**EXH. SIS-1T**
**DOCKETS UE-22___/UG-22___**
**2022 PSE GENERAL RATE CASE**
**WITNESS: SANEM I. SERGICI**

**BEFORE THE**
**WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

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| **WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION,**<br><br>**Complainant,**<br><br>**v.**<br><br>**PUGET SOUND ENERGY,**<br><br>**Respondent** | **Docket UE-22____**<br>**Docket UG-22____** |

# PREFILED DIRECT TESTIMONY (NONCONFIDENTIAL) OF

# SANEM I. SERGICI

# ON BEHALF OF PUGET SOUND ENERGY

**JANUARY 31, 2022**

**PUGET SOUND ENERGY**

**PREFILED DIRECT TESTIMONY (NONCONFIDENTIAL) OF SANEM I. SERGICI**

**CONTENTS**

**PUGET SOUND ENERGY**

**PREFILED DIRECT TESTIMONY (NONCONFIDENTIAL) OF SANEM I. SERGICI**

**LIST OF EXHIBITS**

**PUGET SOUND ENERGY**

**PREFILED DIRECT TESTIMONY (NONCONFIDENTIAL) OF SANEM I. SERGICI**

## I. INTRODUCTION

**Q. Please state your name, business address, and position.**

A. My name is Sanem I. Sergici. I am a Principal with The Brattle Group ("Brattle"). My business address is One Beacon Street, Boston, Massachusetts 02108.

**Q. Please describe your professional experience and educational background**

A. I am an energy economist with 16 years of consulting and research experience. My consulting practice is focused on understanding customer adoption of and response to innovative rate designs and emerging technologies and assessment of their impact on the electricity grid. I regularly assist my clients on matters related to grid modernization investments, retail rate design, electrification, resource planning, and alternative ratemaking mechanisms. I led numerous studies in these areas that were instrumental in regulatory approvals of grid modernization investments and smart rate offerings for electricity customers.

**Q. Have you prepared an exhibit describing your education, relevant employment experience, and other professional qualifications?**

A. Yes, I have. It is Exh. SIS-2.

**Q. Please summarize the purpose of this prefiled direct testimony.**

A. The purpose of my testimony is to demonstrate the ways in which Puget Sound Energy ("PSE" or "the Company") is planning to maximize the customer-facing benefits of Advanced Metering Infrastructure ("AMI"). More specifically, it presents how the Company is planning to maximize AMI benefits through various customer programs and offerings that are enabled or facilitated by AMI, including benefits identified by the Commission, as well as other benefits not quantified in the Company's previous AMI filing. My testimony draws upon a comprehensive report I prepared for PSE titled, "Maximizing Customer Benefits through PSE's Advanced Metering Infrastructure" ("AMI Benefits Report" or "AMI Report"), which is provided as Exh. SIS-3.

**Q. Please summarize your findings.**

A. Key findings from the AMI Benefits Report and my assessment of PSE's AMI investment are as follows:

- I classified 38 AMI use cases identified by PSE into three tiers for my analysis: "Tier 1" use cases are the six customer-facing use cases highlighted by the Commission in its Final Order from PSE's 2019 general rate case, Dockets UE-190529/UG-190530 et al. "Tier 2" use cases represent other AMI benefits PSE has prioritized for implementation. "Tier 3" use cases refer to future use cases which are either difficult to quantify at this time, or initiatives that are in early stages of exploration. I quantified the Tier 1 and Tier 2 use case benefits though 2037, which marks the end of the expected 20-year life of the AMI meters deployed in 2017. I describe the Tier 3 use case benefits qualitatively.

- I estimated the total Tier 1 use case benefits as $267 million for the Base case, $121 million for the Low case, and $424 million for the High case. Benefits from the time varying rates ("TVR") use case are the largest,

followed by the load flexibility program and behavior-based programs. The total Tier 2 benefits are estimated at $358 million for the Base case, with the Low case being $294 million and High case $494 million. The total Tier 2 benefits are mainly driven by the remote connect/disconnect use case and the improved outage management use case. Both Tier 1 and Tier 2 benefits are incremental to the $668 million benefits presented in PSE's original business case as presented in its 2019 general rate case.

- While there is more uncertainty on the program cost side, I made an effort to estimate the incremental costs for the Tier 1 and Tier 2 use cases, above and beyond the AMI investment costs. These costs are $68 million for the Low case, $118 million for the Base case and $199 million for the High case. As noted, these costs are incremental to the $473 million costs estimated in PSE's original business case.

