

REDACTED

BEFORE THE
STATE OF NEW HAMPSHIRE
PUBLIC UTILITIES COMMISSION

DOCKET **DE 24-070**

IN THE MATTER OF: Public Service Company of New Hampshire
 d/b/a Eversource Energy
 Request for Change in Distribution Rates

DIRECT TESTIMONY

OF

Nicholas A. Crowley and Daniel McLeod, PhD

January 24, 2025

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1 **1. Introduction**

2 **Q. Mr. Crowley, please state your full name.**

3 A. My name is Mr. Nicholas Allen Crowley.

4 **Q. By whom are you employed and what is your business address?**

5 A. I am a Vice President with Christensen Associates Energy Consulting LLC (CA Energy
6 Consulting). My business address is 800 University Bay Drive, Suite 400, Madison,
7 Wisconsin, 53705.

8 **Q. Please summarize your education and professional work experience.**

9 A. I have been with CA Energy Consulting since 2016. During this time, I have testified on
10 incentive regulation issues in both the United States and Canada. I have also conducted
11 research related to incentive regulation, recently co-authoring an article with Dr. Mark
12 Meitzen on the impact of performance-based regulation (PBR) on Canadian electricity
13 distribution utilities.¹ Prior to joining this firm, I was an economist in the Office of Energy
14 Market Regulation at the Federal Energy Regulatory Commission (FERC), where I assisted
15 with energy industry benchmarking, the incentive regulation of oil pipelines,² and the review
16 and evaluation of natural gas pipeline rate cases. In these roles, I have worked extensively
17 with FERC and other federal data for the development of cost benchmarks for power
18 systems, in measuring industry total factor productivity, and the development of PBR
19 frameworks filed before regulatory authorities across North America. I have a Bachelor of
20 Science degree in economics, as well as a Master of Science degree in economics from the

¹ Nick Crowley and Mark Meitzen, “Measuring the Price Impact of Price-Cap Regulation Among Canadian Electricity Distribution Utilities,” *Utilities Policy*, 72 (2021).

² Five-Year Review of the Oil Pipeline Index. Issued: December 17, 2015. 153 FERC ¶ 61,312.

1 University of Wisconsin-Madison. I am also a CFA charterholder. My curriculum vitae is
2 attached as Attachment NAC-DPM-1.

3 **Q. Dr. McLeod, please state your full name.**

4 A. My name is Dr. Daniel McLeod.

5 **Q. By whom are you employed and what is your business address?**

6 A. I am an economist with Christensen Associates Energy Consulting LLC (CA Energy
7 Consulting). My business address is 800 University Bay Drive, Suite 400, Madison,
8 Wisconsin, 53705.

9 **Q. Please summarize your education and professional work experience.**

10 A. I have been with CA Energy Consulting since 2021. During this time, I have been involved
11 with electric and gas utility regulatory proceedings in the United States and Canada with a
12 focus on incentive regulation. I received my Ph.D. in economics from the University of
13 Wisconsin-Madison in 2021. My academic background is in industrial organization (IO) and
14 applied econometrics. As an IO economist, I have worked on litigation cases spanning
15 several industries, including agriculture, electronics, and telecommunications. My curriculum
16 vitae is attached as Attachment NAC-DPM-2.

17 **Q. What is the purpose of your testimony in this proceeding?**

18 A. This testimony reviews the proposed PBR framework filed by the Public Service Company
19 of New Hampshire d/b/a/ Eversource Energy (“PSNH,” or “Eversource,” or “the Company”).
20 The purpose of the review is to assess the incentives that the Company will face under its
21 proposed PBR plan, including the “revenue cap,” the capital supplement mechanism known
22 as “K-bar,” the Earnings Sharing Mechanism (ESM), and the Performance Incentive
23 Mechanisms (PIMs). This testimony will evaluate the reasonableness of each of these

1 proposed elements of Eversource’s plan. We are testifying on behalf of the New Hampshire
2 Department of Energy (“the Department”).

3 **Q. How is your testimony organized?**

4 A. This testimony contains a section for each major component of PSNH’s proposed PBR
5 framework. Section 2 provides background on the Company’s proposed framework and the
6 principles of PBR. Section 3 provides an overview and assessment of the Company’s PBR
7 framework, with a discussion of the practical implications on the utility’s revenues and
8 customer rates. Section 4 evaluates the total factor productivity (TFP) and benchmarking
9 studies filed by the Company’s witness Dr. Agustin Ros. Section 5 evaluates the proposed K-
10 bar mechanism. Section 6 discusses the implications of revenue decoupling in Eversource’s
11 proposal. Section 7 assesses additional elements of the Company’s plan, including the
12 earnings sharing mechanism (ESM), the option to renew the revenue cap after four years, and
13 the Company’s proposed PIMs. Section 8 assesses the Company’s proposed Performance
14 Incentive Mechanisms. Section 9 contains a possible alternative to the Company’s proposed
15 PBR framework. Section 10 presents a summary and conclusions.

16 **2. Background and Principles of PBR**

17 **Q. Has PSNH filed a PBR framework that fundamentally differs from its previous**
18 **regulatory framework?**

19 A. Yes. The regulatory framework under which PSNH has operated prior to this filing could be
20 described as a form of traditional cost-of-service regulation, in which the company sets rates
21 according to a cost-based revenue requirement. Under this form of regulation, the Company
22 may file periodic rate cases to reset rates according to prudently incurred costs. PSNH has
23 proposed to change its regulatory framework by operating under what it calls a revenue cap.

1 (In Section 3, we demonstrate that the proposed PBR framework is, in fact, a form of price
2 cap.)

3 **Q. Please explain the difference between setting rates under traditional cost of service
4 regulation and setting rates under a revenue cap.**

5 A. Generally speaking, utility rates are established by two components: (1) a revenue
6 requirement; and (2) company billing determinants, typically consisting of energy (kWh),
7 demand (kW), and the number of customers served. Under traditional cost-of-service
8 regulation, a utility establishes a test year revenue requirement for each customer class, and
9 then divides this revenue requirement by class-level billing determinants to determine prices
10 per billing unit. A revenue cap mechanism operates similarly, except that over the revenue
11 cap period, rates are adjusted each year such that revenues increase no faster than inflation
12 minus a productivity offset (known as “I-X”). A distinguishing feature of revenue caps is
13 that the regulated company is not able to file an application for increased rates during the
14 revenue cap term. This is the source of cost efficiency incentives under PBR.

15 **Q. What is your understanding of why PSNH is proposing to change the structure of its
16 regulatory regime to a PBR framework?**

17 A. The Company cites several reasons for proposing to move from its existing regulatory regime
18 to a PBR framework. These reasons include the promotion of long-term cost control, the
19 reduction of customer bill impacts, and the ability to operate with fewer base distribution rate
20 proceedings.³ The Company states that the current approach, which involves periodic base-
21 rate proceedings with step adjustments, will not provide the level of rate stability for

³ Testimony of Douglas W. Foley, Robert S. Coates, and Douglas P. Horton, pp. 36-37, Bates 01380-01381.

1 customers that the PBR approach might provide. Additionally, the Company states that PBR
2 may introduce superior cost efficiency incentives, resulting from its rate case stay-out
3 commitment.

4 **Q. Will PBR provide the benefits cited by PSNH?**

5 A. There is no guarantee that PBR will result in superior regulatory outcomes relative to other
6 forms of regulation. Not all PBR plans are created equal, nor are the conditions under which
7 each utility operates within the regulatory mechanism. However, a well-designed PBR
8 framework provides the profit maximizing utility with an enhanced incentive to find ways to
9 reduce costs through the elimination of inefficiencies that might have otherwise persisted if
10 the utility had continued operating in the status quo regulatory environment. A well-
11 designed PBR framework also offers greater efficiency in the operation of the regulatory
12 process by lengthening the period of time between costly and administratively burdensome
13 rate cases. A utility under PBR might have two rate applications over a ten-year period,
14 while a comparable utility could have as many as five over the same time period, depending
15 on the jurisdictional ratemaking process. In principle, these incentives and a longer time
16 period between regulatory proceedings than under cost-of-service (COS) regulation can be
17 expected to lead to more efficient utility behavior, efficiency in the regulatory process, and
18 benefits for all stakeholders, including customers of the regulated utility. This testimony
19 evaluates whether the design of PSNH's proposed PBR framework is likely to produce these
20 benefits.

21 **Q. How do customers benefit from the utility's profit maximizing incentives under PBR?**

22 A. One of the fundamental principles of PBR is that customers share in the benefits of incentive
23 regulation. These benefits may occur contemporaneously during the operation of the plan

1 (i.e., *ex ante* benefits) or after the fact (i.e., *ex post* benefits). *Ex ante* benefits would include
2 slower rate escalation and stability of rates as compared to alternative COS-based forms of
3 regulation. *Ex post* benefits would include consumers realizing the fruits of more efficient
4 utility behavior and efficiencies in the regulatory process through the rebasing of rates at the
5 time the plan is reviewed.⁴

6 **Q. Is there any evidence from other jurisdictions that price or revenue caps work to reduce**
7 **price escalation for consumers?**

8 A. Yes. In a recent paper published in *Utilities Policy*, I found (in collaboration with my
9 colleague Dr. Mark Meitzen) that electric distribution utility customers in Alberta and
10 Ontario, where utilities operate under price caps, experienced slower rate escalation than
11 comparable utilities.⁵ In a recent publication in *The Electricity Journal*, Ken Costello stated
12 that “for a utility with normal operating efficiency, our model finds that long-run cost
13 performance on average improves 0.51 percent more rapidly each year in an MRP with a
14 five-year term and no earnings sharing than it does under traditional regulation when rate
15 cases occur every three years.”⁶ In addition, extensive economics research in the
16 telecommunications industry indicate productivity improvements among firms operating
17 under price caps during the 1990s. The National Regulatory Research Institute found
18 increased productivity among telecommunications companies operating under incentive
19 regulation.⁷

⁴ Typically, incentive regulation plans such as price cap plans are subject to a comprehensive review after a pre-determined number of years of operation—e.g., five years.

⁵ Nick Crowley and Mark Meitzen, “Measuring the Price Impact of Price-Cap Regulation Among Canadian Electricity Distribution Utilities,” *Utilities Policy*, 72 (2021).

⁶ Kenneth W. Costello, “Multi-year rate plans are better than traditional ratemaking: Not so fast,” *The Electricity Journal*, 36, (2023).

⁷ Jaison R. Abel, “The Performance of the State Telecommunications Industry Under Price-Cap Regulation: An Assessment of the Empirical Evidence,” NRRI 00-14, The National Regulatory Research Institute, September 2000.

1 **Q. What are the potential risks of implementing a PBR framework?**

2 A. A utility under PBR has enhanced cost efficiency incentives, but these incentives exist
3 because the utility operates over a longer period of time between its rate cases. One result of
4 spending more time between rate applications is reduced transparency into the company's
5 spending. The regulator does not have the opportunity to review the utility's spending during
6 the PBR term. Another risk is the divergence of costs and revenues. The utility takes this
7 risk, as it cannot recover costs beyond what is allowed by the PBR framework during the
8 years of the PBR term. In addition, in general, customers do not obtain the benefits of cost
9 efficiencies until the end of the term when rates are reset. (However, as explained later,
10 PSNH has proposed an earnings sharing mechanism that returns a portion of earnings 25
11 basis points above the allowed ROE to customers during the PBR term.)

12 **3. Assessment of the Company's PBR Framework**

13 **Q. Please describe the key components of the Company's proposed PBR framework.**

14 A. The Company has proposed a four-year "revenue cap" plan defined by an inflation rate and
15 a capital supplement known as "K-bar", with new rates set at the start of each year of the
16 PBR term. The plan also consists of other mechanisms common to PBR frameworks,
17 including an ESM and PIMs. The plan does not include an off-ramp or re-opener for the
18 first four years.⁸ An off-ramp is a mechanism by which the revenue cap can be terminated as
19 a result of unforeseen circumstances during the term of the plan that would threaten the
20 financial integrity of the company or harm service to customers. Table 1 summarizes the
21 company's proposed PBR elements.

⁸ Attachment NAC-DPM-3 (Response to Data Request No. DOE 6-126).

