

PEG Budget Statement

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Introduction

Pacific Economics Group Research LLC (“PEG”) has been engaged for several months in the preparation of power transmission productivity and benchmarking studies for AQCIE-CIFQ. As discussed by the Régie de l’énergie in D-2020-028, these studies are intended to inform the Régie’s decisions concerning the X factor and S factor in the revenue cap index of Hydro-Québec Transmission (“HQT”). We submitted a detailed research and cost proposal for this work on 30 October 2020. Reports on the studies by PEG and HQT’s consultant (the Brattle Group) were filed on 19 February. In a letter dated 5 March 2021, the Regie asked AQCIE-CIFQ to submit a request for reimbursement of expenses incurred to date.

The Régie’s *Guide de Paiement des Frais 2020* discusses the preparation of requests for payment of expenses that it can approve for participation in its proceedings. Requests should include a statement confirming that expenses were incurred for services that satisfy the following criteria:

- important for the *dossier*;
- well-documented;
- addressed complex issues;
- prepared by experienced experts;
- not redundant; and
- reasonable cost.

Expertise of PEG

In our 30 October proposal we detailed our credentials to prepare transmission benchmarking and productivity studies. PEG has done dozens of energy utility productivity and benchmarking studies, including several on power transmission. Our personnel pioneered the use of statistical cost research in North American energy utility ratemaking. As noted in Brattle’s February 19 report, we have participated in many Canadian *MRI* proceedings. Clients of our transmission studies have included Hydro One Networks and the Ontario Energy Board.

Empirical Research Methods

The research methods we used in our study for AQCI-CIFQ were similar in many respects to those used by Brattle in its study. This speaks to the credibility of our empirical work. Based on a review of their report, PEG's current understanding is that Brattle...

- used a similar sample period (1994-2019) but more sampled companies (74 vs. 51)
- used multidimensional output indexes in their productivity trend research with 60/40 weights on growth in peak demand and line length
- used the utilities industry Employment Cost Index and the Gross Domestic Product Price Index as the *CNE* input price deflators for U.S. utilities and the gross domestic product implicit price index for final domestic demand as the price deflator for HQT's material and service expenses
- used the geometric decay specification that PEG favors (as well as the one hoss shay specification that Brattle favors) in their productivity research
- excluded pension and benefit expenses
- massaged some data to make them more plausible
- used a 46-year average service life for transmission assets (rationale: that was HQT's value)
- used the Régie's approved rate of return on capital to calculate the capital price index and capital cost of HQT
- had a similar way of calculating the US utility bond yield (but the rate of return on equity was calculated differently)
- calculated input quantity indexes directly, not residually
- used Tornqvist forms for input price and quantity trend indexes
- calculated industry productivity trends as size-weighted averages of results for individual utilities
- developed econometric benchmarking models for total cost, capital cost, and *CNE*
- calculated percentage differences between actual costs and the benchmarks logarithmically
- used real costs (Cost/Input Prices) as the dependent variables in the econometric models
- used similar "network" variables in the econometric models.

There were, however, also some noteworthy differences between the Brattle and PEG methods. Several of these differences will become issues in this or any successor proceeding as it unfolds. This removes concern that our work was redundant or lacking in a distinct point of view. It is PEG's understanding from reading Brattle's report that Brattle, unlike PEG...

- rented data on Tx utility operations from SNL Financial (we gathered the data from the original documents)

