

**EXH. CAK-7
DOCKETS UE-22 ___/UG-22 ___
2022 PSE GENERAL RATE CASE
WITNESS: CATHERINE A. KOCH**

**BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

**WASHINGTON UTILITIES AND
TRANSPORTATION COMMISSION,**

Complainant,

v.

PUGET SOUND ENERGY,

Respondent.

**Docket UE-22 ___
Docket UG-22 ___**

**SIXTH EXHIBIT (NONCONFIDENTIAL) TO THE
PREFILED DIRECT TESTIMONY OF**

CATHERINE A. KOCH

ON BEHALF OF PUGET SOUND ENERGY

JANUARY 31, 2022

PUGET SOUND ENERGY

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1 **PUGET SOUND ENERGY**

2 **SIXTH EXHIBIT (NONCONFIDENTIAL) TO THE**
3 **PREFILED DIRECT TESTIMONY OF**
4 **CATHERINE A. KOCH**

5 **I. OVERVIEW**

6 **Q. Please describe the purpose of this testimony.**

7 A. This testimony summarizes PSE’s decision to implement its Advanced Metering
8 Infrastructure (“AMI”) investment beginning in 2016, the current status of PSE’s
9 AMI deployment since the Commission’s order on AMI in PSE’s 2019 general
10 rate case, Dockets UE-190529/UG-190530 et al. (“2019 General Rate Case”), the
11 significant progress PSE has made toward maximizing its AMI investment for its
12 customers, the anticipated benefits its AMI investment will provide to PSE and its
13 customers, PSE’s plan for achieving those benefits, and PSE’s proposal for
14 tracking and reporting those benefits to the Commission.

15 **Q. What is PSE requesting from the Commission in this proceeding regarding**
16 **its AMI investment?**

17 A. PSE requests that the Commission authorize PSE’s recovery of its AMI
18 investment made since January 1, 2019, and the return on its AMI investment to
19 date, from the initial AMI investment made in 2016. PSE requests that the
20 Commission include the investment and return on investment in the multiyear rate
21 plan determination as PSE’s entire AMI investment will be completed during the
22 rate plan period.

1 **Q. What materials is PSE providing in support of its AMI investment request in**
2 **this case?**

3 A. In support of its request that the Commission authorize the recovery of the AMI
4 investment and recovery of the return on the AMI investment, PSE is providing
5 the following:

- 6 1. **Koch, Exh. CAK-7 (this Exhibit)**: This testimony summarizes PSE’s
7 AMI deployment; reports on the AMI benefits PSE identified in the 2019
8 General Rate Case; and describes PSE’s progress toward achieving AMI
9 benefits identified by the Commission in the 2019 General Rate Case
10 Final Order, plus additional benefits PSE has identified. Finally, it
11 explains and requests recovery of and on the AMI investments completed
12 and that will be completed through the multiyear rate plan period.
- 13 2. **Koch, Exh. CAK-7, Appendix C**: This document describes PSE’s plan
14 for implementing the AMI benefit use cases that PSE is or intends to
15 implement to maximize its AMI investment; proposes how this plan and
16 realized benefits will be tracked and reported; and highlights specific AMI
17 performance metrics as part of PSE’s multiyear rate plan scorecard.
- 18 3. **Sergici, Exh. SIS-1T**: The Prefiled Direct Testimony of Dr. Sanem I.
19 Sergici describes the AMI Benefits Report prepared by The Brattle Group
20 (“Brattle”), which discusses PSE’s current AMI deployment and plans to
21 maximize customer benefits. Dr. Sergici is a Principal with Brattle.
- 22 4. **Sergici, Exh. SIS-3**: The AMI Report describes the current state of AMI
23 in the United States and in Washington State, the value and use of AMI to
24 further clean energy, PSE’s development and processes that demonstrate
25 an organizational culture and infrastructure to maximize the AMI assets,
26 and the quantification of the benefits expected through PSE’s
27 maximization of AMI, including the six use cases discussed in the *Utility*
28 *Dive* article¹ referenced by the Commission regarding the ACEEE report
29 on AMI.²

¹ Robert Walton, *Most utility 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/>.

² Rachel Gold, Corri Waters, & Dan York, *Leveraging Advanced Metering Infrastructure to Save Energy* (Jan. 27, 2020) (available for download from <https://www.aceee.org/research-report/u2001>).

1 **Q. How is this testimony exhibit organized?**

2 A. This exhibit is organized as follows:

- 3 • Section II reviews PSE’s decision to replace its obsolete Automated Meter
4 Reading (“AMR”) system with AMI, and the primary benefits and cost
5 that supported this decision;
- 6 • Section III reviews PSE’s inclusion of AMI in the 2019 General Rate Case
7 and the Commission’s order regarding the prudence of PSE’s decision to
8 transition to AMI and the reasons for deferring recovery of the return on
9 PSE’s AMI investment;
- 10 • Section IV reviews PSE’s progress in deploying AMI and how it is
11 already used and useful;
- 12 • Section V reviews the three primary quantified benefits outlined in the
13 2016 AMI Business Case (Appendix A) and presents the actual benefits
14 achieved thus far;
- 15 • Section VI discusses PSE’s broader benefit use case development and
16 approach to maximizing the AMI investment, and the quantification of
17 additional benefits in response to the Commission’s order in PSE’s 2019
18 General Rate Case;
- 19 • Section VII discusses why AMI is necessary to meet the Clean Energy
20 Transformation Act (“CETA”);³
- 21 • Section VIII explains why recovery on PSE’s AMI investment is
22 appropriate now and in the multiyear rate plan; and
- 23 • Section IX discusses the recovery of the AMR investment.

24 **II. AMI PROGRAM BACKGROUND**

25 **Q. Please describe PSE’s AMI investment.**

26 A. In 2016, PSE began replacing its AMR system with AMI across PSE’s electric
27 and gas service territory. PSE began installing the AMI network in 2016 and

³ Chapter 19.405 RCW.

1 customer meter and module replacement started in 2018 for PSE’s approximately
2 1.2 million electric and 860,000 gas customers. In total, PSE will invest
3 approximately \$456 million⁴ in capital in an AMI communication network and
4 metering equipment, which is expected to be fully installed by the end of 2023.
5 An additional \$17 million in operations and maintenance (“O&M”) expense,
6 mostly associated with the software system that collects meter data and the effort
7 to enable conservation voltage reduction (“CVR”), brings the total investment to
8 \$473 million.

9 **Q. Why did PSE decide to transition to AMI?**

10 A. As described in my testimony in the 2019 General Rate Case⁵ and in the 2016
11 AMI Business Case, PSE decided to transition from AMR to AMI because PSE’s
12 AMR system was obsolete, failing, and had reached the end of its useful life. In
13 addition, transitioning to AMI would provide significant benefits to customers
14 including the ability to expand voltage reduction for energy savings for
15 customers, serve as a foundational technology in providing a communications
16 platform for advancing distribution automation to improve reliability for
17 customers, enable customer access to more granular energy use information, and
18 provide the foundation for PSE to modernize its grid.

