Réponses du Transporteur
à la demande de renseignements numéro 2
d'Option consommateurs
(« OC ») à Brattle

DEMANDE DE RENSEIGNEMENTS N⁰ 2 D'OPTION CONSOMMATEURS (OC) À HQT (BRATTLE)

DEMANDE DU TRANSPORTEUR DE MODIFICATION DES TARIFS ET CONDITIONS DES SERVICES DE TRANSPORT POUR L'ANNÉE 2022-2025

R-4167-2021

CARACTÉRISTIQUES DU MÉCANISME DE RÉGLEMENTATION INCITATIVE (MRI)

BRATTLE PRODUCTIVITY REPLY EVIDENCE

1. **References :** i)   B-0012, HQT-5, Document 2, Brattle Report
    ii) B-0094, Brattle Reply Evidence
    iii) C- AQCIE-CIFQ-0050 ,PEG Commentary on Brattle Study
    vi) OEB EB-2021-0110 Exhibit A, Tab 4, Schedule 1, Attachment 1,
    Clearspring EA Productivity Study for Hydro One Transmission

Preamble : OC notes Brattle has provided reply evidence rebutting Commentary by Pacific Economics Group on the Brattle Econometric Productivity Study. OC has prepared a table showing the primary points of difference:

PEG Critical Points	Brattle Reply
Productivity Study of US TX Industry 1995-2019	Productivity Study of US TX Industry 1995-2019
• Brattle excludes certain OM&A costs • In particular, accounting for "Transmission by Others". • Accounting for Structural Change-ISO Complications & Costs	• We include accounts 561, 565, and 566 in our productivity study, there may be some misreporting but this does <u>not</u> bias the Studies' results. • FERC O&M accounts specifically capture expenses re ISOs and RTOs. Accounts 575 and 576 are *Regional Market Expenses* accounts.
• Exclusion of General Costs-Admin and General costs	• Including Common costs does not change result. Other Transmission costs are > 50% of O&M. Exclusion results in upward CNE bias.
• Sampled Companies -data issues (6/71)	• PEG excluded several Companies: PG&E, Georgia Power, Central Maine Power etc. Sample bias results in lower TFP and CNE growth
• ROE same for all companies	• Specific ROE used for each company
• Benchmark Year -Capital Stock 1964	• 1988 - readily available data. Weighted average
• Labour Price	• Revised with same Index. <5% change
• One hoss shay for capital -service life sensitivity	• ?

• Output Variable-Ratcheted (monthly) peak demand	• Using ratcheted peak demand artificially constrains the output growth to be no lower than zero
Cost Benchmarking of HQT 2017-2019	**Cost Benchmarking of HQT 2017-2019**
• Brattle includes certain OM&A costs	• PEG's econometric cost-benchmarking study includes account 561 and account 566 but left 'transmission of electricity by others' out.
• Sampled Companies- data issues (6/71)	See above
• Benchmarking Sample Period	See above
• Econometric Model Estimation Procedure- Fixed Effects ("FE") and Random Effects ("RE") estimators rather than OLS estimators	• PEG assumes HQT efficiency is *endogenous*. • The FE estimator controls for HQT's unique factors. Statistical tests performed on our data confirm that a FE model is required and that pooled OLS would result in unreliable cost benchmarking.
• Similar concerns to TFP Study. Input price; OHS -service life; output demand	**?**
• No secondary variables; forestation, construction cost index (per ClearSpring EA for Hydro One)	• Unlikely that the score's for HQT and Hydro One are the same, thus further biasing the cost benchmarking analysis.

a) Please review/amend the above table.

Réponse:

We added a third column to the table with our review/amendment.

PEG Critical Points	Brattle Reply	Brattle Response to OC Observations
Productivity Study of US TX Industry 1995-2019	**Productivity Study of US TX Industry 1995-2019**	
• Brattle excludes certain OM&A costs • In particular, accounting for "Transmission by Others". • Accounting for Structural Change- ISO Complications & Costs	• We include accounts 561, 565, and 566 in our productivity study, there may be some misreporting but this does <u>not</u> bias the Studies' results. • FERC O&M accounts specifically capture expenses re ISOs and RTOs. Accounts 575 and 576 are *Regional Market Expenses* accounts.	• Please see p. 5 and Section II. B of our reply evidence for our opinion on these accounts, exclusion of accounts results in a material upward bias in measured productivity • See p. 19 of our reply evidence on accounts 575 and 576
• Exclusion of General Costs-	• Including Common costs does not change result. Other Transmission costs	• Including common costs does not change results much for PFP O&M