1

Table 1: Summary of PSNH’s PBR Framework

PBR Component	Proposed Approach
Indexed Cap	“Revenue Cap”
Inflation Measure	GDP-PI
X Factor	0.00%
Capital Supplement	K-Bar
Exogenous Costs	Yes
Earnings-Sharing Mechanism	75/25 split, 25 bps deadband
Off ramp/Re-Opener	None
Consumer Dividend	0.15%
PIMs	Two penalty-only PIMs
PBR Term	4 years

2 **Q. Please demonstrate how each of these components fit together to calculate PSNH’s**
3 **revenue requirement in a given year of the PBR term.**

4 A. The Testimony of Douglas W. Foley, Robert S. Coates, and Douglas P. Horton provides the
5 following simplified formula for Eversource’s PBR framework (Equation 1).⁹ Note that
6 “CD” stands for “Consumer Dividend” in this formula, and is synonymous with the term
7 “stretch factor.”

⁹ Testimony of Douglas W. Foley, Robert S. Coates, and Douglas P. Horton. P. 36, Bates 01380.

$$\text{Rev Requirement}_t = (\text{Rev Requirement}_{t-1} \times (1 + I_t - X - CD)) + Z_t + K_t + \text{ESM}_t \quad (1)$$

Where:

Rev Requirement_t = the revenue requirement in the current (forecast) period

Rev Requirement_{t-1} = the approved revenue requirement in the prior period

I = GDP-PI and must be non-negative

X = Zero

CD = 0.15 when I exceeds 2 percent

Z = an exogenous cost adjustment

K_t = a capital revenue adjustment

ESM = earnings sharing adjustment

1 **Q. Please explain how PSNH has proposed to adjust rates under its “revenue cap”**

2 **framework.**

3 A. Setting aside the K-bar mechanism for the sake of simplicity, PSNH has proposed to set its
4 rates according to a revenue requirement that adjusts each year according to the rate of
5 inflation, as measured by the gross domestic product price index (GDP-PI). The billing
6 determinants used to set rates, however, will remain static—equal to the test year billing
7 determinants—over the PBR term. In other words, the revenue requirement will be adjusted
8 by an inflation rate each year, but the test year billing determinants will not be updated for
9 the most recent year. This approach differentiates the proposed plan for New Hampshire
10 from Eversource’s plan in place in Massachusetts, where Eversource operates under revenue
11 decoupling. In Massachusetts, the Company’s revenue decoupling mechanism effectively
12 imposes a cap on revenue by adjusting customer volumetric charges each year such that
13 revenue is set equal to the allowed revenue established by I-X.

1 **Q. Given the rate-setting structure of the proposed framework, has Eversource filed a**
2 **true revenue cap plan?**

3 A. No. If PSNH sets its rates based on static historical test year billing determinants and updates
4 the revenue requirement each year, the Company's prices, but not revenue, will be capped
5 under its proposed plan. This is because, if billing determinants grow, realized revenues will
6 also grow to be larger than the revenue requirement set by the I-X formula. Consider Table 2,
7 which provides an illustrative demonstration of how a formula that caps a revenue
8 requirement, but does not adjust for billing determinants, caps prices rather than revenues.
9 The example uses simplified numbers and only one billing determinant (kWh). Column A
10 depicts a prototypical company's revenue requirement under the framework proposed by
11 PSNH: in Year 1 (for purposes of this example), the prototypical company's revenue
12 requirement is equal to 1,000 and is adjusted each year only by a two percent rate of
13 inflation. Column B depicts the company's test year billing determinants of 10,000 kWh.
14 Importantly, this number is set equal to the test year value in all years—not just the first
15 year—as defined by PSNH's proposed plan. Column C depicts the prototypical company's
16 realized sales volumes in terms of kWh. This value varies year to year. Column D calculates
17 the average rate faced by customers in each year of the PBR plan, equal to the company's
18 revenue requirement—which is adjusted each year by inflation—divided by the test year
19 billing determinant of 10,000 kWh, which is unchanging over the PBR term. Finally, column
20 E calculates the company's actual revenues, equal to customer rates in column D multiplied
21 by actual kWh in column C. Although customer *prices* in this revenue requirement are
22 implicitly capped by the cap on the company's revenue requirement, realized *revenues* are
23 not capped. As the table demonstrates, the company's actual revenues can exceed the so-

1 called “cap” on revenue requirements in each year of the plan. PSNH has filed a kind of price
2 cap, not a revenue cap.

3 **Table 2:**

4 **Demonstration that Proposed PBR Mechanism Does Not Cap Actual Revenue**

	A	B	C	D=(A/B)	E=(C*D)
Term Year	Revenue Requirement	Test Year kWh	Actual kWh	Rate (\$/kWh)	Actual Revenue
Year 1	1,000	10,000	10,000	0.100	1,000
Year 2	1,020	10,000	10,300	0.102	1,051
Year 3	1,041	10,000	10,609	0.104	1,105
Year 4	1,062	10,000	10,927	0.106	1,161
Year 5	1,089	10,000	11,255	0.109	1,225

5
6 **Q. In general, does the specification of the PBR formula differ between a price cap and a**
7 **revenue cap?**

8 A. Yes. Both price and revenue caps rely on a formula that has the general form of “ $I - X$,”
9 where I is a measure of input inflation and X is a measure of productivity growth. However,
10 the X factor, which is determined through a calculation of total factor productivity (TFP)
11 growth, generally differs between price and revenue caps. This is because the output measure
12 used to calculate the X factor for a revenue cap is generally “annual growth in the number of
13 customers served,” while the output measure for a price cap should reflect the elements of
14 output associated with customer prices—i.e., billed output—because those are the elements
15 of output whose prices are being constrained by the cap.¹⁰ If the growth rate in number of
16 customers served differs from the growth rate of a weighted average index of billed output,

¹⁰ For example, see Laurits R. Christensen, Philip E. Schoech, and Mark E. Meitzen, “Total Factor Productivity in the Telecommunications Industry,” in *International Handbook on Telecommunications Economics*, G. Madden and S. Savage, eds., 2003.

1 which would include energy (kWh), demand (kW), and customers served, then the TFP
2 growth measure will differ, and, consequently, the X factor will differ. Furthermore, as
3 recognized by PSNH,¹¹ a principled revenue cap formula contains an additional factor to
4 account for the growth rate in customers served, while a price cap formula contains no such
5 explicit growth factor since under a price cap growth is accounted for in revenues through an
6 increase in billing determinants. These differences in the specification of the PBR formula
7 make sense: since prices and revenues are separate components of a utility's remuneration
8 framework, the constraint on the growth of revenues should not be expected to be identical to
9 the percentage change in prices.

10 **Q. Should PSNH include a “customer growth” factor in its PBR formula if it operates**
11 **without revenue decoupling?**

12 A. No. Witness Augustin Ros is correct that a principled revenue cap formula includes a factor
13 for the growth rate in number of customers served.¹² Witness Ros states that, “Without a
14 customer growth factor in the PBR plan, the Company may be unfairly penalized (rewarded)
15 for customer growth (declines).”¹³ While this is true, it is not germane to Eversource's
16 proposed PBR framework, which is a price cap. The PBR formula for a price cap does not
17 include such a factor.

18 The Company has proposed not to include a “customer growth” factor in its plan, as filed.
19 Therefore, the specification of the PBR formula is correct, as filed. However, it is important
20 to understand the issue. The Company is not taking a voluntary reduction in revenue growth
21 because of its proposal to exclude a factor for growth in the number of customers served. In

¹¹ Testimony of Douglas W. Foley, Robert S. Coates, and Douglas P. Horton. P. 87, Bates 01431.

¹² Attachment ES-AR-1, p. 21, Bates 01826.

¹³ Attachment ES-AR-1, p. 41, Bates 01826.

1 other words, the absence of a growth factor should not be considered an implicit stretch
2 factor in this case.

3 **Q. Should PSNH include a “customer growth” factor in its PBR formula if revenue**
4 **decoupling is imposed on the company?**

5 A. Yes. If the Company operates under revenue decoupling, rates will be adjusted each year
6 such that the Company earns the revenue requirement determined by the I-X formula. The
7 PBR formula under this approach would be appropriately calibrated as a revenue cap. For the
8 reasons provided in the testimony of Witness Augustin Ros, a customer growth factor is a
9 component of a revenue cap plan.¹⁴ Therefore, the Company’s proposal to include a factor
10 for the growth rate of customers served, if revenue decoupling is imposed, is correct.

11 **Q. What tariff changes related to remuneration does PSNH propose in conjunction with its**
12 **proposed PBR plan?**

13 A. PSNH has operated with several cost trackers and reconciling mechanisms that it proposes to
14 eliminate in its transition to PBR. The Company’s Regulatory Reconciliation Adjustment
15 (RRA) tracks the costs of six categories: (1) Regulatory Assessments and Consultant Costs;
16 (2) Property Taxes; (3) Vegetation Management; (4) Storm Cost LTD True-Up; (5) Lost
17 Base Revenues related to Net Metering; and (6) Rate Case Expenses. The Company is
18 allowed to collect revenue through individual reconciliation mechanisms for each of these
19 categories. Likewise, the Company’s Pole Purchase Adjustment Mechanism (PPAM)
20 annually reconciles costs resulting from the CCI pole purchase and specifically associated
21 with pole replacement, inspections, pole attachment, and vegetation management. Finally,
22 PSNH collects Lost Base Revenues associated with energy efficiency under a System

¹⁴ Attachment ES-AR-1, p. 21, Bates 01826.

1 Benefits Charge. Under its proposed framework, the costs associated with most (but not all)
2 of these categories would instead be included in base revenues and adjusted each year by the
3 PBR formula.¹⁵ For three cost categories—lost revenues associated with net metering and
4 energy efficiency, as well as the PPAM—PSNH has proposed that these costs would not be
5 included in base rates, nor would the corresponding reconciliation mechanisms continue.

6 **Q. What are the expected consequences of eliminating these reconciling mechanisms?**

7 A. The purpose of reconciling mechanisms is to provide a utility with the opportunity to track
8 and eventually recover costs associated with specific spending categories. The removal of
9 such mechanisms does two things. First, it increases the Company's base revenue
10 requirement, as these costs are incorporated in the Company's revenue requirement rather
11 than tracked outside of the revenue requirement. Witness Kolesar refers to this expanded
12 revenue requirement as the "spending envelope" under PBR. Second, it introduces risk that
13 the Company may incur higher than expected costs that can no longer be recovered through
14 reconciling mechanisms. Thus, the increase in the Company's base revenue requirement is
15 balanced by the removal of these tracking mechanisms. Under the proposed approach, such
16 costs must instead be managed within the limits of the allotted spending envelope.

17 **Q. Please summarize your findings regarding PSNH's proposed PBR formula.**

18 A. Some of the supporting evidence behind PSNH's proposed PBR formula is not correct. As
19 explained above, PSNH's plan is in fact a form of price cap, because prices are capped but
20 revenues are not capped. However, the formula, as filed, is reasonable because the
21 Company's prices are capped over the PBR term, and price caps are a reasonable form of
22 PBR.

¹⁵ Attachment NAC-DPM-4 (Data Request Response Attachment OCA 2-017).

1 **Q. Why is the Company's proposed PBR formula reasonable, and why is it necessary to**
2 **understand the underlying issues if it is reasonable?**

3 A. A price cap is a widely accepted PBR mechanism, and it is an equally valid form of PBR
4 relative to a revenue cap. It is important to recognize the differences between these PBR
5 approaches, but one is not inherently superior to the other. We provide more detail on the
6 difference between price caps and revenue caps later in this testimony.

7 The Company's PBR formula contains many common elements of price and revenue cap
8 plans. As explained in Section 4, the proposed X factor of 0.00% is acceptable, because the
9 empirical X factor is negative. The plan's additional elements are also discussed in
10 subsequent sections of this testimony. It is important to understand the details because
11 context is important and because setting a PBR plan according to economic principles is key
12 to establishing just and reasonable rates under a construct that provides enhanced incentives.
13 The proposed PBR formula is acceptable, but for the sake of precedent, technical issues with
14 the methodology raised in later sections should not be implicitly accepted in the
15 Commission's decision.

16 **4. Assessment of the Total Factor Productivity and Benchmarking Studies**

17 **Q. What is the purpose of including a Total Factor Productivity (TFP) growth study as**
18 **part of a PBR filing?**

19 A. A TFP growth study measures the industry's annual average output quantity growth minus
20 input quantity growth. This measurement of productivity provides the empirical basis for
21 setting the X factor in a company's revenue or price cap formula (see Equation 1). Along
22 with inflation, the X factor adjusts an indexed cap on an annual basis so that the utility is
23 allowed to set prices in a way that mimics a competitive market. If the indexed cap was set

1 equal to the rate of inflation with no X factor, the utility would be adjusting prices according
2 to the change in input prices, with no consideration for industry-wide changes in productivity
3 (i.e., changes in output quantities relative to changes in input quantities). For example, if
4 input quantities across the industry increase, perhaps because of major, necessary capital
5 projects, while the input *prices* associated with installing that capital remain flat, the indexed
6 cap plan would not allow for rate adjustments needed to cover the increased inputs put in
7 place by the firm. This is particularly applicable to the electric distribution industry, which
8 has faced growing input quantity needs in recent years. Therefore, TFP growth studies are
9 necessary for the calibration of price and revenue cap formulas that reflect industry
10 conditions.

