COST EFFICIENCIES, PRODUCTIVITY AND KEY PERFORMANCE INDICATORS

1. INTRODUCTION

This exhibit discusses the cost efficiencies, productivity improvements and key performance indicators ("KPIs") that Hydro One is implementing to ensure that corporate goals and objectives are aligned with the principles of the OEB's Renewed Regulatory Framework for Electricity ("RRFE"). Hydro One aspires to become a best-in-class, customer centric commercial utility, with a culture of continuous improvement and excellence in execution.

The ability to measure performance will facilitate progress towards the Company's goals. Two critical elements of the journey towards stronger performance management are: (i) the development of a transmission scorecard; and (ii) the selection of key performance indicators that measure the drivers of the company's performance and track productivity improvements. Hydro One's business objectives are discussed at Exhibit B1, Tab 1, Schedule 2.

2. PROPOSED TRANSMISSION SCORECARD

Hydro One is committed to achieving the outcomes outlined in the RRFE: customer focus, operational effectiveness, public policy responsiveness and financial performance. The ability to measure performance, make year over year comparisons and benchmark against peers provides important information for measuring operational effectiveness and identifying areas for improvement. The establishment of a scorecard is one of the key elements of performance measurement under the OEB's new *Filing Requirements for Electricity Transmission Applications.*

A scorecard enables Hydro One to demonstrate improvement over time and share a comprehensive view of the company's performance with the OEB and with customers. The Transmission scorecard is supported by the Company's systems and internal key performance indicators. The incentives that are embedded in the Company's compensation plans also support continuous improvement and improvements in these critical metrics and are designed to both increase efficiency and deliver value to customers.

At a stakeholder session held on April 27, 2016, Hydro One presented a draft of the proposed transmission scorecard to stakeholders for their comments and input. The feedback received was positive and constructive. Hydro One has taken this feedback into consideration in the proposed scorecard filed at Exhibit B2, Tab 1, Schedule 1, Attachment 1. Once approved by the Board, Hydro One will submit the transmission scorecard on an annual basis to the OEB and post it on the Hydro One external website enabling the Board and stakeholders to monitor company performance against the performance metrics set out in the scorecard.

3. KEY PERFROMANCE INDICATORS (KPIS)

Hydro One's Board of Directors and management team are committed to continuous improvement and to excellence in all parts of its business. The company's management team and Board of Directors also have an ongoing commitment to invest in systems, people and tools to ensure that KPIs and measurements of progress and outcomes are a critical element of how the company manages its transmission business. The scorecard and supporting KPIs and systems are a critical element of maintaining a well-functioning and cost effective transmission system in Ontario.

High-level metrics that align with the RRFE performance outcomes were selected for scorecard inclusion, as were the recommendations from the Transmission Total Cost Benchmarking Study, filed as Exhibit B2, Tab 2 Schedule 1. The study suggests the company should "reassess and adjust performance indicators across all levels of the organisation," and leverage best practices from other utilities in terms of KPI selection. Significant focus was placed on selecting KPIs which appropriately measure productivity in the deployment of capital and execution of operations, maintenance and administrative activities, in order to evaluate cost efficiency progress and the delivery of increasing customer value.

The KPIs will evolve and be refined over time, to ensure that they continue to drive and effectively capture the impact of incremental efficiency improvements. Hydro One is committed to building a stronger performance management culture and is committed to continuous improvement, excellence in all parts of the business. The company has an ongoing commitment to invest in systems, develop the talent of its employees and leverage new tools and processes to ensure that this occurs.

4. PROCESS TO DEVELOP SCORECARD METRICS

Hydro One identified potential metrics drawn from internal and external sources that include: Hydro One's past performance management metrics, benchmarking studies, scorecards and metrics of other utilities in the public domain. The identified metrics were screened to select metrics that are relevant, objective, measurable and actionable. The company benefited significantly from knowledge obtained by working on benchmarking committees, networking with other utilities, and having contributed to several international and national benchmarking studies that provided best practice knowledge on metric selection.

Metrics were selected that promote behaviours that will drive desired outcomes for customers, stakeholders and shareholders. The proposed framework aligns customer and transmitter interests, supports the achievement of important public policy objectives, and places a greater focus on delivering long term value for money.

The scorecard metrics are included in Table 1. A scorecard with historical performance is found in Attachment 1. Attachment 2 contains detailed definitions for each metric.

Table 1: Proposed Transmission Scorecard

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

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

5. KPI SELECTION (TIER 2 AND 3 METRICS)

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

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

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

Hydro One consistently evaluates a suite of KPIs across the company and will continue to refine these metrics over time. While many of these metrics are tracked today, others have not been previously measured and will be tracked going forward. Metrics are applied to each area of the business based on the feasibility of measurement, relevance to scorecard outcomes and actionability of the metrics. Table 2 provides examples of Tier 2 and Tier 3 metrics. Hydro One will continue to develop its performance measurement system over time and will refine metric selection based on additional performance information gathered and incentives that best drive customer outcomes to promote a strong performance-based culture throughout the company.

Table 2: Tier 2 and Tier 3 Metrics

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

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

6. COMMITMENT TO PRODUCTIVITY IMPROVEMENT

Hydro One has made efforts to improve the efficiency of the organization and the productivity of its work programs in recent years, and has begun to see the results of these efforts in its work programs and budgets. The company has been able to maintain transmission OM&A at steady levels over recent years, despite factors putting upward pressure on OM&A. See Exhibit C1, Tab 2, Schedule 1 for further details on the OM&A expenditure levels. Forces contributing to these upward pressures include:

- Inflation of approximately 2% per year;
- Increased operating and maintenance requirements of a growing asset base; and
- Costs of compliance with new regulatory standards including NERC Cyber Security, PCB regulation, and new vegetation management standards.

Hydro One will continue to face many of these same upward pressures on OM&A in the coming years. However, through efforts to increase efficiency throughout its work programs, OM&A levels in both 2017 and 2018 are forecast to decline.

Hydro One is committed to pursuing initiatives to increase efficiency across both its administrative and operating groups. These include:

- **Improved maintenance planning** facilitated by greater collaboration between the asset management team and the program management team to ensure an efficient work release process;
- **Revised timelines to release work earlier and in multi-year segments** to enable greater flexibility in planning for outages and staff time;

- **Station-centric maintenance and outage grouping** to reduce the number of outages required to complete work, and to lower the costs incurred to mobilize and demobilize resources;
- **Inventory optimization** at Hydro One's warehouse facilities to increase the availability of commonly used parts and equipment;
- **Reducing spend on overtime labour** by increasing controls, reducing trouble calls performed on overtime, and improved scheduling through collaboration with customers; and
- **Implementing process efficiencies at Central Maintenance Services** to optimize employee skill level and utilize key assets.

Further details on OM&A efficiencies are provided at Exhibit C1, Tab 2, Schedule 6.

Furthermore, as part of recent activities commissioned by the Company's new board and management, a number of initiatives have been identified that are expected to drive greater efficiency and productivity in Hydro One's programs, leading to lower projected OM&A costs. The initiatives include:

- Savings identified through a full evaluation of Hydro One's procurement program and investments in new processes and tools;
- Reductions in administrative expenditures through improved processes and optimization of internal staff skills;
- Rationalization of Hydro One's IT spending; and
- Improved field efficiency through additional work planning improvements, including several opportunities to improve scheduling and labour efficiency.

Hydro One is in the process of validating the magnitude of the specific opportunities listed above. However, the company believes that fully executing on the above

opportunities will allow it to meet the OM&A commitments in this application for 2017 and 2018 test years. Hydro One intends to pursue this OM&A plan in the coming years as part of its strategy to become more efficient and effective, while continuing to deliver power to customers safely and reliably.

7. PRODUCTIVITY METRIC SELECTION

Hydro One selected three metrics to measure cost control and provide evidence that the company continues to advance on its continuous productivity goal on a total cost, a total capital and a total OM&A basis. Taken together, these three metrics provide a view of Hydro One's ability to efficiently leverage its capital and OM&A budgets to support its asset base and to improve efficiency over time. Hydro One has seen steady performance in total costs relative to its asset base in recent years and strives to maintain or improve upon this performance.

These metrics were among those highlighted in the Transmission Total Cost Benchmarking Study (Exhibit B2, Tab 2, Schedule 1, Attachment 1) as effective, high-level metrics for measurement of cost efficiency. In the study, the median levels amongst the peer set for these metrics were found to be:

Total Capital Expenditures + OM&A/Gross Fixed Asset Value = 13.9%

Total Capital Expenditures/Gross Fixed Assets = 6.6%

Total O&M /Gross Fixed Asset Value = 4.3%

7.1 Total Capital and OM&A Expenditures

In the benchmarking study, total capital and OM&A expenditures per gross fixed assets was significantly below the median of the peer set, comprised of Canadian and US utility peers as shown in Figure 1 from the benchmarking study.

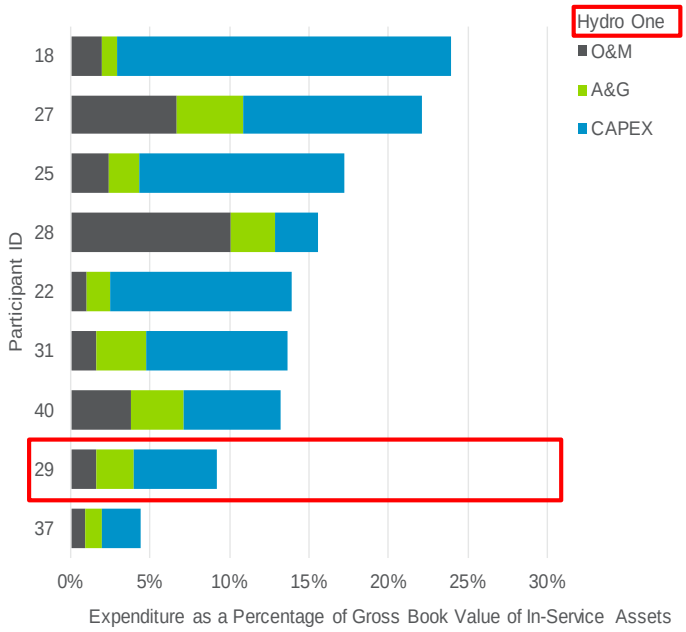

Figure 1: Transmission Lines and Substations OM&A + Capital Expenditures per Gross Fixed Asset

7.2 Total Capital Expenditures

The Transmission Total Cost Benchmarking Study compared Hydro One's capital expenditures to peers for transmission lines and for substations. Hydro One's capital spending was well below the median level for both lines and stations since 2011. Capital investment in these transmission assets increased somewhat in 2014, but the overall trend

is still shows a decrease. Figures 2 and 3 illustrate this point. Navigant Consulting and First Quartile Consulting cited in the study that "Direct CapEx was noticeably lower than the median and has been for several years. Given the relative age of the Hydro One's assets, expectation is that CapEx will need to increase in order to maintain reliability". This is consistent with Hydro One's assessment of its assets as outlined in Exhibit B1, Tab 2, Schedule 4 and Exhibit B1, Tab 2, Schedule 6. The necessary sustainment capital programs are detailed in Exhibit B1, Tab 3, Schedule 2. Hydro One does not expect to see a declining trend in the capital-focused metrics in the next few years.

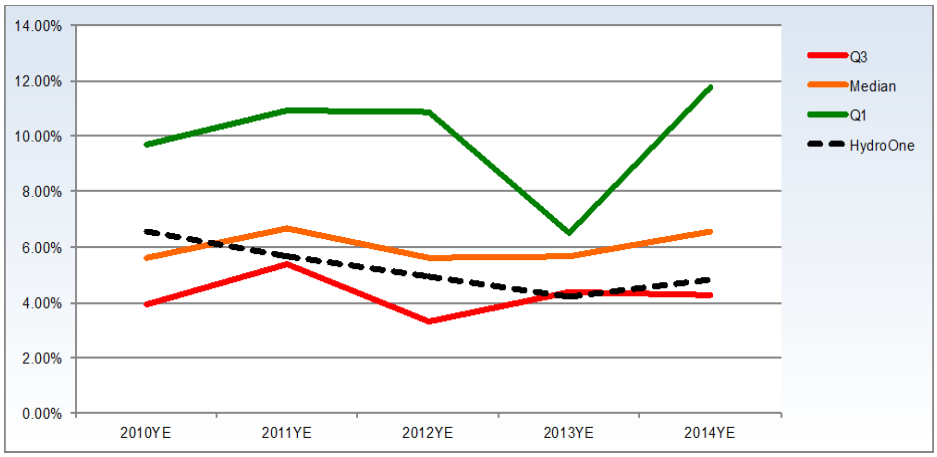

Figure 2: Lines Capital Expenditures per Asset

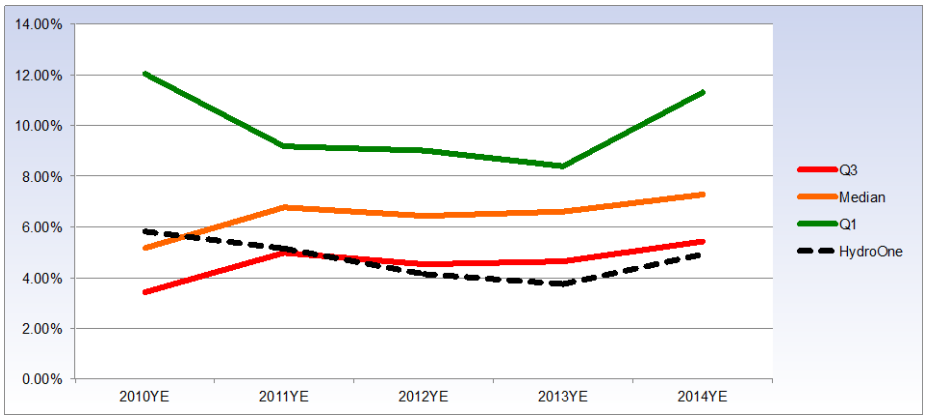

Figure 3: Stations Capital Expenditures per Asset

7.3 Total O&M Expenditures

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

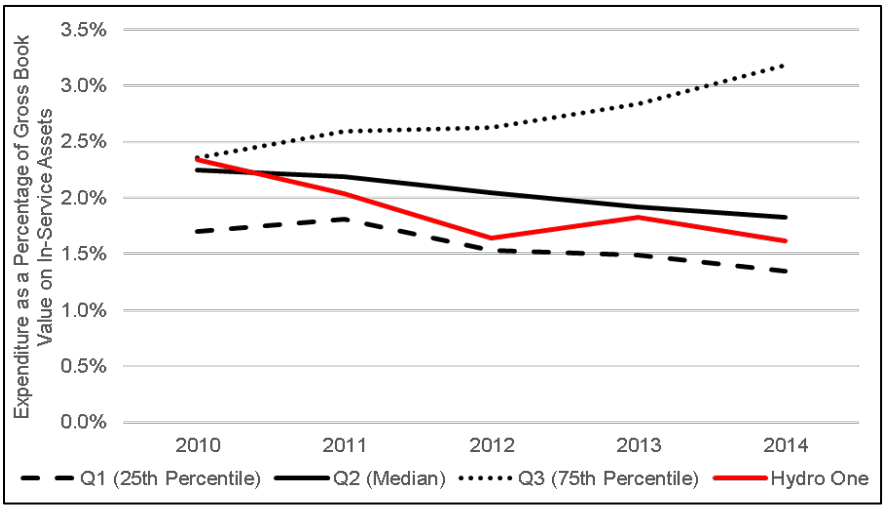

Figure 4: Transmission Lines and Substations Direct O&M per Asset Value

8. UNIT COST METRICS

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

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

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

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

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

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

unit data for the relatively newly initiated steel tower coating program in order to track productivity improvement.

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	*To be measured going forward*			
	$/230kV tower coated				
Network Operating (only)	$/Cable Locate	18	18	16	16

9. RELIABILITY AND COST EFFICIENCY METRICS

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

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

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

$$\text{Outages per \$Billion in assets} = \frac{\text{\# of unplanned outages}}{\text{Gross Asset Value (\$)}}$$

$$\text{Assets per \$ spend on maintenance} = \frac{\text{Gross Asset Value (\$)}}{\text{Maintenance spend (\$)}}$$

$$\text{Reliability Cost Efficiency} = \frac{\text{Outages per \$ Billion in assets}}{\text{Assets per \$ spend on maintenance}}$$

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

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**

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

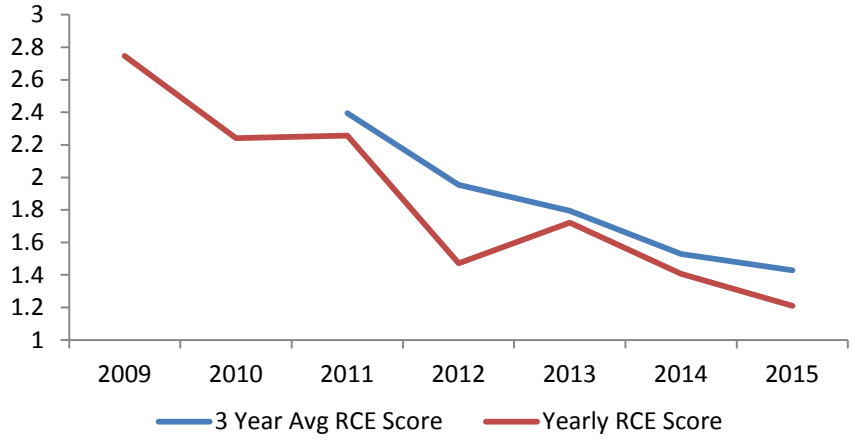

Figure 5: Stations RCE

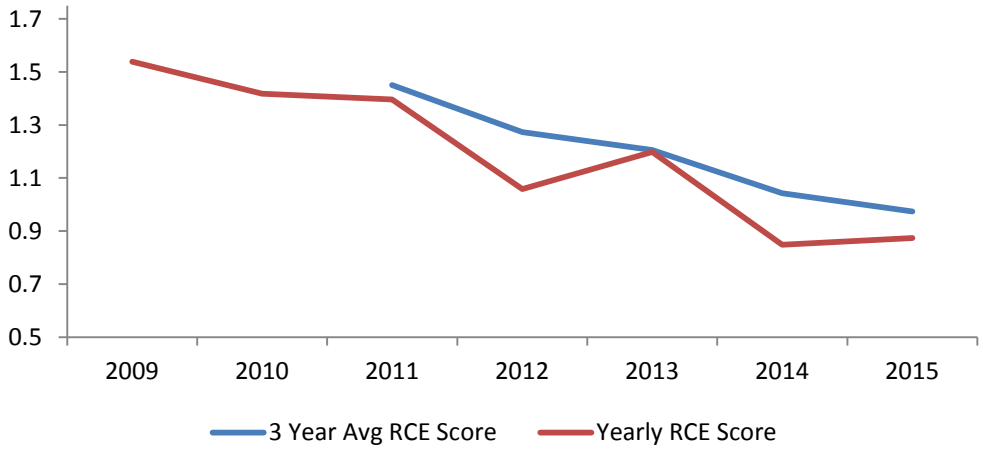

Figure 6: Lines and Forestry RCE Trend

10. OTHER PRODUCTIVITY METRICS

Hydro One has also selected productivity metrics that will provide visibility into the full process of delivering work programs. These metrics cover administration, procurement and work execution.

10.1 Administration

Administrative costs as a percentage of total capital and OM&A costs is an indicator of the share of administrative costs compared to total costs for the company. As Hydro One becomes more efficient in its administrative processes and leverages economies of scale to become more productive in managing its administrative functions, the share of costs allocated to administration will decline.

10.2 Procurement

Hydro One has selected the Planning Index and Supply Chain Services Value Realization as two critical metrics to measure procurement efficiency. The Planning Index measures material ordering according to manufacturer contracted lead time and gauges the efficiency of the ordering process. The Supply Chain Services Value Realization metric relates the value generated by the procurement organization (through discounts and strategic sourcing) as a percentage of the costs incurred to run the procurement organization.

Table 5: Historical Performance Productivity Metrics

	Metric	2011	2012	2013	2014	2015
Administrative Costs	Administrative costs as % of Net OM&A & Capital Expenditures	N/A	11.4%	13.3%	11.9%	10.5%
	Overhead as % of Net Capital Expenditures	13%	14%	15%	15%	12%
Supply Chain	Planning Index (material ordering per lead time)	89%	93%	94%	89%	85%
	Supply Chain Services value realization (Value generated/cost)	0.46	0.70	0.78	0.62	0.93

10.3 Work Execution

Given the limitations of unit costs for some of the types of work completed on the Transmission system, Hydro One selected several metrics that demonstrate productivity in stations maintenance and capital delivery to highlight areas of productivity not captured in unit costs or the RCE metric. Hydro One uses these metrics to improve its ability to ensure that targeted work is being completed in an efficient manner, while driving the outcomes that are valued by the company's customers.

10.3.1 Stations

Hydro One selected the ratio of unplanned work to planned work as a complement to the stations RCE metric. This metric provides insight into the effectiveness of maintenance work planning and of unplanned outage prevention. An effective preventive maintenance program would lead to less unplanned work, and reduce the ratio of unplanned to planned work.

10.3.2 Project Delivery and Construction

Hydro One selected several metrics to measure productivity in capital delivery:

- **In Service Additions as a % of OEB approved budget:** Selected to measure whether capital placed in service aligns with estimates developed during the planning process; and
- **Engineering cost per Engineering and Construction Services (ECS) capital dollar:** Selected to measure productivity in the engineering function of capital delivery. Over time, engineering costs would be expected to go down as a percentage of total Capital costs.

Table 6: Performance of Productivity Metrics

	Metric	2011	2012	2013	2014	2015
Work Execution	ISA as % of the OEB approved budget	95%	75%	90%	106%	85%
	% of budgeted work completed on or ahead of schedule	N/A	N/A	50%	85%	67%
	Engineering costs/ ECS Capital $	N/A	9.15%	9.14%	7.96%	8.23%
	Ratio of Stations unplanned work to planned work	36%	35%	38%	42%	41%

11. EXPECTED PERFORMANCE MANAGEMENT SYSTEM EVOLUTION

Hydro One is committed to developing appropriate mechanisms for tracking and creating performance accountability and incorporating these mechanisms throughout Hydro One's management processes. Hydro One will use the information provided by the metrics it has selected to identify trends and enable more consistent comparison against peers and Hydro One's own past performance. The metrics and KPIs that have been proposed allow the company to identify the causes of trends and better pinpoint the drivers of performance. This process is already in place for the scorecard metrics and an expanded performance management system including the tracking of selected KPIs is expected to be completed as part of Hydro One's continuing effort to become a best-in-class utility.

However, as implementation unfolds, Hydro One expects the performance management system to evolve as the Company learns from experience in using metrics and measuring productivity. Some potential drivers that may lead to changes in metric selection include:

- **Metrics not driving intended behaviours:** Evidence that metrics are providing incentives for behaviours that do not contribute to overall performance or do not align with company values;
- **Shifts in areas of focus for improvement:** Changes in areas of focus for the company and its work programs that may require the addition of new metrics to track performance in an area of particular focus;
- **Declining efficacy of metrics:** As performance improves, some metrics may show declining efficacy in measuring performance; this can be particularly relevant for unit metrics as a lower bound may exist for some of these metrics; and
- **Shifts in composition of work programs:** A significant shift in the work Hydro One is accomplishing may render some metrics less relevant. The recent shift to stations-

centric work is an example of a significant shift in work program composition that has prompted an evaluation of metrics used for measuring stations work performance.

12. SUMMARY

Hydro One aspires to become a best-in-class, customer centric commercial utility, with a culture of continuous improvement and excellence in execution. Hydro One's Board of Directors and management team are committed to continuous improvement and to excellence in all parts of its business. The company's management team and Board of Directors have an ongoing commitment to invest in systems, people and tools to ensure that KPI's and measurements of progress and outcomes are a critical element of how the company manages its transmission business. The scorecard and supporting KPIs and systems are a critical element of maintaining a well-functioning and cost effective transmission system in Ontario. The company believes that its vision and business objectives are consistent and align with outcomes expected in the Board's RRFE.

PROPOSED TRANSMISSION SCORECARD

1. INTRODUCTION

This attachment includes Hydro One's proposed transmission scorecard. The requirement for a proposed transmission scorecard is set out in the Ontario Energy Board Filing Requirements for Electricity Transmission Applications, Chapter 2, Revenue Requirement Applications, section 2.6.2., issued February 11, 2016.

Proposed Transmission Regulatory Scorecard - Hydro One Networks Inc.

			Historical Years					
Performance Outcomes	**Performance Categories**	**Measures**	**2011**	**2012**	**2013**	**2014**	**2015**	**Trend**
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 Return on Equity — Deemed (included in rates) (%)	9.66	9.42	8.93	9.36	9.30	
		Profitability: Regulatory 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 consistant data compared to 2014 and 2015.

Legend:
▲ up
▼ down
- flat

PROPOSED TRANSMISSION SCORECARD - GLOSSARY OF MEASURE DESCRIPTION

Performance Category	Metric	Description
Service Quality	1. Satisfaction with Outage Planning Procedures (% Satisfied)	*1. The OGCC Customer satisfaction survey relates Customer Satisfaction with relevant business processes and transactional customer experience. The question asked is: How would you rate Hydro One's OGCC procedures on outage planning? The measure is not benchmarkable.*
	2. Customer Delivery Point Performance, Standard outliers as % of Total Delivery Points (DPs)	*2. The percentage of customer delivery points deemed as either group or individual outliers. This information is also included in the Transmission Rate Filing. The measure is not benchmarkable.*
Customer Satisfaction	1. Overall Customer Satisfaction, corporate survey (% Satisfied)	*1. This measure reflects the overall satisfaction levels of three major transmission customer segments (Transmission End Users, Local Distribution Companies (LDCs) and Transmission-Connected Customer Generators). Survey objective is to measure key drivers of satisfaction among large Transmission customers and monitor Hydro One's performance on the four key service areas – Price, Customer Service, Product Quality / Reliability and Relationship. The survey measures customers' opinion of the company as a whole (whether they have interacted with Hydro One recently or not). It seeks to uncover perceptions of how well the company is meeting customer expectations and delivering on critical success factors. The survey is conducted online followed by computer-assisted telephone interviewing if customer prefers/is not reached. The measure is not benchmarkable.*
Safety	1. Recordable Rate *(#Recordable Injuries/Illnesses per 200,000 hours worked)*	*1. Work-related injuries/illnesses that result in: restricted work, lost time, loss of consciousness, medical attention beyond first aid, death, or any other significant work-related injury or illness diagnosed by a physician or other health care professional and are confirmed by a Hydro One Occupational Health Nurse. The measure applies to Hydro One Networks Inc. employees only (not contractors). The measure is benchmarkable.*
System Reliability	1. T-SAIFI-S (Sustained Interruption Frequency) *(Average # of times that power to a Customer is interrupted per Delivery Point)*	*1. Average Frequency of Delivery Point Sustained Interruptions is an indicator of the average number of unplanned interruptions that customers experienced and is presented as number of interruptions per delivery point per year. Only includes sustained (1 minute and longer) interruptions. The measure is benchmarkable.*

	2. T-SAIFI-M (Momentary Interruption Frequency) *(Average # of times that power to a Customer is interrupted per Delivery Point)*	*2. Average Frequency of Delivery Point Momentary Interruptions is an indicator of the average number of unplanned interruptions that customers experienced and is presented as number of interruptions per delivery point per year. Only includes momentary (less than 1 minute) interruptions. The measure is benchmarkable.*
	3. T-SAIDI (Duration) *(Average # minutes that power to a Customer is interrupted per Delivery Point)*	*3. Average Duration of Delivery Point Interruptions is an indicator of the average minutes of unplanned interruptions that customers experienced and presented as interruption minutes per delivery point per year. Only sustained (1 minute and longer) interruptions contribute to this measure. The measure is benchmarkable.*
	4. System Unavailability *(% of time system equipment is unavailable)*	*4. Transmission System Unavailability captures the total duration transmission equipment is out of service due to unplanned outages. The measure is benchmarkable.*
	5. Unavailability of Interconnects *(% of time interconnects are unavailable)*	*5. Interconnects Unavailability captures the total duration transmission interconnects are out of service due to unplanned outages. These interconnects include the interties to Quebec, New York, Michigan, Minnesota and Manitoba. The measure is benchmarkable.*
	6. Unsupplied Energy *(minutes)*	*6. Unsupplied Energy is an indicator of total energy not supplied to customers due to delivery point unplanned interruptions. In order to make it comparable among different sizes of utilities, the unsupplied energy is normalized by the system peak. The unit of the measure of normalized unsupplied energy is expressed in "system minutes". The measure is benchmarkable.*
Asset Management	1. In-Service Capital Additions as % of OEB-Approved Plan	*1. The measure is consistent with regulatory requirements of the Transmission Business, measuring the % of Capital In-Serviced relative to plan. The measure is not benchmarkable.*
	2. Capital Expenditures as % of Budget	*2. Progress is measured as the ratio of actual total capital expenditures to the total amount of planned capital expenditures. The measure is benchmarkable.*
Cost Control	1. Total OM&A and CAPEX/Gross Fixed Asset Value (%)	*1. Demonstrates Transmission cost effectiveness by comparing the ratio Total Capital and OM&A to Gross Fixed Asset costs. The measure is benchmarkable.*
	2. Sustainment Capital/Gross Fixed Asset Value (%)	*2. Demonstrates Transmission cost effectiveness by comparing the ratio Sustainment Capital to Gross Fixed Asset costs. The measure is benchmarkable.*
	3. OM&A/Gross Fixed Asset Value (%)	*3. Demonstrates Transmission cost effectiveness by comparing the ratio OM&A to Gross Fixed Asset costs. The measure is benchmarkable.*

Renewable Energy	1. % on-time completion of renewables connection impact assessments	*1. For Transmission-connected generators, Hydro One is obligated to complete a connection impact assessment (CIA) for renewables in 150 days. The measure is not benchmarkable.*
Regulatory Compliance	1. NERC/NPCC Reliability Standards compliance - # of High Impact Violations - # of Medium/Low Impact Violations	*1. Measure tracks Hydro One transmission compliance to NERC/NPCC Reliability Standards by measuring the number of "High Impact Violations" and "Medium/Low Impact Violations" over a calendar year.* *Violations are assessed as "High Impact Violations" when the potential or actual impact of a breach is severe.* *Violations are assessed as "Medium or Low Impact Violations" when the potential or actual impact of a breach is material (for "Medium") or negligible or no impact (for "Low"). These measures are benchmarkable.*
Regional Infrastructure	1. Regional Infrastructure Planning Progress - % Deliverables met	*1. Measures progress in meeting the deliverables including meeting the Transmission System Code prescribed timelines and delivering the required products. The number of deliverables will vary in a given year. Deliverables include Plans, Reports and LDC Status Update Letters. The measure is not benchmarkable.*
Financial Ratios	1. Liquidity: Current Ratio (Current Assets/Current Liabilities) 2. Leverage: Total Debt (includes short-term and long-term debt) to Equity Ratio 3. Profitability: Regulatory Return on Equity - *Deemed Return on Equity (included in rates)* 4. Profitability: Regulatory Return on Equity - *Achieved Regulated Return on Equity*	*1. The company measures the ratio of its current assets to its current liabilities. Current assets are defined as cash or other assets to be converted to cash within the year and that can be used to fund daily operations and pay ongoing expenses. Current liabilities are defined as short term debts or financial obligations that become due within the year. The measure is benchmarkable.* *2. The debt-to-equity ratio is a measure of the company's financial leverage and serves to identify the ability to finance assets and fulfill obligations to creditors, while remaining within the OEB-mandated 60 per cent to 40 per cent debt-to-equity structure (a ratio of 1.5). The measure is benchmarkable.* *3. Measures the Board-approved Return on Equity that is embedded in the transmitter's base rates. Return on Equity is the rate of return that the utility is allowed to earn through its transmission rates, as approved by the OEB. The measure is benchmarkable.* *4. Measures the transmitter's achieved Regulated Return on Equity earned in the preceding fiscal year. The reported return is calculated on the same basis that was used in establishing the transmitter's base rates. This shows the utility's actual Return on Equity earned each year. The measure is benchmarkable.*

TOTAL COST BENCHMARKING STUDY

1. BACKGROUND

In the Hydro One Networks Inc. 2015-2016 Transmission Rate Application Settlement Agreement in proceeding EB-2014-0140, Hydro One agreed to complete an independent Transmission Cost Benchmarking Study to be filed with Hydro One's next Transmission Rates application.

In the Settlement Agreement, Hydro One agreed stakeholders would:

- be consulted regarding the Terms of Reference (TOR) for the Request for Proposal (RFP);
- have an opportunity to review the successful proponent's Study proposal to help ensure it meets the requirements of the TOR; and
- be provided with an opportunity to review and provide comments on the preliminary results prior to finalizing the Study.

Consistent with the Settlement Agreement, Hydro One conducted three stakeholder sessions from February 2015 to January 2016. All stakeholder sessions were held in accordance with the principles, objectives, participation format, and consultation format found in Section 2.0 of Exhibit A, Tab 9, Schedule 1. To assist in facilitating this process, Hydro One Networks retained the services of Optimus SBR Management Consulting and Swerhun Facilitation.

The consultation sessions consisted of the presentation of information to stakeholders, followed by facilitated discussions on the issues raised. In addition, Hydro One staff was available for informal dialogue with stakeholders throughout the process.

2. STAKEHOLDER CONSULTATIONS

This section focuses on the logistics and objectives of the stakeholder consultation sessions held to inform Hydro One's Transmission Total Cost Benchmarking Study report and recommendations.

2.1 Session #1 – Informing the Request for Proposal (RFP)

Session #1 was held on February 11, 2015 at the DoubleTree Hotel in Toronto with Optimus SBR Management Consulting acting as the facilitator and scribe. Prior to this stakeholder session, Optimus SBR issued a survey to establish stakeholder input into the main objectives of the study and to make suggestions regarding comparators and criteria to be used for comparison in the study. The results of this survey subsequently formed the basis for the stakeholder consultation to more fully explore and assist in defining the Terms of Reference (ToR) for the Cost Benchmarking Study. Twelve stakeholders attended the stakeholder consultation representing nine stakeholder organizations and OEB staff. Hydro One listened to stakeholders and considered their input to inform the ToR for the RFP issued to the market. The meeting notes of this session, including the presentation, are found in Attachment 2.

As a result of the competitive bid process, Hydro One commissioned Navigant Consulting and First Quartile Consulting to perform the study.

2.2 Session #2 – Proposed Study Methodology

Session #2 was held on August 6, 2015 at the DoubleTree Hotel in Toronto using Swerhun Facilitation to facilitate the session and produce the minutes of the meeting. Ten participants attended, representing eight stakeholder groups, and OEB staff. In this session, Hydro One Transmission, Navigant Consulting, and First Quartile Consulting presented and sought participant feedback on an overview of the proposed study methodology, benchmarking approach, peer group selection criteria, metric selection, and practice area investigation for the total cost benchmarking study. The meeting notes of this session, including the presentation, are found in Attachment 3.

2.3 Session #3 – Preliminary Results and Findings

Session #3 was held on January 11, 2016 at the DoubleTree Hotel in Toronto with Swerhun Facilitation acting as the facilitator and scribe for the meeting minutes. Fourteen stakeholders attended, representing eleven stakeholder organizations, and OEB staff. In this session, Hydro One Transmission, Navigant Consulting and First Quartile Consulting presented and sought participant feedback on preliminary findings and recommendations resulting from the total cost benchmarking study. The meeting notes of this session, including the presentation, are found in Attachment 4.

2.4 Stakeholder Consultations Summary

Hydro One appreciated and considered the input received throughout the stakeholder consultations held at various steps of the Transmission Total Cost Benchmarking Study. Feedback was included where possible and practical. Hydro One believes that the stakeholder consultations were helpful in ensuring that the study addressed the concerns and issues of OEB staff and the stakeholder community relating to the benchmarking of

the performance of Hydro One in the safe, reliable and cost effective transmission of electricity in the province of Ontario.

3. TRANSMISSION TOTAL COST BENCHMARKING STUDY

To review the Transmission Total Cost Benchmarking Study, refer to Attachment #1 of this exhibit.

There were eight main best practice recommendations in the Transmission Total Cost Benchmarking Study. These recommendations are addressed in the application exhibits as shown in Table 1.

Table 1: Addressing the Recommendations

Best Practice Recommendation	Impact	Exhibit
Reassess and adjust performance indicators across all levels of the organization	Reduce costs, improve performance, build culture of continuous improvement	Cost Efficiencies, Productivity and Key Performance Indicators
Continue building on use of external resources for engineering, to create a pipeline of construction-ready projects	Reduced underspend, improved schedule performance	Capital Work Execution Strategy
Manage the contingency budgets at the portfolio / corporate level	Frees funds for other priority investment opportunities	Capital Work Execution Strategy
Target a corrective maintenance spend that is ~25% of total corrective and preventative	Eventually anticipate better (lower cost) results if more is preventive than corrective.	O&M Work Execution Strategy

Best Practice Recommendation	Impact	Exhibit
Work to reduce administrative costs	Eventually identify opportunities for cost reduction	Cost Efficiencies, Productivity and Key Performance Indicators
Allocate project management resources to improve effectiveness	Improve project cost and schedule performance	Capital Work Execution Strategy
Formalize a rolling two year capital budget and project portfolio and reporting framework, including projected earned value analysis	Provide the flexibility needed to reschedule projects within a two-year rolling window; improves ability to achieve planned annual investments	Capital Work Execution Strategy
Refresh formal driver training program	Reinforces driver safety and provides employees with focused behind-the-wheel training	Transmission Business Performance

4. LIST OF ATTACHMENTS

Attachment #1 - Meeting Notes and Presentation Material – February 11, 2015

Attachment #2 - Meeting Notes and Presentation Material – August 6, 2015

Attachment #3 - Meeting Notes and Presentation Material – January 11, 2016

Transmission Total Cost Benchmarking Study

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EXECUTIVE SUMMARY

As part of Hydro One Networks, Inc. (Hydro One) 2015-2016 Transmission Revenue Requirement Settlement Agreement (EB2014-0140), Hydro One agreed to complete an independent Transmission Total Cost Benchmarking Study and file it as part of its next transmission application. Through a competitive procurement process, Hydro One engaged Navigant Consulting Ltd. (Navigant) and First Quartile Consulting (1QC) (together "the evaluation team") to conduct the study.

This report provides an overview of the methodology that Navigant and 1QC's study deployed and the results of the study. The study, completed in accordance with settlement agreement, includes a set of benchmarks of Hydro One's total transmission cost (capital and operating) and business performance (service delivery effectiveness and efficiency) against a group of peer utilities. The benchmarking study provides insights into the cost and performance of Hydro One's transmission lines and substations planning, operations, maintenance, and construction activities, as well as Hydro One's reliability, project management, safety, and staffing practices. Single point-in-time comparisons are based on 2014 cost and performance data. Navigant and 1QC also analysed trends in cost and performance over a five-year period from 2010 to 2014. Data for 2015 was not available when this study was conducted.

The benchmarking study revealed the following:

Cost	› In 2014, Hydro One's total transmission expenditure (OM&A and CAPEX) was below the median of the peer group, 9.1% of the gross book value of in-service transmission assets ("gross asset value") compared to a median value of 13.9% › In 2014, Hydro One' s direct transmission expenditure (O&M and CAPEX) was among the lowest in the peer group, 6.5% of gross asset value compared to a median value of 9.7% › Hydro One's direct transmission O&M was at the median of the peer group in 2014, 1.6% of gross asset value compared to a median value of 1.8% › Hydro One's CAPEX was among the lowest in the peer group in 2014, 4.8% of gross asset value compared to a median value of 6.6%
Reliability	› Sustained outage frequency for circuits with voltage of 230kV and below was amongst the highest in the peer group in 2014 › Momentary outage frequency was also among the highest in the peer group › Power system condition was the single largest cause of sustained transmission system outages
Project Management	› Hydro One puts significant project management resources and methodologies in place to manage its large annual capital investment plan › A positive note on strong project management was the number of project managers per dollars of capital expenditure, which exceeds the peer group average › Hydro One project estimates are relatively accurate
Safety	› Hydro One's lost time severity rate was low compared to the peer group › Hydro One's vehicular incident rate was below the peer group average
Staffing	› Hydro One's wage rates are close to the median of the peer group › Hydro One's hourly cost of overtime was higher than the median of the peer group, but overtime usage was consistent with the peer group

In most areas, Hydro One's transmission business benchmarked well relative to the peer group (i.e. performance was better than the median). However, there are some areas where Hydro One underperformed the peer group (i.e. performance was worse than the median). These areas include: capital program management, direct substations O&M expenditure, administrative costs, and vehicle safety. In some of these areas, in particular capital program management, the trend analysis indicates that Hydro One's performance has improved.

Hydro One also included in its request for proposal, that industry best practices be included as an outcome of the study. Navigant and 1QC made eight recommendations, targeted to the areas where Hydro One underperformed relative to the peer group. The recommendations are summarised below.

Issue Area	Best-Practice Recommendation
Performance Metrics	Reassess and adjust performance indicators across all levels of the organisation
Substations Maintenance	Target a corrective maintenance spend that is ~25% of total corrective and preventative
Administrative Costs	Assess opportunities to reduce administrative costs
Capital Project Pipeline	Continue building on use of external resources for engineering to create a pipeline of construction-ready projects
Capital Program Expenditure Forecasts	Manage the contingency budgets at the portfolio / corporate level
Capital Program Management Resources	Allocate project management resources to improve effectiveness
Capital Program Budget	Formalise a rolling two-year capital budget and project portfolio and reporting framework, including projected earned value analysis
Driver Safety	Refresh formal driver training program

1. INTRODUCTION

In the Hydro One Networks, Inc. (Hydro One) 2015-2016 Transmission Revenue Requirement Settlement Agreement (EB2014-0140), Hydro One agreed to complete an independent Transmission Total Cost Benchmarking Study and file it as part of its next transmission rates application.[1] To this end, Hydro One retained Navigant Consulting Ltd. (Navigant) and First Quartile Consulting (1QC) (together "the evaluation team") to design, implement, and report the results of the study.

1.1 Study Objectives

This study benchmarks Hydro One's transmission cost (capital and operating) and business performance (service delivery effectiveness and efficiency) against North American peer organisations.

There were five objectives for the study as defined by Hydro One.

- Identify and include an appropriate peer group of businesses as a comparison to Hydro One, taking into account a number of characteristics, including asset demographics, geography, customer characteristics, etc.
- Quantify and evaluate Hydro One's transmission costs relative to the peer group, taking into account cost drivers and differentiating characteristics.
- Ensure a common understanding of the comparison criteria through the use of clear definitions.
- Recommend practices that could be augmented or adopted to realise efficiency gains.
- Engage stakeholders in regards to the peer group selection criteria, comparison metrics, and preliminary findings and recommendations.

1.2 Overview of Approach

The scope of work included two analyses: a quantitative analysis and a qualitative analysis. As part of the study, the evaluation team determined which business and operational demographics were relevant to identify a representative peer group given Hydro One's vast and disparate service territory. This work leveraged First Quartile Consulting's existing transmission cost database as well as cost data from additional peer utilities.

Through the quantitative analysis, the evaluation team identified and collected the necessary data from Hydro One and additional peer utilities, normalised the data, and assembled statistical reports and comparisons. Through the qualitative analysis, the evaluation team explored cost variations, identified current and best practices, and identified gaps that ultimately lead to recommendations on processes and practices that Hydro One could adopt to realise efficiency gains.

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[1] *"Hydro One agrees to complete an independent Transmission Cost Benchmarking Study that will be filed with Hydro One's next Transmission rates application. Intervenors and Board Staff will be consulted, and agreement will be sought, in defining the Terms of Reference that will be included in the Request for Proposal document. The Request for Proposal document will be used in the selection process for the independent party that will complete the Study. After Hydro One selects the independent party that will complete the Study, Intervenors and Board Staff will review the Study proposal provided by the independent party to help ensure that the proposal meets the requirements of the Terms of Reference. Intervenors and Board Staff will also be provided with an opportunity to review and provide comments on the preliminary results prior to finalizing the Study."* Hydro One Networks Inc. 2015-2016 Transmission Revenue Requirement Application – Application, Settlement Agreement and Evidence

The study engaged and included stakeholders. Hydro One consulted with stakeholders regarding the terms of reference for this study. Stakeholders then had the opportunity to review and provide comments at the beginning of the study on the proposed methodology and selection of the peer group. Finally, they commented on the preliminary results, prior to the evaluation team finalising the study.

1.3 Content of Report

This report is organised into three sections and two appendices.

- Section 1: Introduction, provides an overview of the study objectives, and approach.
- Section 2: Benchmarking Process, provides an overview of the process, information collected, peer group selection, and normalising factors used.
- Section3: Benchmarking Results, summarises overall cost performance, reliability performance, project management performance, safety, and staffing
- Section 4: Recommendations, identifies practices that could be augmented or adopted to realise efficiency gains.
- Appendix A: Detailed Peer Group statistics, provides details about the peer group company demographics and relative costs of the peer group utilities to the FERC-reported industry average.
- Appendix B: Performance of Normalising Factors, discusses alternative options to normalise peer group data.

2. BENCHMARKING PROCESS

The benchmarking process is the means by which data is collected and analysed in a standardised fashion. This process provides transparency into Hydro One practices and lends itself to identifying strengths as well as areas for improvement. This section covers four topics.

1. **Overview:** Outline of the benchmarking process from start to finish.
2. **Information Collected:** Data determined to accurately capture Hydro One's practices, collected from Hydro One and the peer group.
3. **Peer Group Selection:** Characterisation of Canadian and U.S. transmission utilities included in the study.
4. **Normalising Factors:** Gross asset, line length, transformation capacity, and other factors are used to normalise utility cost data so that it may be compared on a common basis.

2.1 Overview

This benchmarking study is a replicable analysis that provides a robust evaluation of Hydro One's total transmission costs. This analysis considers total cost and operations across the company's transmission territory, rather than examining regional variations or providing regional recommendations. The benchmarking process consisted of the following steps:

1. **Project structure setup:** Determine peer group, comparator characteristics and comparator metrics, and present design to stakeholders.
2. **Quantitative analysis:** Gather data (internal and external), validate and normalise the data, and assemble the data. Create a statistical report, and create a Hydro One scorecard.
3. **Qualitative analysis:** Review performance metrics, interview Hydro One staff, compare Hydro One practices to industry best practices, and identify practice improvement opportunities.
4. **Analysis and recommendation development:** Review results, develop conclusions and recommendations, and present them to stakeholders.

2.2 Information Collected

To best characterise Hydro One's transmission costs and management practices, the evaluation team collected overall cost performance, reliability performance, project management performance, safety, and staffing data from Hydro One and its peers. This data and the areas covered by the data that was collected for 2013 and 2014 operation years (the most recent complete periods), are summarised in Figure 1. In addition to costs data, performance, and asset data, storm and response data, information on planning and regulatory strategy, and asset management methods were also collected.

Figure 1. Benchmarking Information Collected from Hydro One and Peer Group

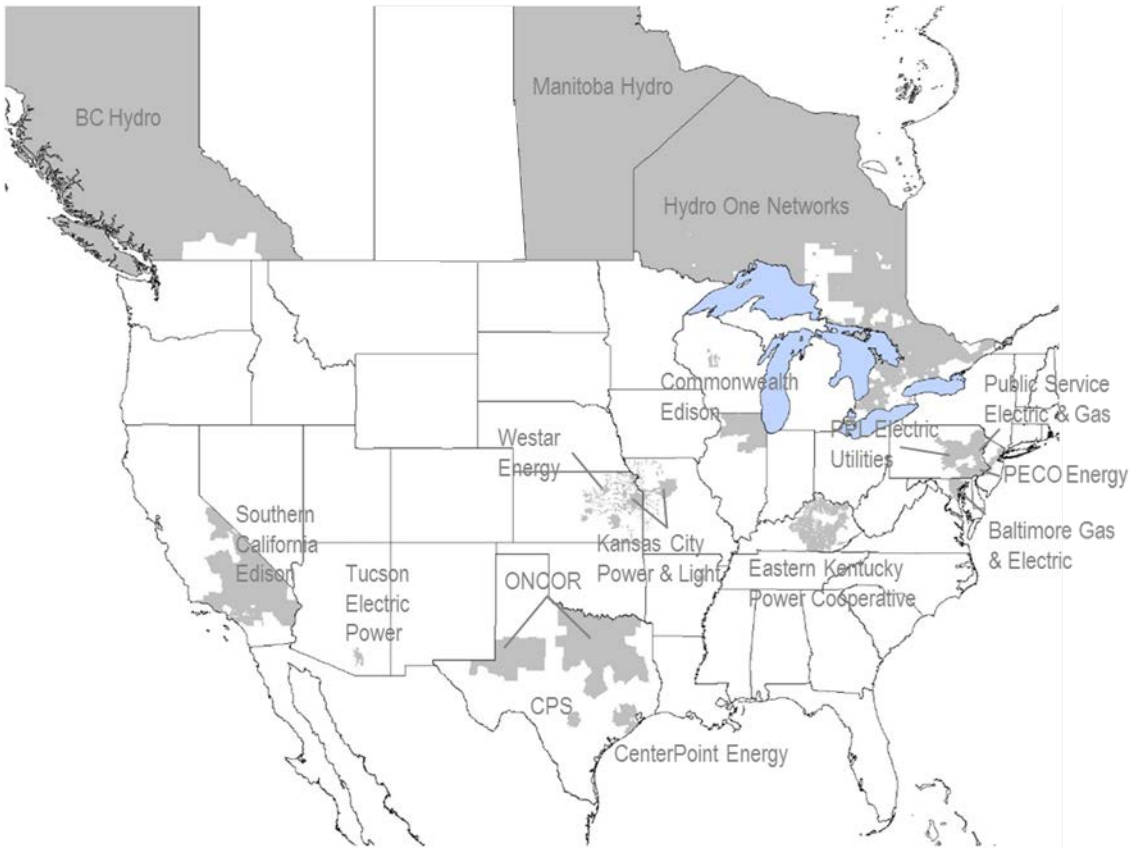
Overall Cost Performance	Reliability Performance	Project Management Performance
• Lines capital expenditues consistent with Federal Energy Regulatory Commission (FERC) accounting structure • Substation capital consistent with FERC accounting structure • Lines O&M consistent with FERC accounting structure • Substation O&M consistent with FERC accounting structure • CAPEX per new service, expansion, and sustaining activities • Line O&M per sustaining activities • Depreciation	• Institute of Electrical and Electronics Engineers (IEEE) statistics per cause • Major events and planned interruptions • North American Electric Reliability Council (NERC) Transmission Availability Data System (TADS) metrics	• Capital budget prioritisation, ranking, and selection • Portfolio re-evaluation processes • Method of adding new projects to portfolio • Project completion relative to due date and budget • Projects managed by managers, management techniques, tools • Number of Full-time project/program managers and support staff per project • Organizational relationships • Close-out process
Safety	**Staffing**	**Assets**
• Safety rates for office and field employees • Motor vehicle safety initiatives and practices • Contractor safety • First aid accidents • Leading indicators • Awards/recogntion • Incident reporting, investigation, follow up • Responsibility/accountability • Wellness • Formal safety observations • Organisation and leadership • Employee involvement • Communication • Personal Protective Equipment (PPE) and Flame-Resistant (FR) regulation compliance	• Hourly wages • Company and contract full-time employees (FTEs) • Overtime hours and wages • Employee engagement, utilization, training • Unions • Recruiting/mentoring • Outsourcing	• Substation transformer banks by voltage class • Substation statistics • Addition of substation equipment for new service, system expansion, and maintenance • Line length • Addition of line for new service and system expansion • Line moving and maintenance • Substation shops • Fleet • Physical security

2.3 Peer Group Selection

The starting point for peer group selection is understanding Hydro One transmission lines and substations planning, operations, and maintenance activities. The evaluation team defined cost, reliability, project management, safety, and staffing characteristics to benchmark. The team used these characteristics to define a profile to recruit among Canadian and U.S. transmission utilities. The 16 peer group utilities represent the breadth of North American utilities with respect to their transmission assets, service territory, transmission line length, and electricity throughput (see Appendix A.1 for additional detail). Together, they provide a reasonable representation of the North American transmission utility industry. Overall costs of the peer group companies were compared against the population of companies who report to the FERC. The comparison shows that the peer group has slightly higher costs than the broader industry, including operations and maintenance (O&M), operating, maintenance, and administration (OM&A), and capital expenditures (CAPEX) (Appendix A.2). However, this does not change the overall conclusions reached by the evaluation team.

A concerted effort was made, as requested by stakeholders, to include more Canadian utilities. However, because there is no requirement for them to participate, and the effort for them to participate in significant, only a few Canadian utilities agreed and provided data for the study. As shown in Figure 2, the utilities in the peer group are located throughout Canada and the United States, such that there are several large companies, some smaller ones, with regulatory circumstances similar and different from Ontario and weather patterns that include some companies with significant winter and summer storm exposure and others without. The net result is a representative and useful comparison peer group.

Figure 2. Peer Group Service Territories



2.4 Normalising Factors

No two utilities in the peer group are the same. Hence, in order to compare cost and performance data across these utilities, the data must be normalised. The evaluation team normalised the cost data using the gross book value of in-service transmission assets ("gross asset value"). This is preferred to net assets since the depreciation methodologies of companies can vary. This single value takes into account the number of substations, transformation capacity, and line length, in a single metric.

Gross asset value as a normalising factor has been previously shown to provide the most consistent and fair comparison of transmission providers. Other factors sometimes used include the number of customers, kilometres of line, and substation capacity (in megavolt ampere, MVA). Appendix B provides some examples of the predictive capability of various normalising factors and why gross asset value is the most appropriate normalising factor.

While not necessary for cost metrics that are normalised based on gross asset value, to normalise currency across U.S. and Canadian utilities, the average annual USD:CAD exchange rate was used. The USD:CAD exchange rate increased from 0.9700 in 2010 to 1.1043 in 2014.

While gross asset value has been previously shown to be the best predictor of spending levels, there are potential limitations that need to be considered when using it as a normalising factor. For example, if the age profile of the subject company is substantially different from that of the peer group it could bias the results. To address this, the peer group should include companies with a range of age profiles and the subject company should fall somewhere within that range, which is the case for this peer group and Hydro One. Another consideration is the starting gross asset value of the peer group companies, or the underlying capital efficiency. To address this, the peer group should be sufficiently broad, and consideration should be paid to the subject company's historical capital expenditures relative to the peer group. In this case, Hydro One's capital expenditure has been at or below the median level of the peer group for the past five years.

3. BENCHMARKING RESULTS

The five key elements of this section are:

1. **Overall Cost Performance:** Comparison of Hydro One's transmission lines and substations CAPEX, O&M, and OM&A costs relative to the peer group, broken out by asset type and activity.
2. **Reliability Performance:** Comparison of Hydro One's frequency and causes of sustained and momentary outages to the peer group.
3. **Project Management Performance:** Comparison of Hydro One's project budget and schedule management to the peer group.
4. **Safety:** Comparison of Hydro One's lost time and frequency of preventable vehicular accidents to the peer group.
5. **Staffing:** Comparison of Hydro One's wage rates and overtime to the peer group.

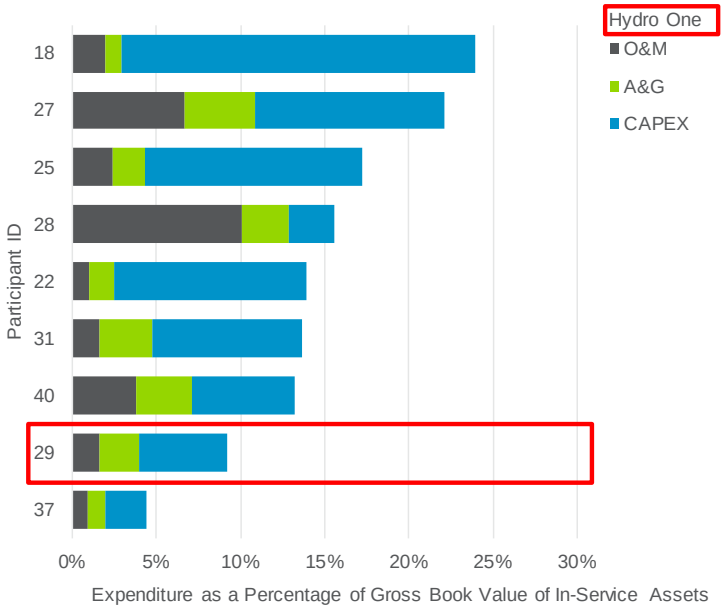
3.1 Overall Cost Performance

The cost analysis portion of the study was quantitative and dissected Hydro One's capital and operations, maintenance and administrative costs. Cost information was gathered for Hydro One as well as for the pool of companies included as comparators in the study directly using FERC accounting conventions and definitions. Costs were also gathered directly from each company based on specific activities as defined by First Quartile Consulting.

3.1.1 Transmission Lines and Substations

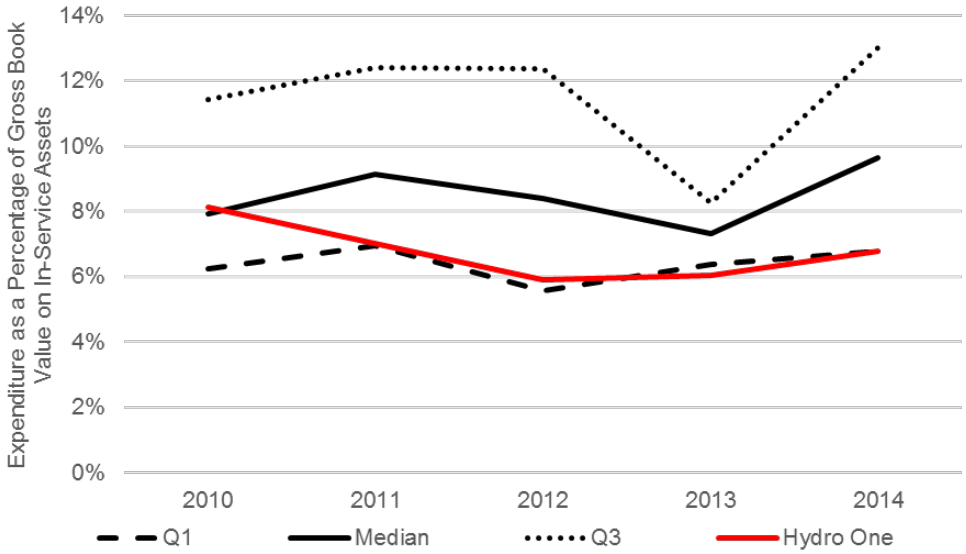
Hydro One's total expenditure for transmission lines and substations was amongst the lowest in the peer group in 2014, at 9.1% (Figure 3) of gross asset value. The peer group median was 13.9% of gross asset value. This measure includes administrative costs and corporate allocations.

