EB-2025-0297: OPG Interrogatories to OEB Staff Experts (02-Jun-2026)

M1-OPG-001

Reference: CAEC Evidence, Exhibit M1

Please provide a complete list of all proceedings in which the CAEC cost of capital witnesses in this proceeding have provided expert evidence, testimony, or reports on utility cost of capital or capital structure, including:

a) CAEC witness;
b) the docket number and jurisdiction;
c) the name of the utility or regulated entity;
d) whether the evidence related to ROE, equity thickness, or both;
e) the final decision date; and
f) the final approved equity ratio and ROE, if any.

Please include copies of the relevant testimony, reports, and final decisions, or provide precise citations to where they are publicly available.

M1-OPG-002

Reference: Exhibit M1, p. 41 of 53.

Preamble:

"We note that these metrics are calculated on the basis of OPG's historical and forecasted financial data. To the extent that these forecasts are adjusted at the conclusion of this proceeding, the recommended equity ratio range may require an update, as the recommendation is based, in part, on these forecasted values."

a) Please confirm whether "the conclusion of this proceeding" means sometime after a final decision is issued by the OEB.
b) If, based on the OEB's decision in this case, the "forecasts are adjusted" to an extent that it requires an update to the equity ratio range, by what mechanism would any such change be reflected in the record in this proceeding?
c) Please identify which forecasted financial data inputs, if adjusted, would require a revision to CAEC's recommended equity ratio range.

M1-OPG-003

Reference: Exhibit M1, p. 44 of 53, Table 6.4

a) For the three Canadian Crown Corporations in CAEC's proxy group:
    i. Provide the credit rating from S&P Global, Moody's, DBRS, and Fitch;
    ii. Provide the most recent credit rating reports from S&P Global, Moody's, DBRS, and Fitch;
    iii. Identify whether the entity has its own stand-alone issuer credit rating;
    iv. Identify whether the entity issues its own long-term debt; and
    v. Identify whether it has a provincial debt guarantee.

b) In preparing its report, did CAEC conduct any analysis of the credit ratings or credit metrics (e.g., FFO/Debt or CFO/Debt ratios) of the three Canadian Crown Corporations that it proposes adding to the proxy group for OPG? If so, please provide that analysis.

M1-OPG-004

Reference: Reference: Exhibit M1, p. 44 of 53, Table 6.4

a) For each of the Canadian Crown Corporations in CAEC's proxy group, provide the regulatory decision(s) authorizing the "Authorized Equity Ratio" in Table 6.5.
b) For each of the Canadian Crown Corporations considered by CAEC for inclusion in the proxy group (i.e., both those that were included in the proxy group and those that were excluded from the proxy group), provide:
    i. The results on the proxy group screening analysis; and
    ii. The supporting calculations, source documents, and page references for the inputs used to analyze each Canadian Crown Corporation's generation (total, nuclear, and hydroelectric), operating revenues (total and regulated), and net income (total and regulated).

M1-OPG-005

Reference: Exhibit M-1

a) Please provide all workpapers and attachments developed and relied on by CAEC to support the recommendations in its report, including for all tables and charts in CAEC's report. Please provide any Excel workpapers in electronic executable format with all formulas intact.
b) To the extent not provided in response to part a), please provide all inputs, formulae, and assumptions used in CAEC's credit metric analyses (Tables 6.2 and 6.3).

c) Please provide all documents cited by CAEC in the footnotes to its report.
d) Please provide copies of any other information or source documents that were developed or relied on by CAEC in support of the tables presented in its report, to the extent not provided in response to parts a) through c).

M3-OPG-006

a) Did OEB Staff ask CAEC to develop an alternative econometric model in place of ScottMadden's model for determining Darlington's normalized TGC/MWh and resulting stretch factor?

    i. Please provide a copy of the specific instructions received from OEB Staff and explain how CAEC responded to these instructions.

b) Did CAEC develop an alternative econometric model that it recommends the OEB use in place of ScottMadden's model for determining Darlington's normalized TGC/MWh and resulting stretch factor.

    i. If yes, please provide the model specification, coefficients, standard errors, workpapers, and resulting Darlington placement, and explain why this was not disclosed in the report that was filed on May 26.