11 **Q. Does PSNH set its proposed X factor using a TFP growth study?**

12 A. No. Witness Ros has filed a TFP growth study, but PSNH does not rely on this study to set
13 the X factor. Instead, the Company has proposed an X factor of 0.00%, citing the TFP growth
14 study by Witness Ros as evidence that the empirical X factor is negative.¹⁶

15 **Q. Given that TFP growth studies are necessary for calibrating price cap formulas that**
16 **reflect industry conditions, is it problematic that PSNH does not rely on a TFP study to**
17 **set its X factor?**

18 A. PBR frameworks across North America regularly deviate from the empirical X factor. This is
19 because PBR frameworks generally include additional factors beyond I and X, like capital
20 supplements, that affect rates each year in a way that does not precisely align with the
21 underlying economic theory of price caps.¹⁷ In setting the X factor equal to a value other than

¹⁶ Testimony of Douglas W. Foley, Robert S. Coates, and Douglas P. Horton. P. 47, Bates 01391.

¹⁷ See Mark E. Meitzen, Philip E. Schoech, and Dennis L. Weisman, “The Alphabet of PBR in Electric Power: Why X Does Not Tell the Whole Story,” *The Electricity Journal*, 30 (2017) 30-37.

1 industry TFP growth (i.e., zero), PSNH has calibrated its PBR formula such that annual rate
2 adjustments do not reflect industry productivity conditions, and instead would result in rates
3 that increase more slowly than the broader distribution sector. However, PSNH has also
4 included a capital supplement (K-bar) that is designed to provide additional revenue beyond
5 the I-X adjustment. In taking this approach, PSNH has proposed that rate adjustments do not
6 equal the rate growth that would be exhibited in a competitive market. Instead, the proposed
7 formula used to adjust rates has been calibrated in the context of the Company's own cost
8 experience.

9 As in other jurisdictions where PBR exists with capital supplements, the proposed PBR
10 formula may still result in rates that are just and reasonable over the four-year term if each
11 additional component of the PBR framework proves to be reasonable in the context of the
12 whole plan. While a pure indexed cap approach would rely only on exogenous industry-wide
13 information to adjust rates, a utility may have a cost experience that differs from that of the
14 distribution sector, thereby warranting rate adjustments that deviate from the industry
15 average in the short run. It is therefore acceptable that PSNH does not rely on a TFP study to
16 set its X factor. However, this approach makes the evaluation of the Company's PBR
17 framework less straightforward and shifts the focus of the analysis onto other elements of the
18 proposed plan.

19 **Q. Will PSNH customers experience slower rate growth than the industry average under**
20 **the proposed PBR framework?**

21 A. Not necessarily. Recent productivity studies indicate negative TFP growth in the electric
22 distribution sector. As explained in Section 3, negative TFP growth generally corresponds to
23 a negative X factor in a price cap formula, which means customer prices are permitted to

1 increase each year at a rate above the rate of inflation. Customer rates will increase more
2 slowly than the industry average when the industry is experiencing negative TFP growth and
3 the price cap X factor is set equal to 0.00%, all else equal.

4 However, PSNH has filed a capital supplement known as K-bar, which provides revenue
5 support beyond the annual I-X adjustment. This capital supplement allows the Company to
6 collect revenue such that rate growth may exceed the industry's average rate growth. This is
7 explained in more detail in Section 5.

8 **Q. Given that the X factor is not set using an empirical TFP growth study, does the**
9 **proposed PBR formula generate the cost efficiency incentives that PBR is supposed to**
10 **provide?**

11 A. Yes. According to the principles of incentive regulation, a price cap will provide cost
12 efficiency incentives to a regulated utility regardless of the value chosen to set the X factor.
13 The purpose of calibrating the X factor with industry TFP growth data is to set price (or
14 revenue) growth such that the utility is able to operate over an extended period of time
15 without filing a rate application while maintaining just and reasonable rates. An X factor that
16 is not calibrated correctly will not affect cost efficiency incentives, but it could result in rates
17 that either do not grow quickly enough to support prudent spending or grow too quickly,
18 resulting in unjust or unreasonable rates.

19 **Q. Do you recommend changes to the TFP growth study or the proposed X factor?**

20 A. As discussed in Section 3, if the Company were setting the X factor based on industry data
21 rather than electing to set the X factor at 0.00%, the TFP growth study may need to be
22 updated so that the output index reflects PSNH's billable outputs. In particular, the output
23 index should be a weighted average of the growth in number of customers, sales volumes

1 (kWh), and peak demand (kW). However, since PSNH has proposed to set the X factor equal
2 to 0.00%, such an adjustment to the TFP growth study is not necessary.

3 **Q. What is the purpose of including a cost benchmarking study as part of a PBR filing?**

4 A. Cost benchmarking studies are generally applied in PBR filings as a tool to establish a stretch
5 factor (also known as a consumer dividend). A cost benchmarking study provides a means of
6 understanding a particular company's level of efficiency by comparing the costs of its
7 operations to the costs experienced by other utilities in the same industry, controlling for
8 exogenous factors that influence cost. This information is useful in the context of calibrating
9 a PBR formula because it can inform assumptions about what efficiency improvements might
10 be expected under a more high-powered regulatory construct. If a utility under cost-of-
11 service exhibits less efficient cost control relative to its peers, the regulator may assume that
12 the company has the ability to find efficiency gains upon switching to PBR. If a utility
13 appears to be more cost-efficient relative to its peers prior to beginning the PBR term, its
14 ability to find efficiency gains may be more limited. This information translates into the
15 magnitude of the utility's stretch factor.

16 **Q. What is the purpose of including a stretch factor in a PBR framework?**

17 A. As shown in Equation (1), a consumer dividend is an additional element of the PBR formula
18 that adjusts the utility's allowed revenue on an annual basis. Specifically, a consumer
19 dividend is a percentage value that, like the X factor, offsets inflation, slowing allowed
20 revenue growth each year, thereby providing customers with immediate benefits over the
21 PBR term. One rationale behind the consumer dividend is that it reflects the regulated
22 utility's expected future gains in productivity resulting from the move from cost-of-service to
23 incentive regulation.

1 **Q. What are the results of PSNH's unit cost benchmarking analysis?**

2 A. Witness Ros conducted two cost benchmarking analyses: a unit cost analysis and an
3 econometric analysis. The unit cost approach simply calculates each company's total cost per
4 customer and compares it to the industry average. According to the unit cost analysis,
5 PSNH's unit cost between 2000 and 2022 averaged \$332.62 per customer, while the electric
6 industry average unit cost during the same period was \$323.26 per customer. The analysis
7 demonstrates PSNH's average unit cost was \$9.35 per customer, or 2.89 percent higher, than
8 the industry average. The workpapers underlying this analysis show that PSNH ranks 52 out
9 of the 87 utilities in the sample, implying that approximately 60% of companies have lower
10 unit costs than PSNH.

11 **Q. What are the results of PSNH's econometric cost benchmarking analysis?**

12 A. A correct econometric analysis isolates each company's level of efficiency relative to the
13 industry average. In practice, it involves comparing PSNH's actual costs to the costs
14 predicted by a model that accounts for cost-driving factors that PSNH cannot control. Dr.
15 Ros estimates his econometric model using two different approaches. The result of this
16 analysis, as reported by Witness Ros, is that the Company's performance is near the industry
17 average. However, as discussed below, this analysis is flawed.

18 **Q. What is your understanding of why Witness Ros conducted an econometric cost
19 benchmarking analysis, rather than relying solely on a unit cost approach?**

20 A. The goal of a cost benchmarking study for the purpose of setting a stretch factor is to
21 estimate a company's level of efficiency relative to its peers. Witness Ros's unit cost analysis
22 quantifies the cost burden borne by customers but does not measure efficiency as it does not
23 account for factors outside of the utility's control that might explain the difference in costs

1 across companies. For instance, a utility might have a high cost per customer because it
2 operates in a larger service territory area that requires more capital investment per customer.
3 Dr. Ros's econometric analysis includes controls for utilities' total customers and MWh as
4 well as the share of plant allocated to distribution. When all relevant controls are included,
5 the implication is that the portion of cost that cannot be explained by these exogenous
6 factors, known as the "residual," is due to differences in efficiency.

7 **Q. How does Witness Ros estimate his econometric model?**

8 A. Witness Ros estimates his model using an ordinary least squares (OLS) estimator as well as a
9 fixed effects (FE) estimator. The FE estimator is Witness Ros's preferred approach.

10 **Q. What is your understanding of why Witness Ros estimated his econometric model using**
11 **two approaches?**

12 A. OLS is a commonly used estimator in econometrics and has been used by experts in other
13 proceedings to estimate cost benchmarking models for the purpose of setting stretch factors.
14 However, Witness Ros claims that this approach may not control for many other factors that
15 are outside of the utility's control and affect costs. He suggests that omitting these factors
16 will lead to an "omitted variable bias" problem, which will lead to misleading benchmarking
17 results that can be explained by these omitted factors. For instance, as mentioned above, a
18 utility may operate in a larger service territory area, or an area with highly forested terrain
19 that is costlier to maintain. If the model does not include these factors as controls, a utility
20 will be assumed to be inefficient when its costs can be explained by factors outside of its
21 control that are unrelated to its performance. Dr. Ros attempts to solve this omitted variable
22 problem with a FE estimator, which controls for any omitted variable that is fixed over time.

1 **Q. Is the fixed effects model employed by Witness Ros estimating PSNH's cost**
2 **performance relative to the electricity distribution industry?**

3 A. No. Instead of estimating the Company's unexplained cost relative to the industry average,
4 the FE estimator employed by Witness Ros estimates the Company's unexplained cost
5 relative to *its own* average. This is not useful from a cost benchmarking perspective.

6 **Q. Please explain further how Witness Ros's fixed effects approach does not compare**
7 **PSNH's cost performance to the industry, but instead compares its cost performance to**
8 **its own average.**

9 A. A FE estimator is used to obtain more accurate estimates of model coefficients. It is identical
10 to OLS, with the exception that it analyzes the relationship between variables that have been
11 demeaned; and, importantly, the mean that is subtracted from each variable is specific to the
12 company. For instance, total costs for PSNH in 2023 are replaced by PSNH's total costs in
13 2023 minus the average of PSNH's total costs over the 2000-2023 sample period. One effect
14 that results from demeaning the data in this way is that confounding factors that are fixed
15 over time do not influence the coefficient estimates, as they do not vary within companies
16 over time. However, Witness Ros is not using the FE estimator solely to obtain better
17 estimates of model coefficients. For instance, he is not interested in simply obtaining a more
18 accurate estimate of how changes in total customers influence total costs. The object of
19 interest in a cost benchmarking model is the residual, as this represents the level of costs that
20 are unexplained by the model's variables, yielding an estimate of the company's relative
21 efficiency level. But because a company's data are adjusted so that they are defined relative
22 to the company's own average, the interpretation of the residual in a FE regression changes:
23 it is no longer the company's efficiency relative to the average efficiency in the industry, but

1 is instead the company's efficiency relative to *its own average efficiency*. Thus, in effect, it is
2 not benchmarking PSNH's costs against the industry but rather, against itself. The numbers
3 presented in the second column of Table 6 of Witness Ros's testimony are, with the
4 exception of two erroneous modifications explained below, simply the difference between
5 the Company's own cost performance in a given year and the Company's average cost
6 performance in the sample. The bottom line of the table takes the average of this difference.