Figure 3. Transmission Lines and Substations OM&A + CAPEX per Asset



Hydro One's transmission lines and substations direct O&M and CAPEX was also among the lowest in the peer group in 2014 at approximately 6.5% of gross asset value. The peer group median value in 2014 was 9.7%.[2] This measure excludes corporate allocations and administrative costs. The following chart (Figure 4) provides a five-year historical view of the transmission lines and substations direct O&M and CAPEX of the peer group with Hydro One denoted in red.

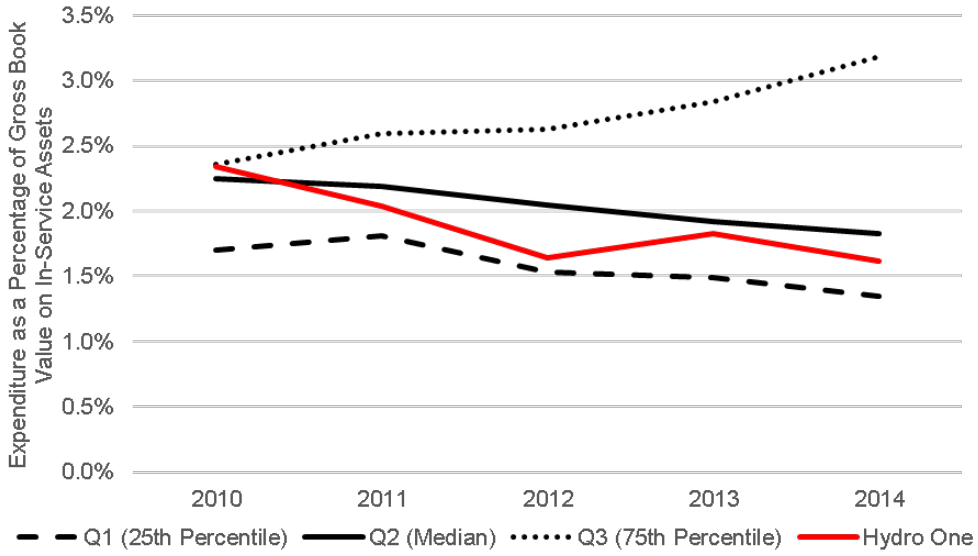
Figure 4. Transmission Lines and Substations Direct O&M + CAPEX per Asset



Hydro One's direct O&M expense for transmission lines and substations was closer to the median of the peer group at approximately 1.6% of gross asset value. The median of the peer group in 2014 was 1.8%. However, from a historical perspective looking at the previous five-year (2010–2014) period, Hydro One's direct O&M cost for transmission lines and substations was consistently below the median and consistent with the downward trend of the peer group (Figure 5).

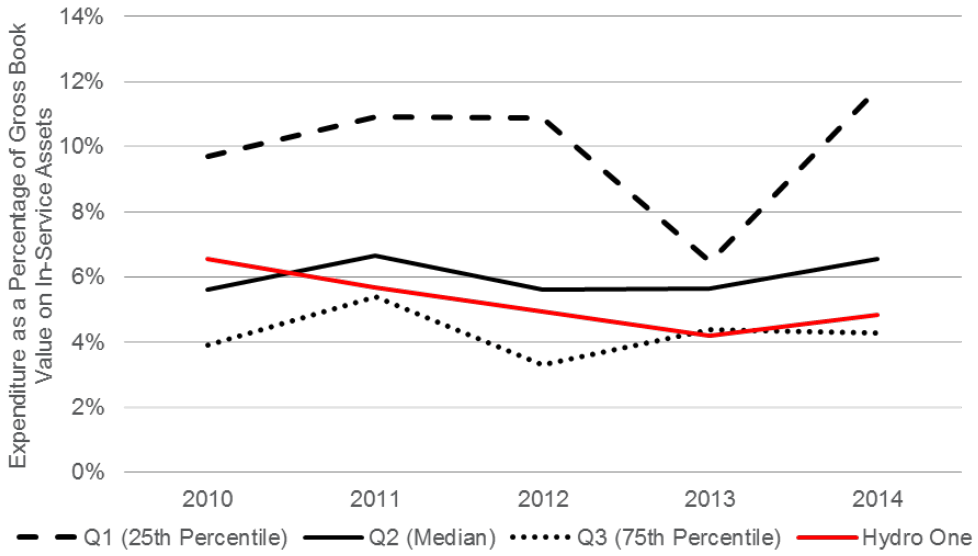
[2] All median values are based on the entire available peer group, including Hydro One.

Figure 5. Transmission Lines and Substations Direct O&M per Asset Value



Hydro One's direct CAPEX was generally below the median of the peer group from 2010 to 2014, as can be seen in Figure 6, below. Hydro One's direct CAPEX was among the lowest of the peer group in 2014 at 4.8% of gross asset value in 2014, compared to the peer group median of 6.6% of gross asset value.

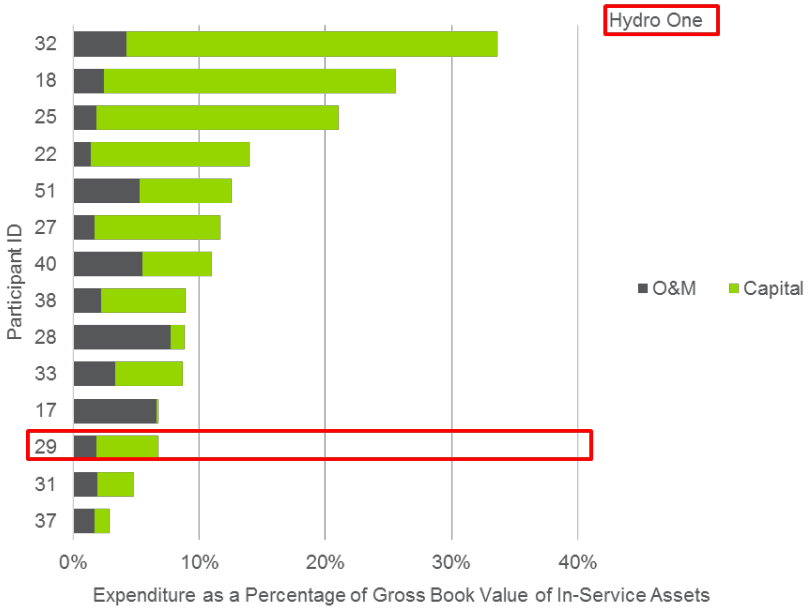
Figure 6. Transmission Lines and Substations CAPEX per Asset Value



3.1.2 Transmission Lines

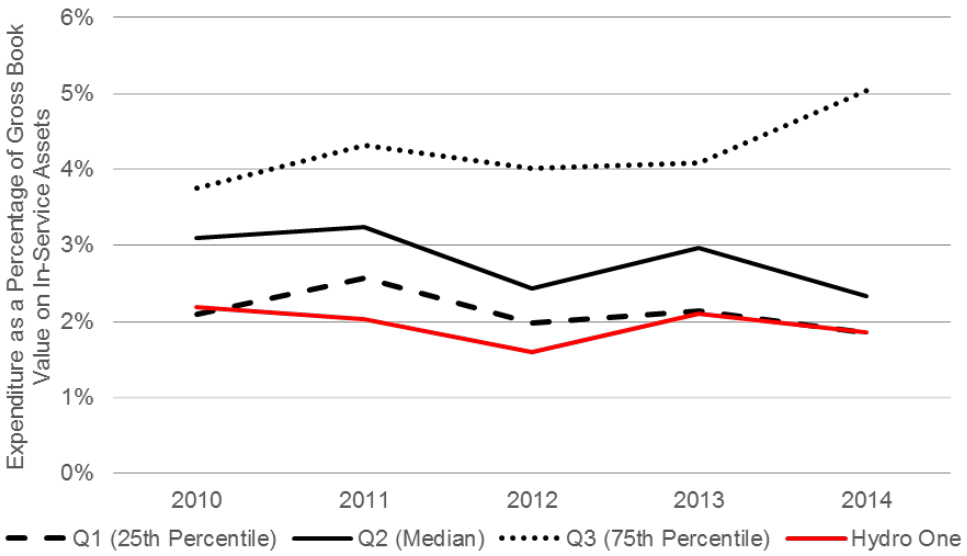
Looking at the direct O&M and CAPEX associated with just the transmission lines assets, Hydro One's spending was among the lowest of the peer group (Figure 7).

Figure 7. Transmission Lines Direct O&M + CAPEX per Asset



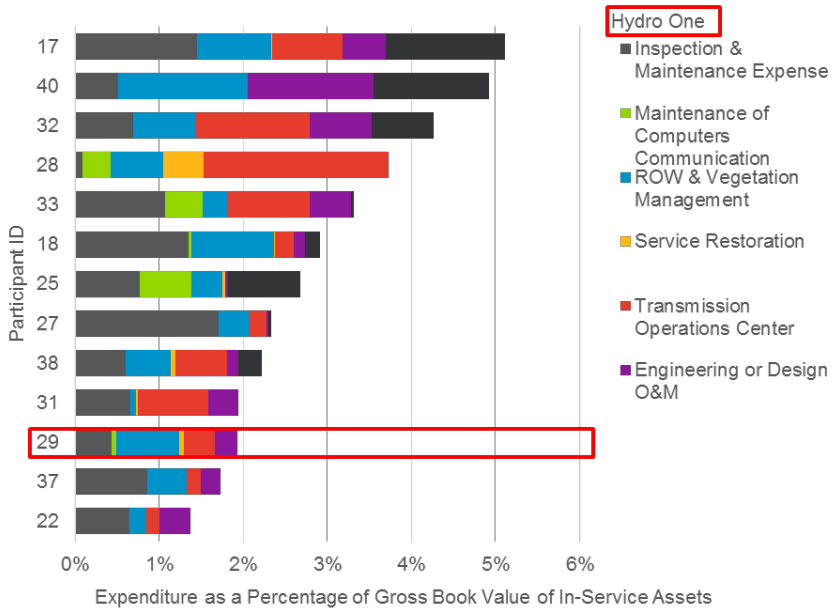
Direct O&M spending by Hydro One on its transmission lines was low compared to the peer group (Figure 8). Over the previous five-year period, Hydro One was able to maintain its level of spending on a per asset basis, and its position was consistently below the median of the peer group.

Figure 8. Transmission Lines Direct O&M per Asset



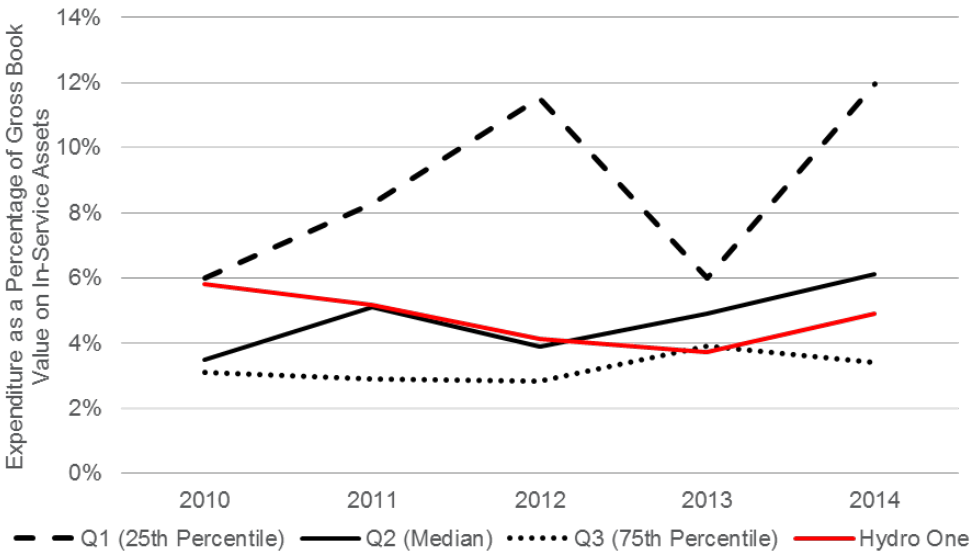
Activity-based direct O&M expenditures for transmission lines are shown below in Figure 9. Note that approximately one-half of the direct O&M spending on transmission lines was committed to vegetation management.

Figure 9. Transmission Lines Direct O&M (Activity-Based) per Asset



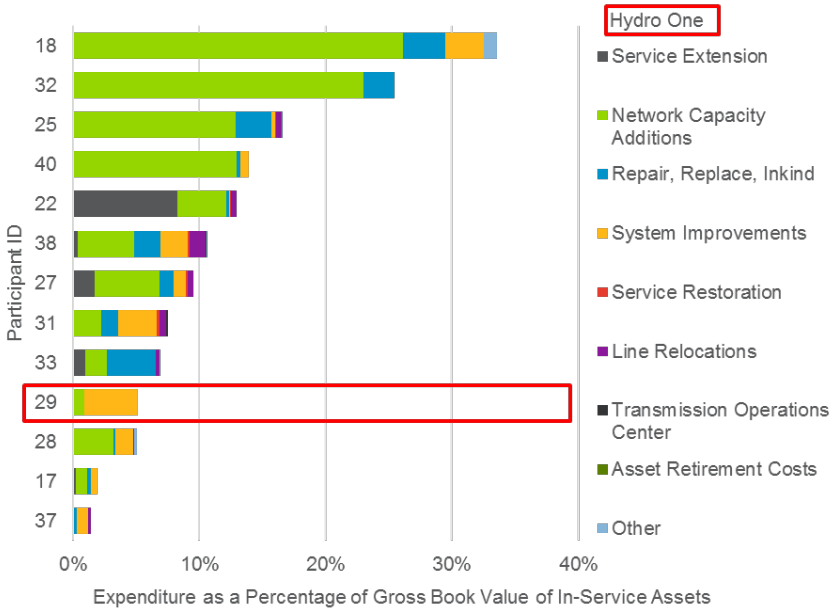
Hydro One's direct CAPEX for transmission lines in 2014 was approximately 5.0% of gross asset value (Figure 10), which was low relative to the peer group median of approximately 6.0%.

Figure 10. Transmission Lines CAPEX per Asset



Although Hydro One direct capital investment in its transmission lines assets increased in 2014 the overall trend over the past five years was downward. Activity-based direct CAPEX for transmission lines are shown below in Figure 11.

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

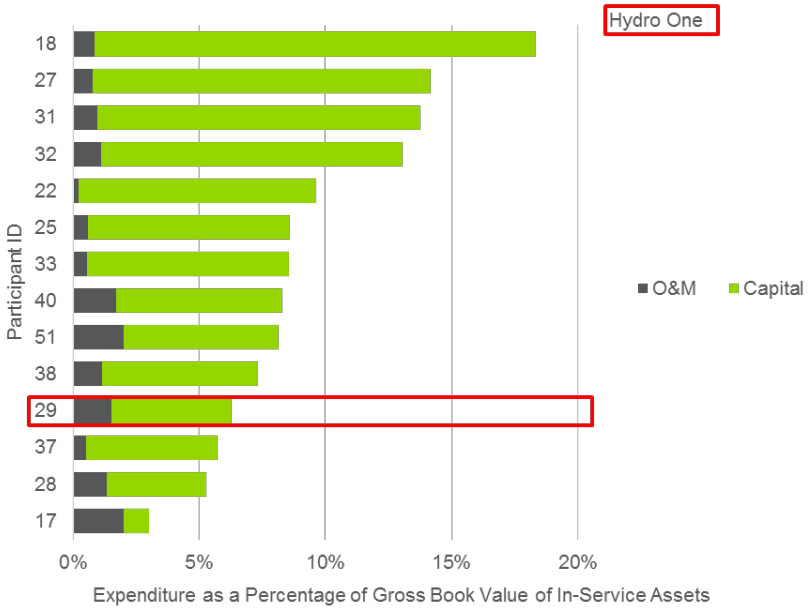


Sustainment capital (i.e. excluding service extension and network capacity additions) was approximately 80% of Hydro One's total capital investment for transmission lines, or approximately 4.0% of gross asset value in 2014. This implies a replacement rate of transmission assets of approximately 25 years on a nominal basis. Realistically, given the much higher costs to replace the older assets, the actual replacement cycle implied is likely closer to 50 years.

3.1.3 Substations

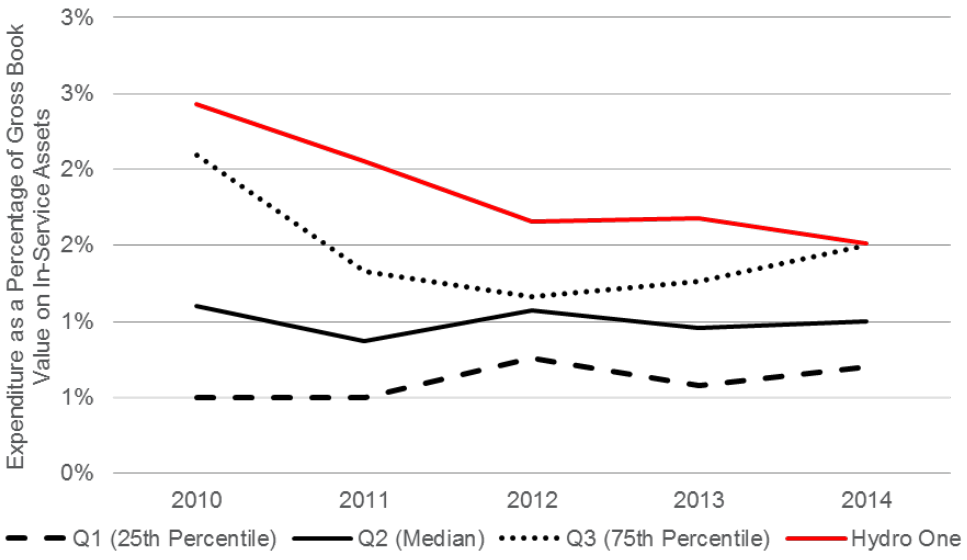
Hydro One's substations direct O&M and capital investment was below the median of the peer companies in 2014 (Figure 12).

Figure 12. Substations Direct O&M + CAPEX per Asset



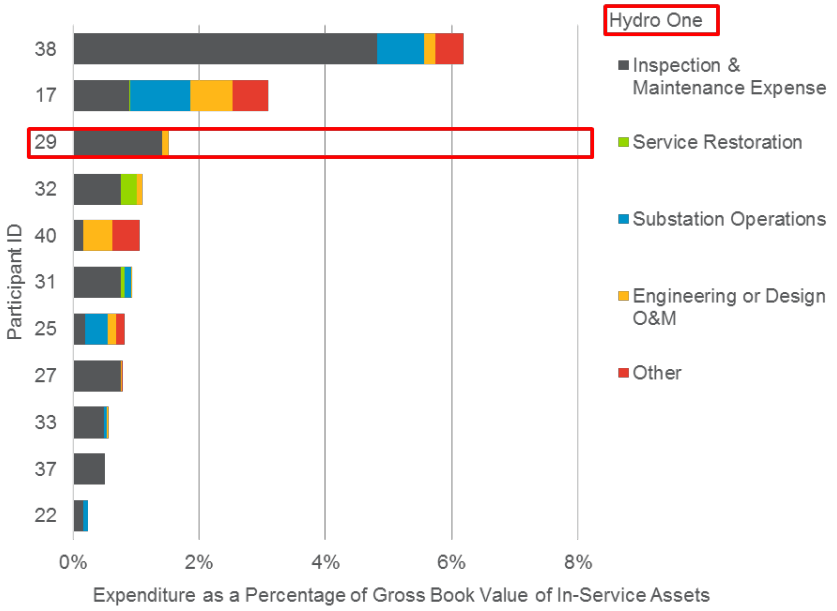
Hydro One's substations direct O&M was among the highest in the peer group in 2014, totalling approximately 1.5% of gross asset value (Figure 13). However, Hydro One's substations direct O&M spending has declined substantially on a per asset value basis from 2.4% of gross asset value in 2010 to 1.5% in 2014 (Figure 13).

Figure 13. Substations Direct O&M per Asset



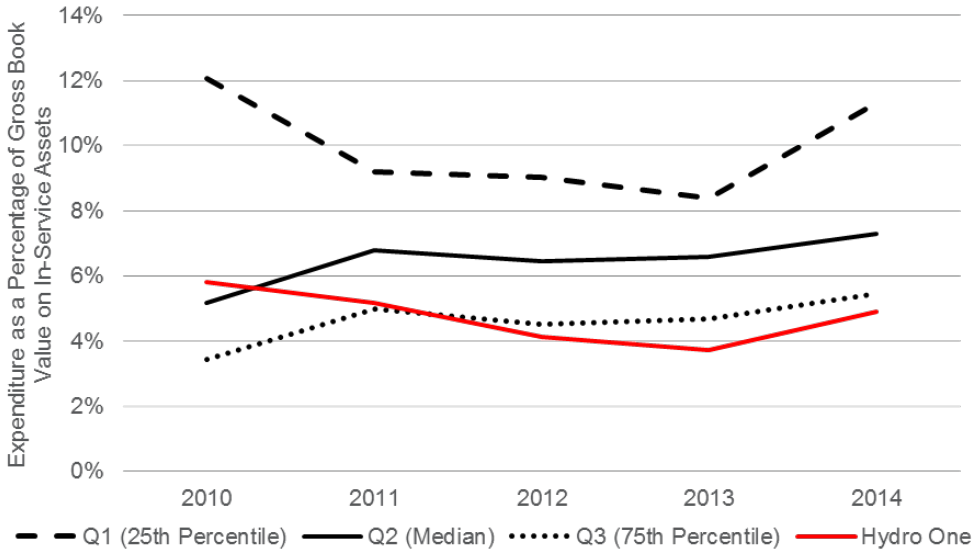
Activity-based direct O&M expenditures for transmission substations is shown below in Figure 14.

Figure 14. Substations Direct O&M (Activity-Based) per Asset



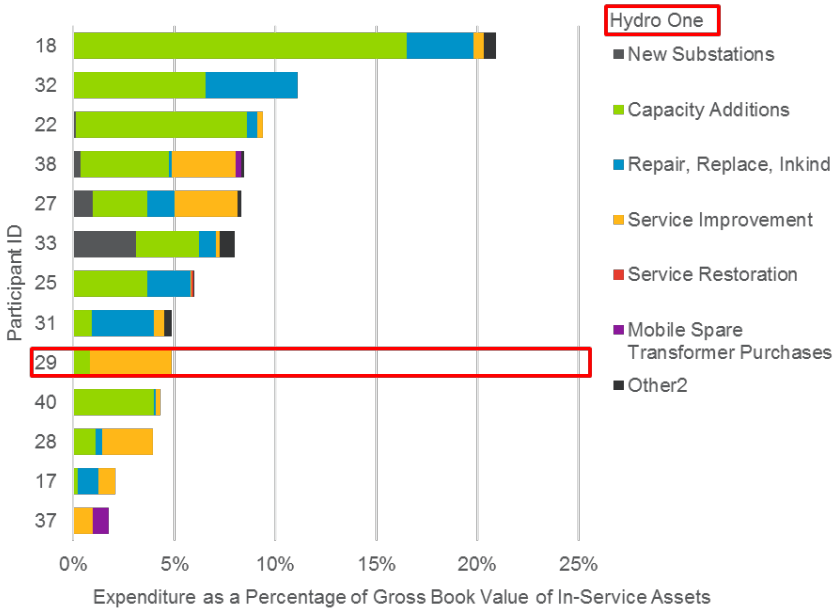
Hydro One's substations direct CAPEX, like that for its transmission lines, was low relative to the peer group at 4.9% of gross asset value (Figure 15). The median value for the peer group was 7.3%. Additionally, Hydro One's capital investment in its substation assets has decreased over the previous five-year period, and as a result, Hydro One generally falls below the substation capital investment rate compared to the peer group.

Figure 15. Substations CAPEX per Asset



Activity-based direct CAPEX for transmission substations are shown below in Figure 16. Sustaining capital (i.e. excluding new substation and capacity additions), which is the investment needed to maintain substations in safe and reliable operating condition, was approximately 80% of the Hydro One's total substations capital investment, which was approximately 4.0% of gross asset value. This equates to a nominal substation asset replacement rate of approximately once every 25 years. As noted above for transmission lines, the nominal replacement rate for substations is likely to be roughly double the actual replacement rate, given the higher costs of replacing the older assets compared to their original value.

Figure 16. Substations CAPEX (Activity-Based) per Asset



3.2 Reliability Performance

Reliability performance can be measured using different perspectives: the impact directly to customers because of an outage or service interruption, and the operating availability of transmission facilities. Service interruptions to customers can be further divided into forced and planned outages. A forced outage results from conditions directly associated with a component requiring that it be taken out of service immediately, either automatically or as soon as switching operations can be performed. A planned outage is the loss of electric power that results when a component is deliberately taken out of service at a selected time, usually for the purposes of construction, preventative maintenance, or repair.

Hydro One reports system reliability information (including transmission-system average interruption frequency index (T-SAIFI) and transmission-system average interruption duration index (T-SAIDI)) to the Canadian Electricity Association (CEA). These metrics measure the impact of Hydro One's transmission system outages on energy delivery to customers.

The Transmission Availability Data System (TADS) is a required reporting system by NERC-regulated companies that focuses only on the availability of transmission facilities. That is, the outage is recorded as a reliability event, whether the facility outage occurs because of a system problem or because the facility is removed from service. Further, the TADS metrics track outages of circuit elements, regardless of whether they affect any end-use customers (i.e. result in an interruption).

While TADS is not intended to provide determinative performance measures, it is used to quantify certain performance aspects. In addition to collecting simple transmission equipment availability, TADS collects detailed information about individual outage events that, when analysed at the regional and NERC levels, will provide data that may be used to improve reliability of the interconnected North American grid. Specific equipment outages can be linked to disturbance reports filed with the NERC, enabling better association of transmission outages with load and generation outages. Additionally, outages by one transmission owner can be tracked to outages of other transmission owners so that any relationship between multiple outages can be established. Although transmission system outages frequently do not directly affect delivery customers, both methodologies (availability and outage performance) are effective tools for gathering reliability information and for assessing overall transmission system performance.

Reliability data was gathered for Hydro One from both the CEA as well as TADS as part of this study. The data includes reported outage causes. Outage causes provide not only a look at the frequency of specific causes but also whether the event was generated within the Hydro One transmission system or by an external factor.

Using the TADS metrics, Hydro One's sustained outage frequency for the lower voltage lines (below 200kV) was the highest in the peer group (Figure 17). Even excluding worst performing circuits (Figure 18), Hydro One's sustained outage frequency for the lower voltage lines remains among the highest in the peer group.

The results in Figure 17 and Figure 18 are outages per circuit element in 2014. An element would be a breaker, a transformer, a span circuit between two breakers. It does not adjust for the length of spans between breakers, which may be different lengths for different companies.

Figure 17. Element Sustained Outage Frequency for <200 kV (left) and ≥200 kV (right)

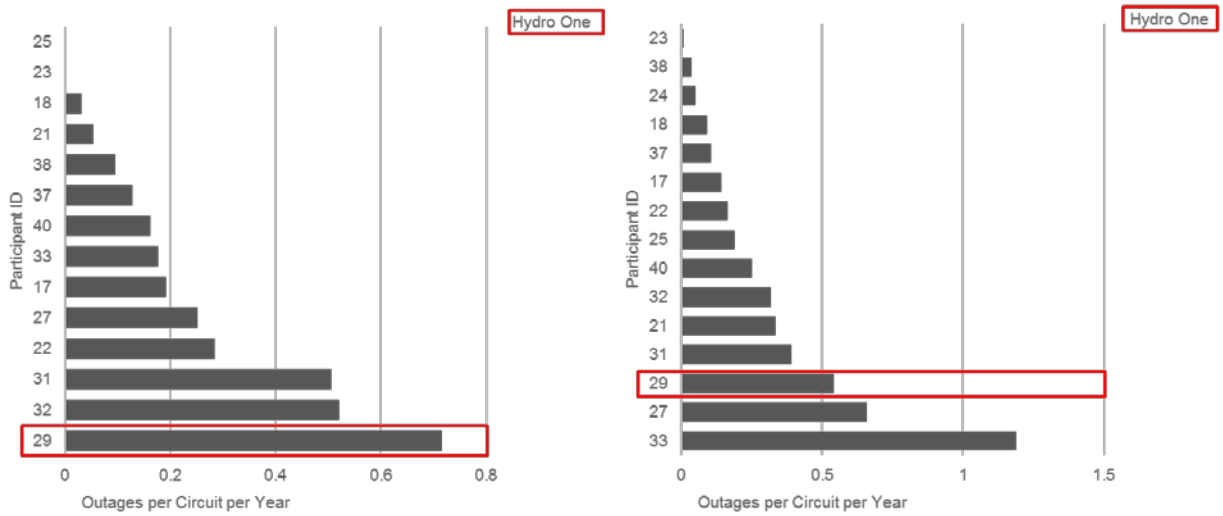
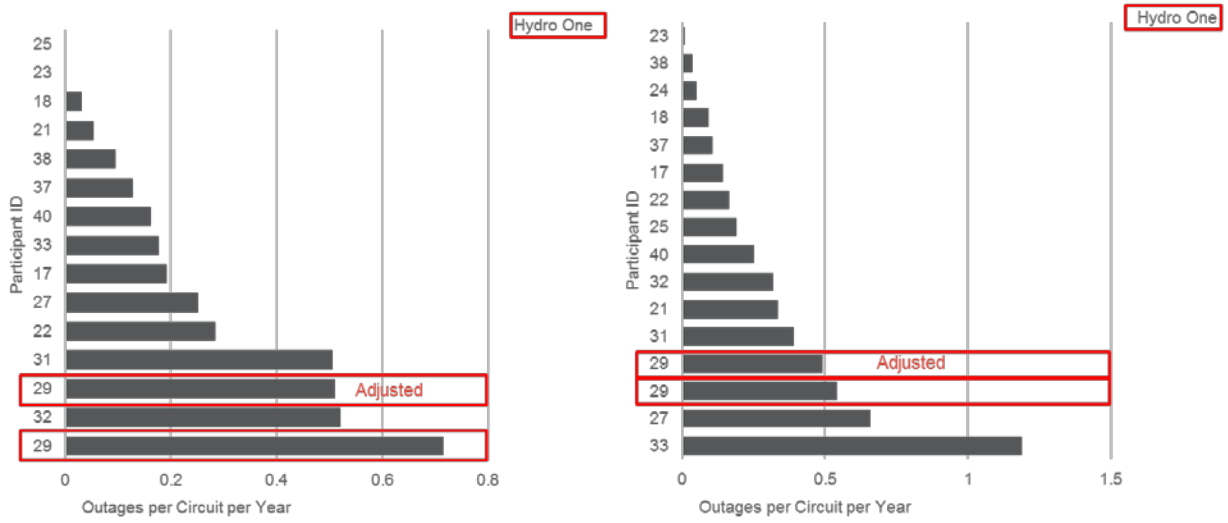
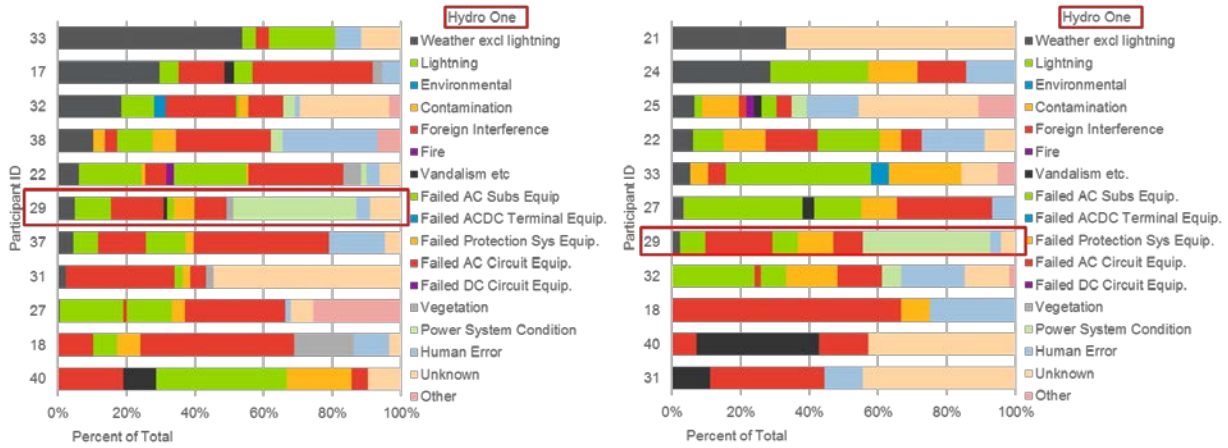


Figure 18. Element Sustained Outage Frequency for <200 kV (left) and ≥200 kV (right), excluding Worst-Performing Circuits



Hydro One's momentary outage frequency was also among the highest in the peer group. "Power system condition" was the single largest cause of sustained transmission system outages. Power system condition causes include system instability, overload trip, out-of-step, abnormal voltage, abnormal frequency, or unique system configurations (e.g., an abnormal terminal configuration due to existing condition with one breaker already out of service).

Figure 19. Sustained Outage by Cause Code for <200 kV (left) and ≥200 kV (right)



A transmission outage can also affect the reliability that delivery customers experience, through delivery point interruptions. The level of impact attributable to transmission is measured in terms of both frequency (T-SAIFI-mc), as shown in Figure 20, and duration (T-SAIDI-mc), as shown in Figure 21. In a recent study by the CEA for multi-circuit supplied delivery points, Hydro One was shown to be performing well when compared to other Canadian companies when it comes to frequency and duration of actual interruptions. The following charts are for multi-circuit performance since 85% of Hydro One's throughput is supplied to multi-circuit delivery points. Note that the three colour in the figures indicate the leading, average, and lagging performance levels.

Figure 20. Sustained T-SAIFI-mc Comparison by the CEA

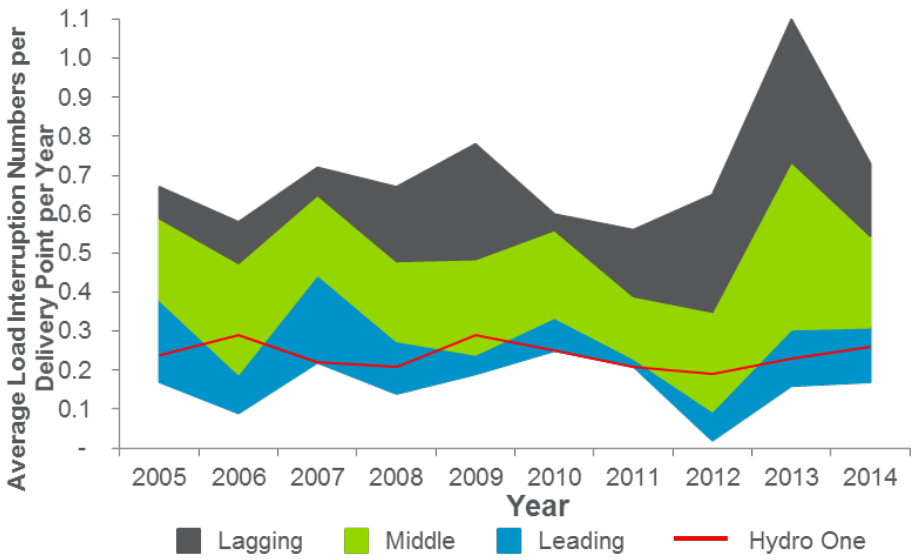
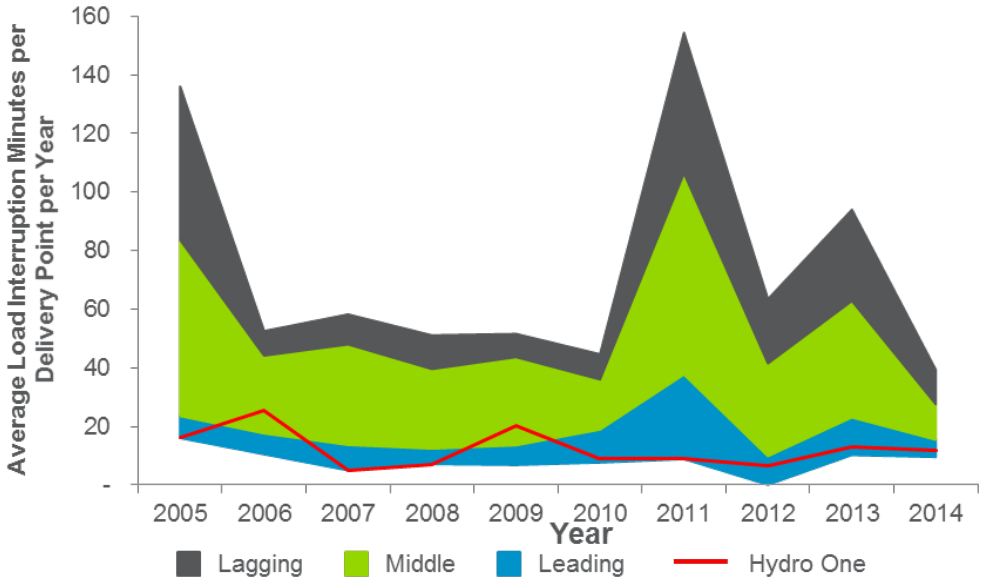


Figure 21. Sustained T-SAIDI-mc Comparison by the CEA



3.3 Project Management Performance

The study looked at the processes and practices used by Hydro One to manage its overall capital budget as well as its individual capital projects and programs. Particular attention was paid to this area since Hydro One had not fully achieved its total capital investment program during the previous three years (2012–2014) in terms of its total capital investment program. In this section, we discuss how Hydro One manages projects, which require multiple levels of sign-off because schedulers and cost analysis staff must approve project plans.

Hydro One has a strong project management culture. It has appropriately put significant project management resources and methodologies in place to manage its large annual capital investment plan. Of particular note was the number of project managers on staff, which exceeds the peer group average (Figure 22). Generous project management staffing is common in companies with strong project management organisations. As a result, the average number of projects assigned to each manager was low relative to the peer group average (Figure 23).

Figure 22. Project Manager Assignments to Capital Additions

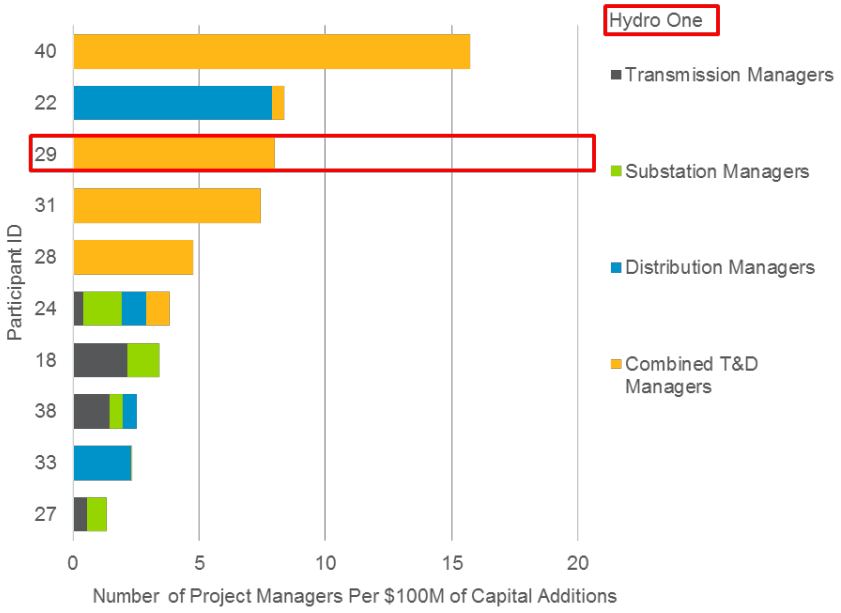
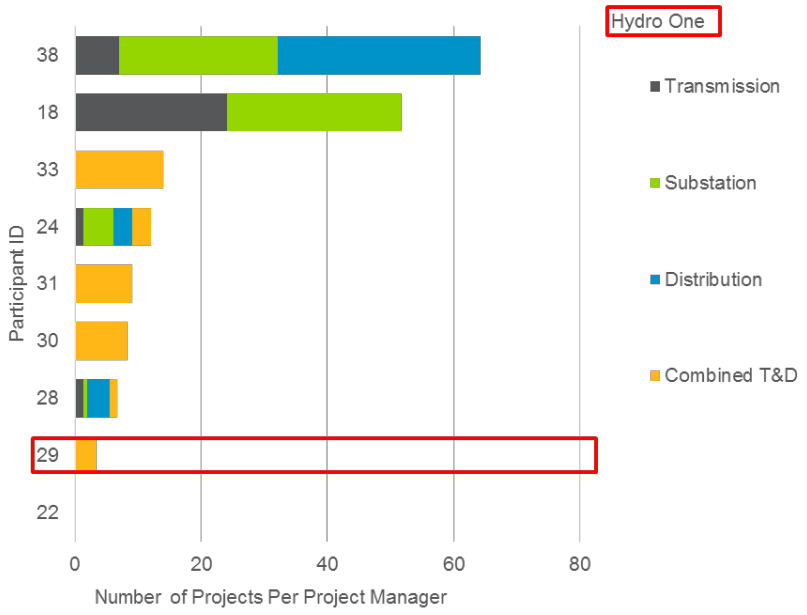
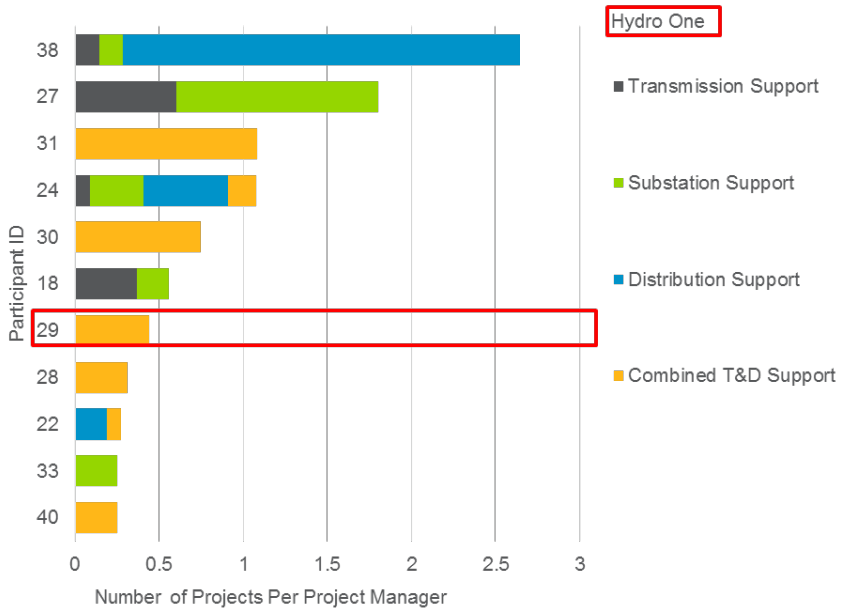


Figure 23. Project Manager Assignments to Projects



The comparatively high number of project managers per capital project might positively influence the effectiveness of the company's project managers. However, the project managers must also complete the tasks normally assigned to support resources (cost analysts, schedulers, material coordinators, contract managers, etc.), which takes them away from the focused management of their projects and programs. As shown in Figure 24, Hydro One project managers do not have as many support resources as project managers at other utilities.

Figure 24. Number of Support Staff per Project Manager



In addition to the strong project management culture, Hydro One project estimates are relatively accurate (Figure 25). This was a positive and significant outcome in that it provides a good basis upon which Hydro One can estimate project resource requirements. Another result was Hydro One's ability to complete projects as scheduled, which was high as compared to the peer group (Figure 26)

Figure 25. Project Spend

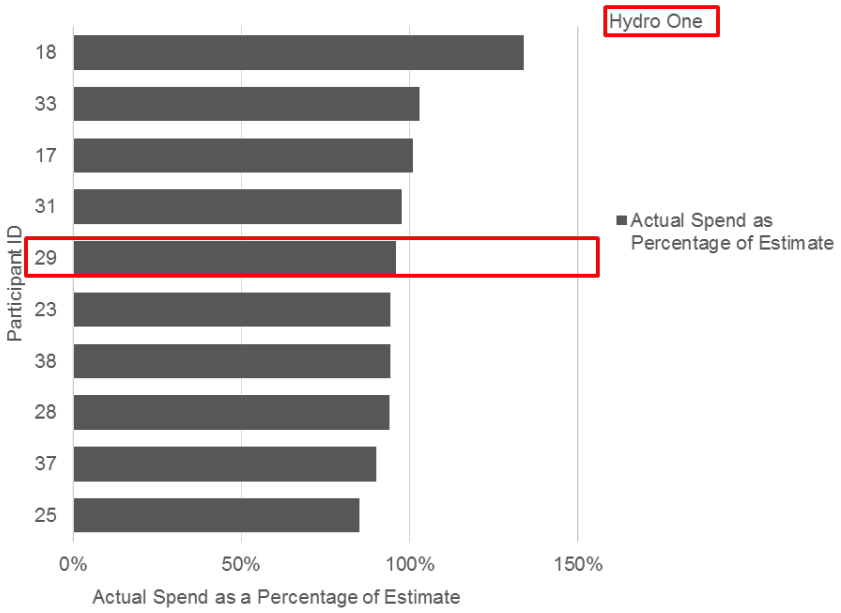
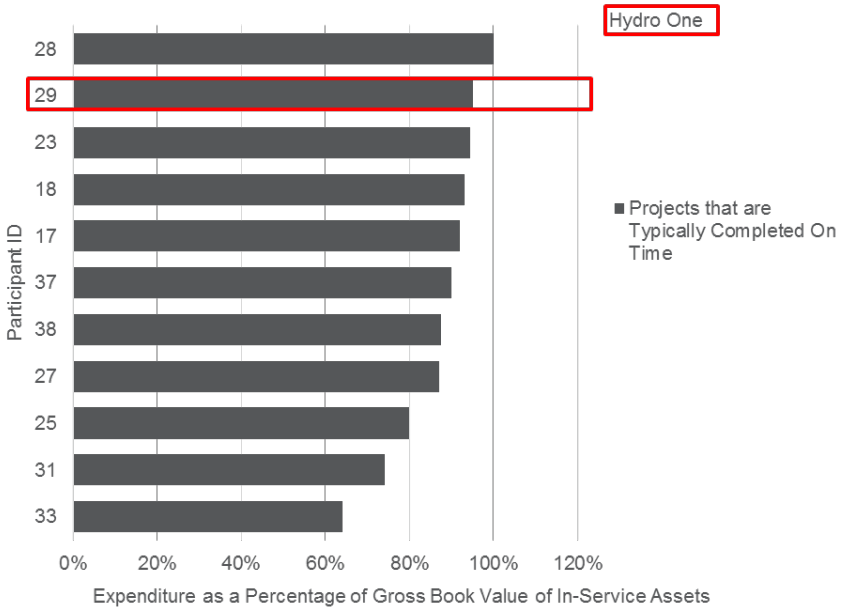


Figure 26. Project Completion



Going forward, Hydro One could strengthen the processes it uses to drive the implementation of its annual capital investment program. As shown in Figure 27, in 2012-2014, Hydro One was biased toward under spending. Additionally, a realignment of some of its project management resources to increase the

support functions would enhance the ability to achieve the implementation of its much-needed annual capital investment plan more regularly. Importantly, Hydro One has already made improvements in this area and, consequently, the 2015 capital investment plan was fully implemented (106% of budget).

Figure 27. Percent of Capital Budget Spent (2012–2014)

3.4 Safety

Hydro One has implemented an umbrella safety program titled Journey to Zero, which is providing the foundation for good safety performance for the company. Of particular importance is the lost time severity rate, which was low for Hydro One compared to the peer group (Figure 28, left).

The vehicular incident rate was good, although a specific performance target for preventable motor vehicle accidents should be established to drive continuous improvement (Figure 28, right). In previous, more detailed studies of vehicular incident rates, the companies in densely populated, highly congested service territories have consistently shown poorer performance. Conversely, low-density service territories have lent themselves to better vehicular accident performance.

Figure 28. Lost Time Severity Rate

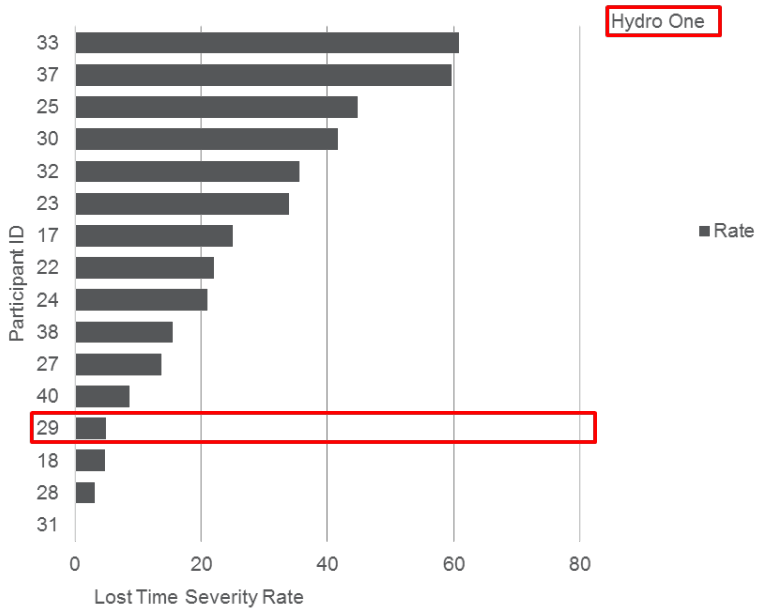
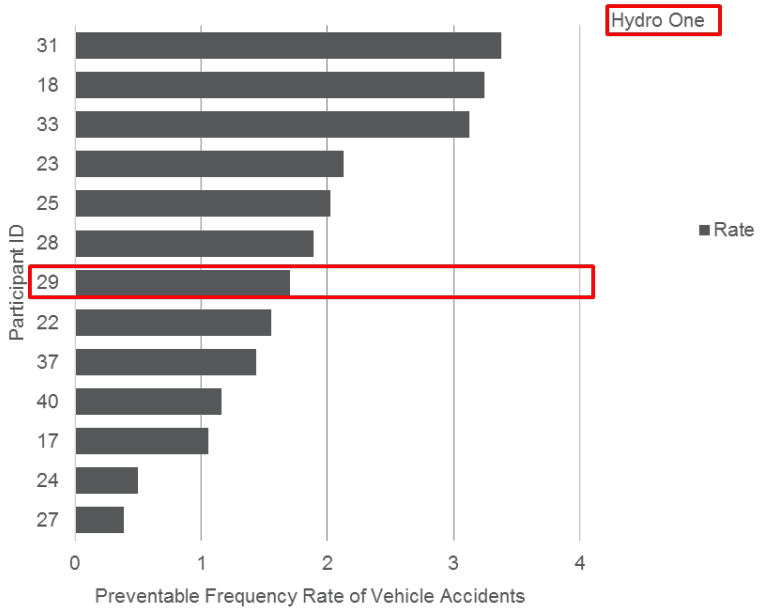


Figure 29. Frequency Rate of Preventable Vehicle Accidents



3.5 Staffing

Hydro One uses company and contract staff. A breakout between the contract and full time staff was not part of the project scope, so the staff numbers here represent all Hydro One staff. Hydro One's straight line wage rates are at about the median of the peer group.

Although the hourly cost of overtime, which is driven by negotiated labour contracts, was higher than the peer group (Figure 30), Hydro One's overtime usage, as a percent of total hours, was consistent with other companies in the peer group (Figure 31). The comparatively high hourly cost of overtime usage for Hydro One is driven by the percentage of overtime hours that is paid at double time rather than time-and-a-half. Hydro One uses a "4-10s" schedule for its construction workforce, which was a conscious business decision given the dispersed nature of the company's service territory. However, under the existing labour agreements, it also means that additional hours begin at double-time pay, rather than time and a half.

Figure 30. Average Overtime Cost per Overtime Hour Worked

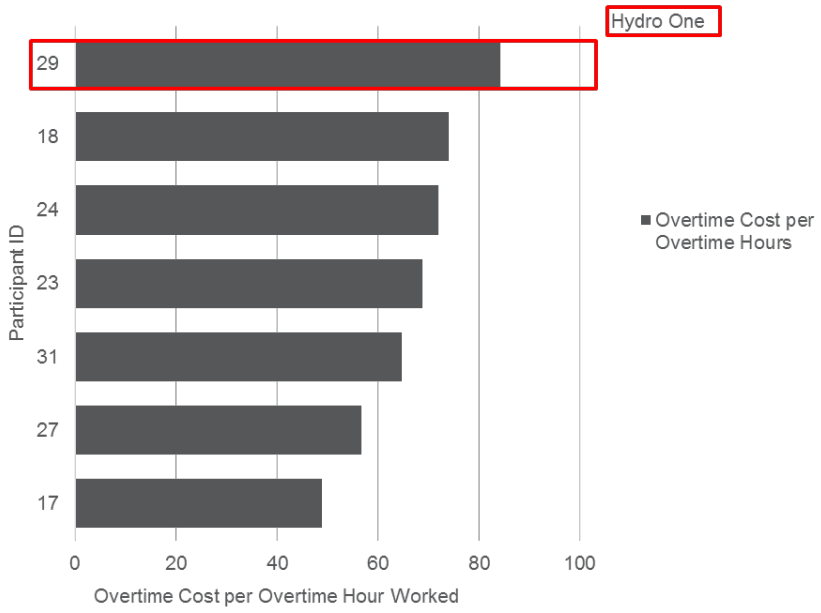


Figure 31. Annual Overtime Hours

Personnel	Overtime Costs per Hour								Average Overtime Hours
	17	18	23	25	27	29	31	33	
Distribution Lineworker			480	512	413	449	515	164	422
Distribution Troubleshooter			840	553	447		582	208	426
Substation Electrician	349	12	175	531	270	409	633	84	308
Substation Meter Relay Communications	297	25	175	446	177		287		235
Transmission Lineworker	205	74	790	442		449	515	152	363

Hydro One

Total annual overtime hours and, thus, cost for individual companies will vary (sometimes significantly) with the level of storm response activity required in a given year. Overtime cost for Hydro One was generally higher than the other reporting companies. Significant benefit can be realised by minimising overtime.

4. RECOMMENDATIONS

Hydro One performs well relative to the peer group utilities and maintains low cost in many areas. However, there are several areas in which Hydro One was under-performing relative to the industry as identified through the benchmarking. These recommendations are detailed, with steps to their implementation and expected impact, in Figure 32.

Figure 32. Best-Practice Recommendations and Implementation Strategy

Issue	Best-Practice Recommendation	Impact	First Steps	Longer-Term Steps
Performance Tracking (Metrics)	Reassess and adjust performance indicators across all levels of the organisation	Reduce costs, improve performance, build culture of continuous improvement	Establish corporate goals and objectives Identify existing metrics used throughout the organisation Identify new metrics that align performance goals and objectives across the organisation	Implement standard tracking and reporting framework Incorporate performance indicators into human capital and performance management processes
Capital Project Delivery (Pipeline)	Continue building on use of external resources for engineering to create a pipeline of construction-ready projects	Full capital budget implementation, improved schedule performance	Implement a short-term initiative utilising external resources to generate a backlog of designed projects that can be released to construction on short notice and completed in the current year Maintain a project backlog totalling 20%–30% of annual capital spending	Formalise the engineering and design processes so that key milestones are clearly defined Develop engineering key performance indicators (KPIs) that measure the engineering and design process Utilise internal engineering resources as owner engineers
Expenditure Forecasts (Contingencies, Probabilities)	Manage the contingency budgets at the portfolio/ corporate level	Frees funds for other priority investment opportunities	Eliminate contingencies in individual projects and allow some spending dead-band for project managers	Develop probability weighted forecasts to inform decision-making on projects and portfolio choices
Substations Maintenance	Target a corrective maintenance spend that is ~25% of total corrective and preventative	Eventually anticipate better (lower cost) results if more is preventive than corrective	Investigate the drivers of the high percentage of corrective maintenance to see if steps could be taken through more preventive work to avoid or reduce the corrective actions	Implement a “worst performer” type of program (analogous to a “worst circuit” program for lines) to target the stations with the most corrective maintenance experienced
Administrative Costs	Work to reduce administrative costs	Eventually identify opportunities for cost reduction	Investigate the causes for the relatively high administrative (corporate and common allocated) costs	Once identified, implement programs and/or process improvements to streamline and minimise administrative costs

Issue	Best-Practice Recommendation	Impact	First Steps	Longer-Term Steps
Project Management (Resources and Process)	Allocate project management resources to improve effectiveness	Improve project cost and schedule performance	Review and adjust project management resources (schedulers, cost analysts, document managers, procurement coordinators, etc.) to provide adequate back-office support for large or complex projects Utilise project managers only for large or complex projects	Refine project management-related processes that define organisational interrelationships and establish accountability for project success
Portfolio Management (Capital Budget and Portfolio)	Formalise a rolling two-year capital budget and project portfolio and reporting framework, including projected earned value analysis	Provide the flexibility needed to reschedule projects within a two-year rolling window; improves ability to achieve planned annual investments	Develop parameters and business rules for a two-year rolling authorisation process and approval	Reinstitute earned value analysis (EVA) to measure project progress as part of a proactive project management framework Establish project management KPIs that leverage the forecasted/projected monthly cash flow and EVA
Safety (Driver)	Refresh formal driver training program	Reinforces driver safety and provides employees with focused behind-the-wheel training	Establish a preventable motor vehicle accident rate target—e.g., zero to leverage the Journey to Zero program	Track progress on driver performance, continue enhancements to programs

APPENDIX A. DETAILED PEER GROUP STATISTICS

A.1 Company Demographics

Nineteen Canadian and U.S. transmission utilities were contacted to participate in the peer group. These companies include those summarized in Figure 33, as well as Austin Energy, Hydro Quebec, New Brunswick Power, and Westar. The Navigant and First Quartile Consulting team followed up with the utilities multiple times to clarify the data needed, and answer questions about reporting. Westar, Hydro-Quebec, and New Brunswick Power declined to participate due to challenges in collecting data. Austin Energy was excluded from the final peer comparison due to its small service territory, which made it incomparable to Hydro One.