⁴ Financial numbers are represented as nominal dollars.

⁵ *WUTC v. Puget Sound Energy*, Dockets UE-190529/190530 et al., Prefiled Direct Testimony of Catherine A. Koch, Exh. CAK-1T (June 20, 2019).

1 **Q. Describe how PSE's AMR system was failing and obsolete.**

2 A. PSE's AMR system was installed between 1998 and 2001 and with a design life
3 of 15 years, PSE's AMR system was obsolete in 2016, over five years ago.
4 Because of AMR system obsolescence, PSE experienced system failure and was
5 unable to obtain replacement equipment causing PSE to rely on refurbished
6 equipment which was unreliable and unsustainable. PSE determined that by
7 transitioning to AMI, it would significantly improve meter reliability and save
8 customers \$230 million in avoided capital and O&M AMR investment.

9 **Q. Describe how customers would benefit from energy savings because of being**
10 **able to broadly implement voltage reduction with AMI.**

11 A. PSE determined that by transitioning to AMI, it would allow PSE to broadly
12 implement CVR, which lowers customers' energy usage through a reduction in
13 supply voltage. Unlike AMR, AMI provides detailed voltage and load data. This
14 information allows PSE to not only set voltage points within required standards,
15 but also identify opportunities for PSE to fine-tune its electricity delivery to
16 provide this conservation benefit with no adverse impact to the customer. PSE
17 determined that transitioning to AMI would provide a total benefit to customers of
18 \$436 million as a result of less energy use.

1 **Q. Describe how AMI would serve as a foundational technology for advancing**
2 **distribution automation to improve reliability for customers.**

3 A. AMI provides a distribution automation (“DA”) communication network that PSE
4 can utilize instead of a commercial cellular network. This network provides
5 secure communications between reclosers, switches, and the control center. The
6 use of the reliable AMI mesh network avoids the on-going cost of a commercial
7 cellular network estimated to a benefit of \$1.5 million.

8 **Q. Describe the AMI capabilities that enable customer choices and further**
9 **customer benefits.**

10 A. Throughout PSE’s 2016 AMI Business Case, PSE highlighted additional AMI
11 capabilities that would be pursued to benefit customers through the use of the
12 granular energy and operating information. This included using data to:

- 13 • Enhance services and offer new products that customers can choose;⁶
- 14 • Proactively notify customers of outages, forecast monthly billing, and
15 issue high bill alerts;⁷
- 16 • Enable dynamic or time of use rates, and facilitate direct load control
17 programs;⁸ and
- 18 • Relative to enabling the modernization of the grid, provide the foundation
19 to effectively build and operate microgrids and other smart city attributes
20 like street light controls, distributed generation integration, electric vehicle
21 integration, and customer home-area network interface.⁹

⁶ Exh. CAK-7, Appendix A at 3 (2016 AMI Business Case).

⁷ *Id.* at 32.

⁸ *Id.* at 9.

⁹ *Id.* at 9-10.

1 PSE's business case focused first on the benefits that were supported by strong
2 PSE empirical data and industry studies, acknowledging that over time, these
3 additional capabilities would be pursued, and benefits would be quantified as
4 data became available.¹⁰ PSE knew that as AMI deployment proceeded, data
5 from the new operational processes would allow better estimation of the benefits
6 that would come as these additional capabilities were explored.¹¹

7 **Q. What was the total net economic benefit PSE estimated customers would**
8 **realize through AMI?**

9 A. PSE determined that the total economic benefit of transitioning to AMI, including
10 avoided AMR investments, implementing CVR, and deploying DA over the AMI
11 network, is \$668 million through 2037. Compared to the cost of the project at
12 \$473 million, the project results in a net benefit to customers of \$258 million
13 through the life of the AMI system.

14 **Q. Is the AMI program on track to achieve the estimated net benefits to**
15 **customers?**

16 A. Yes. As discussed in section V below, PSE has already begun to realize, and is on
17 track to achieve, the economic benefits described above in addition to the
18 numerous non-quantified benefits described above from the 2016 AMI Business

¹⁰ *Id.* at 7.

¹¹ *Id.* at 8.

1 Case. Additionally, PSE is currently forecasting to be under budget on the AMI
2 investment implementation.

3 **III. 2019 GENERAL RATE CASE ORDER ON AMI**

4 **Q. Did PSE seek recovery for its AMI investment in its 2019 General Rate**
5 **Case?**

6 A. Yes. PSE requested recovery of the AMI investments installed between October
7 1, 2016 and December 31, 2018, in its 2019 General Rate Case. I submitted
8 prefiled direct testimony and supporting exhibits in that case, describing and
9 documenting PSE’s business decision to implement AMI, the obsolescence of
10 PSE’s AMR system, PSE’s calculations demonstrating the net benefits to
11 customers in transitioning to AMI, and the non-quantifiable benefits AMI would
12 provide.¹² My testimony demonstrated that PSE’s decision to transition from
13 AMR to AMI was prudent, that the portion of the AMI system installed at the
14 time was in service and benefiting customers, and as result, PSE requested full
15 rate recovery for its AMI investment to date.

16 **Q. Did the Commission find that PSE’s decision to transition to AMI was**
17 **prudent?**

18 A. Yes. The Commission rejected arguments from interveners that PSE prematurely
19 abandoned its AMR system, noting that PSE provided “ample testimony and

¹² *WUTC v. Puget Sound Energy*, Dockets UE-190529/190530 et al., Prefiled Direct Testimony of Catherine A. Koch, Exh. CAK-1T (June 20, 2019).

1 evidence related to the obsolescence of its AMR system” and “testimony and
2 exhibits documenting its business case, including each of the systems it
3 considered before it elected to install AMI. . . . Therefore, we determine based on
4 the record evidence that the operational decision to install AMI was prudent.”¹³

5 **Q. Did the Commission agree with PSE that AMI is the industry standard?**

6 A. Yes. The Commission agreed with PSE that “moving to a smart meter platform
7 has become the industry standard, and the Company is appropriately on pace to
8 keep up with this evolving technology.”¹⁴

9 **Q. Did the Commission allow PSE to recover its AMI investment to date,
10 including a return on that investment?**

11 A. Not entirely. Even though the Commission found that PSE’s decision to transition
12 to AMI was prudent, the Commission allowed PSE to only recover its AMI
13 investment to date but denied PSE any return on that investment.

