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June 20, 2019

Via RESS

Ms. Kirsten Walli
Board Secretary
Ontario Energy Board
PO Box 2319
2300 Yonge Street, 27th floor
Toronto, ON M4P 1E4

Dear Ms. Walli:

Re: **OEB File No. EB-2018-0165 Toronto Hydro-Electric System Limited ("Toronto Hydro")**
Custom Incentive Rate-setting ("Custom IR") Application for 2020-2024 Electricity Distribution
Rates and Charges – Responses to PSE Reply Report Interrogatories

On May 31, 2019, Toronto Hydro filed a supplemental report by Power System Engineering Inc. ("PSE") with respect to productivity benchmarking ("PSE Reply Report"). On June 6, 2019, the OEB issued Procedural Order No. 8, which provided for interrogatories to be filed on the PSE Reply Report. On June 12, 2019, OEB Staff and Energy Probe ("EP") filed interrogatories on the PSE Reply Report.

Enclosed with this letter is an electronic version of Toronto Hydro's and PSE's responses to those interrogatories. Physical copies will follow via courier.

Please contact me directly if you have any questions or concerns.

Respectfully,

Andrew J. Sasso
Director, Regulatory Affairs
Toronto Hydro-Electric System Limited

cc: Lawrie Gluck, OEB Case Manager
        Michael Millar, OEB Counsel
        Parties of Record
        Amanda Klein, Toronto Hydro
        Daliana Coban, Toronto Hydro
        Charles Keizer, Torys LLP

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1   RESPONSES TO OEB STAFF INTERROGATORIES

2

3   INTERROGATORY 1:

4   Reference(s):   Ratcheted Peak Demand

5   PSE's Reply Report, p. 7

6

7   <u>Preamble:</u>

8   PSE states on page 7 that:

9   There are two output variables included in both PEG's and PSE's total cost model.

10   These are: (1) the number of customers served, and (2) ratcheted peak demand ...

11   PEG's ratcheted peak demand variable takes the highest peak demand value for each

12   U.S. utility, starting in 1995. However, for Toronto Hydro, PEG's variable takes the

13   highest peak demand value, starting in 2002. This provides the U.S. utilities the

14   advantage of seven more years to raise their ratcheted peak demand variable. PEG

15   agreed that this inconsistency is present in their model (see PEG's response to M1-TH-

16   018) but has not, to our knowledge, corrected for this inconsistency in the PEG

17   Revised Report. PSE acknowledges that PEG (or any other consultant) is unable to

18   identify the historical peak demands for Toronto Hydro prior to 2002. However, if PEG

19   continues to include U.S. observations prior to 2002 in its sample (which PSE believes

20   is unhelpful), PEG should be defining one of the most important variables in its model

21   consistently. PEG's inconsistency biases the results against Toronto Hydro.

22

23   Toronto Hydro, in its present form, was established in the merging of six former

24   municipal electric utilities under municipal restructuring, on January 1, 1998.

25

26   a) Please confirm that PEG begins computing the ratcheted peak demand variable for

27   the US utilities in 1995 rather than 2002 because it begins its US sample in 1995.

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1   How then could it "correct" for this inconsistency without losing the 1995- 2001

2   US data?

3

4   b) Please confirm that formal CDM programs for Toronto Hydro and other Ontario

5   distributors, under guidance from the Ontario Government, did not begin until

6   2005. From 1995 to 2004, Toronto Hydro and the predecessor utilities

7   experienced a rising demand trend (e.g., more than 2% average annual customer

8   growth). If this is the case, please explain why a ratcheted peak demand

9   established in 2002 would not be reasonably applicable to the

10   later years of the sample period for the cost benchmarking?

11

12

13   RESPONSE (PREPARED BY PSE):

14   a) PEG confirmed the 1995 start year for the U.S. utilities when determining the

15   ratcheted peak demand variable in their response in M1-TH-018 (b). PEG confirmed

16   Toronto Hydro was treated differently from the rest of their sample in part (c) of that

17   same interrogatory. The presence of the inconsistency in the definition of the

18   ratcheted peak demand variable in PEG's dataset could be addressed in a couple

19   different ways. Possible solutions that could have been implemented are: 1) begin

20   the U.S. sample in 2002 to assure consistency, or 2) redefine the ratchet peak demand

21   variable so it can be calculated consistently (for example, use a 5-year or 10-year

22   rolling maximum of the variable for the entire dataset, including Toronto Hydro).

23

24   b) We can confirm that formal CDM programs in Ontario began around 2005. We are

25   unable to verify the customer growth rate of Toronto Hydro and its predecessor

26   companies from 1995 to 2004.

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1   Two points are relevant here. The first is that the U.S. sample observations will have

2   higher values of ratcheted peak demand due to their advantage of having an extra

3   seven years to set their maximum peak demand. This is especially true in the earlier

4   years of the sample, but this advantage persists all the way to the end of the sample

5   for two of the U.S. utilities in PEG's sample (the utilities with pegids[1] 58 and 148). This

6   inconsistency has an impact on the PEG results for Toronto Hydro throughout the

7   entire sample period.

8

9   The second relevant point is that we do not know what the Toronto Hydro peak

10   demand values are for years prior to 2002. PEG cannot be certain that a higher peak

11   demand did not occur prior to 2002 (for Toronto Hydro, or the sum of the predecessor

12   companies) that would have increased Toronto Hydro's peak demand value for part or

13   all of the study period.

14

15   For example, in PEG's dataset, the utility with pegid 148 had a customer growth rate

16   of approximately 1.9% from 1995 to 2004. The utility set its maximum peak for the

17   entire period in 1998. If the demand definition for that utility was identical to the one

18   used for Toronto Hydro (if the cut-off year were 2002), the utility would have had a

19   lower ratcheted peak demand. If the 2002 cut-off year were used as it was for

20   Toronto Hydro, there are numerous other examples of U.S. utilities in PEG's dataset

21   having higher values than they otherwise would have.

---

[1] "pegid" refers to PEG's assigned anonymized company number for each utility.