Figure 33. Peer Group of 16 Canadian and U.S. Transmission Utilities

Company	Gross Transmission Assets ($'000)	Service Territory (sq. km)	Length of Lines (km)	Throughput (TWh)
Baltimore Gas and Electric	1,179,098,656	3,700	1,490	30.6
BC Hydro	5,111,155,732	42,370	18,500	54.6
CenterPoint Energy	2,059,764,178	8,050	6,000	101.7
Commonwealth Edison	3,389,679,995	18,400	7,940	90.0
CPS Energy	877,775,489	2,440	2,410	26.3
East Kentucky Power Coop.	569,099,123	N/A	4,700	22.8
Hydro One Networks	13,244,428,940	640,000	29,080	139.8
Kansas City Power & Light	1,297,124,005	28,840	2,640	40.6
Manitoba Hydro	1,055,000,000	650,000	12,800	30.0
Oncor Electric Delivery	7,005,354,033	86,032	25,730	114.9
PECO Energy	1,439,589,112	3,380	2,030	37.5
PPL Electric Utilities	2,408,545,384	26,000	6,650	40.6
Public Service Electric & Gas	5,845,024,497	2,010	2,660	40.7
Southern California Edison	11,071,660,300	80,450	19,712	89.0
Tucson Electric Power	936,496,126	1,620	3,110	18.3
Westar Energy	2,053,092,375	16,250	5,900	30.4

A.2 Relative Performance

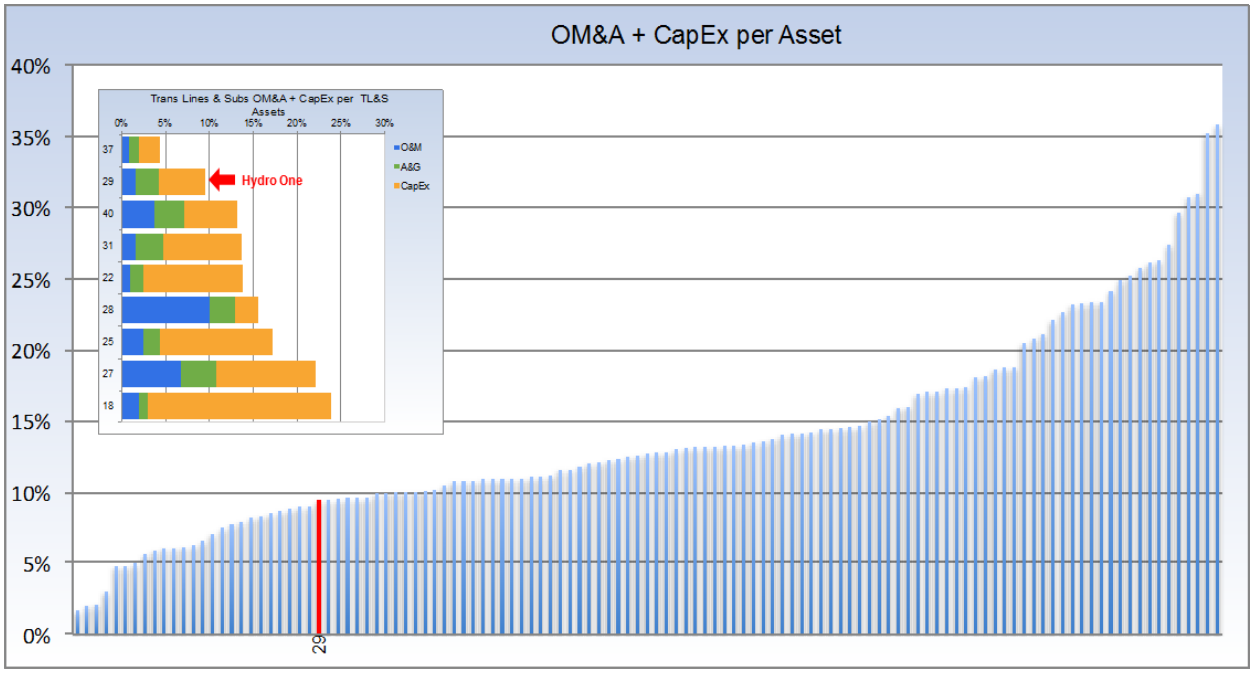
The peer group was compared against the entire group of companies reporting to the FERC. The net results, Figure 34, show that the OM&A and CAPEX costs per asset are higher than the FERC population.

Figure 34. Peer Group Compared to U.S. FERC Reporting Population

	Peer Group		FERC Population	
OM&A per Asset	Q1:	2.5%	Q1:	3.5%
	Median:	4.3%	Median:	4.7%
	Q3:	7.1%	Q3	8.0%
CAPEX per Asset	Q1:	5.2%	Q1:	4.2%
	Median:	8.9%	Median:	6.6%
	Q3:	11.4%	Q3:	9.7%
OM&A + CAPEX per Asset	Q1:	13.2%	Q1:	9.9%
	Median:	13.9%	Median:	13.0%
	Q3:	17.2%	Q3:	17.7%

Hydro One has lower OM&A and CAPEX costs compared to the peer group and the FERC population Figure 35.

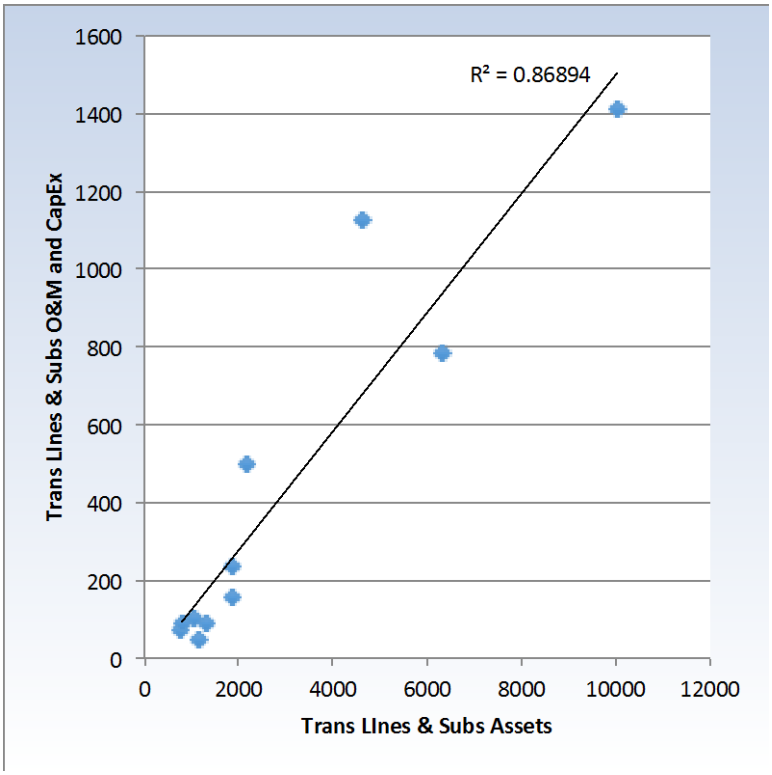
Figure 35. Comparison of Hydro One Total Transmission Costs to Peer Group and Industry



APPENDIX B. PERFORMANCE OF NORMALISING FACTORS

The peer group is a broad representation of Canadian and U.S. utilities. In order to compare cost and performance data across these utilities, the data is normalised according to asset such as number of substations and line length, activity such as annual spending, and FERC reported data such as plant-in service costs. These factors proved to be the most appropriate and had the greatest amount of data available. FERC data and annual spending are reported in a standardised fashion and publicly annotated. Gross assets is consistently the best predictor of costs (Figure 36), with a high predictive capability. A regression of cost per asset across the peer group companies shows an r-squared value, or ability of asset data to predict cost, of 0.87.

Figure 36. Total Costs Predicted by Gross Asset Value[3]



[3] Each dot represents a company in the peer group. To avoid bias, Hydro One is deliberately excluded.

Figure 37 shows the cost predictive capability of normalising factors that were considered for this study. Asset value is either the best or the second best predictor in each cost category, while throughput (MWh transmitted) is the poorest predictor in each category.

Figure 37. Summary of Predictive Capability of Potential Normalising Factors

Lines & Substations	Gross Asset Value	Line Kilometres	MWh Sold	MWh Transmitted
O&M	0.6151	0.5112	0.3680	0.2542
CAPEX	0.8780	0.8348	0.4851	0.3127
O&M + CAPEX	0.8689	0.8184	0.6116	0.3127
Substations Only	**Gross Asset Value**	**Line Kilometres**	**MVA**	
O&M	0.7666	0.3529	0.3164	
CAPEX	0.9230	0.6505	0.4322	
O&M + CAPEX	0.9288	0.6374	0.4292	
Lines Only	**Gross Asset Value**	**Line Kilometres**	**MWh Sold**	**MWh Transmitted**
O&M	0.5428	0.5243	0.3658	0.2439
CAPEX	0.8223	0.8467	0.4154	0.2623
O&M + CAPEX	0.8087	0.8312	0.4187	0.2663

Figure 38 and Figure 39 show the peer group results for total transmission OM&A and CAPEX normalised using circuit kilometres and megawatt-hours transmitted. The median values are $8.6 per circuit kilometre and $45,144 per MWh transmitted, respectively.

Figure 38. Transmission Lines and Substations OM&A + CAPEX per Circuit Kilometre

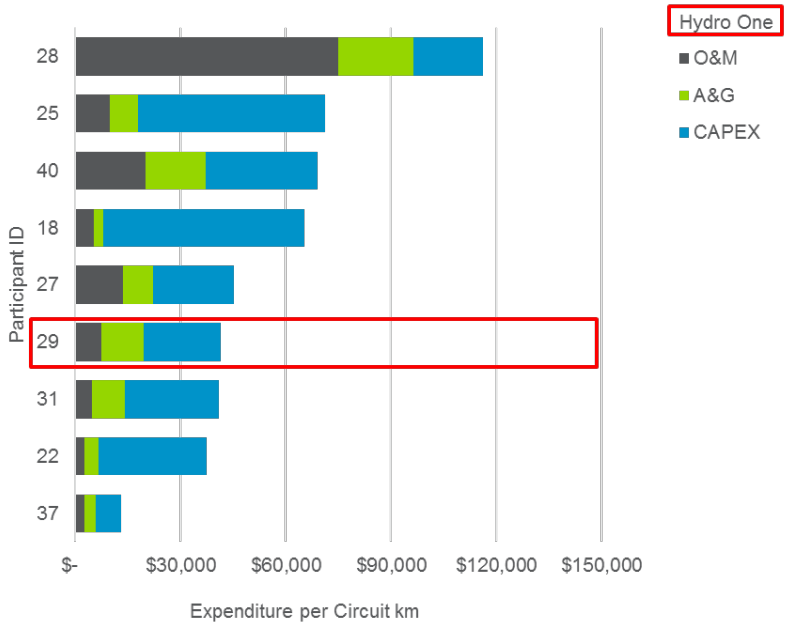
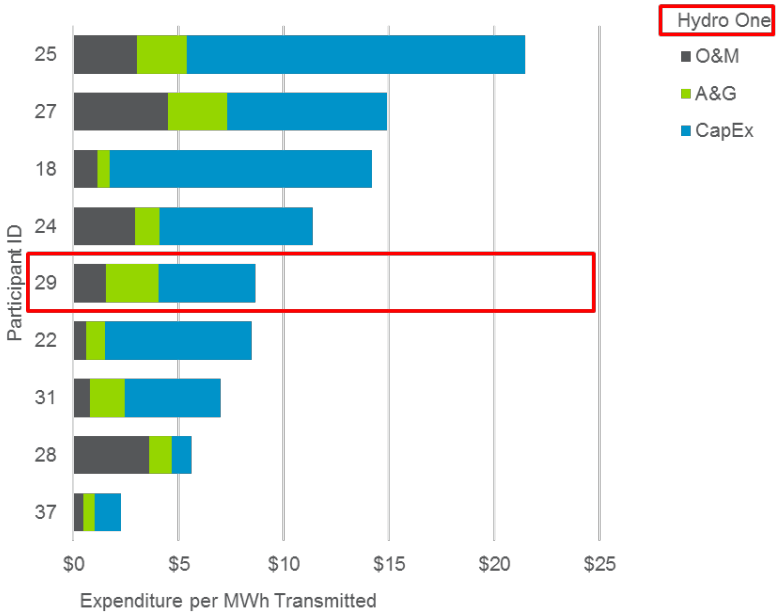


Figure 39. Transmission Lines and Substations OM&A + CAPEX per MWh Transmitted



FORM A

Proceeding: EB-2016-0160

ACKNOWLEDGMENT OF EXPERT'S DUTY

1. My name is Ken Buckstaff. I live at Manhattan Beach, in the state of California.

2. I have been engaged by or on behalf of .HYDRO ONE NETWORKS, INC. to provide evidence in relation to the above-noted proceeding before the Ontario Energy Board.

3. I acknowledge that it is my duty to provide evidence in relation to this proceeding as follows:
   (a) to provide opinion evidence that is fair, objective and non-partisan;
   (b) to provide opinion evidence that is related only to matters that are within my area of expertise; and
   (c) to provide such additional assistance as the Board may reasonably require, to determine a matter in issue.

4. I acknowledge that the duty referred to above prevails over any obligation which I may owe to any party by whom or on whose behalf I am engaged.

Date: May 20, 2016

Signature

Ontario Energy Board Rule 13A Statement

This Statement is provided in compliance with Ontario Energy Board ("Board") Rule 13A, regarding the report Total Transmission Cost Benchmarking Study ("Report") dated May 17, 2016, prepared by Navigant Consulting Ltd. And First Quartile Consulting ("Expert").

Consultant:
Ken Buckstaff, Managing Director,
First Quartile Consulting
1108 14th Street, Suite 220
Cody, WY 82414

Expertise in benchmarking, cost and service level analysis for utilities, with a focus on transmission, distribution, and customer service.

Qualifications:
Education:
B.S. Industrial Engineering, Lehigh University
M.B.A., Finance/Management Science, U.C.L.A.

Utility Experience: 8 years employed by the Salt River Project in Operations Analysis and Power Construction & Maintenance organizations.
Consulting Experience: 28 years conducting large-scale industry benchmark studies covering transmission, distribution, and customer service across North America, as well as Europe and parts of Africa and South America. Providing advisory services in the same functional areas of utilities during that same time period. Participation in regulatory proceedings in jurisdictions in the U.S., Canada, and the U.K.

The lead experts on this project were Ken Buckstaff and Benjamin Grunfeld

Instructions Provided:
N/A

Basis of Evidence:
The primary basis of the evidence is data gathered directly from North American utilities during annual and one-off benchmark studies. The data are provided by the utilities under confidentiality agreements, with the agreement that they will be provided a summary of the results for their use. Guidance is provided to each of the utilities regarding what costs to include or exclude in response to a detailed set of questions designed to collect comparable data across utilities facing different circumstances.

Ontario Energy Board Rule 13A Statement

Context of Evidence:
As part of the negotiated settlement, Hydro One and intervenors agreed that Hydro One would undertake to complete a benchmarking study.

> Intervenors want to better understand the cost of Hydro One's work relative to similar companies. A cost benchmarking study would also be supportive of the Board's Renewed Regulatory Framework. Hydro One agrees to complete an independent Transmission Cost Benchmarking Study that will be filed with Hydro One's next Transmission rates application.
>
> Intervenors and Board Staff will be consulted, and agreement will be sought, in defining the Terms of Reference that will be included in the Request for Proposal document. The Request for Proposal document will be used in the selection process for the independent party that will complete the Study. After Hydro One selects the independent party that will complete the Study, Intervenors and Board Staff will review the Study proposal provided by the independent party to help ensure that the proposal meets the requirements of the Terms of Reference.
>
> Intervenors and Board Staff will also be provided with an opportunity to review and provide comments on the preliminary results prior to finalizing the Study. Hydro One agrees to fund Intervenors for their participation as consistent with Hydro One's past practice.

Confirmation:
The expert has been made aware of and agrees to accept the responsibilities that are or may be imposed on the expert as set out in Rule 13A.

Signature:

Name of Expert:
Ken Buckstaff

Date:
May 20, 2016

FORM A

Proceeding: EB-2016-0160
ACKNOWLEDGMENT OF EXPERT'S DUTY

1. My name is .BENJAMIN GRUNFELD.(*name)*. I live at .TORONTO. (*city)*, in the .PROVINCE. (*province/state*) of .ONTARIO.

2. I have been engaged by or on behalf of .HYDRO ONE NETWORKS, INC. (*name of party/parties)* to provide evidence in relation to the above-noted proceeding before the Ontario Energy Board.

3. I acknowledge that it is my duty to provide evidence in relation to this proceeding as follows:
   (a) to provide opinion evidence that is fair, objective and non-partisan;
   (b) to provide opinion evidence that is related only to matters that are within my area of expertise; and
   (c) to provide such additional assistance as the Board may reasonably require, to determine a matter in issue.

4. I acknowledge that the duty referred to above prevails over any obligation which I may owe to any party by whom or on whose behalf I am engaged.

Date .MAY 20, 2016.

Signature

Ontario Energy Board Rule 13A Statement

This Statement is provided in compliance with Ontario Energy Board ("Board") Rule 13A, regarding the report Total Transmission Cost Benchmarking ("Report") dated May 17, 2016, prepared by Navigant Consulting Ltd. and First Quartile Consulting ("Expert").

Consultant:
Benjamin Grunfeld, Director
Navigant
333 Bay Street | Suite 1250 | Toronto, ON M5H 2Y2

Expertise in benchmarking, cost and service level analysis for utilities, and regulatory economics.

Qualifications:
Education:
B.Sc., Mathematics and Electrical Engineering, Queen's University
M.Sc., Management and Economics, London School of Economics and Political Science

Consulting Experience:
10+ years providing regulatory, operational, and strategic advice to electricity and natural gas utilities. Guided senior executives and boards to develop and implement long-term strategies and strategic initiatives. Supported senior operations executives to identify fact-based opportunities for performance improvement. Advised senior policy makers on effective electricity and natural gas policy development. Analysed the performance of markets, advices on effective market design, and supports market entry and investment decisions. Provided guidance to regulatory agencies and senior regulatory professionals on the development of efficiency regulatory policies and successful regulatory strategies. Participated in regulatory proceedings in jurisdictions in Canada and the U.K.

The lead experts on this project were: Ken Buckstaff and Benjamin Grunfeld

Instructions Provided:
N/A

Basis of Evidence:
The primary basis of the evidence is data gathered directly from North American utilities during annual and one-off benchmark studies. The data are provided by the utilities under confidentiality agreements, with the agreement that they will be provided a summary of the results for their use. Guidance is provided to each of the utilities regarding what costs to include or exclude in response to a detailed set of questions designed to collect comparable data across utilities facing different circumstances.

Context of Evidence:
As part of the negotiated settlement, Hydro One and intervenors agreed that Hydro One would undertake to complete a benchmarking study.

Ontario Energy Board Rule 13A Statement

Intervenors want to better understand the cost of Hydro One's work relative to similar companies. A cost benchmarking study would also be supportive of the Board's Renewed Regulatory Framework. Hydro One agrees to complete an independent Transmission Cost Benchmarking Study that will be filed with Hydro One's next Transmission rates application.

Intervenors and Board Staff will be consulted, and agreement will be sought, in defining the Terms of Reference that will be included in the Request for Proposal document. The Request for Proposal document will be used in the selection process for the independent party that will complete the Study. After Hydro One selects the independent party that will complete the Study, Intervenors and Board Staff will review the Study proposal provided by the independent party to help ensure that the proposal meets the requirements of the Terms of Reference.

Intervenors and Board Staff will also be provided with an opportunity to review and provide comments on the preliminary results prior to finalizing the Study. Hydro One agrees to fund Intervenors for their participation as consistent with Hydro One's past practice.

Confirmation:
The expert has been made aware of and agrees to accept the responsibilities that are or may be imposed on the expert as set out in Rule 13A.

Signature:

Name of Expert:
Benjamin Grunfeld

Date:
May 17, 2016

Stakeholder Consultation Notes

Transmission Cost Benchmarking Study

February 11, 2015
1:15pm – 4:30pm
Double Tree by Hilton, Denver Room
108 Chestnut Street, Toronto

Table of Contents

The presentation materials used in this Session and background materials can be found at this link:

http://www.hydroone.com/RegulatoryAffairs/

Session Participants

Stakeholders

- Julie Girvan, Consumers Council of Canada (CCC)
- Roger Higgin, Energy Probe Research Foundation
- David MacIntosh, Energy Probe Research Foundation
- Paula Lukan, Independent Electricity System Operator (IESO)
- Randy Aiken, London Property Management Association (LPMA) [WebEx]
- Harold Thiessen, Ontario Energy Board (OEB)
- David Barr, Ontario Power Generation (OPG) [WebEx]
- Bayu Kidane, Power Workers' Union (PWU)
- Mark Rubenstein, School Energy Coalition (SEC)
- Vicki Power, Society of Energy Professionals (SEP)
- Bohdan Dumka, Society of Energy Professionals (SEP)
- Mark Garner, Vulnerable Energy Consumers Coalition (VECC)

Hydro One Networks Inc.

- Jim Malenfant – Senior Regulatory Advisor

Presenter / Facilitator

- Allan Cowan – Director, Major Applications, Hydro One Networks Inc.
- Steve Klein – Vice President and Practice Manager, OPTIMUS | SBR

Note-Takers

- Andrea Spencer – OPTIMUS | SBR
- Sequin Martel – OPTIMUS | SBR

1. Welcome by Allan Cowan, Director Major Applications, Hydro One Networks

Allan Cowan ("Mr. Cowan"), Director Major Applications, Hydro One Networks Inc. ("Hydro One") welcomed participants to the first Transmission Cost Benchmarking Stakeholder Consultation Session. Mr. Cowan then introduced Steve Klein ("Mr. Klein"), Practice Manager at OPTIMUS | SBR as the session facilitator.

2. Introductions and Agenda

Mr. Klein stated the purpose of the session is to gather input from participants on defining the associated Terms of Reference for the intended Request for Proposal ("RFP") to be issued by Hydro One. OPTIMUS | SBR was contracted by Hydro One to facilitate the session and support this initial development stage of the Transmission Cost Benchmarking Study RFP. Mr. Klein emphasized the primary purpose of this session is to obtain stakeholder input through direct participation, with OPTIMUS | SBR taking notes to ensure key discussion points and outcomes from the session are documented. All associated material and notes, including the "Transmission Cost Benchmarking Study – Stakeholder Consultation Session #1" presentation deck, will be posted on Hydro One's Regulatory Affairs public website.

3. Overview of the Cost Benchmarking Study

Overview of the Cost Benchmarking Study

Mr. Cowan provided an overview of the Transmission Cost Benchmarking Study ("Study"), and reiterated that the purpose of this session is to gather stakeholder input that would inform the associated Request for Proposal ("RFP"); see "Overview of the Transmission Cost Benchmarking Study" section of the presentation for details. As part of the Settlement Agreement for Hydro One's 2015-16 Transmission Rates, Hydro One agreed to complete the Study as part of the next transmission rate application for 2017-2018 test years, expected to be filed in spring of 2016 if all goes according to plan.

In accordance with the Settlement Agreement, stakeholders were to be consulted and agreement sought in defining the RFP's Terms of Reference. In addition, stakeholders would be given an opportunity to review the successful proponents study proposal to ensure the defined Terms of Reference are addressed and, in turn, review the preliminary findings of the Study prior to finalization of the Study report.

A stakeholder inquired about the benefits of the Study to Hydro One, and Mr. Cowan highlighted that it is designed to explore potential cost variations and whether there are relevant best practises or methods that could be adopted. In regards to the proposed timelines presented by Mr. Cowan, a stakeholder inquired about the purpose of a second Stakeholder Consultation in May. Mr. Cowan indicated that once a consultant has been selected to conduct the Study, the Second Session provides an opportunity for the consultant to provide stakeholders with their planned study approach in response to the Term of Reference and allow for stakeholder comment.

A question was raised about Hydro One's historical experience with transmission cost benchmarking. Mr. Cowan replied that a study had been filed approximately three rates cases ago, and that these

would be reviewed. Given recent changes in Ontario's regulatory framework for utilities, it was noted that the applicability of previous benchmarks and availability of data must be considered, and that the success of the Study depends on the participation of comparator companies. Mr. Klein also highlighted that the Session's survey was designed based on previously completed transmission benchmarking studies.

Another stakeholder asked whether or not similar studies on transmission cost have been completed in the past. Mr. Klein confirmed that studies have been conducted, but it would be up to the successful proponent to determine their relevance and use as proxies for this Study.

In regards to the benchmarking approach, it was suggested that comparing utilities costs as a whole could limit the relevance of associated conclusions. Instead, it may be best to benchmark key components of cost to achieve a more detailed Study. Mr. Klein noted that comparability becomes a challenge at this granular level, due to the greater number of component variables. Another stakeholder suggested that comparing components of cost may actually limit the relevance of outcomes, as the emphasis of this Study is on total cost at a high-level.

A stakeholder asked if there would be an opportunity to provide input on the Terms of Reference prior to issuing the RFP. Mr. Klein indicated that the majority of these terms will be finalized during the current Stakeholder Session, and that the remaining RFP components are generally standard Hydro One boilerplate. Another stakeholder asked about the expected rate application filing date, and Mr. Cowan confirmed that the expected filing date is spring 2016.

Transmission Cost Benchmarking Study: Defining the Terms of Reference

Mr. Klein provided an overview of the Study Context and Objectives; see "Transmission Cost Benchmarking Study: Defining the Terms of Reference" section of the presentation for details. Mr. Klein clarified that the finalized Terms of Reference is not a definitive solution, but that potential proponents will build on their relevant expertise to advise whether they can meet specific requirements. Hydro One's goal is to provide a clear outline of the Study requirements in the finalized RFP. Input collected from the preliminary survey will be incorporated in the draft Terms of Reference.

With respect to the Terms of Reference, context, objectives, suggested comparator characteristics and suggested criteria for comparison will be included. The RFP will be posted publicly on the "Doing Business" with Hydro One website. Details regarding key factors of a successful Study and potential study proponents will also be outlined for internal purposes to support Hydro One's evaluation.

A question was raised regarding the involvement of LDCs and/or large direct Hydro One customers, as well as the Electricity Distributors Association ("EDA"), Association of Major Power Consumers in Ontario ("AMPCO") and CME. Mr. Cowan confirmed that invitations were sent out to those generally active in recent transmission cases, which does not include LDCs or the EDA. Mr. Klein also noted that the sample size of respondents suggests a reliable outcome.

A question was raised regarding the process that Hydro One will use for selecting a consultant to conduct the Study. Mr. Klein explained that selection of the successful consultant will be based on key

success factors and the evaluation criteria being set out by Hydro One. In addition, Mr. Cowan noted that a strict and rigid process would be maintained to effectively guide the Study.

Another question was raised, regarding how proponents will be evaluated in the event that they are only able to address specific components of the RFP. Mr. Klein indicated that this will be addressed as part of Hydro One's evaluation criteria.

A stakeholder suggested that an emphasis on the fact that the Study is independent, involving collaboration among participants, be included in the context. Mr. Klein confirmed these components would indeed be included. In addition, it was requested that the context indicate the expectation of an ability to identify best practises that may be adopted. Mr. Klein confirmed that these details are captured as part of proposed objectives and success factors, but would also be included as part of the context.

Another stakeholder asked for clarification regarding whether or not the causes of variations in cost would be explored by the consultant, or if Hydro One will take the benchmarking results and approach participating companies on their own. A number of participants indicated that they would like these variations explored to understand underlying variations. Mr. Klein noted that Hydro One will likely not be able to go back to Study respondents, as survey respondents generally request non-disclosure of their responses. As a result, while the consultant may be able to gain some understanding for the variances, in all likelihood these would only be high-level insights into the causes of variations. Mr. Cowan also highlighted that the understanding of these variations may not be relevant in another operating environment, and the pursuit of a deeper level of detail may reduce the number of potential respondents willing to participate in the Study.

Mr. Klein presented verbatim responses compiled by OPTIMUS | SBR regarding primary objectives of the Study to capture all salient points. These details informed the development of a Proposed Objective, that Mr. Klein indicated would be updated to incorporate the exploration of benchmark differentiators.

A stakeholder inquired as to whether or not there was any detail provided from the Settlement Conference regarding the expected level of detail to be included in the Study. Mr. Cowan confirmed his understanding was that the Settlement Agreement indicated the cost benchmarking study would be supportive at a high-level, and highlighted that the goal of this session is to inform development of the specific Request for Proposal Terms of Reference requirements. In addition, an opportunity would be available to confirm requirements and provide added feedback at a second Stakeholder Session prior to the commencement of any work by the successful proponent.

A question was raised regarding how the phrase "high-level" might limit the Study; see Proposed Objective, sentence two, "…high-level set of benchmarks…" in the presentation. Mr. Klein indicated that removing these parameters may result in a wide variation of proponent responses, and that questions will still likely be raised on this topic for clarification. The qualifier provides a necessary starting point for potential proponents. It was decided that this issue would be revisited, as necessary, later in the session once all of the other outstanding components have been discussed.

The unique context in which Hydro One operates was flagged by a participating stakeholder as a key component that should be outlined in the RFP. Mr. Klein clarified that these background details will be provided, and are typically part of the standard Hydro One RFP boilerplate. Mr. Klein highlighted that the potential proponent will also be expected to consider variations between comparators and how they will be taken into consideration in the Study.

4. Online Survey Results and Facilitated Discussion

Mr. Klein proceeded to discuss suggested comparator characteristics as well as comparators that may be included in the Study; see "Suggested Comparator Characteristics and Potential Comparators" section of the presentation for details. Mr. Klein noted that the number of survey respondents represents approximately 25% of the stakeholder community surveyed.

A stakeholder inquired as to how suggested comparator characteristics were identified. Mr. Klein explained that OPTIMUS | SBR identified these characteristics from the survey results and reviewed them with Hydro One, prior to presenting these details for input at the first Stakeholder Consultation Session. The number of step-down stations required by a transmitter was suggested by a participating stakeholder as a potential comparator characteristic. Mr. Cowan indicated that the "system configuration" characteristic may cover this particular characteristic. Mr. Klein noted that highlighting this characteristic under the system configuration characteristic, or adding it directly, will be considered.

Another stakeholder asked about the relevance of companies that are of "same relative size" as part of the suggested comparator characteristics. It was clarified that comparability becomes a challenge with companies of varying sizes, particularly with respect to economies of scale. Another stakeholder suggested the phrase "same relative size" presupposes that a difference in size is a relevant characteristic, which may narrow down the set of potential comparators before data has been collected. Instead, it was suggested that a larger sample group would provide a strong foundation for the Study. Variations in costs could then be explored and highlighted.

Mr. Klein noted that these parameters are required to help proponents frame their RFP response, and that these characteristics are only suggestions with an opportunity for potential proponents to provide feedback. He also highlighted that 'relative size' emphasizes comparable organizations in the industry to avoid a sample size that may be too large and too diverse. Mr. Klein suggested removing the word "same" from the phrase "same relative size" on the "Suggested Comparator Characteristics" slide, acknowledging it would allow proponents to explore a somewhat broader set of companies. It was clarified the RFP will highlight that these are 'suggested' characteristics, with an opportunity for potential proponents to suggest exclusions or inclusions.

In regards to the general Study approach, a stakeholder suggested gathering data on a wide variety of variables to enable the development of more detailed profiles based on suggested characteristics. These profiles can then be sorted and explored to understand the variables that do impact cost. As a result, to avoid constraining the variables that might be suggested by potential proponents, it was suggested and confirmed that "Suggested Comparator Characteristics" would be changed to "Potential Comparator Characteristics."

Mr. Klein discussed "Potential Comparator Results", and confirmed that the proponent will be providing input on potential comparators. It was noted that this slide does not reflect a complete list and that suggestions will be sought with respect to comparators to be included in the benchmarking analysis. In addition, potential proponents will advise how data will be collected (including public versus direct, as well as historical versus current) to meet the benchmarking Study objectives.

In regards to the "Number of Comparators," feedback was sought regarding the minimum number of comparators required to achieve a reliable Study against potential data availability limitations. A couple stakeholders suggested that seven (7) comparators would be sufficient, while others suggested a limited number of more detailed insights into comparators would be sufficient. It was then suggested that gathering information on a large set of comparators, followed by the engagement of a more specific sub-set of comparators, would support a reliable Study. Following this component of the discussion, Mr. Klein concluded from the stakeholders' discussions that emphasis should be placed on gathering a wide range of information, but that a minimum of three (3) reasonable comparators may also be sufficient for the purpose of this Study.

A stakeholder inquired about the emphasis on North American companies, and suggested that a broader set of companies from a geographic perspective may support a more detailed Study. Mr. Klein explained that similar studies tend to emphasize North America, but that it will be the responsibility of potential proponents to indicate which elements would enable a reliable Study.

5. Developing the Terms of Reference and Facilitated Discussion

Mr. Klein presented the results of the survey in regards to the suggested criteria for comparison and discussion by the stakeholders was limited. The criteria that were used in the survey were drawn from past benchmarking studies that have included similar types of indicators.

In regards to cost criteria, it was clarified that the definition of "cost" in this context is inclusive of all costs, including OM&A, and it was clearly indicated in the survey. [Ed. Note: the survey defined "Total Cost = Capital and OM&A"]

In determining the final list of criteria for comparison, the group agreed that it would be necessary to rely on the successful proponent to advise on, and define, these items. It was suggested that the proponent would have the required expertise to advise on which indicators will be relevant and will garner the appropriate results through the Study. This request of the proponent should be listed in the RFP as a requirement.

The discussion of Reliability criteria concluded with the inclusion of 'force majeure' events to the list. SAIFI and SAIDI were criticized as measures, as they are deemed to be too broad to be as meaningful as others, and that they are likely interpreted differently by different organizations. Other measures suggested by stakeholders include: interruption by cause code, major events, line losses, and momentary average interruption frequency. Again, it was decided that the group would rely on the successful proponent to build a good list of reliability metrics.

The use of Employee Safety metrics was questioned as to its relevance as compared to others in the context of this Study; it was however acknowledged that it is in fact important as there may be situations in which employee safety is directly impacted by cost strategy, i.e. when organizations cut safety protocols to save costs, to the detriment of employee safety.

Regarding Customer Satisfaction, a definition of customer must first be established. The customer could either be Transmission or retail; although it is unlikely that the customer is retail in this context. Hydro One, and likely other similar organizations, track this through surveys and through feedback from account managers. Again, the advice of the proponent on potential criteria will be welcomed.

Mr. Klein sought stakeholder input as to the desired time period for which the Study should cover and provided some options to facilitate the discussion. Various factors were mentioned which would impact the duration, including its use upon completion. Depending on its use, it may be appropriate to consider developing rolling averages or other mechanisms.

It was decided, however, that longer is better provided the data exists and is of high quality. It will be important to include data that is meaningful and realistic. There may be some gross level data that is available through financial statements, but the level of detail is unknown, and the year-end dates may vary. A potential barrier might be that if the time period chosen is too long, some potential comparators may not have the required data and will be excluded, perhaps unnecessarily.

Other Considerations

Mr. Klein asked the group if any other considerations should be included in the Terms of Reference for this Study. A stakeholder asked whether it would be appropriate to include a study of compensation for certain factors, however, Mr. Cowan clarified that Hydro One regularly undertakes a Mercer study which looks at just that, and thus does not need to be included in this Study.

Vegetation management was another topic that was brought up by a stakeholder for consideration, which the group deemed to be relevant to transmission. It was suggested to include a metric associated with this as a potential metric in the Terms of Reference, and that there is likely some useful data already available through NERC reporting.

Given this discussion, it was reconfirmed that the group of comparators needs to include, at minimum, three (3) organizations that are directly comparable and have high quality, useful data, and an undefined number of additional organizations that are also relevant but not necessarily as meaningful. The proponent will be expected to help define the criteria to ensure that an appropriate sample size is established. A broad group may be identified, then as the proponent learns more, a sub-set of closer comparators may be developed.

When considering the review of best practices, it will be important for the proponent to keep them in mind from the outset and to advise on what they might be.

A list of potential proponents was presented to the group for feedback.

Mr. Klein brought the discussion back to the original context that was discussed at the outset of the meeting, to determine if anything had changed based on the ensuing discussions. Some stakeholders proposed to add more detail into the objectives and comparability criteria sections of the context, but it was also discussed that this is an opportunity for the potential proponents to submit responses that demonstrate what they know, including their understanding of what Hydro One is looking for through this Study.

An additional consideration was brought up by a stakeholder regarding rates as they fundamentally reflect cost. Mr. Klein responded that the proponent can decide; if rates should be considered then details will be captured but there may be comparability issues.

6. Closing Remarks/Next Steps

In terms of next steps, it was determined that the Terms of Reference document within the RFP will be drafted using the input from the current session. It was suggested by stakeholders, subject to Hydro One's Supply Chain procurement policies, this Terms of Reference document might then be reviewed by Mark Rubenstein of the School Energy Coalition on behalf of the participant stakeholders. It was stated that a non-disclosure agreement may need to be signed as per Hydro One's procurement policies, but Mr. Cowan would inquire if feasible and take appropriate steps.

Mr. Klein asked the group for feedback on the process for developing the Terms of Reference. The group agreed that the survey that was used to inform the session and to focus the conversation was a positive and useful addition to the normal process. A suggestion was made and noted, that it may have been helpful to have included participants who were more knowledgeable on transmission subject matter to provide additional context.

Mr. Klein announced that the notes from the session would be posted online and that the Terms of Reference would be drafted based on the stakeholder input from this session. Participants were thanked for their contributions and thoughtful discussion and the meeting was adjourned.

7. Appendices

A. Meeting Agenda

1:00 p.m.	**Registration**	
1:15 p.m.	Welcome	Allan Cowan, Director Major Applications Hydro One Networks Inc.
1:20 p.m.	Introductions and Agenda	Steve Klein, Facilitator, OPTIMUS | SBR
1:30 p.m.	Overview of the Cost Benchmarking Study and Survey Results	Allan Cowan, Director Major Applications Hydro One Networks Inc.
1:45 p.m.	Online Survey Results and Facilitated Discussion on Defining the Terms of Reference ▪ Objective ▪ Comparators	Steve Klein, Facilitator, OPTIMUS | SBR
2:45 p.m.	**Break**	
3:00 p.m.	Online Survey Results and Facilitated Discussion on Defining the Terms of Reference (continued) ▪ Criteria ▪ Key Success Factors ▪ Potential Study Proponents	Steve Klein, Facilitator, OPTIMUS | SBR
4:25 p.m.	Closing Remarks / Next Steps	Allan Cowan, Director Major Applications Hydro One Networks Inc.
4:30 p.m.	**Adjourn**	

B. Meeting Presentation

Transmission Cost Benchmarking Study

Stakeholder Consultation Session #1

February 11, 2015

Agenda

1:00 p.m.	**Registration**	
1:15 p.m.	Welcome	Allan Cowan, Director Major Applications Hydro One Networks Inc.
1:20 p.m.	Introductions and Agenda	Steve Klein, Facilitator, OPTIMUS|SBR
1:30 p.m.	Overview of the Cost Benchmarking Study and Survey Results	Allan Cowan, Director Major Applications Hydro One Networks Inc.
1:45 p.m.	Online Survey Results and Facilitated Discussion on Defining the Terms of Reference • Objective • Comparators	Steve Klein, Facilitator, OPTIMUS|SBR
2:45 p.m.	**Break**	
3:00 p.m.	Online Survey Results and Facilitated Discussion on Defining the Terms of Reference (continued) • Criteria • Key Success Factors • Potential Study Proponents	Steve Klein, Facilitator, OPTIMUS|SBR
4:25 p.m.	Closing Remarks / Next Steps	Allan Cowan, Director Major Applications Hydro One Networks Inc.
4:30 p.m.	**Adjourn**	

Facilitator's Remarks

- Introductions Facilitator, Steve Klein & OPTIMUS | SBR support team
- Meeting Facilities
- Safety Review
- Note taking process
- Participant Introductions

Meeting Process

- Mobile phones “Off” or “Silenced”
- Avoid side discussions while others speaking
- Roundtable format
- All questions are good ones
- All comments are appreciated
- Materials and notes will be posted on Hydro One’s Regulatory Website:

www.HydroOne.com/RegulatoryAffairs

Transmission Cost
Benchmarking Study

Stakeholder Consultation Session #1

Allan Cowan – Director, Major Applications, Hydro One

Overview of the Transmission Cost Benchmarking Study

Background

- In the Settlement Agreement for Hydro One's 2015-16 Transmission Rates, Stakeholders proposed an independent cost benchmarking study.
- Stakeholders expressed a need to better understand the cost of Hydro One's work relative to similar companies.
- Such a study would also be supportive of the Board's Renewed Regulatory Framework.
- Hydro One agreed to complete an independent Transmission Cost Benchmarking Study that will be filed with Hydro One's next Transmission rates application.

Settlement Agreement

- Stakeholders will be consulted, and agreement will be sought, in defining the Terms of Reference that will be included in the Request for Proposal documentation.
- Stakeholders will have an opportunity to review the successful proponent's Study Proposal to help ensure that this independent party's Proposal meets the requirements of the Terms of Reference.
- Stakeholders will also be provided with an opportunity to review and provide comments on the preliminary results prior to finalizing the Study.

The Process

- Dissemination of the Stakeholder Survey.
- Review of Stakeholder Survey Results.
- Development of the Terms of Reference for the Study.
- Development and Issuance of the Request for Proposal.
- Selection of Independent Party (Proponent) and award contract.
- Collection and evaluation of data by Independent Party.
- Development of Preliminary Results.
- Review and commentary on preliminary results.
- Finalization of the Study Report.

Proposed Timelines

- Dissemination of the Stakeholder Survey – January, 2015
- *Stakeholder Consultation #1 – February 11, 2015*
- Terms of Reference – February, 2015
- Issue Request for Proposal – March, 2015
- Award Contract – May, 2015
- *Stakeholder Consultation #2 – May, 2015*
- Preliminary Results (Data & Initial Findings) – October, 2015
- *Stakeholder Consultation #3 – October/November, 2015*
- Final Study to be filed with next Transmission Cost of Service Application

Transmission Cost
Benchmarking Study

Stakeholder Consultation Session #1
February 11, 2015

Steve Klein – Vice President & Practice Lead

Transmission Cost Benchmarking Study: Defining the Terms of Reference

Order of Discussion

- Context
- Objective
- Selection of Comparators
  - Suggested Comparator Characteristics
  - Potential Comparators
- Suggested Criteria for Comparison

- Additional Considerations
  - Key Factors of a Successful Study
  - Potential Study Proponents

Context

Hydro One intends to consult with Stakeholders, as per the Settlement Agreement, at specific points during the process of the Transmission Cost Benchmarking Study.

As an initial step, Hydro One asked OPTIMUS | SBR to independently develop and conduct an Online Survey amongst the Stakeholders that Hydro One normally consults on Transmission rate applications and who actively participate or intervene in Ontario Energy Board hearings for such applications.

The results of this Online Survey subsequently formed the basis for a Stakeholder Consultation to more fully explore and assist in defining the Terms of Reference for the Cost Benchmarking Study.

/Context…2

Context ...2

With this valued input now in hand, Hydro One will seek a qualified independent party ("proponent") to conduct the Study.

While this Request for Proposal provides the much valued Stakeholder input and suggestions, this should strictly be treated as a guide as the proponent should demonstrate their expertise and capabilities by detailing the type of information to be gathered and the types of utilities that should be used for comparison purposes.

/Context...3

Context ...3

Each proponent should be aware that Hydro One and the successful proponent will further consult with the Stakeholders following the Request for Proposal selection process, to review the Study's proposed Scope as provided by the successful proponent to ensure that the proposal meets the requirements of the Terms of Reference.

In addition, Hydro One will provide the Stakeholders with an opportunity to review and provide comments on the preliminary results (the data and initial findings) prior to finalizing the Study.

Objective Results

What do you consider the main objectives of the Transmission Cost Benchmarking Study to be?

- To help determine how Hydro compares in both cost (total cost, and capital and OM&A cost), and productivity and efficiency, among peer organizations
- To assess HONI Capital efficiency and performance relative to a comparable peer group with at least 50% Canadian peer group
- Study to complement industry-wide data
- Provide a high level set of benchmarks of cost and business performance for Hydro One identifying all factors that limit the comparability of the utilities (identifying all the limitations of the comparisons)

Objective Results, *continued*

What do you consider the main objectives of the Transmission Cost Benchmarking Study to be?

- Confirming cost effective delivery of service
- To compare overall and sub-components of TX companies' performance to other like utilities
- To determine whether the categories of costs and the total costs incurred by HONI are reasonable for the purpose of setting rates

Proposed Objective

Hydro One Networks Inc. (“Hydro One”) requires a qualified proponent to complete an independent comprehensive Transmission Cost Benchmarking Study. This Study will provide a high level set of benchmarks and comparisons of Total Cost (defined as Capital and OM&A) and Business Performance (generally defined as service delivery effectiveness and efficiency) for Hydro One among North American peer organizations.

Transmission Cost
Benchmarking Study

Stakeholder Consultation Session #1
February 11, 2015

Steve Klein – Vice President & Practice Lead

Suggested Comparator Characteristics and Potential Comparators

Comparator Characteristics Results

Which criteria from the list below would you consider when determining if a company is comparable?

Companies with same relative size, measured by:	Important	Somewhat Important	Not at all Important	N/A	Total Responses
Gross Fixed Assets	3 (37.5%)	4 (50.0%)	0 (0.0%)	1 (12.5%)	8
Number of Kilometres of Transmission Line	6 (75.0%)	1 (12.5%)	0 (0.0%)	1 (12.5%)	8
Size of Service Territory	5 (62.5%)	2 (25.0%)	0 (0.0%)	1 (12.5%)	8
Transmission Capacity	4 (50.0%)	3 (37.5%)	0 (0.0%)	1 (12.5%)	8

	Important	Somewhat Important	Not at all Important	N/A	Total Responses
Companies of similar geography/weather characteristics	3 (37.5%)	4 (50.0%)	0 (0.0%)	1 (12.5%)	8
Companies of similar organization structure, i.e. Transmission only versus Transmission and Distribution	1 (12.5%)	4 (50.0%)	2 (25.0%)	1 (12.5%)	8
Companies of similar market structure, i.e. public versus private	1 (12.5%)	3 (37.5%)	3 (37.5%)	1 (12.5%)	8
Companies with similar system configuration/design, i.e. system voltage levels	1 (14.3%)	3 (42.9%)	1 (14.3%)	2 (28.6%)	7

Comparator Characteristic Results, *continued*

Are there any other criteria(s) that you believe should be considered when determining whether a company is comparable?

1. Number of Transmission Customers.
2. Considering wages make a significant portion of OM&A, organization of labour... whether unionized or not is a very important consideration. Regulatory regime... cost of service , IRM, etc.
3. Line Connections particularly LDCs and large customers. Grid Connected Generators especially Renewables.
4. Number of employees. Status of employees as management or union.

Suggested Comparator Characteristics

- Companies of same relative size, measured by:
  - Gross Fixed Assets
  - Number of Kilometres of Transmission Line
  - Size of Service Territory
  - Number of Transmission Customers, i.e. LDCs, large customers
  - Transmission Capacity
- Companies of similar geography/weather characteristics
- Companies of similar organization structure, i.e. public versus private; unionized versus non-unionized
- Companies with similar system configuration/design, i.e. system voltage levels

Potential Comparators Results

Which North American companies from the list below would you consider to be comparable to Hydro One?

	Comparable	Not Comparable	Uncertain	Total Responses
BC Hydro	8 (100.0%)	0 (0.0%)	0 (0.0%)	8
Hydro Quebec	7 (100.0%)	0 (0.0%)	0 (0.0%)	7
Pacific Gas and Electric Company	3 (37.5%)	0 (0.0%)	5 (62.5%)	8
Southern California Edison	2 (28.6%)	1 (14.3%)	4 (57.1%)	7
Altalink	4 (50.0%)	0 (0.0%)	4 (50.0%)	8
ComEd (Exelon)	3 (37.5%)	1 (12.5%)	4 (50.0%)	8
Florida Power & Light	2 (33.3%)	0 (0.0%)	4 (66.7%)	6
National Grid	2 (28.6%)	0 (0.0%)	5 (71.4%)	7
Northeast Utilities	3 (37.5%)	0 (0.0%)	5 (62.5%)	8
EPCOR Utilities Inc.	2 (28.6%)	0 (0.0%)	5 (71.4%)	7
SaskPower	5 (62.5%)	1 (12.5%)	2 (25.0%)	8
Energie NB Power	5 (71.4%)	1 (14.3%)	1 (14.3%)	7
Manitoba Hydro	8 (100.0%)	0 (0.0%)	0 (0.0%)	8
Canadian Utilities Limited (ATCO)	3 (37.5%)	2 (25.0%)	3 (37.5%)	8

Potential Comparators Results, *continued*

Are there any other North American companies that you believe should be considered as comparators to Hydro One for the Transmission Cost Benchmarking Study?

1. Xcel Energy
2. Canada – Great Lakes Power Transmission
3. Participants in the First Quartile Consulting Report prepared in the EB-2014-0238 application – Baltimore Gas and Electric, CenterPoint Energy, ComEd, KCP&L, Oncor Electric Delivery, PECO Energy, Portland General Electric, Public Service Electric & Gas, Puget Sound Energy, Tucson Electric, Westar Energy

Potential Comparators Results, *continued*

Are there any other North American companies that you believe should be considered as comparators to Hydro One for the Transmission Cost Benchmarking Study?

4. Other US transmitters – BHE U.S. Transmission (MidAmerican and Pacificorp), American Transmission Company (Duke), ITC (Midwest, Michigan, Great Plains), Southern Company, First Energy

5. For some activities a utility could have a comparable to an unrelated industry private sector company. For example, it is possible to compare what an IT analyst wage is as compared to non-related industry, but related functions. Selective "micro comparators" allow parties to understand if the utility is efficient vis-a-vis other utilities, but also as compared to non-monopolies.

Suggested North American Comparators

- BC Hydro
- Hydro Quebec
- SaskPower
- Manitoba Hydro
- Energie NB Power
- Canadian Utilities Limited (ATCO)
- Pacific Gas & Electric Company
- Southern California Edison
- Altalink
- ComEd (Exelon)
- Northeast Utilities
- FirstEnergy Corporation
- Tennessee Valley Authority

Number of Comparators

From your Stakeholder perspective, what is the minimum number of Comparators for the sample size to be used by the successful Proponent?

- ☐ Three (3)
- ☐ Five (5)
- ☐ Seven (7)
- ☐ Ten (10)
- ☐ Other _____

BREAK

Transmission Cost
Benchmarking Study

Stakeholder Consultation Session #1
February 11, 2015

Steve Klein – Vice President & Practice Lead

Suggested Criteria for Comparison

Suggested Criteria for Comparison

The online survey requested Stakeholders to assess the importance of various metrics under five key criteria categories:

- Cost
- Efficiency
- Reliability
- Employee Safety
- Customer

Cost Criteria Results

	Important	Somewhat Important	Not at all Important	N/A	Total Responses
Total Cost per Customer	4 (50.0%)	4 (50.0%)	0 (0.0%)	0 (0.0%)	8
Total Cost per km of line	5 (62.5%)	3 (37.5%)	0 (0.0%)	0 (0.0%)	8
Total Cost per MWh transmitted	5 (62.5%)	3 (37.5%)	0 (0.0%)	0 (0.0%)	8
Total Cost per Gross Fixed Assets	4 (50.0%)	4 (50.0%)	0 (0.0%)	0 (0.0%)	8
Total Cost per Activity (i.e. cost per km of transmission line refurbished, cost per transformer replaced, etc.)	5 (62.5%)	3 (37.5%)	0 (0.0%)	0 (0.0%)	8
Total Cost per MVA station capacity	3 (37.5%)	3 (37.5%)	2 (25.0%)	0 (0.0%)	8
Total Cost per MW-km	5 (62.5%)	3 (37.5%)	0 (0.0%)	0 (0.0%)	8

Efficiency Criteria Results

	Important	Somewhat Important	Not at all Important	N/A	Total Responses
Replacement total capital per total asset	4 (50.0%)	3 (37.5%)	1 (12.5%)	0 (0.0%)	8
Average % capacity utilized for station MVA	3 (37.5%)	5 (62.5%)	0 (0.0%)	0 (0.0%)	8
Peak % capacity utilized for station MVA	2 (25.0%)	6 (75.0%)	0 (0.0%)	0 (0.0%)	8

Reliability Criteria Results

	Important	Somewhat Important	Not at all Important	N/A	Total Responses
System average interruption frequency	8 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	8
System average interruption duration	8 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	8
Average system availability	7 (87.5%)	1 (12.5%)	0 (0.0%)	0 (0.0%)	8
Momentary average interruption frequency	4 (50.0%)	4 (50.0%)	0 (0.0%)	0 (0.0%)	8
Number of forced outage by asset type	6 (75.0%)	2 (25.0%)	0 (0.0%)	0 (0.0%)	8
Force Majeure Events	*As suggested by one of the Input Survey respondents*				

Employee Safety Criteria Results

	Important	Somewhat Important	Not at all Important	N/A	Total Responses
Employee injury frequency rate	6 (75.0%)	2 (25.0%)	0 (0.0%)	0 (0.0%)	8
Accident severity rate	6 (85.7%)	0 (0.0%)	1 (14.3%)	0 (0.0%)	7
Vehicle accident frequency rate	4 (50.0%)	3 (37.5%)	1 (12.5%)	0 (0.0%)	8
Number of loss time days	3 (37.5%)	4 (50.0%)	1 (12.5%)	0 (0.0%)	8
Number of recordable injuries	5 (62.5%)	2 (25.0%)	1 (12.5%)	0 (0.0%)	8

Customer Criteria Results

	Important	Somewhat Important	Not at all Important	N/A	Total Responses
Customer satisfaction rate	4 (50.0%)	3 (37.5%)	0 (0.0%)	1 (12.5%)	8

Period of Comparison

From your Stakeholder perspective, what is the minimum number of years to be included in this Study for the comparisons to be deemed reasonably reliable?

- ☐ Two (2), e.g. 2012 – 2013, or 2013 -2014 if data available for 2014
- ☐ Three (3), e.g. 2011 – 2013, or 2012 – 2014 if data available for 2014
- ☐ Five (5), e.g. 2009 – 2013, or 2010 – 2014 if data available for 2014
- ☐ Other _____

Transmission Cost
Benchmarking Study

Stakeholder Consultation Session #1
February 11, 2015

Steve Klein – Vice President & Practice Lead

Additional Considerations

Suggested Key Factors of a Successful Study*

- A Study and Report which are seen as entirely independent, comprehensive, transparent and meaningful
- Shows how Hydro One compares to the Benchmarks (based on credible metrics) as derived from the group of Comparators
- All information / data and analysis deemed to be verifiable and reliable
- Clearly identifies differences amongst the Comparators and any contributing best practices
- Presents a Hydro One baseline to assess its own performance

** For Hydro One & Stakeholder reference only – not part of ToR*

Potential Study Proponents*

- EES Consulting
- Elenchus Research Associates
- KPMG
- London Economics International
- McKinsey & Company
- Monitor Deloitte
- Navigant Consulting, Inc.
- Oliver Wyman Group
- PA Consulting Group
- Pacific Economics Group
- Towers Watson & Co.

** For Hydro One & Stakeholder reference only – not part of ToR*

Transmission Cost
Benchmarking Study

Stakeholder Consultation Session #1
February 11, 2015

Allan Cowan – Director, Major Applications, Hydro One

Closing Remarks / Next Steps

Closing Remarks /Next Steps

- Hydro One will publish the notes from today's *Stakeholder Consultation #1*
- Hydro One will continue to build-out the Request for Proposal
- Hydro One will work towards a March 2015 issuance of the Request for Proposal
- Anticipated *Stakeholder Consultation #2*, May 2015, to review the Scope of Work as proposed by the successful Proponent

Thank you for attending!

Check Hydro One's website for further information:
www.HydroOne.com/RegulatoryAffairs

Any questions or comments can be directed to:
Regulatory@HydroOne.com

Transmission Total Cost Benchmarking Study
Stakeholder Session #2
Thursday, August 6, 2015
DoubleTree Hotel by Hilton – The Victoria Room
108 Chestnut Street
1:00 – 4:00pm

OVERVIEW

On August 6, 2015 Hydro One Networks Inc. hosted a stakeholder session with interveners and OEB staff, as part of the Hydro One's transmission application Settlement Agreement (EB-2014-0140). The purpose of this meeting was to present and seek feedback on the proposed approach and framework of the Transmission Total Cost Benchmarking Study.

The stakeholder session included welcoming remarks from Allan Cowan (Director Major Applications, Hydro One Networks), a presentation on the proposed approach and framework of the Transmission Total Cost Study delivered by Benjamin Grunfeld (Director Energy Practice, Navigant) and Ken Buckstaff (Managing Director, First Quartile Consulting), and closing remarks delivered by Allan Cowan.

