears to have focused on investments that appeared in successive applications. In practice,
33 investments are sometimes delayed due to work execution delays or other factors including
34 changes in priority due to changing circumstances since the last rate application. In such cases a
35 project may be delayed in favor of completing another with a more urgent need. Hydro One
36 believes this practice is appropriate and is consistent with its asset management responsibility.
37 To address this concern Hydro One has provided evidence supporting the 2017 and 2018 capital

Witness: Mike Penstone

1 spending plans. These plans are based on the best information available at the time of filing the
2 application. Hydro One is also prepared to explain variations from its previous plans and/or
3 OEB approved spending amounts, compared to actual work completed.

4
5 **Limited Security of Electronic Devices**

6 Hydro One has been improving electronic security concerns through its Security Code of
7 Practice and by increasing security practices in order to be NERC compliant, and by applying
8 security measures that are commensurate with regulatory requirements and the risk to the power
9 system.

- 10
11 • Hydro One has completed the development of a comprehensive security framework. This
12 framework is called the Hydro One Security Code of Practice which includes the Security
13 Policy and Security Operating Standards for the organization. The Code of Practice was
14 completed in November 2015, but was recently modified to include minor revisions required
15 by NERC CIP v5 Standards.
16
17 • Hydro One has developed NERC Critical Infrastructure Protection (CIP) compliant
18 Engineering Standards and Build Documentation for all power system electronic devices. It
19 is Hydro One's policy that all devices deployed will be compliant with these standards. This
20 will ensure standard and consistent security hardening of the devices across all stations.
21 Only a subset of Hydro One's transmission stations is required to fully comply with all
22 NERC CIP requirements (electronic and physical). Other stations are less impactful to grid
23 reliability and require less stringent security measures. These non-NERC impactful stations
24 are protected based on good utility practice. From a cost prudence perspective, different
25 levels of security measures are deployed to stations based on their criticality to grid
26 reliability.

UNDERTAKING – TCJ2.12**Undertaking**

To provide a response to three recommendations of the Auditor General's Report on page 251.

Response

The undertaking was to provide a summary of how three additional areas of concern cited by the Auditor General were addressed in this application. The additional areas are:

- Spare Transformers in Storage Not Aligned with Hydro One's Needs
- Data from Power Quality Meters Not Used to Help Customers Avoid Disruptions
- Weak Management Oversight Processes over Capital Project Costs

Spare Transformers in Storage Not Aligned with Hydro One's Needs

A comprehensive review of the transformer spares inventory at Hydro One's Central Maintenance Shop in Pickering has been completed. Our system of record (i.e. SAP) has been updated to reflect the outcome of review. Hydro One spare inventory management is described in to Exhibit B1, Tab 3, Schedule 2, Section 4.2.2, Spare Transformers.

Hydro One also reviewed its suite of power transformers to determine whether opportunities existed to further consolidate design and procurement standards. The review concluded that there are limited efficiencies to be gained from further standardization.

Data from Power Quality Meters Not Used to Help Customers Avoid Disruptions

Frequency and voltage fluctuations on the transmission system become a power quality event only if customers' equipment or processes are adversely affected. It is not technically possible for a utility to predict or determine whether a voltage sag event caused a PQ disruption to a customer,

The most common power quality problem that can lead to disruption of large industrial customer processes is temporary voltage sags. The impact of voltage sag depends on their magnitude and duration and the resilience of customers' equipment.

Witness: Chong Kiat Ng

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Page 2 of 3

1 Hydro One has completed system studies to estimate the magnitude, frequency and
2 duration of power quality voltage sag events at the specific point of connection of large
3 transmission-connected end users. The results of these system studies provide an
4 indication of the number, severity and duration of voltage sag events that a customer may
5 experience and should be able to withstand according to the IEEE Standard 1668.

6
7 Customers will be able to use these studies to inform their decisions regarding
8 investments to improve the resilience of their facilities and decrease their susceptibility to
9 low-to-moderate voltage sag events as suggested in IEEE Standard 1668.

10
11 Hydro One is also in the process of working with its customers to enable their revenue
12 meters to serve as PQ meters. This will allow for more effective assessment of PQ events.

13
14 Moreover, Hydro One has offered the services of 3rd party experts to assess customers'
15 facilities and recommend measures to mitigate events.

16
17 **Weak Management Oversight Processes over Capital Project Costs**

18
19 Hydro One has taken significant steps to improve in the areas of benchmarking,
20 estimating and tracking to ensure that projects are completed on time and on budget.

21
22 The Navigant Total Cost Benchmarking study (Exhibit B2, Tab 2, Schedule 2,
23 Attachment 1, section 3.3) has been completed noting a number of benchmarks for
24 project management performance. In support of furthering our benchmarking capabilities,
25 Hydro One is refining the internal work breakdown structure to enable a more efficient,
26 consistent and accurate cost collection process for capturing project actual costs which
27 will aid in cost comparisons. In addition, Hydro One is currently working to develop
28 relationships with peer Canadian utilities to develop a consistent approach to
29 benchmarking capital project work with early focus on transmission lines projects with
30 subsequent focus to be on substation projects.

31
32 Contingency and escalation allowances have been reviewed and redefined. As a first step,
33 Hydro One has reduced contingency percentage allocation on projects to a maximum of
34 10% of overall project budget, with exceptions requiring upper management approval.
35 Escalation rates are also now in line and consistent with our corporate business plan
36 (approx. 2%/year). In addition, Hydro One has implemented a quantitative project risk
37 management methodology. Contingencies for major capital projects going forward will
38 be based on an assessment of potential risks with a projected cost impact value and

Witness: Chong Kiat Ng

1 assigned probability weighting. Exceptions to contingency amounts that are greater than
2 10% are reviewed and approved at the Director and or VP level where these exceptions
3 are justified. This approach is in line with industry best practices. In addition, estimates
4 are also now reviewed by all applicable Lines of Business, to ensure alignment and add
5 rigor.

6

7 A formalized project closure report process (including all project stakeholders) has been
8 implemented to analyze the project plan and the effectiveness of its execution. Findings
9 and feedback will be incorporated into future project estimates. This will help ensure
10 major project work (projects >\$5 million) is completed as planned and that project
11 estimates are compared against actuals, with variances explained and lessons learned
12 incorporated into future projects. On a regular basis a list is prepared to capture projects
13 that have/are planned to be completed in a calendar year. On time / on-budget analysis is
14 conducted.