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3   INTERROGATORY 2:

4   Reference(s):   Asset Price Index Levelization

5   PSE's Reply Report, pp. 6-7

6

7   <u>Preamble:</u>

8   On pages 6-7 of the report, PSE states that:

9   In PEG's original study, Toronto Hydro's levelization occurred in 2012, whereas the

10   rest of the sample was levelized in 2008. In the interrogatory M1-TH-026 (d) we

11   pointed out this error, and PEG then acknowledged this error and its inconsistency

12   with the rest of the sample in their response. Accordingly, PEG revised its results after

13   correcting for this error in parts (e) and (f) of the same interrogatory. Part (e) of the

14   response used the older 2008 capital levelization, part (f) used the newer 2012 capital

15   levelization year. Correcting the inconsistency by using the older 2008 levelization

16   year improved Toronto Hydro's total cost benchmarking score by about 5% relative to

17   PEG's original report. Correcting the inconsistency with the newer 2012 levelization

18   year improved the company's score by about 9% relative to the total cost results

19   reported in the initial PEG Report.

20

21   a) Did PSE use the RSMeans Heavy Construction Cost book from 2012 as the source

22   of the City Cost Indexes it used to levelize its asset price indexes? If not, what was

23   the source of these data?

24

25   b) For whichever edition of the RSMeans book that PSE used, please provide a copy

26   of the two-page introduction to the City Cost Indexes titled "How to Use the City

27   Cost Indexes." Does the introduction contain the year of data used in the

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1   construction of the indexes? For example, PEG's 2010 edition of this series reads

2   "Index figures for both material and installation are based on 30 major city

3   average of 100 and represent the cost relationship as of July 1, 2008." If not

4   available, what was the year of the data underlying the City Cost Indexes that PSE

5   used in the study?

6

7   c) According to PSE's reasoning, would 2015 be an even better year than 2012 to

8   levelize the asset price indexes? If not, why not?

9

10

11   RESPONSE (PREPARED BY PSE):

12   a) Yes, PSE used the 2012 edition of the RSMeans Heavy Construction Cost book.

13

14   b) PSE has a paper copy of the 2012 book. The page containing the year of the data

15   underlying the City Cost Indexes states: "Index figures for both material and

16   installation are based on the 30 major city average of 100 and represent the cost

17   relationship as of July 1, 2011." PSE used the 2012 RSMeans book to levelize the

18   capital in the year 2012. Given that we used a consistent asset inflation measure

19   (Handy-Whitman Indexes) for both Toronto Hydro and the U.S. utilities, there would

20   be no meaningful change in results if we had instead levelized the capital in 2011

21   using the 2012 RSMeans book.

22

23   c) Given PEG's treatment in using different capital asset inflation indexes for Toronto

24   Hydro and the rest of the sample, we agree that a more recent capital levelization will

25   be more accurate in evaluating the recent and forecasted total cost values of Toronto

26   Hydro. Rather than 2015, however, the most recent publication available should be

27   used. Both the 2018 and 2019 editions are available.

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3   INTERROGATORY 3:

4   Reference(s):   Asset Price Index Trend

5   PSE's Reply Report, p. 14

6   Figure L3-Staff-3

7

8   <u>Preamble:</u>

9   PSE states on page 14 of its report that:

10   PEG's chosen index includes natural gas distribution, water and sewer, and electric

11   generation, transmission, and distribution. We also note in Section 2.1.3 that PEG's

12   choice for Toronto Hydro's price index is inconsistent with the rest of the sample,

13   because the rest of PEG's sample is using an index specific to the electric distribution

14   sector. This inconsistency produces the unreasonable result in the PEG dataset that

15   Toronto Hydro has a capital price inflation rate from 2005 to 2017 of 0.5%, versus

16   much higher growth rates for the rest of the sample. This improper assumption means

17   Toronto Hydro has, by far, the lowest capital price inflation in PEG's entire dataset.

18   This is simply unreasonable, especially given the City of Toronto's brisk construction

19   growth during the sample period.

20

21   The Handy-Whitman Indexes ("HWI") used by PSE for all utilities, including Toronto

22   Hydro, are specific to the electric distribution sector, and are a better depiction of the

23   inflationary pressures of an electric distributor like Toronto Hydro. Toronto Hydro

24   purchases assets in a global market, and electric distribution has specific commodities

25   that are more relevant to electric distribution than other types of utilities, such as

26   water and sewer or gas distribution. For example, electric distributors require a higher

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1   input of copper than most other utility sectors. The asset inflation index should reflect

2   that reality.

3

4   PEG prepared the following figure to aid in the verification of the above

5   statements.

6   Figure L3-Staff-3

7   Comparing the Asset Price Levels of Toronto Hydro and Sampled US Utilities

8
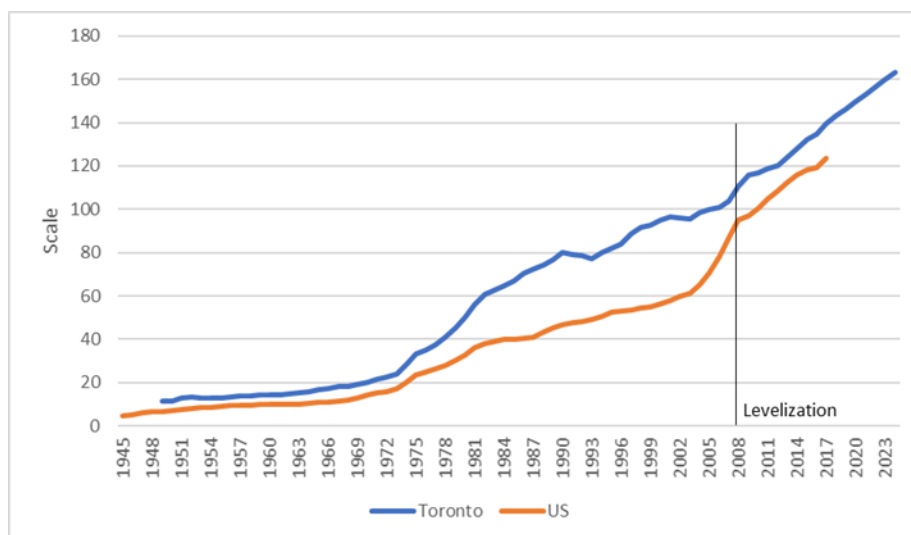
9   a) Please confirm that the goal of the statistical cost research in this proceeding is to

10   benchmark the recent and projected future cost levels of Toronto Hydro and not

11   the cost or productivity trends of the utility or sector.

