



The Commonwealth of Massachusetts

DEPARTMENT OF PUBLIC UTILITIES

D.P.U. 17-05

November 30, 2017

Petition of NSTAR Electric Company and Western Massachusetts Electric Company, each doing business as Eversource Energy, Pursuant to G.L. c. 164, § 94 and 220 CMR 5.00 et seq., for Approval of General Increases in Base Distribution Rates for Electric Service and a Performance Based Ratemaking Mechanism.

ORDER ESTABLISHING EVERSOURCE'S REVENUE REQUIREMENT

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change and foster a clean energy economy, in furtherance of the Commonwealth's clean energy goals. Below, the Department addresses the PBR formula elements and whether the proposed formula, as a whole, appropriately balances ratepayer and shareholder risk and will result in just and reasonable rates.

5. PBR Formula Elements

a. Productivity Offset

i. Introduction

In the context of a PBR, a productivity offset, or X factor, is the difference between the differential in expected productivity growth between the electric-distribution industry and the overall economy and the differential in expected input price growth between the overall economy and the electric distribution industry (Exhs. ES-GWPP-1, at 46). In combination with the inflation factor, the X factor is designed to represent the expected unit cost performance of an average performing company in the industry (Exhs. ES-GWPP-1, at 46; ES-PBRM-1, at 45). As described above, Eversource calculated a proposed productivity offset in the instant case equal to -2.64 percent (RR-DPU-8). Although she does not argue on brief that the Department should adopt it, the Attorney General's witness calculates a productivity offset of -1.36 percent for her nationwide LDC sample and -0.95 percent for her regional LDC sample (Exh. AG/DED-Surrebuttal-1, Sch. DED-Surrebuttal-1, at 1).

The Attorney General maintains that the Companies' proposed X factor is lower than any X factor approved to date for a North American energy utility (Attorney General Brief at 24-27). Further, the Attorney General argues that Eversource's proposed productivity offset is unsupported by reliable measures of U.S. utility productivity growth (Attorney

General Brief at 24-27). The Companies counter that, while other jurisdictions may have approved X factors that are higher, these jurisdictions have also adopted capital cost recovery mechanisms or used industry inflation levels that, when taken into consideration, make the Companies' proposed X factor comparable (Companies Brief at 337). Further, regarding the measures of utility productivity cited by the Attorney General, Eversource argues that BLS data are not strictly limited to the electric distribution industry and, therefore, are not a useful measure of the Companies' productivity (Companies Reply Brief at 43).

The Attorney General notes that no other jurisdiction in North America has approved a negative X factor to date (Exh. AG/DED-1, at 47-48; Tr. 3, at 583-585). This fact does not, however, preclude the possibility of an X factor that is negative. In fact, other jurisdictions have acknowledged that an X factor may be positive or negative (Exh. VS-1-13, Att. (a) at 48). Whether an X factor is positive or negative is determined solely by the relationship between outputs and inputs in a given industry, and there is no reason to dismiss the possibility that the electric distribution industry may be in a period exhibiting changes that result in decreasing output given a similar or increasing level of inputs (see Exh. ES-PBRM-1, at 47). For these reasons, the Department cannot find that the proposed X factor is unreasonable merely because it is negative or lower than any productivity offset approved to date. Rather, in the sections below, the Department reviews the Companies' TFP study to determine whether it was conducted in a reasonable manner using appropriate assumptions.

ii. TFP Study Parameters

To determine the proposed X factor, Eversource conducted a productivity study of U.S. electric distribution TFP and input price growth over the period 2001 to 2015 (Exhs. ES-PBRM-1, at 46; ES-PBRM-2). Eversource considered two different samples for its TFP study: (1) a sample of 67 nationwide LDCs intended to represent the overall U.S. electric distribution industry; and (2) a sample of 17 regional LDCs intended to represent the distribution industry in the Northeast U.S. (Exh. ES-PBRM-1, at 46). As described below, Eversource ultimately used the nationwide sample for its TFP study (Exh. ES-PBRM-1, at 61).

