SCHOOL ENERGY COALITION

CROSS-EXAMINATION MATERIALS – PANEL 5

EB-2018-0165

TORONTO 2020-2024 RATES

RESPONSES TO SCHOOL ENERGY COALITION INTERROGATORIES

INTERROGATORY 21:

Reference(s): Exhibit 1B, Tab 4, Schedule 2, p. 3

SEC is interested in understanding how the current PSE cost benchmarking methodology compares with the OEB's approved cost benchmarking methodology. To assist in this, please apply the current PSE cost benchmarking methodology to each of the ten largest electricity distributors in Ontario, including Toronto Hydro, for each of the years 2014-2017, and compare the results to the results of the OEB's approved cost benchmarking methodology for those same distributors for the same years. Please ensure that the comparison includes each of the six utilities PSE added to its dataset individually, and not aggregated as Alectra.

RESPONSE (PREPARED BY PSE):

Expansion of the sample to include the top ten Ontario distributors, and adding an additional year to the sample, would require a substantial amount of work and take a significant amount of time. PSE does not currently have all of the necessary data for these 10 distributors and does not know whether all such data would be readily available. Data on items such as wage levels would need to be gathered. This task therefore could not be completed in the time allotted, and also would have limited (if any) additional value. The requested results using the current PSE methodology can be provided for the seven Ontario distributors already included in the dataset for the years 2014-2016, and these results can be compared to the OEB cost benchmarking results for those years.

The results and comparison below address SEC's interest in understanding how the current PSE cost benchmarking methodology compares with the OEB's benchmarking methodology. As can be seen by the table below, the two benchmarking methodologies produce somewhat similar results for a number of the distributors, with the exceptions being Toronto Hydro and Kitchner-Wilmont. Enersource, Horizon Utilities, London Hydro, and Hydro Ottawa would all remain in the same stretch factor cohort group with either approach. EnWin would move one group higher from 0.3% to 0.45%. Kitchner-Wilmont would move up two groups higher (from 0.15% to 0.45%), and Toronto Hydro would move down three groups (from 0.60% to 0.15%). The similarities in results for a number of the smaller Ontario distributors, and the differences in results for Toronto Hydro, are explained by a number of reasons, including the following three main ones: (i) the methodology used by the OEB has no urban congestion variable, and the smaller Ontario distributors do not have much of an urban congestion challenge (in contrast to Toronto Hydro); (ii) the sample used by the OEB methodology consists of Ontario distributors, all, except for Hydro One, are smaller than Toronto Hydro – that methodology is therefore more accurate for other Ontario distributors (i.e. not Toronto Hydro); and (iii) the methodology used by the OEB assumes that the costs of capital construction are the same across the province, when in fact, these costs are much higher in Toronto compared to other smaller places in Ontario.

Given that Toronto Hydro's PSE-projected benchmarking scores converge to the 0.30% stretch factor group during the CIR period (assuming full funding of the spending amounts), PSE is recommending a 0.30% stretch factor.

Table 1: Comparison of Benchmarking Scores

Distributor	PSE 2014	OEB 2014	PSE 2015	OEB 2015	PSE 2016	OEB 2016	PSE 2017	OEB 2017
Toronto Hydro	-22.8	+49.9	-21.4	+51.5	-18.3	+52.3	-16.0	+52.9
Enersource	+2.4	-13.9	+9.1	-8.2	+10.4	-6.8	NA	NA
EnWin	+15.7	+10.9	+16.4	+9.9	+15.4	+9.6	NA	+5.3
Horizon Utilities	-6.0	-5.3	-2.9	-2.1	-4.1	-3.9	NA	NA
Kitchner-Wilmont	+14.0	-19.0	+11.5	-22.3	+12.0	-20.4	NA	-19.9
London Hydro	-6.6	-12.8	-3.8	-9.9	-2.0	-8.0	NA	-7.1
Hydro Ottawa	+10.3	+12.7	+13.3	+15.2	+12.9	+15.7	NA	+16.5

RESPONSES TO SCHOOL ENERGY COALITION INTERROGATORIES

INTERROGATORY 22:

Reference(s): Exhibit 1B, Tab 4, Schedule 2, p. 6

SEC is interested in understanding the impact of the %CU variable and the %UG*%CU variable on the results in Table 1. Please re-specify and rerun the PSE model without those variables, and provide the results in the same form as Table 1.

RESPONSE (PREPARED BY PSE):

This request is to create and run a different model that is not PSE's model, and is a fundamentally different approach. Excluding these variables, and creating a model without them, is not a proper or robust approach and would produce misleading results in portraying Toronto Hydro's cost performance. Serving a congested urban core and constructing underground power lines in congested urban areas significantly increases a distributor's total costs. This fact has been confirmed both empirically and through engineering analysis. Excluding these variables from the model would be ignoring important and statistically significant cost drivers that are significant at a 99.9% confidence level. Excluding variables that have both strong engineering and statistical support will produce misleading results that suffer from omitted variable bias. See also the responses to 1B-SEC-28 and 1B-Staff-32 (b) in respect of the importance of these variables.