- Laying the foundations for and undertaking strong customer initiatives take time. It is notable then that PSE has planned and launched a number of innovative pilot programs, even though the Company has not yet completed its AMI deployment. Progress to date underscores PSE's intent to maximize the capabilities provided by its AMI investment. The Company's commitment to maximizing AMI benefits documented in the AMI Benefits Report stands in contrast with other utilities who have yet to maximize customer benefits many years after full AMI deployment, as referenced in the American Council for an Energy-Efficient Economy ("ACEEE") report.[1]

## II. PSE AMI OVERVIEW AND BACKGROUND

**Q. Please provide an overview of PSE's efforts to deploy AMI to date.**

A. PSE began installing the AMI network in 2016, and initiated AMI meter deployment in 2017 for electric and gas customers in its service territory. To date, PSE has installed about 838,085 AMI electric meters and 531,240 AMI gas modules, representing about two thirds of all electric and gas customers. The

[1] Rachel Gold, Corri Waters, & Dan York, *Leveraging Advanced Metering Infrastructure To Save Energy*, ACEEE (Jan. 3, 2020).

Company is on track to reach a deployment rate of 90 percent by the end of this year, and to complete its universal deployment by 2023.

**Q. What benefits associated with the AMI deployment project did PSE identify?**

A. In its 2019 general rate case, PSE identified three main benefit streams related to the deployment of AMI:

- Avoided costs associated with the replacement of the Company's obsolescent AMR system;
- Conservation voltage reduction ("CVR"); and
- Distribution automation benefits.

PSE quantified these benefits over the 20-year lifetime of the AMI assets, reporting an expected total benefit of $668 million.[2] With an estimated cost of $473 million, the project was determined to have a benefit-cost ratio of 1.4.

PSE noted in its filing that AMI would enable a number of other benefits, including the ability to connect and disconnect remotely, advanced outage prediction and communication without customer calls, availability of load profile and demand information. However, PSE did not quantify and include these benefits in its benefit-cost analysis at that time.[3]

[2] *WUTC v. Puget Sound Energy*, Dockets UE-190529/UG-19530, et al., Direct Testimony of Catherine A. Koch, Exh. CAK-1T (June 20, 2019).

[3] As explained in the original AMI business case, PSE prioritized use cases with empirical data available at the time and focused on quantifying use cases whose benefits were expected to be large. PSE did anticipate that many of the non-quantified use cases would likely have material value and envisioned making an effort to quantify some of these benefits when more reliable data became available. *See WUTC v. Puget Sound Energy*, Dockets UE-190529/UG-19530, et al., Direct Testimony of Catherine A. Koch, Exh. CAK-1T, Appendix A (PSE 2016 AMI Business Case) (June 20, 2019).

**Q. What were the Commission's findings with respect to PSE's AMI investment decision?**

A. The Commission ruled that PSE's decision to replace its AMR system with the AMI system was prudent. However, the Commission authorized PSE to recover only its deferred depreciation expense and did not grant PSE the recovery of the return on its AMI investment until the Company is able to demonstrate that both PSE and its customers "receive maximum value from its AMI system."[4] As guidance, the Commission referenced a *Utility Dive* article that describes findings from a report published by the ACEEE[5] and noted,

> "We encourage the Company to carefully review the report referenced in the Utility Dive article, which examined whether utilities are leveraging AMI by capturing data on six use cases: 1) time of use ("TOU") rates, 2) real-time energy use feedback for customers, 3) behavior-based programs, 4) data disaggregation, 5) grid-interactive efficient buildings, and 6) CVR or volt/VAR optimization. The Commission is interested in PSE's analysis of the six use cases and whether or how they are applicable, as well additional information or metrics that demonstrate AMI's benefits to customers. Although we share PSE's optimism about the benefits AMI will ultimately produce, we reiterate our expectation that PSE will maximize those benefits."[6]

**Q. What are the key findings from the ACEEE report?**

A. The ACEEE report describes how utilities can maximize the benefits of their deployed AMI system to end-use customers, detailing six use cases, as listed

[4] *WUTC v. Puget Sound Energy*, Dockets UE-190529/UG-190530, et al., Final Order 08/05/03 ¶157 (July 8, 2020) (hereinafter "Final Order 08/05/03").

5 Robert Walton, *Most Utilities Aren't Getting Full Value From Smart Meters, Report Warns* (Jan. 13, 2020), https://www.utilitydive.com/news/most-utilities-arent-getting-full-value-from-smart-meters-report-warns/570249/; *see also* Gold et al., *Leveraging Advanced Metering Infrastructure to Save Energy*.

[6] Final Order 08/05/03 ¶157.

above. One key finding in the article is that even though many utilities have deployed AMI, they are not fully utilizing opportunities to leverage AMI to maximize energy efficiency and demand response benefits for their customers. The authors recommend that regulators encourage utilities in their AMI business cases to quantify and incorporate AMI's potential conservation benefits.
I note that while the ACEEE report enumerates six "distinct" use cases, in practice, they are not entirely distinct from one another; two or more use cases can be utilized together in a program offering. For example, insights from data disaggregation inform customers enrolled in a TVR program how best to manage and optimize their energy consumption behaviors.