The Attorney General contends that both the nationwide and regional LDC samples selected by the Companies exclude certain relevant peer utilities and, therefore, result in a flawed analysis with questionable reliance on a peer average that does not represent the Companies' own productivity or that of comparable peers (Attorney General Brief at 30). Eversource counters that the utilities cited by the Attorney General are not relevant peer utilities to the Companies (Companies Brief at 355; Companies Reply Brief at 48). Eversource further maintains that the nationwide LDC sample has been used in other TFP studies and is robust because it represents 75 percent of electric distribution customers in the country (Exh. ES-PBRM-1, at 68; Tr. 3, at 562-563, 635; Tr. 8, at 1483-1485).

Because it represents a significant portion (i.e., 75 percent) of electric distribution customers in the country and is sufficiently robust, the Department is persuaded that the Companies' sample of 67 nationwide utilities is reasonably representative of the U.S.

distribution industry and is a reliable basis to establish TFP (Exh. ES-PBRM-1, at 61; Tr. 8, at 1483-1485). With regard to the regional LDC sample, the Companies selected 17 out of 43 available investor owned utilities to represent the electric distribution industry in the northeast United States, which represents 40 percent of investor owned LDCs in the region (Exhs. ES-PBRM-1, at 46, 77; DPU-40-4, Att.). The regional LDC sample contains seven Eversource and National Grid operating companies, which raises some concerns about sample endogeneity (Exh. DPU-24-16).

Eversource calculated industry TFP over the period 2001 to 2015 (Exhs. ES-PBRM-1, at 47-51, 61). Vote Solar argues that this 15-year time period is too short, resulting in a TFP study that is not robust (Vote Solar Brief at 10). The Companies maintain that significant changes in the electric distribution industry render earlier data unreliable and, therefore, data from 2001 to 2015 are most indicative of future productivity expectations (Exh. ES-PBRM-1, at 62; Tr. 3, at 508-509, 642-646).

As Eversource acknowledges, longer time periods generally are better indicators of future expectations and use of a full data set will ensure robust, reliable results (Tr. 3, at 642-646). The Department is persuaded, however, that, in the instant case, the benefit of using more recent data from 2001 to 2015 to incorporate non-trivial industry changes (as discussed in greater detail below) outweighs possible sacrifices to the study's robustness inherent with the use of a shorter time period.

iii. TFP Study Execution/Components; Input Price and Productivity Differentials

Eversource's proposed X factor includes two components: (1) an input price differential, which calculates the average annual difference in input price growth between the overall economy and the electric distribution industry from 2001 to 2015; and (2) a productivity differential, which calculates the average annual difference in productivity growth between the electric distribution industry and the overall economy from 2001 to 2015 (Exh. ES-PBRM-1, at 27, n. 25). The input price and productivity differentials are intended to reflect the average annual difference in productivity and input price growth between the electric distribution industry and the overall economy from 2001 to 2015. Considered jointly, these differentials are meant to reflect the average annual increase in industry unit costs (Exhs. ES-GWPP-1, at 46; ES-PBRM-1, at 28).¹⁸⁸

The sum of the differentials serves as a proxy for the growth in per unit costs that a particular company should have experienced from 2001 to 2015, if it were an average performing company (Exhs. ES-GWPP-1, at 46; ES-PBRM-1, at 28, 46). A company that achieved lower-than-average growth in unit costs during this period would have the opportunity to earn additional profits (Exh. ES-PBRM-1, at 46). Conversely, a company whose growth in unit costs exceeded the average might realize lower-than-anticipated profits (Exh. ES-PBRM-1, at 46).

¹⁸⁸ For companies operating in a competitive market, the prices charged for a product or service are determined by the prices of the inputs used to produce the product or service, adjusted for any productivity gains exhibited in combining those inputs to produce the product or service (Exh. ES-PBRM-1, at 28).

growth (Exh. ES-PBRM-1, at 49; Tr. 3, at 494-495, 633-634). D.P.U. 07-50-A at 48-49. Instead, these capital expenditures are influenced by factors such as the age of the assets, changes in technology, past patterns of customer growth and increases in the load to serve (Exh. ES-PBRM-1, at 49; D.P.U. 07-50-A at 48-49).