Admin and General costs	are > 50% of O&M. Exclusion results in upward CNE bias.	growth, see Brattle response to Regie 12.2. We do not understand the second and third sentence
• Sampled Companies -data issues (6/71)	• PEG excluded several Companies: PG&E, Georgia Power, Central Maine Power etc. Sample bias results in lower TFP and CNE growth	• Excluding companies resulted in an upward bias, thus resulting in higher not lower TFP and CNE growth, see reply evidence Section II. A.
• ROE same for all companies	• Specific ROE used for each company	• No additional comment
• Benchmark Year - Capital Stock 1964	• 1988 - readily available data. Weighted average	• No additional comment
• Labour Price	• Revised with same Index. <5% change	• See reply evidence p. 27, sensitivity analysis using revised labor price shows virtually no impact on measured TFP or CNE growth, the 5% refers to the fact that labor only represents 5% of total costs, and therefore any changes in the labor methodology has small impact on overall results
• One hoss shay for capital -service life sensitivity	• ?	• Not clear what the PEG reference is, no indication is given of context or page number, in general see our direct evidence Table 12 for sensitivity analysis, our use of one hoss shay results in materially higher TFP growth, CNE growth not affected by selection of One hoss shay vs. geometric decay
• Output Variable- Ratcheted (monthly) peak demand	• Using ratcheted peak demand artificially constrains the output growth to be no lower than zero	• See our reply evidence p. 28
Cost Benchmarking of HQT 2017-2019	Cost Benchmarking of HQT 2017-2019	
• Brattle includes certain OM&A costs	• PEG's econometric cost-benchmarking study	• No additional comment

	includes account 561 and account 566 but left 'transmission of electricity by others' out.	
• **Sampled Companies- data issues (6/71)**	**See above**	
• **Benchmarking Sample Period**	**See above**	
• **Econometric Model Estimation Procedure-Fixed Effects ("FE") and Random Effects ("RE") estimators rather than OLS estimators**	• **PEG assumes HQT efficiency is *endogenous*.** • **The FE estimator controls for HQT's unique factors. Statistical tests performed on our data confirm that a FE model is required and that pooled OLS would result in unreliable cost benchmarking.**	• **See reply evidence Section III. A. for full description of our opinion on this topic**
• **Similar concerns to TFP Study. Input price; OHS -service life; output demand**	**?**	• **See reply evidence pp. 40-42 and Table 15 for results of our cost benchmarking sensitivity analysis**
• **No secondary variables; forestation, construction cost index (per ClearSpring EA for Hydro One)**	• **Unlikely that the score's for HQT and Hydro One are the same, thus further biasing the cost benchmarking analysis.**	• **See above on secondary variables and cost benchmarking sensitivity analysis**

1

   b) Provide where appropriate, references to both the February 2021 Brattle Report (Ref i)) and November 2021 Reply Evidence (Ref ii)).

Réponse:

See third column above

2

   c) Please provide specific additional explanatory notes on the issues of sample composition, exclusion/inclusion of certain FERC accounts, structural change and treatment of capital.

Réponse:

See third column above for explanatory notes and reference to our direct and reply evidence where we provide a detail explanation on issues of sample composition, exclusion/inclusion of certain FERC accounts, structural change and treatment of capital.

    d) Compare your sample and exclusion/inclusion of certain FERC accounts and treatment of Capital to the Clearspring EA Productivity Study for Hydro One Transmission (Ref iv)).

Réponse:

For sample comparison, please see our response to OC 5.1, with the amendment that Kansas City Power and Light, Kansas Gas and Electric Company, and South Carolina Electric and Gas Co are in our sample as well. In the data source we use, S&P Global, they have the following different names for the three companies: Evergy Metro, Evergy Kansas South, and Dominion Energy South Carolina, respectively.

With respect to other differences between Brattle and Clearspring, see Brattle Response to Régie 12.1.2 which contains a table comparing the different studies. Brattle includes all transmission O&M accounts while Clearspring includes all except account 565 transmission of electricity by others. Clearspring includes a share of administrative and general expenses and general plant, Brattle does not. Clearspring uses geometric decay for capital services while Brattle uses one hoss shay.

