**DEMANDE DE RENSEIGNEMENT RTIEÉ-1-1**

**Référence(s) :**

**i)** **AQCIE-CIFQ**, Dossier R-4167-2021, Pièce C-AQCIE-CIFQ-0009 , PEG, *Transmission Productivity and Benchmarking Study*, and attachments.

**Demande(s) :**

**1.1.1** Please provide a more comprehensive description of what each of the attachments (including those that are confidential) comprise.

**1.1.2** Why is C-AQCIE-CIFQ-0024 (PEG-2, document 3), Tx Line Miles confidential ?

**Réponse :**

**1.1.1** **Here are the requested descriptions of the attachments.**
**Overview and Report Tables files:**

- **The pdf file PEG WP Overview provides an overview of the working papers.**
- **The Excel file Pegid map provides the list of assignments to pegid variables, which PEG uses to identify each company in its databases.**
- **The Excel file Variable Key provides the names of each variable PEG relied on for its empirical research.**
- **The Excel file HQT Tables Final WP is the final version of the tables provided in the report. This file includes supporting calculations.**
- **The confidential Excel file Supporting Calcs for Table 7 contains the supporting calculations that went into the comparison of HQT to the sample, as presented in Table 7.**

**Price and Construction Cost data:**

- **The Excel file EC12019 contains the underlying employment cost index data for the US and PEG's calculations to regionalize the ECI data through 2019.**
- **The Excel file Labor Price Levelization 2019 includes the calculations PEG relied on to levelize the labor prices of sampled US utilities.**
- **The confidential Excel file Hwdata19 contains the Handy Whitman data PEG relied on in its calculations and PEG's calculations to annualize the Handy Whitman data which is reported semiannually for recent years.**

**HQT-specific data**

- **The Excel file HQT Data WP contains the calculations used to include HQT in the benchmarking research. This includes the calculation of cost, price, operating scale, and other business condition variables.**
- **The Excel file Old Stats Canada Capital Stock Data includes various capital stock data that PEG relied on to calculate HQT's benchmark year capital cost.**

**US utility data (excluding substations):**

- **The confidential Excel file Tx Line Miles contains PEG's processed transmission line mile data for the US utilities.**

- **The confidential Excel file PEGBMData contains the data and calculations for the cost, price, and scale variables for the econometric work.**
- **The confidential Excel file PEG TFP Calcs WP includes the data and supporting calculations for PEG's productivity research.**

**US Substation data processing**

- **The Excel file F1_substations_2009_db is the raw substation data file for the observations for the year 2009.**
- **The Excel file F1_substations_2019_db is the raw substation data file for the observations for the year 2019.**
- **The confidential pdf file Substation Readme contains an overview of the substation data cleaning that PEG undertook.**
- **The confidential file SubstnDataProcessing is the code used by PEG to process the 2009 and 2019 substation data. This file is designed to run in the popular statistical software package R.**

**Econometrics files:**

- **The pdf file EconometricsWPREADME provides details on how to run the models that PEG provided.**
- **The file SingleEqFUNs contains PEG's script for econometric data preparation for benchmarking. This file should be run in the statistical software R.**
- **The file SingleEqRun contains PEG's the code for PEG's processing for econometric benchmarking. This file should also be run in the statistical software R.**
- **The file HQT_OLSmodels contains the code PEG ran for its econometric benchmarking study. This file should be run in the statistical software Stata.**
- **The confidential Excel file HQTDB contains the data that went into PEG's econometric cost research.**

**1.1.2**

**There are two types of documents that comprise the confidential part of the filing. The first are any materials provided to PEG with the condition of confidential treatment. Any analysis that PEG did using these materials is confidential by extension. PEG also requested confidential treatment for their own databases. These data come from a mixture of public sources, and data leased from others. The PEG databases are mostly based upon publicly-available sources, but have added value in that they have been screened, are available in a more convenient electronic format, and in the case of Tx line miles, have been compiled from individual line entries on FERC Form 1. Other data in the PEG databases have been manually entered from paper copies as far back as 1964. A few data items were obtained from photocopies from warehoused physical copies of the Form 1 and it would be difficult or impossible to obtain these data again. We believe these data have commercial value. They are made available to any party willing to agree to confidentiality for any purpose within the context of this proceeding.**