Because of significant changes in the electric distribution utility industry, use of kWh sales as an alternate output measure may also be flawed. In particular, successful energy efficiency programs have led to decreased energy consumption, which has resulted in decreased kWh sales for electric distribution utilities (Exh. ES-GWPP-1, at 21-26; Tr. 1, at 32, 71; Tr. 5, at 986; Tr. 8, at 1474, 1538). D.P.U. 07-50-A at 3, 6. In addition, the introduction of a growing amount of distributed energy resources into the distribution system decreases kWh sales (Exh. ES-GWPP-1, at 22, 25-26). In this current environment, electric distribution utilities may exhibit kWh sales data that are unrelated to distribution system investments or other customer service inputs (see Tr. 3, at 494-495, 633-634).

Given the discussion above, the Department concludes that both output measures used in traditional TFP studies (i.e., kWh sales and customer count) present challenges. The record does not contain the data necessary to allow us to consider a non-traditional output measure. In these circumstances, the Department finds that Eversource has demonstrated that customer count is a reasonably reliable TFP output measure as it is less affected than kWh sales by the industry changes discussed above (Exh. ES-GWPP-1, at 21-26; Tr. 1, at 32, 71; Tr. 5, at 986; Tr. 8, at 1474, 1538). D.P.U. 07-50-A at 3, 6. Going forward, any distribution company conducting a TFP study should consider and present data regarding

alternative or non-traditional output measures that are designed to capture all of the products and services it provides.

The Attorney General raises several other issues with respect to the execution of Eversource's TFP study. First, the Attorney General argues that the Companies' inputs should include not only labor and materials costs booked to distribution O&M expense but also an allocated portion of labor and materials costs associated with customer accounts, sales, administrative and general expenses, and general plant (Attorney General Brief at 28-30). The Companies counter that these accounts should not be included because they contain non-distribution expenses (Companies Brief at 359-360; Companies Reply Brief at 49). As the adjustments affect the distribution revenue requirement, the Department finds that it is not appropriate to include any non-distribution cost elements in the input index.

The Attorney General also argues that Eversource used an improper method to calculate the capital quantity index; specifically it used the one hoss shay method rather than the geometric decay method (Attorney General Brief at 31).¹⁹⁰ The Attorney General contends that a geometric decay method is more appropriate here because it considers gradual depreciation of capital, whereas the one hoss shay method does not (Attorney General Brief at 31). Alternately, the Companies maintain that the one hoss shay method is consistent with the method that the BLS uses to develop multifactor productivity studies (Companies Brief at 368-370; Companies Reply Brief at 49). Further, the Companies claim that the Attorney

¹⁹⁰ The one hoss shay method assumes that the flow of services received for capital is constant at full productive efficiency up until its retirement, whereas the geometric decay method assumes that the productivity of an asset decreases at a constant percentage rate (Tr. 3, at 554-555, 569).

The Department must first determine whether it is more appropriate to base Eversource's historic input price and productivity growth differentials on the historic productivity and input price growth indices of either regional or nationwide LDCs. With respect to input price growth, Eversource's TFP study indicates that, between 2001 and 2015, regional LDCs experienced an average annual input price growth rate of 4.10 percent, while nationwide LDC input prices grew at an average annual rate of 4.13 percent (Exh. ES-PBRM-1, at 47-48). With respect to productivity growth, Eversource's TFP study indicates that, between 2001 and 2015, regional LDCs experienced an average annual productivity growth of -0.41 percent, while nationwide LDCs experienced an average annual productivity growth of -0.46 percent (Exh. ES-PBRM-1, at 47-48). Given the small difference between the regional and nationwide growth rates in each instance and the substantial presence of Eversource and National Grid operating companies in the regional sample which could result in sample endogeneity, we find that use of nationwide LDC input price growth and nationwide LDC productivity growth will maintain a high degree of statistical reliability and preserve the function of the input price and productivity growth rates as true industry-wide averages (Exhs. ES-PBRM-1, at 30, n.30; DPU-24-16).