14 **Q. Why did the Commission deny PSE a return on its investment?**

15 A. The Commission determined that notwithstanding the obsolescence of its AMR
16 system, the prudence of PSE’s decision to transition to AMI, and the economic
17 benefits to customers of transitioning to AMI described above, PSE also needed

¹³ *WUTC v. Puget Sound Energy*, Dockets UE-190529/UG-190530 et al., Final Order 08/05/03 ¶ 153 (July 8, 2020).

¹⁴ *Id.*

1 to provide a plan for achieving certain additional benefits. As explained by the
2 Commission:

3 PSE has not yet satisfactorily demonstrated the benefits of the AMI
4 system as a whole. The Company represented at hearing that it is planning
5 to pursue additional benefits, but has yet to put forth any formal plan or
6 proposal. . . . As such, PSE has not yet made a showing that would justify
7 authorizing the Company to recover a return on any portion of its AMI
8 investment made thus far.

9 Going forward, the Commission will evaluate the portion of AMI
10 investment for which PSE seeks recovery in rates, but will require the
11 continued deferral of the *recovery of the return* on each portion of the
12 investment until the AMI project is complete. Our decision recognizes that
13 PSE will not be able to demonstrate a significant portion of AMI benefits
14 until the system is fully deployed. In light of these circumstances, we will
15 reserve a final determination of prudence on the project as a whole until
16 the AMI installation is complete and all customer benefits can be
17 presented for evaluation. The final prudence determination thus rests on
18 PSE's ability to live up to its promises of multiple customer benefits.¹⁵

19 **Q. Did the Commission explain what benefits it expected PSE to show to earn a**
20 **return on its investment?**

21 A. In its Final Order, the Commission referenced a *Utility Dive* article which
22 described certain AMI use case benefits that had not been subject to discovery or
23 presented as evidence in the case.¹⁶ The *Utility Dive* article was first referenced
24 by the Commission at the general rate case hearing.

¹⁵ *Id.* at ¶¶ 155-156.

¹⁶ Walton, *Most utility 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/>.

1 **Q. Please describe the *Utility Dive* article referenced.**

2 A. The *Utility Dive* article referenced by the Commission summarized the results of
3 an American Council for Energy Efficiency Economics (“ACEEE”) report¹⁷
4 conducted in January 2020, which concluded that most utilities were not getting
5 the full value of smart meters.

6 **Q. Please describe the ACEEE report that was the basis of this article.**

7 A. ACEEE sought input from the top 52 utilities by sales about their AMI programs
8 and whether, as of 2018, the utilities were using AMI to help customers save
9 energy based on six AMI use cases.¹⁸ The report acknowledged that AMI
10 provides other operational and customer benefits, but the primary goal of the
11 research was focused on energy efficiency benefits of AMI.¹⁹ The report
12 highlighted Portland General Electric as one of the two utilities reporting the use
13 of AMI in all six uses cases, approximately seven years after Portland General
14 Electric had implemented AMI. The six use cases were:

- 15 • Real-time energy use feedback to customers;
- 16 • Behavior-based programs with customer feedback and insights;
- 17 • Time-of-use rates;
- 18 • Program targeting, marketing, and technical assistance using insights from
19 data disaggregation;
- 20 • Grid-interactive efficient buildings; and

¹⁷ Rachel Gold, Corri Waters, & Dan York, *Leveraging Advanced Metering Infrastructure to Save Energy* (Jan. 27, 2020).

¹⁸ *Id.* at 53.

¹⁹ *Id.* at 3.

- CVR or Volt/VAR optimization.

Q. Since the 2019 General Rate Case Final Order, has the Commission provided further guidance on rate recovery for an AMI investment?

A. Yes. In the Commission’s Final Order in Avista’s recent general rate case, Dockets UE-200900/UG-200901 et al. (“Avista GRC”), the Commission provided the following guidance on what it expected to see with respect to an AMI investment:

- Maximization of the ACEEE six use cases referenced above, “in addition to further information or metrics that demonstrate AMI’s benefits to customers”,²⁰
- A “substantial” completion of an AMI deployment;²¹
- Demonstration of “a significant portion of benefits,” including the ability to “adequately demonstrate or quantify the associated benefits”;²²
- A plan or proposal for achieving the associated benefits;²³
- “[M]ust be able to present all customer benefits for evaluation, not that all customer benefits must have already been realized. We also refrain from such unrealistic expectations that a utility must demonstrate all benefits that might be realized by AMI in the future before recovery on its investment in rates”;²⁴
- A description of any unquantifiable benefits;²⁵ and
- “Develop and report further analyses of the use cases,” “[c]raft and report plans for achieving benefits through application of each of the use cases, above,” and “[d]evelop and propose AMI performance-based regulation metrics and measurements that the Commission might apply, and

²⁰ *WUTC v. Avista Corp. d/b/a Avista Utilities*, Dockets UE-200900/UG-200901 et al., Final Order 08/05 ¶ 218 (Sept. 27, 2021).

²¹ *Id.* at ¶ 222.

²² *Id.* at ¶ 223.

²³ *Id.* at ¶ 224.

²⁴ *Id.* at ¶ 225.

²⁵ *Id.* at ¶ 226.

1 specifically such metrics and measurements for each of the use cases,
2 above.”²⁶

3 **Q. Does PSE believe recovery of its AMI investment to date, including a return**
4 **on that investment, is warranted?**

5 A. Yes. As described in further detail below, recovery of PSE’s AMI investment to
6 date, including a return on that investment, is appropriate now, for the following
7 reasons:

- 8 1. PSE’s AMI investments since the last rate case and through the end of the
9 test year are used and useful.
 - 10 i. A substantial portion of PSE’s AMI system is installed, is in-
11 service, is benefiting customers now, and full deployment will be
12 completed during PSE’s rate plan period. Sections IV and VIII
13 discuss how many customers now have AMI and the expected full
14 deployment by the end of the rate plan.
 - 15 ii. PSE is already realizing and has a plan to achieve the quantified
16 benefits presented in the 2019 General Rate Case. Section IV
17 discusses how customers are currently benefiting from AMI,
18 including CVR, DA over the AMI network, and avoided AMR
19 investments.
- 20 2. PSE’s AMI investments made from the end of the test year to the end of
21 the rate plan, December 31, 2025, meet the Commission’s Used and
22 Useful Policy²⁷ as discussed in section VIII.
 - 23 i. The programmatic AMI investments are in alignment with the
24 Used and Useful Policy including the investment is programmatic,
25 PSE has provided the estimated cost and basis, a description of the
26 investment, existing documentation, offsetting factors, and
27 expected date in service.
 - 28 ii. PSE’s AMI investments will be subject to the proposed annual
29 prudence review associated with the multiyear rate plan as

²⁶ *Id.* at ¶ 228.

