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Witness: Julia Frayer
Request from: Public Utilities Regulatory Authority

Question:

(OM&A PFP AND X-FACTOR) Exhibit CLP-PBR-2. Explain how differences in utility size affect each utility's contribution to the industry OM&A PFP calculation and identify the utilities with the largest contributions to the aggregate result.

Response:

Utility size affects an EDC's influence on the industry OM&A PFP calculation through its contribution to the underlying industry aggregates, rather than through an explicit utility-level weighting scheme. As explained in the response to OCC-536, nominal OM&A expense for each EDC is converted to a real OM&A input quantity using that EDC's OM&A price index. Those real OM&A quantities are then summed across the EDCs to derive aggregate industry OM&A input quantities. Customer counts are similarly summed across EDCs to derive the industry output measure. OM&A PFP calculation is then calculated based on the change in aggregate customer output relative to the change in aggregate real OM&A input. Please refer to the Company's responses to OCC-535[i] and OCC-536[ii].

Accordingly, EDCs with larger real OM&A quantities would have a bigger presence in the industry OM&A input measure, while EDCs with larger customer counts generally have bigger presence in the industry output measure. This relative influence arises naturally from aggregation of the underlying data; LEI does not separately assign a utility-level size weight, nor are utilities given greater weight because they are similar in size to CL&P.

The Industry TFP model confirms that the largest contributors to the industry aggregates over the 2005–2024 study period are the largest EDCs in the sample. There are 17 EDCs in the sample that have a greater relative contribution than CL&P to both the aggregate real OM&A input and aggregate customer output measures over the 2005–2024 study period. An additional 8 EDCs have a greater relative contribution than CL&P to aggregate customer output, meaning that 25 EDCs in total contribute more than CL&P to the aggregate customer output measure.

It is also important to keep in mind that OM&A PFP measures change in value terms over time; therefore, an individual EDC's influence on a particular year's PFP result depends both on its relative size and on the year-over-year changes in its real OM&A and customer count.

Prior Referenced Response:

[i] OCC-535 Question:

Performance Based Ratemaking Panel Exhibit CLP-PBR-1
Please explain why LEI determined that an aggregate chained Fisher Ideal index is the appropriate methodology for estimating the industry OM&A PFP used to establish the Company's X Factor, rather than calculating utility-level OM&A productivity growth and then aggregating those utility-level results. In your response:

a. State whether LEI calculated annual OM&A PFP growth for each of the 88 individual EDCs included in the study and, if so, provide those results;
b. Provide the resulting industry OM&A PFP growth rates for the 2005–2024, 2010–2024, and 2015–2024 periods using
    i. an even-weighted average of utility-level OM&A PFP growth and
    ii. a cost-weighted average of utility-level OM&A PFP growth;
c. Compare results with the aggregate chained Fisher results reported in Exhibit CLP-PBR-2; and
d. Explain why LEI believes the aggregate chained Fisher result is more appropriate for setting the Company's X Factor than either of the alternative utility-level aggregation methods.
e. Please provide all underlying data and calculations in an unlocked Excel workbook with formulas intact.

OCC-535 Response:

LEI determined that the aggregate Fisher Ideal Index provides the most representative measure of industry-wide OM&A productivity growth, rather than aggregating utility-level productivity results (Section 2.3 of Exhibit CLP-PBR-2).

a. No, LEI did not calculate annual OM&A PFP growth rates for each of the 88 individual EDCs included in the Industry TFP Study. LEI's Industry TFP Study was designed to estimate the OM&A productivity trend for the U.S. electric distribution industry based on the aggregate of the 88 EDCs in the national sample. Accordingly, and consistent with the mathematical properties of an index-based approach to measuring industry productivity trends, LEI identified and estimated the inputs and outputs for each EDC and aggregated those before calculating the trend in partial factor productivity for OM&A over time.

b. LEI did not calculate industry OM&A PFP growth as an average of utility-level OM&A PFP growth rates. In addition, OCC's references to an "even-weighted average" and a "cost-weighted average," which are undefined calculations, in terms of the basis and timing of any proposed cost weights and other parameters. Accordingly, LEI cannot identify or provide the specific alternative calculations requested. As explained in subpart(a), LEI instead calculated industry OM&A PFP using aggregate industry inputs and outputs.

c. LEI did not perform the alternative utility-level aggregation calculations referenced in subpart (b). Moreover, because the proposed "even-weighted" and "cost-weighted" methodologies are undefined, LEI cannot calculate the requested alternatives.

d. The chained Fisher index is the index-number methodology, as described in Section 2.3 of Exhibit CLP-PBR-2. This request therefore appears to conflate the choice of index with the aggregation approach used to derive an industry metric, which are separate elements. LEI's objective was to perform an industry TFP study; thus, LEI chose an approach for aggregation that would most closely reflect the natural composition of the U.S. EDC industry. The alternative approaches – such as using weighting schemes – as suggested in

the question - would create distortions away from the natural composition and therefore LEI did not use such an approach for aggregating to industry.

e. LEI did not perform the alternative utility-level calculations requested in subparts (b) and (c) and no such workpapers exist. The native workpapers supporting LEI's actual Industry TFP calculation are provided in Exhibit CLP-PBR-2a.