12

13   b)   Please confirm that, in such a cost benchmarking study, the chief consideration in

14   choosing asset price indexes is the reasonableness of price levels and not their

15   trends.

16

17   c) Please confirm that, since 2008 is the year that PEG chose to levelize the asset

18   price indexes, the slower growth in PEG's asset price index for Toronto Hydro from

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1   2006 to 2008 has the consequence of making the level of Toronto Hydro's asset

2   prices considerably higher than the norm for sampled US utilities in the years

3   before 2008. Insofar as this biases PEG's benchmarking results, doesn't the bias

4   actually favour Toronto Hydro? If not, why not?

5

6   d) Please confirm that, in seeking to illustrate the importance of PEG's choice of an

7   asset price index for Toronto Hydro, PSE cited the trend in the resultant capital

8   price index, which includes a capital gains term and is therefore very sensitive to

9   the choice of the sample period. Doesn't capital cost rise and fall with capital

10   gains as well?

11

12   e) Please provide your understanding of how the weights on the Handy Whitman

13   Construction Cost Indexes have changed over time (e.g., in what years were the

14   weights set or reset?). To the extent that weights are reset infrequently, won't

15   this tend to overstate the growth in distribution construction costs?

16

17   f) Has the mix of Toronto Hydro's capital expenditures on copper and aluminum

18   conductors changed substantially since 1975?

19

20

21   RESPONSE (PREPARED BY PSE):

22   a) Confirmed. However, the presence of an inconsistent trend in the asset price inflation

23   will impact the capital price level and, ultimately, the study results. An unreasonable

24   capital price inflation of 0.5% for Toronto Hydro versus the much higher assumed

25   inflation for the rest of PEG's sample illustrates how PEG's approach is leading to

26   implausible outcomes in our view (i.e. Toronto Hydro having, by far, the lowest capital

27   price inflation rate in the entire sample). In our view, PEG should have used the most

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1   recently available capital levelization in order to mitigate the impact of the

2   inconsistent asset price trends onto the recent and projected Toronto Hydro

3   benchmark levels.

4

5   b) Confirmed. However, the trends in the asset inflation indexes will influence the levels

6   of the capital price. This is especially true when PEG uses a different asset inflation

7   index between Toronto Hydro and the rest of the sample, and then levelizes the

8   capital in an older year (e.g. 2008). For this reason, PSE believes that PEG should have

9   then levelized the capital in the most recent year available. Instead, PEG levelized

10   capital in 2008 in their original report and in their revised report.

11

12   c) PEG's approach will tend to make Toronto Hydro look better in the older years and

13   worse in the more recent years.

14

15   d) It is true that PSE illustrated the implausible capital price growth rate of 0.5% for

16   Toronto Hydro by considering the entire historical sample period for Toronto Hydro

17   (2005 to 2017). However, PEG also includes a capital gains term, which we agree, is

18   "very sensitive" to the choice of the sample period. PSE does not include the capital

19   gains term for several reasons: the term does not mimic the components of the

20   revenue requirement; it is very sensitive to the specific time period; and the 4th

21   Generation Incentive Regulation research did not include a capital gains term.

22

23   e) PSE is unaware of how the weights for the Handy Whitman Construction Cost Indexes

24   have changed over time. We do not know what the impact of this would be on the

25   published indexes. Either way, the possibility of infrequent weighting exemplifies why

26   using the same indexes for the entire sample, including the studied utility, is PSE's

27   chosen approach. It is inconsistent to be using different indexes for the studied utility

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1   and the rest of the sample due, in part, to the possibility raised in this question. If the

2   index used for Toronto Hydro has a different weighting (either based on a different

3   time period or not) than the index used for the rest of the sample, an inconsistency

4   arises. Furthermore, the two indexes used by PEG will have different weightings due

5   to one index measuring the utility sectors of gas distribution, water and sewer, and

6   electric generation, transmission, and distribution (this is the index applied to Toronto

7   Hydro) and the second index being focused solely on electric distribution (this is the

8   index used for the rest of PEG's sample).

9

10   RESPONSE (PREPARED BY TORONTO HYDRO):

11   f)   Toronto Hydro does not maintain records from 1975. However, Toronto Hydro does

12   not believe the mix of copper and aluminum has changed much over the years given

13   that there have not been any changes to specifications or standards for conductors

14   that would have resulted in a substantial change.

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3   INTERROGATORY 4:

4   Reference(s):   Imputations in Ontario Capital Cost Data

5   PSE's Reply Report, p. 13

6   M1-TH-032

7

8   <u>Preamble:</u>

9   PSE states on page 13 of its report that:

10   For PEG to go back to the 1989 capital benchmark year for Toronto Hydro, it required

11   PEG to make certain assumptions and imputations on the capital addition series from

12   1989 to 2002, since directly reported data was not available for all years … PEG's

13   imputations produce an implausible hypothetical result for Toronto Hydro in 1996,

14   where PEG's imputations resulted in an estimate of Toronto Hydro having plant

15   additions of over $450 million. This was quadruple the typical number in the 1990s,

16   and was not exceeded in any year until 2014.

17

18   PEG stated the following in response to M1-TH-032:

19   The cited value does not appear to be implausible to PEG. Two years prior there was a

20   value that was very low and on balance the two average to a more typical value. The

21   early 1990s were recession years and it is not unreasonable that capex would be low.

22   By the mid-1990s, a renewed boom in construction was happening in Toronto. The

23   source of the increase in the additions was due to a large increase in the plant balance

24   for account 75 (using the pre-Accounting Price Handbook/Reporting and

25   Recordkeeping Requirements account numbers) which is Distribution Lines and

26   Feeders – Underground. Subsequent values in this account remained at the higher

27   levels as did the corresponding successor accounts used currently.