    2. References   i)   **B-0012,HQT-5, Document 2**
        ii)   **C-AQCIE-CIFQ-0050, PEG's Comments on Brattle Study**
        iii)   **B-0095, Brattle Reply Evidence Table 5**
        iv)   **B-0095,Brattle Reply Evidence Table 8**
        v)   **OEB EB-2021-0110 Exhibit A, Tab 4, Schedule 1, Attach.1,**
        Clearspring EA Productivity Study for Hydro One Transmission

ii)   **PEG has summarized the results of the Brattle and PEG Partial (CNE and Capital) and Multi/Total Factor productivity studies for the North American transmission industry:**

	Multifactor Productivity CNE			Capital			
	Brattle (OHS)	Brattle (GD)	PEG (GD)	Brattle	PEG		Brattle (OHS)	PEG (GD)
Full sample period	-1.04%	-1.82%	-0.62%	-3.38%	-0.68%		-0.05%	-0.46%
Last 15 years	-1.69%	-2.91%	-2.26%	-3.09	-1.74%		-0.97%	-2.16%

iii)   **Brattle has provided the effect of using the Brattle Sample on PEG's Results:**

Brattle Table 5 TFP Results–PEG Methodology on Brattle and PEGs Samples

Model	TFP Growth (1995 – 2019)	Growth of PFP O&M (1995 - 2019	Growth of PFP Capital (1995-2019)
PEG Base Case with Brattle Companies (74)	1.22%	-0.94%	-0.72%
Difference due to PEG sample selection bias	0.35%	0.98%	0.02%

Source: Brattle TFP Model; Note: The "PEG Base Case" referenced in the table uses the Brattle TFP model with the sample of 47 companies that are common to the Brattle and PEG sample. It also includes the assumptions used by PEG to model productivity for the US sample-geometric decay for capital, output weights, exclusion of transmission accounts 561, 565, and 566, inclusion of share of A&G and general plant, ratcheted peak demand and asset service life.

iv)   **Brattle shows the upward bias in PEG's productivity study by removing certain FERC accounts**

Brattle TABLE 8: Upward Bias in Measured Productivity from removal of (certain) O&M Accounts

Model	TFP Growth (1995 - 2019)	Growth of PFP O&M (1995 - 2019)
Brattle Base Model	-1.04%	-3.38%
Removing Load Dispatching (Act: 561)	-0.90%	-2.98%
Removing Transmission by Others (Act: 565)	-0.64%	-2.32%
Removing Miscellaneous Transmission Expense (Act: 566)	-0.86%	-3.00%
Removing All Three Accounts	-0.34%	-1.20%

a)   Does Brattle believe the PEG results should be adjusted based on the different samples? If so, what would be the adjusted full period productivity values for TFP, CNE(O&M) and Capital?

Réponse:

Please note that in the referenced table 5 the TFP growth for the period 1995 – 2019 under PEG Base Case with Brattle Companies (74) is -1.22% and not 1.22%. Moreover, the middle row titled "PEG Base Case with PEG Companies (47) is missing in the table above. Table 5 in our reply evidence is:

1

Table 1: TFP Results – PEG Methodology on Brattle and PEG's Samples

Model	TFP Growth (1995 - 2019)	Growth of PFP O&M (1995 - 2019)	Growth of PFP Capital (1995-2019)
PEG Base Case with Brattle Companies (74)	-1.22%	-0.94%	-0.72%
PEG Base Case with PEG Companies (47)	-0.87%	0.04%	-0.70%
Difference due to PEG sample selection bias	**0.35%**	**0.98%**	**0.02%**

Source: Brattle TFP Model; Note: The "PEG Base Case" referenced in the table uses the Brattle TFP model with the sample of 47 companies that are common to the Brattle and PEG sample. It also includes the assumptions used by PEG to model productivity for the US sample – geometric decay for capital, output weights, exclusion of transmission accounts 561, 565, and 566, inclusion of share of A&G and general plant, ratcheted peak demand and asset service life.

Table 5 provides an <u>estimate</u> of what PEG's results would be using its methodology (the PEG Base Case) and using our 74 sample companies. We provide Table 5 to reinforce the point in Table 4 that a smaller sample results in an upward bias in measured TFP growth. The -1.22% TFP growth rate in Table 5 is not the exact TFP growth rate that PEG would have determined if it used our larger sample because our methodology uses a 1988 capital benchmark while PEG uses a 1964 capital benchmark and we do not have 1964 capital benchmark for our sample because the data are not readily available. Only PEG would be in a position to use our 74 companies and apply its methodology using its model to determine how close that number would be to the -1.22% from Table 5.

b) Does Brattle believe the PEG results should be adjusted based on exclusion of certain FERC accounts? If so, please confirm the specific accounts.

Réponse :

See response below.

c) Does Brattle believe the PEG results should be adjusted to include certain FERC accounts? If so, what would be the adjusted full period PEG Productivity values for TFP, CNE(O&M) and Capital?