**DEMANDE DE RENSEIGNEMENT RTIEÉ-1-2**

**Référence(s) :**

**i)** **AQCIE-CIFQ**, Dossier R-4167-2021, Pièce C-AQCIE-CIFQ-0009 , PEG, *Transmission Productivity and Benchmarking Study*, page 68, Table 2:

Table 2 Utilities Sampled in PEG's Studies

| | |
|---|---|
| Alabama Power | *Kansas Gas and Electric* |
| ALLETE (Minnesota Power) | Louisville Gas and Electric |
| Arizona Public Service Atlantic | Kentucky Utilities Mississippi |
| City Electric | Power Monongahela Power |
| Avista | New York State Electric & Gas |
| Baltimore Gas and Electric | Niagara Mohawk Power |
| Central Hudson Gas & Electric | Northern States Power – MN |
| Cleco Power | Oklahoma Gas and Electric |
| *Commonwealth Edison* Connecticut | Orange and Rockland Utilities |
| Light and Power Consolidated | PacifiCorp |
| Edison of New York Delmarva Power | *PECO Energy* |
| & Light | Potomac Electric Power |
| Duke Energy Carolinas | Public Service Company of Colorado |
| Duke Energy Florida | Public Service Electric and Gas |
| Duke Energy Indiana | Rochester Gas and Electric |
| Duke Energy Ohio Duke | *San Diego Gas & Electric* South |
| Energy Progress | Carolina Electric & Gas Southern |
| Duquesne Light | California Edison |
| El Paso Electric Empire | Southern Indiana Gas and Electric |
| District Electric Florida | Southwestern Public Service Tampa |
| Power & Light Gulf | Electric |
| Power | Tucson Electric Power |
| Idaho Power | Union Electric |
| Indianapolis Power & Light | West Penn Power |
| Jersey Central Power & Light | |
| Kansas City Power & Light | |

Notes: Italicized companies are only included in the productivity research.

**Demand(s) :**

**1.2.1** Please provide for each of the sampled utilities the following information. If some information is unavailable, please indicate it or provide an approximation :

| Name of utility | USA State (two letters) | Are the data you considered strictly limited to electric transmission or do they also cover electric distribution and/or gas and/or other transport or distribution? If not, please specify the proportion of each. | Inasmuch as CNE are considered (see your report, pp. 69-71), which Y and Z factors (exclusions and exogeneous factors) were excluded from the data you considered? | Installed Transmission Capacity (MW) ? | Total line length (miles or km - Specify) | Is the electric transmission grid radial ? If not specify. | Are the electric distribution utilities served by that transporter in its zone subject to an obligation to serve clients in all cases or are there exceptions (please specify)? t | In what proportion is heat provided by electricity in that zone? | Please list the events of major reliability or safety failures by that utility during the years examined. Please shortly describe each of those events and indicate year. |
|---|---|---|---|---|---|---|---|---|---|
| Utility no. 1 | | The data | | | | Not known | Not known | Not known | Not known |
| Utility no. 2 | | | | | | | | | |
| Utility no. 3 etc | | | | | | | | | |

**Réponse :**

**The attached Table PEG-RTIEÉ 1.2.1 provides some of the requested information about PEG's sample. Please also note the following.**

- **The main data source used in PEG's study, FERC Form 1, encompasses and itemizes the distribution and well as transmission cost of electric utilities and also includes some data on the cost of any gas operations that these utilities may have. PEG's study relied chiefly on the transmission data but used data on other costs to assign a portion of general costs to the costs under consideration.**

- **The *CNE* items excluded from the study are discussed on pages 69 to 70 of PEG's February report. In both the productivity and benchmarking studies, the excluded *CNE* include the costs of transmission by others and pension and other benefit expenses. The Y factoring of pension and other benefit expenses in the *MRI* of HQT is one reason for their exclusion.**

**In the productivity study miscellaneous transmission and dispatch-related expenses are also excluded for all companies. In the benchmarking study, PEG included both of these expenses in the interest of comparability but excluded some companies with markedly implausible miscellaneous transmission expenses. PEG made the foregoing methodological choices to better obtain relevant productivity trends in the presence of historical restructuring of the transmission industry.**