This summary was written by Yulia Pak and Bianca Wylie, who provided independent facilitation services for the stakeholder session. It provides a high level summary of the main points shared by participants as captured in the "live" notes written during the meeting, and is not intended as a verbatim transcript of the meeting.

KEY MESSAGES AND OUTCOMES OF THE MEETING

While many thoughts were shared by participants at the meeting, the key messages and outcomes are captured in the points below. These points are intended to be read together with the more detailed feedback that follows in the remainder of this report.

1. **Identify and expand on how differences between Canadian and US systems will be addressed in the study**. In particular:
   - Identify and expand on how the differences between Canadian and US accounting methods will be addressed in the methodology (ie. IFRS vs. GAAP).
   - Identify and expand on how both traditional metrics, such as MAIFI, and major event metrics, such as IEEE, will be normalized in the model.

2. **The stakeholder group did not provide opinion on the high or low capital spending options for the first quartile presented by the consultant team for the report.** They stated that they needed more data and more information, including reliability linkage, in order to have an opinion on the matter.

3. **Provide details on the methodology used to divide and isolate the transmission and distribution assets within the list of the peer firms.**

DETAILED FEEDBACK

Ben Grunfeld from Navigant, and Ken Buckstaff from First Quartile Consulting delivered an overview presentation that described an overall work plan and proposed approach, peer group selection criteria, metric selection, and practice area investigation for the Transmission Benchmarking Study for Hydro One. The presentation was broken into 4 parts and each part was followed by a question of clarification period. These questions, followed by a summary of the discussion, are organized into the six categories below. Please note that the responses provided by consultants are in *italics.*

Overall Work Plan & Proposed Approach

- Can you give us some idea about timelines with major milestones? (Roger Higgin, Energy Probe)*The goal is to complete the work by the end of the year. We will come back to stakeholders in November and conclude everything in December of this year. In September and October, we will be collecting missing data and conducting qualitative and quantitative analyses.*

- What is the analytical framework and methodologies for the data? What major statistical analysis will you be performing on the dataset? (Roger Higgin, Energy Probe) *We will be performing a regression analysis. First we need to decide what we need to measure—what we are comparing and normalizing. Per kilometer and per asset basis is our end point metric. The things that affect these metrics are density (recognizing that there is a lesser impact on transmission than distribution) and demographic variables.*

- Are you planning on using any econometric models and look at factors such as total factor productivity? (Roger Higgin, Energy Probe) *We are not planning to do much on econometric models. The reason is because we do our work to improve our clients' models. From our past experience with econometric models, we find that they are not as useful for our clients. Econometric models are good to find the outcomes, but not the causes, so these models cannot really tell us what we can do. Same for the factor productivity.*

- Consider using the Total Productivity Study on Transmission in the US to inform the Transmission Benchmarking Study for Hydro One, as it won't require doing new work (Roger Higgin, Energy Probe).

Peer Group Selection Criteria

- Are the outliers removed from the peer group or do they stay in? How do you make that decision? (Shelley Grice, AMPCO) *We look at the reasons behind the differences in outliers. For example, O'Kane in New York City has completely different costs and reliability, so it is not really comparable. However, if we have a*

company, say, with the costs considerably higher or lower without an apparent reason, we would still keep it in.

- Are the outliers based on a single metric or is it an overall metric? (Alfredo Bertolotti, PWU) *It could be based on one metric or more. For example, let's take utility vs. OEM. A comparator could be an outlier in either or both of the metrics. However, we will not necessarily remove the company from the peer group just because it's an outlier in one metric.*

- Why the proposed group of peers is so different from the list of companies we were asked to provide in February? (Emma Blanchard, CME) *The starting point for us is data availability. Based on the scope of this project, we estimated that we could go after half a dozen companies. So, we looked your list, looked at the data we had, and decided that we should go after Canadian companies. We wanted to make sure we have a good representation of the industry as a whole -- with the companies similar to Hydro One and different utilities as well.*

- I'd like to confirm that the proposed peer group consists of the companies you work with and have data sets for, except for the Canadian ones. Are there American companies that are similar to Hydro One but are not included in the peer group primarily because they are not your clients and you do not have data sets for them? (Tom Brett, OPG*) Yes, that's correct. It's not the full list of companies we work with -- we took some companies off the list. We also took off the list the companies that do not want to work with us. For example, Northwestern Energy operating in South Dakota, Nebraska, and Montana would be a US-based company that is very similar to Hydro One, but that refuses to work participate in our studies.*

- I would call this approach to the peer group selection as the "soft" approach. It's not a hard numbers comparison; rather you are doing more of nuanced analysis to draw out practices (Tom Brett, OPG). *Hard numbers will come across all metrics, and the reason for drawing out practices is to get behind the numbers*.

- Are you going to do any touch base with the companies you already have data for? (Bohdan Dumka, Society) *We have the end of the year results presentation in couple of weeks for all the companies we work for. There will be an opportunity for us to ask any questions that we might need answered for this study. However, the plan is not to go back to them. Canadian companies are really where we have a data gap.*

- I understand that if you do not get data from the companies that you do not currently work with, these companies would be removed from the peer group. What are your expectations around the number of new companies to provide you with data? (Harold Thiessen, OEB) *About 50/50.*

- How do we as outsiders understand which comparators look like Hydro One and which do not? It would be helpful to see a visual representation of the companies that are in the "close", "middle", and "far" buckets in terms of similarities to Hydro One and explain methodology behind the buckets (Emma Blanchard, CME). *The columns on page 10 of the presentation deck are a good start. All companies have differences. Some utilities could be alike in terms of service territory and length of*

lines, but different in terms of storm susceptibility. We can definitely show where Hydro One sits on the presented range of peers.

- There are fundamental differences between the IFRS and the GAAP accounting systems. While GAAP is more popular in the US, big Canadian electricity companies mostly use IFRS. Was the accounting system a factor in selecting a peer group? If not, how do you reconcile the differences – for example, normalizing capitalization criteria? (Bohdan Dumka, Society). *The accounting system was not a factor in selecting the peer group. We provide a guideline and a survey in the beginning of the data collection process; and we are quite explicit about what to include and what not to include in terms of costs. In terms of the capitalization criteria, even companies that follow the same rules will have different results. When you roll everything up, allocation becomes less of a challenge; however, when we look at specific capital allocation, we ask questions about accounting system, etc. to better understand the results.*

- Consider Altalink and Emera based in Nova Scotia. Both have good similarities with Hydro One. For example, Emera experiences lots of outage due to hurricanes (Roger Higgin, Energy Probe).

- Consider going to the Regulator for permission to collect data on Canadian companies that participated in CEA surveys and studies (Roger Higgin, Energy Probe). *Going to the Regulator is a good place to start. Although there would be likely data gaps that we would need to fill in.*

- Consider looking into the Best Practices Working Group that has been doing specific studies around transmission over the past couple of years. They would have published data (Emma Blanchard, CME). *Yes, we happened to be the consultants that conducted that work for the Best Practices Working Group; and we are hoping to get their permission to use some of the data.*

Metric Selection Criteria

- What is the extent of distribution in the proposed peer companies? Are the indicators for the transmission lines only (Harold Thiessen, OEB)? *Many of these companies have distribution and transmission much like Hydro One (except for the Kentucky company on the list). All of the presented numbers are for the transmission lines only.*

- So this is separated transmission data, not generation and/or distribution. Where do you draw the line between transmission and distribution? (Tom Brett, OPG*) We give everybody we work with a voltage classification. Sometimes we get companies with odd voltage, but generally everyone is more or less consistent in their voltage-based definition of transmission and distribution.*

- Some workforces work harder than others; and some are better enabled with different systems. Is it possible to assess the efficiency of the workforce? (Tom Brett, OPG*) I think there are very few workers that come to work and say, "I will work harder today". So, the second point is more of a challenge because it's not just the*

systems that better enable the workforce, it's also supervisions, management structure, scheduling, assigning, the quality of equipment, etc. Our approach is to look at management systems. We know that generally speaking, there are three management systems that are really good and we ask companies if they use any of the three. You can make each system work, but some companies don't have any management systems in place and that's what we are after.

- Most Canadian providers use old style metric systems, such as SAIFI and MAIFI, which are not commonly used in the US. The Loss of Supply (LOS) is a critical parameter that needs to be thought of. How are you going to bridge that gap and put the data on some reliable familiarly regulated basis? (Roger Higgin, Energy Probe) *We use SAIFI and MAIFI metrics on distribution level, so we have them. In terms of LOS, we ask for LOS-related costs.*

- The treatment of major event day (MED) classification is treated differently in Canada and the US. How do you normalize MEDs? In Canada we are leaning towards using IEEE-P1366 (Roger Higgin, Energy Probe). *Yes, we are aware of that. We also know that Hydro One wrote several excellent critiques about the 1366 standard. There could be complications that would need to be addressed. We ask how many major event days one usually has and how the company defines it; then we ask to give us values based on the IEEE standards.*

- Is your work on the wage-rate analysis going to be similar to the recently published Mercer Report that looked at compensation? (Emma Blanchard, CME) *No, the Mercer Report is very detailed. We are only going to look at the core wage to see if there is a significant difference. In the North American market, there is a range of 30% from high to low; anything within that range would not be considered a significant difference.*

- Would a significant delta in cost comparison trigger a more detailed look? (Emma Blanchard, CME) *It won't trigger us to investigate further. It is nice to know, but we cannot do much about it.*

- Some companies use headcount and some use FTEs as a staffing metric, which could produce widely different numbers. What are you using as a metric for staffing? (Maia Chase, IESO) *We use FTEs. Staffing numbers could be useful but could also be misleading.*

- It is important to know what qualifies "Thunderstorms" and "Snow" and the frequency of such events. On slide 11, Thunderstorms should be included for Manitoba Hydro (Roger Higgin, Energy Probe).

- Do you take into consideration whether or not the labour force is unionized (Maia Chase, IESO)? *It's a question we ask. In the proposed peer group we only have 3 companies that do not have union for their whole labour force – San Antonio, CPS, and Baltimore.*

Practice Area Investigation

- Most transmission service providers are part of larger organizations. How does that play into asset management and regulatory regime (Roger Higgin, Energy Probe)? *Most of the companies have outside drivers – state and/or municipal, and federal, including NERC and FERC. Higher level NERC and FERC regulations are consistent; lower level state regulations are not. We tend to look at and understand each case individually*.

Capital Spending

Consultants asked meeting participants whether they had a preference of having high or low capital spending in the first and the last quartiles.

- There is an assumption that O&M spending should be in an inverse relationship with Capital spending in the first and the last quartile; and it is better to have low Capital spending in the first quartile. Do you support this assumption? (Lisa Lee, Hydro One) *Yes, sometimes O&M spending has an inverse relationship with Capital spending. We try to get a better sense of it by looking at O and M spending separately. When put everything together, we generally pick low capital spending for the firth quartile as a better option; but at this point we are not supporting anything. We would like to hear from stakeholders what would work better in their opinion.*

- What about an assumption that higher replacement capital lowers sustaining capital dramatically? (Tom Brett, OPG) *At this point, we cannot really affirm it – it's inconclusive.*

- Until I know whether reliability is good, bad, different for Hydro One, I don't want to answer the question whether high capital spending in the first and last quartiles is better or worse. The linkage to reliability is important because the economic impact of LOS on the province is really a big deal (Harold Higgin, Energy Probe).

- There are also regional planning and other initiatives that do not have links to reliability.

- We would also need to know growth vs. sustaining spending (Harold Thiessen, OEB).

- Currently, participants do not have a position on this matter and require more data, including reliability linkages, etc. (Tom Brett, OPG).

Process Advice

- Participants indicated that they liked the new meeting format facilitated by independent facilitators.

- Consider distributing meeting materials couple of days in advance of the meeting (Tom Brett, OPG). *Maxine Cooper from Hydro One added that the comment forms*

will be e-mailed to participants the following day to give everyone an opportunity to provide additional feedback. The deadline to submit additional feedback is a week from the day of the meeting – August 13, 2015.

- The scope of attendance is important. Usually everybody "come out of the woods" once the deliverable has already been produced. It's important to have as many interveners attending the meeting as possible (Roger Higgin, Energy Probe).

WRAP UP & NEXT STEPS

Allan Cowan wrapped up the meeting by thanking the facilitator, consultants, and participants for coming and for the quality feedback provided. He said that Hydro One was looking forward to receiving further stakeholder input in a week time and that submitted feedback will be attached to the meeting report. He reminded participants that the next session will be held in November to review the Transmission Benchmarking Study.

PARTICIPANT LIST

The following is a list of participants that attended the meeting and the organizations they represent.

Stakeholders

1. Alfredo Bertolotti, Power Workers' Union (PWU)
2. Emma Blanchard, Canadian Manufacturers & Exporters (CME)
3. Tom Brett, Ontario Power Generation (OPG)
4. David Butters, Association of Power Producers of Ontario (APPRO)
5. Maia Chase, Independent Electricity System Operator (IESO)
6. Bohdan Dumka, Society of Energy Professionals
7. Shelley Grice, Association of Major Power Consumers of Ontario (AMPCO)
8. Roger Higgin, Energy Probe
9. David MacIntosh, Energy Probe
10. Harold Thiessen, Ontario Energy Board (OEB)

Hydro One Networks Inc. & Consultant Team

1. Ken Buckstaff – First Quartile Consulting (Presenter)
2. Maxine Cooper – Senior Regulatory Advisor, HONI
3. Allan Cowan – Director, Major Applications, HONI
4. Benjamin Grunfeld – Navigant (Presenter)
5. Lisa Lee, HONI
6. Dwyane Stratford - Navigant
7. Dave Weiler – First Quartile Consulting

Swerhun Facilitation

1. Yulia Pak, Note taker
2. Bianca Wylie, Facilitator

MEETING AGENDA

1:00 pm	**Welcome** Allan Cowan, Director, Major Applications, Hydro One Networks
1:05	**Introductions and Agenda Review** Bianca Wylie, Swerhun Facilitation
1:10	**Section 1 – Overview** Benjamin Grunfeld, Navigant
1:15	**Section 2 – Approach** Benjamin Grunfeld, Navigant/ Ken Buckstaff, First Quartile Consulting
1:30	**Section 3 – Peer Group Selection** Ken Buckstaff, First Quartile Consulting
1:50	**Questions of Clarification** Bianca Wylie, Swerhun Facilitation
2:05	**Break**
2:20	**Section 4 – Metrics Selection** Ken Buckstaff, First Quartile Consulting
2:50	**Questions of Clarification** Bianca Wylie, Swerhun Facilitation
3:00	**Section 5 – Practice Area Investigation** Benjamin Grunfeld, Navigant
3:15	**Final Questions of Clarification & Feedback Discussion** Bianca Wylie, Swerhun Facilitation
3:55	**Next Steps and Session Wrap Up** Allan Cowan, Director, Major Applications, Hydro One Networks

NAVIGANT

ENERGY

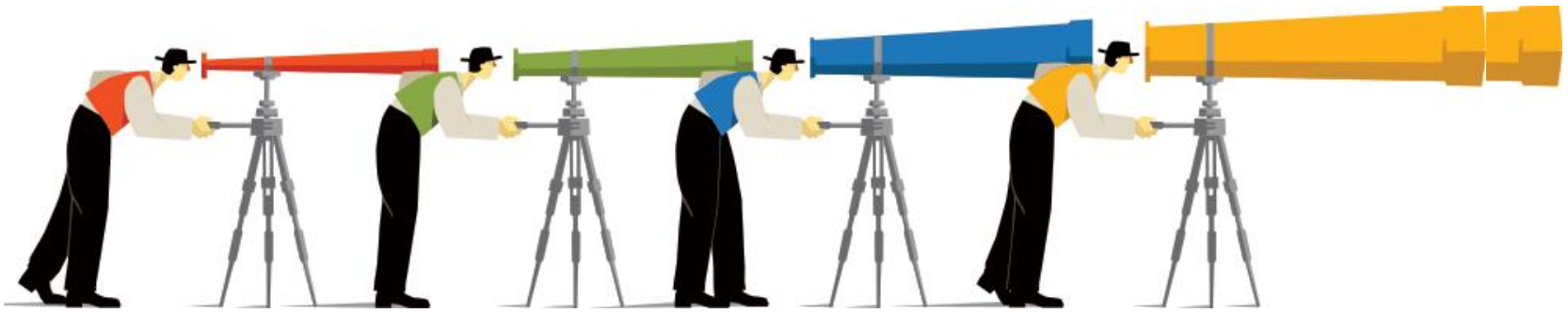
FIRST QUARTILE CONSULTING

Transmission Cost Benchmarking Study Work Plan and Peer Selection

hydro one

Stakeholder Engagement Meeting

August 6, 2015



Agenda

Section 1 » Overview

Section 2 » Approach

Section 3 » Peer Group Selection

Section 4 » Performance Metrics

Section 5 » Next Steps

NAVIGANT

- A ***global and independent*** consulting firm, Navigant's reputation is for assisting our clients across core industries to address the critical opportunities and challenges of new markets, evolving customer demands, regulation and business model changes, new technologies, risk, and disputes
- With more than 400 consultants, Navigant's **Global Energy Practice** is the largest energy management consulting team in the industry. Our team of ***experienced professionals*** serves leading energy companies to address their most complex business opportunities and challenges

	Client Profiles				
	Nearly 300 financial services companies including many of the largest banks in the U.S.	Over 80% of AMLAW 100 firms	50 of the largest electric and gas utilities 20 largest independent power generators	Over 300 hospitals, health systems and academic medical centers in 2014 including most of the top-ranked U.S. institutions. Also many of the top life sciences companies in the world.	Federal, state and local government departments and agencies
DI&E	✓	✓	✓	✓	✓
FR&C	✓	✓		✓	✓
HEALTHCARE		✓		✓	✓
ENERGY		✓	✓		✓

First Quartile Consulting

FIRST QUARTILE CONSULTING

» First Quartile Consulting is the leading provider of benchmarking services in the transmission and distribution and customer service areas for utilities

» Established in 2007, the leadership team has was together for 20 years prior to founding of 1QC
  › The 1QC team began conducting large-scale transmission and distribution benchmarking studies in 1989
  › Annual studies under the First Quartile Consulting name began in 2008

» Beyond the annual studies, the firm conducts many different tailored benchmarking studies each year for individual clients, designed to meet specific needs, be it deep concentration on a particular area (e.g. work management approaches, capital planning, field construction, etc.), or a broader view across geographies or outside the utility industry

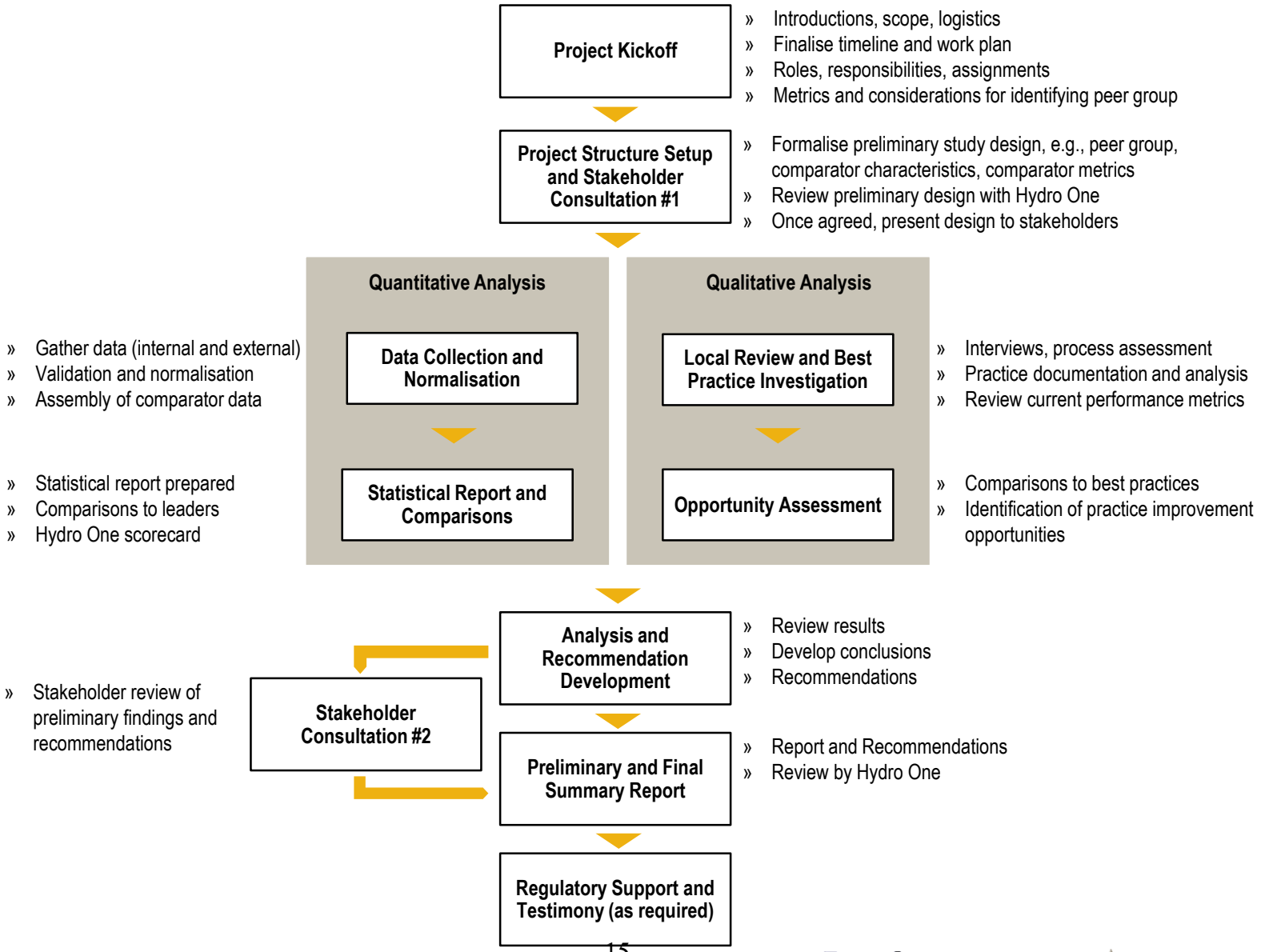
Study Objectives

Design and implement a robust and replicable benchmarking study of Hydro One's transmission costs

» The benchmarking study will:

- › Include an appropriate group of businesses to use as comparators/peers to Hydro One, taking into account a number of characteristics, including asset demographics, geography, customer characteristics, etc.;
- › Quantify and evaluate Hydro One's transmission costs relative to the peer group, taking into account cost drivers and differentiating characteristics;
- › Ensure a common understanding of the comparison criteria through the use of clear definitions;
- › Explore cost variations and associated practices and methods;
- › Make recommendations on practices that could be augmented or adopted to realise efficiency gains;
- › Engage stakeholders in regards to the peer group selection criteria, comparison metrics, and preliminary findings and recommendations.

Work Plan


Project Kickoff
» Introductions, scope, logistics
» Finalise timeline and work plan
» Roles, responsibilities, assignments
» Metrics and considerations for identifying peer group
Project Structure Setup and Stakeholder Consultation #1
» Formalise preliminary study design, e.g., peer group, comparator characteristics, comparator metrics
» Review preliminary design with Hydro One
» Once agreed, present design to stakeholders
Quantitative Analysis
Qualitative Analysis
» Gather data (internal and external)
» Validation and normalisation
» Assembly of comparator data
Data Collection and Normalisation
Local Review and Best Practice Investigation
» Interviews, process assessment
» Practice documentation and analysis
» Review current performance metrics
» Statistical report prepared
» Comparisons to leaders
» Hydro One scorecard
Statistical Report and Comparisons
Opportunity Assessment
» Comparisons to best practices
» Identification of practice improvement opportunities
Analysis and Recommendation Development
» Review results
» Develop conclusions
» Recommendations
» Stakeholder review of preliminary findings and recommendations
Stakeholder Consultation #2
Preliminary and Final Summary Report
» Report and Recommendations
» Review by Hydro One
Regulatory Support and Testimony (as required)

Significant experience conducting T&D benchmark studies

- Refined approaches over time to improve data accuracy and validity
  - Introduced data validation comparisons
  - Began comparing results of different questions to identify outliers
  - Introduced a “data steward” for each company
  - Introduced steps in the data collection process to validate data before it is submitted

- Mostly long-term participants in our benchmarking community
  - Helps with data stability
  - Companies have at least the bias that they are voluntarily participating, with a goal of trying to improve

- Data Sources
  - Primary focus is data directly from companies, rather than public sources
    - Allows better targeting of practices and more detailed cost data
    - “some” use of FERC data for validation, but not for primary analysis

Multiple activities ensure accurate data for comparisons

Questionnaire	» Detailed questionnaire asking for cost data in specific categories – FERC-based data and activity-based data
Glossary & Guidelines	» Instructions defining significant terms, and describing what to include in various cost categories (and what to exclude)
Data Steward	» Assigned a consultant to each company, to help with data collection, and to review their data for accuracy, identify anomalies, and correct errors.
Kick-off Meetings	» Meeting with each company at start of data collection period to review guidelines, help with interpretations and understanding of the questionnaire.
Data Collection Webinars	» Group discussions during data collection – to help with specific questions and interpretations, give guidance on what to include or exclude for specific circumstances.
Report Review Webinars	» Review of reports in group setting, identifying outliers, highlighting any data issues so they can be investigated before dataset is finalized.
Statistical Analysis	» Review and analysis of data by 1QC to identify any questions of data accuracy, or errors of inclusion or exclusion of important factors.

Approaches to creating a pool of companies for a benchmarking study

Approach 1: Concentrate only on comparing overall performance outcomes
Panel 1: Select a homogeneous panel

Approach 2: Investigate operating practices in order to find the best practices
Panel 2: Select a panel of different utilities

Approach recommended for Hydro One:

a. Study goal is to look at both performance and practices
b. Select a "balanced" panel to include like companies as well as different companies
c. Some factors to consider in selecting peers for Hydro One:
   - ✓ Size of company
   - ✓ Density of the territory
   - ✓ Regulatory regime
   - ✓ Ownership structure
   - ✓ Weather and storm patterns
   - ✓ Ability to collect financial, operating, and practice data

Companies Under Consideration

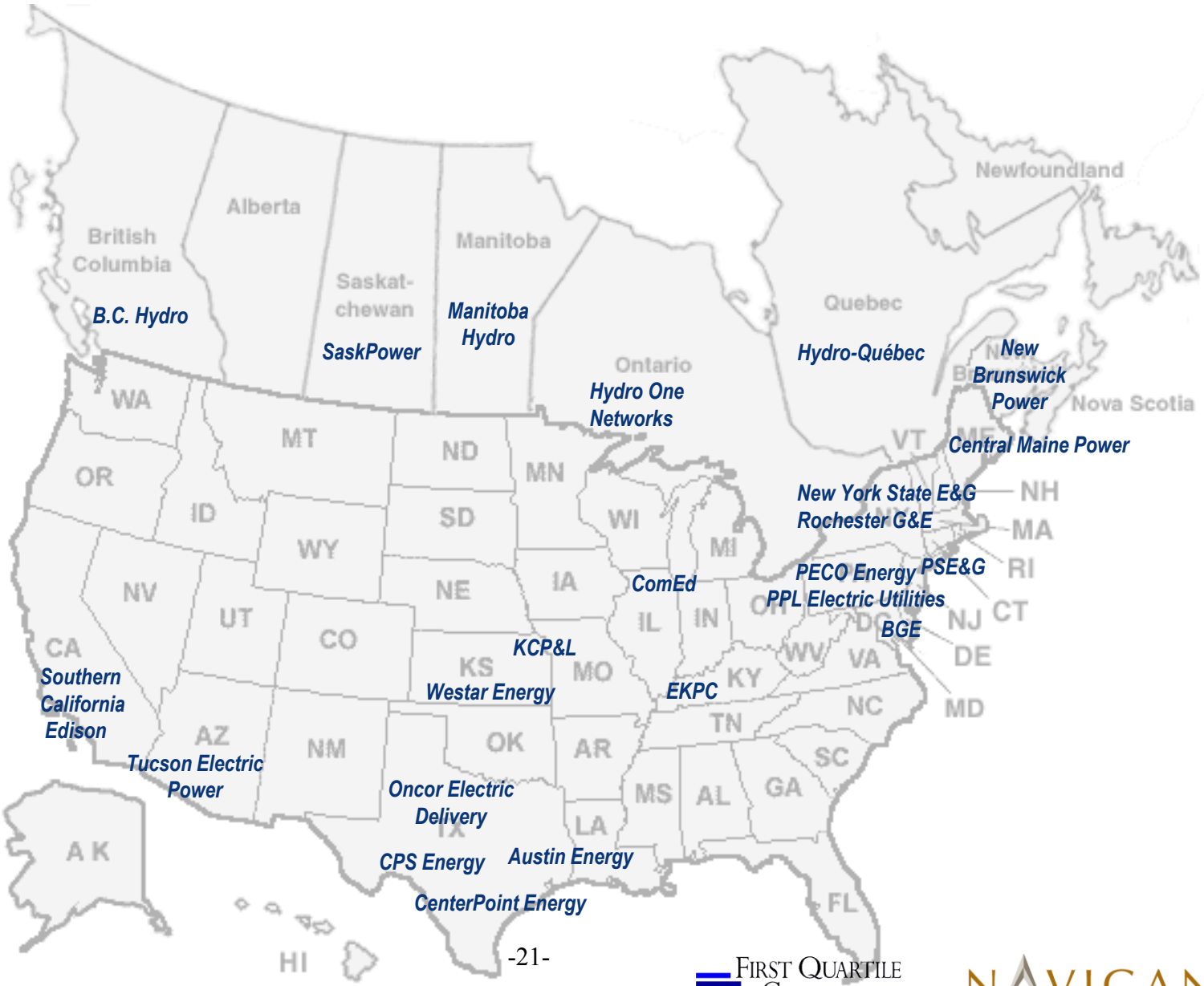
Company	Customers ('000)	Service Territory (sq. km)	Length of Lines (km)	Throughput (TWh)
Austin Energy	440	700	1,000	12.6
B.C. Hydro	1,950	42,370	18,500	54.6
CenterPoint Energy – Electric (Houston, TX)	2,300	8,050	6,000	101.7
CPS Energy (San Antonio, TX)	770	2,450	2,400	26.3
East Kentucky Power Coop.	530	N/A	4,700	22.8
Exelon – Baltimore Gas & Electric	1,350	3,700	2,100	30.6
Exelon – ComEd (Chicago)	3,840	18,400	8,650	90.0
Exelon – PECO Energy (Philadelphia)	1,235	3,400	1,750	37.5
Hydro-Quebec	4,200	527,079	33,600	175.0
Kansas City Power & Light	905	28,850	4,250	24.7
Manitoba Hydro*	555	N/A	12,800	30.0
New Brunswick Power*	395	73,450	6,850	18.3
Oncor Electric Delivery (Dallas, TX)	3,310	86,050	25,800	114.9
PPL Electric Utilities (Central Pennsylvania)	1,400	26,000	8,750	40.6
Public Service Electric and Gas (New Jersey)	2,260	2,000	2,300	40.7
SaskPower*	490	651,000	151,000	20.0
Southern California Edison	4,970	80,450	26,200	90.0
Tucson Electric Power	415	1,600	3,100	18.3
Westar Energy (Kansas)	695	16,250	9,950	30.4

Companies Under Consideration

Company	Ownership	Retail Open Access	Susceptible to Winter Storms	Susceptible to Summer Storms
Austin Energy	Municipal	Yes		T
B.C. Hydro	Provincial		S, I	
CenterPoint Energy – Electric (Houston, TX)	IOU	Yes		T, H
CPS Energy (San Antonio, TX)	Municipal	Yes		T
East Kentucky Power Coop.	Cooperative		I, S	T
Exelon – Baltimore Gas and Electric	IOU		S	T
Exelon – ComEd (Chicago)	IOU	Yes	I, S	T
Exelon – PECO Energy (Philadelphia)	IOU	Yes	S	
Hydro-Quebec	Provincial		I, S	T
Kansas City Power and Light	IOU		I, S	T, H
Manitoba Hydro*	Provincial		I, S	H
New Brunswick Power*	Provincial		I, S	
Oncor Electric Delivery (Dallas, TX)	IOU	Yes	I, S	T
PPL Electric Utilities (Central Pennsylvania)	IOU	Yes	S, I	
Public Service Electric and Gas (New Jersey)	IOU		I, S	T, H
SaskPower*	Provincial		S, I	T
Southern California Edison	IOU	Yes		
Tucson Electric Power	IOU			T
Westar Energy (Kansas)	IOU		I, S	T, H

I - Ice Storms S – Snowstorms H – Hurricanes, Tornados T – Thunderstorms, Wind

Companies Under Consideration



Approach to Metric Selection

Navigant and First Quartile recommend a balanced approach to metric selection

- Selection Criteria
  - Balanced metrics (i.e. multi-dimensional)
  - Few enough to be manageable
  - Comparable across utilities

- Level at which to track
  - Total transmission organization
  - Transmission lines versus substations
  - Hybrid combination

- Topic areas to consider
  - Cost / investment
  - Reliability
  - Safety
  - Staffing

Metrics to Consider

Four categories of performance to investigate

- Costs
  - Capital
  - Operating, Maintenance, and Administrative (OM&A)
- Reliability
  - Transmission lines
  - Substations
- Safety
- Staffing

Navigant and First Quartile recommend analysing the following cost metrics

Cost Category	Per Asset	Per Kilometre	Per MVA	Per Substation
Total Capital	X			
Lines Total Capital	X	X		
Substation Total Capital	X		X	
Total Sustaining Capital	X			
Lines Sustaining Capital	X	X		
Substation Sustaining Capital	X		X	
Total Growth Capital	X			
Lines Growth Capital	X	X		
Substation Growth Capital	X		X	
Total OM&A	X			
Lines Total OM&A	X	X		
Substations Total OM&A	X		X	X

Reliability metrics

Transmission Lines

- Element total outage frequency (TOF)
- Element sustained outage frequency (SOF)
- Element Momentary outage frequency (MOF)
- Element Sustained Outage Duration Time (SODT)
- Circuit Total Outage Frequency, Circuit-length Adjusted (TCOF100CTmi)
- Circuit Sustained Outage Frequency, Circuit-length Adjusted (SCOF100CTmi)
- Circuit Momentary Outage Frequency, Circuit-length Adjusted (MCOF100CTmi)
- Percentage of Elements with Zero Automatic Outages (PCZO)
- Sustained automatic outages by cause code

Substations

- Contribution To SAIFI
- Contribution to SAIDI
- Transformer Failures per 1000 Transformers
- % Mis-Operation Rate for Relays
- MOF from failed AC substation equipment, plus failed protection system equipment
- SOF from failed AC substation equipment, plus failed protection system equipment
- TOF from failed AC substation equipment, plus failed protection system equipment

Safety and staffing metrics

Safety

- Recordable injury rate - combined for Substations and Transmission lines
- Recordable injury rate - for Substations
- Recordable injury rate - for Transmission lines
- Days Away, Restricted, and Transfer (DART) incidence rates
- Lost workday case rates
- Lost time severity rate
- Total frequency of vehicle accidents
- High risk vehicle accident frequency rate
- Days worked since the last employee fatality
- Preventable frequency rate

Staffing

- Wage rates for key jobs -- Journey-level line-worker, substation electrician
- Span of control - Substations and Transmission lines
- Outsourcing % - Substations (Design, Construction, Maintenance)
- Outsourcing % - Transmission lines (Design, Construction, Maintenance)

The study objectives include identification of best practices for analysis

- Decisions to be made
  - Level of depth to investigate
    - Broad topics/processes at corporate level (e.g. Strategic Planning, Asset Management)
    - Very localized practices (e.g. crew sizes for specific job types)
  - Volume of areas to address
    - Comprehensive across planning, design, construction, operations, and maintenance
    - More limited scope to cover a few key areas (e.g. system expansion, system sustainment)

- Some selection criteria
  - Ability to gather comparative practice information
  - Ability to take action in reasonable time-frame (i.e. not core system design/configuration changes)
  - Practices that can be analyzed year on year with a peer group
  - Areas of particular interest to Hydro One for investigation currently

Practice Areas to Consider

Seven categories to consider

- Asset management
- Capital project and portfolio management
- System maintenance
- Emergency response
- Safety
- Staffing
- Support

Asset management and capital project portfolio management

Asset Management

- Roles and responsibilities
- Analytic approaches
- Replacement programs

Capital Project and Portfolio Management

- Work plan development
  - Project identification
  - Project evaluation and ranking
  - Project selection
- Work plan execution – portfolio management
  - Portfolio re-evaluation
  - Execution stages
- Work plan execution – project / program management
  - Staffing - project managers, program managers, etc.
  - Project planning
  - Project management approaches - managing projects
  - Project control and monitoring
  - Project close-out process

Operating practices

Maintenance

- Planning
- Work management
- Inspections
- ROW management
- Outage planning

Emergency response

- Plans and preparations
- Organization structure
- Customer communications

Staffing approaches

- Outsourcing
- Crew size / structure

Safety programs

Support functions

- Fleet management
- Materials management

Next Steps

Several short-term and some long-term activities to prepare the comparisons

- Follow-up from the stakeholder session
  - Respond to inputs
  - Modify the metrics and practice areas as necessary

- Data gathering
  - Hydro One internal data gathering
    - Interviews
    - Complete a questionnaire
  - Supplement the existing dataset with data from a few additional Canadian utilities
    - Work with other utilities to validate their data for accuracy and comparability

- Summary and reporting
  - Initial draft of data comparisons for data validation and analysis
  - Analysis and normalization
  - Draft report

- Analysis expected to be complete in late-October, next stakeholder session planned for mid-November

Presentation: HONI Tx Cost Benchmarking Study Work Plan and Peer Selection

Feedback and Discussion

Do you have any questions of clarification on the presentation?
Other than those noted at the Meeting
How to normalize data for weather-related costs
How to normalize for US GAAP vs IFRS

1. *Consider the Approach presented.* **Are there other options you would like to see Navigant consider? If so, what are they?**

   Need to provide profiles for peer groups.
   Organizational Structures are they independent or is the Asset management Strategy/Plan driven by the System Operator e.g. MISO etc.
   Is Transmitter Investor 0wned/Public/Other
   Regulatory Regime State FERC etc
   How do these factors play into the Analyses

2. *Consider the Peer Group Selection.* **Do you have any additions and/or suggested edits to the list or areas identified?**

As per the Comment at the Meeting Omission of Altalink and Emera/Nova Scotia Power need to be reconsidered or explained

3. *Consider the Performance Metrics: Costs, Reliability, Safety, and Staffing.* **Do you have any additions and/or suggested edits to the list identified?**

   Reliability Benchmarking is an Important new area for Ontario. Need to clearly identify Measures and relationship to historic traditional SAIDI SAIFI etc

4. *Consider the seven Practice Area Investigation Categories.* **Do you have any additions and/or suggested edits to the list identified or other options you would like considered?**

   Need to identify/delineate Costs Based on Ontario Pool Characteristics:
   Network, Line, and Transformation

5. **Do you have any other advice for the Hydro One or Navigant team as they develop the Approach and Analytics that will be used in the Cost Benchmarking Study?**

   Research if other Benchmarking Studies for Canada have been done either by CEA or individual Transmitters/IESOs. Examine results and data problems and take into account in the design of database and Analyses.

   Should consideration be given to include data on/for the <u>Ontario</u> UTR Pool members Great Lakes etc?

   Roger Higgin SPA INC. Consultant to Energy Probe

Further Questions/Comments on the companies chosen

1. In the Summary Report Input Survey published in February 2015, you listed a number of transmission companies that you asked whether they were similar to HONI TX. Of the fourteen companies listed, only seven remain in your current Peer Group Selection (companies under consideration). The seven ("List A") are:

   (a) BC Hydro.

   (b) Quebec Hydro.

   (c) Exelon (Com. Ed).

   (d) SaskPower.

   (e) Emerge Power.

   (f) Manitoba Hydro.

   (g) Southern California Edison.

   You left off the following seven companies ("List B")

   (a) Pacific Gas and Electric.

   (b) Altalink (principal Alberta Transmission Company).

   (c) Florida Power and Light.

(e) Epcor Utilities.

(f) Canadian Utilities Ltd.

(g) NorthEast Utilities.

On the other hand, you added ten new companies to the list, bringing the total list to seventeen.

The companies added were, as I understood your comments last Thursday, were all companies with whom you already work, and for whom you are engaged to perform an annual multi-client study. Those are ("List C").

(a) Austin Energy (is this not primarily a distribution company, like Epcor)?

(b) CentrePoint Energy.

(c) East Kentucky Power Corporation.

(d) Exelon (Baltimore Gas and Electric).

(e) Exelon PECO Energy (Philadelphia).

(f) Kansas City Power and Light.

(g) Oncor Electric Delivery (Dallas).

(h) PPL Electric Utilities (Central Pennsylvania).

(j) Tucson Electric Power.

My understanding is that you added the companies because you were intimately familiar with their operations, having studied them closely for several years.

The companies you eliminated from the first list include some of the larger US and Canadian transmission companies, which, with the possible exception of Epcor, have large, diverse, service territories.

Would you explain, for each company that you removed, why you did so (other than for the fact they were not on your existing client list for your annual multi utility study).

2. You have stated that your "peer group" can (and does) consist of some companies that are similar to HONI TX and companies that are not, because sometimes good ideas and best practices can be gleaned from smaller or very different companies, and you have expressed two different purposes for having the peer group.

The first is to have a reliable cost benchmark against which to measure HONI TX various costs categories and total costs per various metrics as per the Settlement Agreement provision.

The second purpose was to have a heterogeneous group of companies, in terms of size, urban/rural split. line assets vs. station assets, etc. as a source of "good ideas and best practices".

You have also stated that the list chosen to compare against HONI TX is effectively the participant list for your annual multi-client studies plus most (but not all) of the major Canadian transmission companies.

In the result, while you may have a suitable cross section of utilities from which to draw for best practices, I question whether you have a suitable group of comparators for a cost benchmarking study of HONI TX which HONI TX agreed to do. For this purpose, whether you may have studied these companies is pretty much irrelevant, is it not?

I would like to see substantial further justification from you for why you have removed/added the companies you have.

An analysis of what you consider the key characteristics, eg. size, terrain, density, urban/rural which make one transmission company similar to another to the point when it can be included in a sensible peer group for the purpose of a cost/reliability benchmarking study would be helpful.

Please justify your selection of criteria and then discuss how each of the proposed companies meet that criteria.

As for the second part of the task, identifying best practices, presumably many of them would be drawn from those transmission companies with the best cost/reliability performance, although you would be free to recommend some from companies you have studied.

3. You have stated that FERC data on transmission companies is not as useful to you as your own data you have obtained from many years of annual studies of the same group of

companies. While the view is understandable, please explain what relevant data FERC has on these companies, and what are its shortcomings. In other words, if one wanted to introduce, say, Pacific Gas and Electric transmission into the list, what required information would not be available?

4. Please differentiate the criteria you would use to assess the cost/reliability performance of transmission companies from those that you would use to do the same analysis for distribution companies.

Transmission Total Cost Benchmarking Study

Summary Report for Participant Review
Stakeholder Session #3
Monday, January 11, 2016
DoubleTree Hotel by Hilton – The Victoria Room
108 Chestnut Street
1:00 – 4:00pm

SESSION OVERVIEW

On January 11, 2016 Hydro One Networks Inc. hosted a second stakeholder session with interveners, as part of Hydro One's transmission application. The purpose of this second meeting was to present and seek feedback on the preliminary findings and recommendations resulting from the Transmission Total Cost Benchmarking Study.

The stakeholder session included welcoming remarks from Maxine Cooper (Senior Regulatory Advisor, Regulatory Affairs, Hydro One Networks), a series of presentations, which described preliminary findings and recommendations resulting from the Transmission Total Cost Benchmarking Study delivered by Benjamin Grunfeld (Director Energy Practice, Navigant) and Ken Buckstaff (Managing Director, First Quartile Consulting), and closing remarks delivered by Maxine Cooper.

This summary was written by Matthew Wheatley and Bianca Wylie, who provided independent facilitation services for the stakeholder session. It provides a high level summary of the main points shared by participants as captured in the "live" notes written during the meeting, and is not intended as a verbatim transcript of the meeting.

Note that there are two appendices to this summary (attached separately), including:

Appendix 1. Individual Submissions Received After the Meeting
Appendix 2. Presentation Slides

NOTE:	This summary reflects what happened during the meeting and does not include the written feedback received after the meeting. Please see Appendix 1 for the additional feedback received.

FEEDBACK SUMMARY

The presentations from Ben Grunfeld and Ken Buckstaff, described preliminary findings and recommendations resulting from the Transmission Total Cost Benchmarking Study and were delivered in four parts: (1) Introduction and Panel Overview; (2) Cost Analysis; (3) Reliability, Capital Project and Program Management, and Safety; and (4) Recommendations.

Following each presentation, stakeholders asked questions of clarification and provided feedback. The questions asked and feedback shared during the session is organized by the 4 parts of the presentation. Each of the following sections begins with key messages, which are intended to be read together with the more detailed feedback that follows. Please note that in the detailed feedback and advice sections, as well as in the questions of clarification, feedback from participants is in **bold** and the responses provided by consultants are in *italics.*

Part 1 – Introduction and Panel Overview

KEY MESSAGES

1. Improve the labeling and format of the graphs. Specific suggestions include: clearly label what's being measured, how companies are labeled, use a consistent colour for Hydro One data and a consistent colour for trend data.
2. Include a note on exchange rate impacts and how the issue of exchange rates is managed.
3. Include a note on the process used to get from the long-list of potential companies to the final panel.
4. Include a note on why companies decline involvement in the panel and any opportunities and challenges in addressing these issues.

DETAILED FEEDBACK & ADVICE

- Add legends to the charts to provide a consistent interpretation of what the numbers are and what they represent.

QUESTIONS OF CLARIFICATION

Panel Participants

- **Hydro Quebec is not in your panel even though they import power from Hydro One and they are under a benchmarking requirement by the regime. Why are they not in your panel?** *Your argument here was my argument when we were talking to them. Their short answer was not now. They will be participating in our studies for the next 5 years to meet that requirement with the regulator but we don't have their current data and they didn't want to do it for this particular study.*
- **Can you get Hydro Quebec's data from FERC?** *No, they don't report to FERC. We have a small amount of data for Hydro Quebec from an annual report we do with them, but we do not have a complete data set.*
- **In your data you identified peer groups that are similar to Hydro One and other peer groups that are more reflective of the broader industry. How did you pick from these groups**? *One of the principal drivers is whether or not we could get data. We also did after the fact analysis to understand how the costs for this data set that we collected reflect the broader industry costs defined by the FERC population. There are a number of variables that we look to in order to determine if our panel is balanced from an industry standpoint, e.g. storm susceptibility, geography, size, throughput. We have*

not gone back and checked every single one of those variables to determine if the average of the peer group is statistically consistent with the average of the industry, but we do take all of these factors into account. We do this on total cost, which is our primary output and we have presented some of that in the appendix to this presentation. We look at all of those factors and take them into account when we are evaluating the final peer group.

- **TVA and Bonneville Power are similar to Hydro One in that they serve a large area, why are they not included in your panel?** *Bonneville Power won't give us the data for these kinds of studies. With TVA we have some data for them from another study we've done but they would not give us the rest of the data we needed for this study.*
- **Can you tell us why some companies chose not to participate?** *A lot of it has to do with internal resources. Companies first decide if they are interested in benchmarking then determine if they have the resources. Some companies just don't look outside themselves. Others look outside and say they don't have the people to help support participating. It is a combination of these factors. A couple of clients say that they are spread over several states and they always have a rates proceeding going on in at least one of them and don't want this information showing up in those kinds of proceedings.*
- **Do you have any strategies for overcoming barriers to participation?** *For the companies that don't have enough resources we have to make the questionnaire smaller and more reasonable for them. There isn't much we can do with the companies that choose not to participate because of their rates proceedings.*

Panel Data

- **There seems to be a problem with the data for Manitoba Hydro, I believe they are larger than what the data indicates.** *The slide for Manitoba Hydro has a typographical error in the chart. We have correct numbers and used these in our analysis. We will update this for the Final Report with the corrected data.*
- **On the age profile charts what is the information down the left hand side?** *These are identifiers for the different companies in the study. We hide the company names to protect the other companies. We have flagged Hydro One in each chart so you can see where they sit.*
- **Do the numbers in the charts represent cumulative assets or the net book value of assets?** *It is the gross book value of assets that are still in service or the original cost of the assets currently in service.*
- **If you are using gross assets and a system is traditionally overbuilt wouldn't the costs of operating, maintaining and repairing also be higher?** *It is not obvious that is the case, it is a theory we have tested this theory a few times, but we have not developed a firm conclusion on it.*
- **In terms of gross assets, it sounds like you are using an output as an input, is this correct?** *That is a fair observation. The question comes back to whether to pick gross book value as the normalising factor? We pick a measure that is the best predictor of total cost; gross book value. There are many different factors that go into the gross asset number, e.g. the age of the system impacts it because we are not adjusting for inflation so the older the system the small that number. None of the normalizers are perfect, we have the test results against a number of different normalising factors to see if the gross asset number and the overall assessment swing dramatically if we change the normalizing factors.*

Exchange Rate

- **What exchange rate do you use for the US companies? I'm thinking about the 30 – 40% swing we've experienced.** *We have the fortunate circumstance that the 40% swing happened after the end of our time period in the study. We'll have a problem with that in future years but at the end of 2014 it*

was about 1.07 or 1.08. The benefit of using gross book value as your common denominator for normalizing is you take the currency out. For example, when looking at US utilities we are comparing the current year US dollar costs against US gross book value denominator, so the ratio removes the currency unit. This is similar for the Canadian companies.

Part 2 – Cost Analysis

KEY MESSAGES

1. Separate sustaining and development capital expenditures.
2. Be explicit about what is included and not included in the Hydro One costs (pension costs and benefits, for example).
3. Provide any additional information possible on depreciation and how it's managed in the study.
4. Provide information on how the quartiles are calculated and where Hydro One is included or not included in the mean measurements.

DETAILED FEEDBACK & ADVICE

- **It would be helpful to have the analysis show both the developing utility and the sustaining utility as well as the totals so that one can differentiate the differences over time, and understand whether a utility is going through an expansion phase**. *We have these details and we can include* them in the final report. I think one of the goals here is to ask the question, how well is Hydro One sustaining its assets and growing its assets.
- **On depreciation versus expenditure** - *I understand that you are benchmarking on total value, which means you are looking at a 4 or 5-year trend. On the spending side this does not necessarily reflect a utilities historical capital expenditures. Therefore, by using depreciation you get a purer reflection of the utilities total historical investment as a percentage. If you are saying that using either total capital or depreciation gives you the same conclusion I think it should be shown in the data.*
- **The report should be very clear about what is included, where it is included and what is not included in the data.**
- **It would be helpful to Hydro One represented by the same colour on all of the slides**. *We will make the colour used for Hydro One consistent in the final report.*
- **When doing trend analysis for reliability the correlation between expenditure and reliability should be reflected over a longer period of time***, particularly because this is a lagging indicator.*
- **Be clear on how the quartiles are calculated in the final report**, *i.e. is Hydro One included in the median calculation and whether it is a weighted average or a simple average.*

QUESTIONS OF CLARIFICATION

Comparative Analysis

- **In terms of OM&A what I'm reading from what you said is that Hydro One under invests in its capital and overinvests in its bureaucracy. How do you gage this in a benchmark against other utilities, i.e. how they invest in their bureaucracy or administration and how much they invest in their actual maintenance of their assets? Is there a way to somehow benchmark these things so that we can understand this better?** *I think getting at units of work is outside of what we can do with this study. However, one of the things we can do is start to look at some of the different outputs, i.e. what do you get for the level of spending that has been taking space in terms of reliability and use that as a gage to determine if the investment profile is consistent with the outputs that you want and*

how does that help to inform the efficacy. We have this data already showing sustaining versus total growth and we'll make sure that it shows up in the final report. We also looked at O&M plus the sustaining capital and we determined it did not shift our conclusions. This data will also be available in the final report.

- **You mention a couple of times the economy of scale versus size. You show that Hydro One is the biggest utility and is one of the most efficient. Are you saying that the economy of scale is not a factor here because they are all big enough?** *The short answer is that the economy of scale is set so that all the utilities are big enough. Economies of scale do exist, but there are a number of factors that impact overall performance. In the work we have done around this over the years we have not found that the bigger utilities are more efficient than smaller ones.*
- **How consistent are amortization rates across utilities, generally?** *We have not looked at this in great detail.*
- **Is there evidence of significant differences in the accounting practices around depreciation rates?** *This is not something that we studied in detail, for the few we have looked at they are within a reasonable range.*

System Age

- **How did you determine age of the system?** *We looked at the big buckets of assets, poles, cables, transformers, towers, etc. and we looked at when they were installed.*
- **Do you have age data for the individual utilities?** *Yes, for all the companies that provided age data. The ones that did not provide this data are not included in the chart.*
- **If you have two utilities with similar, but not the same depreciation rates, would the book value versus the total value of assets ratio provide you with an age of the system?** *Possibly. It could be meaningful if the deprecation rates were the same, if not then it would not.*
- **Would there be any value in showing age based on book value versus gross value?** *We have used this in other studies and it gives you a proxy for the age of the assets. We can look to see if we have this data and present it in the final report.*

Total Cost Approach

- **For your total cost you have done CAPEX plus OM&A, of the benchmarking studies that I have seen on the distribution side it is usually OM&A plus depreciation, why have you done CAPEX plus OM&A?** *Historically, we've looked at a straight CAPEX and OPEX, this is the way that our participants in our benchmark studies have asked us to do it. To your point, a look at a depreciation rate would be tighter with how rates are set, we're trying to look at costs of operations not how they are translated to rates. If you are looking at numbers of multiple jurisdictions, then the depreciation plus cost of capital method you can run into some challenges. You are either using individual values for each jurisdiction in which case you are now taking into account not just the cost structure of the utilities but also the regulatory regime and the cost recovery mechanisms within each jurisdiction, which could vary. If you use the same depreciation schedule and the same, cost structure then you get to the same answer and you just get a smaller CAPEX number.*
- **I'm not sure your conclusion is right because depreciation can start taking account of historical spending and CAPEX is the current. As you indicated, CAPEX is going down but you get a bigger number and you compare the magnitude of CAPEX versus the operating expenses yearly. CAPEX is a bigger number, therefore if you define your CAPEX as growth or non-growth related you would say the utility is very efficient because it didn't spend money over the last few years. If you use the historical depreciation that includes all the years you have data for.**

- **Do you collect depreciation for the utilities in your panel?** *This something that we do not generally collect. We have total depreciation, the net book value but we do not track annual depreciation.*

Measuring Efficiencies

- **When you are looking at total dollars spent, unless you know units of work, it conceals as much as it reveals. For example, if a utility is spending half as much as another utility but only doing 10% of the work they are not more efficient. Is there a measurable way you can get at this in a meaningful way?** *At the highest level we looked at this through the replacement rates of poles and transformers.*
- **Have you integrated replacement rates with total dollars spent to determine overall efficiency of spend?** *Not for this study but we have started gathering data to be able to do this.*

Data Inclusion and Exclusion

- **What is not included in the data you are using?** *When you look at the total OM&A and the CAPEX the only thing that is not included is the line item customer care. This is not included because US utilities measure customer care separately. Customer care only represents 5 to 10 million Hydro One's transmission business, which is a relatively small line item. When we start to break down into direct O&M and direct transmission we are removing the corporate and common costs as well as some of the costs that are allocated to CAPEX.*
- **Are pension and other benefits included?** *When we are looking at OM&A pension is included, when we are looking at O&M it is not included because it is part of administration costs.*
- **Are you able to show the ratio for CAPEX over depreciation?** *We were not able to do this for this study because of a lack of data. We do not have the annual appreciation data. We will go back and look at the data we have to see if there is anything we can add regarding this.*
- **When calculating the median is Hydro One excluded?** *Yes, Hydro One is excluded.*
- **Is the median weighted by the size of the utility or is it a simple average**? *For this study it is a simple average. Based on work we have done in previous studies we have found that there isn't a significant difference in the aggregate. We also account for this by normalizing for gross assets.*

End-customer Cost

- **One of the outputs with respect to costs is how they translate to the actual costs customers pay; have you ever done benchmarking in terms of whether it is a percentage of the total transmission amounts?** *For this study we did not look at this metric specifically.*

Peer Group Selection & Comparisons

- **When picking peer groups for your sample, how did you test to ensure your sample did include a bias, e.g. every company is either low cost or high cost?** *We did a comparison against the entire FERC population to see if our group, on aggregate, is higher or lower on average costs against the whole panel. We also did statistical testing around the means between the two panels and our subset is slightly higher cost than the average of the FERC population. We also found that where Hydro One sits next to the FERC panel does not materially change the outcome. This will be explained in the final report.*
- **Are you comparing the US peer group versus the FERC or all the utilities you have in your panel**? *We are comparing our entire panel against the FERC panel. We haven't looked to see if you drop the*

Canadian utilities out of the peer group and then compare the residual panel against the FERC group does it change the outcome, that is something we could look at.

Part 3 – Reliability, Capital Project and Program Management, and Safety

KEY MESSAGES

1. Acknowledge that some companies will spend all of their money, always, as policy, whereas some will underspend when it is an option. Consider grouping them as such and then making comparisons to Hydro One.
2. Acknowledge that levels of approvals required for sign-off on a project is a major factor for Hydro One, as are regulatory requirement to fully spend money allocated to particular budget items.
3. Share any additional information about Hydro One's outsourcing/contracting levels.