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1   a) Please confirm that PSE used a 1989 benchmark year for capital quantity indexes

2   of Ontario utilities in several public studies, including its previous benchmarking

3   study for Toronto Hydro filed in EB-2014-0116.

4

5   b) Given PEG's response in M1-TH-032 on the 1996 capital additions, please explain

6   why PSE still considers this an "implausible hypothetical result".

7

8   c) Please confirm that PSE used the same value of over $450 million in its 2014 study

9   for Toronto Hydro.

10

11

12   RESPONSE (PREPARED BY PSE):

13   a) PSE did use a 1989 benchmark year in EB-2014-0116. We also used a 1989

14   benchmark year in our Hydro Ottawa benchmarking study in EB-2016-0004. The

15   benchmark year and data used matched the 4th Generation Incentive Regulation data

16   calculated by PEG. However, since that time we have become uncomfortable using

17   the 1989 benchmark year, due to the obvious data problems that occur when 1989 is

18   used as the benchmark year. In PSE's benchmarking research for Hydro One

19   Distribution in EB-2017-0049, we instead used 2002 as the benchmark year. As

20   discussed in the preamble to this question, the $450 million in plant additions that

21   PEG assumed was spent by the company in 1996 is an anomaly and seems highly

22   implausible to PSE. Beyond that, there are observations for the other Ontario

23   distributors that have negative values for the assumed plant additions in the 1990s.

24   Negative plant additions are certainly implausible and reveal the deficiency of the

25   methodology of using 1989 as the benchmark year. PSE desired consistency in its

26   treatment of the Ontario distributors and Toronto Hydro; therefore, we used 2002 as

27   the capital benchmark year for Toronto Hydro and the rest of the Ontario sample.

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1   b) PEG does not explain how a company could quadruple its plant additions in a single

2   year. This does not appear plausible to PSE. The plant category increase that PEG

3   references could more easily be explained by an adjustment to that category rather

4   than actual plant additions. Due to the age of this data and our inability to verify it,

5   we simply do not know exactly what happened. However, it seems implausible to PSE

6   that additions quadruped in 1996, with no other year having a similar increase, then

7   returned to their former levels in 1997. Beginning the capital series in 2002, so that

8   all data can be verified, is the better course of action.

9

10   c) Confirmed. Please see part (a) of this response.

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3   INTERROGATORY 5:

4   Reference(s):   PSE's Reply Report, pp. 9, 11-12

5   Exhibit D-1-1 Attachment 1

6

7   <u>Preamble:</u>

8   PSE states on p. 9 of its report that:

9   PEG's model does not contain quadratic business condition variables, including two

10   PEG states are significant cost drivers.

11

12   PSE states on p. 12 of its report that:

13   PEG chose not to include any of the quadratic variables despite finding statistical

14   evidence that two of them are important and statistically significant cost drivers. Not

15   including these variables creates bias in PEG's model—omitted variable bias. PEG says

16   in their response that they did not include the variables "to avoid the possibility of

17   overfitting the model." However, they are underfitting the model, and this impacts the

18   accuracy of their reported results. If PEG were to include the two quadratic terms they

19   found to be significant, their results for Toronto Hydro would materially improve.

20

21   a)   Please confirm that it is generally difficult to predict the value for the quadratic

22   term of a business condition (aka Z) variable.

23

24   b)   Please confirm that it would have been equally reasonable, ex ante, for PSE to

25   •   interact the trend variable with the other Z variables in its cost model

26   •   interact the Z variables with the scale variables

27   •   include a quadratic term for the trend variable.

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1   c) If all possible quadratic and interaction terms for Z variables are included in a cost

2   model, isn't it likely that the model will produce an implausibly large dispersion of

3   performance results?

4

5   d) Given the numerous possible quadratic and interaction terms that are possible

6   with Z variables, how can the OEB establish that the inclusion of a particular

7   subset of such terms are not chosen to produce favorable results for a client?

8

9   e) Where in PEG's evidence is it revealed that two quadratic business condition

10   variables were statistically significant in PEG's modelling research?

11

12

13   RESPONSE (PREPARED BY PSE):

14   a) Confirmed.

15

16   b) Not confirmed. Including the quadratic Z variable terms to capture the curvature of

17   their impacts on total cost is more reasonable than including the first two bulleted

18   items. The reason for this is similar to the reason why output variables include

19   quadratic and interaction terms to capture the curvature of the impacts on total cost

20   from the output variables. Including a quadratic variable for the time trend could also

21   be a reasonable approach if the researcher wanted to estimate the curvature of the

22   trend variable, and how that changes with more recent observations in the model.

23   We note, this would only add one extra variable to the model.

24

25   c) No. PSE examined this by including several of the Z variable interaction terms. The

26   standard deviation of the performance results was actually slightly lowered by these

27   inclusions.

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1 d) The OEB can evaluate the rationale provided for the included variables and decide if

2   the model is a more accurate depiction of performance with these variables included.

3   PSE maintains that including the quadratic terms was necessary to estimate the

4   curvature of the congested urban variable, which is due to Toronto Hydro's outlier

5   status with respect to that variable. It would appear that this same reasoning was

6   used by PEG when it inserted a quadratic term for overhead miles in their alternative

7   total cost benchmarking model for Hydro One Distribution in EB-2017-0049. PSE did

8   not object to PEG's inclusion of the quadratic term in that case, because it was logical

9   that PEG would want to estimate the curvature of a variable such as overhead line

10   miles, given that Hydro One Distribution's data was an outlier in that variable. If the

11   quadratic term is not included, the variable cannot adjust for this curvature and that

12   will have a large impact for utilities that are outliers in this key variable. Estimating

13   that curvature empirically and adjusting for it is the best course of action. The

14   quadratic variable is highly statistically significant and excluding the variable leaves

15   out an important component that is relevant to the total cost benchmark for Toronto

16   Hydro. PSE did use the quadratics for all Z variables to treat them all consistently;

17   however, our motivation for inserting the quadratic terms was to properly estimate

18   the curvature of the congested urban variable, given the importance of the variable

19   and the fact that Toronto Hydro's data is an outlier for that variable. The results are

20   mostly impacted by the inclusion of the congested urban quadratic variable.