- did not levelize the capital asset price index for sampled U.S. utilities (all U.S. utilities are apparently assumed to pay the same rates for construction and installation in a certain year)
- did not levelize the labor price for sampled U.S. utilities either (instead, all utilities are apparently assumed to have the same labor price in 2019)
- calculated the labor price for HQT as $\text{Labor Cost}_{\text{HQT}}/\text{Employees}_{\text{HQT}}$, thereby removing HQT's wage rates as a benchmarking issue
- excluded the administrative and general expenses and the cost of general plant of U.S. utilities from their featured productivity and benchmarking calculations (PEG included these costs)
- used 1988 as the first (or "benchmark") year for its capital quantity indexes (PEG used 1964)
- featured their *one hoss shay* productivity results in their report and used one hoss shay in their benchmarking study (PEG used geometric decay in both studies.)
- did not exclude dispatching expenses, miscellaneous Tx expenses, or Tx by others expenses from their productivity or benchmarking studies, thereby producing a sizable negative impact on their CNE productivity results (PEG excluded all of these costs from the productivity research and some of these costs from the benchmarking research in order to make the results more relevant for setting HQT rates)
- used peak demand data in their benchmarking work which are not comparable to HQT's (PEG used more comparable peak demand data in the benchmarking research)
- used ratcheted peak demand in their benchmarking study but not in their productivity study (PEG used ratcheted peak demand in both studies)
- did not have variables in their cost models to measure the impact on transmission cost of weather or forestation (PEG had both variables)
- didn't use econometric models with second order terms (e.g., peak demand x peak demand and peak demand x line km), a common practice in econometric benchmarking, because they didn't obtain "conclusive results" (PEG included second order terms in all three models)
- used different parameter estimation methods in their econometric work
- included HQT in the econometric sample used to estimate the benchmarking models (PEG did not)
- had numerous insignificant variables in their econometric models (PEG did not) had econometric cost models with lower explanatory power than ours.

Productivity Results

Here is a summary of the productivity results obtained by PEG and Brattle.

	Multifactor			CNE		Capital	
	Brattle (OHS)	Brattle (GD)	PEG (GD)	Brattle	PEG	Brattle (OHS)	PEG Tx (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%

It can be seen that these results differ most markedly with respect to the *CNE* inputs. These results are particularly important inasmuch as the Regie may not approve a revenue cap index in any successor plan which applies to capital as well as *CNE* revenue. If the revenue cap index applies only to *CNE* revenue, Brattle proposes an X factor of **-3.38%**. If a future revenue cap index applies to capital cost as well as *CNE*, Brattle proposes to base X on full-sample period results: **-1.04%** if the inflation measure is an input price index and a much more negative **-2.82%** if an economy-wide inflation measure like the GDPIPI is used.

PEG's research supports a much more positive X factor in a *formule d'indexation* for *CNE* revenue. If a future revenue cap index applies also to capital revenue, PEG states that the Regie should choose between **0%**, **-0.62%**, and **-2.26%** as an X factor depending on how much extra revenue the *MRI makes available* to fund capex surges. PEG did not address the possibility of a macroeconomic inflation measure but can do so later in the proceeding if requested.

Benchmarking Results

Here is a comparison of the average econometric benchmarking results of PEG and Brattle for the last three years of the sample period (2017-19).

	Total Cost	Capital Cost	CNE
Brattle	-4%	8%	-41%
PEG	67%	55%	121%

Informed by these results, Brattle proposes a stretch factor in the **0.10%** to **0.30%** range. PEG, in contrast, argues for an S factor of at least **0.60%** plus an adder for the fact that many transmitters in the econometric sample operated under formula rate plans that weakened their performance incentives. PEG also encourages the Regie not to be bound to the conservative benchmarking/stretch factor schedule used by the Ontario Energy Board.

What Value Has Been Added by PEG and AQCIE-CIFQ?

PEG's research and report has been valuable in many ways.

- Based on our extensive experience in *MRI* proceedings for energy utilities, we provided the Regie with extensive and authoritative discussions of key issues that arise when statistical cost research is used to set the X factors and S factors of revenue cap indexes. Issues that we covered included the following.
 - alternative rationales for revenue cap index design (our analysis differs from Brattle's) [p. 19]
 - why a multidimensional output index can be desirable in productivity research [pp. 23-24]
 - how the choice of an X factor is linked to other *MRI* provisions such as the availability of extra capital cost funding [pp. 20-23]
 - how custom, forward-looking econometric productivity growth benchmarks could be developed for HQT with additional data [pp. 34-37]
 - alternative benchmarking methods [pp. 26-34]
 - choice of a functional form in econometric model development [pp. 99-100]
 - which of five well-established capital cost specifications are most relevant for utility ratemaking [pp. 37-52] (Brattle discussed two options)

An important theme in these discussions was how to make statistical cost research more relevant for ratemaking.