M3-OPG-007

CAEC states that ScottMadden's CANDU coefficient captures factors unique to Bruce or Pickering and likely accounts for controllable cost-driving factors at Darlington.

a) In CAEC's opinion, what specific controllable factors at DNGS is the CANDU variable accounting for? Please provide any analysis (including calculations and assumptions) that supports this opinion.
b) Is CAEC essentially claiming that the refurbishment at Bruce increased the CANDU coefficient and also that Pickering having not yet done a refurbishment has also increased the CANDU coefficient?
c) Does CAEC agree that CANDU technology materially impacts TGC/MWh?
    a. If no, explain why and provide the supporting analysis that CAEC relies on.
    b. If yes, please confirm that any proper benchmarking analysis would necessarily be highly sensitive to the costs attributed to the CANDU technology.

d) Please confirm whether CAEC has verified that Bruce life-extension, Refurbishment, or Major Component Replacement costs were included in the EUCG TGC data used in ScottMadden's econometric model.

e) Please quantify, to the extent possible, the portion of the $539 million CANDU coefficient that CAEC attributes to:
i) Bruce Life-Extension Program, Major Component Replacement, or other Bruce-specific costs;
ii) Pickering age, refurbishment status, or other Pickering-specific costs;
iii) Controllable cost-performance differences among CANDU plants; and
iv) Other factors not related to CANDU technology.

If CAEC cannot quantify items i) to iv) above, explain why.

f) If CAEC is unable to quantify any of the amounts requested in response to d and e, please explain the evidentiary basis for concluding that the CANDU coefficient is overstated by enough to move Darlington from the third quintile to the fourth quintile.

M3-OPG-008

CAEC states that "a corrected coefficient lower than $523 million is reasonable."

a) Is $523 million CAEC's estimate of a corrected CANDU coefficient?
   i. If yes, please provide the supporting calculations and assumptions for this correction.
   ii. If no, please confirm that $523 million is the numerical threshold at which Darlington's stretch factor classification changes from 0.3% to 0.45%. If not confirmed, please explain the basis for the $523 million threshold.

Please provide the workpapers supporting Figures 2.1 and 2.2, including the calculation of Darlington's normalized TGC/MWh and quintile placement at the $523 million and $426 million CANDU coefficient levels.

M3-OPG-009

CAEC states that the Average Unit Age effect may not be economically meaningful as constructed because plant age is not reduced following refurbishment.

a) Did CAEC test an alternative age variable that resets or otherwise adjusts for refurbishment.
    i. If yes, please provide the results and supporting calculations and assumptions.
    ii. If no, please provide the analysis (and supporting calculations and assumptions) which supports the referenced observation.

M3-OPG-010

CAEC states that the planned outage adjustment may overstate the performance of plants with high planned outage rates, but also states that the adjustment does not have a material impact on CAEC's recommended stretch factor.

a) Please confirm whether CAEC relies on its planned outage critique as a basis for recommending a higher stretch factor. If so, please provide Darlington's TGC/MWh, quintile placement, and indicated stretch factor with and without the planned outage adjustment.
b) Please confirm that CANDU plants have a higher minimum, higher median, and higher maximum of planned outages than the other two plant types.
c) CAEC mentions the possibility that the variation in planned outages may be controllable, however, is it also possible that there are other uncontrollable factors at the other plants causing the variation?
    i. If yes, has CAEC investigated these possible uncontrollable factors? If so, please provide the results and details on the analysis.

M3-OPG-011

Please provide Darlington's normalized TGC/MWh percentile/quintile placement and indicated stretch factor under i) CAEC's preferred CANDU coefficient, if any; and ii) any other scenario CAEC relies on to support its recommendation that the stretch factor be increased from 0.3% to 0.45%.