In addition, while the ACEEE report provides an important perspective, the report's primary focus is on energy efficiency. AMI certainly enables utilities to offer a broader range of conservation opportunities to their customers, either through new programs and services or enhancing existing ones. AMI's customer-facing benefits extend beyond energy efficiency opportunities, including many tangible and intangible benefits. The Company documented some of these benefits in its 2019 general rate case filing, and I discuss them further below. Equally important, AMI will enable customer empowerment and will be instrumental in helping PSE make meaningful progress toward decarbonizing its power system.

**Q. Please explain how AMI enables customer empowerment and PSE's decarbonization efforts.**

A. In recent years, customers have become increasingly engaged in their energy consumption decisions. Some customers are interested in modifying their energy lifestyle to reduce bills. Others are interested in adjusting their energy habits due to concerns about climate change, wishing to mitigate greenhouse gas emissions through personal actions. At the same time, new energy technologies have become more accessible than ever: rooftop PV panels, battery storage, and electric vehicles ("EV") are becoming more economically appealing. As a result, customers desire and demand more information that can enable them to identify ways to lower their energy usage, reduce their carbon footprint, and save money. AMI's granular data and two-way communication capabilities allow customers to participate in utility rates programs with incentives for customers to actively manage their usage. Such programs can also provide AMI-enabled appliance-level information and insights such that customers can more effectively identify and take advantage of energy efficiency opportunities. Customers can also leverage AMI data to inform their decisions about adopting new technologies and taking advantage of new rates and programs (i.e., EV, TOU rates) which improve the economics of their investments, while benefiting the broader system.

In addition, AMI plays a critical role in making the power grid more flexible, a functionality that will become exceedingly important as more renewable energy resources are deployed in the future. Washington State, through its Clean Energy

Transformation Act, commits to source 100 percent of its energy from renewable resources by 2045. Because renewable energy resources are intermittent and variable, Washington's electricity grid will need to operate more flexibly, both on the supply side and the demand side (in the form of load flexibility), for system reliability and to minimize costs. One of the most efficient and cost-effective ways to deploy load flexibility is through real-time pricing coupled with enabling technologies such as smart thermostats, smart appliances, whole-house energy management systems, and grid-interactive efficient buildings ("GEB"). Other time-varying pricing options can be relied on in the interim until enabling technologies can seamlessly communicate with and respond to real-time prices. AMI is a necessary platform in the implementation of any time-varying pricing and other load flexibility programs.

## III. AMI BENEFITS REPORT

### A. Purpose and Scope of AMI Benefits Report

**Q. What is the purpose of Brattle's AMI Benefits Report?**

A. In response to the Commission's request that PSE demonstrate its progress in maximizing the customer-facing benefits of AMI, the Company retained Brattle to develop a report on the customer benefits of AMI-enabled and AMI-enhanced programs. These include both the benefits that PSE has been able to achieve to date as well as those that PSE plans to achieve through future customer programs and offerings.

**Q. What are the AMI use cases that you consider in the report?**

A. Prior to engaging Brattle, PSE followed a systematic approach and identified 38 AMI use cases that are enabled, enhanced, or facilitated by AMI.[7] These include the six use cases that the Commission highlighted in the 2019 general rate case Final Order, as well as benefits that PSE did not quantify in the Company's previous filing. As described above, I evaluated all of these use cases and classified them into three tiers for analysis:

- **Tier 1:** the six customer-facing use cases that the Commission highlighted in the previous rate case;
- **Tier 2:** use cases that PSE has prioritized and made progress on planning or implementing to date; and
- **Tier 3:** use cases that are either difficult to quantify or are in very early stages of development.

**Q. What are the specific programs in each use case that you evaluate in the report?**

A. The specific programs associated with each use case are shown in Figure 1 below. While the 2019 general rate case Final Order highlights six use cases, I consolidated use cases that would drive similar impacts into one category for my Tier 1 use case evaluation. Specifically, the real-time informational feedback use case, the data disaggregation use case, and the behavior-based program use case are all evaluated as the "**behavior-based program use case**." The specific programs include:

[7] The AMI report elaborates on the specific role that AMI plays in the various use cases.

- Online information presentment program (supplemented with data disaggregation);
- High usage notification program (supplemented with data disaggregation);
- Virtual commissioning pilot (for small business customers); and
- In-home display pilot (for residential customers).

I refer to the GEB use case as the "**load flexibility use case**" as the latter is a more commonly used term in the industry and has broader coverage. This use case includes a smart thermostat program, a grid-interactive water heater program, and a behavioral demand response program in PSE's case. I also evaluate the Bainbridge Island Targeted Demand Response ("DR") pilot and the City of Duvall Targeted DR pilot under the scope of the load flexibility use case. The third Tier 1 use case, "**time-varying rates use case**," includes TOU rate, peak-time rebate, and TOU rate for customers who own electric vehicles. Finally, I did not quantify the benefits of the behavior-based *pilot* programs at this point given their relatively small scale. I also did not evaluate the "CVR Volt/VAR use case" as it was addressed in PSE's original business case and will be reported in the Prefiled Direct Testimony of Catherine A. Koch, Exh. CAK-1T. Figure 1 below provides a mapping of our Tier 1 use cases with the Commission-identified six use cases and a brief overview of our approach.