- We have also discussed at some length the conditions driving negative transmission productivity growth in the States and noted that some of these conditions might not apply to HQT.
- We also provided insightful and detailed discussions of idiosyncrasies in the use of FERC Form 1 transmission operating data.
 - Why some components of reported transmission costs (e.g., transmission by others expenses) should be excluded from productivity and/or benchmarking research. [pp. 63-66]
 - Why the choice between peak load variables is an important issue. [pp. 73-75]
- We provided a lengthy discussion of special operating conditions facing HQT that are pertinent in the preparation of a benchmarking study [pp. 83-89 and 91-93]
- The Brattle team had evidently not previously done U.S. power transmission and benchmarking studies. Our 30 October cost proposal and our benchmarking and productivity reports in recent Ontario *MRI* proceedings detailed a research agenda similar to that which Brattle followed in its study. Brattle used many methods that PEG used in recent Ontario studies, as noted above.
- PEG's benchmarking study has some notable advantages over that which Brattle has prepared.
 - We calculated construction cost and labor price levels for each utility in 2019.

- We used additional business condition variables for forestation and weather-related transmission construction standards.
- We provided benchmarking results using productivity level indexes [p. 92] as well as econometric models.

Complexity of the Research

Research of this kind is very complex and there are few prior studies available on these topics to learn from. A great deal of time was doubtless taken by Brattle as well as PEG to reduce the chance of errors.

Documentation

We discussed our work at considerable length in our 113 page report and have also prepared extensive working papers that include the restatement of our productivity and cost calculations (initially undertaken with code) in spreadsheet form. Additional documentation can be provided in response to information requests.

Cost

PEG undertook all of the core tasks that we detailed in our 30 October proposal. To keep the charges reasonable, we allocated to this project only 40% of the costs incurred for three tasks because we may be able to charge future clients for some of this work.

- addition to the sample of three years of operating data (2017-19)
- calculation of asset price and labor price level indexes in 2019
- recalculation of some older capital cost data.

Concerns about cost recovery prompted us to scale back to \$5,000 the fee that we paid to noted microeconomist Jean Paul Chavas of the University of Wisconsin for assistance on some theoretical capital cost issues. Nothing useful to this proceeding was accomplished on this budget and so we are not requesting reimbursement for this expense. To avoid controversy, we also used the hourly rates sanctioned in the *Guide de Paiement des Frais*, even though these are well below the rates we charge to other clients.

Despite these measures, the CAD 370,589 in costs for which we request recovery exceeded the CAD 307,175 budget for core tasks which we proposed in our 30 October submission. There are several reasons for this discrepancy.

- The benchmarking proved to be quite difficult and took longer than expected because of 1) HQT's accounting eccentricities 2) HQT's outlier status in our benchmarking results (which made us reexamine our methods and examine more closely the differences between HQT and US

power transmitters) and 3) the need to develop *CNE* and capital cost benchmarking models as well as a total cost model.

- The productivity research was also time-consuming because we needed to update the dataset and recreate some variables that had been developed by another consultancy [Power Systems Engineering (“PSE”)] in the Ontario proceedings.¹
- We repeatedly recognized the need to expand the scope of statistical cost research issues discussed to make sure that the Régie was properly briefed.
- We had neglected to put in a full budget for the development of working papers in our October 2020 proposal.

We encourage the Régie to compare our hourly rates and budget to those of the Brattle Group if these are available.

¹ Our reports were due after PSE’s, and we could use PSE’s data in our own econometric cost model after signing a confidentiality agreement.