7 **Q. If Witness Ros's preferred econometric approach simply compares PSNH's cost**
8 **performance each year to PSNH's average cost performance over all years, why does**
9 **Witness Ros's Table 6 report an average cost difference of +0.18%, rather than 0.00%?**

10 A. By definition, the average difference between a variable and its average over a sample is
11 zero, so the number on the bottom line of Witness Ros's Table 6, column 2, should equal
12 zero. However, the presentation of results in Table 6 does not reveal the benchmarking
13 study's obvious problem because the presentation is obscured by two inappropriate
14 modifications. First, Witness Ros estimated his econometric model using years 2000 through
15 2022, but then omitted the year 2000 from the average of the differences presented on the
16 bottom line of his Table 6. Omitting this year, or any year from the average, will result in an
17 average difference other than 0.00%.¹⁸ Witness Ros acknowledges there is no justification for
18 excluding the year 2000, as shown in his response to Data Request No. DOE 8-183.¹⁹ When
19 the year 2000 is included, PSNH's average performance implied by the FE estimator changes
20 from 0.18% to -0.51%. As shown in Table 3b (in Attachment NAC-DPM-18) this -0.51%

¹⁸ This can be demonstrated with a simple example. Consider the average of three numbers: 1, 2, and 6. The average of these numbers is 3. The difference of each number from the average is -2, -1, and +3, respectively. The average of these differences is $(-2-1+3)/3 = 0$. If we remove one of these numbers and take the average, we obtain an average difference of something other than zero: $(-1+3)/2 = 1$.

¹⁹ Attachment NAC-DPM-5.

1 score is identical for all companies. That the average performance implied by the model is -
2 0.51% for all companies demonstrates an error, since, using Witness Ros's interpretation of
3 the results, this would imply that each and every company performs better than the industry
4 average.

5 In fact, were it not for an adjustment by Witness Ros that obfuscates this error, the
6 calculation would result in an average of 0.00% for all companies—which is expected given
7 that the model compares each company's cost experience with its own average. The reason
8 that the average residual for each company is -0.51% and not 0% is because Witness Ros
9 makes an adjustment to the fitted values of his regression model that is not reasonable.

10 Witness Ros adds the mean squared error of the residuals divided by 2 to each fitted value of
11 his model. Witness Ros estimates his model in logs, meaning each variable in the model is
12 replaced with its natural logarithm before estimation. In response to Data Request No. DOE
13 8-182,²⁰ Witness Ros cited work that notes such an adjustment is necessary when the
14 researcher desires a particular interpretation of the residuals when a log model is converted
15 into a level model. However, the Company's performance is quantified in log terms, as
16 shown in the last line of Dr. Ros's code in Data Request No. DOE 8-182, and so such an
17 adjustment is not necessary or appropriate. Even if Witness Ros were correct that this
18 adjustment is necessary, however, his analysis is still clearly incorrect, given that it generates
19 identical cost benchmarking results for every utility in his sample (see Attachment NAC-
20 DPM-18), which is a mathematical impossibility if each company were being compared with
21 the average in the sample.

²⁰ Attachment NAC-DPM-6

1 **Q. If the two modifications described above are reversed, what are the benchmarking**
2 **results of the econometric model?**

3 A. To demonstrate the error in Witness Ros's testimony, we have recreated his analysis showing
4 the impacts of correcting these two modifications. The impacts to the FE and OLS results are
5 shown in Tables 3 and 4, respectively. The first column of Table 3 reproduces the "%
6 Difference (Fixed Effects)" column of Dr. Ros's Table 6. The second column removes Dr.
7 Ros's adjustment to the fitted values. At the bottom of the table, the average is calculated
8 over 2001-2022, as well as over all years (2000-2022). When the fitted value adjustment is
9 omitted and the average is taken across all years, the average percentage difference between
10 PSNH's cost and the model's prediction falls from 0.18% to 0.00%. Table 3a (found in
11 Attachment NAC-DPM-18) shows that Dr. Ros's model predicts benchmarking results of
12 0.00% for all companies in the sample when these corrections are made. This shows that a
13 fixed effects model used in this way will always erroneously show a company to be an
14 average performer, because the company's performance in a given year is being compared to
15 its own average performance. Furthermore, as noted above, if Witness Ros's adjustment to
16 the fitted values of the regression is made, the results show that every company's average
17 percent difference between its cost and the model's prediction is 0.51% instead of 0%, as
18 shown in Table 3b (in Attachment NAC-DPM-18). This would imply that each and every
19 one of the 87 companies in the sample is 0.51% less efficient than the average, which cannot
20 be true. This clearly demonstrates that the fixed effects approach is fundamentally flawed as
21 implemented.

22 We repeat this exercise for the OLS approach in Table 4, showing that the Company's level
23 of inefficiency rises from 5.49% above the average to 8.16% above the average.

1

Table 3: Corrected Benchmarking Results for the FE Model

Year	% Difference (Fixed Effects) - Original	% Difference (Fixed Effects) – No Adjustment
2000	-15.56%	-15.06%
2001	-12.07%	-11.57%
2002	-10.24%	-9.73%
2003	-9.11%	-8.60%
2004	-7.47%	-6.96%
2005	-8.66%	-8.16%
2006	-8.93%	-8.43%
2007	-8.29%	-7.78%
2008	-2.85%	-2.34%
2009	-1.42%	-0.92%
2010	0.59%	1.10%
2011	2.37%	2.88%
2012	2.29%	2.80%
2013	5.28%	5.79%
2014	2.26%	2.76%
2015	5.34%	5.84%
2016	6.53%	7.03%
2017	7.53%	8.04%
2018	3.29%	3.80%
2019	7.19%	7.70%
2020	11.43%	11.94%
2021	12.37%	12.88%
2022	6.47%	6.98%
<i>2000 - 2022 Avg.</i>	-0.51%	0.00%
<i>2001 - 2022 Avg.</i>	0.18%	0.68%

2

1

Table 4: Corrected Benchmarking Results for the OLS Model

Year	% Difference (OLS) - Original	% Difference (OLS) – No Adjustment
2000	-6.09%	-2.91%
2001	-4.23%	-1.05%
2002	-2.55%	0.62%
2003	-2.51%	0.66%
2004	-5.00%	-1.82%
2005	-6.81%	-3.63%
2006	-6.66%	-3.48%
2007	-6.00%	-2.83%
2008	0.63%	3.81%
2009	4.37%	7.54%
2010	4.96%	8.14%
2011	9.20%	12.38%
2012	9.36%	12.53%
2013	12.38%	15.56%
2014	9.43%	12.60%
2015	12.92%	16.10%
2016	14.22%	17.40%
2017	15.11%	18.29%
2018	5.97%	9.15%
2019	10.87%	14.04%
2020	15.88%	19.06%
2021	17.12%	20.29%
2022	12.07%	15.25%
<i>2000 - 2022 Avg.</i>	4.98%	8.16%
<i>2001 - 2022 Avg.</i>	5.49%	8.66%

2

3 **Q. Is there an alternative to the FE approach that produces valid results?**

4 A. While a fixed effects approach used to compare performance in levels as Dr. Ros does is
 5 incorrect, a similar method can be used to benchmark a company’s performance *growth*
 6 relative to the industry. This achieves the intended goal of controlling for unobservable time-
 7 invariant factors like terrain, since any variable that is fixed for a company over time will not
 8 affect cost growth and so is implicitly controlled for, but shifts the analysis to a performance

1 metric that is estimable when unobservable time-invariant factors are controlled for:
2 efficiency growth. In other words, in order to control for more omitted variables without
3 additional data as Dr. Ros attempts to do, the dimension of the benchmarking study must
4 change from a levels comparison to a growth comparison for the results to meaningfully
5 summarize productivity differences across companies.

6 **Q. What are the results of this alternative econometric approach?**

7 A. The cost growth benchmarking results are shown in Table 3c (in Attachment NAC-DPM-18).
8 PSNH's inefficiency growth is higher than average at 1.2%, corresponding to a ranking of 78
9 out of 87. This implies that roughly 88% of companies in the sample had superior
10 performance growth over the sample period of 2000-2022.

11 **Q. What are the implications of the corrected benchmarking results, with respect to**
12 **PSNH's stretch factor?**

13 A. Because the Company is proposing an X factor of zero despite Dr. Ros's estimated X factor
14 of -1.42%, we do not recommend a higher stretch factor be imposed, given the significant
15 implicit stretch factor already present. However, the company's standing relative to the
16 industry should be clarified. Our corrections to Dr. Ros's analysis suggest that PSNH is about
17 8.2% less efficient in level terms than the industry controlling for the observable exogenous
18 factors included in Witness Ros's study, rather than Dr. Ros's estimate of 5.5%, implying
19 that roughly 62% of companies are more efficient than PSNH. This result may be influenced
20 by exogenous cost drivers that are fixed over time, such as terrain, weather, the regulatory
21 environment, or the size of the service territory area, as Dr. Ros suggests. In order to control
22 for these variables without additional data, growth rates must be studied rather than levels.
23 Our results suggest that PSNH's cost growth has been higher than average and ranks near the

1 bottom of the sample of companies included in Dr. Ros's analysis: roughly 88% of
2 companies had lower cost growth over the sample.

3 While the calibration of a company's stretch factor is often cited as the purpose of a cost
4 benchmarking study, other reasons for benchmarking costs also exist. Cost comparison
5 information can be used to assess progress on affordability and cost control. Therefore, it is
6 important to get the methodology right.

7 **Q. How does PSNH's proposed stretch factor compare to other stretch factors in the**
8 **Northeast?**

9 A. Table 4 shows a summary of stretch factors from recent PBR frameworks accepted in
10 Massachusetts. PSNH has proposed a lower stretch factor than most that exist in
11 Massachusetts. However, it is important to consider the context of these stretch factors. In the
12 first four PBR frameworks listed in this table, the accepted X factor was based on empirical
13 computations of total factor productivity, which were negative. In this case, PSNH has
14 requested an X factor of 0.00%, which would result in a revenue adjustment each year that is
15 slower than these plans, all else equal. On the other hand, the first four plans depicted in the
16 table did not include a K-bar capital supplement. In addition, PSNH's proposed plan caps
17 prices, rather than revenue. For these reasons, PSNH's proposed stretch factor is not directly
18 comparable to those in Table 4. However, the table provides some context for a reasonable
19 range.

1

Table 5: Summary of Recent Massachusetts PBR Frameworks

Decision	Distribution Service	Term (Years)	Exogenous Factors	Consumer Dividend (bps)	ESM (Cust/Firm/Dead)*
D.P.U. 17-05	Electricity	5	Yes	25	75/25/200
D.P.U. 18-150	Electricity	5	Yes	40	75/25/200
D.P.U. 19-120	Natural Gas	10	Yes	15	75/25/100
D.P.U. 20-120	Natural Gas	5	Yes	30	75/25/200
D.P.U. 22-22	Electricity	5	Yes	25	75/25/100
D.P.U. 23-80	Electricity	5	Yes	25	75/25/100

*The first two numbers presented in this column represent the profit split between customers and the firm, while the third number represents the deadband, or ROE threshold, over which the company must share. Note that NSTAR Gas (D.P.U. 19-120) has a tiered ESM for its 10-year plan, in which profits 150 basis points (bps) above the allowed ROE are shared 50/50, and profits 200 bps above the allowed ROE are shared 75/25.

2 **Q. What is your recommendation for a stretch factor for PSNH if the proposed framework**
 3 **is accepted?**

4 A. Judgement is often the primary basis for setting a utility’s stretch factor under PBR, and
 5 given the nature of PSNH’s proposed filing, which deviates from a pure price cap formula by
 6 including additional plan elements such as K-bar and an ESM, establishing a stretch factor
 7 directly from empirical analysis may not be possible. Based on our judgement, informed by
 8 the corrected benchmarking study and on precedent in other jurisdictions, we recommend a
 9 stretch factor range between 15 and 35 basis points, with a midpoint of 25 basis points,
 10 compared to PSNH’s proposed stretch factor of 15 basis points only when inflation exceeds 2
 11 percent.

12 **5. Evaluation of the Proposed K-Bar Mechanism**

13 **Q. What is your understanding of why PSNH filed a capital supplement as part of its PBR**
 14 **framework?**

15 A. Capital supplements are common in PBR plans across jurisdictions in North America. As
 16 discussed above, under cost-of-service regulation, utilities may file applications before their

1 regulatory authority to recover prudently incurred costs on an as-needed basis. Under PBR,
2 on the other hand, the utility is not permitted to file a rate applications during an extended
3 “rate stay-out period”—in this case, four years. The longer a utility refrains from filing a rate
4 application, the more likely that costs and revenues differ. The I-X formula exists to provide
5 attrition relief to utilities over the rate stay-out period, but in recent years, as utility capital
6 inputs have grown faster than the historical average, capital-related revenue needs have
7 exceeded what can be recovered under the I-X cap over a long period of time. As a result,
8 regulators have accepted mechanisms that provide supplemental revenue to utilities operating
9 under PBR. These mechanisms differ by jurisdiction, and include K-bar (in Massachusetts
10 and Alberta), capital trackers (in Ontario and Hawaii), and capital forecasts (British
11 Columbia). Each such approach to providing supplemental capital has potential benefits and
12 potential drawbacks. These mechanisms are discussed in greater detail in Attachment NAC-
13 DPM-17.