M3-OPG-012

CAEC recommends either: (a) broadening the revenue base to include DRP, PRP, and DNNP in-service additions, or (b) adding 15 basis points to the stretch factor to compensate for the narrower base.

a) Please describe how OPG can increase cost efficiency on specific assets that have already been placed in the rate base?
b) Will the large increase in the rate base due to these capital projects tend to increase or decrease the proportion of controllable costs to total costs for OPG?
c) Please confirm that capital productivity gains are only possible by lowering future in-service additions and once assets enter the rate base they become fixed costs and are no longer sources of possible capital productivity gains. If CAEC disagrees, please explain
d) Please provide the analysis undertaken by CAEC (and supporting calculations and assumptions) to determine that 15 basis points is an achievable level of incremental productivity.
e) If the projected level of incremental productivity cannot be achieved, what are the potential impacts with respect to the company's ability to:
    i. Carry out prudent and necessary work at its nuclear facilities
    ii. Earn the regulated deemed rate of return

M3-OPG-013

Does CAEC consider that OPG faces analogous business conditions in the 2027-2031 rate period as it did in the 2022-2026 period?

M3-OPG-014

a) Please confirm that, from a statistical standpoint, the expected efficiency gains for an average-performing utility, is equal to the expected efficiency gains of the average-performing utility within the industry.
b) Please confirm that a stretch factor is a term that adds an additional amount of efficiency gains above and beyond what is statistically expected.
c) Has CAEC conducted an analysis of the expected efficiency gains of the nuclear industry? If yes, please provide the results and working papers of the analysis.

M3-OPG-015

a) Please confirm that all cited stretch factor examples in other jurisdictions are significantly below CAEC's recommended stretch factor in this case.
b) Please confirm that there are no nuclear-only stretch factor examples from other jurisdictions that CAEC is aware of. If not able to confirm, please provide examples.

c) Please confirm that there are no generation-only stretch factor examples from other jurisdictions that CA is aware of. If not able to confirm, please provide examples.
d) Please list the utilities in Table 3.5 who have the stretch factor applied only to a subset of revenue.
a) For those utilities listed in part d, please provide the percentage of revenues that the stretch factor is applied to.

M3-OPG-016

a) Has CAEC investigated if the controllable costs of OPG's nuclear operations are similar to those of Ontario's distribution utilities? If yes, please provide the results and full details of the analysis.
b) Is CAEC of the opinion that the nuclear industry has "similar efficiency opportunities" as the distribution industry?
c) In CAEC's expert view, are the asymmetric stretch factors in the RRF ranging from 0.0% to 0.6% reasonable additional productivity targets for the distribution industry now that the industry has been under incentive regulation since 2001?

M4-OPG-017

Please specify where in the workpapers PEG provides a version of Table 2 (as seen on page 52 of Exhibit M4, Tab 1), with all the formulas and links to source data intact.

M4-OPG-018

Is the input/cost data collected and compiled for PEG's TFP research the same data that was used in PEG's benchmarking research? If it is not the same, please identify all differences.

i. Is the historical O&M and capital cost data deflated into real dollar terms? Which specific year of real dollar terms is all the data represented?

ii. Is the capital cost data estimated pursuant to PEG's assumptions on geometric decay, use of HWI, and the implied rental price of capital?

M4-OPG-019

Please confirm that for PEG's TFP research, PEG used an index based technique, rather than an econometric technique, to establish the average TFP trends for the hydroelectric industry that are documented in Table 10 on page 97 of Exhibit M4, Tab 2.

i. Please confirm whether a TFP study using an index technique calls for a scale variable or an output quantity variable.

M4-OPG-020

See page 7 of Exhibit M4, Tab 2. If the benchmarking analysis was based on an econometric model that had been calibrated for 21 years (2004 to 2024), why is PEG focused on reporting only the last three years of performance (2022 to 2024)?

i. On page 75 of Exhibit M4, Tab 2, PEG writes that it benchmarked OPG only starting from 2016. Please explain how an economic cost model fitted with data from 2004 is appropriate for such an exercise?

ii. Can PEG re-estimate the parameters using only data from 2016 to 2024 and report those?

M4-OPG-021

Would PEG characterize its benchmarking research in Exhibit M4 as a form of unbalanced panel regression? What adjustments were made to effectuate correction for the unbalanced panel?