Next, the Department addresses the appropriate output measure to use in the calculation of average annual productivity growth. As described above, Eversource calculated annual productivity growth using TFP, which is defined as the ratio of total output to total input (Exh. ES-PBRM-1, at 30; Tr. 3, at 487-489). Annual gains or losses in productivity are measured as the percentage change in TFP, which is calculated as the

percentage change in total output less the percentage change in total input (Exh. ES-PBRM-1, at 30-31).

Traditionally, the Department has approved TFP studies that use both customer count and a measure of sales (i.e., kWh sales) as output measures. See D.P.U. 96-50 (Phase I) at 275-278; D.T.E. 03-40, at 476. Eversource used number of customers as the sole output measure for its TFP study (Exh. ES-PBRM-1, at 30; Tr. 3, at 491). Several intervenors maintain that the Companies' use of number of customers as the sole output measure is problematic because total output consists of all of the products and services produced by the relevant firm or industry (Attorney General Brief at 31; Vote Solar Brief at 6-7).

The Department has previously expressed concern with the use of number of customers as the sole indicator of LDC output growth. D.P.U. 07-50-A at 48-49; D.P.U. 96-50 (Phase I) at 275-276.¹⁸⁹ As Eversource recognizes, while the number of customers is a driver of the costs needed to operate gas or electric distribution systems, it does not capture all of the reasons for changes in costs associated with providing distribution services (Exh. ES-PBRM-1, at 49; Tr. 3, at 495). D.P.U. 07-50-A at 48-49. For example, a distribution company may make capital expenditures to replace existing assets and the magnitude of capital replacement required has little or no correlation with levels of customer

¹⁸⁹ Certain economists have concluded that number of customers is an appropriate output measure in determining the productivity offset for a revenue-per-customer PBR, because the number of customers directly affects a utility company's revenues (Exhs. ES-PBRM-1, at 36-38; ES-PBRM-Rebuttal-1, at 31 n.44; Tr. 3, at 626-631; RR-DPU-6, Att. at 129-130). The Companies have not, however, proposed a revenue-per-customer PBR. Instead, the Companies propose a revenue cap PBR where the annual revenues resulting from any PBR adjustments are unrelated to changes in the number of customers (Exhs. ES-PBRM-1, at 39-40).

General's calculation of the capital quantity index using the geometric decay method is unreliable because she excluded data from more than 20 percent of the sample companies (Companies Brief at 356, 370-371).

While the gradual depreciation of capital assets is necessary for accounting and cost recovery purposes, a capital asset's contribution to a company's productivity remains relatively constant until it is retired (Tr. 3, at 554-558). As Eversource correctly notes, the BLS relies on a method similar to the one hoss shay method for its multifactor productivity studies (Exh. ES-PBRM-1, at 69; Tr. 3, at 554-558). For these reasons, the Department finds that Eversource's use of the one hoss shay method to calculate the capital quantity index is appropriate.

Finally, the Attorney General raises concerns about the method used by Eversource to calculate the industry productivity growth rate (Attorney General Brief at 30). Once Eversource determined the quantity of output and the quantities and total prices of total input for each firm and each year, it used these data to calculate the industry productivity growth rate (Exh. ES-PBRM-1, at 73; ES-PBRM-2). In calculating the industry average annual productivity growth, Eversource weighted each company's TFP by its relative number of customers (Exh. ES-PBRM-1, at 73). The Attorney General argues that weighting the companies by their relative number of customers is inappropriate because the TFP estimates are already scaled for size given that productivity is a relative measure comparing a utility's inputs to its outputs (Attorney General Brief at 30). Even if such weighting is found to have a legitimate basis, the Attorney General asserts that Eversource's actual adjustment is both

limited and selective (Attorney General Brief at 30). Specifically, the Attorney General claims that there are a number of differences between utilities that could affect the productivity estimates (e.g., regulatory environment, geography, service territory characteristics) and that only adjusting for size without adjusting for all other possible factors results in a weighted average that is selective and arbitrary (Attorney General Brief at 30-31). Eversource maintains that weighting for size is necessary given that the output measure is number of customers (Companies Brief at 358). Without such weighting, the Companies contend that the ten largest firms (which serve 45.3 percent of the customers in the study) have the same weight as the ten smallest firms (which serve 2.5 percent of the customers in the study) (Companies Brief at 358-359). Because the output measure is number of customers, the Department finds that weighting to account for utility size may result in more representative industry-average TFP data. Accordingly, the Department concludes that the Companies' weighting of TFP estimates is appropriate.