RESPONSES TO SCHOOL ENERGY COALITION INTERROGATORIES

INTERROGATORY 23:

Reference(s): Exhibit 1B, Tab 4, Schedule 2, p. 6

SEC is seeking to understand how Toronto Hydro's cost performance compares to the benchmark over different time periods. To this end, we have prepared the following spreadsheet that expands Table 1. (A live version of the spreadsheet is included with the filing of these interrogatories)

Toronto Hydro Actual and Benchmark Cost Increases *Using PSE Model*				
Year	***Actual***	***Increase***	***Benchmark***	***Increase***
2005	$436,128		$641,275	
2006	$450,686	3.34%	$681,212	6.23%
2007	$502,433	11.48%	$744,486	9.29%
2008	$556,429	10.75%	$813,528	9.27%
2009	$595,932	7.10%	$852,775	4.82%
2010	$647,456	8.65%	$882,130	3.44%
2011	$710,544	9.74%	$912,729	3.47%
2012	$691,388	-2.70%	$910,814	-0.21%
2013	$727,152	5.17%	$925,488	1.61%
2014	$777,414	6.91%	$976,095	5.47%
2015	$826,886	6.36%	$1,024,030	4.91%
2016	$861,394	4.17%	$1,034,492	1.02%
2017	$904,560	5.01%	$1,061,642	2.62%
2018	$964,885	6.67%	$1,095,430	3.18%
2019	$999,492	3.59%	$1,122,407	2.46%
2020	$1,044,567	4.51%	$1,148,601	2.33%
2021	$1,085,324	3.90%	$1,174,549	2.26%
2022	$1,134,689	4.55%	$1,201,662	2.31%
2023	$1,180,820	4.07%	$1,229,463	2.31%
2024	$1,225,282	3.77%	$1,257,907	2.31%
Total 19 Year Increase		180.95%		96.16%
CAGR - 19 years		5.59%		3.61%
Increase from 2017		35.46%		18.49%
CAGR - 7 years		4.43%		2.45%

With respect to Table 1 and the above spreadsheet:

a) Please confirm that the calculations and results shown above are correct.

b) Please add a column to the above table showing the increase in outputs assumed for each year in the expected costs. Please confirm that the same increase in outputs has been assumed for each year in the forecast Toronto Hydro costs. Please provide the expected costs for the period 2020 to 2024 using the PSE model if the outputs are assumed to remain at 2019 levels.

c) Please reconcile, mathematically, the rates of increase for Toronto Hydro on the above table with the rates of increase of the CPCI proposed in Ex.1B/4/1, p. 13, Table 5.

d) Please confirm that, in seventeen of the nineteen years, Toronto Hydro's actual cost increases were higher than the PSE benchmark.

e) Please confirm that, for each of the years in the CIR period, Toronto Hydro proposes to increase its costs at a rate in excess of the benchmark set by its own expert, and that on average it proposes to increase its costs from 2017 to 2024 by almost double the PSE benchmark increase.

f) Please explain why, in the expert's opinion, the expected costs for a distributor like Toronto Hydro were expected to increase over the nineteen years in the model period by more than twice the rate of inflation. What underlying or systemic factors existed during this period, in the expert's opinion, that resulted in Toronto Hydro's costs rising at a much greater rate than the costs of other

businesses in the Canadian economy?

g) Please provide a detailed explanation of any investigations carried out by the expert to determine the reasons why Toronto Hydro's actual costs in 2005 were only 64.4% of the expected costs for that year using the current PSE cost benchmarking methodology.

h) Please confirm that, if the Board only allowed the rates (and therefore costs) of Toronto Hydro to increase at the same rate as the PSE benchmark from 2018 to 2024, Toronto Hydro's total costs for the five year CIR period would be $548 million less than those proposed in the current application, and costs (and therefore rates) in 2024 would be $153 million (12.53%) less than proposed by Toronto Hydro.

RESPONSE (PREPARED BY PSE):

a) We can confirm that the actual and benchmark costs in the table match those in the 2018 PSE Study and that the arithmetic percentage increases are calculated correctly. However, in displaying the percentage increases, the conventional approach is to show these logarithmically rather than arithmetically. Please see page 27 of the PSE report for an example of how to calculate a logarithmic difference. The arithmetic approach used in SEC's expanded table requires a decision on which denominator to use in showing the change between the two numbers. In contrast, the logarithmic approach will produce the same answer regardless of that choice. In the table prepared by SEC, the arithmetic approach is used with the prior year as the chosen denominator. This will tend to exaggerate the percentage increase, due to the prior

year typically being the lower value. The table below shows the logarithmic percentage differences.

PSE Expanded Table 1 (Logarithmic)

Toronto Hydro Actual and Benchmark Cost Increases *Using PSE Model*				
Year	***Actual***	***Increase***	***Benchmark***	***Increase***
2005	$436,128		$641,275	
2006	$450,686	3.3%	$681,212	6.0%
2007	$502,433	10.9%	$744,486	8.9%
2008	$556,429	10.2%	$813,528	8.9%
2009	$595,932	6.9%	$852,775	4.7%
2010	$647,456	8.3%	$882,130	3.4%
2011	$710,544	9.3%	$912,729	3.4%
2012	$691,388	-2.7%	$910,814	-0.2%
2013	$727,152	5.0%	$925,488	1.6%
2014	$777,414	6.7%	$976,095	5.3%
2015	$826,886	6.2%	$1,024,030	4.8%
2016	$861,394	4.1%	$1,034,492	1.0%
2017	$904,560	4.9%	$1,061,642	2.6%
2018	$964,885	6.5%	$1,095,430	3.1%
2019	$999,492	3.5%	$1,122,407	2.4%
2020	$1,044,567	4.4%	$1,148,601	2.3%
2021	$1,085,324	3.8%	$1,174,549	2.2%
2022	$1,134,689	4.4%	$1,201,662	2.3%
2023	$1,180,820	4.0%	$1,229,463	2.3%
2024	$1,225,282	3.7%	$1,257,907	2.3%
Total 19 Year Increase		103.3%		67.4%
CAGR - 19 years		5.44%		3.55%
Increase from 2017		30.35%		16.96%
CAGR - 7 years		4.34%		2.42%