- **FERC Form 1 data are available on transmission substation capacity.**

- **The sampled utilities generally have an obligation to provide electric service to all customers.**

- **PEG does not know whether the transmission grids of sampled utilities are radial, what proportion of space heating is provided by electricity, or whether there were major reliability events during the sample period. However, PEG understands that electric space heating is generally more popular in the pacific northwest (where abundant hydroelectric generation lowers power prices) and in the southeast (where power prices tend to be moderate and low-to-moderate space heating requirements have traditionally made heat pumps more practical. In most of the United States, demand for power is summer peaking due to large air conditioning loads. In these areas, the provision of power for heating poses no special cost or reliability challenges. Note also that high summer temperatures in many American states makes it important to serve air conditioning loads reliably.**

**1.2.2** Is it correct to understand that the same list of utilities Sampled is also used in all of PEG's Benchmarking Studies, with no or little differences in that list? Please provide the list of jurisdictions in which such identical or similar list was used, as well as the web link to your report, and the name of the utility, with the following details. If some information is unavailable, please indicate it or provide an approximation :

| Name of regulator to which your report was filed (indicate year) | Web kink to your report | Name of utility. Plase also specify USA State or Canadian Province por other country | Are the data you considered strictly limited to electric transmission or do they also cover electric distribution and/or gas and/or other transport or distribution? If not, please specify the proportion | Inasmuch as CNE are considered (see your report, pp. 69-71), which Y and Z factors (exclusions and exogeneous factors) were excluded from the data you considered? | Installed Transmission Capacity (MW) ? | Total line length (miles or km - Specify) | Is the electric transmission grid radial ? If not specify. | Are the electric distribution utilities served by that transporter in its zone subject to an obligation to serve clients in all cases or are there exceptions (please specify)? t | In what proportion is heat provided by electricity in that zone? | Please list the events of major reliability or safety failures by that utility during the years examined. Please shortly describe each of those events and indicate year. |
|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | of each. | | | | | | | |
| Your report no. 1 | | | | | | | | | | |
| Your report no. 2 | | | | | | | | | | |
| Your report no. 3 etc. | | | | | | | | | | |

**Réponse :**

**Please see the response to OC DDR 1 for information on PEG's other transmission cost benchmarking studies. The samples vary from study to study and tend to be smaller than those for PEG's for power distribution cost studies.**

**1.2.3** Were there specific utilities that you chose to exclude from that list? In such case, please enumerate them and indicate why they were excluded.

**Réponse :**

**Please see our responses to Brattle DDR 1.3.1 through 1.3.11 for a discussion of PEG's sample.**

**1.2.4** On pages 11, 63 and 85, you specifically refer to Texas or to the Electric Reliability Council of Texas (ERCOT). However, Texas utilities seem absent from your list of sampled utilities. Why ? Were Texas utilities present in previous versions of your list of sampled utilities and, if so, why and when were they removed from that list.

**Réponse :**

**PEG included data from two Texas utilities (El Paso Electric and Southwestern Public Service) in their studies. PEG has generally not used data on utilities in the Electric Reliability Council of Texas in their recent productivity and benchmarking studies. One reason is that the requisite power distribution data are not available for these utilities. The Brattle study and the recent studies by Mr. Fenrick for Hydro One Networks also excluded data for these utilities. PEG did not make a priority in this project of expanding the sample they had used in their recent Ontario studies.**

**DEMANDE DE RENSEIGNEMENT RTIEÉ-1-3**

**Référence(s) :**

**i)** **AQCIE-CIFQ**, Dossier R-4167-2021, Pièce C-AQCIE-CIFQ-0009 , PEG, *Transmission Productivity and Benchmarking Study*.