Réponse:

Please refer to PEG's response to Brattle IR 2.4.

Brattle believes that PEG's results should be adjusted to include the three transmission O&M accounts that PEG excluded (Accounts 561.1-561.8, 565 and 566). In response to Brattle request 2.4, PEG indicated that its full period

1 **productivity values for TFP, CNE (O&M) and Capital were, -1.12%, -2.38% and -**
2 **0.46%, respectively.**

d) Which FERC accounts does Clearspring EA exclude from its costs for the Hydro One Transmission Productivity Study? Please list and compare to PEG and Brattle studies.

Réponse :

3 **Clearsrping EA excluded only FERC Account 565 from their definition of O&M**
4 **expenses, they included all other FERC transmission O&M accounts. PEG excluded**
5 **FERC Accounts 561.1 – 561.8, 565 and 566 from transmission O&M expenses and**
6 **included all other FERC transmission O&M accounts. Brattle did not exclude any**
7 **O&M FERC Accounts from its productivity study.**

e) Please provide a comparison table with the Brattle-adjusted PEG values, the Brattle Results and ClearSpring EA results for the full period and for Clearspring EA 2000-2019.

Réponse:

8 **See table below.**

	TFP Growth	PFP O&M
Brattle (1995 - 2019)	-1.04%	-3.38%
Brattle-adjusted PEG values (1996-2019)[1]	-1.12%	-2.38%
Clearspring EA (2000 − 2019)	-1.66%	-2.26%[2]
Brattle (2000 − 2019)	-1.50%	-3.28%
Brattle-adjusted PEG values (2000-2019)[3]	-1.54%	-1.76%

[1] From PEG response to Brattle IR 2.4

[2] Calculated from Clearspring Report Tables 11 and 12

[3] Calculated from PEG response to Brattle IR 2.4

9

3. References   **i)**   **C-AQCIE-CIFQ-0050, PEG Commentary, Table 10**
                       ii)   **B-0095, Brattle Reply Evidence, Table 5 & Table 8**

Preamble : PEG Table 10 shows the effect of cost exclusions and other adjustments :

PEG Table 10
Productivity Results with All Three *CNE* Exclusions,
Improved Benchmark Year, Capital Quantity, and Ratcheted Peak Demand
(growth rates)

Sample Period	Multi-Factor	CNE	Capital
1995-2019 (full sample period)	**0.09%**	**-1.00%**	**0.34%**
2000-2019 (last 20 years)	-0.40%	-1.53%	-0.13%
2005-2019 (last 15 years)	-0.72%	-2.16%	-0.39%
2010-2019 (last 10 years)	-1.19%	-1.77%	-0.90%

a) PEG has indicated that with all three FERC accounts added, using a 1964 Benchmark Year and using GD rather than OHS, the Brattle productivity results would be closer to those of PEG, i.e. counter to Brattle's adjustment to PEG results (in the opposite direction). Please comment in detail which assumptions Brattle believes intervenors should accept-PEG or Brattle adjustments to the other expert's study?

Réponse :

1   **Some corrections to the question. First, PEG did not update Brattle's study**
2   **using a 1964 benchmark year. Second, PEG's Table 10 does not use GD, it uses**
3   **One Hoss Shay.**

4   **We do not recommend any of the changes PEG made to our model to arrive at**
5   **the results in Table 10 above. Please see our reply evidence for our detailed**
6   **explanation.**

b) Please provide a tabular comparison of the experts productivity ranges for Multi-Factor, CNE (O&M) and Capital assuming:
   i)   Brattle adjustments
   ii)   PEG adjustments
   iii) ClearSpring EA Study productivity values for a similar period.

Réponse :

7   **The question is ambiguous and unclear. See table in response to 3.e above.**

BRATTLE BENCHMARKING STUDY- REPLY EVIDENCE

4. References

i) C-AQCIE-CIFQ- 0050, PEG Commentary, Table 11
ii) B-0094,Brattle Reply Evidence, Pages 22 and 33
iii) B-0094,Brattle Reply Evidence, Table 11
iv) B-0088, HQT-10, Doc 1.2, Table 5

Preamble : Brattle states the following: "PEG's econometric models have a _fundamental methodological flaw_ because they fail to control for those _unobservable_ economic and business condition factors that are specific to each firm, and especially HQT, which has unique cost characteristics. By not controlling for HQT's unobservable factors, PEG's predictions significantly under estimate HQT's costs that are outside management's control. These factors include characteristics such as the type of organization (_e.g._, HQT being a government-owned crown corporation), unique technology, and challenging logistical conditions to name a few, see more below. PEG did not have independent variables that controlled for these and other factors described below. When PEG uses its econometric model to predict and to benchmark HQT's costs it assumes that if the economic and business factors that cannot be included in the econometric model increase costs more for HQT than for US companies, then HQT is relatively less efficient.[33] This assumption, which is wrong and makes PEG's cost benchmarking unreliable, is the main explanation for the differences between Brattle and PEG's cost-benchmarking results."