b) The table below provides Toronto Hydro's outputs, which are the number of customers and maximum peak demand. The percentage increase is calculated arithmetically, to match the calculations found in the table in the question. However,

as we stated in our answer to the previous question, the logarithmic method is preferred. The increase in outputs is based on projections provided to PSE by Toronto Hydro. The forecasts in outputs are the inputs for determining the benchmark levels of Toronto Hydro's costs. The columns added by PSE are shaded in green.

Table 1 with THESL Outputs

Toronto Hydro Actual and Benchmark Cost Increases								
Using PSE Model								
Year	*Actual*	*Increase*	*Benchmark*	*Increase*	*Number of Customers*	*Increase*	*Maximum Peak Demand*	*Increase*
2005	$436,128		$641,275		676,678		5,005	
2006	$450,686	3.34%	$681,212	6.23%	678,106	0.21%	5,018	0.26%
2007	$502,433	11.48%	$744,486	9.29%	679,913	0.27%	5,018	0.00%
2008	$556,429	10.75%	$813,528	9.27%	684,145	0.62%	5,018	0.00%
2009	$595,932	7.10%	$852,775	4.82%	690,243	0.89%	5,018	0.00%
2010	$647,456	8.65%	$882,130	3.44%	700,386	1.47%	5,018	0.00%
2011	$710,544	9.74%	$912,729	3.47%	709,323	1.28%	5,018	0.00%
2012	$691,388	-2.70%	$910,814	-0.21%	718,661	1.32%	5,018	0.00%
2013	$727,152	5.17%	$925,488	1.61%	734,576	2.21%	5,018	0.00%
2014	$777,414	6.91%	$976,095	5.47%	744,252	1.32%	5,018	0.00%
2015	$826,886	6.36%	$1,024,030	4.91%	758,311	1.89%	5,018	0.00%
2016	$861,394	4.17%	$1,034,492	1.02%	761,920	0.48%	5,018	0.00%
2017	$904,560	5.01%	$1,061,642	2.62%	768,126	0.81%	5,018	0.00%
2018	$964,885	6.67%	$1,095,430	3.18%	773,961	0.76%	5,018	0.00%
2019	$999,492	3.59%	$1,122,407	2.46%	779,962	0.78%	5,018	0.00%
2020	$1,044,567	4.51%	$1,148,601	2.33%	787,303	0.94%	5,018	0.00%
2021	$1,085,324	3.90%	$1,174,549	2.26%	794,105	0.86%	5,018	0.00%
2022	$1,134,689	4.55%	$1,201,662	2.31%	801,729	0.96%	5,018	0.00%
2023	$1,180,820	4.07%	$1,229,463	2.31%	809,403	0.96%	5,018	0.00%
2024	$1,225,282	3.77%	$1,257,907	2.31%	817,078	0.95%	5,018	0.00%
Total 19 Year Increase		180.95%		96.16%		20.75%		0.26%
CAGR - 19 years		5.59%		3.61%		1.09%		0.01%
Increase from 2017		35.46%		18.49%		6.37%		0.00%
CAGR - 7 years		4.43%		2.45%		0.91%		0.00%

If the Toronto Hydro system stayed at its projected 2019 output values for both customers and maximum peak demand, the benchmark costs for the 2020 to 2024 period would be as indicated in the column shaded green in the following table. Note: the maximum peak demand is already projected to remain flat in the PSE report.

Table 1 with THESL Outputs (Outputs stay at 2019 Level)

Toronto Hydro Actual and Benchmark Cost Increases					
Using PSE Model					
Year	***Actual***	***Increase***	***Benchmark***	***Increase***	***Benchmark using 2019 output levels for 2020-2024***
2005	$436,128		$641,275		
2006	$450,686	3.34%	$681,212	6.23%	
2007	$502,433	11.48%	$744,486	9.29%	
2008	$556,429	10.75%	$813,528	9.27%	
2009	$595,932	7.10%	$852,775	4.82%	
2010	$647,456	8.65%	$882,130	3.44%	
2011	$710,544	9.74%	$912,729	3.47%	
2012	$691,388	-2.70%	$910,814	-0.21%	
2013	$727,152	5.17%	$925,488	1.61%	
2014	$777,414	6.91%	$976,095	5.47%	
2015	$826,886	6.36%	$1,024,030	4.91%	
2016	$861,394	4.17%	$1,034,492	1.02%	
2017	$904,560	5.01%	$1,061,642	2.62%	
2018	$964,885	6.67%	$1,095,430	3.18%	
2019	$999,492	3.59%	$1,122,407	2.46%	
2020	$1,044,567	4.51%	$1,148,601	2.33%	$1,141,341
2021	$1,085,324	3.90%	$1,174,549	2.26%	$1,160,328
2022	$1,134,689	4.55%	$1,201,662	2.31%	$1,179,415
2023	$1,180,820	4.07%	$1,229,463	2.31%	$1,198,885
2024	$1,225,282	3.77%	$1,257,907	2.31%	$1,218,731
Total 19 Year Increase		180.95%		96.16%	
CAGR - 19 years		5.59%		3.61%	
Increase from 2017		35.46%		18.49%	
CAGR - 7 years		4.43%		2.45%	

c) We are unsure what the question is requesting.