²⁷ *In the Matter of the Commission Inquiry into the Valuation of Public Service Company Property that Becomes Used and Useful after Rate Effective Date*, Docket U-190531, Policy Statement on Property that Becomes Used and Useful After Rate Effective Date (Jan. 31, 2020).

1 described in the Prefiled Direct Testimony of Jon A. Piliaris, Exh.
2 JAP-1T.

3 2. PSE has met the Commission's guidance regarding recovery of return on
4 the investments.

5 i. PSE is already realizing and is presenting a plan to achieve the
6 benefits referenced by the Commission in the 2019 General Rate
7 Case Final Order, plus additional quantifiable and unquantifiable
8 benefits. Section VI discusses PSE's progress to achieve benefits
9 associated with the ACEEE use cases and PSE's processes to
10 maximize AMI. This is further addressed in Sergici, Exh. SIS-1T
11 and the AMI Benefits Report.

12 ii. PSE is presenting a proposal in this case for tracking and reporting
13 on its AMI benefits referenced by the Commission in Avista's
14 GRC along with performance-based regulation metrics and
15 measurements that the Commission might apply in connection with
16 PSE's AMI deployment. PSE's AMI Benefit Implementation Plan,
17 Appendix C, provides roadmaps that demonstrate a clear plan for
18 implementing the uses cases and achieving the associated benefits.

19 **IV. A SIGNIFICANT PORTION OF PSE'S AMI SYSTEM IS**
20 **INSTALLED, IN-SERVICE, AND BENEFITING CUSTOMERS NOW**

21 **Q. How much of the AMI system is installed as of June 30, 2021?**

22 A. From January 1, 2019 to June 30, 2021, PSE invested \$282.4 million in capital
23 and \$10,362 in O&M related to capital associated with 4,377 communication
24 network devices, 527,966 electric meters, and 360,140 gas modules placed in
25 service.

26 In total, since beginning deployment, over 1,106,981 meters and modules have
27 been installed. This amounts to 94 percent of the communication network, 59
28 percent of electric meters, and 47 percent of gas modules.

1 **Q. Is the AMI deployment on track?**

2 A. Yes. PSE is on track to complete full deployment in 2023 and within budget. PSE
3 has experienced deployment challenges including complications caused by
4 COVID-19, installation resource shortages, and supply chain delays, but the
5 transition to AMI remains on schedule.

6 **Q. Are the installed AMI meters and modules used and useful?**

7 A. Yes. Over 1,160,981 customers now have their energy use measured and billed
8 utilizing AMI equipment, and the meters and modules installed are performing the
9 function they were designed to do. AMR meters and modules for these customers
10 have been removed.

11 **Q. How is AMI benefiting customers now?**

12 A. AMI is benefiting customers both directly (customers with AMI installed) and
13 indirectly (all customers, irrespective of AMI installation status). For example:

- 14 • PSE's Customer Care organization is using the more granular AMI data in
15 resolving billing issues;
- 16 • Customers have access to more granular usage data and thus can make
17 better decisions about their energy usage. In addition, as of the end of
18 2021, PSE expanded its online data presentment program, providing
19 customers with interval data, more-customized energy management tips,
20 and estimated end-use load data disaggregation;
- 21 • PSE built a dashboard that the Revenue Protection team uses to flag self-
22 reconnects which are then investigated further, drilling into AMI interval
23 energy use data and if appropriate, pursuing a potential diversion;
- 24 • Because installing AMI meters and modules requires visiting every
25 customer premise, many issues have been discovered including stopped

1 meters, tampering, damaged meters, and meter mix ups. In mass
2 deployment, PSE's vendors take pictures which help to identify modules
3 that have slowed. Additionally, PSE has identified 188 potential
4 diversions in this process;

- 5 • AMI data is being used by PSE engineers to implement CVR, which
6 benefits all customers;
- 7 • PSE is leveraging the AMI network to implement DA and control
8 reclosers to improve reliability; and
- 9 • PSE has approximately 400 smart street lights using the AMI network and
10 is rolling more out each day.

11 **Q. Should PSE be permitted to earn a return on its AMI investment even**
12 **though the AMI deployment will not be complete until 2023?**

13 A. Yes, it is appropriate for the Commission to authorize PSE to earn a return on the
14 AMI investment for several reasons. First, as indicated above, while PSE's AMI
15 system is not yet fully implemented, it is used and useful for those customers that
16 have AMI meters or modules installed. At the time of this filing, some PSE
17 customers will have had AMI meters or modules installed and operating for
18 several years yet PSE is not being allowed to earn a return on that equipment.

19 Second, as described above, the AMI system is already providing benefits to all
20 PSE customers, not just those that have meters or modules installed, as PSE
21 leverages the AMI network to bring benefits to all customers, including those that
22 may not have an AMI meter or module yet.

23 Third, it is important to put PSE's AMI program in perspective. In the recent
24 Commission order allowing Avista recovery and return on its AMI investment,

1 the Commission observed that Avista's AMI roll-out was substantially complete.
2 Notably, while both PSE and Avista began their AMI roll-out in 2017, PSE has
3 installed more than twice the number of meters and modules than Avista's total-
4 roll out in roughly the same time period.

5 Finally, given that PSE's AMI deployment will be complete in 2023 which is
6 during PSE's rate plan period, recovery of the investment and recovery of the
7 return on the investment should be considered as other investment plans are
8 considered in this rate plan. Delaying this decision until the next filing after the
9 completion of this rate plan would effectively mean PSE would not begin to
10 recover the return on investment until sometime in 2026, three years after
11 completed deployment and nearly ten years after PSE began installing the AMI
12 system.

13 For the reasons noted above and as described in greater detail below, PSE
14 requests that the Commission authorize PSE to earn a return on its AMI
15 investment, including the deferred amount from the 2019 General Rate Case,
16 from March 2019 forward to be included in the first rate year of 2023.

**V. PSE IS ALREADY REALIZING AND IS ON TRACK TO
ACHIEVE THE AMI BENEFITS IT PROJECTED IN THE 2019
GENERAL RATE CASE**

Q. Is PSE on track to achieve the benefits described in the 2019 General Rate Case?

A. Yes. As described above, CVR, DA over the AMI network, and avoided AMR are core benefits from AMI, and PSE is on track to achieve them. Relative to each core benefit implemented because of AMI that PSE has deployed through the revenue rate periods, Table 1 summarizes the projection of these benefits that will be realized over the 20-year life of the AMI asset. Each benefit is described in more detail below.