14 **Q. What is the history of the K-bar mechanism?**

15 A. K-bar originated in Alberta, where distribution utilities operate under a price cap. The initial
16 idea behind K-bar came from a paper that proposed a forecasted capital approach, under
17 which utilities would forecast their capital spending over the five-year PBR term, and then
18 recover the difference between the forecast and actual revenue obtained under the I-X
19 formula.²¹ The Alberta Utilities Commission (AUC) adjusted this proposed approach by
20 setting revenue recovery with the historically driven formula now known as K-bar, rather
21 than relying on a forecast from each utility. The Alberta distributors began using this

²¹ “Sappington, David and Weisman, Dennis, Assessing the Treatment of Capital Expenditures in Performance-Based Regulation Plans,” September 1, 2015.

1 revenue adjustment mechanism in the second generation PBR framework, after a capital
2 tracker approach in the first generation generated an excessive regulatory burden for both the
3 companies and the AUC.²² The goal of K-bar was to apply a formulaic approach to
4 supplemental capital in order to simplify the capital recovery process relative to capital
5 trackers.²³ In 2022, the Massachusetts Department of Public Utilities approved Eversource’s
6 proposed K-bar mechanism.²⁴ The mechanism was also approved for Unitil in Massachusetts
7 in 2024.²⁵

8 **Q. How does K-bar differ from other forms of capital supplements?**

9 A. In contrast to most mechanisms that provide supplemental revenue for capital spending under
10 PBR, K-bar does not rely on actual spending in the current year to determine the utility’s
11 revenue requirement. Capital trackers, which are a common tool to provide utilities with
12 additional revenue, set supplemental revenue equal to the utility’s current year spending. A
13 capital tracker reduces the cost efficiency incentives of PBR by nudging the utility back in
14 the direction of cost-of-service regulation (i.e., if the utility spends on capital, it can recover
15 the cost and place the associated plant into rate base; if it does not spend money, it does not
16 collect revenue and does not place the plant into rate base). K-bar sets revenue according to
17 historical spending, rather than current year spending. The assumption is that spending in
18 recent history is representative of spending needs in the near future. By setting revenue
19 according to a historical spending trajectory, the utility has a profit incentive to reduce capital
20 spending over the PBR term. This is a cost efficiency incentive that capital trackers do not
21 provide. In addition, K-bar has a relatively low administrative burden during the PBR term,

²² AUC 20414-D01-2016, December 16, 2016, p. 7.

²³ Capital tracking mechanisms require a “mini rate case” each year in order to justify costs.

²⁴ Massachusetts D.P.U. 22-22, at 66.

²⁵ Massachusetts D.P.U. 23-80/81, at 44.

1 as annual capital tracker filings are not necessary. For these reasons, K-bar is seen as aligning
2 with the principles of PBR.

3 **Q. What are the risks associated with K-bar?**

4 A. We note two risks associated with K-bar. First, because K-bar is based on historical
5 spending, rather than current spending, the utility operating under K-bar may end up with
6 costs that differ from allowed revenue. Much like PBR more broadly, K-bar reflects a
7 tradeoff between providing cost efficiency incentives and separating the utility's spending
8 from its allowed revenue for a period of time. From the customer perspective, this means that
9 rates may be temporarily set at a level that is higher than necessary for the provision of safe
10 and reliable service. The converse of this is a risk to the utility: that revenue could be
11 temporarily insufficient. This risk can be mitigated by comparing K-bar revenue forecasts
12 with the Company's actual spending forecast—as PSNH has done—and calibrating the K-bar
13 formula accordingly.

14 Second, a risk associated with K-bar's incentive to reduce spending is that the utility might
15 reduce spending to the detriment of customers. For example, a utility could determine that it
16 can increase profits by eliminating spending that is necessary to provide safe and reliable
17 service of electricity. This risk can be mitigated through the introduction of PIMs that
18 penalize the utility for service quality degradation.

19 **Q. Does PSNH need a capital supplement as a component of its PBR framework?**

20 A. PSNH proposes to operate under a four-year PBR term in which rates are adjusted by an I-X
21 formula, with an X factor equal to zero. As discussed, recent TFP growth studies indicate
22 that the empirical X factor is in fact negative, reflecting input growth in the electricity
23 distribution industry that have given rise to revenue needs that have grown faster than the

1 rate of economy-wide inflation. Based on these studies, a revenue cap with a zero X factor,
2 as proposed by PSNH, would not be expected to provide the company with sufficient
3 revenue support to make the PBR work over an extended stay-out period. In addition, the
4 Company has outlined capital investment needs that will exceed the rate of GDP-PI inflation
5 over the four-year PBR term.²⁶ Given these conditions, it is reasonable to include a capital
6 supplement in PSNH's PBR framework.

7 **Q. How does PSNH's proposed K-bar work?**

8 A. The K-bar mechanism provides the Company with revenue beyond its base revenue
9 requirement as adjusted each year by the I-X formula. The amount of additional revenue is
10 calculated as follows:

11 Step 1: Calculate the "going in" capital-related revenue requirement that is recovered in
12 the base rates under the I-X mechanism for the first year of the PBR term. This is the sum
13 of the Company's depreciation expense, the return on rate base, and property taxes.

14 Step 2: Establish the percentage change in revenue collected under the I-X formula, which
15 in this case is set equal to GDP-PI minus zero.

16 Step 3: Determine the capital recovery supported by I-X for a given year by inflating the
17 "going in" capital revenue requirement by GDP-PI.

18 Step 4: Calculate the notional revenue requirement for capital expenditures the year, based
19 on historical capital spending.

- 20 i. Obtain capital additions for each of the past three years.
21 ii. Inflate each of the capital additions to current dollars using the approved I-X
22 formula, with the approved I factor for each year and the approved X factor for
23 the prior generation PBR plan.
24 iii. Using the inflated capital additions, calculate the average K-bar capital
25 additions over the historical three-year period.
26 iv. Inflate the average K-bar capital additions to the current year using the new
27 approved I-X formula.

²⁶ Attachment NAC-DPM-7 (Data Request Response Attachment DOE 6-121, p. 2).

- 1 v. Calculate the amount of K-bar capital cost incurred for the current year as the
2 sum of depreciation, return on rate base, and property taxes, based on the
3 current year capital additions from the prior sub-step.

4 Step 5: Calculate the base K-bar. Calculate the difference between the current year K-bar
5 capital-related revenue requirement required on a projected basis (from Step 4) and the
6 current year K-bar capital-related revenue requirement recovered in the base rates (from
7 Step 3). The result is the capital funding shortfall or surplus amount for the current year.

8 The Company will adjust rates according to the K-bar calculation as part of its annual rate
9 adjustment filing each year of the PBR term. Determinations of prudence for capital spending
10 during the PBR term will not occur until the Company's next rate application.²⁷ Revenue
11 collected through K-bar will not be clawed back, even if projects are later deemed imprudent.

12 **Q. Does this approach to K-bar differ from how K-bar is implemented in other**
13 **jurisdictions?**

- 14 A. Yes. The methodology differs from the implementation of K-bar in Alberta in three ways.
15 First, PSNH's approach relies on a rolling average of historical capital additions for Step 4,
16 whereas the methodology in Alberta uses a historical average of capital additions that
17 remains fixed over the duration of the PBR term. Second, PSNH uses three years of historical
18 data to calculate the K-bar revenue requirement in Step 4, whereas a five-year period is used
19 in Alberta. Third, PSNH has proposed to cap the amount of capital additions eligible for
20 inclusion in the K-bar historical average at ten percent the forecasted spending amount for
21 that year, as set forth in the Company's four-year spending plan. PSNH's methodology also
22 differs from the implementation in Massachusetts. In Massachusetts, Eversource and Unitil
23 use a five-year rolling average of historical data to calculate the K-bar revenue requirement,
24 rather than a three-year rolling average.

²⁷Attachment NAC-DPM-8 (Response to Data Request No. DOE 6-125).

1 **Q. What is your understanding of why the Company proposed a methodology that uses a**
2 **three-year rolling average to set the K-bar revenue requirement rather than the five-**
3 **year fixed average that is used in the original Alberta K-bar methodology?**

4 A. Setting the K-bar revenue requirement using a three-year rolling average provides PSNH
5 with more revenue than a fixed five-year average. The Company has demonstrated that a
6 historical average of five years would result in insufficient revenue relative to the Company's
7 capital spending forecast.²⁸ Furthermore, PSNH proposes to use a rolling average, rather than
8 a fixed average, because "the rolling-average K-bar provides customers protection from
9 annual rate increases that do not reflect recent capital investment levels and mitigates the
10 magnitude of rate adjustments."²⁹ In other words, a rolling average provides the Company
11 with a K-bar revenue requirement that is more reflective of current capital spending than an
12 average that is fixed over a historical time period. In the Alberta methodology, a company's
13 K-bar revenue requirement could be based on capital additions information that is as old as
14 nine years prior to the current year, if the company is in year 4 of the PBR term. Whether
15 more recent data is justifiable depends on whether recent spending data reflects future
16 spending more accurately than older spending data.

17 **Q. What is your understanding of why the Company proposed a cap on spending that can**
18 **be included in the rolling average used to calculate the K-bar revenue requirement?**

19 A. The Company stated that the cap on spending that can be included in the rolling average used
20 to calculate the K-bar revenue requirement was included, to further protect customers from

²⁸ Attachment NAC-DPM-9 (Response to Data Request No. DOE 6-121).

²⁹ Testimony of Douglas W. Foley, Robert S. Coates, and Douglas P. Horton, p. 52, Bates 01396.

1 substantial rate increases in the event the Company is required to make significant capital
2 investments in a single year.³⁰

3 **Q. From a theoretical standpoint, are PSNH's changes to the original Alberta methodology**
4 **for K-bar reasonable?**

5 A. A fixed historical average of five years provides similar, though not identical, cost efficiency
6 incentives in comparison to a rolling three-year average. Both approaches provide superior
7 incentives relative to traditional capital trackers. The rolling average provides a slight
8 incentive for the Company to spend more capital during the PBR term, since the Company
9 can recoup a fraction of the expenditure through the K-bar mechanism under this approach.
10 However, under either approach, after the PBR term ends the Company will not recover
11 capital-related revenue for projects deemed imprudent by the Commission at the end of the
12 PBR term. Imprudent capital projects will not be included in rate base going forward. This
13 means the Company will not be able to collect any revenue associated with the depreciation
14 expense and return on rate base of imprudent projects after the conclusion of the PBR term.
15 This provides consumers protection from possible gold-plating of long-lived assets by the
16 Company.³¹ The proposed cap on the amount of spending that can be included in the rolling
17 average provides additional protection to consumers. From a theoretical perspective, the
18 approach is reasonable.

³⁰ Testimony of Douglas W. Foley, Robert S. Coates, and Douglas P. Horton, p. 53, Bates 01397.

³¹ One risk, however, is that short-lived capital investments could be fully recovered under K-bar before the end of the PBR term. If this occurs, the Company would effectively avoid a prudence review for these investments.

1 **Q. From an empirical standpoint, are PSNH’s changes to the original Alberta methodology**
2 **for K-bar reasonable?**

3 A. We must evaluate which methodology—a three-year rolling average or a five-year fixed
4 average—more accurately provides the revenue necessary to meet the Company’s prudent
5 spending needs over the PBR term. A concern associated with using a three-year average to
6 set K-bar revenue is that recent capital spending by the Company has been above average,
7 and therefore not representative of future spending needs.³² Indeed, the Company has shown
8 that the three-year average will provide more revenue over the PBR term. Specifically, in
9 response to Data Request DOE 6-121, the Company demonstrated that a five-year rolling
10 average approach would not provide sufficient revenue relative to the PSNH spending plan.
11 Regarding this concern, Witness Kolesar stated that the three-year rolling average “is
12 reasonable given that the industry is in transition and capital additions are now more difficult
13 to forecast; and recognizing that capital needs are growing to provide for grid modernization
14 and other requirements to support the energy transition and decarbonization objectives.”³³
15 We agree. However, the spending needs demonstrated in response to Data Request DOE 6-
16 121 also demonstrate that a three-year average does not provide sufficient revenue relative to
17 PSNH’s spending plan, which calls into question whether any historical average would
18 provide the Company with adequate revenue for its spending plan under PBR. Therefore,
19 from an empirical perspective, the Company’s proposed approach is questionable.

³² Attachment NAC-DPM-9. Also see Attachment NAC-DPM-10 (Responses to Data Request No. DOE 6-121 and Data Request No. DOE 14-263).