d) Confirmed. Given Toronto Hydro's low-cost position at the beginning of the sample, with actual costs being $200 million below benchmark costs, we would expect convergence to the benchmark value. This would make it likely there would be more years where actual cost increases exceed benchmark cost increases.

e) The PSE benchmarking study makes assumptions and normalizations in calculating the actual costs reported in the study. The cost levels reported by PSE are not equivalent to the revenue requirement and cost levels being requested by Toronto Hydro. We can confirm that the actual costs shown for Toronto Hydro in Table 1 increase at a rate in excess of the benchmark calculated by PSE. This is to be expected for a utility that is requesting a C factor to meet its capital needs. By our calculations, the increase is not double (or near double) the PSE benchmark increase. The PSE benchmark increases by $196 million from 2017 to 2024. Toronto Hydro's actual (projected) total costs increase by $320 million during that same period.

f) The expected costs (benchmark costs) increased by about 3.5% annually during the full sample period. There are two primary reasons this is higher than the general rate of inflation.

The first is that Toronto Hydro's system added customers during this period. Since the 3.5% is measuring costs, and customers are the primary driver of costs, we would expect the growth rate in the number of customers to increase a utility's costs above the industry input price inflation. In Toronto Hydro's case, customers grew by 1.1% during the sample period. The second primary reason is that the electric distribution industry has experienced industry-specific input price inflation at a level higher than the general economy. This is due to the different input components of the electric distribution industry relative to the composition of the economy at large. An example of this is that the price of copper has increased by an annual growth rate of approximately 4.4% from 2005 to the present day. Capturing these differences is why using an asset price inflation index that is specific to the electric distribution industry is important.

g) There were no investigations carried out by PSE to determine the reasons why Toronto Hydro's actual costs in 2005 were only 64.4% of the expected costs for that year. Toronto Hydro in 2005 and onward has consistently been below its cost benchmarks with convergence towards the benchmarks.

h) The PSE benchmarking study makes assumptions and normalizations in calculating the actual costs reported in the study. The cost levels reported by PSE are not equivalent to the revenue requirement and cost levels being requested by Toronto Hydro. We can confirm that in this hypothetical scenario posed by this question, the total costs in Table 1, if summed for all five CIR years, would be $548 million lower if the benchmark increase rate was used. Such a result would ignore Toronto Hydro's capital needs or imply that the additional capital needs identified by the company throughout its proposal are not reasonable or justified. This average is just under $110 million per year. In 2024, the difference would be $153 million.

An additional point is necessary. If the proposed capital spending plan were in fact significantly reduced by a Board decision, then the projected actual total costs of Toronto Hydro would also be significantly reduced. This would likely push Toronto Hydro to the 0.15% stretch factor cohort during the CIR period. Therefore, if the capital spending program proposed by Toronto Hydro were significantly reduced (in this hypothetical scenario), PSE's recommended stretch factor would likely become 0.15% rather than 0.3%.

Table 10

Year by Year Total Cost Benchmarking Results

Year	Percent Difference[1]
2005	-38.5%
2006	-37.5%
2007	-30.9%
2008	-29.1%
2009	-27.5%
2010	-20.0%
2011	-12.2%
2012	-13.9%
2013	-8.7%
2014	-6.9%
2015	-4.6%
2016	0.8%
2017	3.7%
2018	*7.5%*
2019	*8.7%*
2020	*11.4%*
2021	*13.4%*
2022	*15.9%*
2023	*17.8%*
2024	*19.5%*
Annual Averages	
2005-2017	**-17.3%**
2015-2017	**0.0%**
2020-2024	**15.6%**

[1] Formula for benchmark comparison is $\ln(Cost^{THESL}/Cost^{Bench})$.

Note: Italicized numbers are projections/proposals.

RESPONSES TO ENERGY PROBE INTERROGATORIES

INTERROGATORY 73:

Reference(s): Exhibit L3, Reply Report to PEG Evidence; Exhibit L1/Tab 2/Schedule 2, pp. 3-4.

Preamble:

With regard to the reference 2, we wish to understand directionally, how the differences in sample, input data and methodology between PEG and PSE may affect the PSE total cost benchmark for Toronto Hydro. Exhibit L1/Tab 2/Schedule 2, Page 3 of 4 IRM-4" refers to the 2013 PEG study (and its annual updates) and Exhibit M1 refers to the PEG's revised benchmarking study of Toronto Hydro submitted in response to M1-TH-026. The table also lists differences found between the latter study and PSE's study in Exhibit 1B, Tab 4, Schedule 2.