***Figure 1: Tier 1 Use Cases Quantified in AMI Benefits Report***

| Commission Use Case | Brattle's Tier-1 Classification | Status/Approach |
|---|---|---|
| 1. TOU Rates | 1. Time-Varying Rates<br>• Time of Use Rates<br>• Time of Use Rates with Peak-Time Rebates | PSE is currently planning a TVR pilot that will test TOU and PTR rates (including rates for customers with EVs, low-income customers and small business customers). |
| 2. Behavior-based Programs | 2. Behavior-based Programs<br>• Online Information Presentment<br>• High Usage Notifications<br>• Virtual Commissioning Pilot (small business) | PSE is currently implementing three programs that are intended to yield energy savings through effective provision of information to customers. |
| 3. Real-time Informational Feedback for Customers | 2. Behavior-based Programs<br>• IHD Pilot Program (residential)<br>• Online Information Presentment | PSE is currently implementing an in-home display pilot program. The information presentment is expected to yield behavior change and lead to conservation. |
| 4. Data Disaggregation | 2. Behavior-based Programs<br>• Actionable Information, deployed with other behavior-based programs (online information presentment, high usage notifications)<br>• Increased Marketing Effectiveness and Targeting for PSE Programs | While the primary benefit of data disaggregation is likely the increased marketing effectiveness of utility programs, we only quantify the customer benefits associated with conservation due to better information about appliance usage. |
| 5. Grid-interactive Efficient Buildings (GEB) | 3. Load Flexibility Programs<br>• Smart thermostat programs for space heating (system-wide)<br>• Grid-interactive water heating load control (system-wide)<br>• Behavioral demand response (system-wide)<br>• Bainbridge Island Targeted Demand Response ("DR") pilot (for reducing electricity peak demand)<br>• City of Duvall Targeted DR pilot (for managing gas peak demand) | While the GEB use case is specifically about reducing the electricity usage and improving load flexibility in large buildings through smart controls, the PSE team has reinterpreted this use case as the broad umbrella of load flexibility programs more effectively enabled by AMI. |
| 6. CVR or volt/VAR Optimization | • CVR/VVO | This use case has been quantified in PSE's AMI business case and will be discussed in Witness Catherine Koch's testimony. |

The Tier 2 use cases include smart street lighting, remote connect and disconnect, improved outage management, and reduced metering costs for customer with distributed generation.

Finally, I qualitatively describe the benefits of a select number of Tier 3 use cases, including improved bill generation, avoided metering issues, better visibility into asset utilization, and improved DER planning and integration.

## B. Process and Method

**Q. Please describe your process for quantifying the use case benefits.**

A. As I mentioned earlier, prior to engaging Brattle, PSE had convened a working group of internal subject matter experts ("SMEs") to identify a wide range of AMI benefits for both electric and gas customers. I reviewed all of these AMI use cases and prioritized a select group to quantify. After that, I worked closely with the PSE SMEs to understand and gather information about the current status and future plans for all relevant programs. When there were questions about execution plans for any of the programs, I followed up with the respective PSE team as needed. To evaluate the benefits of various use cases, I independently designed a modeling framework. To the extent that the PSE SMEs were able to provide information and data necessary for my assessment of benefits, I reviewed and confirmed most of them and proposed alternatives for others based on my experiences in other jurisdictions. I augmented any data gap through additional research, outreach to industry experts, and my expert judgment as informed by my experience and familiarity with similar programs elsewhere.

**Q. Please describe the general benefit assessment framework that you developed.**

A. For each of the use cases, I quantified the expected annual benefits through 2037, which marks the end of expected 20-year life of the AMI meters deployed in 2017. After estimating the annual expected benefits through 2037, I calculate the total nominal benefits. Given the uncertainty involved in calculating expected benefits over a long-time horizon, I developed Low, Base, and High cases for each use case to provide a range for the expected values.

**Q. What are the major benefit categories that you quantified?**

A. For the Tier 1 use cases, I focus on five major benefit categories. They are:

- Avoided generation capacity cost;
- Avoided transmission and distribution ("T&D") capacity costs;
- Avoided energy costs;
- Avoided emissions; and
- Avoided T&D losses

In general, for each of these benefit categories, I relied on information from PSE's 2021 Integrated Resource Plan to the extent possible. I discuss the details of our approach and specific assumptions for each of these benefits and specific use cases in the AMI Benefits Report. It is important to note that not all five benefit categories were quantified in every program examined in the AMI Benefit Report, because each program offers a different set of applicable benefits. Figure 2 below presents each of

the Tier 1 use cases, the programs addressed under each, and the benefit categories quantified.