**ii)** **HYDRO-QUÉBEC TRANSÉNERGIE (HQT)**, Dossier R-4167-2021, Pièce B-0012, HQT-5 Document 2, Brattle Report :

*Page Adobe 31, note 47 :« it seems that **a key assumption** of the cost benchmarking and comparison approach is the belief that the statistical model predicts the production possibility frontier, so that a top performer is on the frontier and thus it could make no further improvements. The production possibility frontier refers to all the combinations of output that a firm can produce if it uses all its resources and inputs efficiently. ». Page Adobe 32, note 49 : « **There are many intangible factors** that can explain why one firm performs differently from another, such as the quality of workers and management, the quality and strength of the procurement process—i.e., negotiation and bargaining with suppliers—and the amount of X-inefficiency in the company. **To the extent that data limitations preclude such relevant factors from being included in an econometric cost model, departures from "average" efficiency may well represent the effect of these other factors, rather than failure to minimize cost.** ».*

**iii)** **HYDRO-QUÉBEC TRANSÉNERGIE (HQT)**, Dossier R-4167-2021, Pièce B-0061, HQT-10 Document 6.1, Brattle's answers to RTIEÉ :

***BRATTLE'S ANSWER 1.1.5 TO RTIEE:***
*We believe it is a strong assumption in that it is unlikely that a statistical model will be able to capture and control for all observable and unobservable factors and predict accurately the production possibility frontier of each firm's position within the frontier.*

***BRATTLE'S* ANSWER 1.1.6 TO RTIEE** :
*For purposes of our analysis, intangible factors are those factors that likely have an impact on a transmission company's costs but that are unobservable.*

*There are two possibilities for why they are unobservable. The first is that they are inherently unobservable—i.e., the X-inefficiencies that are discussed in the economics literature and that we cite in note 48. The second is that, even though the factors in theory may be measurable, resource constraints—e.g., time, data, costs—make them unobservable to the researcher.*

*While there is judgement involved, some on the list in the question seem to fall into the first category while others fall into the second category. For example, "scope of the obligation to serve", "accommodations and adaptations to concerns of social acceptability", "accommodations and adaptations to local purchasing concerns," seem to be very difficult to measure in an objective and robust manner, even if resources were not constrained. The others seem to fall more into the second category.*

*In addition to these, in note 49 we included: "quality and strength of the procurement*

*process—i.e., negotiation and bargaining with suppliers."*

**iv)** **HYDRO-QUÉBEC TRANSÉNERGIE (HQT)**, Dossier R-4167-2021, Pièce B-0061, HQT-10 Document 6.1, Brattle's answers to RTIEÉ :

***BRATTLE'S ANSWER 1.1.8 TO RTIEE (EXCERPT)*** *:*
*Firms that compete in a market are different in many ways—reflecting differences in both tangible and intangible factors. Firms may have different wage contracts, procurement practices, cost of capital, strategic initiatives, managerial quality and brand value. These differences determine a company's overall strength and weakness in competing—with all firms being good at some things and not as good at others. There is no requirement, however, that firms be identical in every way for competitive markets to function*

**v)** **REGROUPEMENT POUR LA TRANSITION, L'INNOVATION ET L'EFFICACITÉ ÉNERGÉTIQUES (RTIEÉ)**, Dossier R-4167-2021, Pièce **C-RTIEÉ-0016, RTIEÉ-1, Doc. 3 :**

***Dimitrios GIANNAKIS, Tooraj JAMASB, Michael POLLITT****, Benchmarking and incentive regulation of quality of service : An application to the UK electricity distribution networks, In: (2005) vol 33 no. 17 Energy Policy, pp. 2256-2271, https://nyuscholars.nyu.edu/en/publications/benchmarking-and- incentive-regulation-of-quality-of-service-an-ap:*

> *p. 33: We also found that* ***some firms that performed well in the cost- only models did not score high in our quality-only model and the correlation coefficients between the cost-only and quality-only*** scores were somewhat low**. This indicates a** possible trade-off or differing competencies between costs and quality of service**. These findings show that, at least conceptually,** it is plausible and desirable to integrate quality of service and capital expenditure in benchmarking and incentive regulation of electricity networks**.**
>
> *p. 33: Regulatory benchmarking schemes involving capital expenditures and quality of service still need to address concerns about* ***long-term impacts of leaving investments and quality to benchmarking models instead of approval of investment plans and standards of performance for quality****.*
>
> *[Souligné en caractère gras par nous]*