		IRM-4	Exhibit M1 (Revised)	PSE
Sample	Region of sampled Utilities	Ontario	U.S., Ontario (THESL only)	U.S., Ontario (6 utilities)
	Sample Size	73	84	90
	Sample Period	2002-2012	1995-2017	2002-2016
Cost Definition	Distribution O&M	Included	Included	Included
	Sales Expenses	Included	Included	Included
	Customer Accounts (less uncollectible)	Included	Included	Included
	Customer Service and Information	Included	Excluded	Excluded
	Pensions and Benefits	Included	Excluded	Included
	Capital Benchmark Year	1989 or 2002	1964 (U.S.), 1989 (THESL)[2]	1989 (U.S.), 2002 (Ontario)
	Contributions in Aid of Construction	Included	Excluded	Excluded
	High Voltage Expenses	Excluded	Included	Included
Price Indexes	Labor Price Index	Ontario AWE	Regionalized ECI[4] (US), Ontario AWE (THESL)	ECI (US), ECI*PPP[6] (Ontario)
	Materials Price Index	Canada GDP-IPI	Canada GDP-PI (US), GDP-IPI (THESL)	GDP-PI (US), GDP-PI*PPP (Ontario)
	Construction Cost Trend Index	EUCPI[3]	HW (US), Custom[5] (THESL)	HW (US), HW*PPP (Ontario)
	O&M Cost Share Weights	Fixed	Varied	Fixed

Function	Translog Treatment of Scale Variables	Yes	Yes	Yes
Estimation Procedure	Cost-share equations, SUR[7]	Yes	No	No
	Composite price index, one equation	No	Yes	Yes
	Correction for Autocorrelation	Yes	Yes	No
	Correction for Heteroskedasticity	Yes	Yes	Yes
Total Cost Model Variables	Number of Customers	Yes	Yes	Yes
	Ratcheted Maximum Peak Demand	Yes	Yes	Yes
	Retail Deliveries	Yes	No	No
	Average Line Length	Yes	No	No
	Customer Growth over 10 Years	Yes	No	No
	Percent Congested Urban	Yes	Yes	Yes
	Percent of Plant Underground	Yes	No	Yes
	Area Not Congested Urban	No	Yes	No
	Percent Forested	No	Yes	Yes
	Percent of Customers Electric	No	Yes	Yes
	Percent of Customers with AMI	No	Yes	Yes
	Elevation Deviation	No	Yes	Yes
	Trend	Yes	Yes	Yes
	Ontario Binary Variable	No	No	Yes
	%UG*%CU	No	No	Yes
	Percent Plant Overhead	No	Yes	No

1. Kaufmann, Lawrence, Hovde, Kalfayan, Rebane. Productivity and Benchmarking Research in Support of Incentive Rate Setting: Final Report to the Ontario Energy Board. November 5, 2013.

2. Exceptions are Toronto Hydro and Northern States Power – WI, which both received a 1989 benchmark year.

3. Electric utility construction price index for distribution systems (Statistics Canada).

4. Regionalized Utility Salaries and Wages ECIs (Employment Cost Indexes from the U.S. Bureau of Labor and Statistics). Note that PSE uses the salaries and wages version of ECI too even though pensions and benefits are included in their cost.

5. PEG's preferred Ontario LDC plant additions deflator originates from Statistics Canada Stock and Consumption of Fixed Non-Residential Capital ("SCFNRC") program. The annual survey collects data on utility-business capital expenditure on over 140 different types of

machinery, equipment, and construction assets, which is then used to construct an annual index of deflated capital investment. Since deflated investment is provided in both constant (2012) and current prices, the ratio of the two implicitly yields capital asset price change over time. The indexes are constructed by industry and region and in particular, are available for the utility business in Ontario. Handy-Whitman (HW) regional power distribution construction cost indexes are used for the U.S. companies.

6. Utility Employment Cost Index (U.S. Bureau of Labor Statistics). Purchasing Power Parity between U.S. and Canada.

7. SUR = seemingly unrelated regression technique for estimating parameters of multiple equations.

a) Please provide any corrections or additions to the PSE column in the PEG Table

b) Please add an additional column showing, where applicable, directionally, the noted material differences between PSE and PEG that may affect the PSE Result for Toronto Hydro cost benchmark. Use arrows to indicate Neutral/No Change ➡ Reduce ⬇ and Increase ⬆ Toronto Hydro benchmark total costs.
Provide complete explanations for the results.

c) Based on Table 2 in Exhibit M3, please provide a graphical representation of the PSE and PEG total benchmark cost for Toronto Hydro for the 2015-2024 period.

d) Please add a line for the PSE forecast from the prior proceeding.

RESPONSE (PREPARED BY PSE):

a) The only minor correction to the table above is that the PSE sample includes seven Ontario utilities rather than the six stated, with one of the seven being the studied utility, Toronto Hydro.

b) Given the limited response time and the expectation of the OEB that the interrogatories be "very limited in scope and address only the evidence provided in the Supplemental Report,"[1] PSE is unable to produce a dataset and model to examine the impact of all the differences. However, we provide our estimate of the directional changes. These expectations were not fully tested, and only represent our current expectation of the directional change.

- Sample differences between PEG and PSE. PSE believes that adding the Ontario distributors to the sample decreased Toronto Hydro's total cost benchmark. Said differently, adding the Ontario distributors likely worsened Toronto Hydro's score.

- Pensions and benefits being included in PSE's dataset worsened Toronto Hydro's benchmark score. We anticipate, however that this had a small impact on the benchmark score.