***Figure 2: Tier 1 Use Case Benefits***

| | Programs | Avoided Generation Capacity Costs | Avoided T&D Capacity Costs | Avoided T&D Losses | Avoided Energy Costs | Avoided Emissions |
|---|---|---|---|---|---|---|
| TVR | TOU | ● | ● | ● | ● | x |
| | TOU + PTR | ● | ● | ● | ● | x |
| | EV TOU | ● | ● | ● | ● | x |
| Behavior Based Programs | IHD Pilot | (Not Quantified) | | | | |
| | Virtual Comissioning Pilot | (Not Quantified) | | | | |
| | Online Information Presentment | ● | ● | ● | ● | ● |
| | High Usage Notification | ● | ● | ● | ● | ● |
| | Data Disggregation | ● | ● | ● | ● | ● |
| Load Flexibility Programs | Smart Thermostat for Space Heating | ● | ● | ● | x | x |
| | Behavioral Demand Response | ● | ● | ● | x | x |
| | Grid-Interactive Water Heating | ● | ● | ● | ● | x |
| | Bainbridge Island Targeted DR Pilot | (Avoided Distribution Component of Wired Solution Deferral Benefit) | | | | |
| | City of Duvall Targeted DR Pilot | (Avoided Pipeline Deferral Benefit) | | | | |

**Q. Please describe your approach for evaluating benefits of other use cases.**

A. I undertook the same general process to examine other use cases, where I worked closely with PSE SMEs to identify which use case(s) can be reliably evaluated. Specifically, I examined four Tier 2 use cases:

- **Outage management –** AMI information can be integrated with other systems to allow PSE to detect outages earlier, reduce outage duration, and provide customers with accurate and timely outage information.

- **Remote connect and disconnect –** AMI provides PSE the ability to remotely turn on or off meters to support changes in occupancy, recurring non-payment issues, and prepaid service offerings. The main benefits of this use case are reduced operations and maintenance costs due to fewer truck rolls, reduced bad debt amount, and reduced unauthorized energy usage.

- **Smart street lighting –** The AMI communication network can be used for communicating the status and performance of the Company's LED street lights. Benefits include reduced truck rolls, fewer outage calls, and improved asset management.

- **Lower metering costs for customers with distributed generation –** With AMI meters, customers do not need to upgrade their meters in order to participate in net metering programs.

It is important to note that some of the use cases also lead to other benefits such as increased customer satisfaction, increased reliability and resilience, and local job benefits. I have not quantified these benefits at this time due to lack of reliable inputs.

**Q. Are there additional costs to be incurred, above and beyond the AMI costs, in order to realize the benefits from the Tier 1 use cases?**

A. Yes. While AMI provides the foundational functionalities (i.e., broadband communications and granular data reading capabilities, etc.) to enable many of the customer-facing use cases addressed in my testimony, PSE would need to develop, implement, and support these programs, and therefore incur some additional costs. For each use case, I consider three cost categories: capital investment costs; program administration costs; and program implementation costs. Capital costs include expenditures that PSE will incur when upgrading its billing or IT systems to accommodate new programs. For example, prior to

deploying TVR, PSE will need to make modifications to its billing system to incorporate new or different billing determinants. Program administration costs refer to pre-launch costs associated with program design and development (such as personnel and consultant costs) as well as day-to-day operation costs when the program is up and running. Finally, program execution costs include general marketing cost, customer acquisition costs, and any program incentives (such as rebates for eligible devices or participation payments). These costs scale with the number of participants.