Preamble: PEG has adjusted the Brattle cost benchmarking results by removing 6 companies' data:

**PEG Table 11 Summary of Alternative
Benchmarking Results Total Cost**

1

Sample Period	Remove 6 Companies with Bad Miscellaneous Transmission Expenses							
	Brattle		Upgraded Benchmark Year Adjustment (A)			(A)+RemoveTransmission by Others		
Years	FE*	RE*	FE*	RE*	OLS**	FE*	RE*	OLS**
2001 - 2019	*-1.7%*	*0.6%*	*-1.2%*	*0.7%*	*109.3%*	*-0.7%*	*0.9%*	*89.0%*
2005 - 2019	*-2.7%*	*-0.3%*	*-2.1%*	*-0.1%*	*109.3%*	*-0.4%*	*1.3%*	*90.2%*
2010 - 2019	*-5.8%*	*-3.3%*	*-4.8%*	*-2.7%*	*106.2%*	*-2.1%*	*-0.3%*	*88.6%*
2017 - 2019	*-3.8%*	*-0.5%*	*-3.2%*	*-0.4%*	*107.5%*	*1.4%*	*4.2%*	*93.2%*

* FE –Fixed Effects Panel Data
  RE-Random Effects Panel Data
**OLS-Ordinary Least Squares for variables

a) Confirm that Commonwealth Edison, Kansas Gas & Electric, Oklahoma Gas & Electric, PECO Energy, San Diego Gas & Electric and Southern California Edison were removed by PEG.

Réponse :

1   **Please refer to PEG's response to Brattle IR 2.6.**

b) Comment on the PEG claim of questionable data.

Réponse :

1   **Please see Section II.A.1. of Brattle's rebuttal report.**

    c)   Brattle Table 11 shows the effect of the change to be minor. Please comment.

Réponse :

2   **Brattle Table 11 in our reply evidence shows that the effects of removing the six**
3   **companies on our TFP and O&M (CNE) growth is 16 and 28 basis points**
4   **respectively. The exclusion of these six companies have modest impact on TFP**
5   **and O&M growth rates.**

Table 2: TFP Results Removing Six Companies PEG removed in its Benchmarking Study

Model	TFP Growth (1995 - 2019)	Growth of PFP O&M (1995 - 2019)
Brattle Base Model	-1.04%	-3.38%
Brattle Base Model with Six Companies Removed	-0.88%	-3.10%

6
7 Note: The six companies removed by PEG were Commonwealth Edison, Kansas Gas & Electric, Oklahoma Gas
8 & Electric, PECO Energy, San Diego Gas & Electric, and Southern California Edison.

    d)   PEG also suggests Brattle's econometric benchmarking study is flawed, primarily due to the use of Fixed Effects (FE) panel data. PEG Table 11 shows a huge difference in HQT scores using OLS residuals. Please comment in detail.

Réponse :

9   **Please see Section III.A of our reply evidence for a detailed explanation on**
10   **differences in benchmarking results arising from choice of estimator and why it**
11   **is our opinion that OLS produces biased and inconsistent results and unfairly**
12   **penalizes HQT management for factors that are not included in the model and**
13   **are outside its control.**

    e)   Brattle levels a similar criticism related at use of Ordinary Least Squares residuals. What would be the HQT benchmark result, if the PEG sample used FE and RE panel estimators?

Réponse :

1 **In Table 13 of our reply evidence (reproduced below), we re-ran PEG's cost**
2 **benchmarking analysis using its data and FE. Using PEG's data (which means**
3 **using all its assumptions regarding capital, output measure, labor price, capital**
4 **price, common costs, translog specification, etc.) we found results are very**
5 **different than PEG's model based upon OLS. HQTs costs are now within a range**
6 **of +/- 10%.**

Table 3: Comparison of PEG's Benchmarking Results: OLS Vs. Fixed-Effects

	OLS			Fixed Effects		
	Total Costs	Capital Costs	O&M Costs	Total Costs	Capital Costs	O&M Costs
2008 - 2019	74.1%	61.3%	124.5%	-0.5%	-0.5%	-2.1%
2017 - 2019	67.4%	54.8%	121.1%	-7.1%	-8.2%	-1.1%

7
8 Note: This analysis uses the same specifications as laid out by PEG in the February report and workpapers.