21

22 e) In PEG's response to M1-TH-021 p.1 PEG states:

23   A statistical test was performed on the quadratic terms of the business condition

24   variables in PSE's model and revealed that all but the percent forest and percent

25   congested urban quadratic terms were jointly insignificant. In other words, there

26   is statistical evidence that four of these variables together do not have an effect

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1   on cost and should be excluded from the model to enhance the precision of the

2   parameter estimates for remaining variables.

3

4 This statement certainly seems to imply that PEG found that the percent forest and

5 percent congested urban quadratic term were jointly significant. Further, PSE found

6 that both of these variables are also independently statistically significant at a 99%

7 confidence level.

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3   INTERROGATORY 6:

4   Reference(s):   PSE's Reply Report, p. 9

5   1B-STAFF-45

6

7   Preamble:

8   PSE states on page 9 of its report that:

9   PEG's sample period starts in 1995. PEG begins their U.S. sample period in 1995. PSE

10   began the U.S. sample in 2002. Beyond the inconsistency impact this decision had on

11   PEG's ratcheted peak demand variable, expanding an already large sample that

12   already contained over 1,300 observations to include the years of 1995 to 2001 is

13   unnecessary and inserts observations that are less reflective of the current-day

14   industry. The benchmarking results are mainly used to examine Toronto Hydro's

15   recent and projected cost performance, and including observations from the 1990s

16   detracts from that objective. Technology advances, regulatory requirements, and

17   reliability and service quality expectations have evolved throughout the years. A more

18   contemporary sample is more reflective of the current day reality within the industry.

19

20   PSE states in Interrogatory Request Response 1B-STAFF-45, pages 3-4, that:

21   The strength of econometric benchmarking method is that heterogeneity or diversity

22   in the characteristics of the utilities can be accommodated and adjusted for through

23   the econometric process. Heterogeneity or diversity should be helpful to the model,

24   rather than a detriment.

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1   a) Please confirm that the time trend parameter of a cost model captures the net

2   effect on the costs of sampled utilities of changes in technology and other external

3   business conditions over the years of the sample period.

4

5   b) Does PSE's statement on the heterogeneity of data being helpful in model

6   estimation apply only across utilities and not across time? For example, wouldn't

7   zero values for the AMI variable before 2002 help to sharpen the precision of its

8   parameter estimate?

9

10   c) Please confirm that consistent estimators are unbiased only as the sample size

11   approaches infinity. Accordingly, a longer sample period that increases the size of

12   the sample increases the precision of model parameter estimates.

13

14   d) Did PSE conduct a statistical test (e.g., a Chow test) for a structural break in the

15   data that would substantiate their contention that US data before 2002 should not

16   be used in cost model development?

17

18

19 RESPONSE (PREPARED BY PSE):

20 a) Confirmed.

21

22 b) The statement applies to both: heterogeneity of utilities and heterogeneity of time.

23   However, increasing the number of observations by inserting only observations from

24   the 1990s detracts from the objective of producing accurate recent and projected

25   benchmarking results for Toronto Hydro. PSE's sample already contains observations

26   that begin in 2002. There is no gain in adding even older observations; in fact, there is

27   a loss. Parameter estimates for variables are most precise for the variable at their

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1   mean. While diversity in values is helpful, it is not helpful to move the mean of the

2   variable away from the value of the studied utility. Given that the study is most

3   interested in estimating Toronto Hydro's recent and projected results, PEG's approach

4   does not add diversity in time (we already accomplished that through including

5   observations that begin in 2002), but it does push the average year of their sample

6   significantly backwards. For PEG's 1995 to 2017 sample, the median year is 2007. For

7   PSE's 2002 to 2017 sample, the median year is 2010/2011. Given that we are most

8   interested in evaluating the more recent and projected Toronto Hydro results,

9   pushing back the sample period's mean year by only including older observations is

10 not helpful and does not add to the precision of the parameter estimates as they

11 pertain to the more recent results.

12

13 PEG's approach is analogous to adding several very rural utilities to the sample and

14 claiming those additions enhance the precision of benchmarking Toronto Hydro's

15 total costs. This would have the effect of moving the mean variable value for the

16 congested urban variable (and likely other variables) further away from Toronto

17 Hydro's value. This would not be helpful to the precision of the Toronto Hydro

18 benchmarks. Conversely, PEG did assist in the precision of the benchmarks by adding

19 2017 to the sample period, because this helped make the dataset more contemporary

20 and reflective of the years stakeholders are most interested in. For this reason, PSE

21 also updated our results to include 2017 data in the Reply Report.

22

23 In PSE's view, adding the Ontario distributor observations for those distributors that

24 have congested urban service territory will enhance the heterogeneity of the data and

25 move the data set towards better reflecting the realities that Toronto Hydro operates

26 in. PEG chose not to include these observations, but did include observations from

27 the U.S. from the 1990s. Including observations of distributors operating in Ontario

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1   will improve the precision of the benchmarks for Toronto Hydro, whereas PEG's

2   approach to only include U.S. utilities, and include data from those utilities back to

3   1995, does not.

4

5   c) Confirmed that consistent estimators are unbiased only as the sample size approaches

6   infinity. Please see our response to part (b) on why including observations from the

7   1990s does not enhance the precision of the 2015-2024 benchmarks for Toronto

8   Hydro. Further, the PSE sample already included over 1,300 observations, which is a

9   large and robust sample.

10

11   d) No.

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1   RESPONSES TO OEB STAFF INTERROGATORIES

2

3   INTERROGATORY 7:

4   Reference(s):   PSE's Reply Report, p. 17

5

6   Preamble:

7   PSE states on page 17 of its report that

8   Our understanding is that any ratemaking regulatory reforms would normally be

9   considered by the Board at a generic proceeding, with stakeholder involvement

10   and proper consideration of any proposals.

11

12   a) Please confirm that the current form of Custom IR used by Toronto Hydro, and

13   including a Custom Capital Factor was approved in Toronto Hydro's previous

14   Custom IR case (EB-2014-0116), and not through a generic consultative process.

15

16   b) Please confirm that a similar Custom Capital Factor was proposed by Hydro One

17   Networks and, subsequently, approved with changes by the OEB in another rate

18   application (EB-2017-0049)?