**Q. Have you quantified these costs in your assessment of PSE's AMI use case benefits?**

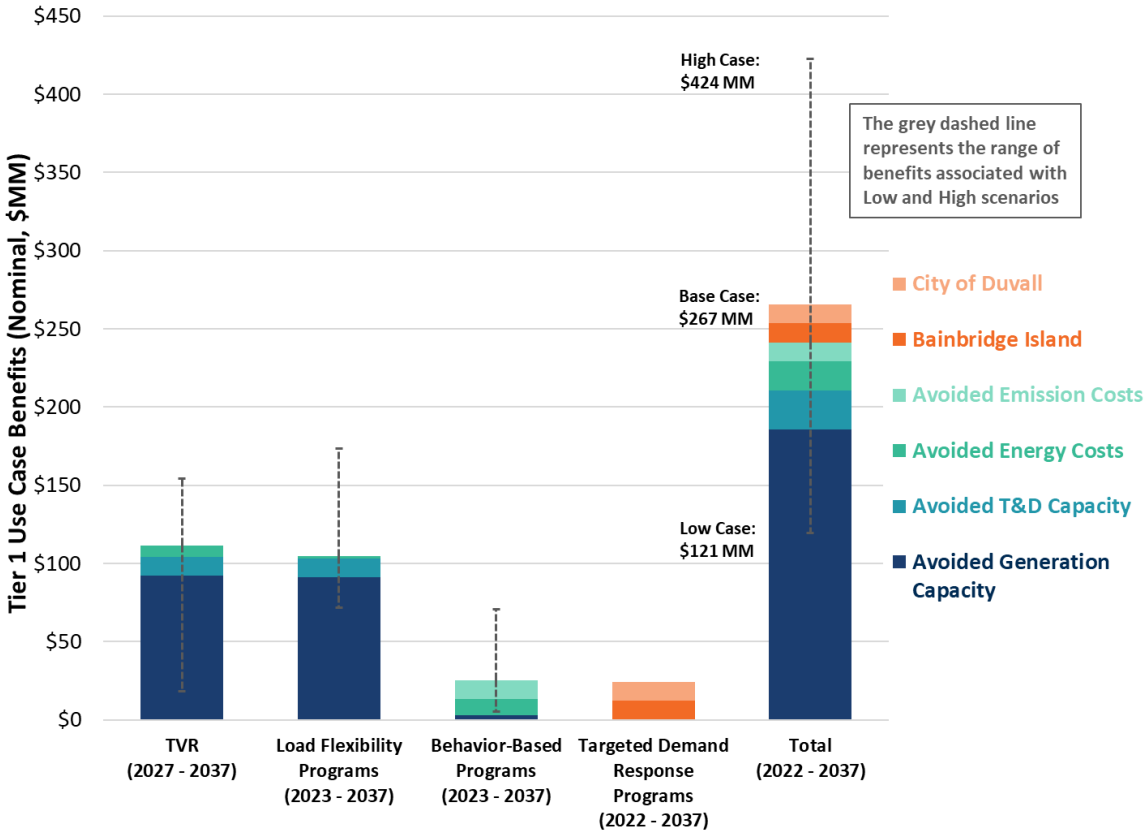
A. Yes, I quantified costs based on currently available information. I note, however, that the cost estimates could change, either upwards or downwards, as additional cost information becomes available. Many of the Tier 1 use cases are in their planning stages, and some longer-term capital and O&M costs to support these programs have not been fully determined by PSE SMEs at this time. In order to develop an order of magnitude for these costs, I have leveraged data from other utilities and jurisdictions to the extent that data is publicly available. However, these borrowed cost assumptions have a wider band of uncertainty compared to benefits, as costs are closely linked to each utility' existing IT, billing, and program administration capabilities, which can vary from one utility to another.

## C. Key Results and Conclusions

**Q. What are the benefits of Tier 1 use cases?**

A. I estimate that total benefits of the Tier 1 use cases amount to about $267 million in the Base case. These benefits are incremental to the benefits estimated in PSE's original business case at $668 million. As seen in Figure 3 below, load flexibility programs (including the Duvall and Bainbridge DR programs) are expected to provide the most benefits, followed by the TVR programs and behavior-based programs. Of the five benefit categories, the avoided generation capacity benefit ranks the highest. I note that there is a wide range in total benefits, extending from $121 million in the Low case to $424 million in the High case. This range is a function of the uncertainty in some of the assumptions.