[ii] OCC-536 Question:

Performance Based Ratemaking Panel Exhibit CLP-PBR-1
Please explain in detail how differences in utility size affect each EDC's influence on the aggregate chained Fisher OM&A input index and OM&A PFP result reported in Exhibit CLP-PBR-2. In your response:

a. Describe how each EDC's OM&A input price, OM&A input quantity, and relative expenditure or value share enter the Laspeyres, Paasche, and Fisher Ideal index calculations;
b. Explain whether, and to what extent, larger EDCs have greater influence on the resulting industry OM&A PFP than smaller EDCs and EDCs that have similar size to the Company have greater influence on the resulting industry OM&A PFP than other EDCs;
c. Provide, for each EDC and year, the data necessary to identify its relative contribution to the aggregate OM&A input index and customer output index; and
d. Explain how LEI evaluated whether the resulting weighting is representative of the productivity trend relevant to the Company.

OCC-536 Response:

Utility size does not enter the aggregate chained Fisher Ideal index through an explicit utility-level weighting scheme. Rather, EDC-level real OM&A quantities and customer counts are aggregated to form the industry OM&A input and output quantities before the industry indexes are calculated. Accordingly, an EDC's influence arises from its contribution to those industry aggregates, rather than from a separately assigned, size-based weight.

This aggregation approach is consistent with the productivity literature and electricity-sector TFP studies. For example, Quantonomics, in its TFP analysis prepared for the Australian Energy Regulator, applies its TFP index to the aggregated annual time-series data for the electricity distribution industry as a whole1. Von Brasch and Raknerud similarly explain that firm-level outputs can be aggregated into an industry-level composite and that the same principle applies to inputs.

The use of the Fisher Ideal index and a chained formulation is also consistent with standard index-number theory. The Bureau of Economic Analysis ("BEA") defines the Fisher index as the geometric mean of the corresponding Laspeyres and Paasche indexes and explains that its chain-type indexes use information from adjacent periods rather than fixed weights. Diewert also provides the theoretical basis for using Fisher Ideal indexes to measure changes in aggregate inputs and outputs and discusses the desirable aggregation properties of superlative and chained indexes.

a. Laspeyres, Paasche, and Fisher Ideal are standard index-number methods used to measure changes over time in the quantity or price of a group of inputs or outputs. Laspeyres uses prior-period prices as weights, Paasche uses current-period prices as weights, and the Fisher Ideal index combines the two measures by taking their geometric mean. As discussed in Section 2.3 of Exhibit CLP-PBR-2, LEI selected the Fisher Ideal index because of its desirable index-number properties and used a chained formulation in which each year is compared with the immediately preceding year.

For each EDC and year, LEI divides nominal OM&A expense by the EDC-specific OM&A input price index to derive the EDC's real OM&A input quantity. As described in Section 3.2 of Exhibit CLP-PBR-2, the EDC-specific OM&A price index reflects the utility's individual labor and non-labor cost shares. The resulting real OM&A quantities are then summed across EDCs to derive the aggregate industry OM&A input quantity.

Once the EDC-level quantities are aggregated, OM&A is treated as a single industry input. LEI calculates the Laspeyres and Paasche measures of the year-over-year change in aggregate OM&A input quantity and takes their geometric mean to derive the Fisher Ideal OM&A input index. LEI then uses the Fisher Ideal OM&A input index, together with the Fisher Ideal output index, to calculate OM&A PFP, which measures the change in output relative to the change in OM&A inputs.

An EDC's OM&A input price affects the calculation by determining its real OM&A quantity, and that quantity contributes directly to aggregate industry OM&A. There is no separate EDC-level expenditure or value-share weight in the Fisher calculation.

b. For the OM&A input measure, EDCs with larger real OM&A quantities generally have greater influence because they account for a larger share of aggregate industry OM&A. This influence arises naturally from the aggregation of the underlying EDC data rather than from weights separately assigned by LEI. Customer output is calculated separately by aggregating customer counts. EDCs that are similar in size to CL&P do not receive greater weight merely because of that similarity.

c. Exhibit CLP-PBR-2A provides the underlying EDC-level data used to construct the aggregate industry amounts. In the "TFP_Data" tab, columns AD, AH, AI, and AQ provide, for each EDC and year, the nominal OM&A expense, EDC-specific OM&A price index, real OM&A input quantity, and number of customers used in the analysis, respectively. The corresponding year and EDC are provided in columns AA–AB for OM&A, and AN–AO for customer data.

   LEI did not calculate a separate EDC-specific contribution or weight. Rather, real OM&A quantities and customer counts are aggregated across EDCs by year before the industry indexes are calculated. These annual aggregates are shown in the "TFP_Calc" tab in cells D15:D34 for real OM&A and F15:F34 for customers. The resulting chained Fisher OM&A input and customer output indexes are shown in columns AT and BB, respectively.

d. LEI did not separately evaluate whether a size-based weighting was representative because no such weighting was applied. The purpose of the Industry TFP Study is to measure the productivity trend of the electric distribution industry, rather than the productivity trend of utilities that are similar in size to CL&P.

   This approach is consistent with the economic theory underlying I-X regulation. As Bernstein and Sappington explain, "Price cap regulation is intended to replicate the discipline of competitive market force". Consistent with this principle, the productivity benchmark is intended to reflect external industry performance rather than be tailored to the regulated utility based on characteristics such as its size. LEI therefore did not treat similarity in size to CL&P as a basis for assigning greater influence to particular EDCs.