Table 1. Summary of AMI Core Benefits Projected over 20 Year AMI Asset Life

Core Benefit	Benefit over 20 years for devices installed between 1/1/2019 – 6/30/2021	Cumulative benefit over 20 years for devices installed since initial installation through 6/30/2021	Cumulative benefit of 20 years for devices installed since initial installation through 12/31/2025
Conservation Voltage Reduction (NPV \$ millions) ²⁸	6.0	14.8	83.8
Distribution Automation over the AMI Network (Nominal \$ millions)	0.12	0.14	2.40
AMR Obsolescence Avoided (Nominal \$ millions)	118.4	138.1	326.9

²⁸ Benefits are represented in net present value dollars to align with the PSE’s energy efficiency program measurement approach.

1 **A. CVR Benefits Resulting From AMI**

2 **Q. Please describe CVR and how it is implemented.**

3 A. With AMI meters in place, PSE can gather load profiles and monitor voltage
4 using the AMI meter voltage capability, model various conditions, and adjust
5 substation settings to serve customers within the lower half of the standard
6 voltage range, moving away from higher, more conservative settings that result in
7 customers using more energy. AMI meters will facilitate voltage performance
8 monitoring to check and verify the circuit modeling.

9 **Q. Please describe how the CVR benefit was estimated in the 2016 AMI
10 Business Case.**

11 A. PSE estimated CVR starting with AMI pilots in 2013 which ramped up over
12 several years to 12 substations annually.

13 **Q. Please describe the total CVR benefits that have been realized.**

14 A. Through June 30, 2021, PSE has completed CVR implementations at 15
15 substations and the total annual energy savings is 12,183,176 kWh with a
16 cumulative energy saving for customers of 47,044,274 kWh. Using the
17 calculation methodology consistent with PSE's energy efficiency methodology,²⁹
18 through June 30, 2021, the cumulative CVR benefit over the 20-year life of AMI

²⁹ Calculation includes values for avoided energy, capacity, social cost of carbon, deferred renewable acquisition, and deferred T&D.

1 is \$14.8 million, and by December 31, 2021, there is a cumulative CVR benefit of
 2 \$23.2 million.

3 **Q. Please describe the benefits that are expected in each rate period.**

4 A. Table 2 provides the actual number of substation CVR projects between January
 5 1, 2019 through June 30, 2021, and the resulting benefits realized from this work
 6 as well as implementations since the initial CVR installation. The projected plan
 7 and benefits are represented in the remaining periods through the last year of the
 8 rate plan period.

9 **Table 2. CVR Plan and Benefits by Rate Period**

Benefits (NPV)	Up through Current Test Year 1/1/2019 – 6/30/2021	Proforma 7/1/2021 – 12/31/2021	Gap Year 2022	Rate Plan Year 1 2023	Rate Plan Year 2 2024	Rate Plan Year 3 2025
Substations with CVR installed (#)	6	7	12	12	12	12
Cumulative Substations with CVR installed since initial installation (#)	15	22	34	46	58	70
20 year benefit for CVR installed (\$ millions)	6.0	8.3	14.4	14.9	15.4	15.9
Cumulative 20 year benefit for CVR installed since initial installation (\$ millions)	14.8	23.2	37.6	52.5	67.9	83.8

10 **B. Distribution Automation Benefits Resulting from AMI**

11 **Q. Please describe DA over AMI and how it is implemented.**

12 A. The AMI mesh radio network is utilized to transport communication messages for
 13 command and control of distribution grid assets such as reclosers and switches in

1 lieu of cellular radios. To use commercially available cellular networks for this
2 communication requires a fixed investment in the cellular radio and a reoccurring
3 service cost per device, while the use of the AMI network would avoid these
4 reoccurring service costs.

5 **Q. Please describe how the DA over AMI benefit was estimated in the 2016 AMI**
6 **Business Case.**

7 A. PSE estimated the installation of 40 devices annually for DA avoiding a yearly
8 cellular service cost.

9 **Q. Please describe the total benefits that have been realized.**

10 A. Through June 30, 2021, PSE has installed 41 devices using the AMI network
11 which is projected to avoid approximately \$0.14 million over the 20-year life of
12 AMI. PSE will install an additional 55 devices by the end of the pro forma period,
13 December 31, 2021, for a total of 96 devices installed which will result in the
14 cumulative avoided cost of approximately \$0.32 million over the 20-year life of
15 AMI.

16 **Q. Please describe the benefits that are expected in each rate period.**

17 A. Table 3 provides the actual number of DA devices between January 1, 2019
18 through June 30, 2021, and the resulting benefits realized from this work as well
19 as implementations since the initial DA over AMI installation. The projected plan
20 and benefits are represented in the remaining periods through the last year of the
21 rate plan period.

Table 3. DA over AMI Network Plan and Benefits by Rate Period

Benefits (Nominal)	Up through Current Test Year 1/1/2019 – 6/30/2021	Proforma 7/1/2021 – 12/31/2021	Gap Year 2022	Rate Plan Year 1 2023	Rate Plan Year 2 2024	Rate Plan Year 3 2025
Devices installed (#)	35	55	75	112	173	215
Cumulative devices installed since initial installation (#)	41	96	171	283	456	671
20 year benefit for devices installed (\$ millions)	0.12	0.18	0.26	0.40	0.63	0.80
Cumulative 20 year benefit for devices installed since initial installation (\$ millions)	0.14	0.32	0.57	0.97	1.60	2.40

C. AMR Obsolescence Avoided with AMI

Q. Please describe the AMR obsolescence and how the AMI deployment avoids additional cost.

A. AMR obsolescence results from an unacceptable failure rate of meters and modules, an unacceptable failure rate of the communication network, decreasing manufacturer product supply, and lack of market focus on enhancing the AMR technology to meet future needs. AMI will avoid the maintenance obligations that would otherwise increase if the existing AMR system were not replaced which includes increasing dependence on refurbishing existing equipment to meet replacement need.

1 **Q. Please describe how the avoided AMR obsolescence cost was estimated in the**
2 **2016 AMI Business Case.**

3 A. The avoided AMR obsolescence cost was estimated by comparing the difference
4 in the overall operating cost between (i) the assumption that AMR could continue
5 to operate, including the O&M cost and capital cost of refurbishing meters and
6 acquiring scarce supplies from others³⁰ and (ii) the similar time period investment
7 for AMI. The complexity of this avoided cost has been simplified using the 2016
8 AMI Business Case failure rates to predict failure that would have occurred had
9 AMR assets not been replaced with AMI thus far.

10 **Q. Please describe the total benefits that have been realized.**

11 A. Through June 30, 2021, PSE predicts³¹ 65,039 meters and modules would have
12 failed, and 13 network assets would have failed which results in a nominal
13 avoided cost benefit of \$138.1 million over the 20-year life of the AMI assets.
14 Additionally, PSE estimates approximately 72,000 manual reads have been
15 avoided. Based on the actual and forecasted deployment rate, PSE forecasts an
16 avoided cost benefit of \$181.4 million over the 20-year life of the assets as a
17 result of AMI installations through the pro forma period, December 31, 2021.