*Figure 3: Tier 1 Use Case Benefits*



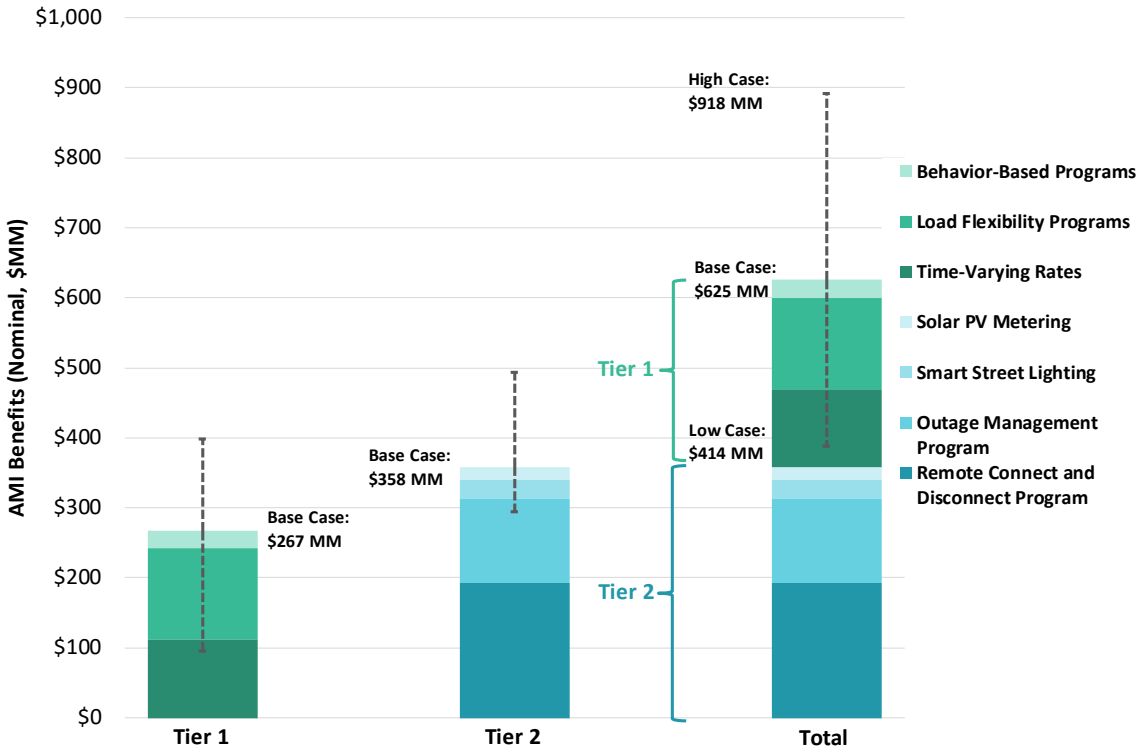

Note: Benefits associated with T&D loss are incorporated into the other benefit categories.

**Q. What are the benefits of Tier 2 use cases?**

A. The total benefits of Tier 2 use cases are higher than the benefits of Tier 1 use cases. I estimate the total Tier 2 benefits to be $358 million in the Base case, with the Low case being $294 million and High case $494 million. The magnitude of the total benefit amount is driven by the outage management use case and the remote connect/disconnect use case, which are expected to respectively lead to $121 million and $192 million in benefits in the Base case. When Tier 1 and Tier

2 benefits are added together, the total benefit in the Base case is about $625 million over the 20-year period (see Figure 4 below).

***Figure 4: Benefits of Tier 1 and Tier 2 Use Cases***




**Q. What are your estimates of the program costs?**

A. I estimate that the incremental costs for implementing Tier 1 and Tier 2 use case total program costs will be about $118 million (see Figure 5 below). For Tier 1 use cases, the largest cost item will be the TVR program, followed by the load flexibility program. Again, these costs are incremental to the AMI investment costs included in the original business case. The top two largest benefits, outage management and remote connect/disconnect, are primarily enabled by the AMI

core capabilities; therefore, the major costs associated with these two use cases are already accounted for.[8]

*Figure 5: Costs for Tier 1 and Tier 2 use cases ($ million)*

| Program | Benefit | Incremental Cost |
|---|---|---|
| **Tier 1** | | |
| Time-Varying Rates | $ 111 | $ 45 |
| Load Flexibility Programs | $ 130 | $ 48 |
| Behavior-Based Programs | $ 25 | $ 3 |
| **Total** | **$ 267** | **$ 95** |
| **Tier 2** | | |
| Remote Connect and Disconnect | $ 192 | $ 10 |
| Outage Management | $ 121 | $ 0.04 |
| Smart Street Lights | $ 27 | $ 12 |
| Solar PV Metering | $ 18 | $ 0.1 |
| **Total** | **$ 358** | **$ 22** |
| **Total** | **$ 625** | **$ 118** |

**Q. What are your conclusions about PSE's Tier 1 and Tier 2 program benefits and costs?**

A. Across all of the Tier 1 and Tier 2 use cases, I estimate that the total benefit will be about $625 million over the 20-year period and the total costs are about $118 million. These benefits and costs are incremental to the original AMI business case benefits and costs and result in a benefit-cost ratio of about 2.2. The High benefit-cost ratio is driven by Tier 2 use case benefits, especially benefits associated with the outage management use case and the remote connect/disconnect use case. This is because the AMI network and meter

[8] There is a capital investment cost of $10 million for the remote connect and disconnect capability.

deployment constitute the bulk of the capital cost for these two use cases, and that cost is already accounted for in the original AMI business case. As noted earlier, the cost estimates involve a large level of uncertainty. However, given that the quantified benefits are overwhelmingly greater than these estimated costs, it is reasonable to think that even if the costs are several times greater, there would still be net benefits from these use cases. The Company will be able to quantify these costs with much improved accuracy in their programmatic filings.

I would also note that PSE in its original business case estimated the cost of the AMI project at $473 million, and the benefits at $668 million, yielding a benefit-cost ratio of 1.4. These results alone provide a compelling basis for and clearly justify PSE's decision to implement AMI.

## IV. PSE IS WELL-POSITIONED TO ACHIEVE THE PROJECTED AMI BENEFITS

### A. AMI Benefit Maximization Process

**Q. In your experience, how long does it take for utilities to maximize benefits from their AMI investment?**

A. It depends on the specific utility, but in general, it takes time to lay the foundations for and undertake strong customer-facing initiatives. Some operational benefits can be achieved almost immediately while others will take several years to be realized. For example, operational savings associated with remote connect/disconnect benefits can be realized as soon as AMI meters are

installed and activated.[9] Likewise, CVR and distribution automation benefits can be realized relatively quickly.[10] On the other hand, customer-facing programs can take more time to implement, in part because of the level of customer engagement and education required to design and deploy these programs thoughtfully and successfully. For example, full deployment of TVR programs can take several years because the utility requires some time to conduct market research, hold focus groups, perform economic analysis, convene stakeholder meetings, and design the program elements. Often, the utility will wish to conduct a pilot prior to launching a full-scale program to test and learn at a smaller scale, and the pilot may last a couple of years. And of course, the utility will need to carry out this activity with the regulator's approval.