³³ Attachment ES-MK-1, p. 19.

1 **Q. Is K-bar the best form of capital supplement for PSNH?**

2 A. As discussed, the K-bar approach offers a cost efficiency incentive advantage over capital
3 trackers. As recognized by the Alberta Utilities Commission, K-bar also minimizes the
4 Company's ability to "game" the PBR system because it uses historical data.³⁴ There is no
5 risk of over-inflated forecasts driving up the Company's revenue requirement during the PBR
6 term. A drawback to the proposed K-bar mechanism is that a company's historical capital
7 spending may not accurately forecast future spending. While there is no theoretical reason
8 that K-bar should be rejected, whether the mechanism is accepted should be based at least
9 partially on the accuracy of the historical spending pattern to meet future spending needs. If
10 the proposal is accepted, the Company will need to find a way to operate successfully under
11 the restricted revenue trajectory, as it will not be able to request additional revenue during the
12 PBR term. Given this concern, we offer an alternative approach that relies on the Company's
13 current spending forecast as a basis for K-bar revenue, rather than the Company's historical
14 spending data. We discuss this in more detail in Section 9.

15 **6. Revenue Decoupling**

16 **Q. Has PSNH filed a revenue decoupling mechanism methodology as part of its rate**
17 **application?**

18 A. Yes, PSNH has filed a revenue decoupling methodology. However, the Company does not
19 propose to implement this methodology.

³⁴ Alberta Utilities Commission, Decision 20414-D01-2016, December 16, 2016, p. 64.

1 **Q. How does the implementation of revenue decoupling relate to PSNH’s proposed PBR**
2 **framework?**

3 A. Revenue decoupling, as it is generally implemented, is not a requirement for implementing a
4 revenue cap plan, nor for PBR frameworks more generally, but, if implemented, a revenue
5 decoupling mechanism will affect rates set by the PBR formula. As explained in Section 3, if
6 PSNH does not implement revenue decoupling, the Company’s PBR framework, as
7 proposed, will not be a revenue cap plan. Instead, the PBR framework will be a form of price
8 cap. This is because PSNH has proposed that test year billing determinants will be used to set
9 rates for all years of the plan. If the Company’s revenue requirement is adjusted each year by
10 I-X, but billing determinants do not change because they are fixed at the test year quantities,
11 then higher sales during the PBR term could result in realized revenue above the revenue
12 requirement adjusted by I-X. Therefore, revenue would not be capped, but prices would be
13 capped. Under revenue decoupling, as applied in Massachusetts, the volumetric rate would
14 be adjusted each year such that revenue is, in fact, capped.

15 **Q. Does PSNH need to implement revenue decoupling in order to operate under a revenue**
16 **cap?**

17 A. Not necessarily. Revenue decoupling, meaning a framework that symmetrically returns to
18 customers revenue above or below what is allowed, is not required for PSNH to operate
19 under a revenue cap. However, by definition, if revenue is capped, the Company must have a
20 mechanism to return revenue collected in excess of that cap. A decoupling mechanism is one
21 option. A mechanism that returns excess revenues above the allowed revenue is another
22 option (like an “asymmetric” decoupling mechanism that does not collect for under-
23 recovery). An alternative to revenue decoupling that would allow PSNH to operate under a

1 near-revenue cap would be to set rates each year using updated billing determinants. Under
2 this alternative, instead of using billing determinants that are fixed at the test year levels,
3 billing determinants would be updated as part of the annual filing process in which revenue is
4 updated. While this is not a true revenue cap, such an approach would approximate the
5 outcome of a revenue cap.

6 **Q. Do you recommend that PSNH operate under revenue decoupling?**

7 A. Revenue decoupling is a viable option for PSNH, but it is not necessary. As discussed in
8 Witness Mike Clark's testimony, one reason why revenue decoupling may be preferred is
9 that the Company's test year billing determinants reflect an abnormal weather year.³⁵
10 Revenue decoupling would avoid locking in relatively higher rates that arise from this
11 abnormal year. Alternatively, the Company could weather normalize its test year billing
12 determinants to set initial cast-off rates.

13 The Company has stated a preference not to implement a revenue decoupling mechanism
14 (RDM),³⁶ and the Department of Energy has voiced skepticism that an RDM would be
15 beneficial for customers. Since revenue decoupling is not required for a utility to operate
16 under PBR we do not recommend that PSNH implement an RDM. However, in Section 9 we
17 provide an alternative approach to the Company's PBR framework, in which the Company
18 would update its billing determinants each year in the process of setting rates so that it
19 operates under a framework more like a true revenue cap.

³⁵ Testimony of Witness Mike Clark, p. 39.

³⁶ Testimony of Douglas W. Foley, Robert S. Coates, and Douglas P. Horton, p. 86, Bates 01430.

1 **7. Assessment of Other Elements of PSNH's PBR Framework**

2 **Q. What are the components of PSNH's PBR framework, other than the I-X formula and**
3 **K-bar?**

4 A. PSNH has included in its PBR framework an earnings sharing mechanism (ESM), a Z factor
5 for exogenous events, and performance incentive mechanisms (PIMs). The Company has
6 also proposed an option to renew the PBR plan for five years after the initial four-year term
7 is completed. This section will discuss the ESM, the Z factor, and the renewal option. The
8 Company's proposed PIMs will be discussed in Section 8.

9 **Q. In general, why are ESMs included in PBR frameworks?**

10 A. ESMs can serve as guardrails to protect consumers and the utility in the event of dramatic
11 deviations from the utility's allowed ROE. An oft-cited reason for including an ESM in a
12 PBR plan is to provide customers with benefits if the Company exceeds its authorized ROE
13 beyond some threshold. However, for reasons explained further below, customers may in fact
14 not be better off under an ESM, because the Company has a dulled incentive to seek cost
15 efficiencies if part of the gains from those efficiencies are immediately taken away.

16 **Q. What are the incentive properties of ESMs, generally?**

17 A. Although ESMs are a common feature of PBR frameworks, they induce the opposite cost
18 efficiency incentives that PBR aims to generate. If the objective of PBR is to introduce cost
19 efficiency pressure on the utility, symmetric ESMs reduce this pressure by allowing the
20 utility to collect additional revenue if it is unable to achieve the level of efficiency assumed
21 in its revenue forecast, and, conversely, forces the utility to give back a portion of the gains
22 from efficiency improvements relative to the forecast. For this reason, the utility does not
23 have a strong incentive to improve its productivity under an ESM, particularly as the

1 deadband shrinks. As Witness Kolesar writes, “a PBR plan without earnings sharing provides
2 greater incentive effects than plans with earnings sharing.”³⁷ To the extent that consumers
3 obtain any shared earnings through the ESM, this benefit is likely to be a larger slice of a
4 smaller pie. In many cases, consumers do not see any benefits from ESMs because the
5 Company never exceeds the ROE deadband.

6 **Q. Do all ESM designs have the same incentive properties?**

7 A. No. ESMs may be designed to be symmetrical or asymmetrical, have deadbands of different
8 sizes, and share earnings in different proportions depending on the deviation of earnings from
9 the authorized rate of return. Calibrating these parameters changes the incentive structure of
10 the ESM. For example, economist Dr. Dennis Weisman proposed a “high-powered” ESM in
11 Alberta during the 2023 proceeding, which was designed to operate the same way as the
12 standard ESM for returns within and below the deadband. The difference arises for returns
13 above the upper bound on earnings above the deadband. The first one-hundred basis points of
14 returns above the upper bound on the deadband accrue largely to consumers. The second
15 one-hundred basis points above the upper bound on the deadband accrue largely to the
16 regulated utility.³⁸ This provides the Company with continued incentive to seek efficiencies
17 even after it crosses the sharing threshold.

18 **Q. Please describe the Company’s proposed ESM.**

19 A. The Company proposes an asymmetric ESM with a deadband of 25 basis points (bps). If the
20 Company’s earned ROE exceeds the allowed ROE by more than 25 bps 75% of excess
21 earnings are shared with customers and the Company retains 25% of these earnings. If the

³⁷ Attachment ES-MK-1, p. 3, Bates 01776.

³⁸ “Economic Tradeoffs in the Design of the Third-Generation PBR Regime,” Dennis L. Weisman, PhD., January 27, 2023. Alberta Utilities Commission, Proceeding 27388.

1 Company fails to achieve the allowed ROE, the ESM does not recover any additional
2 revenue from customers. Thus, customers have protection from earnings in excess of the
3 allowed ROE, but the utility does not have protection from underearning. The Company
4 states that the 25 bps deadband is consistent with the Company's 2009 rate case, Docket No.
5 DE 09-035.³⁹

6 **Q. What is your assessment of the Company's proposed ESM?**

7 A. The strict ESM proposed by the Company means that the PSNH has a limited opportunity to
8 achieve profits above the allowed ROE. Because of this reduced opportunity for profit, the
9 incentive properties of the PBR framework are reduced. However, customers receive an
10 assurance through the ESM that the rates they pay will not result in outsized profits for
11 PSNH during the PBR term.⁴⁰ Whether to include such a mechanism depends on whether the
12 priority of the PBR framework is to provide incentives for productivity improvements in the
13 form of cost efficiency, or to minimize risk. If the goal of the plan is to minimize risk over a
14 long multi-year rate plan (MYRP) term, an ESM may be an appropriate element to include.
15 Given that PBR is a new approach in New Hampshire, the risk reducing benefits of an ESM
16 may be worth the dampening effect on efficiency incentives. In light of these considerations,
17 and in light of precedent (Docket No. DE 09-035), we recommend that the ESM is approved
18 as filed for the first generation PBR plan. We also recommend that PSNH consider an ESM
19 with a larger deadband, or a PBR framework with no ESM at all, in its second generation
20 PBR framework should it file one in the future.

³⁹ Testimony of Douglas W. Foley, Robert S. Coates, and Douglas P. Horton, p. 65, Bates 01409.

⁴⁰ Attachment NAC-DPM-11 (Response to Data Request No. DOE 6-114).

1 **Q. What is an exogenous cost factor, and are they common in PBR frameworks?**

2 A. An exogenous cost factor (also called a “Z factor”) is often included in PBR frameworks to
3 provide for one-time exogenous events that impose unforeseen costs on the utility. The
4 Z factor allows for an adjustment to a company’s rates to account for a significant financial
5 impact (either positive or negative) of an event outside of the control of the company and for
6 which the company has no other reasonable opportunity to recover the costs within the PBR
7 formula. One commonly cited example of a Z factor could be an unexpected, one-time
8 increase in tax rates during the PBR term. Another example of a Z factor could be
9 construction projects required by the state, like the movement of utility plant to make way for
10 a road. A materiality threshold, usually in the form of a dollar value associated with the
11 exogenous event’s cost, ensures that Z factor adjustments occur only when events have a
12 significant influence on the operation of the utility. For example, in Massachusetts, the
13 Z factor threshold value equals the product of 0.001253 and the Company’s total operating
14 revenue in the test year.⁴¹

15 **Q. How does the Company propose to incorporate an exogenous cost factor into its PBR**
16 **framework?**

17 A. The Company has defined the exogenous cost factor for PSNH as positive or negative cost
18 changes that are beyond the Company's control and not reflected in the calculation of GDP-
19 PI.⁴² The Company has proposed to include requests for exogenous event cost recovery in its
20 annual PBR compliance filing. The Company’s proposed exogenous cost factor may adjust
21 rates upward or downward. In addition, the Company defines its exogenous cost factor to

⁴¹ Massachusetts D.P.U. 22-22, Final Order, November 30, 2022.

⁴² Testimony of Douglas W. Foley, Robert S. Coates, and Douglas P. Horton, p. 65, Bates 01409.

1 cover both non-recurring costs and ongoing costs. The proposed materiality threshold for this
2 factor is \$1.5 million, which is calculated as the total cost of all exogenous events in a single
3 year. The Company proposes to include requests for exogenous event cost recovery in its
4 annual PBR compliance filing.

5 **Q. Does the Company's proposed exogenous cost factor differ from Z factors in other**
6 **jurisdictions?**

7 A. Yes. While there is not unanimity among the application of Z factors in PBR plans across
8 jurisdictions, there are two differences between the Company's proposed exogenous cost
9 factor and the generally accepted approach to Z factors. First, the Company has defined its
10 proposed exogenous cost factor to pertain to both one-time events and ongoing events. In
11 other jurisdictions, Z factors generally recover costs associated with one-time events, while Y
12 factors recover ongoing costs outside of the utility's control. PSNH's exogenous cost factor
13 combines these two separate mechanisms into one. Second, the materiality threshold is
14 calculated as the sum of costs associated with all exogenous events, rather than single events.
15 In other jurisdictions, such as Ontario⁴³ and Massachusetts,⁴⁴ the materiality threshold is
16 applied to single events only, such that many small events may not result in any Z factor
17 adjustment.