³⁰ Long term feasible operation is not possible due to dependency on viable harvesting of removed AMR equipment and optimistic refurbishment potential.

³¹ Based on failure rates documented in the 2016 AMI Business Case, Appendix A of Exh. CAK-7.

1 **Q. Please describe the benefits that are expected in each rate period.**

2 A. Table 4 provides the avoided AMR obsolescence resulting from predicted failures
3 between January 1, 2019 through June 30, 2021, and the resulting benefits
4 realized from this work as well as implementations since the initial AMI
5 installation. The projected plan and benefits are represented in the remaining
6 periods through the last year of the rate plan period.

7 **Table 4. AMR Obsolescence Avoided Benefits by Revenue Period**

8

Benefits (Nominal)	Up through Current Test Year 1/1/2019 – 6/30/2021	Proforma 7/1/2021 – 12/31/2021	Gap Year 2022	Rate Plan Year 1 2023	Rate Plan Year 2 2024	Rate Plan Year 3 2025
Avoided failures (#)	737,184	269,307	447,997	225,629	2,117	0
Cumulative avoided failures since initial AMI installation (#)	852,442	1,121,749	1,569,747	1,795,376	1,797,493	1,797,493
20 year benefit of avoided failures since initial installation (\$ millions)	118.4	43.3	89.7	55.1	0.6	0
Cumulative 20 year benefit of avoided failure since initial AMI installation (\$ millions)	138.1	181.4	271.2	326.3	326.9	326.9

1 **VI. PSE IS ALREADY REALIZING AND HAS A PLAN TO ACHIEVE**
2 **THE BENEFITS REFERENCED BY THE COMMISSION IN THE 2019**
3 **GENERAL RATE CASE FINAL ORDER, PLUS ADDITIONAL**
4 **BENEFITS**

5 **A. PSE Has the Necessary Planning and Infrastructure to Achieve the Benefits**
6 **Referenced in the 2019 General Rate Case, Plus Additional Benefits**

7 **Q. Is PSE on track to achieve the benefits referenced in the ACEEE report?**

8 A. Yes. PSE is on track to achieve the benefits referenced in the ACEEE report
9 identified by the Commission in its 2019 General Rate Case Final Order as well
10 as other benefits. As I explain below, PSE’s processes and plans to operationalize
11 and fully leverage AMI began several years before the 2019 General Rate Case
12 Final Order.

13 **Q. Did the ACEEE report identify practices that can help utilities to leverage**
14 **AMI to deliver energy savings?**

15 A. Yes. The report contains suggested practices that are pertinent to utilities and have
16 been helpful to PSE as it leverages AMI to deliver energy savings and benefits to
17 customers. The first is that company program administrators need to break down
18 traditional business silos to manage and maximize AMI. The report emphasizes
19 the importance of coordination across multiple departments or business units that
20 traditionally may not have interacted in the same way.³²

³² Rachel Gold, Corri Waters, & Dan York, *Leveraging Advanced Metering Infrastructure to Save Energy* (Jan. 27, 2020), at 34.

1 Second, the report highlighted the need for utilities to bolster capabilities such as
2 big data management, analytics, security, communications, and requisite staffing
3 to fully utilize and process AMI data.³³ Additionally, once collected, utilities need
4 to provide customers full access to their data in a form that is easy to understand
5 and identify opportunities for customers to make beneficial changes.³⁴ AMI data
6 also needs to be readily available for not just customer billing and records
7 departments, but also to demand-side management program staff, system
8 planners, system operators, and customers.

9 **Q. Please describe what resources, personnel, and planning PSE has expended**
10 **to maximize AMI, consistent with the ACEEE report.**

11 A. Shortly after PSE began implementing AMI, PSE started planning for AMI
12 maximization. In 2018, PSE conducted a review of AMI opportunities and an
13 internal gap analysis that identified several potential risk areas that could prevent
14 PSE from fully realizing the benefits of the AMI deployment. One of the primary
15 risks identified was that PSE did not have a centralized resource to identify and
16 prioritize AMI data use cases and to coordinate AMI capabilities and use cases
17 across different PSE departments and business units.

18 Accordingly, in 2019, PSE hired an AMI strategist that was responsible for
19 maximizing AMI as PSE moved towards completing the transition from AMR.

³³ *Id.* at 34-35.

³⁴ *Id.* at 35.

1 The AMI strategist led a cross functional working group which, in the spring of
2 2020, led to the formation of PSE’s AMI Data Enablement Working Group.

3 The primary goal of the AMI Data Enablement Working Group was to identify,
4 prioritize, and initiate the development of high value AMI data use cases,
5 consistent with the ACEEE recommendations. As part of the process, the working
6 group sought opportunities to align with PSE’s Data Enablement and Enrichment
7 Program which, as discussed in the Prefiled Direct Testimony of Suzanne L.
8 Tamayo, Exh. SLT-1T, is an investment by PSE in data management and science
9 to harvest data and develop tools for increased access and analysis. Appendix B to
10 Exh. CAK-7 describes the evaluation and prioritization process that the AMI Data
11 Enablement Working Group conducted which reviewed 38 uses cases and the
12 functional dependency of each.

13 In July 2020, PSE formed a cross functional “AMI Alliance” team to address on-
14 going business governance for AMI capabilities and related data. The AMI
15 Alliance team is responsible for tracking, managing, and confirming that PSE’s
16 AMI use cases are progressing, as well as developing additional use cases. In
17 early 2021, PSE developed a cross functional innovative group called the “Grid
18 Modernization Emerging Technology Council” that further supports leveraging
19 AMI assets with intentional focus on the exploration, evaluation, and integration
20 of new technology for the benefit of the customers, the environment, and PSE.

1 Today, PSE's AMI strategist role continues to serve as a centralized resource who
2 receives input from across PSE for new AMI use case ideas, coordinates ongoing
3 project schedules and needs, and helps facilitate cross-functional strategy and
4 implementation. PSE's cross functional AMI Alliance team and Grid
5 Modernization Emerging Technology Council will continue to evaluate and
6 prioritize opportunities to maximize PSE's AMI assets and data and leverage
7 PSE's IT architecture strategy that deploys use of the AMI network where
8 valuable.

9 PSE's significant investment in AMI working groups, internal company
10 processes, and specialized staff positions demonstrates PSE's commitment to
11 leveraging the AMI infrastructure and data to the maximum extent possible,
12 proactively filling implementation and organizational gaps highlighted by the
13 ACEEE report.

14 **Q. What else has PSE done to prepare to maximize its AMI investment?**

15 A. In addition to the significant efforts by PSE to plan for and achieve AMI
16 maximization, PSE engaged Dr. Sanem I. Sergici and Dr. Ahmad Faruqui from
17 Brattle, industry leaders in AMI applications, to assist PSE in maximizing and
18 quantifying the benefits from the use cases mentioned in the ACEEE report.
19 Brattle's work is described in greater detail below.