19

20   c) Does PSE believe that THESL's form of Custom IR, including the C-factor, should

21   not be reconsidered in this proceeding? If so, please provide PSE's reasons for this

22   view.

23

24

25   RESPONSE (PREPARED BY PSE):

26   a) Toronto Hydro's current Custom IR, including its C Factor, was approved in decision

27   EB-2014-0116.

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1 b) Decision EB-2017-0049 sets out the particular Custom IR, including the C Factor, that

2   was approved in that application by Hydro One.

3

4 c) It will, of course, be up to the OEB to consider Toronto Hydro's Custom IR proposal in

5   this proceeding. PEG has put forth several discussion points on how to potentially

6   reconsider Custom IR compared to past precedents. PEG itself has claimed that some

7   of these considerations would require more investigation and are beyond the scope of

8   the project. PSE agrees with PEG that many of these items and their consequences

9   have not been fully investigated. It is our understanding that a re-consideration of

10   Custom IR in the manner suggested by PEG would normally be done in a generic

11   proceeding, particularly given that the Custom IR framework was defined through an

12   OEB policy.

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1   RESPONSES TO OEB STAFF INTERROGATORIES

2

3   INTERROGATORY 8:

4   Reference(s):   Stretch Factor

5   PSE's Reply Report, pp. 17-18

6

7   <u>Preamble:</u>

8   PSE states on pages 17-18 of its Reply Report that:

9   PEG's commentary on pp.62-63 of their report states that customers would never

10   receive the full benefit of the industry's productivity trend in the long run. This

11   statement ignores the reality of Ontario incentive regulation containing a stretch

12   factor. On average, utilities must exceed the industry's long run productivity by 0.30%

13   due to the stretch factor. A higher cost utility will need to exceed the industry's MFP

14   by even more on an annual basis. While numbers like 0.30% might not appear large at

15   first, this expectation of exceeding the industry's MFP is compounded annually and

16   results in a considerable cost savings to ratepayers over time.

17   ...

18   PEG correctly states that the stretch factors themselves already provide a "materiality

19   threshold and dead zone for capital revenue". Not only does the stretch factor already

20   serve as a materiality threshold for capital revenue in the company's Custom IR

21   proposal but the presence of the C factor also creates a larger stretch factor and

22   reduced revenue on the OM&A portion of the revenue requirement. [footnote

23   omitted] Further, the increased stretch factor due to the proposed capital spending

24   will not only increase the stretch factor in this plan but will tend to increase it in future

25   plans as well as the capital cost portion of the measured total costs will continue to

26   include the depreciated portion of the additional capex spending for decades to come.

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1　　All of this to say, stretch factors do contain substantial incentive properties. These

2　　properties are eliminated or diminished if the stretch factors are not formulaic and

3　　mechanistic but become arbitrary. Stretch factors will also have long-lasting effects on

4　　the company's revenues and C factors will tend to raise stretch factors both in the

5　　current and subsequent plans. This will influence the allowed revenue requirement for

6　　years to come. The productivity expectation on the company in future plans will be

7　　higher due to the current proposed C factor, again, assuming stretch factors remain

8　　formulaic.

9

10　　a)　Please provide any and all citations from past Ontario Energy Board decisions

11　　　　where the Board states that the goal of the stretch factor is to ensure that

12　　　　customers receive the benefit of the industry productivity trend rather than to

13　　　　receive a benefit that is superior to the industry trend.

14

15　　b)　If this is an additional role of stretch factors, are they properly calibrated at

16　　　　present?

17

18　　c)　Please explain how the C-factor, as posed by Toronto Hydro in this application,

19　　　　and as approved by the OEB in Toronto Hydro's previous Custom IR application

20　　　　(EB-2014-0116) raises the stretch factor in current and subsequent plans.

21

22

23　RESPONSE (PREPARED BY PSE):

24　a)　PSE did not state that either one was a goal of the Board. We also fail to see how

25　　　providing citations for all past OEB decisions is directly connected to PSE's Reply

26　　　Report. Nonetheless, the 4GIR decision in EB-2010-0379 states on p. 19,

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1   Stretch factors promote, recognize and reward distributors for efficiency

2   improvements relative to the expected sector productivity trend.

3   Consequently, stretch factors continue to have an important role in IR plans

4   after distributors move from cost of service regulation.

5

6   b)   The question is unclear on what additional role is being referenced. If the reference is

7   that stretch factors promote productivity gains beyond the expected sector

8   productivity trend and how these productivity gains compare to C-Factor productivity

9   impacts, then substantially more analysis would be required prior to being able to

10   adequately respond to the question.

11

12   c)   The requested additional capital spending of the company is reflected in the

13   benchmark analysis done by both PSE and PEG. The requested additional capital

14   spending, and that incurred during the prior application, will increase the company's

15   total costs in the benchmark analysis above what would have been calculated if the

16   additional capital spending was not incurred or requested. This has had the impact of

17   increasing the company's total costs both in recent history and the projected total

18   costs to 2024 and, therefore, worsened the benchmark results for the company and

19   raised the recommended stretch factor. The additional capital spending from both

20   the prior application and the current one will impact the company's future total cost

21   calculations for decades to come. To the extent that stretch factors are calculated

22   mechanistically from total cost benchmarking results, the company's C-Factor

23   proposal has and will continue to result in higher and more challenging stretch

24   factors.

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1   RESPONSES TO ENERGY PROBE INTERROGATORIES

2

3   INTERROGATORY 73:

4   Reference(s):   Exhibit L3, Reply Report to PEG Evidence; Exhibit L1/Tab

5   2/Schedule 2, pp. 3-4.