- The capital benchmark differences had an unknown impact. If the PEG data from 1964 was implemented appropriately, we would expect the difference in results to be small. Given that the older data cannot be

[1] Procedural Order No. 8 dated June 6, 2019.

verified and may contain errors, we do not know if the difference in results is actually small.

- The differences in the input price indexes are unknown and dependent on when the levelization is taking place (specifically the levelization for capital). PEG's results using the 2012 capital levelization found in their response to M1-TH-026 (f) will have a smaller difference, due to the input price indexes used, than the difference in PEG's results when using an older 2008 capital levelization.

- The differences in the OM&A cost share weights would likely not have a meaningful impact on results.

- The autocorrelation correction difference would likely not have a meaningful impact on the results.

- PSE included a percent plant underground variable. Adjusting for this business condition raised Toronto Hydro's total cost benchmark. Said differently, including the variable improved Toronto Hydro's benchmark score.

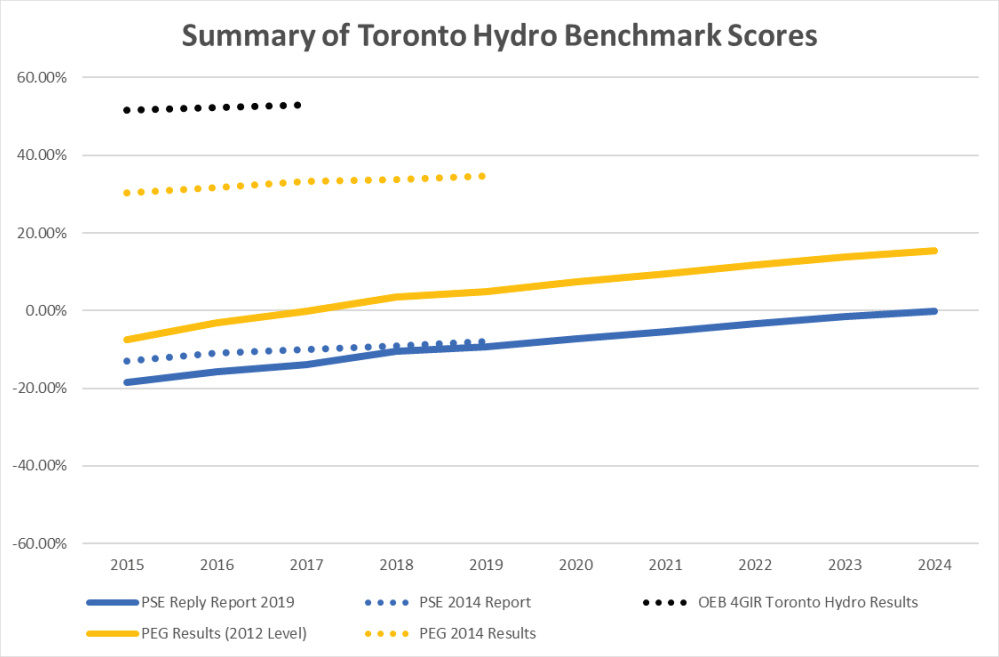
- PSE did not include the area <u>not</u> congested urban variable. PEG did. If PSE had included the variable, Toronto Hydro's benchmark total costs would have increased. Said differently, the company's benchmarking score would have improved.

- PSE included the Ontario binary variable. Adjusting for this business condition lowered Toronto Hydro's total cost benchmark. Said differently, including the Ontario binary variable worsened Toronto Hydro's benchmark score.

- PSE included a percent plant underground variable interacted with the congested urban variable. Adjusting for this business condition raised Toronto Hydro's total cost benchmark. Said differently, including the variable improved Toronto Hydro's benchmark score.

- Energy Probe's table includes a "Percent Plant Overhead". This is essentially the inverse of the percentage underground variable. The table states the PEG includes this variable in their total cost study. However, after reviewing the PEG report, we do not believe that is the case.

c) The PEG (solid yellow line) and PSE (solid blue line) results from Table 2 of the Reply Report are provided graphically. We also added the PSE results from the prior Toronto Hydro application (blue dotted line), PEG's results from the prior application (yellow dotted line), and the latest OEB 4th Generation Incentive Regulation (4GIR) total cost benchmarking update for Toronto Hydro (dotted black line). In our view, the prior 2014 study conducted by PEG, and the OEB 4GIR study, do not adequately account for the congested urban challenges encountered by Toronto Hydro. However, in its report in this application PEG has included our congested urban variable and its proposed stretch factor has been lowered.



1

2 d) Please see our response to part (c).

The column labeled "PEG TC Results (2012 Capital Level)" shows the updated PEG results from their Interrogatory Answers. PEG corrected their results from the initial PEG Report in their response found in M1-TH-026 (f).[1]

Table 1 PSE Total Cost Results vs. PEG Total Cost Results

Year	PSE TC Results	PSE—Average Results Prior 3 Years	PEG TC Results (2012 Capital Level)	PEG—Average Results Prior 3 Years
2015	-18.4%		-7.6%	
2016	-15.7%		-3.1%	
2017	-13.8%		-0.2%	
2018	-10.5%	**-16.0%** (SF=0.15%)	3.5%	-3.6% (SF=0.30%)
2019	-9.3%	**-13.3%** (SF=0.15%)	4.8%	0.1% (SF=0.30%)
2020	-7.2%	**-11.2%** (SF=0.15%)	7.5%	2.7% (SF=0.30%)
2021	-5.5%	**-9.0%** (SF=0.30%)	9.4%	5.3% (SF=0.30%)
2022	-3.3%	**-7.3%** (SF=0.30%)	11.8%	7.2% (SF=0.30%)
2023	-1.6%	**-5.3%** (SF=0.30%)	13.8%	9.6% (SF=0.30%)
2024	-0.1%	**-3.5%** (SF=0.30%)	15.4%	11.7% (SF=0.45%)
CIR Avg.	**-3.5%**		**+11.6%**	