**Q. How does PSE's progress in maximizing AMI benefits compare to other utilities when at a similar stage of AMI deployment?**

A. As I explain further below, PSE's progress in implementing AMI and maximizing benefits meets or exceeds industry standards. PSE has planned and launched a number of innovative pilot programs, even though the Company has not yet completed its AMI deployment. PSE has identified a number of AMI use cases, tasked multiple teams with delivering the benefits of these use cases, and started implementing some of these use case benefits. The Company's commitment to maximizing the AMI benefits documented in the AMI Benefits Report stands

[9] It is my understanding that PSE had planned to initiate this program, but paused the program implementation due to the COVID-19 moratorium on disconnects.

[10] Please refer to Exh. CAK-7 for more information on how PSE has achieved these benefits to date.

favorably relative to other utilities who have yet to maximize customer benefits many years after full AMI deployment, as referenced in the ACEEE report. The time it takes to develop customer-facing programs is also evident from the utilities highlighted in the ACEEE report. For instance, Portland General Electric ("PGE"), one of the two utilities singled out in the ACEEE for using AMI for all six use cases, started its AMI deployment in 2008 and completed it in 2010.[11] PGE's smart pricing pilot was approved in 2015 and recruitment began in 2016. After the successful implementation of the pilot, PGE started to offer TVR rates to the full customer population in 2019, 11 years after the start of the deployment.[12] Similarly, Consumers Energy started its AMI deployment in 2012 and concluded it in 2017.[13] The utility implemented two pricing pilots, one in 2010 prior to the AMI deployment and another in 2019. Resulting from the success of these pilots, Consumers Energy deployed TOU rates to the full customer population in 2020.[14] In Consumer Energy's case, it took eight years for the company to offer the TOU rates to the full customer population from the start of the deployment.

[11] Portland General Electric, *Smart Grid Report*, at 92(June 2019), https://edocs.puc.state.or.us/efdocs/HAQ/um1657haq15635.pdf.

[12] *Id*. at 94.

[13] T&D WORLD, *Consumers Energy to Finish Installing Upgraded Meters in 2017* (Jan. 4, 2017), https://www.tdworld.com/smart-utility/metering/article/20967551/consumers-energy-to-finish-installing-upgraded-meters-in-2017.

[14] Ahmad Faruqui, *Moving Ahead with Time-Varying Rates (TVR)*, THE BRATTLE GROUP (Apr. 6, 2020), https://brattlefiles.blob.core.windows.net/files/18500_moving_ahead_with_time-varying_rates_tvr_-_us_and_global_perspectives.pdf.

In this context, PSE's progress to date is notable, and it underscores PSE's intent to maximize the capabilities provided by its AMI investment.

## B. PSE has the Right Framework to Maximize Benefits from its AMI Investments

**Q. Please discuss the steps that PSE has taken to allow the Company to leverage its AMI investment to maximize customer benefits.**

A. PSE has devoted significant resources and taken a thorough and holistic approach to maximizing customer benefits from its AMI investments. From hiring a specialized staff position, to creating a working group, to developing internal company processes to facilitate coordination across the company, the Company has demonstrated a strong commitment to fully leverage AMI in its current and future customer offerings and services.

Since PSE began implementing AMI, the Company has taken several important steps so it would be well positioned to maximize customer benefits enabled by AMI. Recognizing the need for a centralized resource to identify and prioritize AMI data use cases and to coordinate AMI capabilities and use cases across different departments and business units, PSE in 2019 hired an AMI strategist. Led by the AMI strategist, PSE in the spring of 2020 created the AMI Data Enablement Working Group, which focused on identifying, prioritizing, and initiating the development of high value AMI data use cases. Shortly after, PSE formed a cross-functional AMI Alliance team. The team is responsible for tracking, managing, and confirming that the AMI use cases are progressing, and

addressing any related business governance issues as needed. Both the AMI strategist and the AMI Alliance team continue to evaluate and prioritize maximizing PSE's AMI assets and data.

Please refer to Exh, CAK-7 for a more detailed discussion of PSE's internal infrastructure and plans to maximize its AMI investment.

**Q. To this end, what specific programs or initiatives has PSE developed?**

A. PSE has planned and launched a number of innovative pilot programs that aim to maximize customer benefits by leveraging capabilities provided by its AMI investment. To keep track of and to communicate its progress in this effort, PSE has devised an implementation plan for each benefit use case. For the full implementation plan, please refer to Exh. CAK-7, Appendix C. Progress to date illustrates the Company's intent to maximize customer benefits, even though the Company has not yet completed its AMI deployment. PSE has thoroughly demonstrated its plan to maximize AMI benefits, and has begun to realize some of these benefits.

## V. CONCLUSION

**Q. Does this conclude your prefiled direct testimony?**

A. Yes.