9

f) How does this translate to a recommended S-Factor range? Please discuss.

Réponse:

10 **We would provide the same range. We based our stretch factor recommendation**
11 **on several factors, including the cost benchmarking. The results using PEG's**
12 **data and FE are similar enough to our results. See Section VIII.D. of Brattle's**
13 **Direct Report and Section I.C.1 of Brattle's Rebuttal Report.**

g) Confirm/calculate the impacts of the S-factor on the 2022 MRI revenue
requirement (Ref iii)):
   i) S=0.1%
   ii) S=0.3%
   iii) S=0.6%

Réponse :

14 **Brattle cannot comment on the effect of the stretch factor on HQT's revenue**
15 **requirement as we have not performed analysis in this area.**

h) Would the S-factor apply to both CNE and Capital if the latter was included in the RCI
formula? Please discuss.

Réponse :

Yes. Please refer to Brattle's No. 1 OC response to 12.1.

5. References   **i)**   **C -AQCIE-CIFQ -0050, PEG Commentary, Table 11**
                               ii)   **B-0094,Brattle Reply Evidence, pages 30-32**

Preambule: Brattle notes the following: "In its Report, PEG discussed unique features of HQT comparison with its U.S. counterparts. Among the unique HQT characteristics that PEG identified were:
• Being a crown corporation (p. 83) and having a unique corporate structure (p. 87);
• Transmission of large amounts of power over large distances has over the years encouraged HQT to use *unusual and innovative technologies* including 735 kV alternating current lines and high-voltage direct current line, new tower design, and remote monitoring systems (p. 85);
• Sizable lakes, rivers, cold winters throughout territory with postes sometimes housed in structures (p. 86);
• Special logistical challenges, many facilities are distant from good roads (p. 86);
• Extensive telecommunications network (p.85);
• HQT operating asynchronously from North America's Eastern Interconnection (p. 85);
• Sizable portion of HQT's access to transmission corridors achieved by easements (p. 85);
• Hard rock close to the surface, difficult to establish footing for structures (p. 86);
• Accounting idiosyncrasies (p. 88);
• A list of cost advantages including scale and scope economies, low borrowing rates, and no income taxes (pp. 86-87);
In its econometric cost-benchmarking model, analysis and its predictions for HQT, PEG does not control for the above-listed factors. In response to Brattle question 5.1, PEG conceded that although it believes it has a good model, it did not capture all relevant factors that affect total, CNE and capital transmission costs."
"Brattle utilizes a fixed-effects, (FE), model for our econometric cost-benchmarking analysis and for predicting HQT's costs. A FE estimator is very well suited to the econometric problem at hand because it controls for HQT's unique factors when benchmarking HQT's costs. Specifically, the FE model treats all of the companies' unique characteristics as another parameter to estimate and used in making predictions. In essence, each company's fixed effect parameter is another independent variable and ensures that the model does not penalize or reward a company for its unique characteristics when making predictions."

     a) Confirm that Brattle used <u>both</u> Fixed Effects (FE) and Random Effects (RE) panel estimators. Please discuss the relevance of each and why only FE is noted in the Reply Evidence.

Réponse :

1   **This statement is confirmed. Please see Section VII.B. of Brattle's Direct Report**
2   **for detailed explanation on the choice of estimator. Brattle presented results**
3   **from only the FE in the reply evidence because the benchmarking results are**
4   **robust to the choice of estimator.**

     b) Please provide a list of electric utility benchmarking studies that used FE and RE panel estimators.

Réponse :

1 **We provide a literature review on the use of panel data models (like FE and RE)**
2 **in econometric cost benchmarking, including the electric sector, see Section**
3 **III.A.3 and Appendix A in Brattle's Rebuttal Report. We are aware of only the**
4 **Ontario Energy Board using econometric cost benchmarking for electric utility**
5 **for purposes of setting a stretch factor as is the case in this proceeding, thus**
6 **the use of econometric benchmarking in setting the stretch factor in regulatory**
7 **settings is limited.**

c) Why does Brattle include HQT-the subject utility- in the sample but PEG does not? What is the normal practice for experts? Please discuss.

Réponse :

8 **We include HQT because it is very different from our US company in the sample**
9 **in both size and operational characteristics. As mentioned above, there are**
10 **limited examples of econometric benchmarking in setting the stretch factor in a**
11 **regulatory setting. We believe that the issue of whether to include the**
12 **benchmark company or not is best decided on a case by case basis and based**
13 **upon the particulars of each case.**

d) Please discuss if the characteristics and business conditions of HQT are similar to other utilities in the Brattle sample or unique. List the similar companies using the above noted characteristics.