18 **Q. What is your assessment of the exogenous cost factor proposed by PSNH?**

19 A. The exogenous cost factor proposed by PSNH is reasonable despite differences with respect
20 to other jurisdictions. An exogenous factor that combines the concept of a Z factor with a

⁴³ Report of the Board on 3rd Generation Incentive Regulation for Ontario's Electricity Distributors, Ontario Energy Board, Appendix p. V.

⁴⁴ Massachusetts D.P.U. 17-05, Final Order, November 30, 2017, p. 396.

1 Y factor results in a mechanism that operates not unlike what is done in PBR frameworks
2 elsewhere. Also, a materiality threshold on the cumulative cost of exogenous events makes
3 intuitive sense. If a state-initiated cost change were imposed on the Company at a cost of \$1
4 million, and a federally initiated cost change were separately imposed on the Company at a
5 cost of \$1 million, it is reasonable that the utility would recover the sum of these costs rather
6 than recover none of these costs. We also acknowledge that in 2010, the New Hampshire
7 Public Utilities Commission found that exogenous cost factors could be applied to a series of
8 events.⁴⁵

9 **Q. What is the Company's proposal to renew the PBR plan after the first four years?**

10 A. PSNH has proposed to have the option to renew its PBR plan without rebasing at the
11 conclusion of the first four years of the PBR term. If the Company requests, and the
12 Commission approves, a four-year extension of the PBR term, starting on August 1, 2029,
13 then the Company will file for a rate case for new permanent base distribution rates effective
14 on August 1, 2033.⁴⁶The Company has proposed that, should the PBR term be extended,
15 PSNH would operate under the same PBR framework approved in this proceeding (the same
16 X factor, the same PIMs, the same ESM, the same K-bar mechanism), with one exception: if
17 the PBR term were extended, the Company would have the ability to request a base rate
18 adjustment by filing a base rate case if its earned ROE falls below seven percent for two
19 consecutive quarters, after the PBR Plan is allowed to be extended beyond the initial four-
20 year stay-out. In other words, the Company would adopt an off-ramp that would apply only
21 to the years of the extended PBR plan.

⁴⁵ “We understand that this provision is intended to allow PSNH to adjust its rates for the impact of an event or series of events that have a net distribution revenue impact in a given year of \$1,000,000 or more.” New Hampshire Public Utilities Commission, Order No. 25,123, June 28, 2010, p. 38.

⁴⁶ Attachment NAC-DPM-12 (Response to Data Request No. DOE 6-127).

1 **Q. What is your assessment of the Company's PBR plan renewal proposal?**

2 A. In principle, a four-year renewal after an initial four-year PBR term is reasonable if
3 intervenors have the opportunity to submit an opinion between PBR terms and the
4 Commission has the ability to determine whether a renewal is appropriate. One way to
5 conduct such a renewal would be to update the X factor using more recent data at the renewal
6 date but keep other elements of the plan the same.

7 For its PBR framework, PSNH has proposed a capital supplement in the form of K-bar that
8 adjusts current year revenue based on a rolling average of past capital spending. Because of
9 the mechanics of K-bar, if the Company renews its PBR framework after four years, revenue
10 in the renewed PBR term may begin to deviate substantially from costs for reasons other than
11 efficiency gains (for example, if the Company has invested heavily in capital during the first
12 PBR term, and no longer requires a capital supplement in the second PBR term). The ESM
13 would provide customers with protection against overearning in this case. However, the
14 Company would have a longer period between prudency reviews of capital investments.
15 Given that the K-bar mechanism allows recovery of some capital spending through the
16 rolling average, allowing as many as seven years from the time of year one investments and a
17 prudency review may be too long for a first generation PBR plan. Therefore, we recommend
18 against the option to renew in this case. A renewal option may be more appropriate in other
19 circumstances—such as if the Company operated under a pure PBR formula, rather than one
20 with a K-bar capital supplement.

1 **8. Assessment of the Proposed Performance Incentive Mechanisms**

2 **Q. What are performance incentive mechanisms (PIMs) and why are they applied to PBR**
3 **frameworks?**

4 A. The widely agreed-upon definition of a PIM is: a regulatory tool that ties financial incentives
5 to identified benchmarks or targets. PIMs can be reward-only, penalty-only, or “symmetric,”
6 meaning they could result in both a reward and a penalty. Typically, PIMs operate by
7 adjusting a utility’s return on equity (ROE), though in some cases a pre-determined dollar
8 value is used for a penalty or reward. Generally, the utility must have a measurable target,
9 and it must be possible to recognize the achievement of this target using publicly available
10 information at the end of each year when rates are set for the subsequent year of the PBR
11 term. In addition, the financial penalty or reward associated with achievement of (or failure
12 to achieve) the target must be known in advance. PIM penalties or rewards will be applied to
13 rates each year as a rider, adjusting revenue according to performance in the most recent
14 completed year.

15 PIMs are included in PBR plans to encourage achievement of new policy objectives and
16 counter implicit negative incentives that a regulatory model creates. For example, given the
17 cost reduction incentives of price cap plans, PIMs tied to safety and reliability can align
18 incentives such that the utility does not reduce costs at the expense of safe and reliable
19 service.

20 **Q. What new metrics has PSNH proposed to track?**

21 A. The Company has proposed two different sets of metrics: service quality metrics and
22 reporting metrics. The service quality metrics will measure System Average Interruption

1 Duration Index (SAIDI)⁴⁷ and Months Between Interruptions (MBI).⁴⁸ Only the service
2 quality metrics can be considered PIMs, as these metrics are tied to financial consequences.
3 The reporting metrics do not result in financial rewards or penalties, but cover performance
4 areas including customer satisfaction, solar interconnection, customer requested work, and
5 active demand response. The Company is proposing to report on the progress of the proposed
6 PBR metrics in a filing to the Commission in a report on or before May 15th each year. This
7 report will document the performance of each metric for the calendar year prior.⁴⁹

8 **Q. What is your understanding of why the Company proposed to include PIMs in its PBR**
9 **framework?**

10 A. PSNH stated that it has included PIMs and reporting metrics to provide transparency in
11 relation to the Company's performance under its first PBR framework. The Company also
12 stated that both the PIMs and reporting metrics "will create greater alignment between the
13 Company's business objectives and regional and state priorities as well as customer
14 expectations," particularly with respect to service quality.⁵⁰

15 **Q. How will the service quality PIMs be implemented?**

16 A. The SAIDI and MBI penalty-only PIMs are proposed to be structured as follows. First, a
17 baseline for these metrics would be calculated using a five-year rolling average of each
18 metric. Then, a lower bound target and an upper bound target would be set equal to two
19 standard deviations above and below the baseline, respectively. If the Company's MBI

⁴⁷ SAIDI is calculated as System Average Interruption Frequency Index (SAIFI) multiplied by the Customer Average Interruption Duration Index (CAIDI). The Company proposes to adjust its SAIDI measure for the following items 1) Interruptions that are resolved within 5 minutes or less; (2) Private customer outages; (3) Planned outages; (4) Loss of External Supply; (5) Public Safety directed outages; (6) Major Event Days.

⁴⁸ Testimony of PBR Metrics Panel, p. 8, Bates 01921.

⁴⁹ Ibid, p. 11, Bates 01924.

⁵⁰ Attachment NAC-DPM-13 (Response to Data Request No. DOE 6-137).

1 performance falls below the lower bound target, a \$1.5 million penalty will be imposed. This
2 dollar value is approximately equal to 10 basis points of the Company's initial return on
3 equity amount in its going-in revenue requirement.⁵¹ If the Company's MBI performance
4 exceeds the upper bound target, the Company will gain a \$1.5 million credit that can be used
5 to offset future penalties. The Company would not be provided a financial reward for
6 exceeding the target.⁵² The SAIDI PIM operates similarly.

7 **Q. Did PSNH present any benefit-cost analysis used to establish the penalty value of its**
8 **PIMs?**

9 A. No. The penalty value is set equal to the exogenous cost threshold. The Company did not use
10 an assessment of the dollar value of reliability (e.g., Value of Lost Load) to set the SAIDI or
11 MBI penalty value.

12 **Q. Did PSNH present any the reasoning for the baseline calculation and threshold values**
13 **for its service quality PIMs?**

14 A. Yes. The Company used the methodology from the Institute of Electrical and Electronics
15 Engineers (IEEE), which developed a methodology to calculate Electrical Reliability Metrics
16 both all-in, and normalized to exclude exceptional events (e.g., storms or natural disasters).⁵³

17 **Q. What is your assessment of PSNH's proposed service quality PIMs?**

18 A. PSNH has proposed two penalty-only PIMs. The Company has not shown that the financial
19 penalties associated with these PIMs bear any relationship to the marginal cost of reliability
20 shortfalls below the PIM targets. As such, it is not possible to assess whether the financial
21 penalties are priced according to the value that customers have for reliability. Because the

⁵¹Attachment NAC-DPM-14 (Response to Data Request No. DOE 6-132).

⁵²Attachment NAC-DPM-15 (Response to Data Request No. DOE 6-128).

⁵³Attachment NAC-DPM-16 (Response to Data Request No. DOE 6-134).

1 service quality PIMs are penalty-only PIMs that were volunteered by the Company, the
2 importance of calibrating an accurate financial incentive is reduced. If the Company were to
3 seek a PIM with a financial reward, it should provide some demonstration that the
4 performance associated with that reward provides value to customers at least as high as that
5 reward. Likewise, if a regulator were to impose a financial penalty for a certain level
6 performance, that regulator would bear the burden of demonstrating that the penalty reflected
7 lost customer value.

8 **Q. What reporting-only metrics has PSNH proposed?**

9 A. PSNH has proposed the reporting metrics in the following categories: customer satisfaction;
10 solar generation, customer work requests, and demand response. These proposed reporting
11 metrics report performance by PSNH relative to a benchmark but do not involve financial
12 incentives.⁵⁴

13 **Q. Please summarize the Customer Satisfaction reporting metrics that PSNH has**
14 **proposed.**

15 A. PSNH has proposed two customer satisfaction reporting-only metrics.

16 (1) Number of Customer Complaints Reversed – measures complaints where an error by
17 the Company is validated and acknowledged after investigation.

18 (2) Transactional Customer Satisfaction Index - this metric uses customer surveys to
19 measure customer satisfaction after being restored from a blue-sky outage; satisfaction
20 after interacting with the Company's phone customer service resources, either live-agent
21 or interactive voice; satisfaction with the process of interconnecting solar resource at a
22 customer's home; satisfaction with working to connect new construction to the grid; and

⁵⁴ Testimony of PBR Metrics Panel, p. 12, Bates 01925.

1 satisfaction after using the Company’s website. The metric reflects the equal-weighted
2 average of the relevant survey responses, (in which satisfaction is measured from 1 to
3 10).⁵⁵

4 **Q. Please summarize the Company’s proposed solar generation metric.**

5 A. In the interest of streamlining the connection of distributed energy resource customers,
6 PSNH has proposed to collect data on the timeline for solar applications between the years
7 2025 and 2026. This data would be used for the purpose of establishing a baseline and a
8 target by 2027 for simplified projects, standard projects, and standard projects requiring SIS.
9 Until baseline data is complete, the Company proposes to report the annual timelines in the
10 PBR metrics reports filed during calendar years 2025 and 2026.⁵⁶

11 **Q. Please summarize the Company’s proposed customer work metric.**

12 A. The Company’s “Customer Work Request” metric would measure the percentage of work
13 requests the Company completes within a target number of business days in specific types of
14 service categories. Initial targets would be set equal to ninety percent multiplied by the
15 average number of business days, excluding “hold days,” that it took for the Company to
16 complete the customer work requests in each category in New Hampshire in calendar year
17 2023. Since more data will be available in 2026, PSNH proposes to rely on the average of
18 2023 through 2025, rather than only calendar year 2023, to set the baseline and target values.
19 The percentage of customer requests meeting the business day targets would be calculated by
20 adding the number of requests that are completed within or under the target number of

⁵⁵ Ibid, p. 12, Bates 01925.

⁵⁶ Testimony of PBR Metrics Panel, p. 25, Bates 01938.