1 **B. Implementing AMI Will Provide Significant Benefits to PSE and Its**
2 **Customers**

3 **Q. Has PSE quantified the benefits it will achieve through its AMI use cases?**

4 A. Yes. PSE retained Brattle to assist in quantifying the benefits expected to be
5 achieved by maximizing AMI, including the use cases identified in the ACEEE
6 report.

7 **Q. Please describe Brattle's work in more detail.**

8 A. Brattle is an economic and financial analytics consulting firm, with a specialty
9 practice in energy and utility issues. Dr. Sergici and Dr. Faruqui are experts in
10 grid modernization including smart meters, energy efficiency, demand response,
11 dynamic pricing, distributed generation, and prosumer behavior. Brattle brings a
12 critical and credible eye to PSE's AMI work, including assisting PSE in
13 implementing AMI consistent with best industry practices. The focus of their
14 work for PSE was to gather PSE's AMI program information and help PSE
15 conduct a robust analysis so that PSE can achieve realistic customer benefits from
16 maximizing AMI.

17 **Q. Did Brattle prepare a report containing its analysis?**

18 A. Yes. Brattle's AMI Benefits Report is provided as Exh. SIS-3.

1 **Q. What use case benefits did Brattle evaluate in the AMI Benefits Report?**

2 A. The AMI Benefits Report describes PSE’s maximization of the ACEEE report’s
3 six use cases and several other use cases identified by PSE and Brattle. Brattle
4 evaluated 38 uses cases and divided them into three categories, as follows:

Brattle's Tier-1 Classification	Commission Use Case ³
1. Time-Varying Rates <ul style="list-style-type: none">• Time of Use Rates• Time of Use Rates with Peak Time Rebates	1. TOU Rates
2. Behavior-based Programs <ul style="list-style-type: none">• Online Information Presentment• High Usage Notifications• Virtual Commissioning Pilot (small business)	2. Behavior-based Programs
2. Behavior-based Programs <ul style="list-style-type: none">• IHD Pilot Program (residential)• Online Information Presentment	3. Real-time Informational Feedback for Customers
2. Behavior-based Programs <ul style="list-style-type: none">• Actionable information, deployed with other behavior-based programs (online information presentment, high usage notifications)• Increased marketing effectiveness and targeting for PSE programs	4. Data Disaggregation
3. Load Flexibility Programs <ul style="list-style-type: none">• Smart thermostat programs for space heating (system-wide)• Grid-interactive water heating load control (system-wide)• Behavioral demand response (system-wide)• Bainbridge Island Targeted DR pilot (for reducing electricity peak demand)• City of Duvall Targeted DR pilot (for managing gas peak demand)	5. Grid-interactive Efficient Buildings (GEB)
CVR/VVO	6. CVR or volt/VAR Optimization

7 Tier 2 uses cases are additional AMI uses cases PSE is currently pursuing which
8 Brattle quantified. They include:

Brattle's Tier-2 Classification

Smart Street Light

Remote Connect and Disconnect

Solar PV Metering – Lower metering costs for customers with distributed generation

Outage Management

1 Tier 3 uses cases are currently under development and PSE expects to quantify
2 their associated benefits in the future. For now, their benefits are only discussed
3 qualitatively. They include:

Brattle's Tier-3 Classification

Improved Bill Generation

Avoided Metering Issues – Theft and Fraud Detection / Meter Failures

Better Visibility into Asset Utilization

Improved DER Planning and Integration

Other Tier 3 Use Cases – 14

4 **Q. What are the key takeaways from the AMI Benefits Report?**

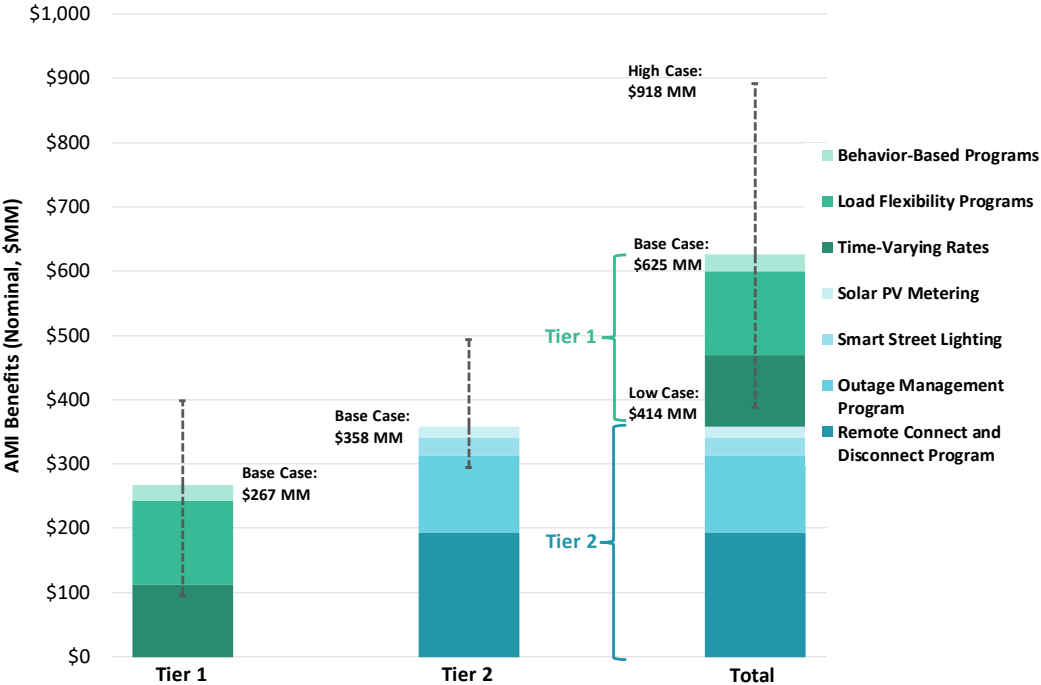
5 A. The key takeaways from the AMI Benefits Report include that the total estimated
6 customer benefit through PSE's AMI implementation of the use cases above will
7 be about \$625 million, or \$507 million net benefits through 2037. These benefits
8 are incremental to the AMI benefits PSE identified in the 2016 AMI Business
9 Case.³⁵ In addition, the AMI Benefits Report and Dr. Sergici's testimony
10 conclude that PSE's AMI governance and processes meet or exceed industry
11 standards and provide confidence of PSE's ongoing ability and commitment to
12 maximizing the AMI assets and customer benefits. Figure 1 summarizes the total

³⁵ Benefit is defined by avoided generation capacity costs, avoided transmission and distribution capacity costs, avoided energy costs, avoided emissions, and avoided transmission and distribution losses.