Réponse :

14 **The table below shows the difference in the business conditions of HQT and**
15 **U.S. sample and shows some significant differences. In addition, there are other**

1 **characteristics and business conditions that are difficult to measure that are**
2 **very different between HQT and the U.S. sample companies.**

Variable	Unit	HQT Average	Sample Average
Length of Transmission Lines	km	33,336	5,548
System Peak Demand	MW	37,855	5,113
Total Energy	MWh	207,393,368	27,053,926
Percent Transmission Plant	%	32%	17%
Average Substation Capacity	kV	199	313
Substation Count	#	514	80
Average Voltage of Tx Lines	kV	389	213
Percentage of Lines Underground	%	0%	2%
Substation Count per line km	#/km	0.02	0.02

3
4 Source: Brattle Benchmarking Dataset

e) Please discuss whether the characteristics and business conditions of HQT, Hydro One and Manitoba Hydro are/are not similar.

Réponse :

5 **Please see below for comparison based upon readily-available data. We have**
6 **not performed a detailed analysis of all the differences among the companies**

Company	Most Recent Peak (MW)	Transmission Line Length (Miles)
Hydro One Transmission	23,213	17,741
Hydro Quebec Transmission	40,806	34,530
Manitoba Hydro	4,755	7,270

Sources: Hydro One transmission peak comes from the Hydro One 2018 PSE study, "Re: EB-2018-0218 – Hydro One Sault Ste. Marie's Application and Evidence for 2019 Rates and Other Related Matters". Hydro One transmission line length comes from their transmission plan, see: "2021-08-05 EB-2021-0110 Exhibit B-2-1". Hydro Quebec Transmission data comes from the Brattle TFP model. Manitoba Hydro data comes from their 2019/2020 Electric Rate Application filing and the Province of Manitoba's website. Manitoba Hydro peak is 2017. Hydro One Transmission peak is 2020

f) Why have both experts in their Hydro One Transmission benchmarking studies used OLS, included business condition related variables and included second order terms, that Brattle has rejected? Please discuss rationale for the different model specifications in detail.

Réponse:

1   **Please our Direct Evidence and Reply Evidence for a detailed description of the**
2   **rationale for our models, as well as sensitivity tests we performed on second**
3   **order terms which did not have a material impact on our results (see Table 15 in**
4   **our Reply Evidence).**

5   **We cannot answer why both experts in their Hydro One transmission studies**
6   **did what they did.**

6.   References   **i)**   **B-0012, HQT-5, Document 2, Brattle Report**
                             ii)   **C -AQCIE-CIFQ -0050, PEG Commentary, Pages 20/21**
                             iii)   **B-0094, Brattle Reply Evidence, Table 12 and**
                                        Footnote 39

Preamble : PEG states" Brattle's methodology would be more useful were the goal of the econometric research to predict HQT's cost. However, the goal of the exercise is instead to provide a benchmark that permits us to estimate the extent of the Company's cost efficiency. The benchmark should effectively be the cost that typical utility managers would incur if faced with Brattle's (sic) business conditions."

Brattle states **"**Specifically, in lay terms and for our purposes the null hypothesis of the Hausman test is that there is no correlation between the unique, company-specific factors and the independent variables. A rejection of the null hypothesis means that the unique, company-specific factors are important and failure to control for them would result in biased and inconsistent parameter estimates. Importantly for our purposes, failure to reject the null hypothesis means that PEG's pooled OLS methodology is econometrically in error and leads to biased and inconsistent parameter estimates and unreliable cost-benchmarking conclusions".

a) Does Brattle agree that the difference of opinion between the experts on the appropriate benchmarking model specifications is very marked? Please provide support from other similar benchmarking studies for Brattle's use of FE/RE estimators.

Réponse :

7   **Agree. See response to question 5 b above.**

b) Please provide the other accepted statistical tests for the Brattle and PEG benchmarking models (R^2 ,etc.).

Réponse :

8   **The R^2 is not a statistical test. The relevant statistical tests for purposes of**
9   **deciding among the OLS, FE and RE estimators are the Hausman test, the**

1   **overidentication test and the F-test, which we provide for our data and for PEG's**
2   **data in Table 12 of our Reply evidence.**

c)   Discuss the test results and significance to the cost performance of HQT.