6

7   Preamble:

8   With regard to the reference 2, we wish to understand directionally, how the differences

9   in sample, input data and methodology between PEG and PSE may affect the PSE total

10   cost benchmark for Toronto Hydro. Exhibit L1/Tab 2/Schedule 2, Page 3 of 4 IRM-4" refers

11   to the 2013 PEG study (and its annual updates) and Exhibit M1 refers to the PEG's revised

12   benchmarking study of Toronto Hydro submitted in response to M1-TH-026. The table

13   also lists differences found between the latter study and PSE's study in Exhibit 1B, Tab 4,

14   Schedule 2.

15

		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

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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

2 1. Kaufmann, Lawrence, Hovde, Kalfayan, Rebane. Productivity and Benchmarking

3 Research in Support of Incentive Rate Setting: Final Report to the Ontario Energy Board.

4 November 5, 2013.

5

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

7 1989 benchmark year.

8

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

10

11 4. Regionalized Utility Salaries and Wages ECIs (Employment Cost Indexes from the U.S.

12 Bureau of Labor and Statistics). Note that PSE uses the salaries and wages version of ECI

13 too even though pensions and benefits are included in their cost.

14

15 5. PEG's preferred Ontario LDC plant additions deflator originates from Statistics Canada

16 Stock and Consumption of Fixed Non-Residential Capital ("SCFNRC") program. The annual

17 survey collects data on utility-business capital expenditure on over 140 different types of

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1 machinery, equipment, and construction assets, which is then used to construct an

2 annual index of deflated capital investment. Since deflated investment is provided in both

3 constant (2012) and current prices, the ratio of the two implicitly yields capital asset price

4 change over time. The indexes are constructed by industry and region and in particular,

5 are available for the utility business in Ontario. Handy-Whitman (HW) regional power

6 distribution construction cost indexes are used for the U.S. companies.

7

8 6. Utility Employment Cost Index (U.S. Bureau of Labor Statistics). Purchasing Power

9 Parity between U.S. and Canada.

10

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

12 equations.

13

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

15

16 b) Please add an additional column showing, where applicable, directionally, the

17   noted material differences between PSE and PEG that may affect the PSE Result

18   for Toronto Hydro cost benchmark. Use arrows to indicate Neutral/No Change ➡

19   Reduce ⬇ and Increase ⬆ Toronto Hydro benchmark total costs.

20   Provide complete explanations for the results.

21

22 c) Based on Table 2 in Exhibit M3, please provide a graphical representation of the

23   PSE and PEG total benchmark cost for Toronto Hydro for the 2015-2024 period.

24

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

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1 RESPONSE (PREPARED BY PSE):

2 a) The only minor correction to the table above is that the PSE sample includes seven

3   Ontario utilities rather than the six stated, with one of the seven being the studied

4   utility, Toronto Hydro.

5

6 b) Given the limited response time and the expectation of the OEB that the

7   interrogatories be "very limited in scope and address only the evidence provided in

8   the Supplemental Report,"[1] PSE is unable to produce a dataset and model to examine

9   the impact of all the differences. However, we provide our estimate of the directional

10   changes. These expectations were not fully tested, and only represent our current

11   expectation of the directional change.

12

13   • Sample differences between PEG and PSE. PSE believes that adding the

14   Ontario distributors to the sample decreased Toronto Hydro's total cost

15   benchmark. Said differently, adding the Ontario distributors likely

16   worsened Toronto Hydro's score.

17

18   • Pensions and benefits being included in PSE's dataset worsened Toronto

19   Hydro's benchmark score. We anticipate, however that this had a small

20   impact on the benchmark score.

21

22   • The capital benchmark differences had an unknown impact. If the PEG

23   data from 1964 was implemented appropriately, we would expect the

24   difference in results to be small. Given that the older data cannot be
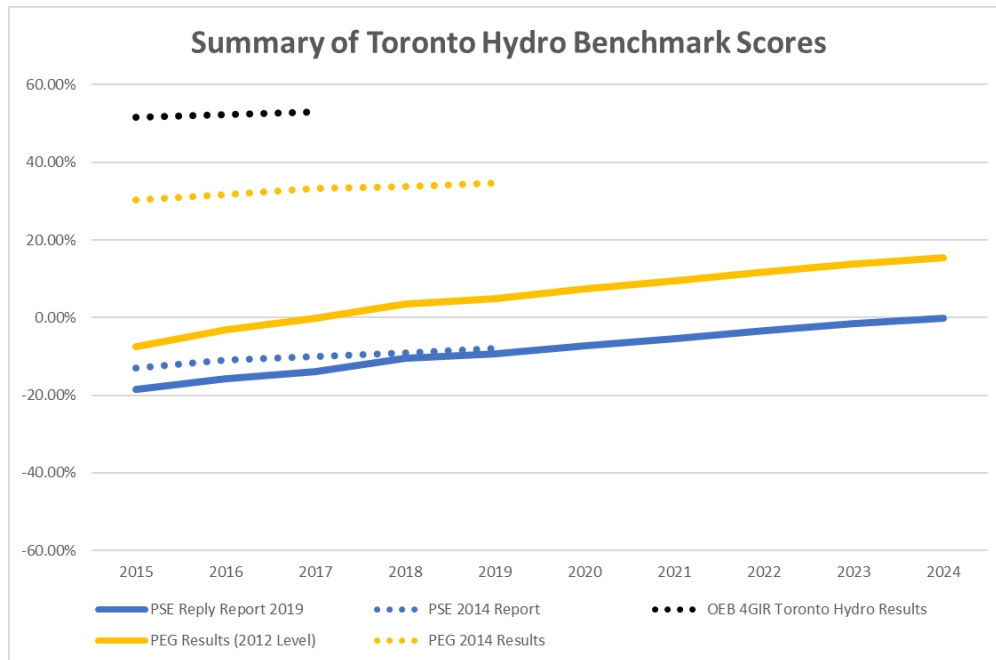
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[1] Procedural Order No. 8 dated June 6, 2019.

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1   verified and may contain errors, we do not know if the difference in results

2   is actually small.

3

4   •   The differences in the input price indexes are unknown and dependent on

5   when the levelization is taking place (specifically the levelization for

6   capital). PEG's results using the 2012 capital levelization found in their

7   response to M1-TH-026 (f) will have a smaller difference, due to the input

8   price indexes used, than the difference in PEG's results when using an

9   older 2008 capital levelization.

10

11   •   The differences in the OM&A cost share weights would likely not have a

12   meaningful impact on results.