1 business days for each category and dividing that number by the total number of work
2 requests across all measured categories.⁵⁷

3 **Q. Please summarize the Company's proposed demand response metric.**

4 A. The Company has stated that peak demand is a major driver of costs experienced by the
5 Company's customers and that efforts to reduce peak demand can generate significant
6 reductions in system costs for customers. The Company's Active Demand Response metric
7 would focus on PSNH's system peak, which occurs during the summer months. The metric
8 would set a baseline demand reduction of 7.5 MW. PSNH has proposed to remain at or better
9 than reductions of 14.5 MW annually for the PBR Term.

10 **Q. What is your assessment of PSNH's proposed reporting-only metrics?**

11 A. All four categories of reporting metrics are reasonable and well-constructed. It is not clear
12 the extent to which reporting-only (i.e., reputational) metrics drive performance given that
13 the outcomes do not have a financial consequence. If the Company has proposed these
14 metrics because the proposed PBR framework does not otherwise adequately encourage the
15 goals addressed by these metrics, it may be useful for the Company to consider converting
16 these metrics into PIMs in subsequent generations of PBR. However, it is reasonable to apply
17 these metrics with no financial rewards or penalties for PSNH's first PBR framework.

18 **Q. What do you recommend as next steps for PSNH regarding PIMs?**

19 A. The introduction of PIMs in other jurisdictions often involves a process of stakeholder
20 engagement to evaluate the key policy objectives of all stakeholders, discuss how the current
21 regulatory framework does not address those policy objectives, and collaborate on how PIMs
22 could be used to align the utility's incentives with customer needs. We recommend that the

⁵⁷ Ibid, p. 28, Bates 01941.

1 Company engage with stakeholders to develop new PIMs and enhance existing PIMs. This
2 would provide more assurance that the Company's PIMs address customer needs and have
3 penalties (or rewards) that are priced appropriately.

4 **9. Proposed Alternative PBR Framework**

5 **Q. What changes to PSNH's proposed PBR framework could be made to alleviate**
6 **concerns about the way revenue is set over the four-year term?**

7 A. We present three modifications to the way revenue is established under the Company's
8 proposed PBR framework. First, we describe an alternative to K-bar that relies on the
9 Company's capital spending forecast rather than the Company's historical capital spending to
10 set revenue over the PBR term. Second, we present a true revenue cap, which modifies the
11 Company's proposed PBR formula (which, as explained in Section 3, is in fact a price cap).
12 These first two adjustments are not necessarily better, but they may be preferred for other
13 reasons. Third, as this is a first generation PBR plan, we recommend including a reopener
14 provision to provide the Company and stakeholders an opportunity to review the PBR plan
15 before the completion of the four year term.

16 **Q. What is a potential concern with the use of K-bar as a capital supplement?**

17 A. The main concern with K-bar is that it relies on historical capital spending, which may not
18 accurately forecast forward-looking capital-related revenue needs. Thus, in the absence of an
19 ESM, K-bar could result in revenue collection that is too high or too low. This concern must
20 be weighed against the risks that result from alternative approaches to capital recovery, such
21 as capital trackers and forecasted revenue requirements, or for that matter, more frequent rate
22 cases.

1 **Q. If K-bar is not accepted, can the proposed PBR framework be modified to provide the**
2 **Company with sufficient revenue while maintaining the same cost efficiency incentives?**

3 A. Yes. An alternative to the K-bar mechanism that could be used to provide the Company with
4 sufficient capital revenue is a forecast approach, known as an “F factor.” This approach was
5 a conceptual precursor to the K-bar mechanism described by Drs. Dennis Weisman and
6 David Sappington in the Alberta Utilities Commission’s second generation PBR
7 proceeding.⁵⁸ Much like K-bar, the Sappington-Weisman F factor consists of a differential
8 between the Company’s forecast of expected capital expenditures and the actual revenue
9 recovered through the I minus X formula (and not due to exogenous events). The difference
10 is that whereas K-bar relies on a historical spending pattern to set forecasted capital needs
11 through a formula, the F factor relies on the Company’s own forecast of capital needs. Much
12 like the annual K-bar calculation, the Company would make the F factor revenue adjustment
13 each year as part of the annual PBR filing.

14 **Q. Why is a forecast approach preferred over a capital tracker?**

15 A. The F Factor approach retains the incentive properties of PBR by setting an allowed revenue
16 equal to the Company’s forecast, and allowing the Company to benefit from cost efficiencies
17 relative to the forecast. In contrast, capital trackers do not provide the Company with an
18 incentive to find cost efficiencies, since the tracker allows for recovery of—and subsequent
19 inclusion into rate base of—any prudently incurred costs. Cost trackers are generally not
20 considered to align with the characteristics of PBR, though they have in some cases been
21 deemed necessary for sufficient cost recovery.

⁵⁸ “Sappington, David and Weisman, Dennis, Assessing the Treatment of Capital Expenditures in Performance-Based Regulation Plans,” September 1, 2015.

1 **Q. Do you recommend changes to the X factor if the F factor approach is adopted?**

2 A. When a PBR framework is first designed, we recommend an approach that calibrates the
3 plan's parameters using economic theory and standard practice. However, it may make sense
4 to deviate from recommended parameters. For instance, the TFP study typically aims to
5 estimate average productivity in the industry. A company may believe it can be more
6 efficient than the industry with respect to inputs that it can adjust more readily, but is
7 experiencing faster than average capital cost growth that is largely exogenous. Thus, it may
8 recommend a higher (more positive) X factor, provided it receives sufficient revenue growth
9 for rising capital investment over the term. The Commission and Company may agree that
10 such deviations are feasible for the Company and in the best interest of customers. However,
11 they should be viewed relative to the recommendation based on the theory and standard
12 approach to calibrating plan parameters. When one portion of the plan changes, for instance,
13 substituting K-bar for an F factor, we believe it is reasonable to reset the recommendation to
14 what is implied by the empirical studies, and allow stakeholders the opportunity to advocate
15 a deviation from that recommendation. Therefore, if the Company were to adopt the F factor
16 approach, in lieu of K-bar, we recommend that PSNH adopt the empirical X factor
17 of -1.67%. This is a 25 basis point adjustment downward from the Company's estimate, to
18 account for the fact that this is a price cap and should therefore include an index of billable
19 outputs instead of simply using customers as the output measure. Using an empirically
20 calibrated X factor, the Company's revenue would adjust each year in accordance with the
21 economic principles of incentive regulation and it would be clear to all stakeholders the
22 magnitude of revenue adjustments arising from the F factor. In other words, by using the
23 empirical X factor in the annual PBR revenue adjustment, F factor revenue would be plainly

1 defined as revenue provided to the Company in excess of revenue growth that would occur
2 under a competitive market.

3 **Q. What are the advantages and disadvantages of relying on a forecast to set allowed**
4 **capital-related revenue?**

5 A. The F factor uses the Company's actual forecasted revenue needs, rather than relying on an
6 average of historical spending on capital to set revenue. An advantage to this approach is that
7 the utility's spending forecasts may more accurately reflect revenue needs than a historical
8 average over the PBR term. A drawback is that the reliance on a forward-looking capital
9 spending estimate requires more trust in—or more critical evaluation of—spending forecasts
10 at the outside of the PBR term.

11 **Q. What are the implications of the F factor, relative to the incentives of K-bar, on the**
12 **incentive to commit to capital expenditures?**

13 A. A common concern under PBR is that a company could have an incentive to cut costs to the
14 detriment of customers. Whereas a rolling average K-bar shifts the incentives marginally
15 back toward more capital spending, the F factor removes the marginal incentive that a rolling
16 average approach to K-bar provides. This could be viewed as both an advantage and a
17 disadvantage. A marginal reduction in the incentive to spend on capital could be viewed as a
18 disadvantage of the F factor if there is concern that, under PBR, the Company will reduce
19 capital spending that is necessary for the provision of safe and reliable service. Conversely, if
20 there is concern about overspending on capital during the PBR term, the F factor effectively
21 caps capital recovery and incents capital spending efficiency.

1 **Q. Can the PBR framework filed by PSNH be modified to be closer to a true revenue cap?**

2 A. Yes. As explained in Section 3, the Company's proposed PBR formula is, in fact, a form of a
3 price cap. If a revenue cap is the preferred approach, the Company needs a mechanism to
4 return revenue above the cap to customers. A decoupling mechanism could be used for this
5 purpose, as in Massachusetts. A one-way mechanism could return revenue above the cap, but
6 not collect additional revenue if actual revenue falls below what is allowed. An alternative
7 that is not a true revenue cap but approximates one would be that the Company updates its
8 billing determinants each year such that rates reflect the current-year revenue requirement
9 divided by current-year billing determinants. Under this approach, rates are adjusted each
10 year to reflect allowed revenue and updated billing determinants, but no true-up occurs if
11 actual revenue deviates from what is allowed. We refer to this as a "near" revenue cap.

12 **Q. Is a revenue cap preferred to the Company's proposed approach?**

13 A. Not necessarily. The cost efficiency incentives associated with revenue caps and price caps
14 are similar. However, a revenue cap ensures that revenue will not exceed the capped amount.
15 A price cap approach provides an opportunity to earn more revenue through increased sales.
16 Outsized profits are less of a concern given the Company's proposed ESM, which shares
17 75% of profits above 25 basis points of the allowed ROE.

18 **Q. What is a reopener, and why have you recommended including one in PSNH's PBR**
19 **framework?**

20 A. PBR plans are typically characterized by a longer period of time between traditional revenue
21 requirement applications for the utility under the plan. This time between "rebasings" results
22 in a prolonged separation of costs and revenues, providing the utility with enhanced
23 efficiency incentives but also enhanced risk. Because costs and revenues are separated over

1 the PBR term by design (the automatic nature of the I-X formula does not adjust annual
2 revenues for sustained changes in utility costs in the comprehensive manner that rate
3 applications adjust revenues), a utility operating under PBR could potentially experience
4 earnings that are dramatically higher or lower than the allowed ROE set at the beginning of
5 the PBR term. To protect against an untenable divergence of costs and collected revenues
6 resulting from problems with the PBR design, PBR plans include “re-openers,” or
7 mechanisms that allow for review of the regulated entity’s PBR plan during the PBR term
8 and potential relief in the form of adjustments to the PBR plan or exiting the plan completely
9 in the event certain predefined conditions occur. We recommend that PSNH include a re-
10 opener provision in this plan to provide the Company and stakeholders with an opportunity to
11 review the PBR plan before the end of the four-year term. The re-opener could be triggered,
12 for example, by a pre-determined number of basis points above or below the Company’s
13 allowed ROE after accounting for the ESM.

14 **Q. Please summarize the two proposed alternatives to PSNH’s proposed PBR framework.**

15 A. The two possible modifications to PSNH’s proposed PBR plan are not interdependent, which
16 means the Commission could accept one of these alternatives, both, or neither. Table 5
17 summarizes these possible modifications. The table also notes that we recommend rejecting
18 the Company’s proposed option to renew its PBR plan for an additional four years.

1

Table 6: Elements of a Modified PBR Plan for PSNH

PBR Component	Proposed Approach	Possible Alternatives
Indexed Cap	“Revenue Cap”	True Revenue Cap, or a “Near” Revenue Cap
Inflation Measure	GDP-PI	
X Factor	0.00%	
Capital Supplement	K-Bar	F Factor
Exogenous Costs	Yes	
Earnings-Sharing Mechanism	75/25 split, 25 bps deadband	
Off ramp/Re-Opener	None	Included
Consumer Dividend	0.15%	0.15-0.25%
PIMs	Two penalty-only PIMs	
PBR Term	4 years	

2

*Indicates change from the Company’s proposed framework.

3

10. Summary and Conclusion

4

Q. Could you please summarize your testimony?

5

A. PSNH has proposed a PBR framework that generally aligns with PBR plans currently in

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place in North America. In particular, the Company has filed an indexed cap plan with a

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formulaic capital supplement in the form of K-bar, along with an ESM and an exogenous

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cost factor. To set a proposed consumer dividend, the Company filed a cost benchmarking

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study. Although this benchmarking study is not correct, we have provided corrected results.

10

The Company has also filed two penalty-only PIMs and four scorecard metrics, which are

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reasonable additions to the proposed PBR framework. We recommend accepting most

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aspects of the proposed PBR framework. However, we recommend against the four-year

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renewal option, for reasons stated in Section 8. We have also provided two modifications that

14

could be considered: the F factor capital supplement in lieu of K-bar, and an adjustment to

1 make the proposed cap closer to a true revenue cap. We have also made recommendations for
2 consideration in the future, including a wider deadband on the ESM and the consideration of
3 attaching financial incentive to the reporting-only metrics.

4 **Q. Does this conclude your testimony?**

5 A. Yes it does.