M4-OPG-022

See page 26 of Exhibit M4, Tab 2. The text starting on this page describes the various capital decay (depreciation) profiles under "monetary methods that have been most commonly used in research to design rate and revenue cap indexes". Based on the logic described on this page and the next page, can PEG confirm that generally for the same starting level of capital stock, the geometric decay profile will produce the smallest estimate in changes in real capital stock over time from capital investment and therefore the smallest change in capital input quantities, and consequently the most positive TFP growth rate, holding all else constant?

M4-OPG-023

Please confirm whether PEG is familiar with regulatory decisions in relation to setting price and/or revenue cap indices that were based on TFP studies for the industry using a one hoss shay method. If PEG is familiar with such regulatory decisions, please list out the regulators and utilities for which this circumstance applied.

M4-OPG-024

Page 76 of Exhibit M4, Tab 2 specifically states that PEG's research was done using a geometric decay profile for measuring capital input quantities. Did PEG test any other decay specification? If so, please provide the results and work papers.

M4-OPG-025

On page 65 of Exhibit M4, Tab 2, PEG writes: "This would accordingly have been a good proceeding to explore the intermediate hyperbolic decay (HD) specification." PEG does not present any results with a hyperbolic decay.

i. Why didn't PEG produce results using the hyperbolic decay?

ii. Has PEG ever presented a hyperbolic decay profile in any other testimony for a regulatory proceeding?

iii. What kind of challenges, if any, does PEG anticipate in producing a TFP study with hyperbolic decay specification for the hydroelectric generation industry?

M4-OPG-026

On page 72 of Exhibit M4, Tab 2, PEG writes that a 15-year average is what it most "often uses … in econometric model estimation". PEG also appears to have focused on a 15-year trend for the TFP research it conducted and presented in its evidence.

i. In Exhibit M4, Tab 2, on page 82, PEG writes that for its independent benchmarking research, it fitted the models over 21 years. How does that reconcile with the preference for 15 years on page 72 on Exhibit M4, Tab 2?

ii. Has PEG tested what the fitted values and benchmarking results would look like if it only used the last 15 years of data to fit its cost models? If so, please provide those results in associated workpapers.

M4-OPG-027

The value of the trend regression method, as noted on page 49 of Exhibit M4, Tab 2, is to reduce the sensitivity of the long-term average TFP results to the end points under a model using generation as the output measure. Please list other PEG TFP studies where PEG has calculated and recommended use of the trend regression results.

M4-OPG-028

On page 23 and 24 of Exhibit M4, Tab 2, PEG argues in favour of "size weighted averages". Please refer to the TFP results reported in table 10 on page 97 of Exhibit M4, Tab 2. The text on page 96 of Exhibit M4, Tab 2 says these are "cost weighted" results. In the workpapers "PEG_HydroGen_EconometricCode", PEG also does "mean scaling" pursuant to notes.

i. For PEG's TFP research, please clarify what kind of weighting approach was used to get to an industry average TFP growth rate.

ii. For PEG's benchmarking research, please explain what approach, if any, PEG used for weighting the data in the econometrics and why that is relevant.

M4-OPG-029

Please confirm that OPG is included as part of the industry average for PEG's research of industry TFP and specifically as part of the results in Table 10, page 97 of Exhibit M4, Tab 2.

M4-OPG-030

PEG is proposing an output index for the TFP study that is based on capacity, instead of actual billing determinants that would apply to OPG's hydroelectric CIR plan. On page 18 of Exhibit M4, Tab 2, PEG asserts that the "output differential" is "close to zero".

i. Please reconcile the statement with the analysis that PEG performed and documented on page 57 of Exhibit M4, Tab 2, where PEG estimates that there is a positive differential of 0.11% under the trend regression method but reported to be -0.17% for 15 years under the average annual growth rate method.

ii. Does PEG believe that a differential of 0.11% or -0.17% is immaterial and should be treated as zero?

iii. If already provided, please identify the exact location in the workpapers where PEG provides the calculation with all formulas intact for Table 2 on page 58 of

Exhibit M4, Tab 2. If such information does not exist in the workpapers circulated, please provide an additional workpaper including all formulas and links intact.