DETAILED FEEDBACK

- In the final report, distinguish between utilities that have a dollar philosophy and utilities that establish a budget and decide they are going to spend that budget.
- Show the median values, for example the CAPEX as a percentage of the budget. *We can state this.*
- Provide any additional information about the impacts of a utility doing work in house versus contracting out; in terms of the number of project managers required. *This depends on where the utility draws the line. For example, is the third party doing the entire construction management piece, or is the utility maintaining a portion of it. We have some data on the percentage of work outsourced; we can provide this in the final report.*
- It would be useful to see the degree to which Hydro One is outsourcing work. *I would think that the reason Hydro One would be outsourcing would be in the interest of cost efficiency.*
- I would recommend comparing the subgroup of utilities that always spends 100% of their capital budget to the subgroup of utilities that doesn't spend 100% of their capital budget and look at the differences between those two groups. *We will look at how much data we have on this to see if we can provide this comparison.*

QUESTIONS OF CLARIFICATION

Outages

- **Do the TADS metrics measure forced versus unforced, planned and unscheduled outages?** *The TADS metrics measure automatic versus non-automatic. Automatic is what you might think of as forced, something causes a trip and the line goes out. The delivery point metrics, T-SAIDI and T-SAIFI, measure how many minutes a given delivery point was unable to deliver power through that point.*
- **If Hydro One has a failure that does not affect any customers, will this be shown through TSAIFI or TSAIDI?** *No, because it won't be an outage at the delivery point for the transmission customer.*
- Is there general/raw FERC data on TSAIFI and TSAIDI? *No, FERC doesn't track reliability but NERC does and what NERC has gone through is the TADS metric.*
- **Are there metrics in reliability with utilities that measure outages by cause?** *The TADS metrics have 18 cause codes. You can break down those measures for each company by the 18 cause codes and you can go back to see what the dominant ones were. For an individual company there might be a particularly bad year and you can go back and look at and see it was, e.g. storms.*
- **Can you include these in the study?** *These are included in supporting slides.*

Data Clarification

- **What do the coloured lines on the charts represent?** *These are the break points between the first, second and third quartile. They all seem to follow the same pattern, is there a reason for that? These don't have any exclusions for storms. For a year where there are a lot of storms all of these go up a little bit.*
- **On slide 23 (T-SAIFI and T-SAIDI) what is the difference between the upper right and lower left on these charts?** *The chart in the upper right shows sustained outage frequency. The chart in the lower left shows sustained and momentary outage frequency.* The word total would be helpful here.
  Can you clarify the TADS calculation? *It is a measure of the availability, meaning the number of times a line segment is out of service by automatic means. It is not a question of failing to deliver service because there is an ability to route around the line segment or station that is out of service. For example, if you lose a station you can still route around it and get power, however, this will be considered a TADS outage.*
- **Which data excludes storms?** *The T-SAIFI and T-SAIDI do have exclusions, the TADS does not have exclusions.*
- **For the data presented on slide 22 do you have data for Hydro One prior to 2012.** No, *before 2012 there was no requirement to track data under 200 KV.*

Capital Budget Expenditures

- **How did you determine what each utility spent and how much of their budget they spent?** *We determined this by obtaining their total investment numbers and their capital budget numbers for each year.*
- **The timing of projects can affect budgets tremendously, how did you deal with this?** *That is not explicitly adjusted for in the study.*

Peer Group Comparison

- **How are you comparing the two different peer groups (TADs vs. T-SAIDI/SAIFI) in a meaningful way?** *The first step for us was to look at consistency, if it was deteriorating then we looked at how it compared to the rest of the group.*

Staffing Levels

- **Is the level of project management support staff spending unique to Hydro One?** *No*, i*t's not unique to Hydro One*
- **Can you explain what you mean by project management support staff?** *This includes two classifications, schedulers and cost analysis staff. Schedulers organize resources while costs analysts are tracking costs to ensure things remain on budget.*
- **Are you making the assumption that Hydro One does not meet their budgets because they have less people than other utilities overseeing their budgets**? *No, internal to Hydro One they have the bias, that you see in some other companies as well, that they do not want to go over their budget.*
- **What is the number of support staff supposed to be demonstrating?** *When we took a detailed look at project management within Hydro One, i.e. how Hydro One staffs and manages individual projects and we observed that the project manager span, the dollars they are overseeing, is reasonable but it is slightly above the median. The ratio between project managers who should be focused on overarching people/project management versus dedicated schedulers and costs analysts is slightly out of line. This*

does mean that costs will be lower based on this; we simply observed that this is something Hydro One should look at over the long term.

Accidents

- **Did you look at other things causing accidents besides vehicles?** *We have a whole range of metrics around employee injuries. This data is in the supporting slides, however, there is nothing outstanding that we observed in this data.*

Hydro One Approvals Process

- **At our last meeting there were descriptions around the levels of approvals required for the implementer (transmission company) to actually put shovels in the ground and spend money. Did you investigate this, for example regional planning?** *The data that we have showed here relates to work after budgets were approved.*

Part 4 – Recommendations

KEY MESSAGES

1. Consider any opportunities to frame the data, analysis or recommendations in the regional perspective, as the topic has been raised in this and other studies.

DETAILED FEEDBACK

- To improve clarity can the focused areas no longer be gold in the presentation. *Yes, we can make this change.*
- Make the recommendations more specific in the final report because specific recommendations are easier to understand and implement.

QUESTIONS OF CLARIFICATION

Capital Budget and Capital Program Process

- **How does Hydro One currently conduct capital budgeting?** *It is primarily tied to fiscal calendar years and the regulatory window. There is visibility out 5 years, Hydro One does have a longer term capital budget but in terms of hard approvals internally and detailed project budgets it starts to trail off.*
- **Does Hydro One currently have a long list of shovel ready projects in the pipeline?** *Not shovel ready projects, but they do have a longer-term capital program. They will likely require external resources to get this started but once they are into a maintenance mode Hydro One can likely do this internally.*

Vehicle Accidents

- **Is the frequency rate of vehicle accidents an annual number?** *It is the number for the year based on 200,000 miles.*
- **Why does your recommendation around vehicle accidents only look at cars/trucks and not other vehicles, for example, helicopters?** *The only reason that cars/trucks was brought up in our recommendations was that is the one that is around the median, given Hydro One's service territory where we would expect it to be lower.*

Hydro One Score Card

- **In this process did you look at Hydro One's current score card and in the context of these recommendations are you going to be recommending modifications to their current score cards?** *If you are referring to the OEB scorecard, that relates to distribution only.*

Administration Costs

- **Did you do any work to determine where administration costs originated within Hydro One?** *No, we did not get into this level of detail.*
- **On administration Hydro One operates as a shared service model between distribution and transmission. Did you look at these prior to allocation to determine if there were problems with administration costs related transmission?** *No, we looked at total administration costs related to transmission after allocation.*
- **Did you gather data from the utilities about how many FTEs they have?** *Yes, we don't find this terribly helpful because of the question of how much is outsourced. We have data on how many bodies each company has but we don't have data on how many bodies they use externally.*

Regional Impacts

- **I notice there is an absence in your recommendations for accountability by region, why is there not a discussion about the reporting by region?** *This is something that we would like to take away and think about. We were not able to get the level of detail we were looking for in terms of the split to benchmark Hydro One by region.*

PARTICIPANT LIST

The following is a list of participants that attended the meeting and the organizations they represent.

Stakeholders

1. Bayu Kidane - *Power Workers' Union (PWU)*
2. Bohan Dumka - *The Society of Energy Professionals*
3. David MacIntosh - *Energy Probe*
4. Emma Blanchard - *Canadian Manufacturers and Exporters*
5. Harold Thiessen - *Ontario Energy Board (OEB)*
6. Jie Han - *FortisOntario/Canadian Niagara Power*
7. Kevin Kilfoil - *FortisOntario/Canadian Niagara Power*
8. Maia Chase - *Indpendent Electricity System Operator*
9. Marion Fraser - *Building Owners and Managers Association (BOMA)*
10. Mark Rubenstein - *School Energy Coalition*
11. Mark Garner - *Vulnerable Energy Consumers Coalition (VECC)*
12. Richard Stephenson – *Power Workers' Union (PWU)*
13. Roger Higgin - *Energy Probe*
14. Shelley Grice - *Association of Major Power Consumers of Ontario (AMPCO)*

Hydro One Networks Inc. & Consultant Team

1. Ken Buckstaff – *First Quartile Consulting (Presenter)*
2. Benjamin Grunfeld - *Navigant (Presenter)*
3. Erin Henderson – Hydro One Networks Inc. (*HONI)*
4. Ian Malpass - Hydro One Networks Inc. (*HONI)*
5. Jody McEachran - Hydro One Networks Inc. (*HONI)*
6. Lisa Lee - Hydro One Networks Inc. (*HONI)*
7. Maxine Cooper - Hydro One Networks Inc. (*HONI)*

Swerhun Facilitation

1. Bianca Wylie – *Facilitator*
2. Matthew Wheatley – *Note taker*

MEETING AGENDA

Stakeholder Session – Transmission Total Cost Benchmarking

Monday, January 11, 2016
1:00pm – 4:00pm
The Victoria Room – DoubleTree Hotel by Hilton
108 Chestnut Street, Toronto, ON

AGENDA			
Agenda Review • Welcome • Safety • Housekeeping	Maxine Cooper Bianca Wylie	1:00pm	10 minutes
Introduction and Panel Overview	Ben Grunfeld Ken Buckstaff	1:10pm	20 minutes
Question and Answer		1:30pm	10 minutes
Cost Analysis	Ben Grunfeld Ken Buckstaff	1:40pm	40 minutes
Question and Answer		2:20pm	20 Minutes
Break		2:40pm	10 minutes
Reliability, Capital Project and Program Management, and Safety	Ben Grunfeld Ken Buckstaff	2:50pm	30 minutes
Question and Answer		3:20pm	10 minutes
Recommendations	Ben Grunfeld Ken Buckstaff	3:30pm	15 minutes
Question and Answer		3:45pm	10 minutes
Wrap Up & Final Comments	Maxine Cooper Bianca Wylie	3:55pm	5 minutes

Appendix 1. Individual Submissions Received After the Meeting

Feedback forms were provided at the meeting and distributed to participants by email following the stakeholder.

The feedback forms included five questions. One completed feedback form was received and is included below.

Feedback Form #1

Presentation: HONI Tx Cost Benchmarking Study – Findings and Recommendations

Feedback and Discussion

Do you have any questions of clarification on the presentation?

Provide an Extensive 20 page Executive Summary with key findings and conclusions

1. *Consider the Introduction and Panel Overview presented.* **Do you have any suggestions or areas of clarification you would like Navigant to consider?**

2. *Consider the Cost Analysis Selection.* **Do you have any suggestions or areas of clarification you would like Navigant to consider?**

The revenue requirements of the five (Ontario) transmitters are allocated to three transmission pools, Network, Line Connection and Transformation Connection on the basis of a cost allocation study conducted annually by Hydro One Networks. The costs are then divided by forecast consumption (charge determinants) to establish the UTR. The Independent Electricity System Operator (IESO) charges these rates to all wholesale market participants, including electricity distributors. EB-2015-0311

The combined UTR for 2016 is $6.55/kw, a $0.09 or 1.4% decrease relative to the 2015 UTR. The primary driver behind this decrease is the lower cost of capital for 2016. This change will be implemented effective January 1, 2016.

Questions

Is the TX Cost Allocation for Ontario with 3 asset pools and HO comprising the major Revenue requirement similar to other jurisdictions? See Attachment. Appendix A -EB-2015-0311
If not how does this affect Rates?
Are the rates Competitive with those in the Peer group. A chart showing Rates for Network Services would be useful.

3. *Consider the Reliability, Capital Projects and Program Management, and Safety section presented .* **Do you have any suggestions or areas of clarification you would like Navigant to consider?**

4. *Consider the Recommendations.* **Do you have any suggestions or areas of clarification you would like Navigant to consider?**

Comment
Based on IESO Regional Planning a multiyear Rolling Capital Plan (5-10 years) with "shovel ready" projects for first 2 years would be useful.

5. **Do you have any other advice for the Navigant team as they develop the Final Report for the Cost Benchmarking Study?**

Please provide information on Performance Incentive Mechanisms (PIMs) based on Reliability, Cost etc. plus a "Strawman" Scorecard for HO.

2016 Uniform Transmission Rates and Revenue Disbursement Allocators
(for Period January 1, 2016 to December 31, 2016)

Transmitter	Revenue Requirement ($)			
	Network	Line Connection	Transformation Connection	Total
FNEI	$3,701,645	$878,727	$1,746,716	$6,327,088
CNPI	$2,660,767	$631,635	$1,255,551	$4,547,953
GLPT	$23,732,985	$5,633,935	$11,199,017	$40,565,936
H1N	$866,145,218	$205,612,810	$408,712,802	$1,480,470,830
B2MLP	$32,965,146	$0	$0	$32,965,146
All Transmitters	$929,205,761	$212,757,107	$422,914,086	$1,564,876,953

Transmitter	Total Annual Charge Determinants (MW)*			
	Network	Line Connection	Transformation Connection	
FNEI	187.120	213.460	76.190	
CNPI	522.894	549.258	549.258	
GLPT	3,498.236	2,734.624	635.252	
H1N	249,552.000	241,956.000	207,936.000	
B2MLP	0.000	0.000	0.000	
All Transmitters	253,760.250	245,453.342	209,196.700	

Transmitter	Uniform Rates and Revenue Allocators			
	Network	Line Connection	Transformation Connection	
Uniform Transmission Rates ($/kW-Month)	**3.66**	**0.87**	**2.02**	
FNEI Allocation Factor	**0.00398**	**0.00413**	**0.00413**	
CNPI Allocation Factor	**0.00286**	**0.00297**	**0.00297**	
GLPT Allocation Factor	**0.02554**	**0.02648**	**0.02648**	
H1N Allocation Factor	**0.93214**	**0.96642**	**0.96642**	
B2MLP Allocation Factor	**0.03548**	**0.00000**	**0.00000**	
Total of Allocation Factors	1.00000	1.00000	1.00000	

** The sum of 12 monthly charge determinants for the year.*

Note 1: FNEI Rates Revenue Requirement and Charge Determinants per Board Decision and Order on EB-2009-0387 dated December 9, 2010. Set as Interim on December 29, 2015 under EB-2015-0368.
Note 2: CNPI Rates Revenue Requirement and Charge Determinants per OEB Decision EB-2014-0204 dated June 25, 2015 and 2016 order under EB-2015-0354, issued January 14, 2016.
Note 3: GLPT Rates Revenue Requirement and Charge Determinants per OEB Decision EB-2014-0238, issued December 18, 2014 and 2016 order under EB-2015-0337, issued January 14, 2016.
Note 4: Hydro One Rates Revenue Requirement per Board Decision on Settlement Agreement for EB-2014-0140 dated December 4, 2014 and 2016 order issued January 14, 2016.
Note 5: B2M LP 2016 Revenue Requirement per Board Decision and Order EB-2015-0026 dated December 29, 2015. 2016 Rate Order approved on January 14, 2016.

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FIRST QUARTILE CONSULTING

DISCUSSION DRAFT
SUBJECT TO CHANGE

Total Transmission Cost Benchmarking

Stakeholder Presentation #2

DRAFT FINDINGS AND RECOMMENDATIONS

Prepared for Hydro One Networks Inc.

January 11, 2016

Objectives

DISCUSSION DRAFT
SUBJECT TO CHANGE

» Design and implement a robust and replicable benchmarking study of Hydro One's transmission costs

» The benchmarking study will:

– Include an appropriate group of businesses to use as comparators/peers to Hydro One, taking into account a number of characteristics, including asset demographics, geography, customer characteristics, etc.;

– Quantify and evaluate Hydro One's transmission costs relative to the peer group, taking into account cost drivers and differentiating characteristics;

– Ensure a common understanding of the comparison criteria through the use of clear definitions;

– Make recommendations on practices that could be augmented or adopted to realise efficiency gains; and

– Engage stakeholders in regards to the peer group selection criteria, comparison metrics, and preliminary findings and recommendations

Benchmarking is the process of comparing one's business processes and performance metrics to industry bests or best practices from other industries.

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Peer Group Statistics

DISCUSSION DRAFT
SUBJECT TO CHANGE

» While smaller, the peer group is generally reflective of the broader North American industry

Company	Gross Transmission Assets ($'000)	Service Territory (sq. km)	Length of Lines (km)	Throughput (TWh)
Baltimore Gas and Electric	1,179,098,656	3,700	1,490	30.6
BC Hydro	5,111,155,732	42,370	18,500	54.6
CenterPoint Energy	2,059,764,178	8,050	6,000	101.7
Commonwealth Edison	3,389,679,995	18,400	7,940	90.0
CPS Energy	877,775,489	2,440	2,410	26.3
East Kentucky Power Coop.	569,099,123	214,000	4,700	22.8
Hydro One Networks	13,244,428,940	640,000	29,000	139.8
Kansas City Power & Light	1,297,124,005	28,840	2,640	40.6
Manitoba Hydro	1,055,000,000	250,116	12,800	30.0
Oncor Electric Delivery	7,005,354,033	86,032	25,730	114.9
PECO Energy	1,439,589,112	3,380	2,030	37.5
PPL Electric Utilities	2,408,545,384	10,000	6,650	40.6
Public Service Electric & Gas	5,845,024,497	2,010	2,660	40.7
SaskPower		651,000	13,000	20,0
Southern California Edison	11,071,660,300	80,450	19,712	89.0
Tucson Electric Power	936,496,126	1,620	3,110	18.3
Westar Energy	2,053,092,375	16,250	5,900	30.4

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Peer Group Service Territories

DISCUSSION DRAFT
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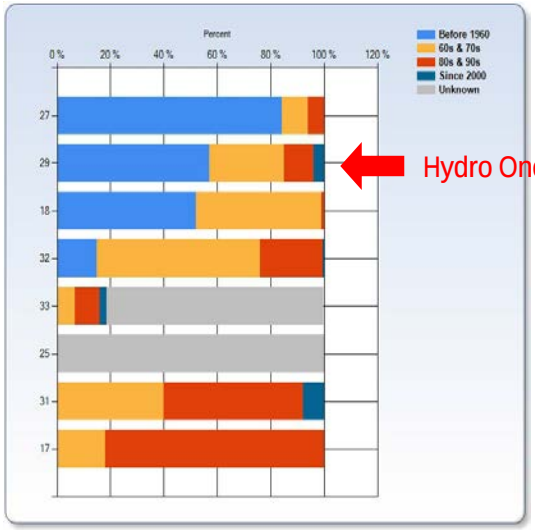
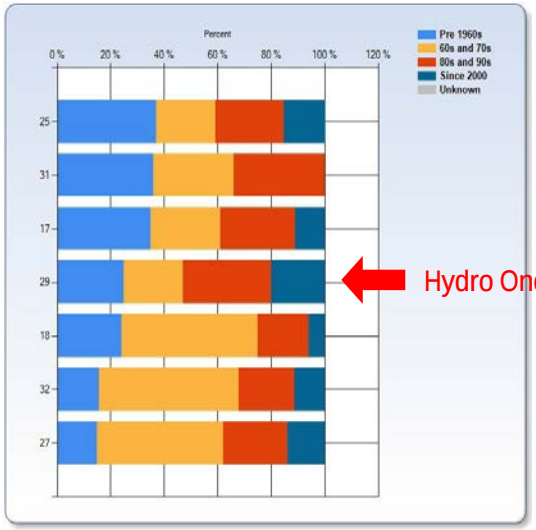
Age Profile of System

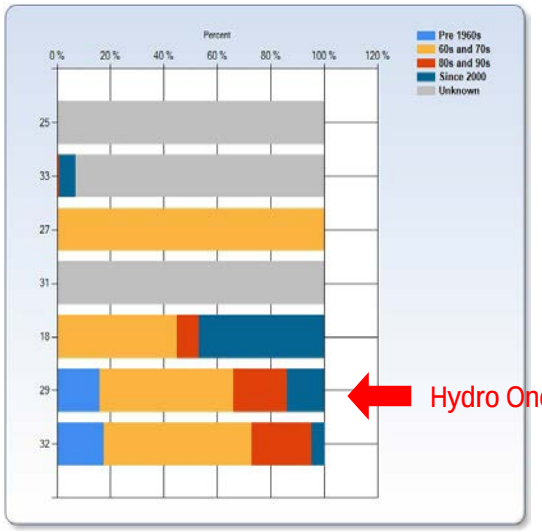
Transmission Towers



Transmission Wood Poles



Transmission Cable



- Hydro One's transmission towers are amongst the oldest in the peer group (~60% installed before 1960)
- The age of Hydro One's transmission cable and transmission wood poles are closer to the median

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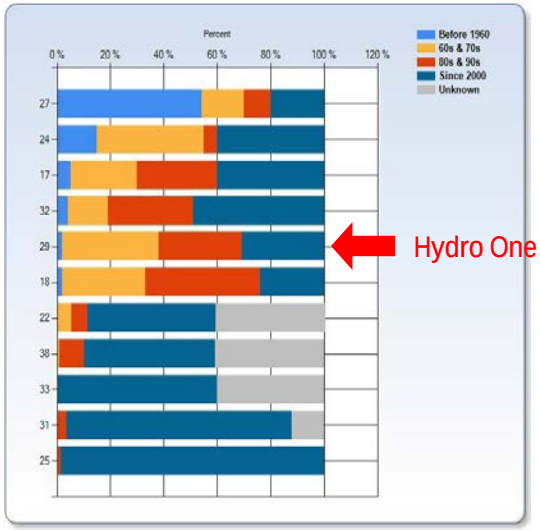
Age Profile of Transmission Substations

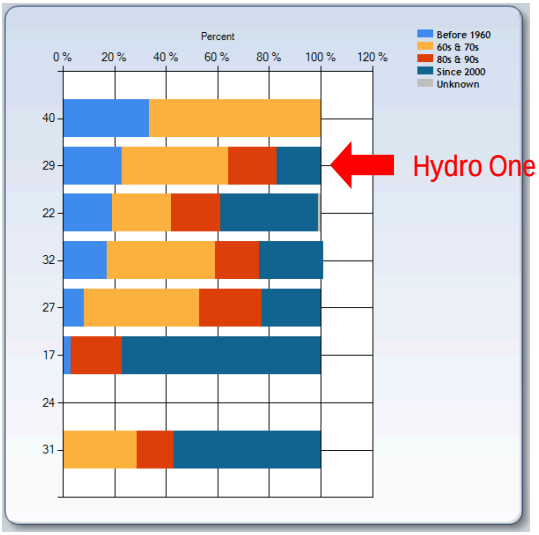
DISCUSSION DRAFT
SUBJECT TO CHANGE

Circuit Breakers

Relays



Power Transformers



» Similarly, Hydro One's circuit breakers and power transformers are amongst the oldest in the peer group

– Approximately 45% of circuit breakers and 60% of power transformers were installed before 1970 (45 years ago)

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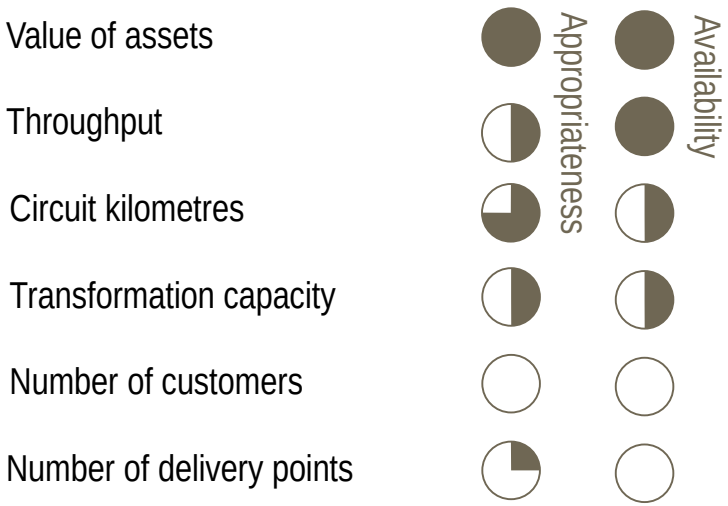
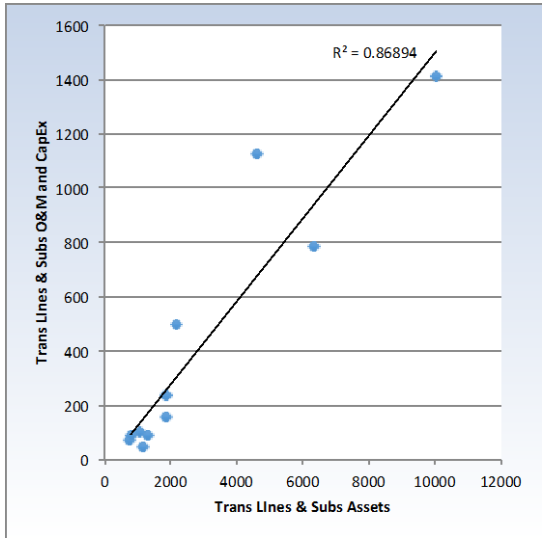
Normalisation Factors

DISCUSSION DRAFT
SUBJECT TO CHANGE

Normalisation Methods



Total Costs predicted by Total Asset Value



Note: each dot on the graph represents a company in the peer panel. To avoid bias, Hydro One is deliberately excluded from this analysis.

- Gross assets is consistently the best predictor of costs
- When analysing the usefulness of normalising factors for costs, we evaluate the ability of a given independent variable to predict the cost value
- Various different independent variables have been tested periodically over a 20-year time span, with generally consistent results
- The chart at left shows the use of total assets to predict the total transmission costs for a group of companies
  - The r2 value is a measure of the predictive ability of the independent variable (assets) on the total cost
  - A value of 1.0 is a perfect predictor, so .87 as shown is extremely good as a predictor
  - Other normalising factors perform worse

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Questions

DISCUSSION DRAFT
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Summary Observations

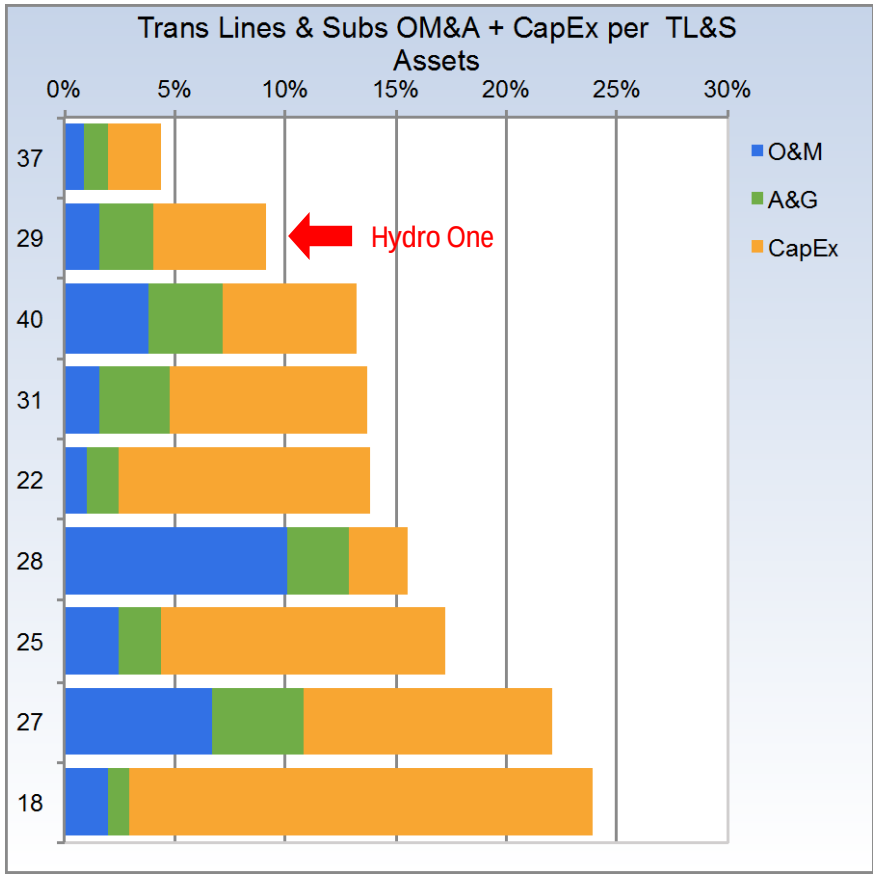
Cost

- Hydro One's total 2014 expenditure was noticeably lower than the median, when normalised by total gross transmission plant in service (lines and substations)
  - Total expenditure includes operations, maintenance, and administrative (OM&A) expenditures and capital expenditures (CAPEX)
- Direct O&M expenditure was lower than the median
  - Hydro One's direct O&M expenditure has declined inline with industry average over the past five years
- Within direct O&M, substation O&M expenditure is above average; however, expenditure over the past five years has also declined
- Total OM&A expenditure was slightly lower than the median; indicating that administrative costs were above average
- Direct CAPEX was noticeably lower than the median and has been for several years
  - Given the relative age of the Hydro One's assets, expectation is that CAPEX will need to increase in order to maintain reliability

Total Transmission Costs

DISCUSSION DRAFT
SUBJECT TO CHANGE

Transmission Lines and Substations
OM&A + CAPEX (FERC) per Asset Value



» Hydro One's total costs for transmission lines and substations (OM&A and CAPEX) are noticeably below the median

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Total Transmission Costs

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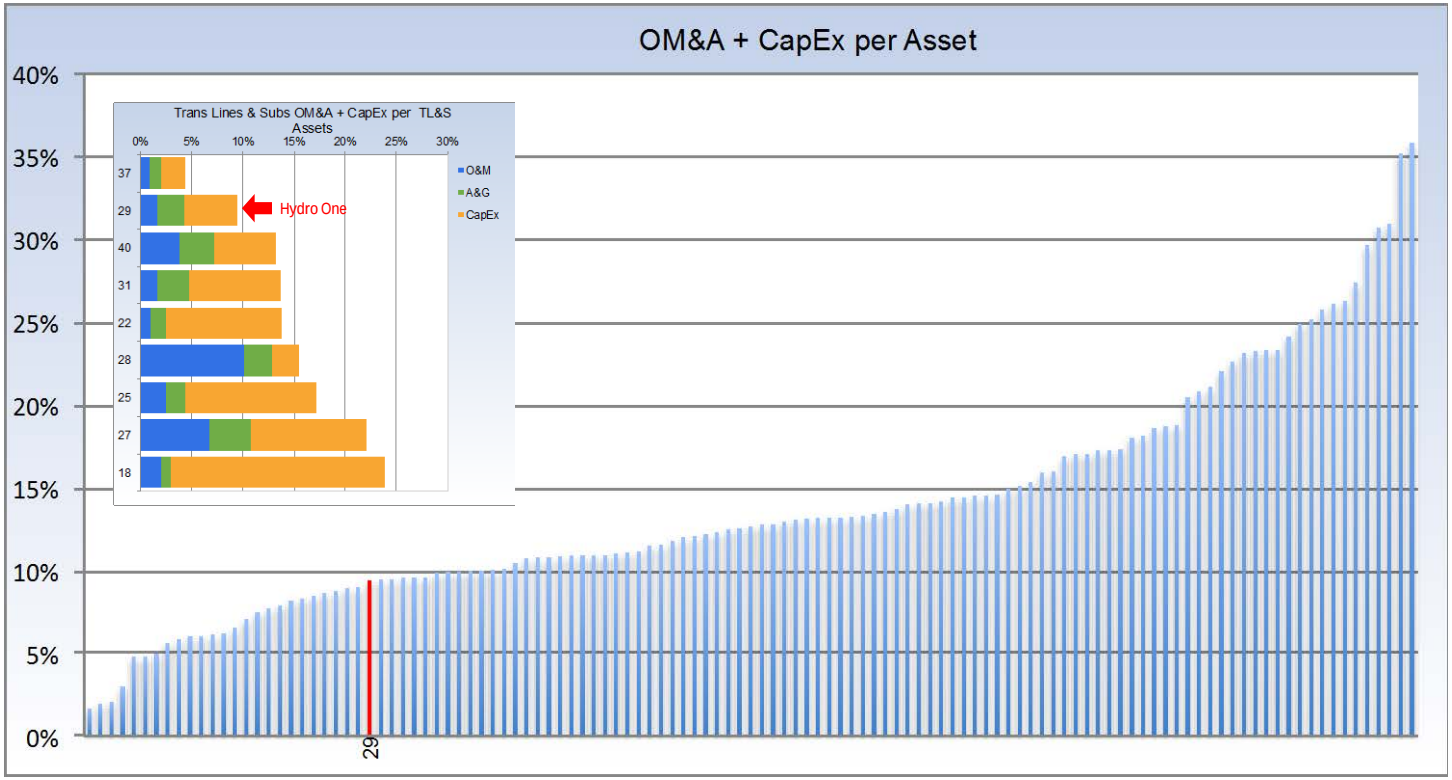
» To provide perspective on the impact of panel selection, we compared the relative position of Hydro One within the benchmark comparison panel and its position within the entire population of companies who report costs to the FERC

» While the benchmark panel is slightly higher cost than the average company, the relative position (i.e. quartile) for Hydro One is consistent



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Total Transmission Costs

DISCUSSION DRAFT
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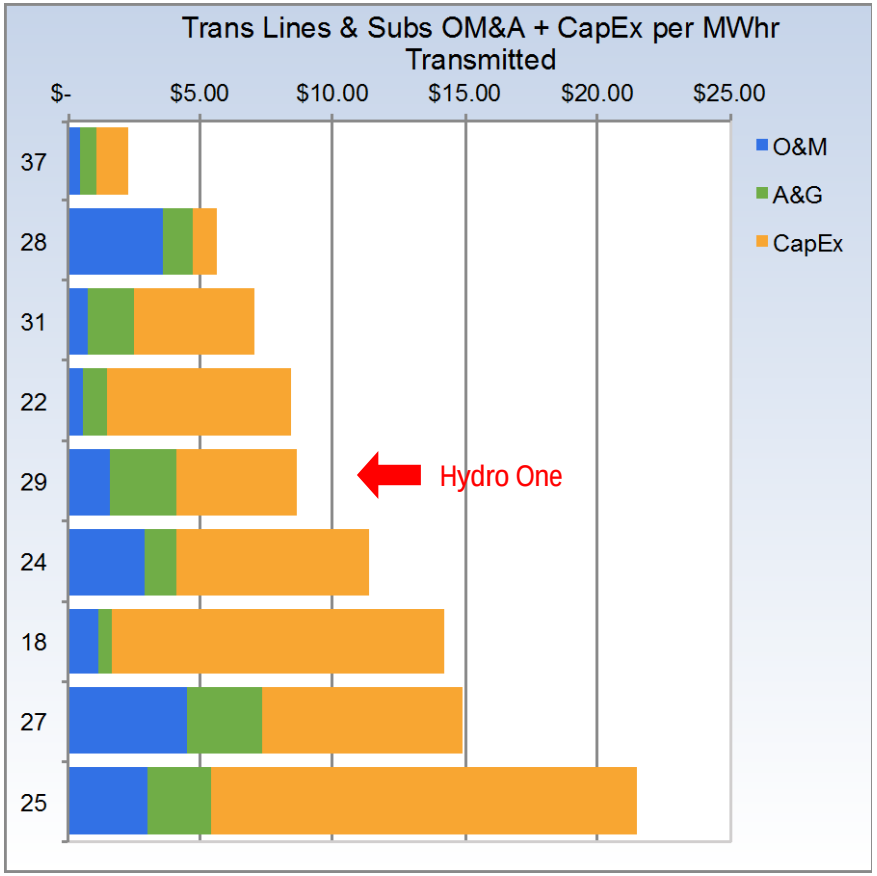
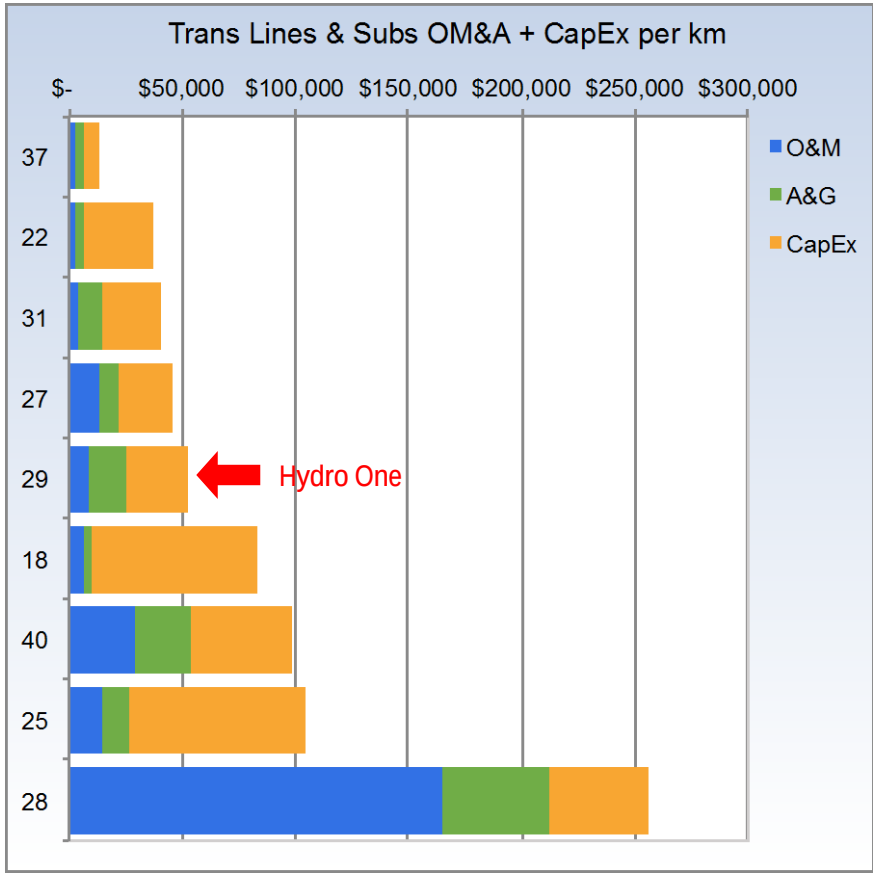
» While the focus remains on assets as the primary normalising factor, using throughput or line length does not change the overall conclusions

Transmission Lines and Substation
OM&A + CAPEX per MWh Transmitted (FERC)



Transmission Lines and Substations
OM&A + CAPEX per Circuit Kilometre (FERC)



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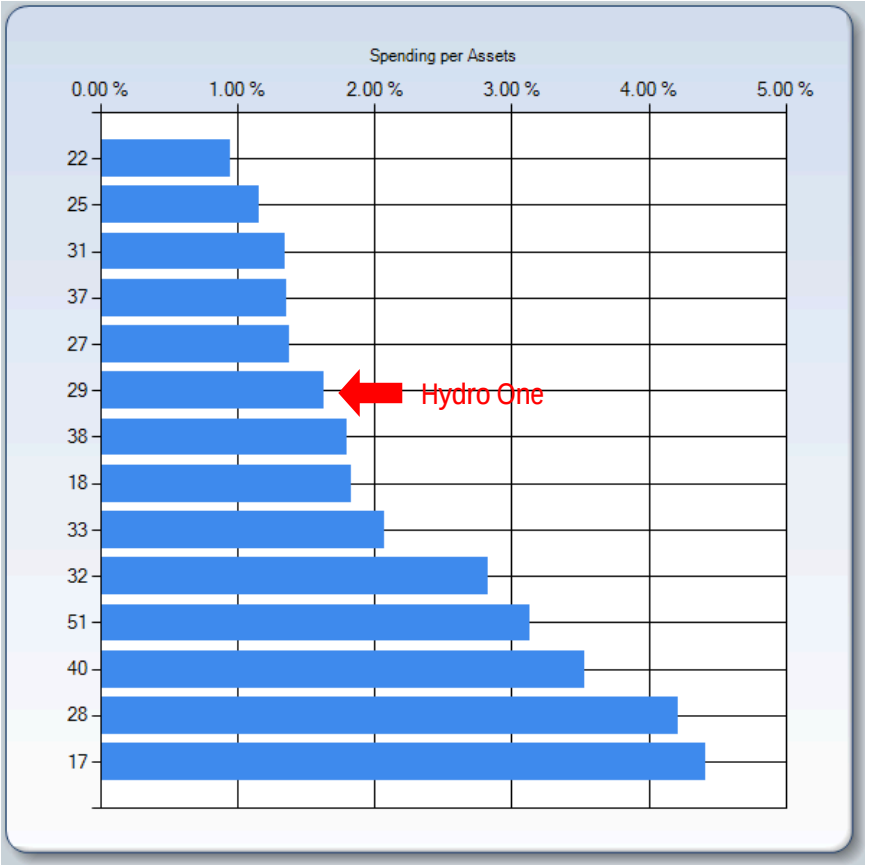
Direct O&M

Transmission Lines and Substations
O&M per Asset Value



Costs do not include any overhead or corporate allocations

- Hydro One's direct O&M expense for lines and substations is lower than the median of the peer group (1.63%)
- The trend for Hydro One and the industry average is declining direct O&M expenditure (see next slide)
  - The trend for the fourth quartile of companies is increasing direct O&M expenditure

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Direct O&M Trend

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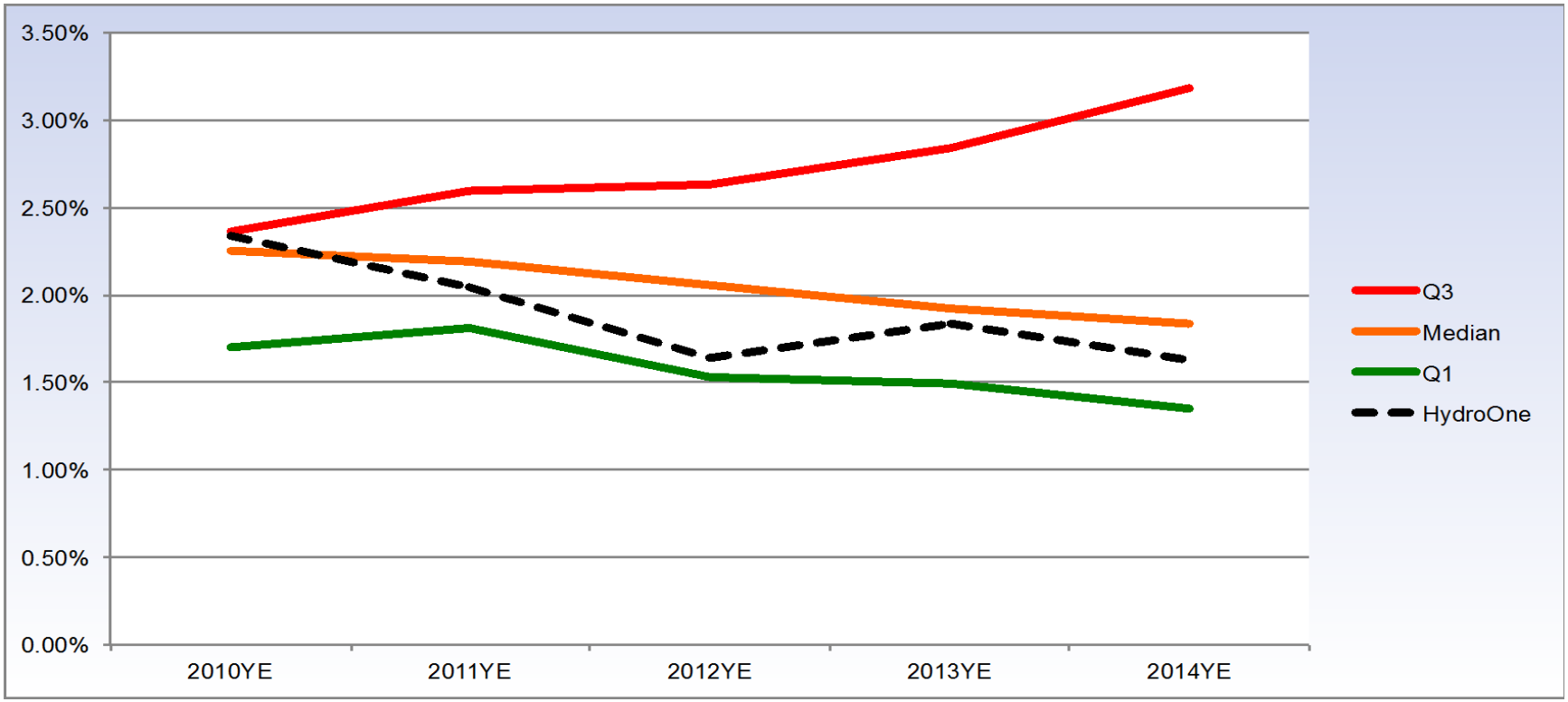
SUBJECT TO CHANGE

Transmission Lines and Substations
O&M per Asset Value



Costs do not include any overhead or corporate allocations

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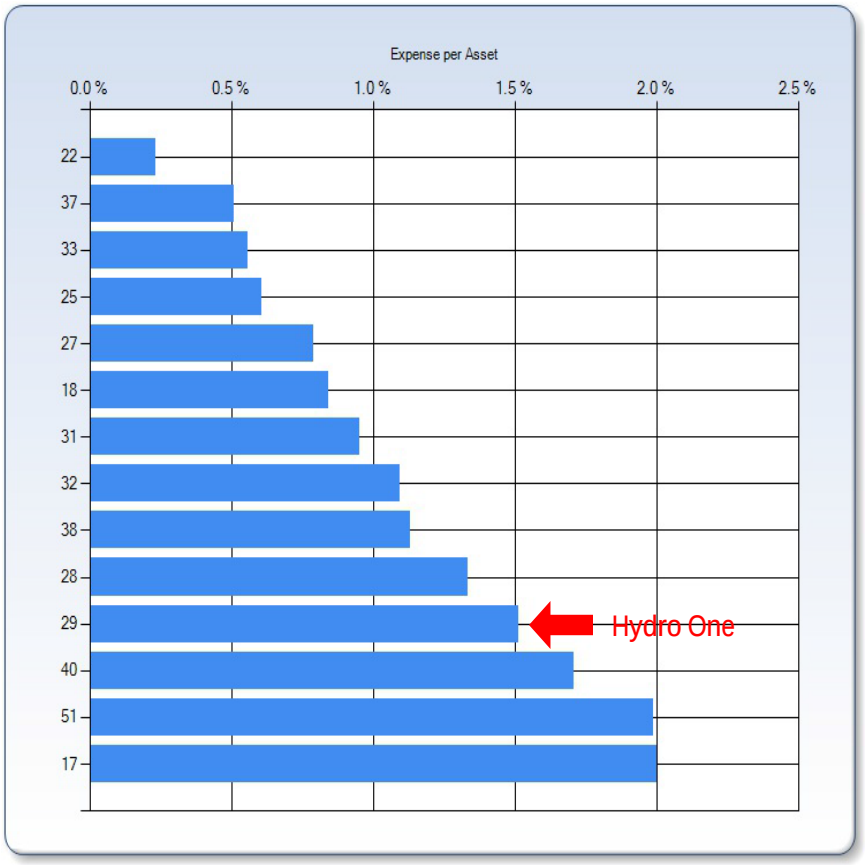
Substation O&M

Substations
O&M per Asset Value



Costs do not include any overhead or corporate allocations

- Hydro One's substation O&M is among the highest in the comparison group (~1.5%)
- Approximately half of the direct substation O&M expenditure is corrective (including planned corrective) and half is preventative
- The industry average trend is relatively flat, whereas Hydro One's direct substation O&M expenditure has declined over the past five years (see next slide)

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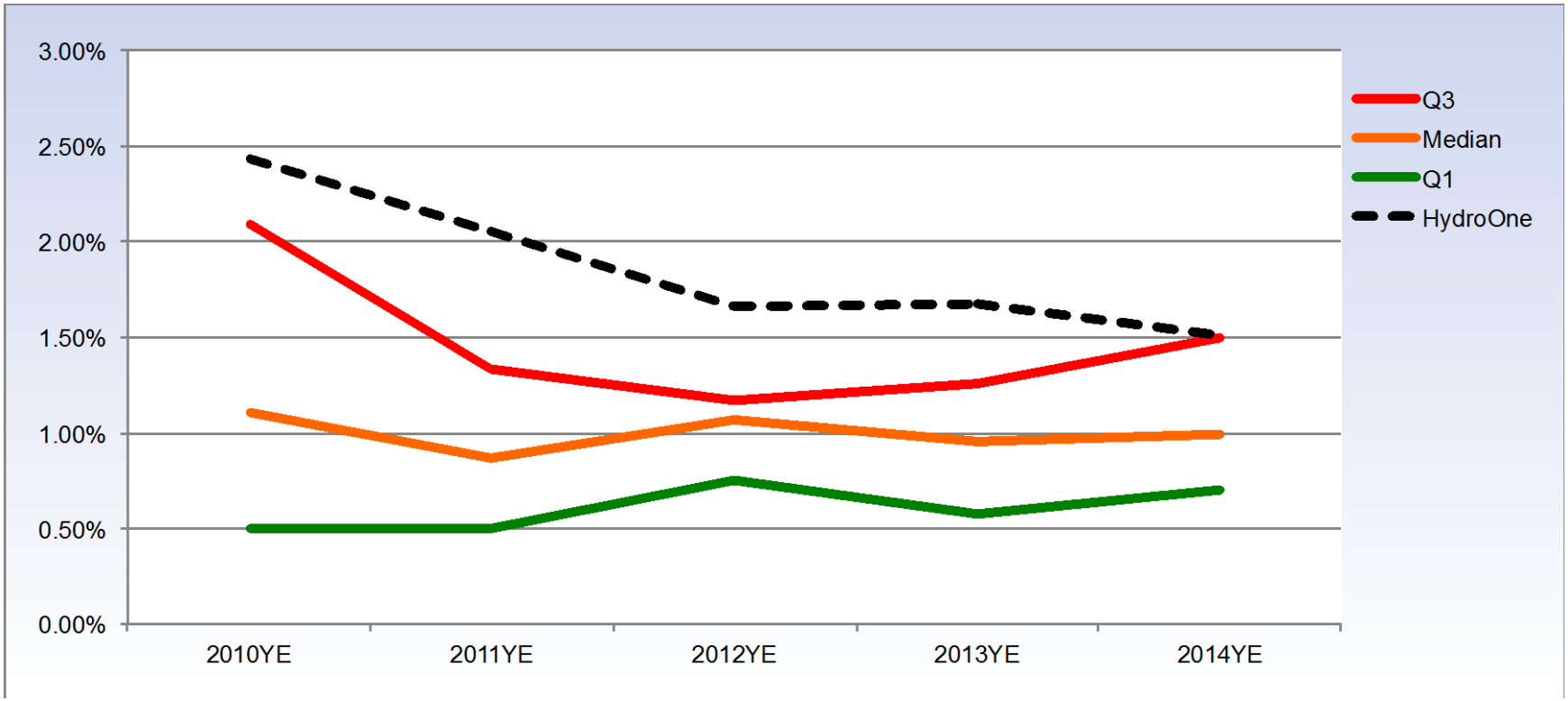
Substation O&M Trend

DISCUSSION DRAFT
SUBJECT TO CHANGE



Costs do not include any overhead or corporate allocations

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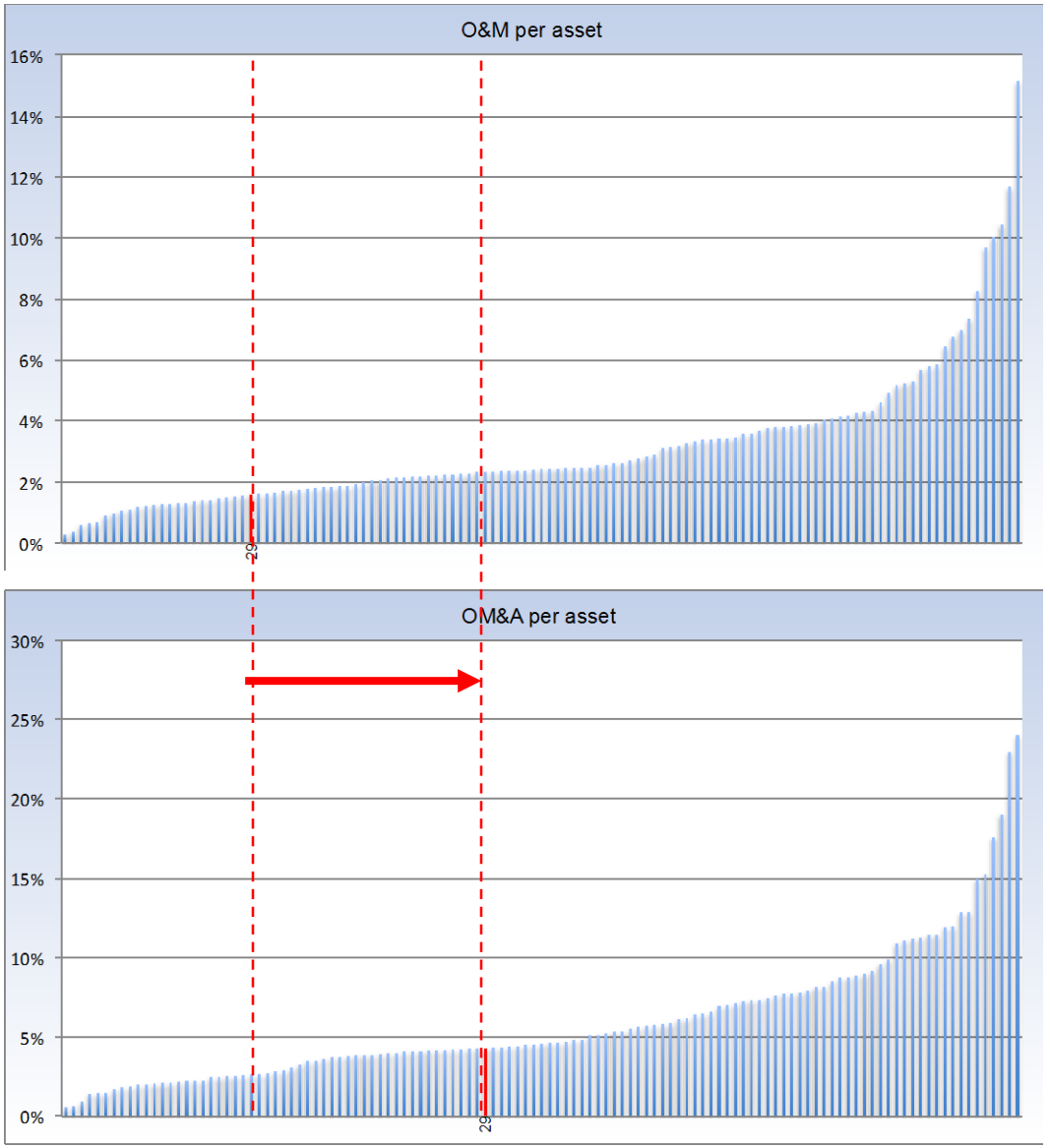
Administrative Costs

DISCUSSION DRAFT
SUBJECT TO CHANGE

- With the inclusion of administrative costs, Hydro One's performance against the peer group and the FERC population shifts from low cost to median
- This implies that Hydro One's administrative costs are higher than the average
- Total OM&A expenditure, as indicated previously, is lower than the median



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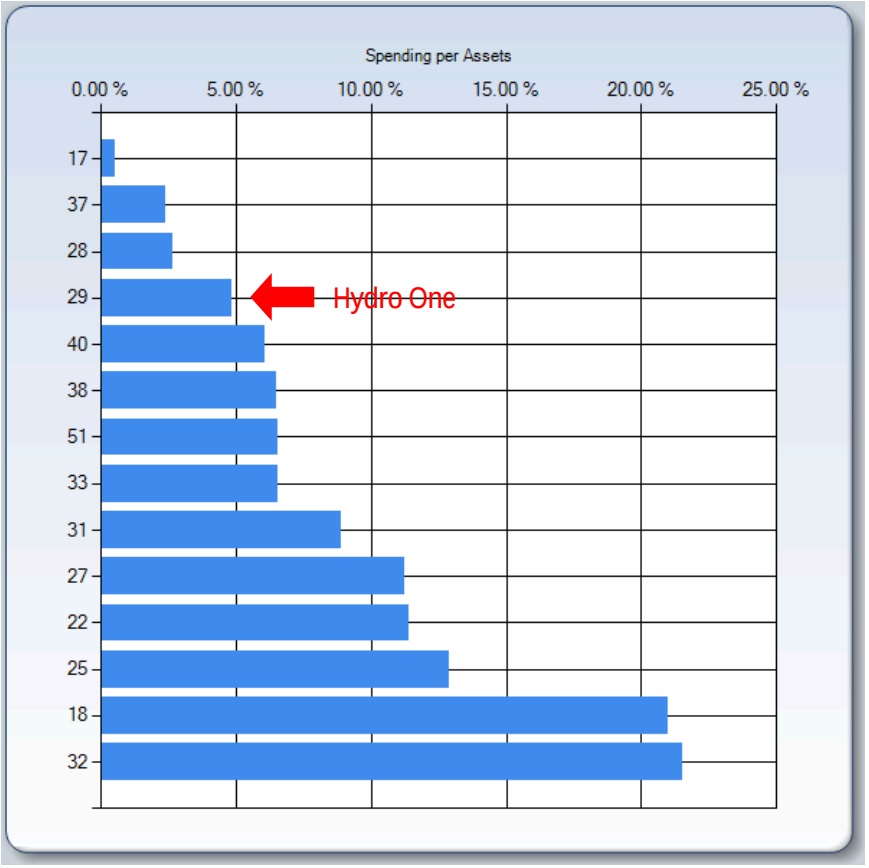
Direct CAPEX

DISCUSSION DRAFT
SUBJECT TO CHANGE

Transmission Lines and Substations
CAPEX (FERC) per Asset Value



Costs do not include any overhead or corporate allocations

- Hydro One's direct capital investment for lines and substations is among the lowest in the peer group (4.83%)
- Sustainment capital is approximately 80% of the total capital expenditure (~4.0%)
  - This implies a replacement rate of approximately 25 years at historic costs; and likely closer to 50 or 60 years at current costs
- Hydro One's direct CAPEX has been consistently below the median of the comparison panel (see next slide)
  - To achieve median spend would require an additional capital investment of approximately $250M annually