**vi)** **REGROUPEMENT POUR LA TRANSITION, L'INNOVATION ET L'EFFICACITÉ ÉNERGÉTIQUES (RTIEÉ)**, Dossier R-4167-2021, Pièce C-RTIEÉ-0015, RTIEÉ-1, Doc. 2 :

***Paul L. JOSKOW, MIT****, Incentive Regulation in Theory and Practice: Electricity Distribution and Transmission Networks, Harvard, January 21, 2006, https://hepg.hks.harvard.edu/files/hepg/files/joskow_incentive_2006.pdf*

> *p.51 :* ***Incentive regulation in practice is considerably more complicated than incentive regulation in theory****.*
>
> *p. 51: Incentive regulation has been promoted as a straightforward and superior*

*alternative to traditional cost of service or rate of return regulation.* ***In practice, incentive regulation is more a complement to than a substitute for traditional approaches to regulating legal monopolies****.*

*pp. 51-52:* ***Performance benchmarks must be defined and the power of the relevant incentive mechanisms determined****. The information burden to implement incentive regulation mechanisms well is similar to that for traditional cost of service regulation.*

*p. 52:* ***There is a lot of loose and misleading talk about the application of price caps in practice****. From a theoretical perspective the infatuation with price caps as incentive devices is surprising since* ***price caps are almost never the optimal solution to the tradeoff between efficiency and rent extraction*** *when the regulator must respect the regulated firm's budget-balance constraint (Schmalensee 1989)* ***and raise service quality issues****. However, price caps in practice are not like "forever" price caps in theory.*

*p. 53:* ***The evaluations of the performance of price cap regulation should therefore be evaluated from the perspective of the effects on performance incentives not on its effects on price structures*** *since these are typically not chosen voluntarily by the regulated firm but are subject to independent regulatory determinations.*

*p. 53:* ***Collection of data on all relevant and significant measures of firm performance and the use of these data for benchmarking purposes and for developing performance targets is an important component of good incentive regulation in practice****.* ***Regulators need the authority to require firms to collect performance data, to audit performance data and to analyze these data. Absent these authorities and resources incentive regulation mechanisms will not achieve their promise in practice****.*

*p. 53:* ***Quality of service schemes appear to have been bolted on to schemes designed to provide incentives for cost reduction and do not effectively incorporate information on consumer valuations of quality and the costs of varying quality in different dimensions****.*

*p. 54:* ***it is better to use an imperfect estimate of the right number than a highly accurate estimate of the wrong number***

*p. 55: Incentive regulation mechanisms often have "deadbands," caps, and floors* ***that place limits on the performance realizations for which the regulated firm is at risk****.*

*[Souligné en caractères gras par nous]*

**vii)** **R. Anthony INMAN**, Page Internet de présentation, http://www.business.latech.edu/inman/ : Le professeur R. Anthony Inman de la Louisiana Tech University souligne la difficulté mais néanmoins la nécessité, dans les études de productivité, de trouver un moyen de **mesurer non seulement les extrants quantitatifs mais aussi les extrants qualitatifs** :

*The ways in which input and output are measured can provide different productivity measures. Disadvantages of productivity measures have been the distortion of the measure by*

*fixed expenses and also **the inability of productivity measures to consider quality changes** (e.g., output per hour might increase, but it may cause the defect rate to skyrocket). **It is easier to conceive of outputs as tangible units such as number of items produced, but other factors such as quality should be considered**.*

**viii)** **Anthony INMAN**, *Productivity concepts and measures*, http://www.referenceforbusiness.com/management/Pr-Sa/Productivity-Concepts-and-Measures.html , Souligné en caractère gras par nous :