In Table 1 we show each model's annual benchmarking score and included the average of the prior three years for both PSE's results and PEG's results. We also included the applicable stretch factor (SF) based on the 4th Generation SF cohorts.[2]

As can be seen in the table, PSE's results suggest a 0.30% SF for the majority of the Custom IR period and for the 2020 to 2024 average. PEG's model results also suggest a 0.30% SF for the majority of the Custom IR period. If the full custom IR forecasted period is averaged, PEG's recommended stretch factor becomes 0.45%.

This convergence in results toward a 0.30% stretch factor is primarily due to the advancement of the congested urban variable. PSE and PEG each use the new variable in their models. The congested urban challenges of Toronto Hydro are now being recognized in both models, and the total cost benchmarking results of both consultants reflect this advancement.

[1] In PEG's response to interrogatory questions M1-TH-026 (e) and (f), PEG calculated total costs using 2008 and 2012, respectively, as the capital levelization year. In Table 1 we show the results using the newer 2012 capital levelization found in part (f) of the interrogatory response. In Section 3.1.1 we discuss why using the more recent capital levelization provides the most accurate depiction and partially mitigates the impact of PEG using inconsistent asset price escalators between Toronto Hydro and the rest of the sample. We note that in the PEG Revised Report, PEG used the older and less accurate 2008 capital levelization year.

[2] The 4th Generation SF cohorts are based on the 3-year historical total cost benchmarking scores. Average scores greater than 25%, between 10% to 25%, between 10% to -10%, between -10% to -25%, and less than -25% suggest a SF of 0.60%, 0.45%, 0.30%, 0.15%, and 0.00%, respectively.

RESPONSES TO SCHOOL ENERGY COALITION INTERROGATORIES

INTERROGATORY 27:

Reference(s): Exhibit 1B, Tab 4, Schedule 2, p. 18, 21

With respect to input prices:

a) Please explain why the expert did not use the same measure of input prices that the OEB uses to calculate inflation.

b) Please provide tables for each of the seven Ontario distributors showing the changes in OM&A inputs assumed by PSE, and a breakdown of each such assumption.

c) Please reconcile the resulting changes in assumed input prices with the assumed 1.2% inflation factor used by Toronto Hydro in the Application (e.g. Table 5).

RESPONSE (PREPARED BY PSE):

a) Important measures of input prices for a benchmarking study are the input price levelizations used to adjust for the fact that items like wages and construction costs vary from city to city and region to region. For example, salaries and wages will tend to be significantly higher in New York City than in Madison, Wisconsin. These differences need to be properly adjusted to create a level playing field for the entire sample within the benchmarking study.

A key difference in the PSE Study versus the OEB Study is that the PSE adjusts for the construction cost differences between the utilities using RSMeans construction cost

indexes by city. A city like Toronto is likely to have higher construction costs than a city like London, ON. The OEB Study assumes all the Ontario distributors have equal capital prices. This will tend to unfairly harm the benchmarking scores of utilities serving higher cost regions, such as Toronto Hydro. PSE has corrected for this omission in our study.

PSE also updated our labour levelizations using 2010 Canadian census data and U.S. Bureau of Labor Statistics (BLS) data. We are unsure of how the OEB Study specifically adjusted for labour input prices but we use the updated Canadian Census on over 100 job occupations to create a composite wage level that matches the composition of an electric utility. We used Bureau of Labor Statistic (BLS) data to match those same occupations for the U.S. sample.

After the levelizations are set, growth rates (inflation) are applied to move the levelized input prices from year to year. PSE used Handy-Whitman indexes for electric distribution in constructing the capital input price. The OEB Study methodology uses the Canadian Electric Utility Construction Price Index (EUCPI). However, the EUCPI has been discontinued as of 2014. Further, PSE is of the opinion that it is more appropriate to use a construction cost inflation index that is specific to the electric distribution industry, rather than other possibilities that are generalized to either the electric utility industry or just the utility industry at large. For the Ontario distributors, we did translate the Handy-Whitman electric distribution indexes into Canadian currency using the purchasing power parity indexes (PPPs) for Canada. Similarly, PSE used U.S. employment cost indexes and a GDP price index to inflate OM&A related costs, but adjusted these inflation measures using the Canadian PPP for the Ontario distributors.

b) The table below illustrates the input price levels and trends for the Ontario distributors including in the PSE sample. As can be seen by the fact the growth rates are all the same, we used identical input price inflation assumptions for all seven distributors. The differences show up in the levelizations of labour and capital. Toronto Hydro and Enersouce have the same input prices in all years because we mapped each one to the city of Toronto to determine the levels of salaries and wages and capital construction prices. The other utilities were mapped to their respective headquarter cities.