Based on the findings above, the Department has determined that that Eversource's input price differential of -1.29 percent and productivity growth differential of -1.35 percent were determined in a reasonable manner.

iv. Conclusion

In the sections above, the Department has determined that the Companies' TFP study was conducted in a reasonable manner using appropriate data and assumptions. Accordingly, the Department has determined that the resulting input price differential of -1.29 percent and productivity growth differential of -1.35 percent were determined in a reasonable manner.

Accordingly, the Department will use these inputs to calculate an appropriate productivity offset for the Companies.

Eversource maintains that the proposed X factor of -2.64 percent would allow it to absorb the \$400 million grid modernization base commitment investment (Companies Brief at 36, 403). The average annual revenue requirement associated with the \$400 million base commitment investment is represented by an implicit stretch factor of 1.08 percent (Exhs. ES-GWPP-1, at 54; ES-PBRM-1, at 60; AG-21-2, Att. at 1; Tr. 2, at 240-242; Tr. 8, at 1553-1559, 1595-1597; Companies Brief at 403). To the extent that the Department determines it is appropriate to remove the grid modernization base commitment from the PBR, the Companies maintain that they would not object to making the 1.08 percent explicit and removing it from the X factor (Exhs. ES-GWPP-1, at 54; ES-PBRM-1, at 60; AG-21-2, Att. at 1; Tr. 2, at 240-242; Tr. 8, at 1553-1559, 1595-1597; Companies Brief at 403).

For reasons discussed in Section X.B.3 below, the Department has determined that it is in the public interest to remove the proposed grid modernization base commitment investments from the PBR. Accordingly, the Department will reduce Eversource's proposed X factor by 1.08 percent, representing the estimated revenue requirement associated with the \$400 million grid modernization base commitment investment (Exhs. ES-GWPP-1, at 54; ES-PBRM-1, at 60; AG-21-2, Att. at 1; Tr. 2, at 240-242; Tr. 8, at 1553-1559, 1595-1597; Companies Brief at 403). Accordingly, the Department approves an X factor of -1.56 percent.

b. Inflation Index and Floor

In D.P.U. 94-50, at 141, the Department found that the GDP-PI is the most accurate and relevant measure of output price changes for the bundle of goods and services whose TFP growth is measured by the BLS. In addition, the Department found that GDP-PI is: (1) readily available; (2) more stable than other inflation measures; and (3) maintained on a timely basis. D.P.U. 94-50, at 141. In the instant proceeding, no party disputes that the GDP-PI is an appropriate measure for inflation in a revenue cap PBR formula. Accordingly, the Department approves the Companies' use of GDP-PI as an inflation index in the PBR formula.

As described above, Eversource proposes to include an inflation floor of one percent in the revenue cap formula, meaning that if inflation drops below one percent, the Companies would fix the inflation component of the PBR formula at one percent (Exh. ES-GWPP-1, at 12, 47-48). The Attorney General, Cape Light Compact, and CLF argue that the proposed inflation floor is unprecedented and unjustified (Attorney General Brief at 21; Cape Light Compact Brief at 55-56; CLF Brief at 17). The Companies concede that there are no other examples of incentive regulation plans that include a floor on inflation (Tr. 3, at 544). Eversource's primary justification for its proposed inflation floor stems from its commitment to spend \$400 million over five years on grid modernization investments (Exhs. ES-GWPP-1, at 47-48; DPU-24-6; DPU-44-4; DPU-44-5, AG-28-6; Tr. 2, at 314). However, as discussed in Section X.B.3 below, the Department has determined that it is in the public interest to address the grid modernization base commitment investments outside of the PBR.