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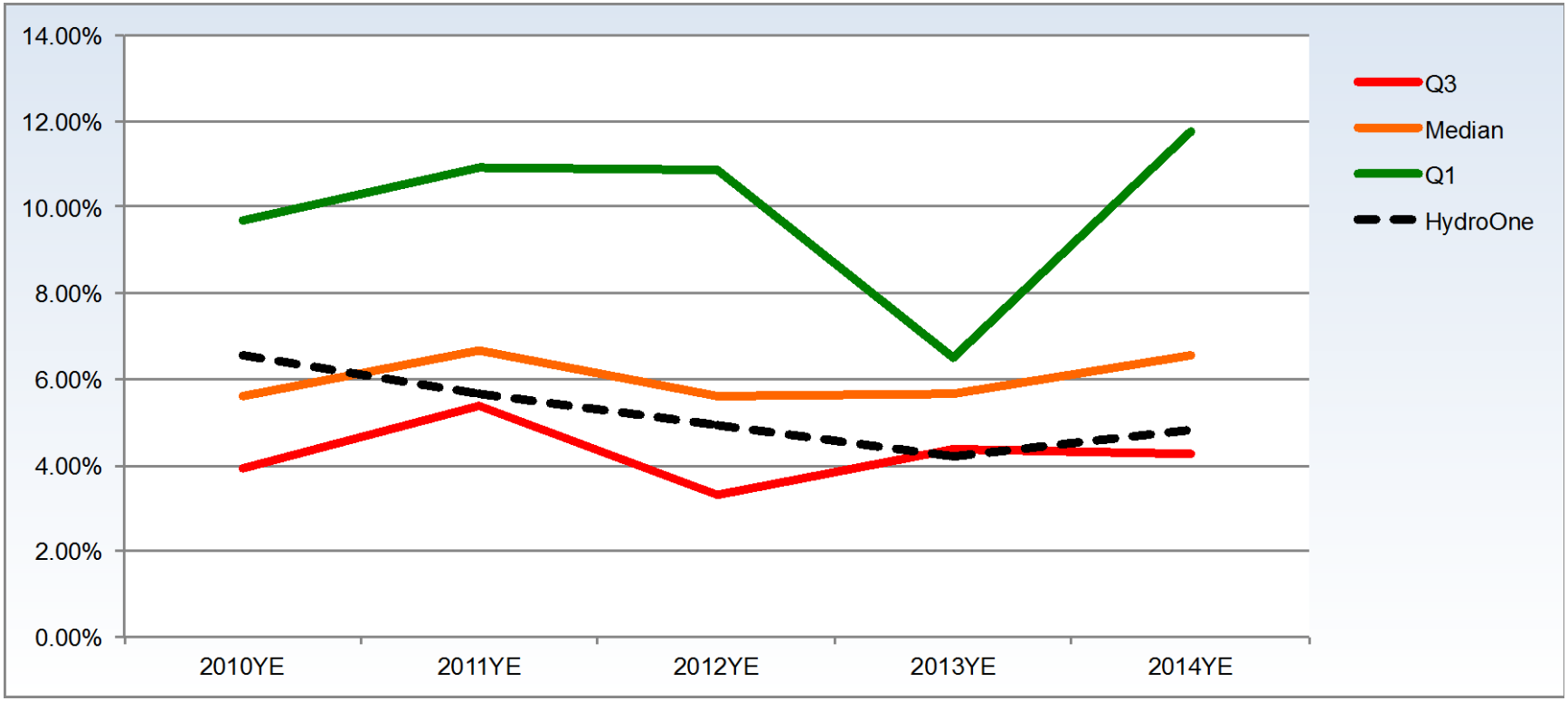
Direct CAPEX Trend

DISCUSSION DRAFT
SUBJECT TO CHANGE

Transmission Lines and Substations
CAPEX (FERC) per Asset Value



Costs do not include any overhead or corporate allocations

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Questions

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Summary Observations

Reliability

» The availability of individual circuit elements across Hydro One's service territory is noticeably lower than the median (as reflected by the "TADS" metrics)

– The TADS metrics, which indicate availability, are the North American Electric Reliability Council Transmission Availability Data System metrics

» Impact of outages on customers (i.e. transmission delivery points) is at or better than average (as reflected by the "Delivery Point" metrics)

– The Delivery Point metrics, which indicate customer impact, are the traditional electricity utility reliability metrics, T-SAIDI and T-SAIFI, as measured at transmission delivery points

TADS Metrics (<200kV)

DISCUSSION DRAFT
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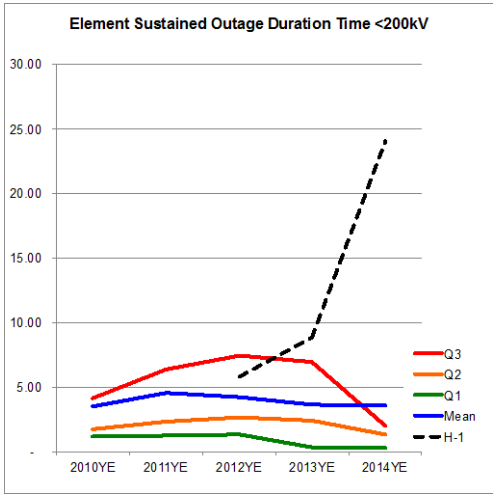
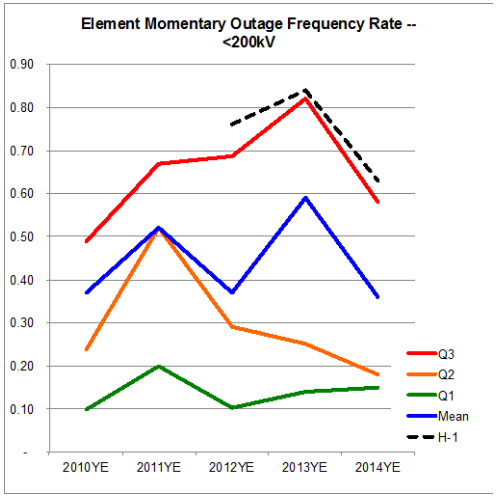
Sustained Outage Duration

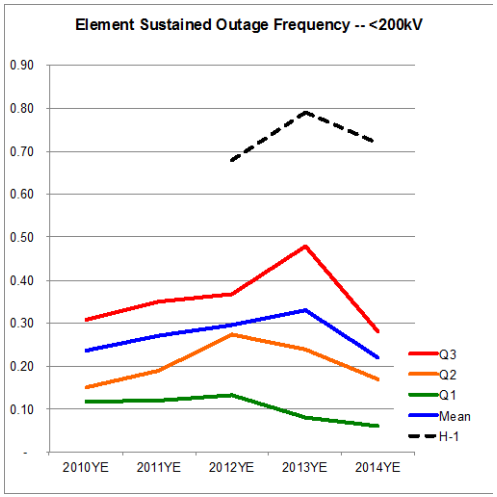


Momentary Outage Frequency



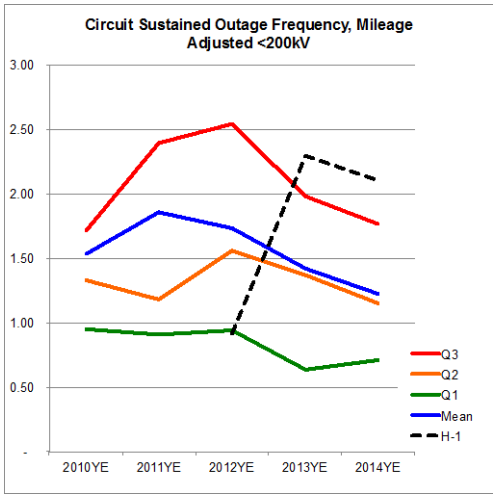
- For the lower voltages (i.e. below 200kV), Hydro One's reliability results, as measured by TADS metrics, indicate relatively high sustained outage frequency and duration
- Adjusted for circuit length, the sustained outage frequency is closer to the average for the peer group

Sustained Outage Frequency



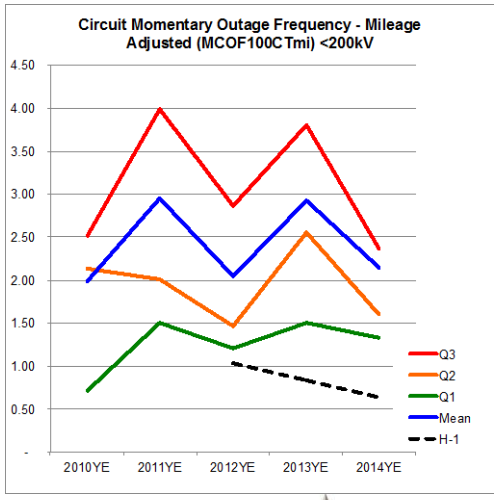
Sustained Outage Frequency

Mileage Adjusted



Momentary Outage Frequency

Mileage Adjusted



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TADS Metrics (>200kV)

DISCUSSION DRAFT
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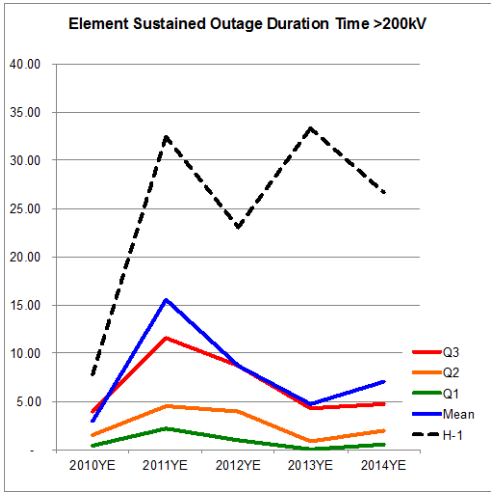
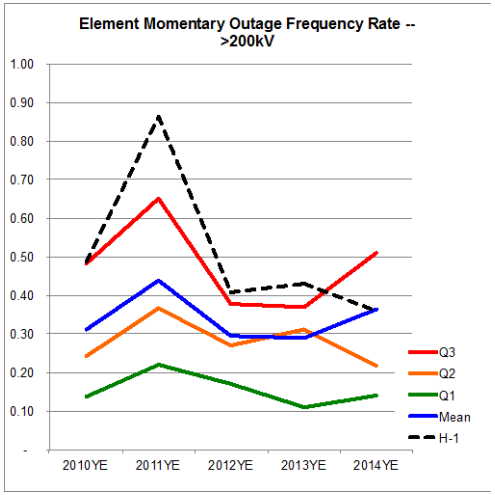
Sustained Outage Duration

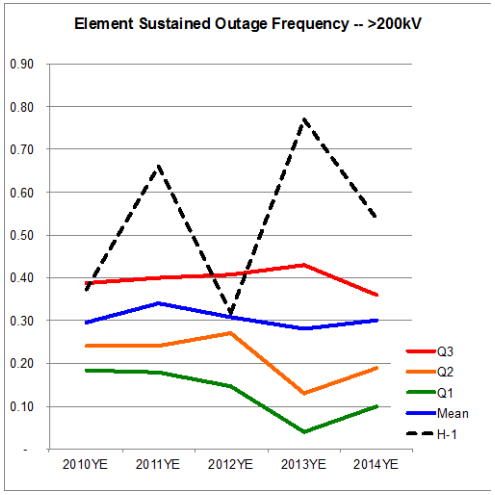


Momentary Outage Frequency



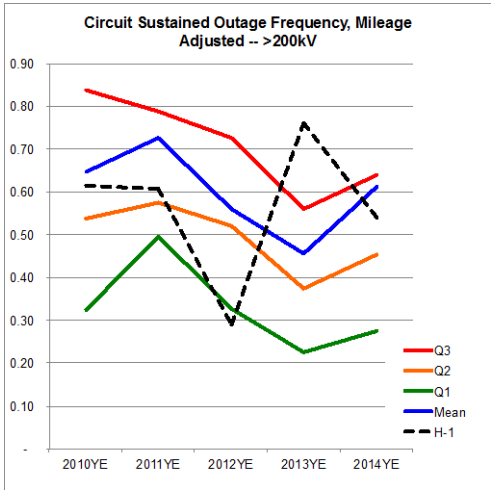
- For the higher voltage transmission lines (>200kV), Hydro One's reliability results, as measured by the TADS metrics, show mixed performance
- Adjusted for circuit length, except for 2013, Hydro One has mostly been near the median of the peer group in terms of frequency of sustained outages

Sustained Outage Frequency



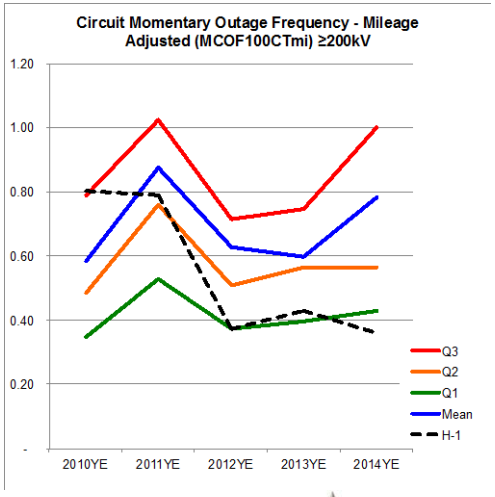
Sustained Outage Frequency

Mileage Adjusted



Momentary Outage Frequency

Mileage Adjusted



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T-SAIFI and T-SAIDI

DISCUSSION DRAFT
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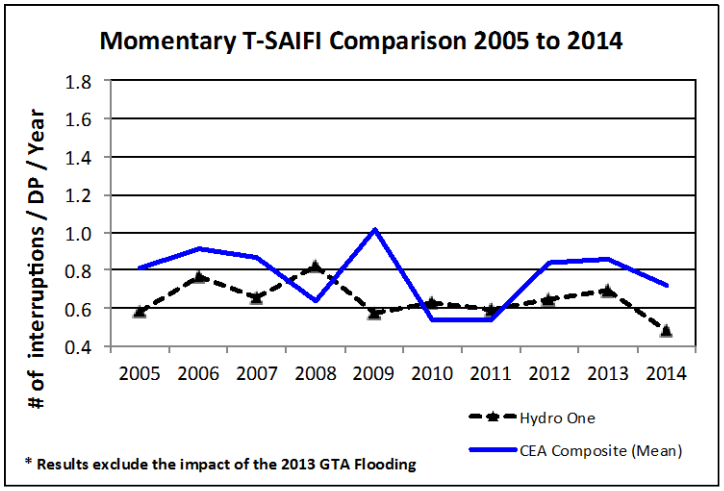
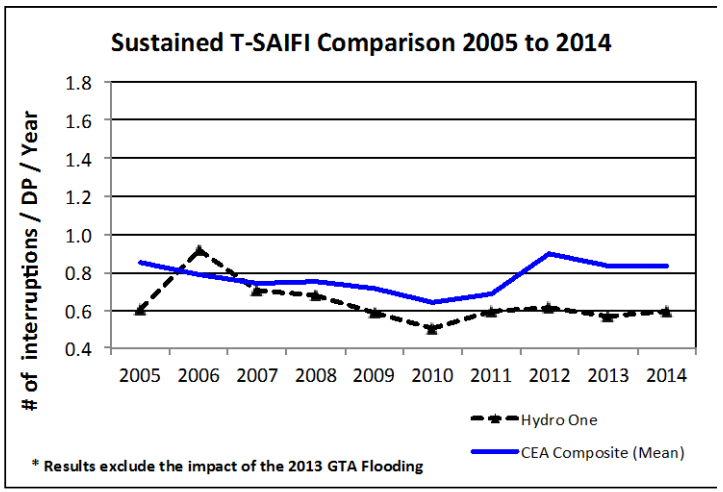
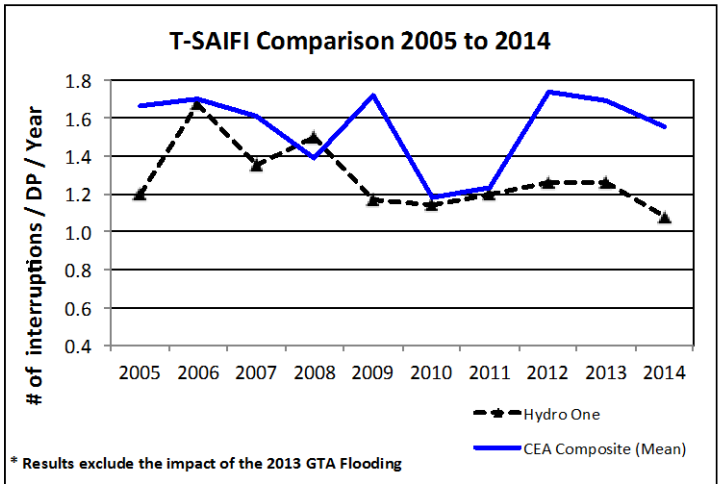
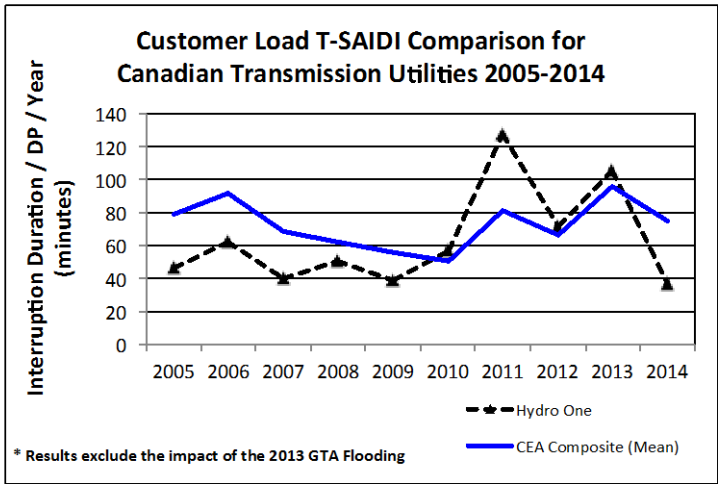
» In a study conducted by the Canadian Electricity Association, T-SAIDI and T-SAIFI metrics for Hydro One are leading among Canadian utilities









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Capital Budget

DISCUSSION DRAFT
SUBJECT TO CHANGE

Percent of Capital Budget Spent

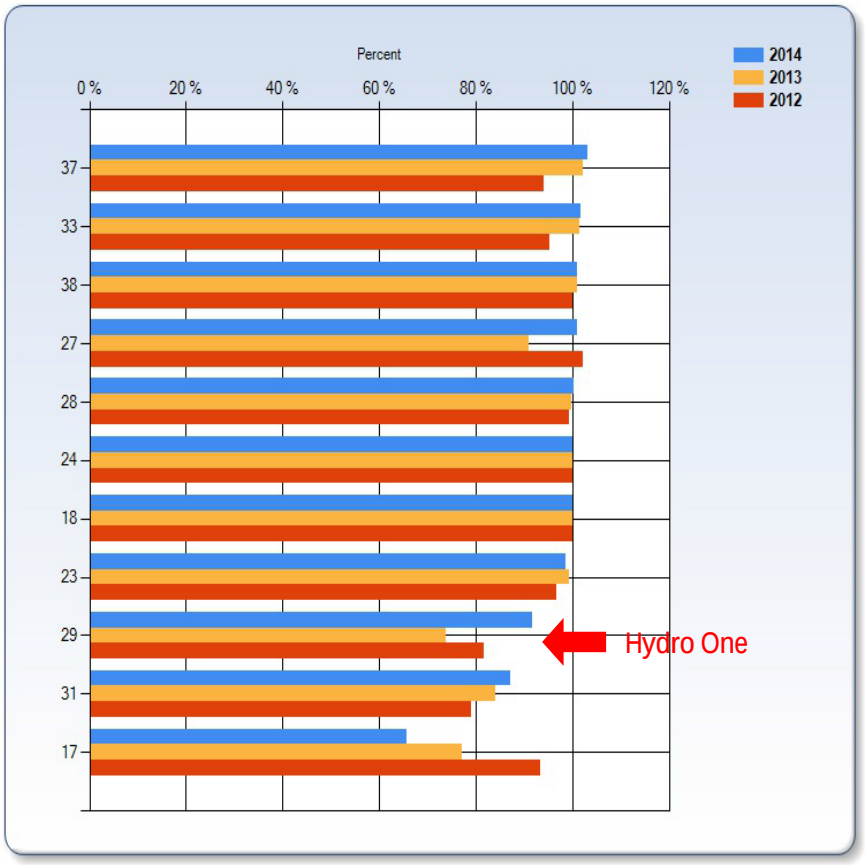

Figure represents total capital budget. Split between growth and sustaining capital investment isn't available.

- Hydro One has a large capital investment program. The company has historically underspent its capital budget
- Hydro One reports that it has achieved its 2015 capital budget

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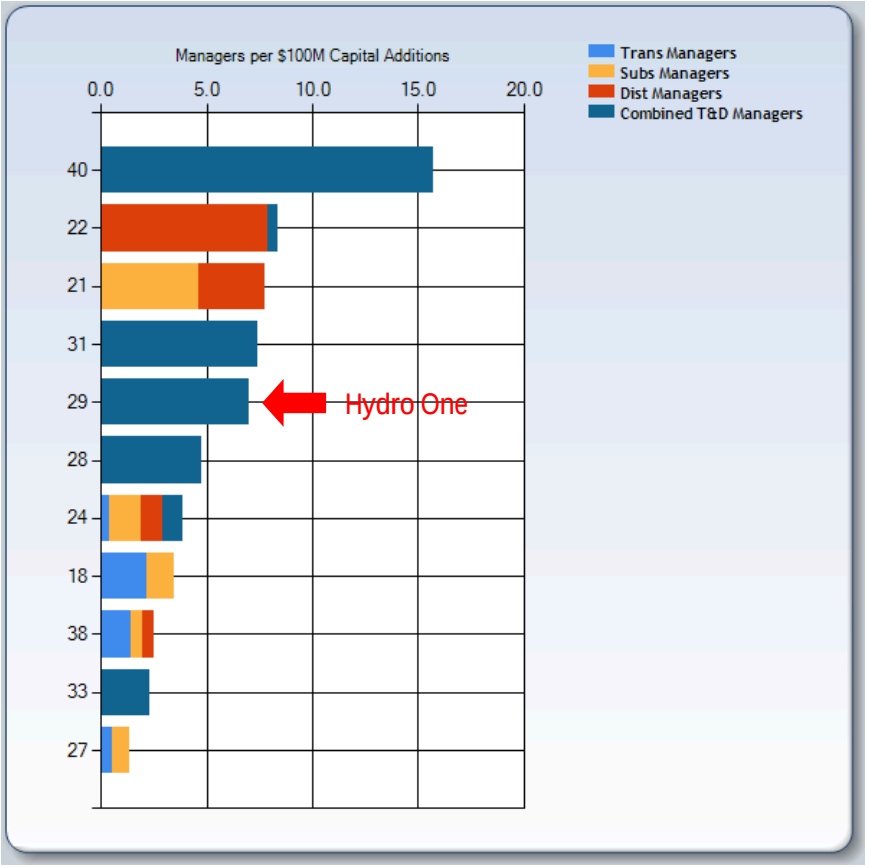
Project Managers

Project Managers per $100M of Capital Additions

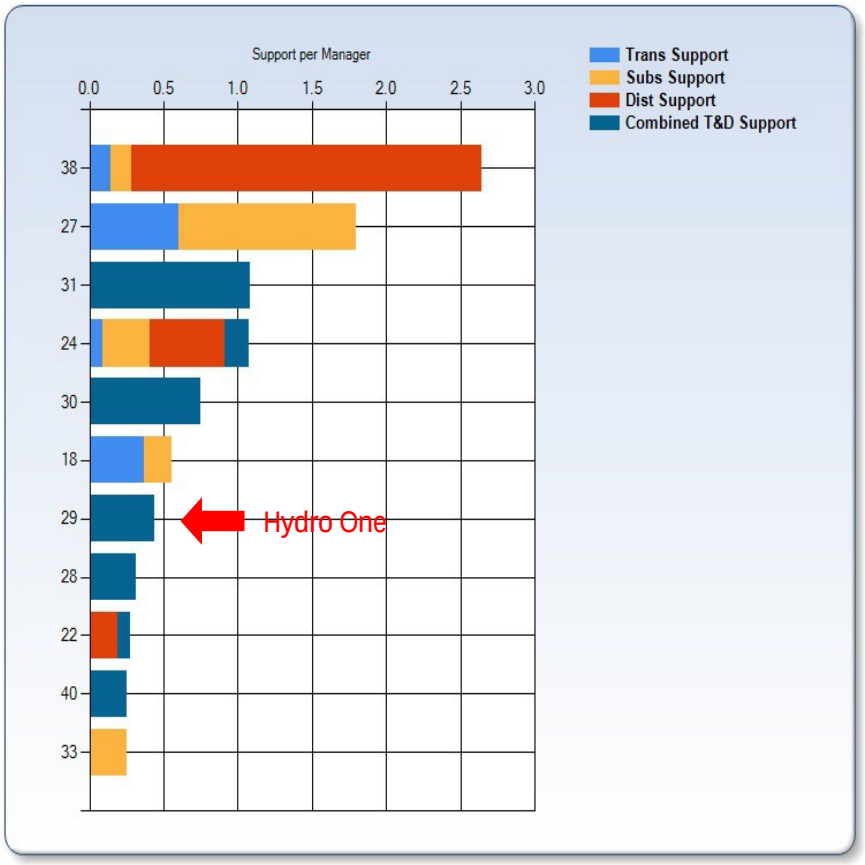


Note: Combined T&D project management staff is typically reported since companies do not align project management organisations with a particular business area but instead maintain a common organisation that handles all types of projects.

- Hydro One has a strong project management culture
- Project manager staffing is slightly above the median, often true for strong project management organisations

Support Staff

Number of Support Staff per Project Manager



Note: Combined T&D project management staff is typically reported since companies do not align project management organisations with a particular business area but instead maintain a common organisation that handles all types of projects.

- For Hydro One, support staff resources generally are below the panel average
- Part of the reason is the limited difference in hourly cost between a project manager (MP5 or MP6) and support staff (MP3 or MP4)

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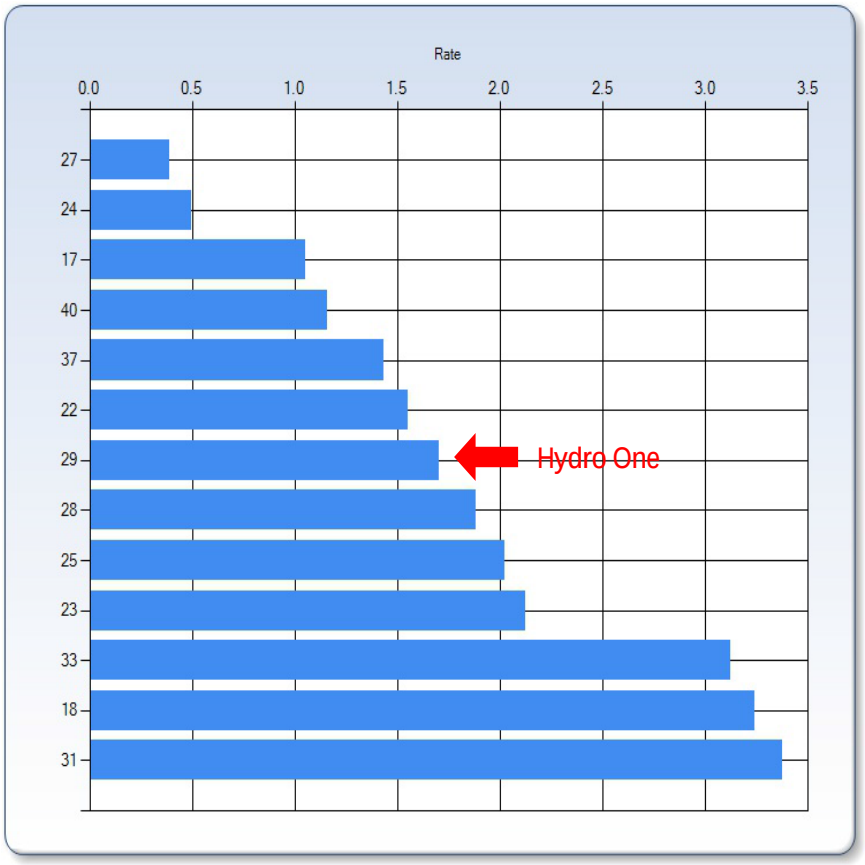
Preventable Frequency of Vehicle Accidents

DISCUSSION DRAFT
SUBJECT TO CHANGE

Preventable Frequency Rate of Vehicle Accidents



The vehicular incident rate is computed as the # of incidents x (1,000,000 / kilometers driven) Rate includes both preventable and non-preventable motor vehicle accidents.

- Hydro One has implemented an umbrella safety program ("Journey to Zero") which has lead to a low severity rate versus the benchmark panel
- Vehicular incident rate is average although a specific target for PMVAs has not been established
- Given the rural service territory, Hydro One should have a lower PMVA rate

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Questions

DISCUSSION DRAFT
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Overview

DISCUSSION DRAFT
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» Recommendations categories based on potential impact on company performance (broadly defined to include cost, reliability, safety, etc.) and degree of complexity and effort

» Recommendations target areas where Hydro One was under-performing relative to the industry average as identified through the benchmarking, in particular:
  – Capital program management
  – Direct substation O&M expenditure
  – Administrative costs
  – Vehicle safety

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Recommendations

DISCUSSION DRAFT
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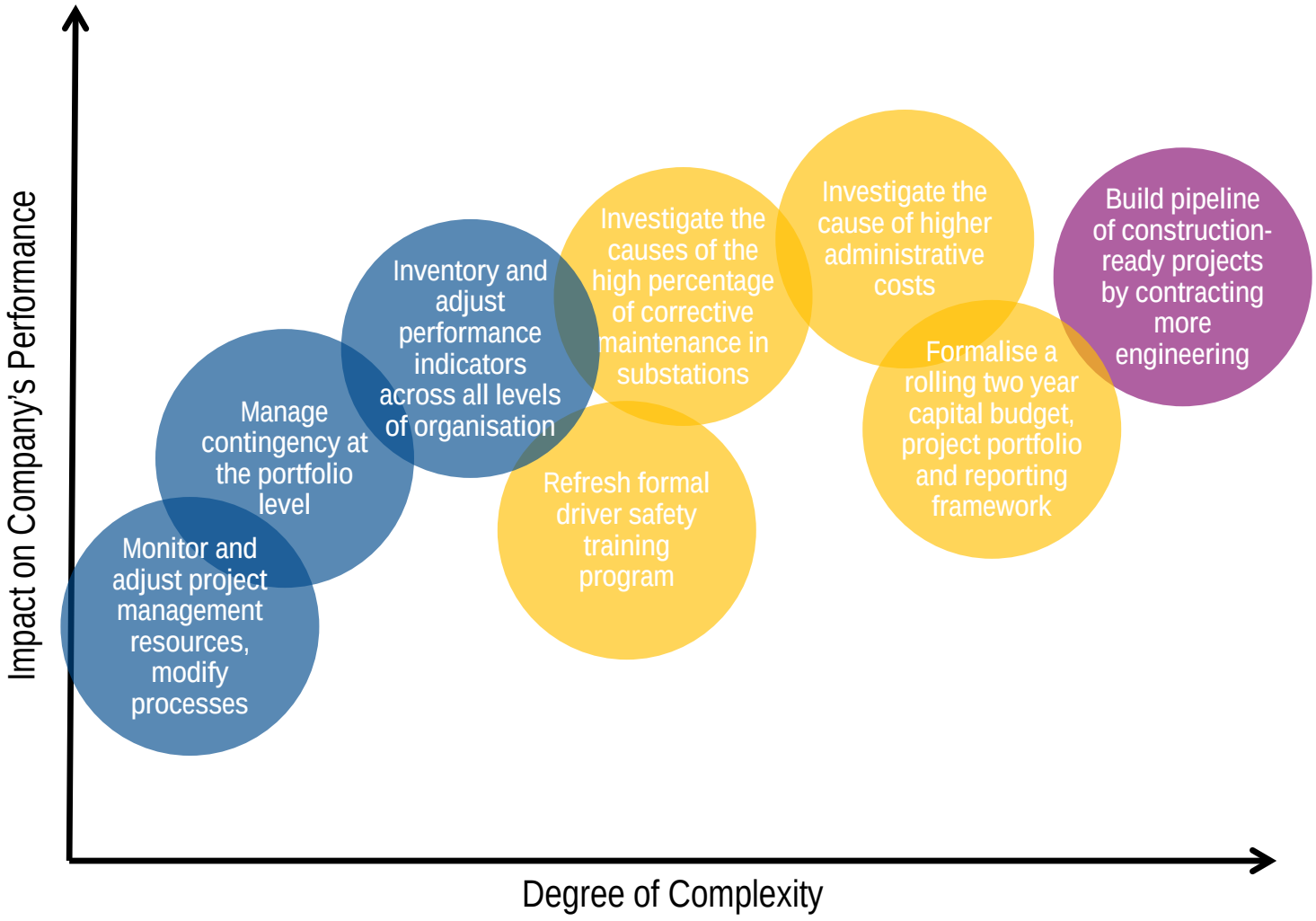

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Additional Supporting Slides

- Introduction

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Approach and Work Plan

DISCUSSION DRAFT
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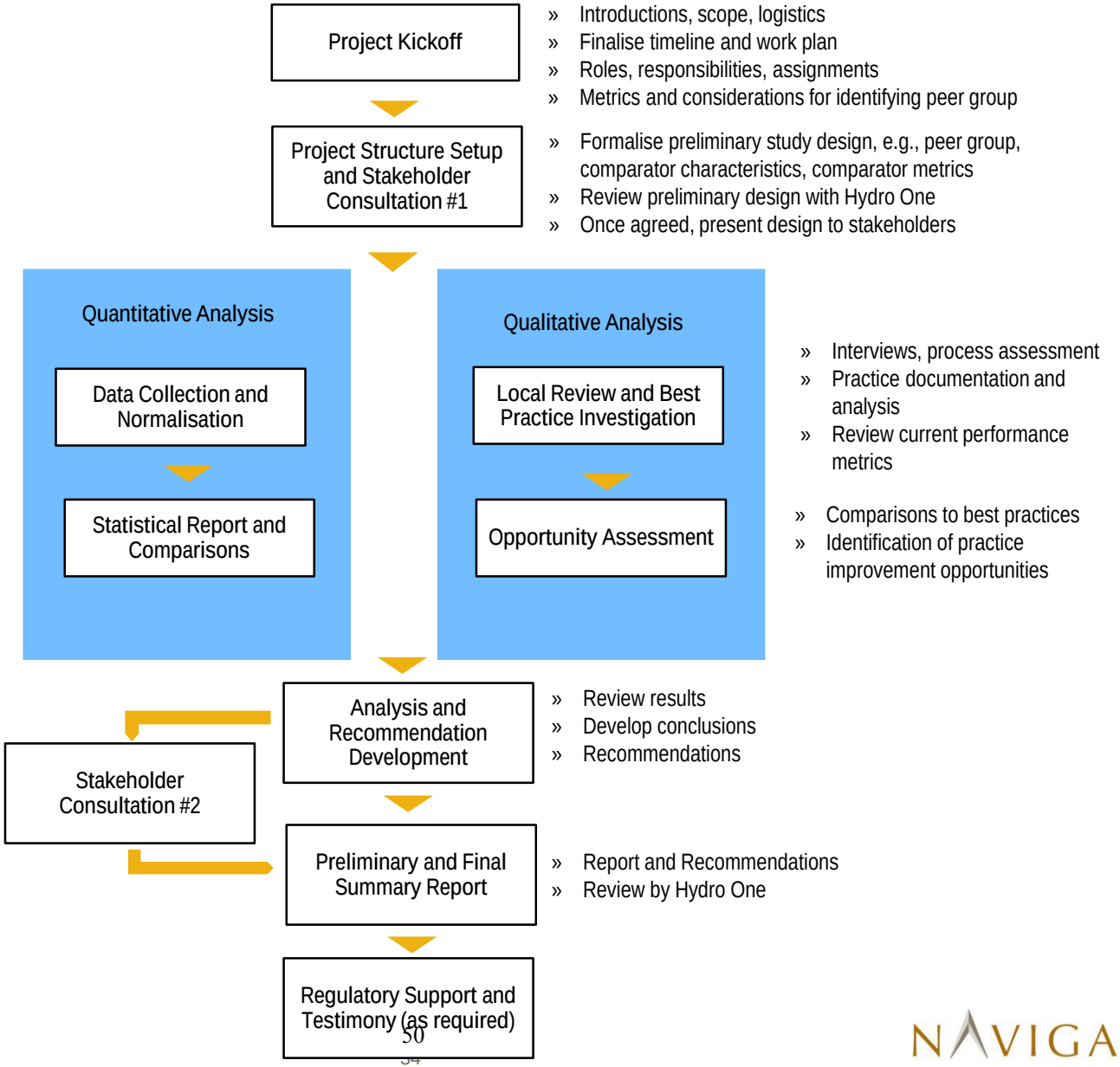

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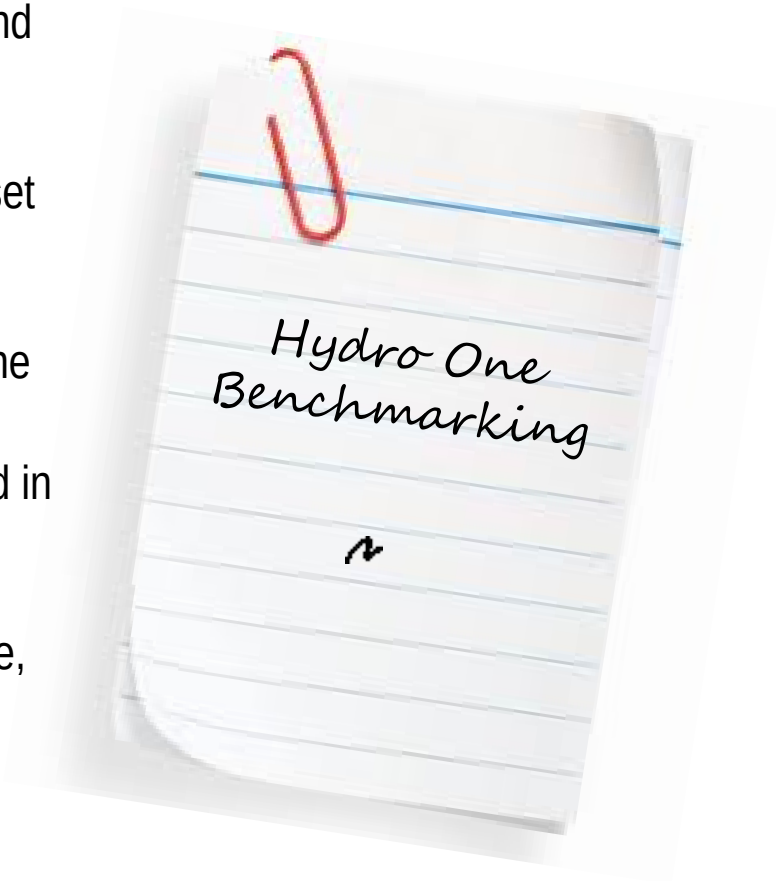
Report Notes

- Hydro One provided responses to a detailed questionnaire that covered transmission system costs, performance, and work practice information
- Additionally, Navigant and First Quartile interviewed 20 Hydro One management and technical staff from the asset management, engineering, operations, construction, and support areas
- This report generally examines 2014 data from Hydro One and the peer group utilities
- Only specific significant benchmark results are discussed in the following slides, a full set of comparison charts are available and will be included in the final report
- For data charts, comparison utilities, including Hydro One, are not shown in instances where data was not supplied
- Comparisons are provided for both activity based (i.e. spending in years) costs and FERC (i.e. plant-in service) costs
- The majority of comparisons are done on a per-asset (gross book value) basis
  - Asset value is the best predictor of expenditures of the available normalising factors (see appendix)



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Key Assumptions

DISCUSSION DRAFT
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- The capital expenditures (CAPEX) and operations and maintenance (O&M) expenses used in the report are aligned to those reported to FERC, using FERC accounting definitions
- O&M data was provided directly by the participating companies
- Administrative costs and corporate overheads for the operations, maintenance, and administrative (OM&A) comparisons was gathered from a combination of sources, directly from the companies and from FERC filings
- The report assumes costs reported utilising Generally Accepted Accounting Principles (GAAP)
  - The use of GAAP facilitates a readily consistent comparison of the selected benchmark panel
- Where applicable, costs are presented in Canadian dollars
  - The conversion rate used was the average exchange rate over the year as follows

Rate	2010	2011	2012	2013	2014
USD:CAD	0.9700	0.9987	0.9995	1.0300	1.1043

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Interviews Conducted

DISCUSSION DRAFT
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Name	Title
Colin Penny	SVP, Technology and CIO
Andy Stenning	VP, Stations & Operations
Chris Cooper	Director, Project Delivery
Alex Turpin	Director, Construction Services Lines
Rob Berardi	Director, Supply Chain
Scott McLachlan	Director, Planning Optimisation, Asset Management
Bing Young	Director, System Planning, Asset Management
CK Ng	Director, Transmission Asset Management
Kathy Moulton	Director, Quality Assurance and Operations Support, Provincial Lines
Keith Loyer	Manager, Work Management, Provincial Lines

Name	Title
Michelle Dunbar	Programs Process Specialist, Provincial Lines
Andrew Spencer	Director, Engineering Services
Ahmed Al-Tamimi	Team Lead, Project Engineering
Jason Brooksbank	Team Lead, Conceptual Engineering
Ibrahim Hathout	Manager, Transmission Lines Engineering
Joe Kim	Manager, Equipment Engineering, Standards and New Technology
Kathleen McCorriston	Director, Project Management
Mike Piggott	Director, Fleet Services
Tom Irvine	Director, Network Operating

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Peer Group Selection

DISCUSSION DRAFT
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» Goal of the selection process
  – The goal of the selection is to provide a comparison panel that is representative of the North American utility industry as a whole, so that Hydro One's relative performance can be understood in the context of the industry

» Selection process
  – Companies were identified such that some exhibit strong similarities to Hydro One, while others face different operating conditions
  – Many of the companies chosen are participants in the annual benchmark studies conducted by First Quartile Consulting, while others were identified based on assuring a representative population, including Canadian companies
  – In the end, all companies in the comparison panel had to agree to provide data for the comparisons, which means some desired companies are not represented

» The selected comparison group
  – The group has several large companies, some smaller ones, a geographic range across North America, regulatory circumstances that are both similar and different from Ontario, and weather patterns that include some companies with significant storm experience, and others without
  – Overall costs of the companies were compared against the population of companies who report to FERC; the results show that the comparison panel has slightly higher costs than the broader industry, including O&M, OM&A, and CAPEX (see appendix)

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Peer Group Statistics

DISCUSSION DRAFT
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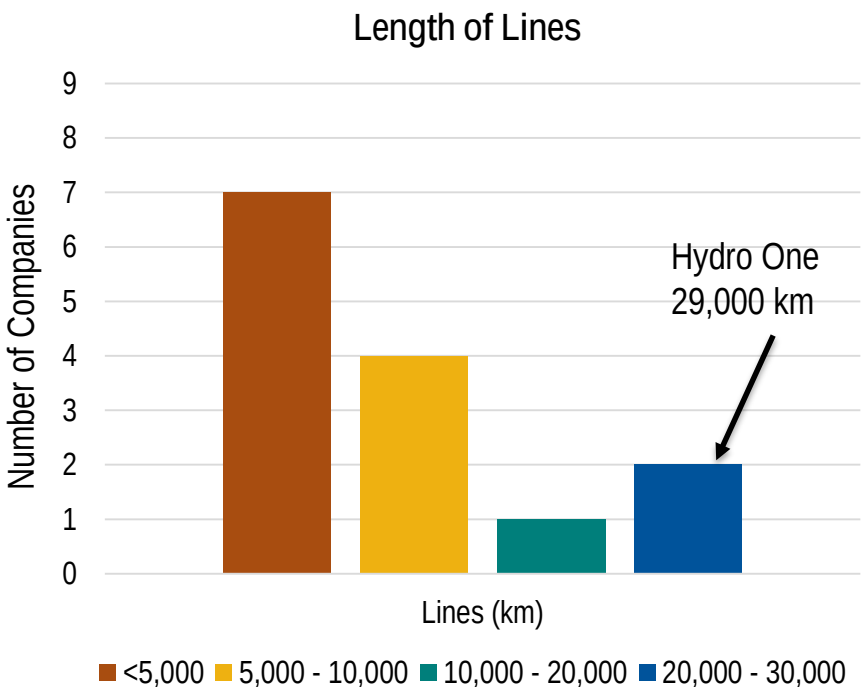

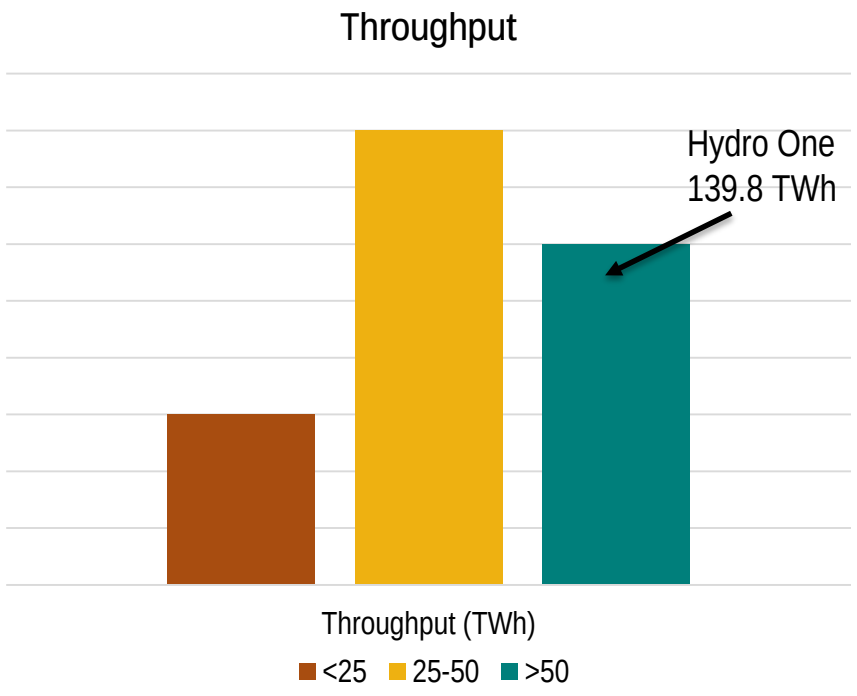

Peer Group Statistics

DISCUSSION DRAFT
SUBJECT TO CHANGE

Company	Ownership	Retail Open Access	Susceptible to Winter Storms	Susceptible to Summer Storms	Transmission (T) Distribution (D)
Baltimore Gas and Electric	IOU		S	T	T, D
BC Hydro	Provincial		S, I		T, D
CenterPoint Energy	IOU	Yes		T, H	T, D
Commonwealth Edison	IOU	Yes	I, S	T	T, D
CPS Energy	Municipal	Yes		T	T, D
East Kentucky Power Coop.	Cooperative	-	I, S	T	T
Hydro One Networks	Provincial/IOU	Yes	I, S	T	T, D
Kansas City Power & Light	IOU		I, S	T, H	T, D
Manitoba Hydro	Provincial		I, S	H	T, D
Oncor Electric Delivery	IOU	Yes	I, S		T, D
PECO Energy	IOU	Yes	S		T, D
PPL Electric Utilities	IOU	Yes	I, S		T, D
Public Service Electric & Gas	IOU		I, S	T	T, D
SaskPower	Provincial		S, I	T	T, D
Southern California Edison	IOU	Yes			T, D
Tucson Electric Power	IOU			T	T, D
Westar Energy	IOU		I, S	T, H	T, D

I - Ice Storms S – Snowstorms H – Hurricanes, Tornados T – Thunderstorms, Wind

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Peer Companies – All Years

DISCUSSION DRAFT
SUBJECT TO CHANGE

- For the multi-year trend benchmarking, the peer group companies change slightly
- The majority of the peer group companies used to benchmark current year cost (2014) remain in the panel throughout

Company	2014YE	2013YE	2012YE	2011YE	2010YE
East Kentucky	x				
PPL Electric Utilities	x	x		x	
Austin Energy	x	x	x	x	x
Oncor Electric Delivery	x	x	x	x	x
PSE&G	x	x	x	x	
Exelon - ComEd	x	x	x	x	x
Southern California Edison	x				
Westar Energy	x	x	x	x	x
Exelon - PECO Energy	x	x	x	x	x
Hydro One	x	x	x	x	x
PSEG Long Island	x	x			
Tucson Electric Power	x	x	x	x	x
BC Hydro	x	x	x	x	x
CPS Energy	x	x	x	x	x
Hydro-Québec	x	x	x	x	x
KCP&L	x	x	x	x	x
CenterPoint Energy	x	x	x	x	x
Exelon - BGE	x	x	x	x	x
Chelan County PUD		x			
Northwestern Energy		x			
DTE Energy		x		x	
Public Service of New Mexico			x		
Arizona Public Service			x		
Texas-New Mexico Power			x		
We Energies			x	x	x
Central Maine Power				x	x
El Paso Electric				x	x
LGE&KU				x	x
New York State Electric & Gas				x	x
Omaha Public Power District				x	x
Puget Sound Energy				x	x
Rochester G&E				x	x

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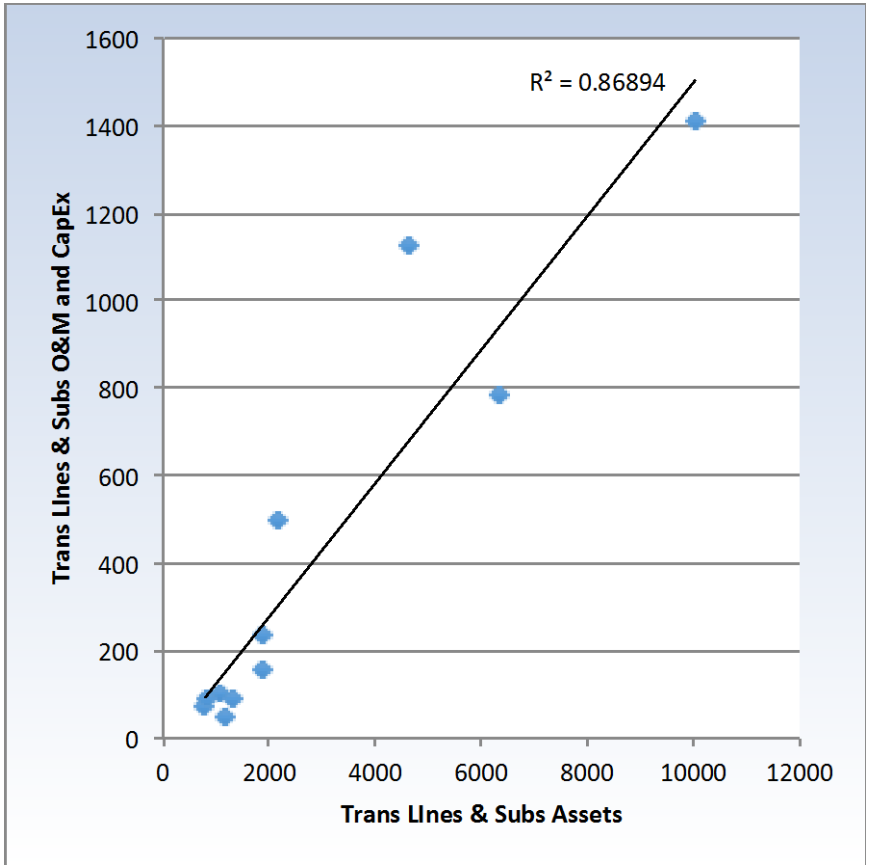
Analysis of Normalising Factors

DISCUSSION DRAFT
SUBJECT TO CHANGE

Total Transmission Costs predicted by Total Asset Value



Note: each dot on the graph represents a company in the peer panel. To avoid bias, Hydro One is deliberately excluded from this analysis.

- When analysing the usefulness of normalising factors for costs, we evaluate the ability of a given independent variable to predict the cost value
- Various different independent variables have been tested periodically over a 20-year time span, with generally consistent results
- The chart at left shows the use of total assets to predict the total transmission costs for a group of companies
- The r^2 value is a measure of the predictive ability of the independent variable (assets) on the total cost
- A value of 1.0 is a perfect predictor, so .87 as shown is extremely good as a predictor

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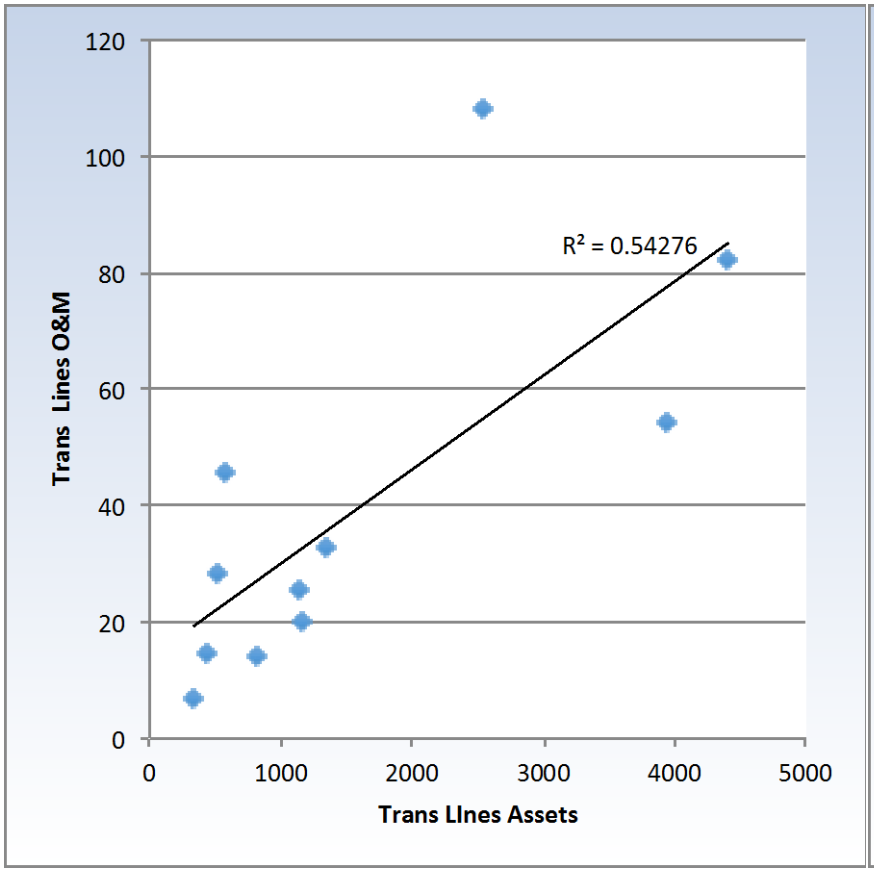
Analysis of Normalising Factors

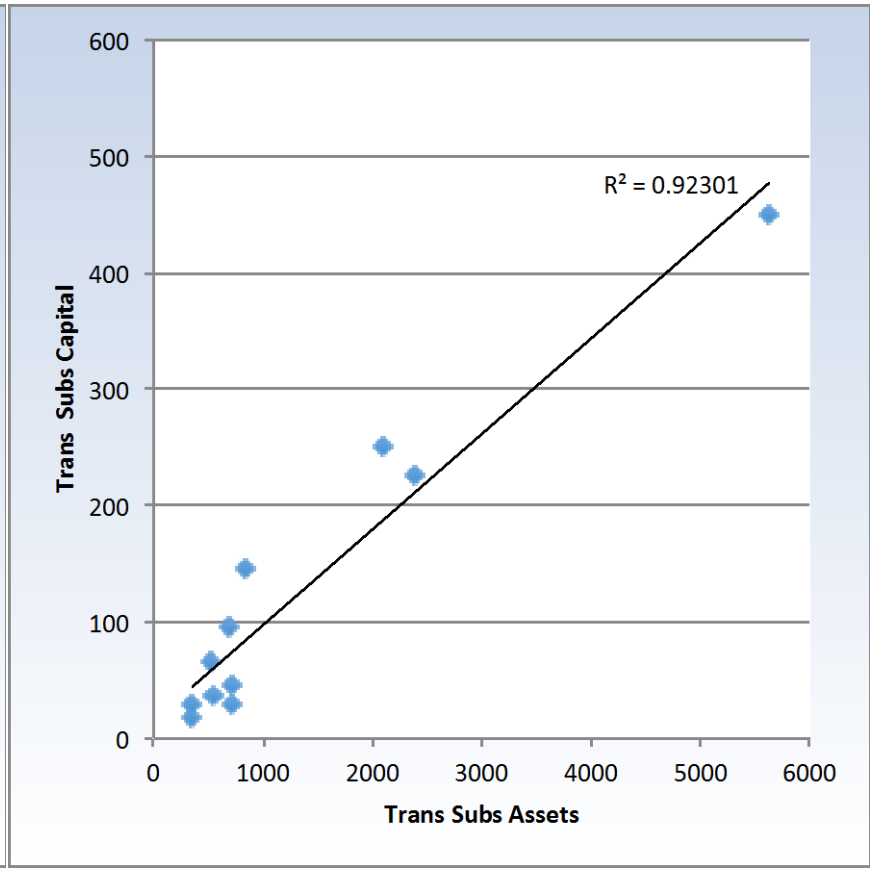
DISCUSSION DRAFT
SUBJECT TO CHANGE

» Examples of the predictive capability of Assets on various cost elements

Transmission Line O&M predicted by Lines Asset Value



Transmission Subs CAPEX predicted by Subs Asset Value



Note: Each dot on the graphs represents a company in the peer panel. To avoid bias, Hydro One is deliberately excluded from this analysis.