iv. Please reconcile this observation on page 19 of Exhibit M4, tab 2 about a small and insignificant output differential with what is observed from PEG's TFP research and specifically the results for the "multifactor productivity" for capacity and volume that is reflected in Table 10 on page 97 of Exhibit M4, Tab 2. For example, under the trend regression for the last 15 years, PEG reports multifactor productivity for the industry is estimated at -0.47%. However, for the same industry and same timeframe, PEG reports a multifactor productivity growth rate of -1.69% is estimated if using volume.

v. Please provide examples of other TFP studies that have included an "output differential".

vi. Has PEG explored how generation varies with capacity for each of the plants and for each of hydroelectric operators included in PEG's research of TFP and benchmarking over the study timeframe? If PEG has examined this, please provide PEG's observations and accompanying workpapers.

M4-OPG-031

Please confirm whether PEG agrees with the following definition for generating capacity: a measurement of potential production capability.

M4-OPG-032

On the top of page 19 of Exhibit M4, Tab 2, PEG provides a conceptual formula for an OM&A only revenue cap. The formula in equation [15a] refers to an industry TFP trend. If this is truly just a revenue cap for OM&A, should the TFP component in the formula be replaced with a partial factor productivity (PFP) component that represents OM&A only?

M4-OPG-033

PEG used a benchmark year of 1964 as stated on page 76 of Exhibit M4, Tab 2.

i. Where did PEG source the data and check the quality of the data for this benchmark year, given FERC Form 1 was not digitized before 1994?

ii. Please describe how this choice of a 1964 benchmark year would impact directionally the estimate of capital input quantities for PEG's research into industry TFP trends.

iii. Please confirm that this benchmark year also impacts the annual capital cost values used in PEG's benchmarking research.

M4-OPG-034

On page 40 of Exhibit M4, Tab 2, PEG describes an adjustment that it made to OPG's historical cost data to reflect the presence of certain "equipment associated with step up functions". Please provide a detailed written explanation and identify where in PEG's workpapers there are intact formulas that represent how PEG implemented this adjustment in both its TFP and benchmarking research. If such information does not exist in the workpapers circulated, please provide an additional workpaper including all formulas and links intact.

M4-OPG-035

Based on the data that PEG chose to use to develop its cost benchmarking research, PEG appears to believe that FERC Form 1 and EIA data for hydroelectric generation are adequate to allow for robust benchmarking of costs between firms. What research or analysis did PEG conduct to confirm this?

M4-OPG-036

For PEG's independent benchmarking research and specifically the resulting total cost models represented in Tables 5, 6, and 7, on pages 85, 87, and 89 of Exhibit M4, Tab 2, were those fitted parameters based on data that also includes OPG?

M4-OPG-037

PEG reports the results of its total cost, capital cost, and O&M models in Tables 5-7 of Exhibit M4, Tab 2.

i. Please explain why PEG used "Number of Generator Units" as a variable in the total cost and capital cost models, but "Number of Plants" in the O&M model. What is the economic intuition behind using different explanatory variables?

ii. Please explain why the "Weighted Average Conventional Hydroelectric Generator Age" variable was included in the total cost and capital cost models, but not in the O&M model.

M4-OPG-038

FERC Form 1 data for hydroelectric generation is available at the plant level. Was PEG's econometric models for benchmarking based on regressing costs against explanatory variables at the individual plant level, or at the company level?

i. Please explain the step-by-step process by which PEG gathered and aggregated the raw cost data.

ii. If plant-level data transformation to company-level information has already been provided in workpapers, please identify the file.

M4-OPG-039

On page 68 of Exhibit M4, Tab 2, PEG writes: "This estimate of the labor cost share cannot be vetted and is out of line with US power generation experience."

i. Can PEG confirm that labour costs are not typically reported in FERC Form 1 for hydroelectric generation?

ii. How does PEG then come to its conclusion that LEI's assumption is "out of line"?

M4-OPG-040

PEG writes on page 72 of Exhibit M4, Tab 2 that: "To be included in the study, the data also were required to be a good quality and plausible".

i. What steps did PEG take to screen the data for "quality" and "plausibility"?

ii. Please provide workpapers as relevant for such a screening analysis.