13

14   •   The autocorrelation correction difference would likely not have a

15   meaningful impact on the results.

16

17   •   PSE included a percent plant underground variable. Adjusting for this

18   business condition raised Toronto Hydro's total cost benchmark. Said

19   differently, including the variable improved Toronto Hydro's benchmark

20   score.

21

22   •   PSE did not include the area <u>not</u> congested urban variable. PEG did. If PSE

23   had included the variable, Toronto Hydro's benchmark total costs would

24   have increased. Said differently, the company's benchmarking score would

25   have improved.

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

5

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

10

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

15

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

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Summary of Toronto Hydro Benchmark Scores

Legend: PSE Reply Report 2019 · PSE 2014 Report · OEB 4GIR Toronto Hydro Results · PEG Results (2012 Level) · PEG 2014 Results

1

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

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1   RESPONSES TO ENERGY PROBE INTERROGATORIES

2

3   INTERROGATORY 74:

4   Reference(s):   Exhibit M3   Reply Report to PEG Evidence Page 8, 2.2.1

5

6   Preamble:

7   PEG's sample does not include any Ontario distributors. PEG did not include the six

8   Ontario distributors that PSE included in our sample. The PSE sample is more

9   comprehensive and more reflective of a large utility serving in Ontario.

10

11   a)   Please list the 6 Ontario utilities and provide the specific criteria for selection.

12

13   b)   Provide the Congested Urban Variable, the Undergrounding Percentages and Rural

14   variable for each.

15

16   c)   Compare to Toronto Hydro and the Averages for US sample.

17

18   d)   Please provide the recent 2012-2017 Total Cost performance for the chosen

19   Ontario distributors and compare to the average of the US Sample.

20

21   e)   Provide the TFP cohort for each of the chosen utilities.

22

23   f)   Why did PSE not use a larger Ontario sample from the OEB Yearbook based on

24   scale factors such as km of lines, customers, assets that are comparable to the 84

25   US distributor sample?

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1   g) Why did PSE not include data from Hydro Quebec Distribution that have been filed

2   by PEG and CEA with the Regie d'Energie in Quebec?

3

4   h) Please discuss why using a limited selective sample of 6 Ontario distributors (as

5   opposed to a larger sample) does not introduce selective bias.

6

7

8   RESPONSE (PREPARED BY PSE):

9   a) Please see Table 5 of the PSE Report for the list of Ontario distributors. Please see p.

10   15 of the PSE Report for the specific criteria for selection of the Ontario distributors.

11

12   b) Please see PSE's working papers.

13

14   c) Please see PSE's working papers.

15

16   d) Please see the response to 1B-SEC-21.

17

18   e) Please see the response to 1B-SEC-21.

19

20   f) Please see the response to 1B-Staff-35 (c) and 1B-Staff-41 (a) and (c).

21

22   g) Please see the response to 1B-Staff-41 (b).

23

24   h) Please see the response to 1B-Staff-35 (c). We would add that no other Ontario

25   distributor observations other than the seven (Toronto Hydro plus the six Ontario

26   distributors with congested urban territory) were inserted into the PSE modeling

27   dataset. We chose the selection criteria ahead of time and did not choose the sample

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1   to achieve a certain result. The sample was chosen based on the criteria as described

2   in Part (a) of this Interrogatory Response. There is no selection bias.

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2

3   INTERROGATORY 75:

4   Reference(s):   Exhibit M3 Reply Report to PEG Evidence

5

6   Preamble:

7   PSE Reply to Concern #6: PSE notes that PEG did include both a congested urban variable

8   and a measure of percent undergrounding (constructed as a percent overhead variable) in

9   their reliability model for SAIFI. This is inconsistent for PEG to say they are not convinced

10   that both variables are needed for a total cost model, but they are needed for PEG's

11   reliability model.

12

13   a) Please confirm that Toronto Hydro provided PSE with Reliability Projections

14   (SAIDI/SAFI) for 2018-2024.

15

16   b) Please list these and provide an update for the 2018 actuals.

17

18   c) How have the 2018 results affected the data set and the results (directionally)?

19

20   d) Please provide a comparison table and chart showing Toronto Hydro reliability as

21   estimated by the PEG and PSE models for the full data and IRM period.

22

23   e) Please provide a discussion on the cause/effect of congested urban area and

24   underground/overhead variables on SAIDI and SAIFI.

25

26   f) Please provide a commentary regarding the differences between the results from

27   PEG and PSE reliability models.

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1   g) Why should the Board adopt Toronto Hydro/PSE's reliability projection for the CIR

2   period?

3

4

5   RESPONSE (PREPARED BY PSE):

6   a) We note that the PSE Reply Report does not discuss the reliability results. However,

7   we provide the responses to parts (a) through (g) as a courtesy to Energy Probe.

8

9   Please see the response to 1B-EP-13 part (g).

10

11   b) Please see Table 2 and Table 3 found on p. 9 and p. 10 of the PSE Report. The

12   benchmarks will not change due to the 2018 actual reliability scores now being

13   available for Toronto Hydro. The 2018 actual reliability scores will have a small impact

14   on the benchmark scores, but the difference in the 2018 projected scores and the

15   2018 actual scores is not a meaningful difference (+/- 2 or 3 percent). The benchmark

16   scores will move by the same amounts (+/- 2 or 3 percent) as the difference in the

17   actual and the projected metric.

18

19   c) Please see the response to part (b).

20

21   d) Please see Table 2 and Table 3 found on p. 9 and p. 10 of the PSE Report for the PSE

22   reliability benchmarks. Please see Table 3 and Table 4 of the revised PEG Report on p.

23   31 and p. 32 for the PEG reliability benchmark scores.

24

25   e) Please see the response to 1B-Staff-38 (a).

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1   f) From a directional perspective, both the SAIFI and CAIDI results match for PSE and

2   PEG. The CAIDI results are quite similar; the SAIFI scores are different, due to the

3   differing explanatory variables included in each model.

4

5   g) The reliability projections are conducted by Toronto Hydro and given to PSE. PSE has

6   no opinion on the veracity of the reliability projections.