Distributor	2016 Labour OM&A Input Price	2005-2016 Annual % Growth Rate	2016 Non-Labour OM&A Input Price 2016	2005-2016 Annual % Growth Rate	2016 Capital Input Price	2005-2016 Annual % Growth Rate
Toronto Hydro	90,563	3.0%	1.40	2.0%	13.38	4.0%
Enersource	90,563	3.0%	1.40	2.0%	13.38	4.0%
Horizon Utilities	85,546	3.0%	1.40	2.0%	13.04	4.0%
London Hydro	81,346	3.0%	1.40	2.0%	12.85	4.0%
Kitchner-Wilmont	85,236	3.0%	1.40	2.0%	12.32	4.0%
Hydro Ottawa	91,495	3.0%	1.40	2.0%	12.95	4.0%
EnWin	87,251	3.0%	1.40	2.0%	12.20	4.0%

c) The input price inflation assumed by PSE is looking at the historic industry inflation for each year, whereas the 1.2% is the recent escalation factor. Further, the industry

inflation has been higher than the inflation factor, primarily due to the 4.0% growth in capital prices and the 3.0% growth in utility employment cost indexes. We would expect the industry-specific inflation to be different from the more general indexes used in the inflation factor. In a benchmarking study, all utilities receive the same or similar treatment regarding inflation assumptions, and this assumption will likely have a small impact on the relative scores or rankings of the individual utilities being benchmarked. The inflation assumptions are important when benchmarking projected data. PSE believes we have used estimates that are conservative in those projections. For example, rather than continuing the 4.0% capital inflation rate, we instead used a capital inflation assumption of 2.18% for 2020 to 2024. PSE stayed on the lower bound of what we would consider reasonable estimates for asset price inflation in order to help address one of the three Board concerns cited in the Board's 2015 Decision.

RESPONSES TO SCHOOL ENERGY COALITION INTERROGATORIES

INTERROGATORY 28:

Reference(s): Exhibit 1B, Tab 4, Schedule 2, p. 20

Please explain why the %CU variable and the %UG*%CU variable do not measure similar or related effects.

RESPONSE (PREPARED BY PSE):

The congested urban variable (%CU) measures the cost impact of serving a highly congested urban service territory. This has been shown both empirically and through engineering analysis to be a significant driver of a distributor's total costs.

The underground variable (%UG*%CU) measures the important cost differences between undergrounding power lines in congested urban areas relative to non-congested urban areas. It will tend to be far less costly to underground lines in suburban and/or rural areas. In fact, in many areas, utilities are able to direct bury power lines, and overall costs can be reduced relative to constructing overhead power lines (see the negative coefficient value on the %UG variable). By including the %UG*%CU variable, the model can disaggregate the vast cost differences between undergrounding in rural/suburban areas versus undergrounding lines in congested urban areas.

The added flexibility of distinguishing between the differences this variable provides is important to accurately evaluating Toronto Hydro's total cost performance, given their high percent undergrounding and high percentage of congested urban service territory. If this variable were excluded, undergrounding costs in the model would combine the low-

cost rural/suburban undergrounding with the much higher cost urban undergrounding making the model less precise and accurate.

PSE stated the importance of disaggregating the underground costs on p. 20 of the PSE report:

> The **percent underground multiplied by congested urban variable** provides the interaction between the percent underground variable and the congested urban variable. Constructing underground lines in urban settings is far more costly than in more rural settings. For example, underground lines in rural settings can be "direct buried" without the need for concrete-enclosed banks and other capital infrastructure. We would expect a positive coefficient on the variable.

RESPONSES TO SCHOOL ENERGY COALITION INTERROGATORIES

INTERROGATORY 29:

Reference(s): Exhibit 1B, Tab 4, Schedule 2, p. 22

SEC is seeking to understand how the change in the maximum peak demand variable impacts the model results.

a) Please provide a table showing the maximum peak demand of Toronto Hydro for each year from 2002 onwards using the 2015 methodology and using the current methodology, and explain each year that there is a difference.

b) Please confirm that the new methodology assumes that, even if demand declines, that never, over time, reduces the costs of an electricity distributor. If not confirmed, please explain.

RESPONSE (PREPARED BY PSE):

a) The maximum demand variable is defined the same as the capacity variable included in the 4th Generation OEB benchmarking model. The difference in the annual peak demand and maximum peak demand is due to the maximum peak demand variable measuring the highest peak demand variable from either the current year, or from all past years since 2002, whereas the annual peak demand measures only the current year.

Table 1: Annual and Maximum Peak Demand for Toronto Hydro

Year	Annual Peak Demand	Maximum Peak Demand
2002	4,771	4,771
2003	4,821	4,821
2004	4,521	4,821
2005	5,005	5,005
2006	5,018	5,018
2007	4,788	5,018
2008	4,564	5,018
2009	4,607	5,018
2010	4,786	5,018
2011	4,919	5,018
2012	4,830	5,018
2013	4,915	5,018
2014	4,274	5,018
2015	4,404	5,018
2016	4,592	5,018
2017	4,260	5,018
2018	4,217	5,018
2019	4,195	5,018
2020	4,165	5,018
2021	4,119	5,018
2022	4,069	5,018
2023	4,038	5,018
2024	4,052	5,018

b) A distributor's actual total costs can still increase or decrease based on the actual cost levels incurred. It is true that the definition of the variable prevents the maximum

peak demand variable from decreasing over time. This is because the distribution system is required to be built to meet maximum peak demands over a multi-year period and not just the annual peak demand in each year.