M4-OPG-041

Table 4 on page 73 of Exhibit M4, Tab 2 contains the list of companies used in PEG's research for both the TFP and benchmarking analysis. Has PEG examined the institutional, regulatory, or commercial environments in which these companies operate their hydroelectric

business? If yes, please provide the detailed findings of PEG's examination and any associated workpapers.

M4-OPG-042

On page 75 of Exhibit M4, Tab 2, PEG states: "Prices that utilities pay for hydroelectric generation inputs are likely roughly proportional to those paid for distributor inputs." Please provide the empirical evidence that PEG relied on to support this statement.

M4-OPG-043

On page 76 of Exhibit M4, Tab 2, PEG discusses how costs were calculated. This section falls under Chapter 7.2 which is entitled "Variables used in PEG's benchmarking models".

i. Why was 1985 chosen; why not 1987 or 1983 or another year?

ii. Please confirm that this calculation applied equally for PEG's TFP research as well as PEG's benchmarking research.

iii. Please explain why PEG thought this approach was necessary.

iv. Please specify where in the work papers this "two part" calculation is documented.

M4-OPG-044

PEG writes on page 78 of Exhibit M4, Tab 2 that it made an ad hoc adjustment to the non-labour portion of O&M input prices: "In the benchmarking work, the levels of utility M&S input prices were assumed to differ in 2019 by 1/3 of the difference between sampled utilities and their corresponding labor prices."

i. Please provide empirical substantiation for this adjustment by PEG – in other words, how did PEG come up with 1/3?

ii. Why did PEG apply it in 2019?

iii. Was a similar adjustment made to OPG's cost data?

iv. Does this adjustment also impact PEG's TFP research?

M4-OPG-045

On page 79 of Exhibit M4, Tab 2, PEG describes employing an index of construction cost levels that varied by service territory of the utilities.

i. Please specify in which workpapers we can see the calculations of this adjustment and how it interacts with the Handy Whitman index.

ii. Why was this applied around 2008 as an anchor year?

iii. Was a similar adjustment made to OPG's cost data?

iv. Does this adjustment also impact PEG's TFP research?

M4-OPG-046

On page 81 of Exhibit M4, Tab 2, PEG writes that run of river plants "don't involve dams". How did PEG come to this conclusion?

M4-OPG-047

On page 84 of Exhibit M4, Tab 2, PEG writes: "Total cost was higher the higher was the share of capacity that was established prior to 1964. However, it was lower the higher was the average age of generating stations. This suggests that there was a general tendency of capacity cost to fall with system age until a sizable number of plants had advanced age."

i. Please confirm if there is a typographical error in this text.

ii. Please reconcile the first sentence which refers to total cost, versus the third sentence which refers to capacity cost.

M4-OPG-048

On page 84 of Exhibit M4, Tab 2, PEG writes: "Total cost was also lower the higher was the share of generating capacity devoted to pump storage…." Please explain the underlying economic intuition for this outcome.

M4-OPG-049

Table 5 in Exhibit M4, Tab 2 shows the parameter estimates for various explanatory variables used in PEG's economic model under its benchmarking. Please explain the economic intuition of the parameter estimate and specifically the sign for the %CH variable and the CH Gen Age variable.

M4-OPG-050

On page 90 of Exhibit M4, Tab 2, the last paragraph describes how PEG used a forecast of 2025 to 2031 for "the Company" to benchmark OPG's cost in the future. Please identify where in the workpapers there are tables with all formulas intact and original raw data (and sources for that raw data) that show how the forecast values used by PEG in the benchmarking were developed from the raw data. If such information does not exist in the workpapers circulated, please provide an additional workpaper including all formulas and links intact.

M4-OPG-051

Please identify where in the workpapers PEG shows how it derived the forecast benchmark scores identified in Table 9 on page 92 of Exhibit M4, Tab 2, with all links and formulas intact. If such information does not exist in the workpapers circulated, please provide an additional workpaper including all formulas and links intact.

M4-OPG-052

Table 10 on page 97 of Exhibit M4, Tab 2 contains PEG's industry TFP results. Please identify where in the workpapers there is a version of Table 10 that has all working links and formulas intact to other various workpapers with index calculations for PEG's TFP research.