***Experts have cited a need for a measurement program that gives an equal weight to quality as well as productivity**.*

**ix)** **Erwin DIEWERT**, *Le défi de la mesure de la productivité totale des facteurs*, http://www.csls.ca/ipm/1/diewert-un-fr.pdf : Dans le même sens, le Professeur Erwin Diewert du département d'économie de l'Université de la Colombie-Britannique, dans *« Le défi de la mesure de la productivité totale des facteurs »*, souligne que *« **de nombreux extrants du secteur des services sont difficiles à mesurer conceptuellement** : il suffit de songer à la prolifération des forfaits de services téléphoniques et aux difficultés que pose la mesure de l'assurance, du jeu, des affaires bancaires et des opérations sur options. »*. (page 3). Il se demande en outre :
*« **Comment pouvons-nous mesurer le capital-savoir ?** Compte tenu de la façon dont nous avons défini le savoir (comme ensembles de possibilités de production propres à l'entreprise et qui sont fonction du temps), **il est extrêmement difficile de mesurer le savoir et les variations du savoir (l'innovation)**. » (page 10).*

**x)** **John O'GRADY (Prism Economics and Analysis), Prof. Brenda MCCABE (Dept. of Civil Engineering, University of Toronto)**, *Productivity in the Construction Industry: Concepts, Trends, and Measurement Issues*, http://www.ogrady.on.ca/Downloads/Papers/Productivity%20in%20the%20Construction%20Industry.pdf , page 6. Souligné en caractère gras par nous. Selon cette référence, s'il y a variation des extrants du point de vue qualitatif, John O'Grady (de Prism Economics and Analysis) et le Professeur Brenda McCabe (du Département du génie civil de l'Université de Toronto) recommandent un ajustement qualitatif pour refléter cette variation qualitative :

> ***If the quality of the output changes over time, an allowance must be made for the impro.vement or reduction in quality**.*

**Demand(s) :**

**1.3.1** Please comment on the matters raised by Brattle in references ii and iii as to the intangible factors that cannot be taken into account by the statistical models.

**Réponse :**

**Excluded relevant variables are a challenge in statistical benchmarking. PEG, like Hydro One witness Steven Fenrick, have addressed this challenge by including numerous business condition variables in their benchmarking models. Since both consultants have done multiple studies, they have over time been able to develop models of considerable sophistication. Brattle, in what is apparently their first transmission cost benchmarking study, has developed less sophisticated models but then used a fixed effects econometric**

**benchmarking method that controls for excluded relevant variables but also inappropriately includes HQT's average inefficiency in the resultant cost benchmarks.**

**1.3.2** Should your model take into account intangible factors or do you agree with Brattle's statement in reference iv ?

**Réponse :**

**PEG considers some of the intangible factors referred to by Brattle to be aspects of the management performance that benchmarking should measure. PEG would not seek to control for wage contracts, procurement practices, strategic initiatives, managerial quality and brand value with the intent of using them to explain cost. We want these intangible factors to be counted as part of management performance because finding out who is good at these things is the whole point of the benchmarking study.**

**1.3.3** Please provide, to your best knowledge, the studies (or any web link to such studies that does not require membership or registration) that take into account or recommend into account intangible factors into such benchmarking models.

**Réponse :**

**PEG has not done an exhaustive survey of the econometric methods used in econometric benchmarking studies. However, they believe that the particular fixed effects methodology that Brattle used in their study for HQT has not been common in these studies. In response to DDR 13.9 from AQCIE-CIFQ, Brattle stated that they had not done a survey of estimators used in benchmarking studies and noted only a study undertaken by Dr. Ros as using fixed effects. However, this was not a benchmarking study.**

**1.3.4** What is your opinion on Joskow, Giannakis, Inman, Diewert and O'Grady-McCabe's statements in references v, vi, vii. Viii, ix and x regarding the taking into account of intangible factors into such benchmarking models?

**Réponse :**

**PEG agrees that the quality of service is a legitimate consideration in utility performance benchmarking studies, although quality does not necessarily merit equal weight with cost. In cost benchmarking, the quality of service provided is a potential explanatory variable. Unfortunately, consistent and reliable data on the quality of services provided by U.S. energy utilities are not readily available. Data of less than excellent consistency and quality on the reliability of power distribution services are available from the U.S. government on Form EIA 861. PEG has found the integration of these data into a distribution cost benchmarking study to be difficult.**

**PEG also notes that measures have been taken in the United States in recent years to improve the quality of transmission services. This is likely one of the reasons for the poor recent measured productivity growth in the industry in recent years. Efforts to improve quality have influenced the estimated parameters of PEG's transmission cost benchmarking models, particularly that for the trend variable.**