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Analysis of Normalising Factors

DISCUSSION DRAFT
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» The table below shows, for a series of cost elements, the related R^2 value of the predictive variable tested

» As can be seen from the table, the Asset value is either the best or the 2nd best predictor in each cost category, while throughput (MWh transmitted) is the poorest predictor in each category

Lines & Substations	Assets	Line Miles	MWh Sold	MWh Transmitted
O&M	0.6151	0.5112	0.3680	0.2542
CAPEX	0.8780	0.8348	0.4851	0.3127
O&M + CAPEX	0.8689	0.8184	0.6116	0.3127
Substations Only	**Assets**	**Line Miles**	**MVA**	
O&M	0.7666	0.3529	0.3164	
CAPEX	0.9230	0.6505	0.4322	
O&M + CAPEX	0.9288	0.6374	0.4292	
Lines Only	**Assets**	**Line Miles**	**MWh Sold**	**MWh Transmitted**
O&M	0.5428	0.5243	0.3658	0.2439
CAPEX	0.8223	0.8467	0.4154	0.2623
O&M + CAPEX	0.8087	0.8312	0.4187	0.2663

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Peer Panel versus Industry

» The peer panel used for the study was compared against the entire group of companies reporting to FERC

» Net results show the peer panel is slightly higher cost than the FERC population

	Panel		FERC Population	
OM&A per Asset	Q1: Median: Q3:	3.44% 6.18% 9.51%	Q1: Median: Q3:	3.53% 4.69% 8.04%
CAPEX per Asset	Q1: Median: Q3:	4.90% 10.92% 13.42%	Q1: Median: Q3:	4.15% 6.57% 9.66%
OM&A + CAPEX per Asset	Q1: Median: Q3:	13.24% 14.54% 22.71%	Q1: Median: Q3:	9.92% 12.99% 17.70%

CAPEX used for this comparison is different from the CAPEX used for rest of the report. CAPEX is actual FERC reported additions for all companies.

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Additional Supporting Slides

- Cost Analysis

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Direct O&M and CAPEX

DISCUSSION DRAFT
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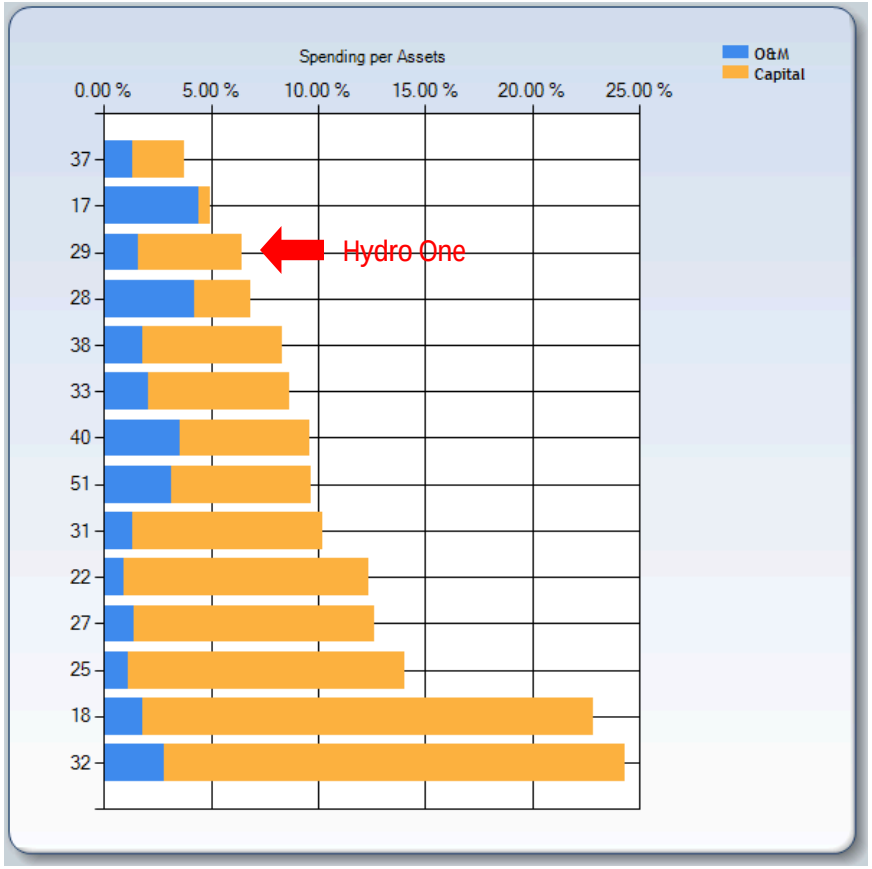
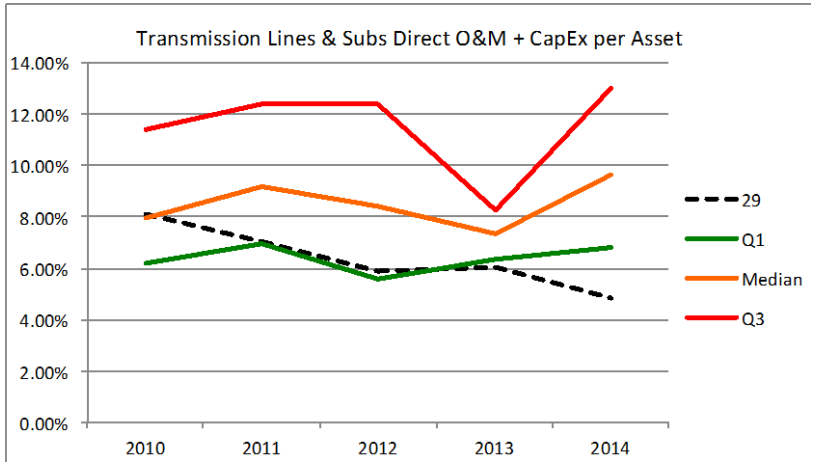
Transmission Lines and Substation
Direct O&M + CAPEX (FERC) per Asset



» Hydro One's direct transmission lines and substations O&M + CAPEX is among the lowest in the peer group (~6.5%)
  – Note, this excludes administrative costs and corporate allocations
  – Costs are normalised across the utilities based on the gross book value of the assets

Transmission Lines and Substations
Direct O&M + CAPEX Trend



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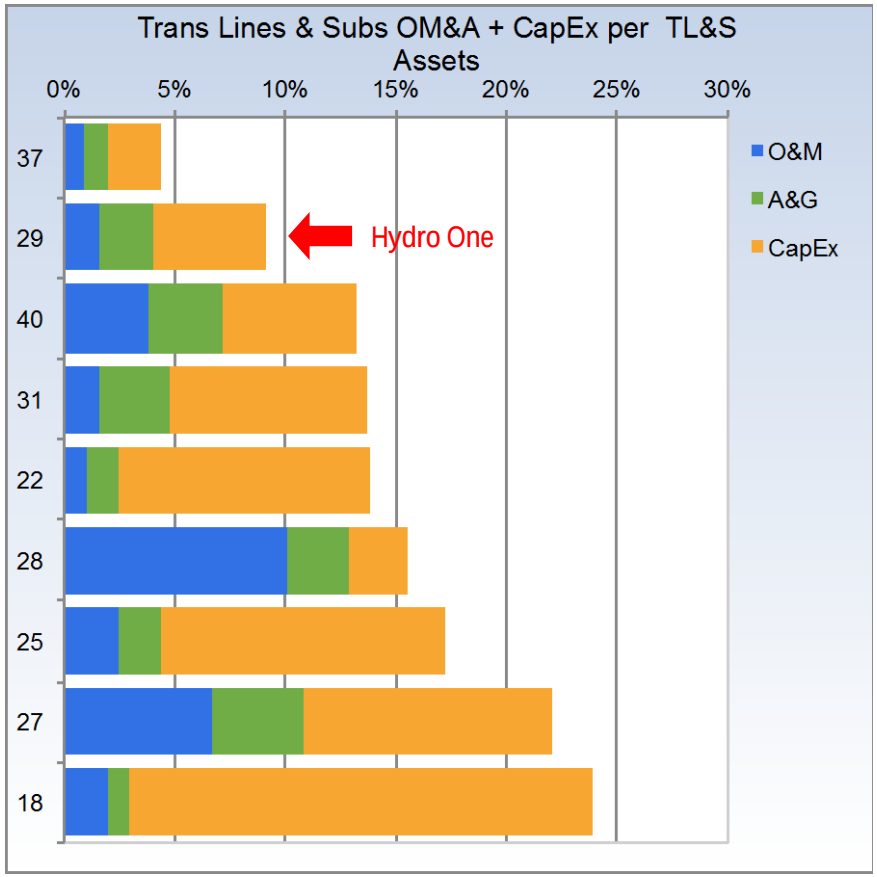
Total OM&A + CAPEX

DISCUSSION DRAFT
SUBJECT TO CHANGE

Transmission Lines and Substations
OM&A + CAPEX (FERC) per Asset Value



Costs include all overhead and corporate allocations

» When administrative and corporate overheads are included, Hydro One's total cost for transmission lines and substations is still among the lowest in the peer panel

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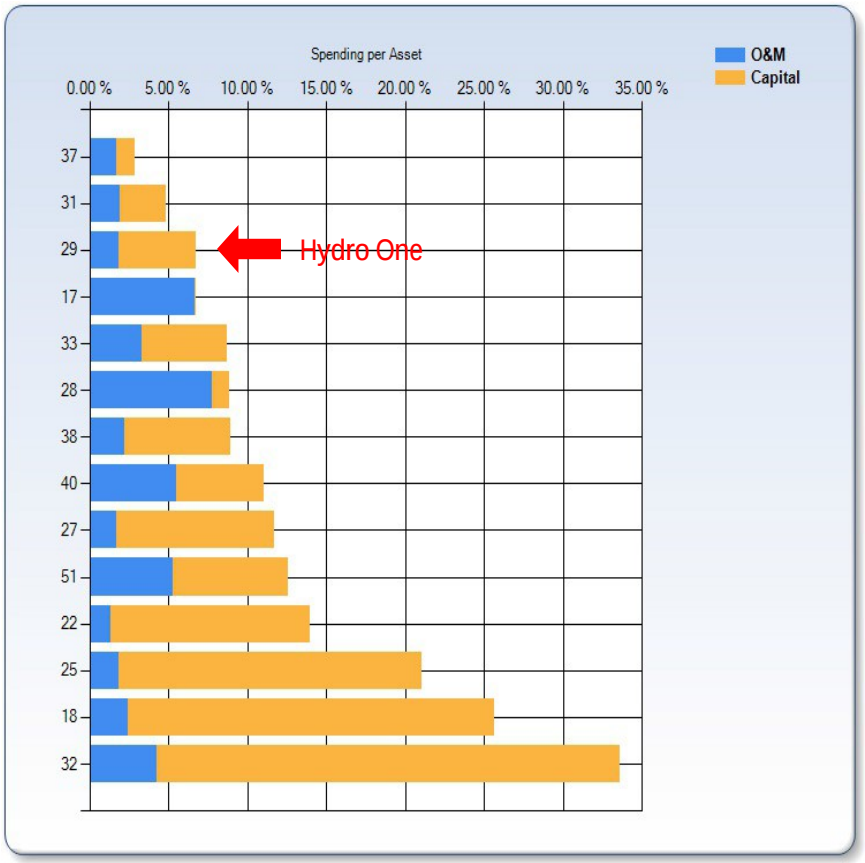
Lines Direct O&M + CAPEX

DISCUSSION DRAFT
SUBJECT TO CHANGE

Transmission Lines
O&M + CAPEX (FERC) per Asset Value



Costs do not include any overhead or corporate allocations

- When spending for just transmission lines is reviewed, Hydro One is among the lowest of the comparison panel
- Capital investment in transmission lines assets is also very low

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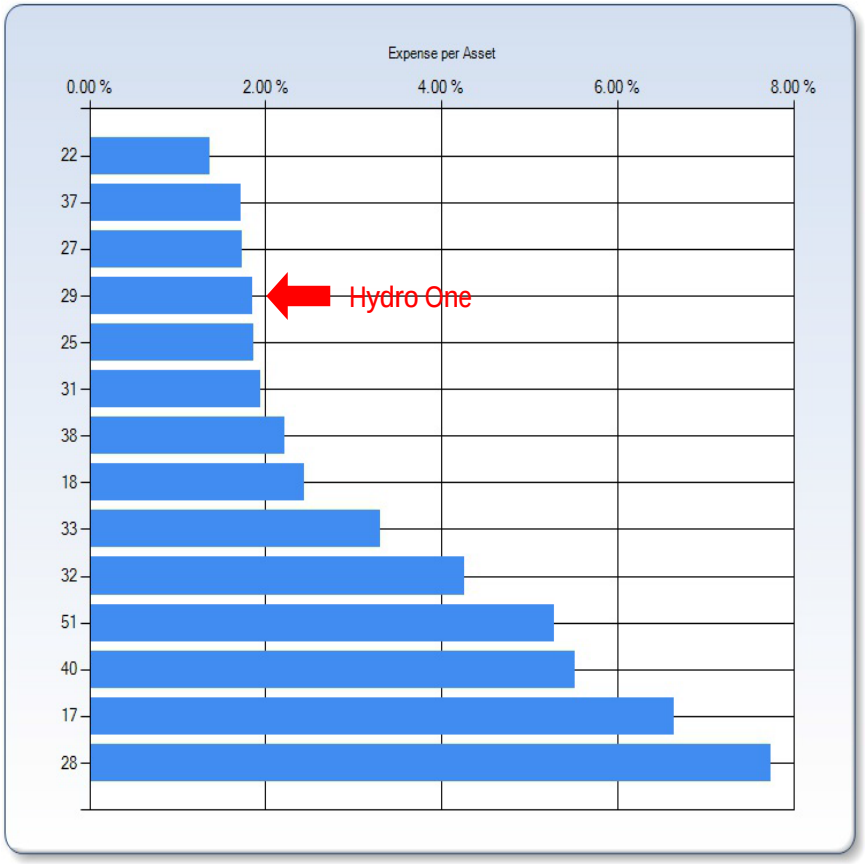
Direct Lines O&M

DISCUSSION DRAFT
SUBJECT TO CHANGE

Transmission Lines
O&M per Asset Value



Costs do not include any overhead or corporate allocations

» Hydro One's transmission lines O&M is among the lowest of the comparison panel

Note: Assets are valued at gross value, not net of depreciation

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Direct Lines O&M Trend

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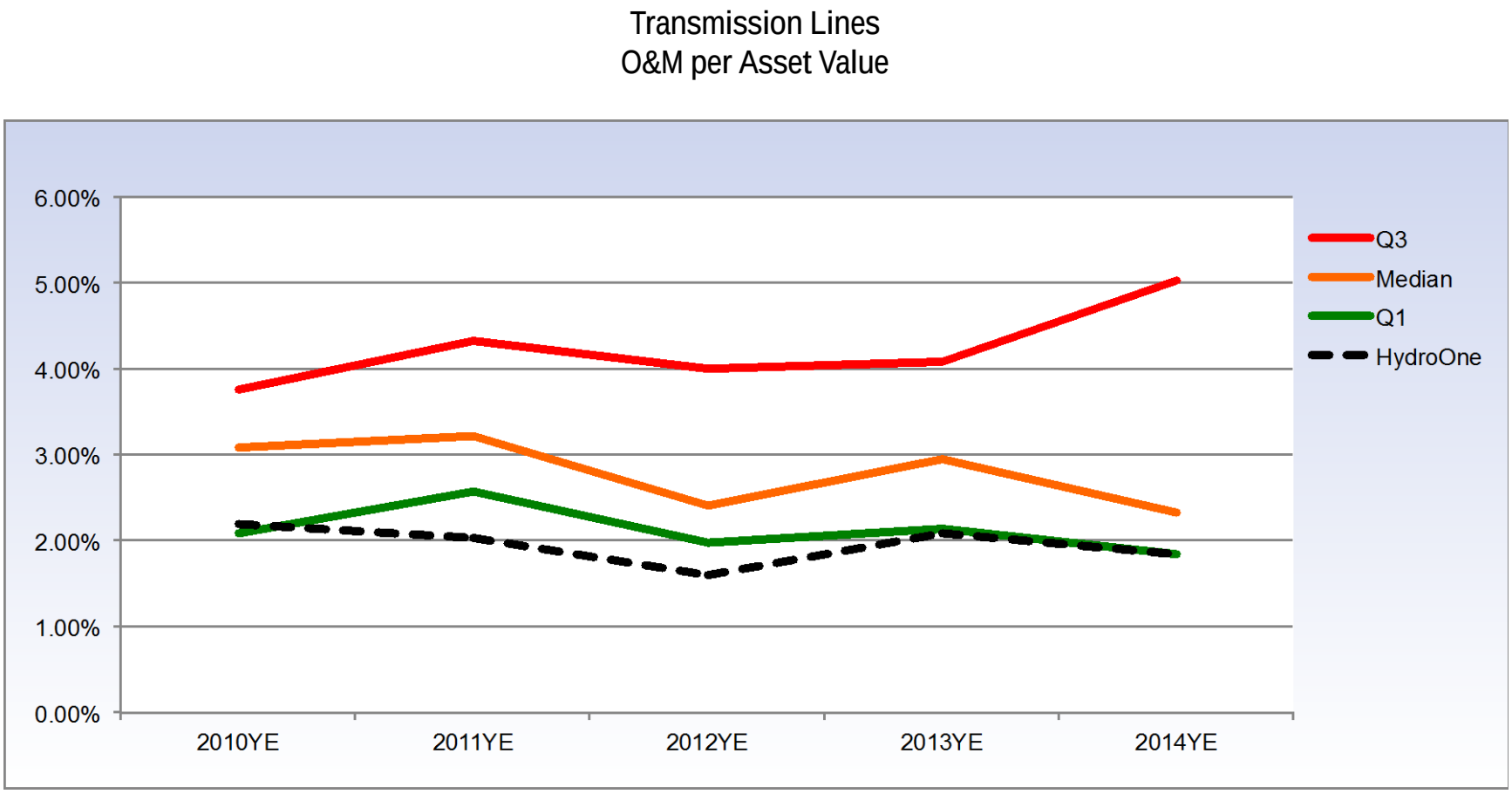
» Transmission lines O&M spending is low for Hydro One



Costs do not include any overhead or corporate allocations

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Direct Lines O&M (Activity Based)

DISCUSSION DRAFT
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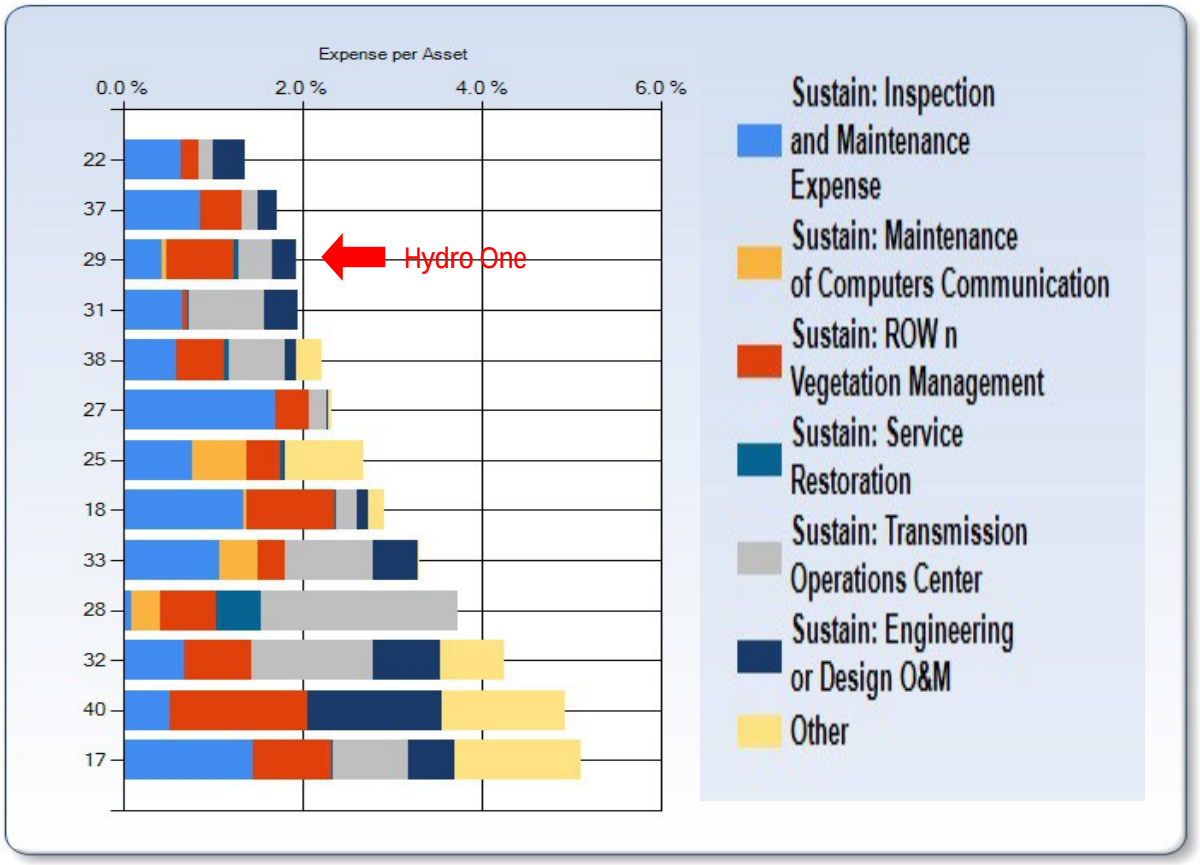
Transmission Lines
O&M (Activity Based) per Asset Value



Costs do not include any overhead or corporate allocations

- With the activity-based comparisons, the conclusion remains consistent, Hydro One's transmission line O&M spending is low
- Approximately half of the direct O&M spend is on vegetation management

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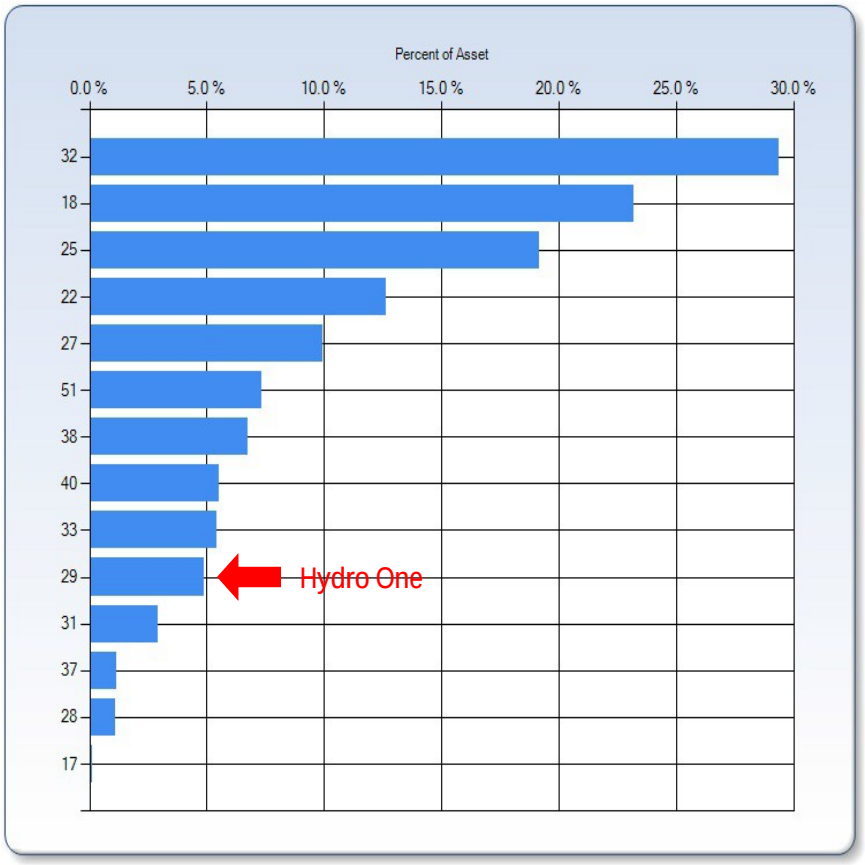
Direct Lines CAPEX

Transmission Lines
CAPEX (FERC) per Asset Value



Costs do not include any overhead or corporate allocations

- Hydro One's total capital investment in transmission lines (sustainment and development) is low relative to the comparison group (~5.0%)
- The highest spenders are typically experiencing significant growth

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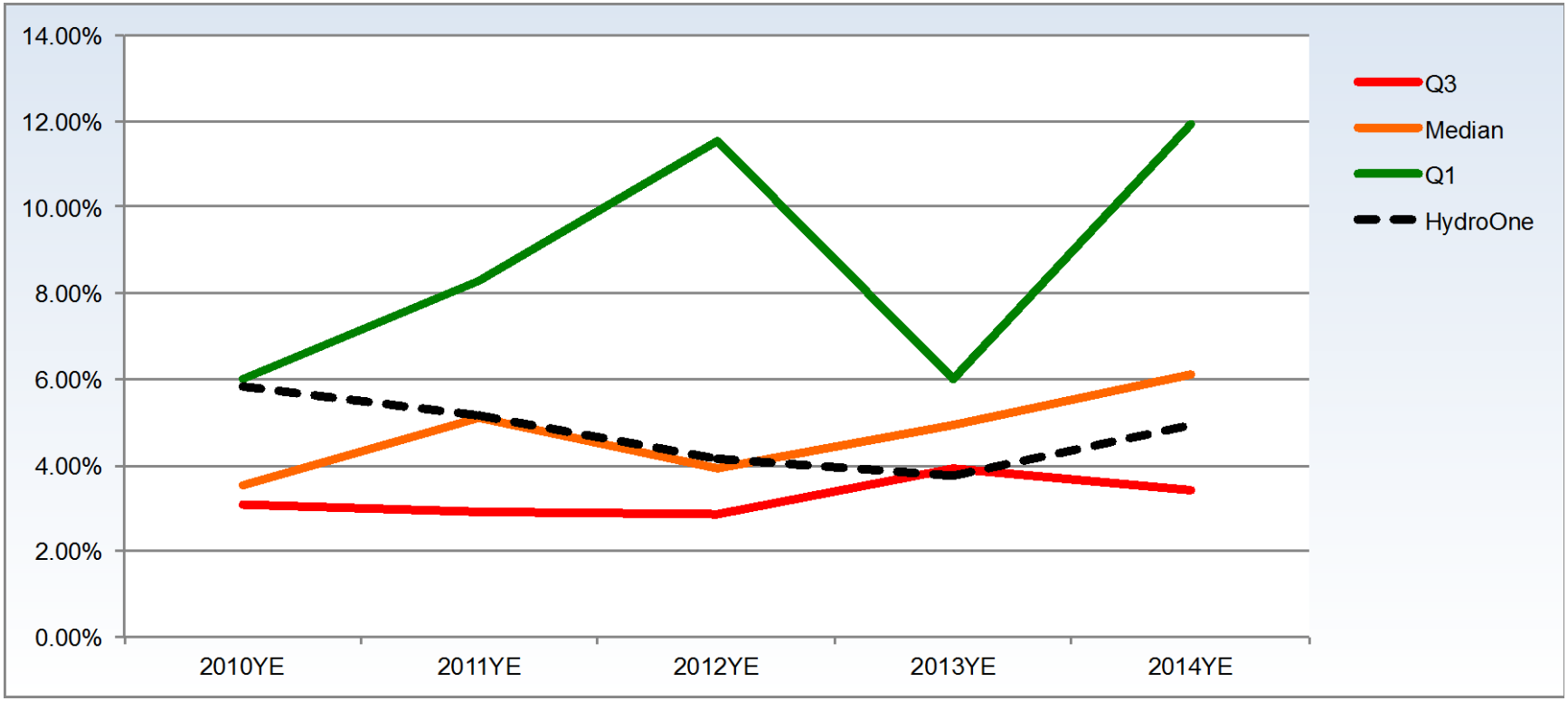
Lines CAPEX Trend

DISCUSSION DRAFT
SUBJECT TO CHANGE

» Hydro One capital investment in its transmission assets increased in 2014 but the overall trend is downward

» Also Hydro One generally lags in transmission investment versus the benchmark panel

Transmission Lines
CAPEX (FERC) per Asset Value



Costs do not include any overhead or corporate allocations

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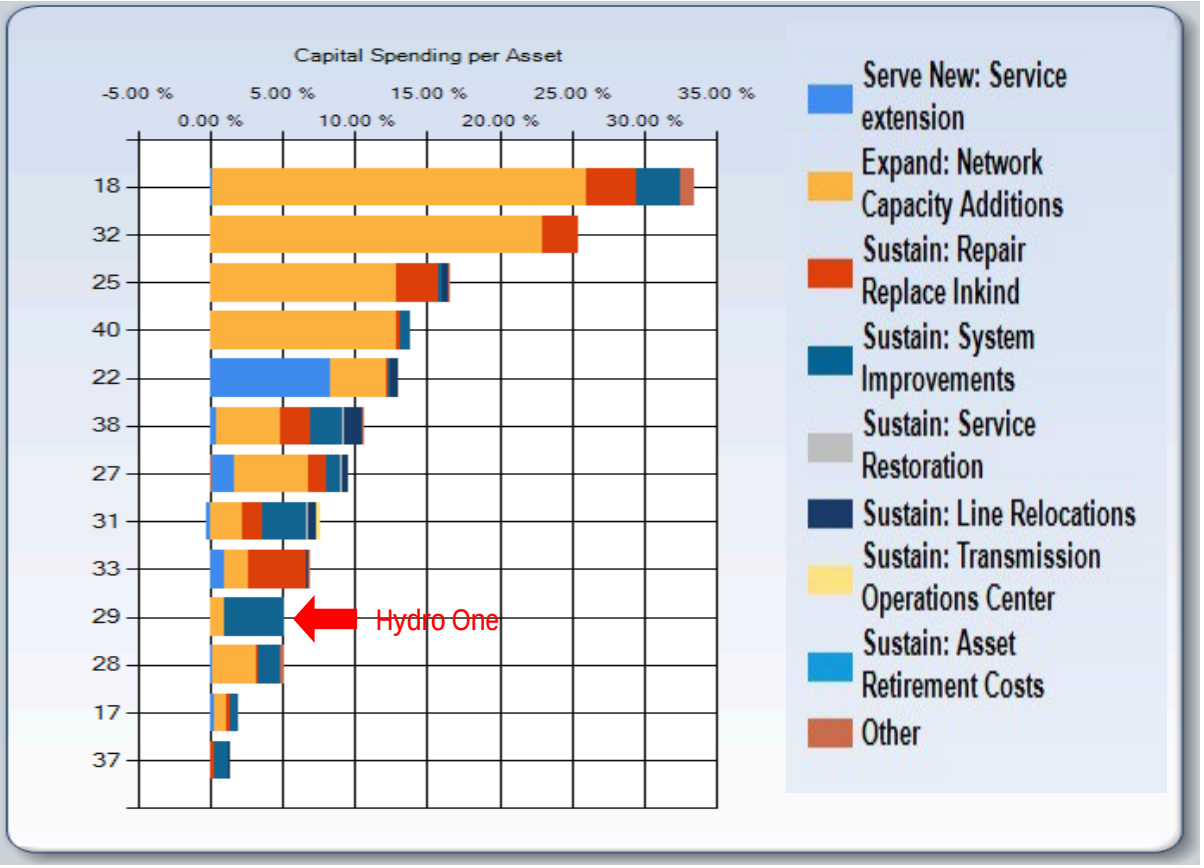
Lines CAPEX (Activity Based)

DISCUSSION DRAFT
SUBJECT TO CHANGE

Transmission Lines
CAPEX (Activity Based) per Asset Value



Costs do not include any overhead or corporate allocations

- With the activity-based comparisons the conclusion remains consistent, transmission line capital investment is low
- Sustainment capital is approximately 80% of the total capital spend for lines (~4.0%)
  - This implies a replacement rate of approximately 25 years at historic costs; and likely closer to 50 or 60 years at current costs

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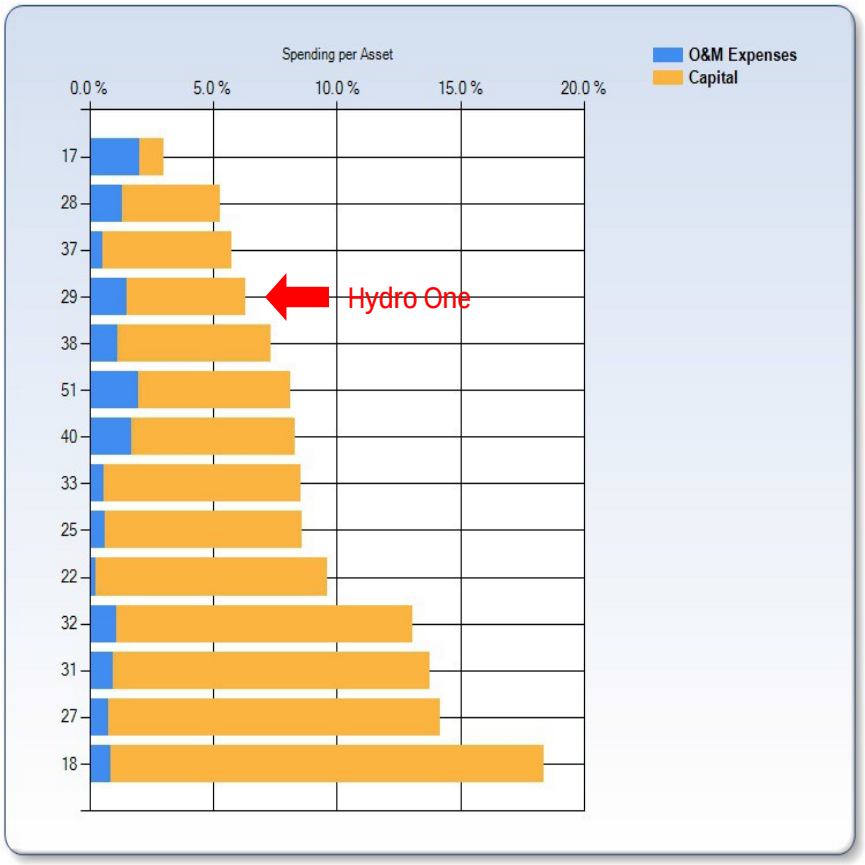
Substation O&M + CAPEX

DISCUSSION DRAFT
SUBJECT TO CHANGE

Substations
O&M + CAPEX (FERC) per Asset Value



Costs do not include any overhead or corporate allocations

» Hydro One's substation spending for CAPEX and O&M is below average

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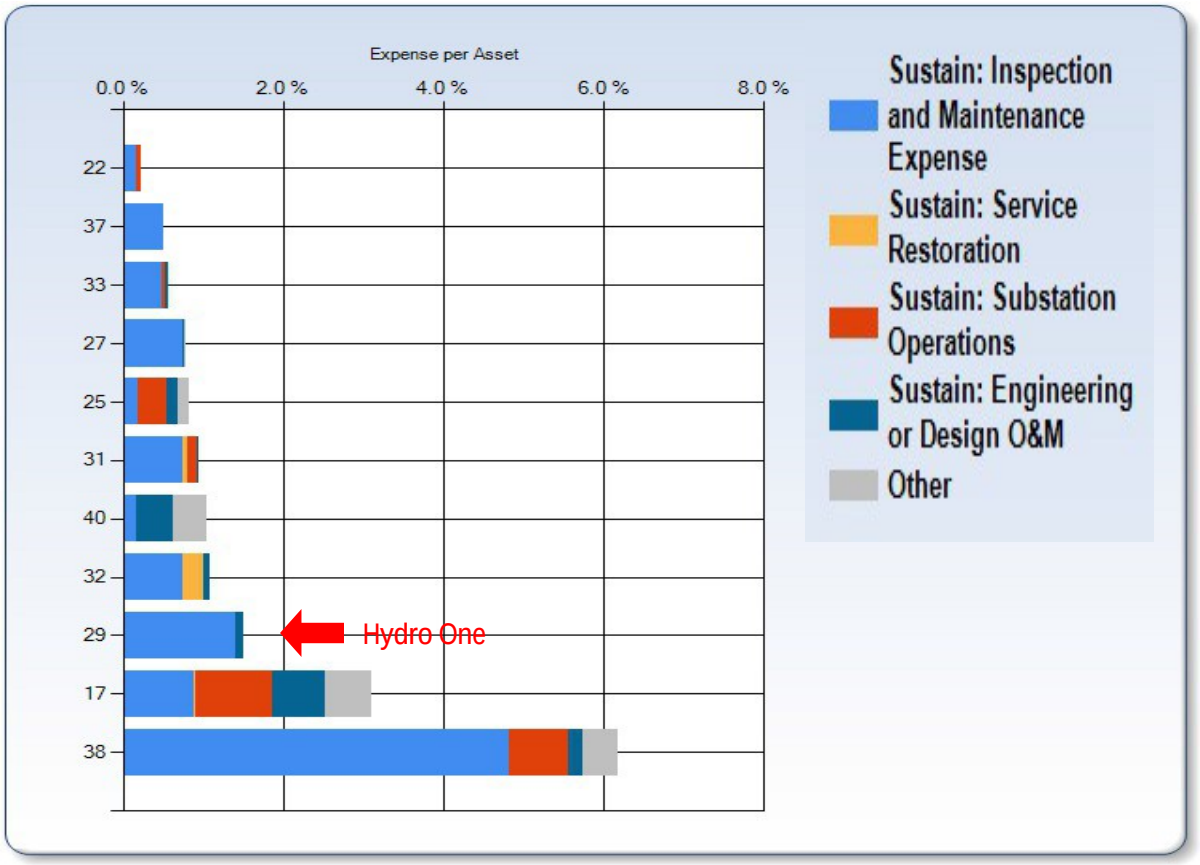
Substation O&M (Activity Based)

Substation
O&M (Activity Based) per Asset Value



Costs do not include any overhead or corporate allocations

» With the activity-based comparisons, the conclusion remains consistent, Hydro One's substation O&M spending is high

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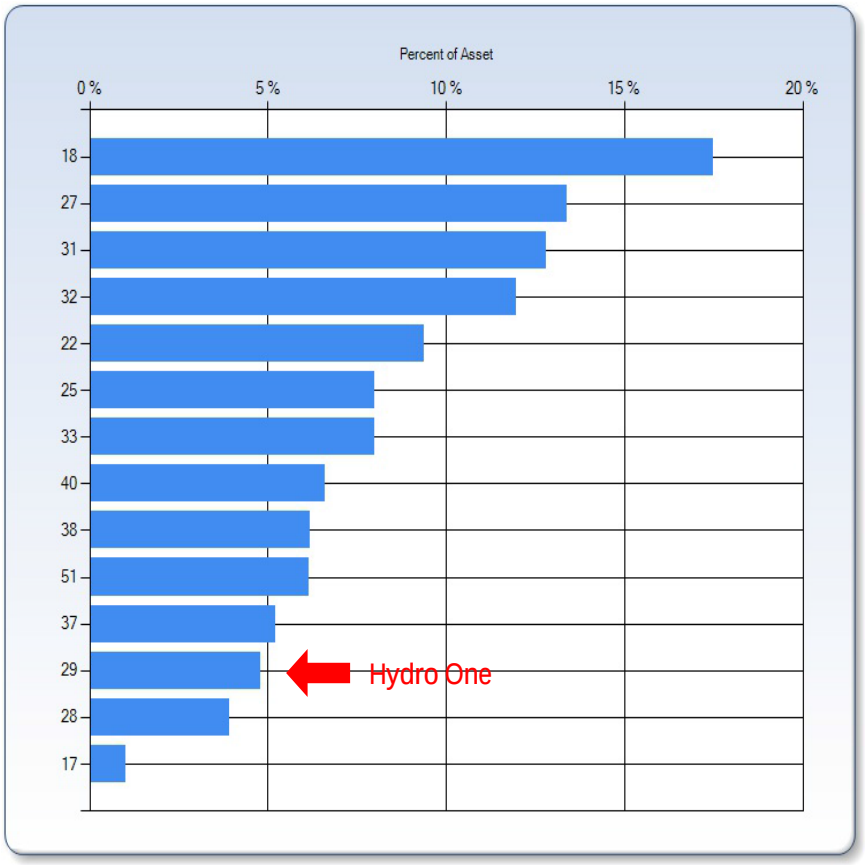
Substation CAPEX

DISCUSSION DRAFT
SUBJECT TO CHANGE

Substation
CAPEX (FERC) per Asset Value



Costs do not include any overhead or corporate allocations

» Hydro One's Substation capital investment, like that for transmission lines, is low versus the peer group (~5%)

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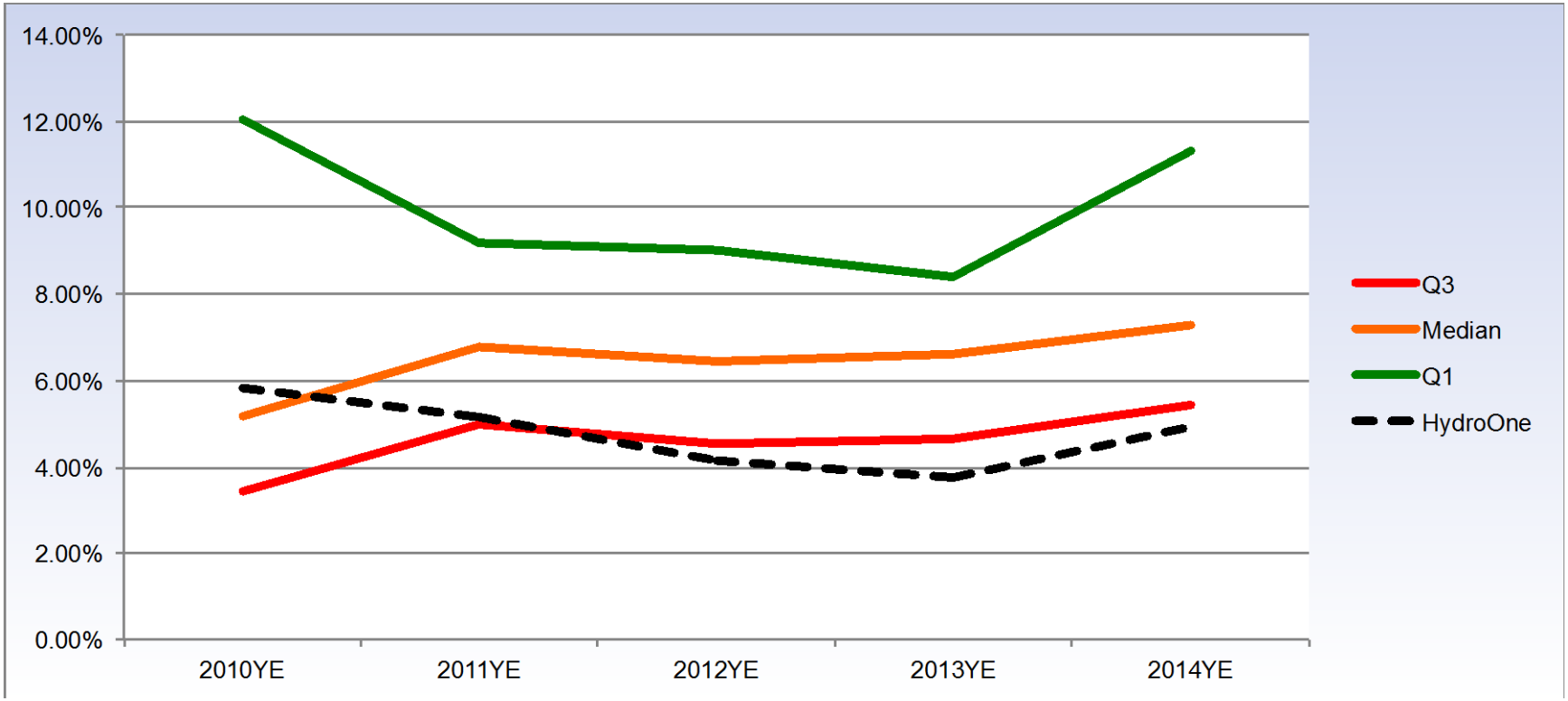
Substation CAPEX Trend

DISCUSSION DRAFT
SUBJECT TO CHANGE

» Hydro One capital investment in its substation assets has decreased over the five year period

» Hydro One generally lags in substation investment versus the benchmark panel

Substations
CAPEX (FERC) per Asset Value



Costs do not include any overhead or corporate allocations

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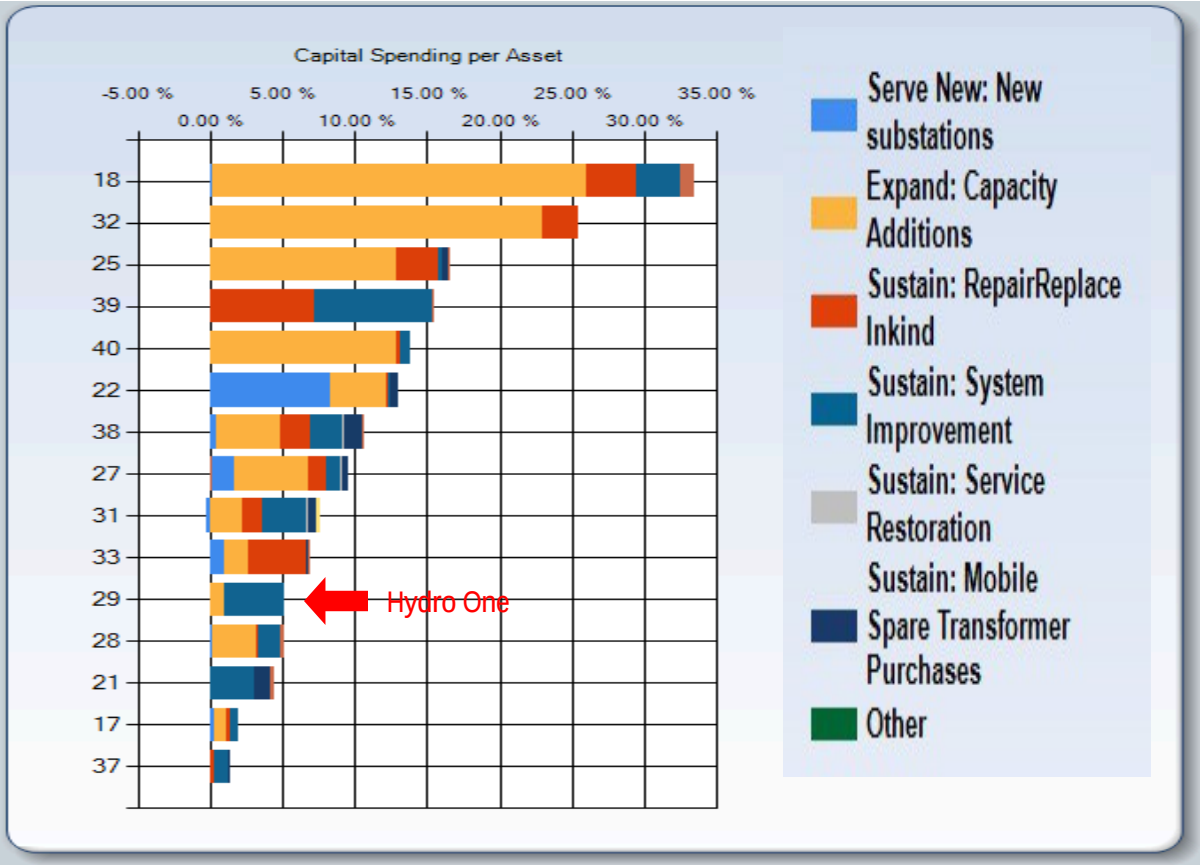
Substation CAPEX (Activity Based)

DISCUSSION DRAFT
SUBJECT TO CHANGE

Substation
CAPEX (Activity Based) per Asset Value



Costs do not include any overhead or corporate allocations

- With the activity-based comparisons, the conclusion remains consistent, Hydro One's substation capital investment is low
- Sustainment capital is approximately 80% of the total capital spend for lines (~4.0%)
  - This implies a replacement rate of approximately 25 years

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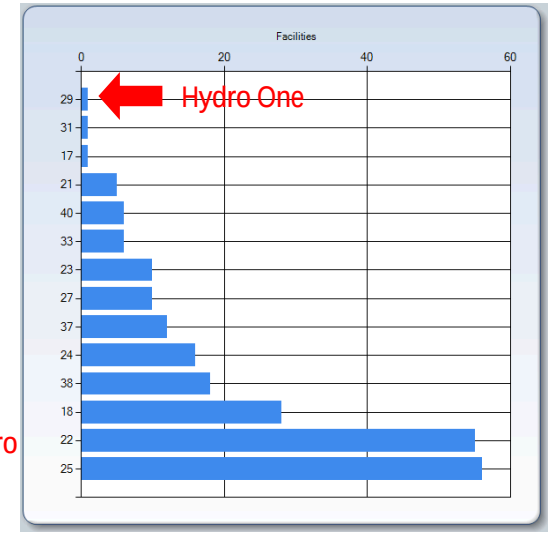
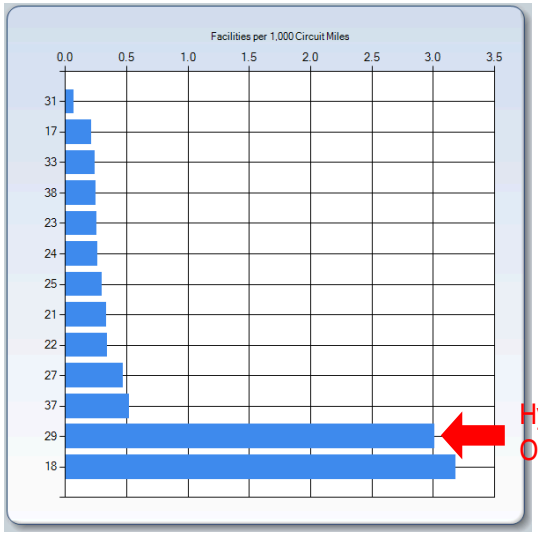
Inventory

Company-operated Storerooms

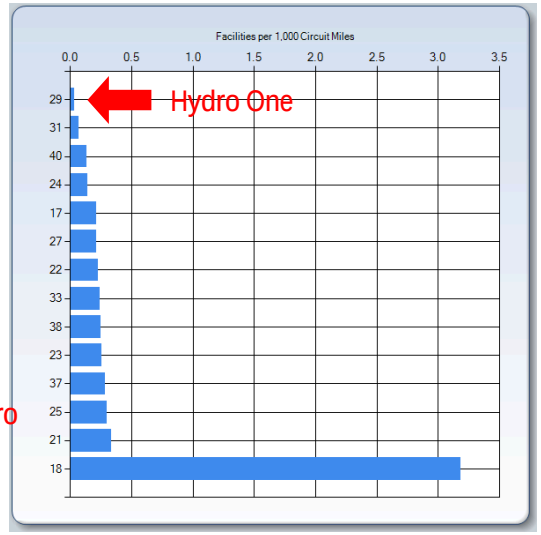
Fully-staffed Warehouses



Storerooms per 1000 Circuit Miles



Warehouses per Circuit Mile



- Inventory level and turns are reasonable but carrying costs are high
- Hydro One operates 81 field store locations which are serviced by 29 provincial lines stock keepers (a ratio of approximately 2.8 store locations per stock keeper) and one distribution centre (Barrie Warehouse) serviced by nine supply chain stock keepers

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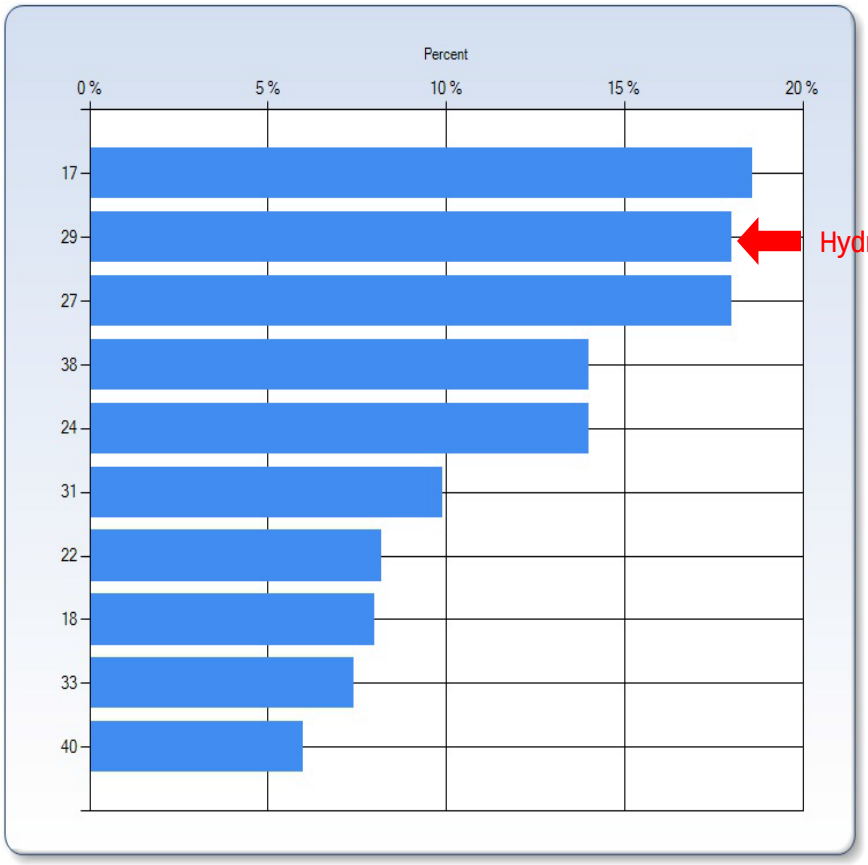
Inventory Loading Rate

Stores Loading Rate
Transmission and Distribution



» Higher stores loading rate (approximately 18%) is likely driven by the number of storerooms (>80) operated across Hydro One's territory

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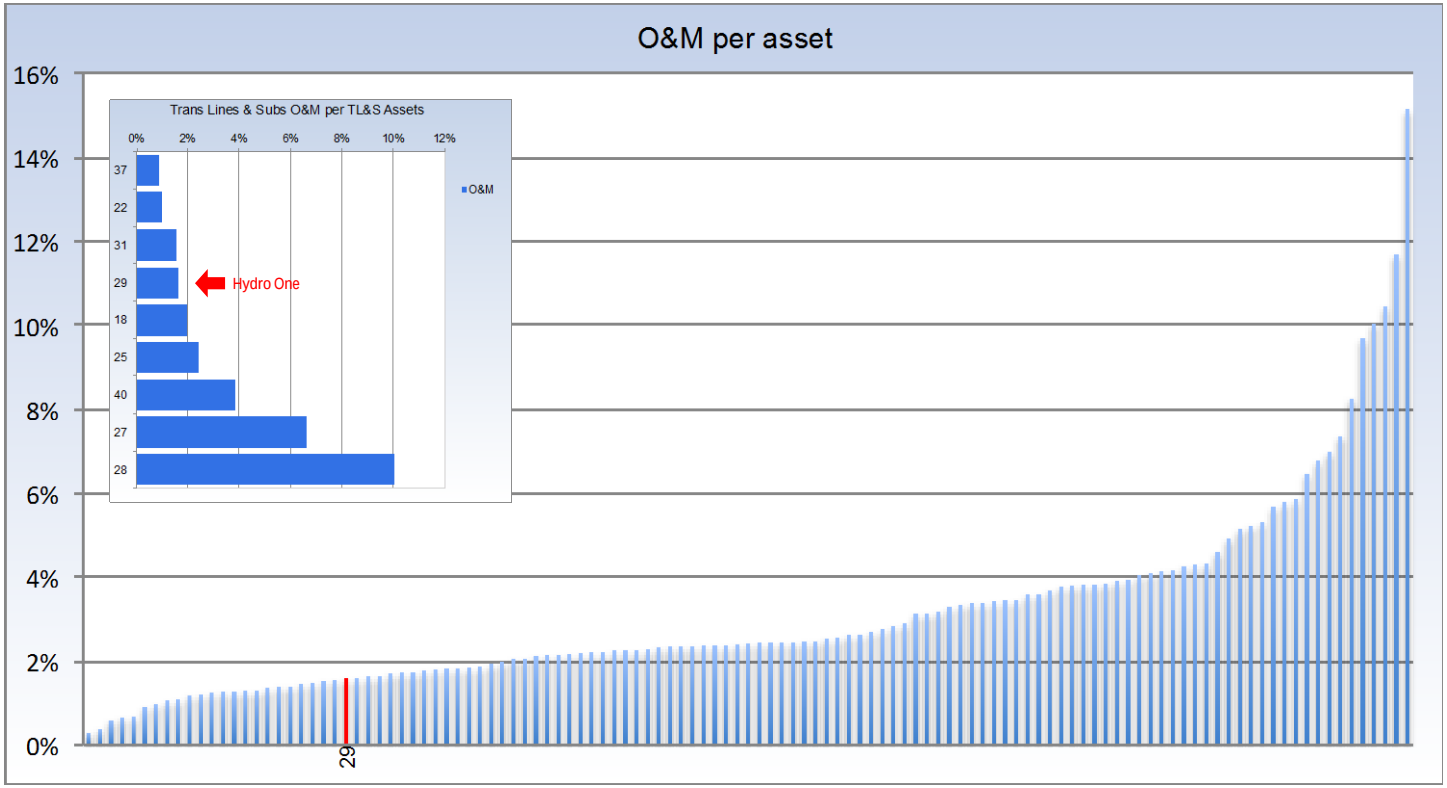
O&M per Asset

» For direct O&M, Hydro One's relative position within the benchmark panel and the broader array of companies who report to FERC is approximately the same