Réponse :

3   **Please see the discussion surrounding Table 12 in our Reply evidence.**

7. References   **i)   B-0094, Brattle Reply Evidence,** Tables 13 & 14
                              ii)   B-0094, Brattle Reply Evidence, Page 40
                     iii)   C-AQCIE-CIFQ-0068, PEG responses to OC IRs No 1

TABLE 13: COMPARISON OF PEG'S BENCHMARKING RESULTS: OLS VS. FIXED-EFFECTS

	OLS			Fixed Effects		
	Total Costs	Capital Costs	O&M Costs	Total Costs	Capital Costs	O&M Costs
2008 - 2019	74.1%	61.3%	124.5%	-0.5%	-0.5%	-2.1%
2017 - 2019	67.4%	54.8%	121.1%	-7.1%	-8.2%	-1.1%

Note: This analysis uses the same specifications as laid out by PEG in the February 2021 report and workpapers

TABLE 14: BRATTLE COST-BENCHMARKING RESULTS USING OLS

	OLS			Fixed Effects		
	Total Costs	Capital Costs	O&M Costs	Total Costs	Capital Costs	O&M Costs
2001 - 2019	114.3%	118.3%	68.1%	-1.7%	-1.1%	-8.5%
2005 - 2019	114.4%	122.2%	57.7%	-2.8%	1.9%	-20.8%
2010 - 2019	111.4%	123.1%	43.5%	-6.0%	2.5%	-35.2%

.
Note: This analysis uses the same data and specifications as laid out by Brattle in the July report.

Preamble : Brattle states- "As is the case with Brattle's replication of PEG's benchmarking analysis, the average differences in costs obtained from the incorrect OLS approach are dramatically different than the fixed effects estimator. The OLS results show that actual total costs for HQT are more than double those predicted by the model while the fixed effects estimator shows that cost differences are within the +/-10% range.
From the results presented in Table 13 and Table 14, it is evident that the **vast differences in conclusions by PEG and Brattle are driven primarily by the choice of estimators [emphasis added].** The differences in conclusions are generally not driven by the underlying data, TFP assumptions, or methodologies".

a)   How do the intervenors and regulator decide which benchmarking model to rely on and which of the experts' estimates for S-Factors are appropriate? Please discuss.

Réponse :

1
2

The decision should be based upon a review of the arguments and evidence put forth by both experts and which one seems more likely to be correct.

b) PEG has provided a review of previous X and stretch factor approvals in North America (Ref iii)). This suggests that stretch factors in the range of 0.3-1.00% have been approved by regulators. Does Brattle have any other examples to support its recommendation? If, so, please provide these.

Réponse:

Please see Table 5 of Brattle Direct Evidence that has additional examples not included in the PEG evidence.

8. References
1d'OC

i) **C-AQCIE-CIFQ-0068, Réponses de PEG à la DDR no 1d'OC**

ii) **B-0094, Brattle Reply Evidence, p. 40**

Preamble: PEG clarifies that the cited mention of a partial true up of capital revenue to actuals was intended as an alternative to a simple compte d'ecarts et reports ("CER")[1]. The proper treatment of capital in a succeeding MRI
for HQT is ideally addressed in a separate proceeding. However, *PEG did recommend a partial true up of capital revenue to actuals as a Custom IR provision in the last MRI proceeding of Hydro One Transmission.*[2]
PEG first notes that Hydro-Québec Distribution operates under a comprehensive revenue cap index and has limited opportunity to obtain supplemental capital revenue. It is PEG's understanding that the Company influenced the design of this MRI.

a) Please provide/reiterate Brattle's views on a HQT comprehensive MRI, including capital and if this should be implemented in 2022 or later.

Réponse :

3
4
5
6

See Table 20 in our Direct Report where we presented the costs and benefit discussion of including capital in an MRI. We understand that including capital in an MRI plan for 2022 is not contemplated and is not an option, but could be for any potential future MRIs and would require a fuller analysis.

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[1] C-0050 PEG Commentary on Brattle Study page 46
[2] OEB EB-2028-0049 Hydro One Transmission

b) Please provide an example of such an RCI MRI formula, including definitions of the terms.

Réponse :

1   **RCI is not defined. See response to the question above.**

c) Should the MRI include an Earnings Sharing Mechanism (ESM) (*écarts de rendement*)? If so what form should this take?

Réponse :

2   **See response to OC question 12.2.**

d) Please provide an appropriate I-factor, X-Factor and S-Factor(s) for such a hypothetical MRI formula, based on Brattles' studies.

Réponse :

3   **We provide our recommended X-factor and S-factor in our Direct Report. We**
4   **have not done analysis on the I-factor and take as given the existing I-factor in**
5   **the current MRI plan.**