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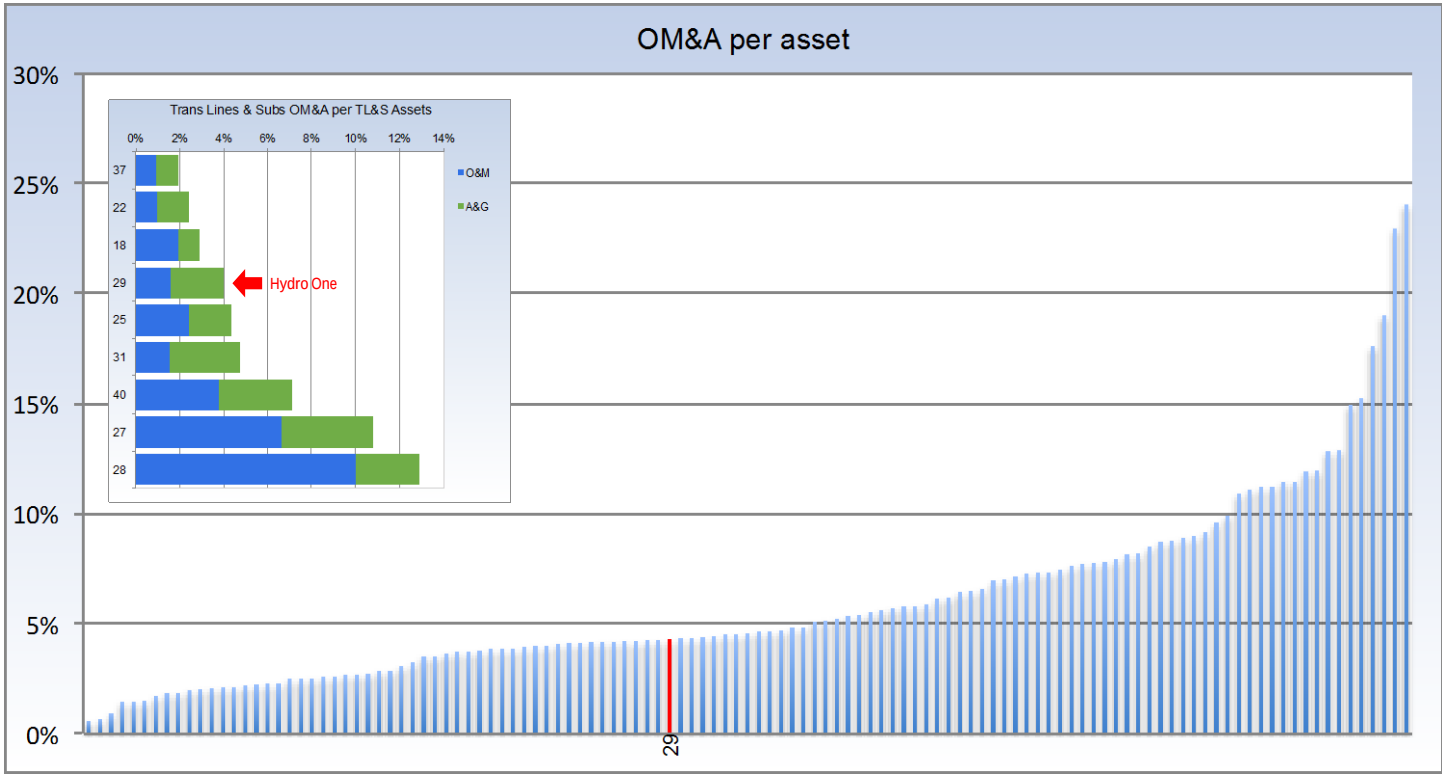
OM&A per Asset

DISCUSSION DRAFT
SUBJECT TO CHANGE

» When OM&A is compared, Hydro One's relative position within the benchmark comparison panel is roughly the same as in the broader FERC-reporting panel, at slightly below the median value

» The inclusion of the administrative costs in addition to direct O&M changes Hydro One's relative position from first quartile to second quartile (just below the median)



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CAPEX per Asset

DISCUSSION DRAFT
SUBJECT TO CHANGE

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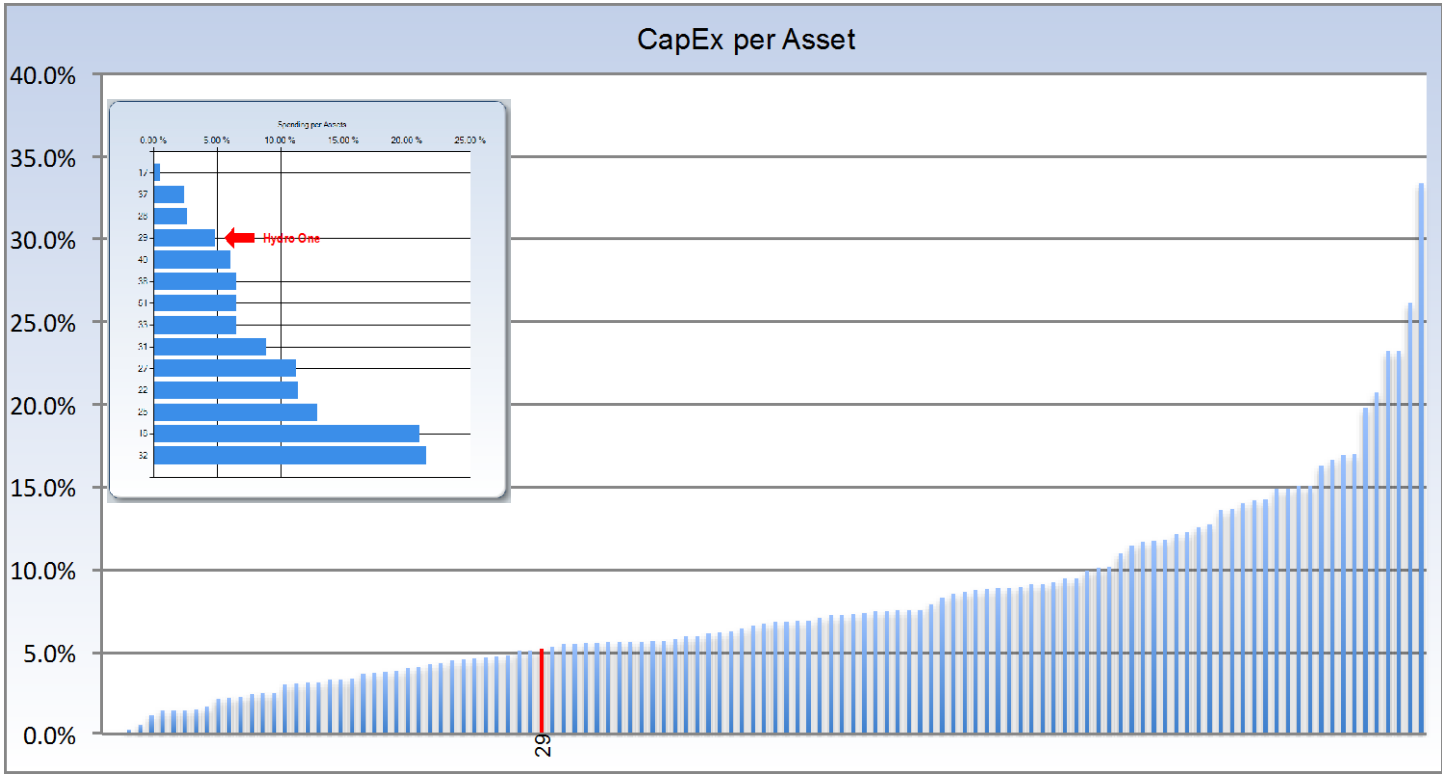

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Additional Supporting Slides

- Reliability

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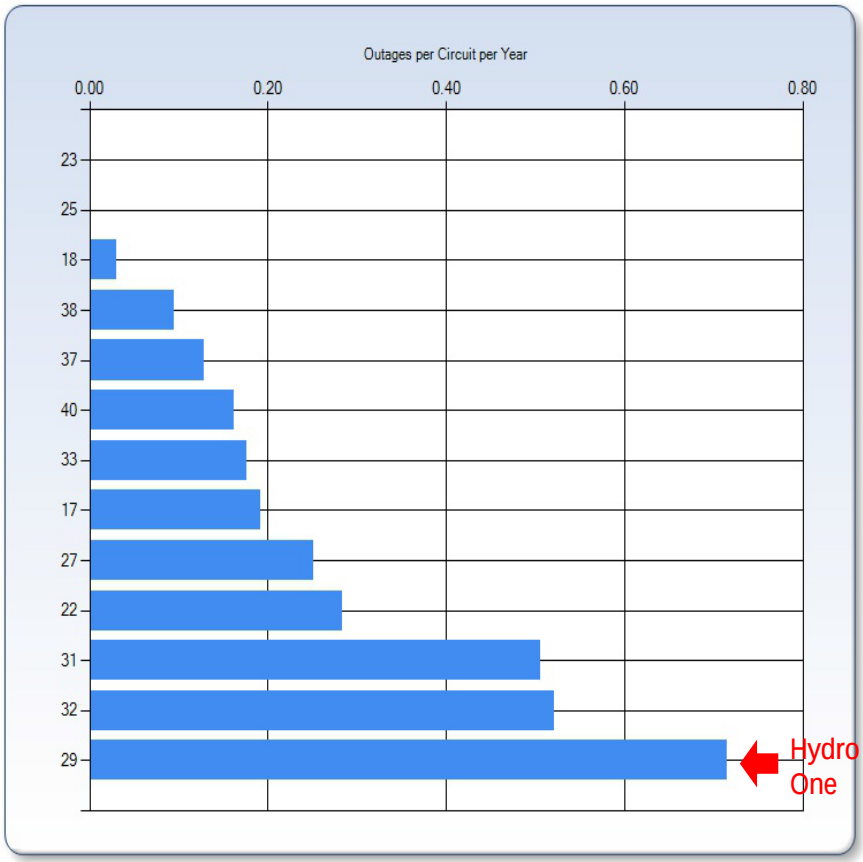
Sustained Outages

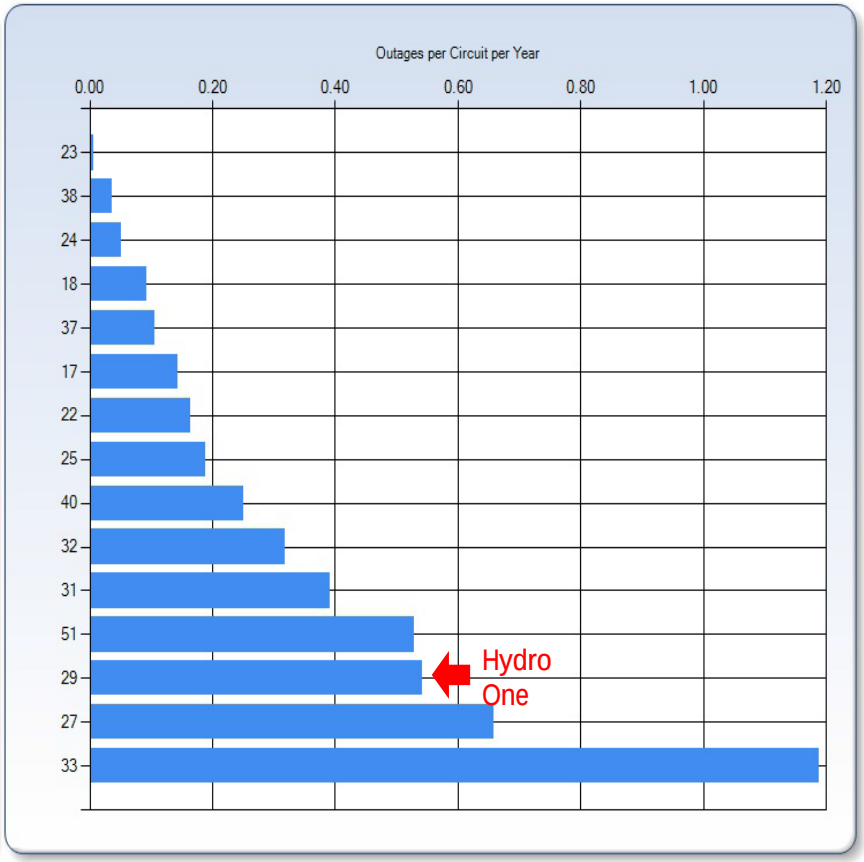
DISCUSSION DRAFT
SUBJECT TO CHANGE

» Hydro One's sustained outage frequency for the lower voltage lines is the highest in the peer group

Element Sustained Outage Frequency (SOF) <200 KV



Element Sustained Outage Frequency (SOF) **≥200** KV



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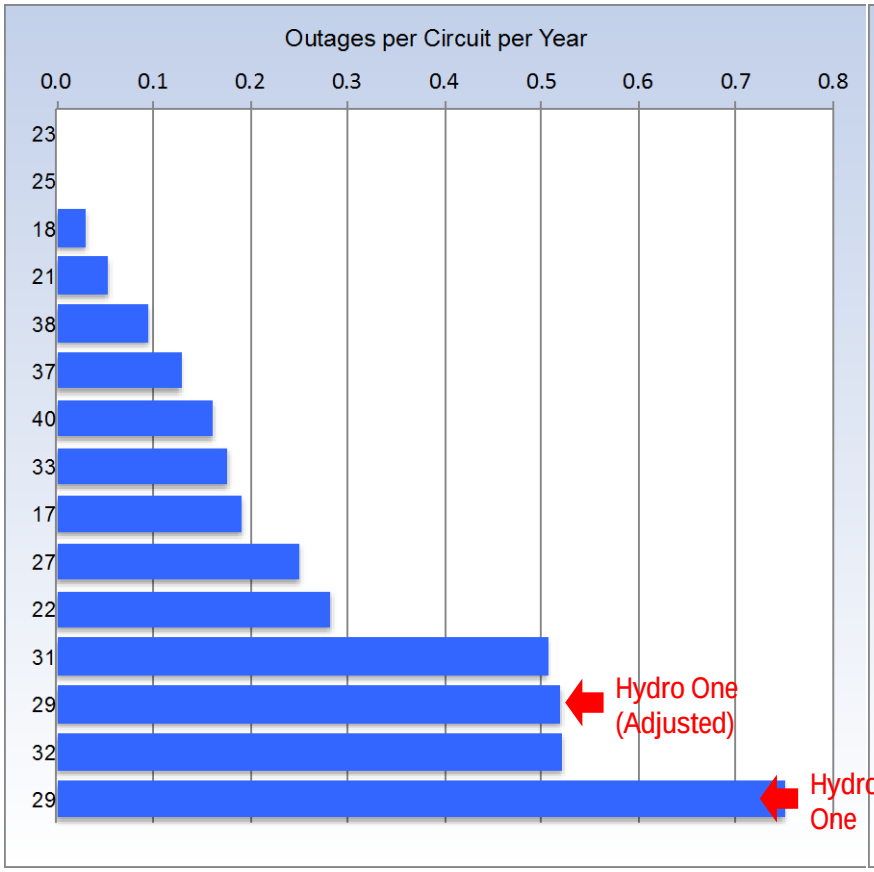

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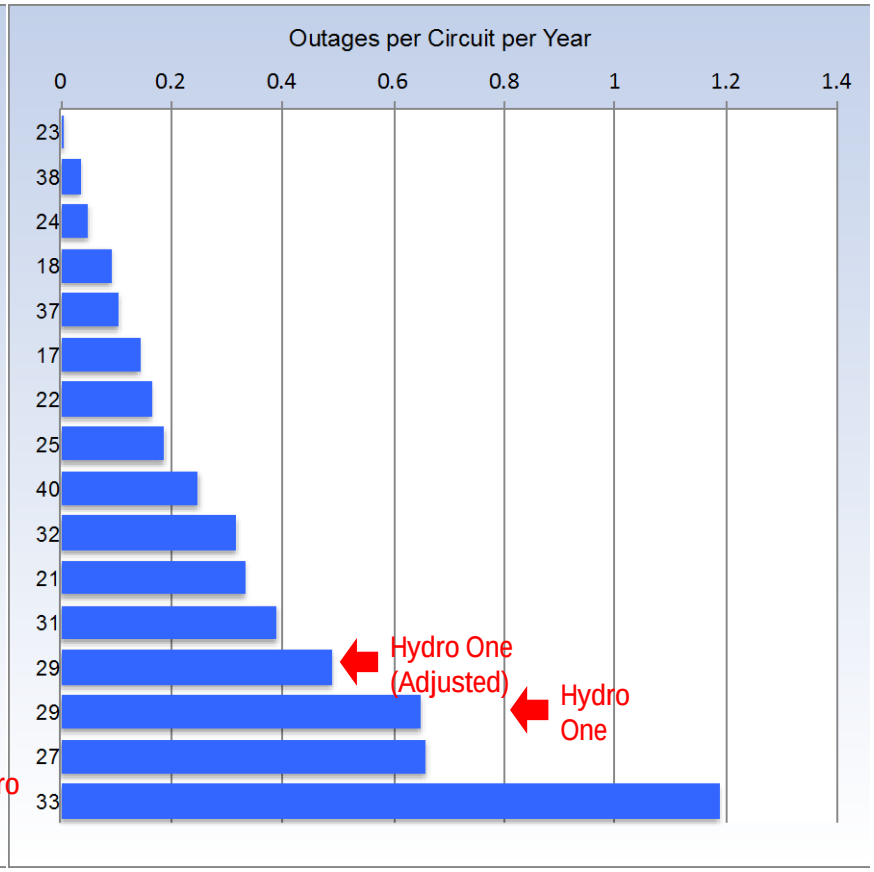

Note: "Adjusted" means excluding the worst-performing circuits

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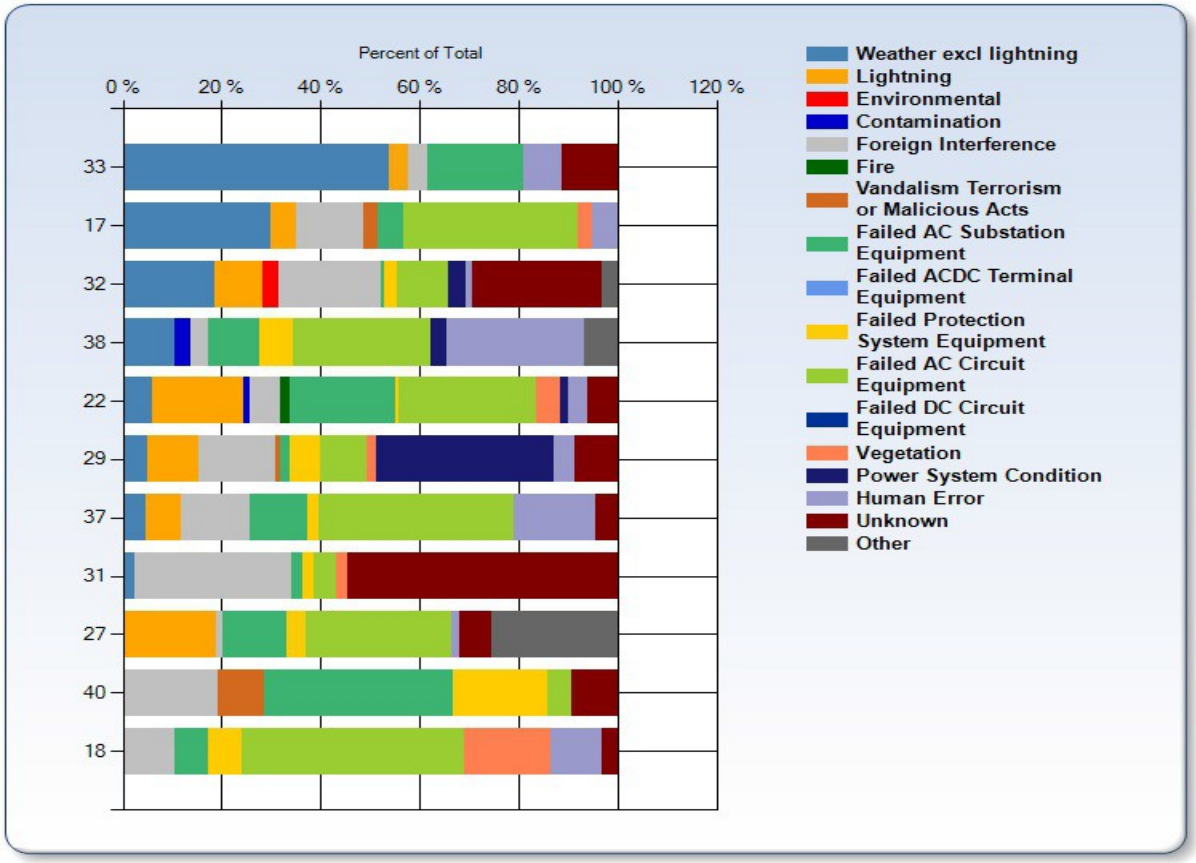
Sustained Outage Causes (<200kV)

DISCUSSION DRAFT
SUBJECT TO CHANGE

Sustained Outage by Cause Code (<200kV)



- Power system condition is the single largest cause of sustained transmission system outages
- Additional study of the root cause(s) might be beneficial

Note: "Power System Condition" includes instability, overload trip, out-of-step, abnormal voltage, abnormal frequency, or unique system configurations (e.g. an abnormal terminal configuration due to existing condition with one breaker already out of service).

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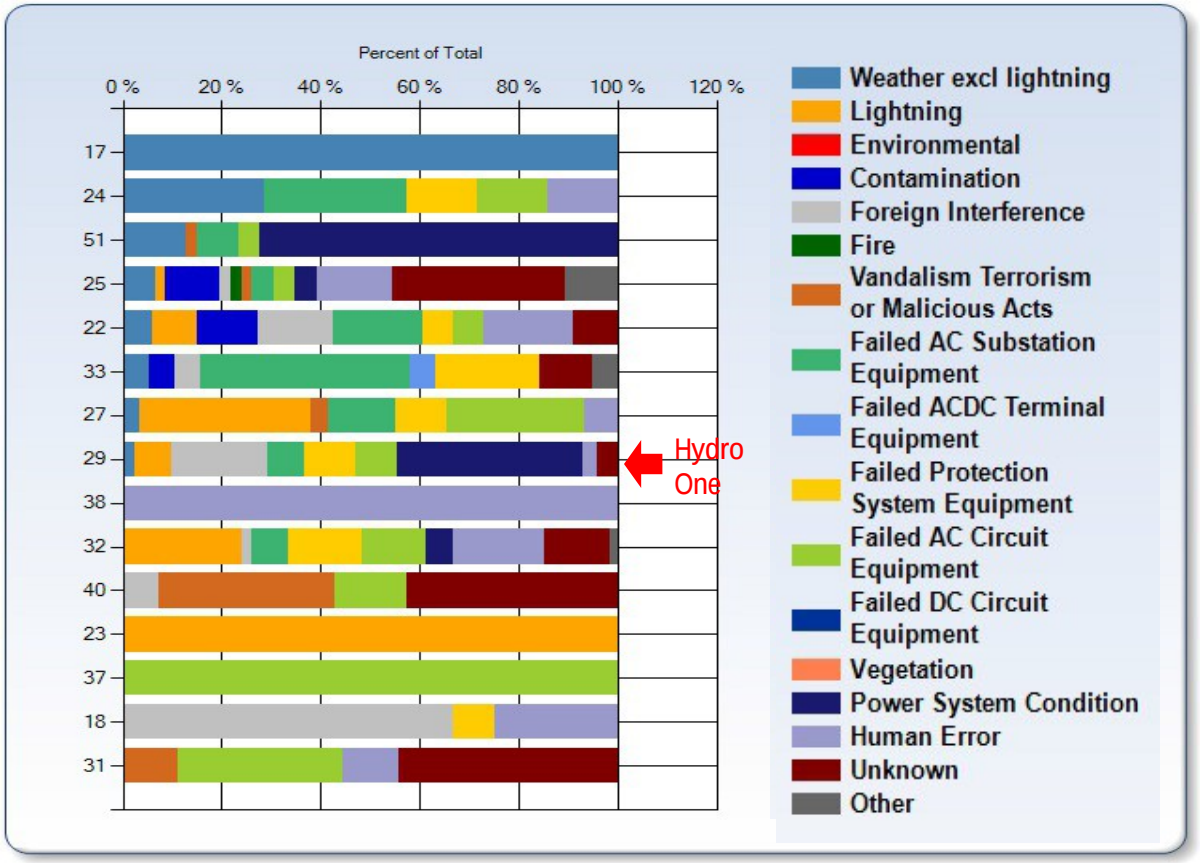
Sustained Outage Causes (>200kV)

DISCUSSION DRAFT
SUBJECT TO CHANGE

Sustained Outage by Cause Code (≥200kV)



Note: "Power System Condition" includes instability, overload trip, out-of-step, abnormal voltage, abnormal frequency, or unique system configurations (e.g. an abnormal terminal configuration due to existing condition with one breaker already out of service).

- The largest cause, by far, for Hydro One outages is Power System Condition, with the second being Foreign Interference
- This pattern is unique within the panel, and may be caused by the DESN design of Hydro One's substation fleet
  - The design provides redundancy at load serving stations
  - The relatively high unavailability of individual equipment thus doesn't typically substantially affect customers or load delivery

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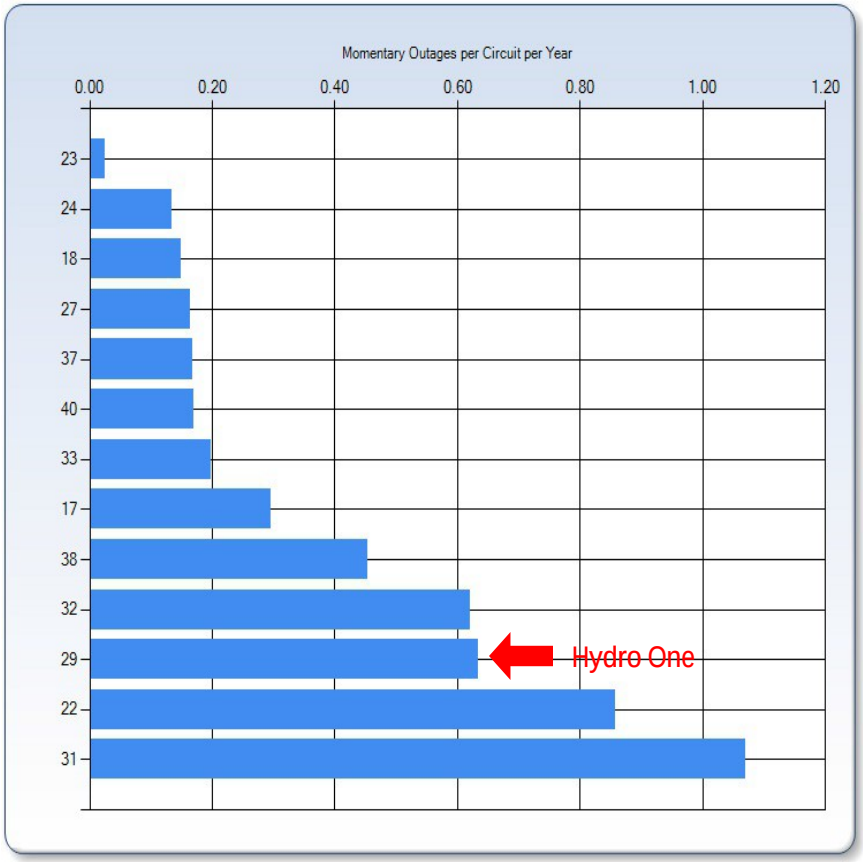
Momentary Outages

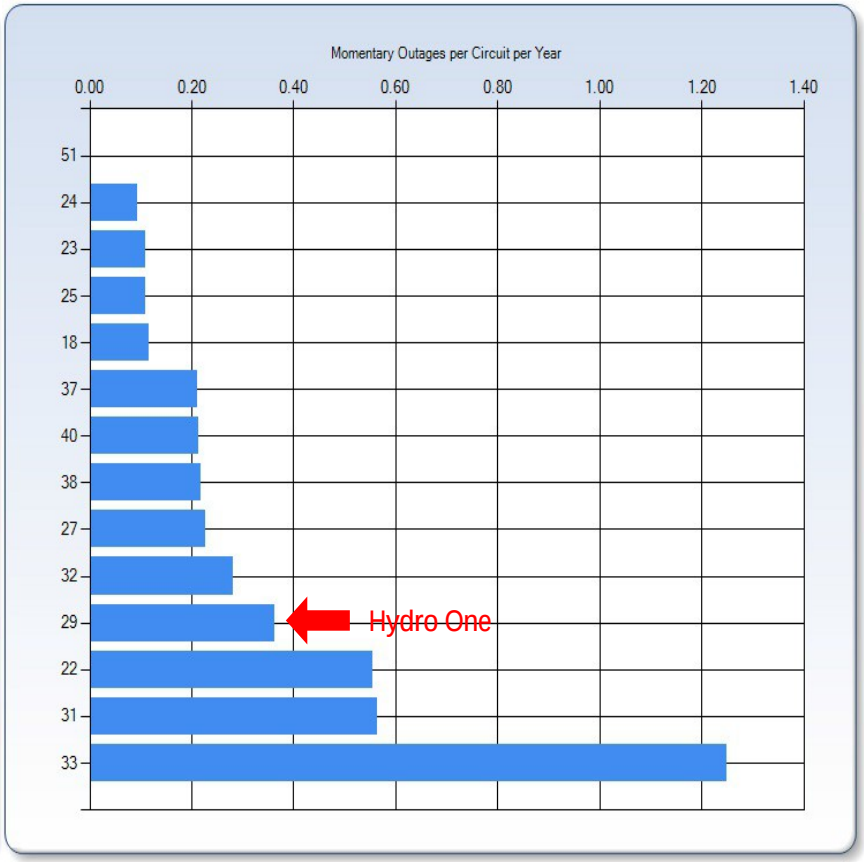
DISCUSSION DRAFT
SUBJECT TO CHANGE

» Hydro One's momentary outage frequency is among the highest in the peer group

Element Momentary Outage Frequency (MOF) <200 KV



Element Momentary Outage Frequency (MOF) **≥200** KV



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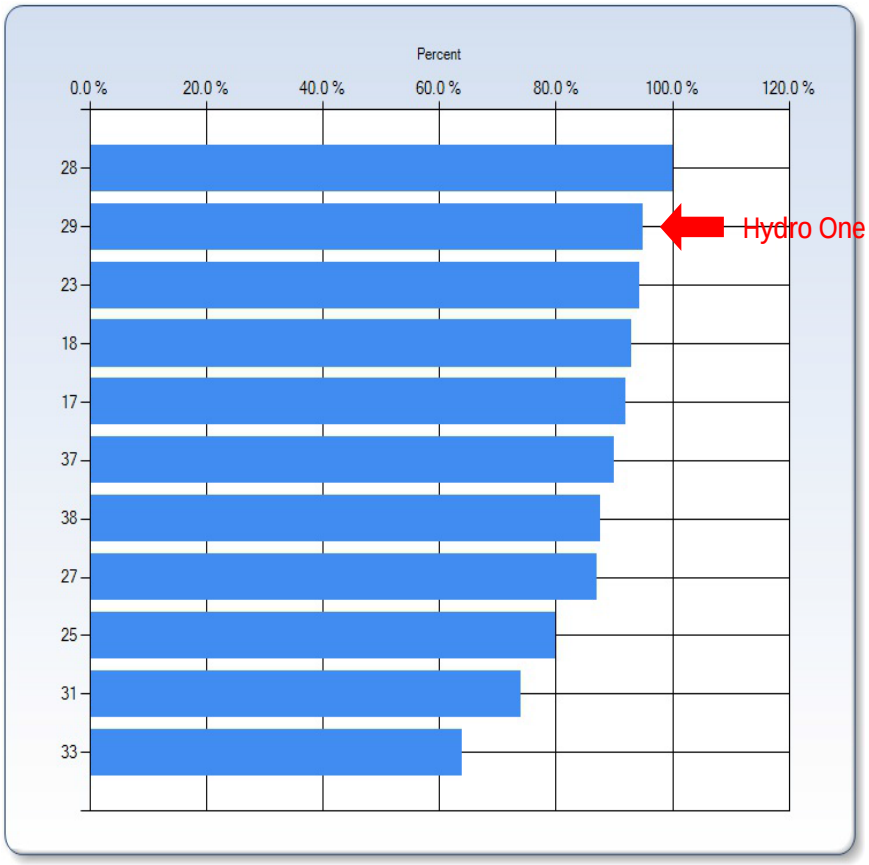
Additional Supporting Slides

- Project Management, Safety, and Staffing

Project Completion

DISCUSSION DRAFT
SUBJECT TO CHANGE

Percent of Projects Completed On Time



- Significant project management resources and methodologies are in place
- During 2014, Hydro One was a leader in completing its capital projects on time.
- Hydro One should strengthen its capital management processes to support achievement of its annual capital investment plan

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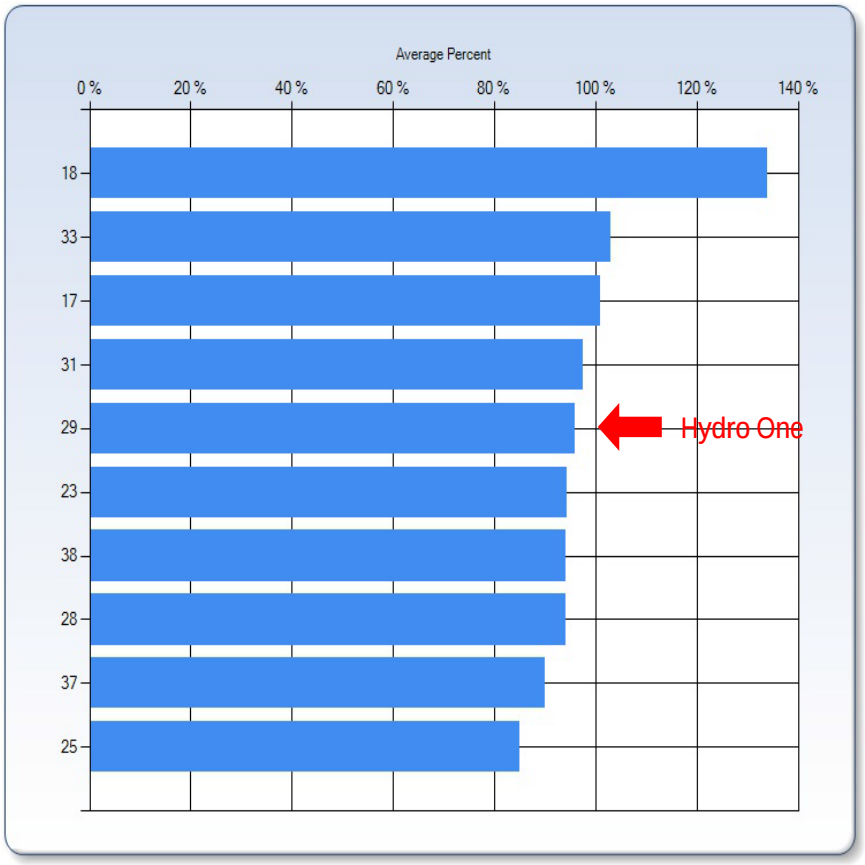
Project Budget

Project Actual Spend as Percent of Estimate



» Although Hydro One tends to slightly underspend its capital budget, project estimates are relatively accurate

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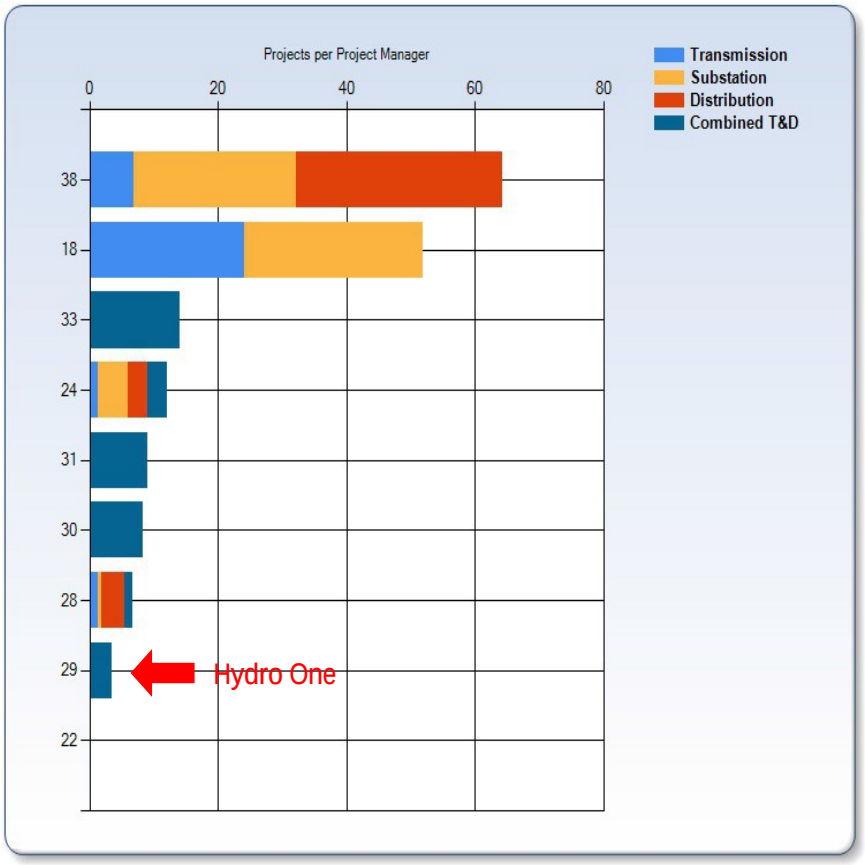
Projects per Project Manager

Projects per Project Manager



Note: Combined T&D project management staff is typically reported since companies do not align project management organisations with a particular business area but instead maintain a common organisation that handles all types of projects.

» The number of projects managed per project manager is low relative to the panel average

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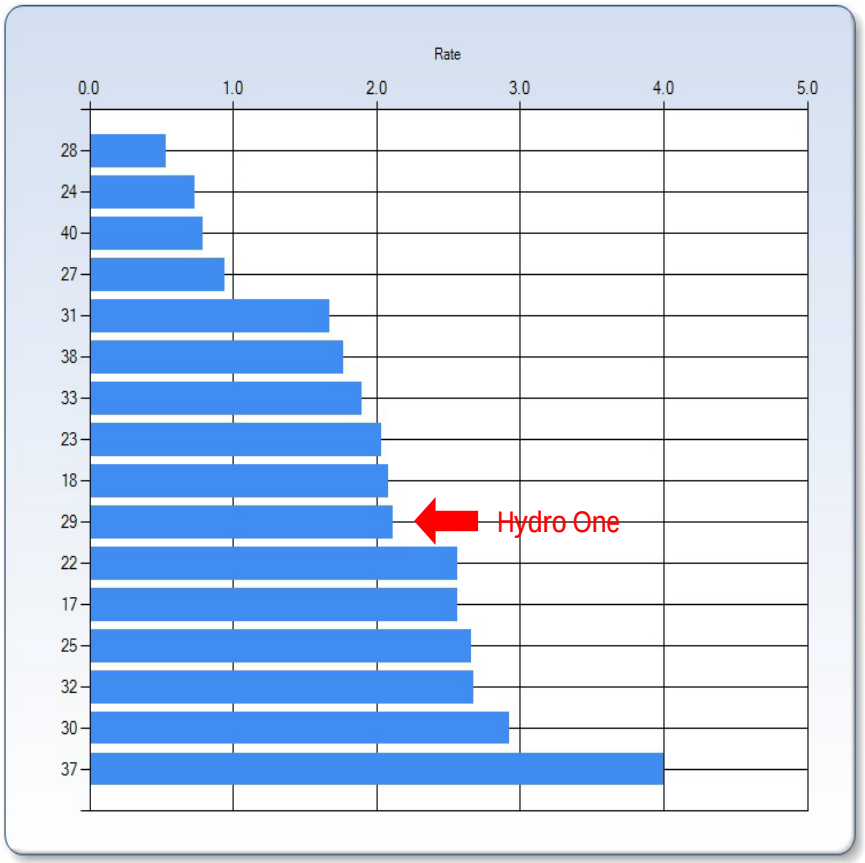
DISCUSSION DRAFT
SUBJECT TO CHANGE

Recordable Injury Rate



- Hydro One has implemented an umbrella safety program ("Journey to Zero") which has provided the foundation for good safety performance for the company
- Hydro One has reported that it expects the recordable injury rate for 2015 to be closer to 1.7

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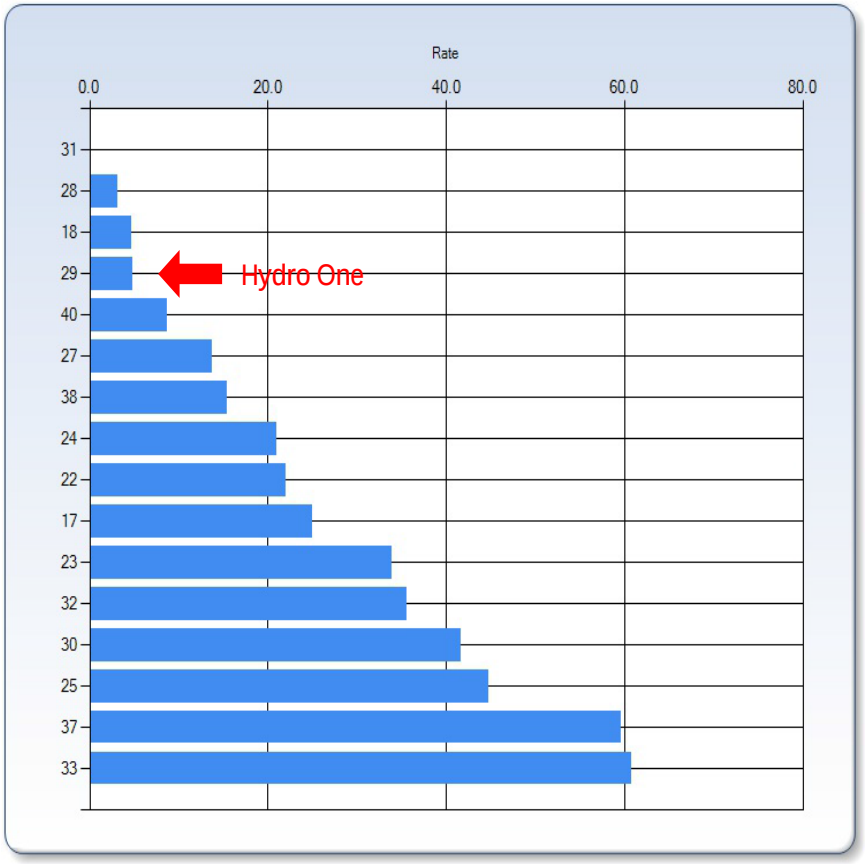
Lost Time Severity

DISCUSSION DRAFT
SUBJECT TO CHANGE

Lost Time Severity Rate



» Hydro One has implemented an umbrella safety program ("Journey to Zero") which has lead to a low severity rate versus the benchmark panel

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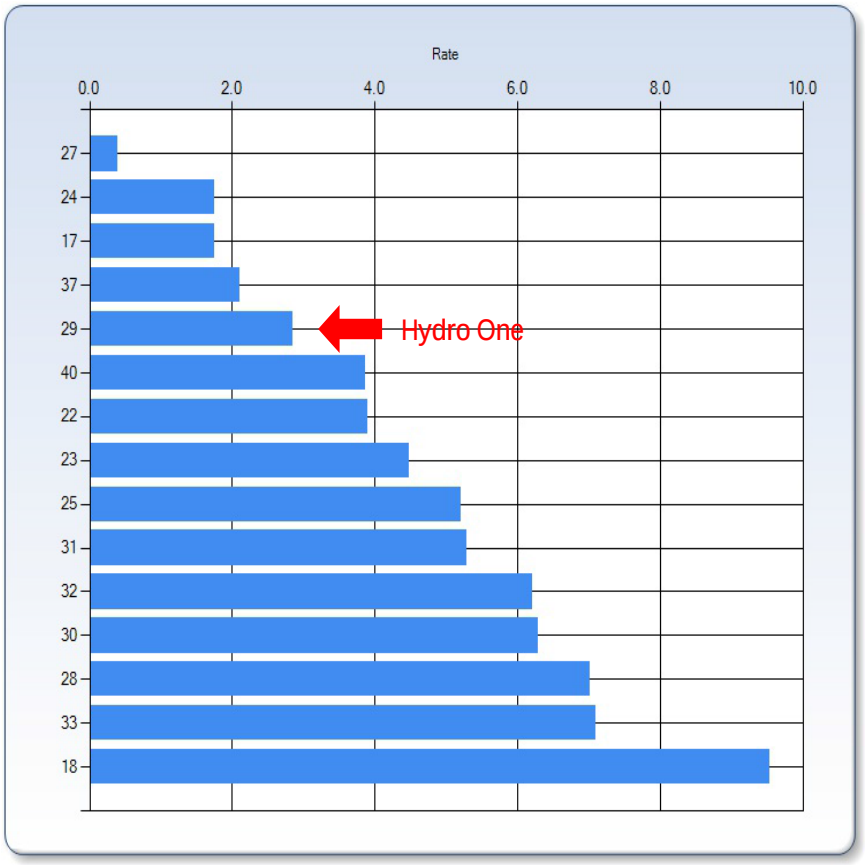
Frequency of Vehicle Accidents

DISCUSSION DRAFT
SUBJECT TO CHANGE

Total Frequency Rate of Vehicle Accidents



The vehicular incident rate is computed as the # of incidents x (1,000,000 / kilometers driven) Rate includes both preventable and non-preventable motor vehicle accidents.

» Vehicular incident rate is good although a specific target for preventable motor vehicle accidents (PMVAs) has not been established

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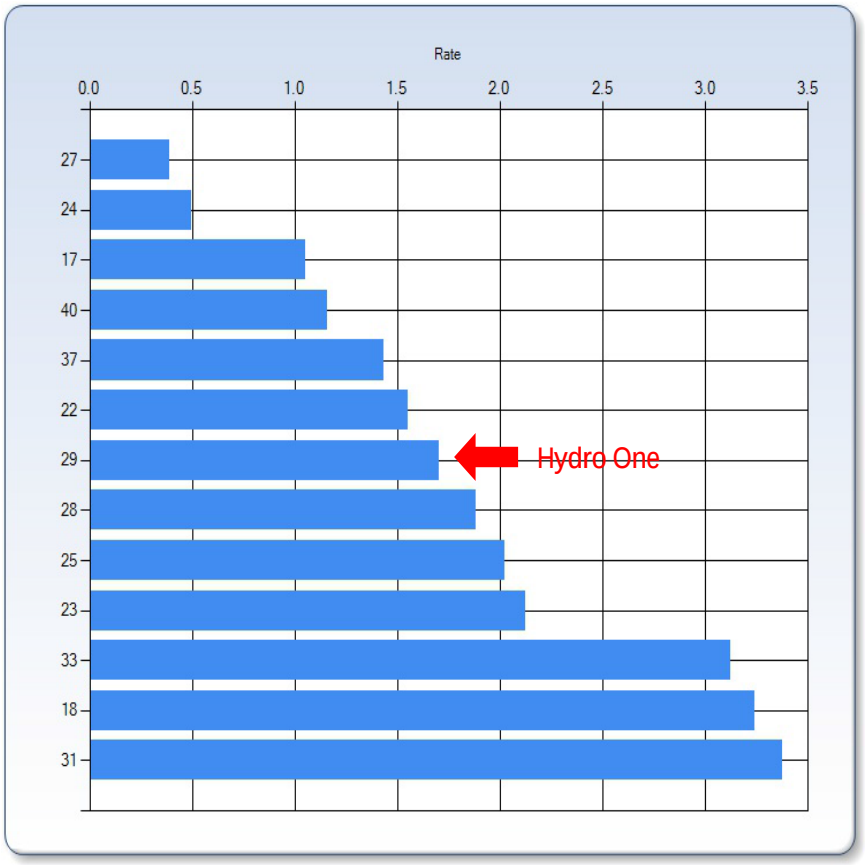
Preventable Frequency of Vehicle Accidents

DISCUSSION DRAFT
SUBJECT TO CHANGE

Preventable Frequency Rate of Vehicle Accidents



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» Vehicular incident rate is good although a specific target for PMVAs has not been established

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Wage Rates - Lines

DISCUSSION DRAFT
SUBJECT TO CHANGE

Wage Rate: Lines Journey Level Electrician

» Hydro One wage rates are at about the median of utility panel

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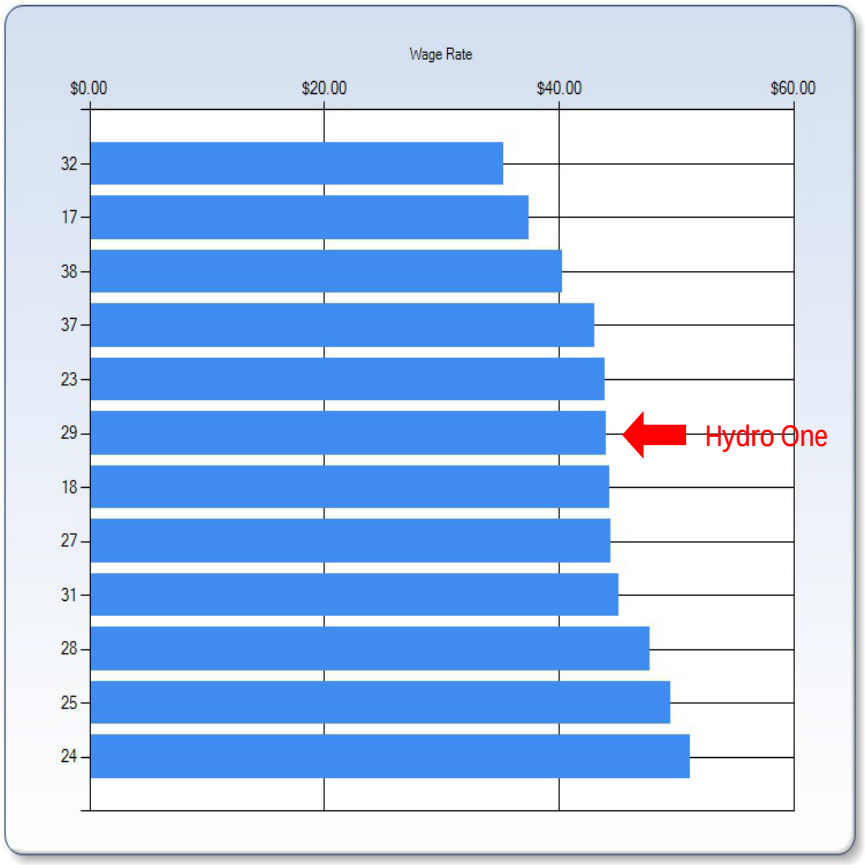
Wage Rates - Substations

DISCUSSION DRAFT
SUBJECT TO CHANGE

Wage Rate: Substation Journey Level Electrician



» Hydro One wage rates are at about the median of utility panel

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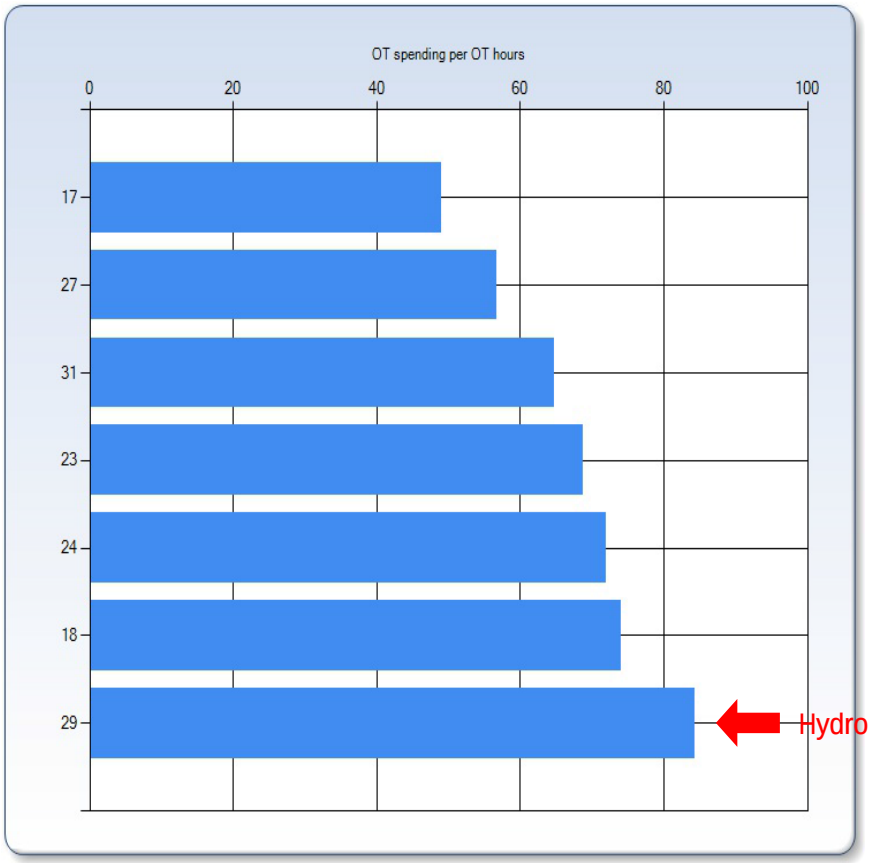
Wage Rates - Overtime

DISCUSSION DRAFT
SUBJECT TO CHANGE

Average Overtime Cost per Overtime Hour Worked



- Overtime cost (per hour) for Hydro One is generally higher than the other reporting companies
- Some benefit can be realised by minimising overtime
- Hydro One can improve results and reduce overtime through
  - Increasing training
  - Eliminating low value work
  - Coordinating scheduling
  - Enhancing performance metrics
- Note that Hydro One uses a “4-10s” schedule for its construction workforce, which makes sense for the spread-out service territory, but also means that additional hours begin at double-time pay, rather than time and a half

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Total Overtime Hours

DISCUSSION DRAFT
SUBJECT TO CHANGE

- Hydro One's overtime usage is in line with other companies in the industry
- Annual figures for individual companies tend to vary with the level of storm response activity required for a given year
- In the more manageable construction work activities, Hydro One averages approximately 150 hours of OT per worker, below the average figures shown in the table.

Total Respondents: 8	Average Overtime Hours
Distribution Lineworker	422.2
Distribution Troubleshooter	526.0
Substation Electrician	307.9
Substation Meter Relay Communications	234.5
Transmission Lineworker	363.0

Hydro One

	17	18	23	25	27	29	31	33
Distribution Lineworker			480	512	413	255	515	164
Distribution Troubleshooter			840	553	447		582	208
Substation Electrician	349	12	175	531	270		633	84
Substation Meter Relay Communications	297	25	175	446	177		287	
Transmission Lineworker	205	74	790	442		205	515	152

Note that Hydro One doesn't distinguish between distribution and transmission line workers, so the results have been recorded as the same for both transmission and distribution.

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Additional Supporting Slides

- Recommendations

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Recommendations

DISCUSSION DRAFT
SUBJECT TO CHANGE

Issue	Best-Practice Recommendation	Impact	First Steps	Longer-Term Steps
Performance Tracking (Metrics)	Reassess and adjust performance indicators across all levels of the organisation	Reduce costs, improve performance, build culture of continuous improvement	Establish corporate goals and objective Identify existing metrics used throughout the organisation Identify new metrics that align performance goals and objectives across the organisation	Implement standard tracking and reporting framework Incorporate performance indicators into human capital and performance management processes
Capital Project Delivery (Pipeline)	Continue building on use of external resources for engineering, to create a pipeline of construction-ready projects	Reduced underspend, improved schedule performance	Implement a short-term initiative utilising external resources to generate a backlog of designed projects that can be released to construction on short notice and completed in the current year. Maintain a project backlog totaling 20% to 30% of annual capital spending.	Formalise the engineering and design processes so that key milestones are clearly defined. Develop engineering KPIs that measure the engineering and design process. Utilise internal engineering resources as Owner Engineers
Expenditure Forecasts (Contingencies, Probabilities)	Manage the contingency budgets at the portfolio / corporate level	Frees funds for other priority investment opportunities	Eliminate contingencies in individual projects and allow some spending dead-band for project managers.	Develop probability weighted forecasts to inform decision-making on projects and portfolio choices
Substation Maintenance	Target a corrective maintenance spend that is ~25% of total corrective and preventative	Eventually anticipate better (lower cost) results if more is preventive than corrective.	Investigate the drivers of the high percentage of corrective maintenance, to see if steps could be taken through more preventive work to avoid or reduce the corrective actions	Implement a “worst performer” type of program (analogous to a “worst circuit” program for lines) to target the stations with the most corrective maintenance experienced

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Recommendations

DISCUSSION DRAFT
SUBJECT TO CHANGE

Issue	Best-Practice Recommendation	Impact	First Steps	Longer-Term Steps
Administrative Costs	Work to reduce administrative costs	Eventually identify opportunities for cost reduction	Investigate the causes for the relatively high administrative (corporate and common allocated) costs	Once identified, implement programs and/or process improvements to streamline and minimise administrative costs
Project Management (Resources and Process)	Allocate project management resources to improve effectiveness	Improve project cost and schedule performance	Review and adjust project management resources [schedulers , cost analysts, document managers, procurement coordinators, etc.] to provide adequate back office support for large or complex projects. Utilise project managers only for large or complex projects.	Refine project management-related processes that define organisational interrelationships and establish accountability for project success
Portfolio Management (Capital Budget and Portfolio)	Formalise a rolling two year capital budget and project portfolio and reporting framework, including projected earned value analysis	Provide the flexibility needed to reschedule projects within a two-year rolling window; improves ability to achieve planned annual investments	Develop parameters and business rules for a two-year rolling authorisation process and approval	Reinstitute Earned Value Analysis (EVA) to measure project progress as part of a proactive project management framework Establish project management KPIs that leverage the forecasted / projected monthly cash flow and EVA
Safety (Driver)	Refresh formal driver training program	Reinforces driver safety and provides employees with focused behind-the-wheel training	Establish a preventable motor vehicle accident rate target, e.g. zero, to leverage the “Journey to Zero” program	Track progress on driver performance, continue enhancements to programs.

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