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anticipated benefits identified in the AMI Benefits Report of the use cases quantified by Brattle.

Figure 1. AMI Benefits Report of Estimated Total Quantified AMI Benefits



As noted above, the benefits evaluated and calculated in the AMI Benefits Report are incremental to those presented by PSE in the 2019 General Rate Case.

Q. Do other PSE witnesses discuss these AMI Tier 1 and Tier 2 use cases?

A. Yes. The AMI Benefits Report provides a holistic view of the benefits that can be delivered from maximizing AMI, but many of the AMI use cases are discussed and sponsored by other PSE witnesses in various PSE departments. Other witness testimony that discusses projects that leverage AMI equipment or data, are as follows:

Table 5. AMI Use Cases and PSE Responsible Witnesses/Departments

	USE CASE	Ownership	Prefiled Direct Testimony Exhibit
1	Time Varying Rates	Will Einstein	Exh. WTE-1CT
2	Online Usage Presentment	Energy Efficiency will oversee this work outside of the rate case proceeding (through biennial conservation planning processes)	N/A
3	High Usage Alert		
4	Virtual Commission		
5	In-Home Display		
6	Demand Response - System-wide load flexibility programs		
7	Duvall		
8	Bainbridge	Roque Bamba	Exh. RBB-1T
9	Tenino High School	Catherine Koch	Exh. CAK-5
10	Bucoda	Catherine Koch	Exh. CAK-5
11	SOLACE (EPRI)	Catherine Koch	Exh. CAK-5
12	Smart Street Lighting	Will Einstein	N/A
13	Remote connect/disconnect	Suzanne Tamayo	Exh. SLT-1T
14	Improved Outage Management	Catherine Koch	Exh. CAK-5
15	Solar PV - Customer Metering Costs	Will Einstein	Exh. WTE-1CT

Q. Does PSE have a plan for how it intends to achieve the benefits described in the AMI Report?

A. Yes. Appendix C to Exh. CAK-7 contains PSE’s AMI Benefit Implementation Plan. The plan is organized consistent with the AMI Benefits Report and contains a detailed plan for each benefit use case. Each use case plan summarizes the total estimated benefit, potential key performance indicators, the PSE organizational owner, expected full benefit realization year, a timeline for implementation through the rate plan, and how the benefit will be reported. The plan also includes a template for annual reporting of AMI benefits that is in addition to various

1 required reporting such as through PSE’s biennial conservation report or the
2 Clean Energy Implementation Plan (“CEIP”) status report. Finally, the plan also
3 proposes several AMI performance metrics in alignment with the Avista GRC
4 which are introduced in the Prefiled Direct Testimony of Dr. Mark N. Lowry,
5 Exh. MNL-1T.

6 **Q. Has PSE identified additional ways to leverage AMI that are not addressed**
7 **in the AMI Report?**

8 A. Yes. PSE is constantly looking for and is finding new opportunities to leverage
9 AMI. A few examples include:

- 10 • PSE’s Beyond Net Zero Carbon initiative, which is discussed in the
11 Prefiled Direct Testimony of Adrian J. Rodriguez, Exh. AJR-1T, offered
12 the opportunity to evaluate dual fuel heat pump³⁶ effectiveness in driving
13 down natural gas energy use overall. AMI interval data from customers
14 with dual fuel heat pumps is being used to understand heat pump load
15 profiles and benefits, design a dual fuel heat pump pilot through energy
16 efficiency, and understand the synergy between electric and gas use to
17 minimize energy bills overall.

- 18 • PSE experienced a significant heat event in August 2021 resulting in a
19 larger number of service transformer failures than had been experienced
20 historically. After the event, PSE engineers leveraged AMI data to
21 understand loading characteristics of service transformers and identify
22 improvements to make and develop any needed asset plans.

³⁶ A dual fuel heat pump is an electric heat pump that uses a natural gas furnace as backup for colder temperatures when heat pump effectiveness may be less.

1 **VII. AMI IS NECESSARY FOR PSE TO ADHERE TO THE CLEAN**
2 **ENERGY TRANSFORMATION ACT AND OTHER STATE**
3 **MANDATES.**

4 **Q. Does AMI play a role in the transition to clean energy and grid**
5 **modernization?**

6 A. Yes. AMI is a foundational technology that is necessary for PSE to meet
7 Washington State’s clean energy and grid modernization requirements and
8 objectives. Over the past few years, Washington State has adopted numerous
9 clean energy laws and policies whose requirements and objectives cannot
10 realistically be met without greater volume and accuracy of metering data, a
11 modernized power grid, and two-way communication between customers’
12 premises and utilities, all of which requires AMI.

13 For example, in 2019, the Washington State Legislature passed Chapter 19.280
14 RCW to “encourage the development of new safe, clean, and reliable energy
15 resources to meet demand in Washington for affordable and reliable electricity.”³⁷

16 A provision of that chapter requires electric utilities to engage in distributed
17 energy resource (“DER”) planning that must “identify the data gaps that impede a
18 robust planning process as well as any upgrades, such as but not limited to
19 ***advanced metering and grid monitoring equipment*** [emphasis added]. . . that
20 would allow the electric utility to quantify the locational and temporal value of
21 resources on the distribution system.”³⁸ This requirement matches one of the DER

³⁷ RCW 19.280.010.

³⁸ RCW 19.280.100(2)(a).

1 planning “best practices” that the Commission identified to the Washington
2 Legislature in its December 31, 2017 *Report on Current Practices in Distributed*
3 *Energy Resource Planning*.³⁹

4 In addition, as discussed further below, AMI is necessary for PSE to meet CETA
5 which requires electric utilities in Washington to remove all coal-fired electric
6 generation from their resource portfolios by the end of 2025, use a portfolio of
7 resources that is greenhouse gas neutral and 80 percent from renewable or non-
8 emitting power by 2030, and produce an electricity supply from renewable
9 resources by 2045.⁴⁰ The law requires PSE to file a CEIP for reaching these goals,
10 and deploying AMI is a key part of delivering the capability associated with the
11 investments that are in PSE’s CEIP.⁴¹

12 Finally, the 2021 Washington State Energy Strategy describes the goal of clean
13 energy and reduced emissions and reinforces that “[a]dvanced metering
14 infrastructure (AMI) is one of the key components of a smart grid.”⁴² To that end,
15 the Strategy recommended that Governor Inslee and the Legislature “[p]rovide
16 support for increased deployment of advanced metering infrastructure (AMI).”⁴³

³⁹ Washington Utilities and Transportation Commission, *Report on Current Practices in Distributed Energy Resource Planning: Operating Budget, Laws of 2017, Ch. 1, § 142*, at 3 (Dec. 31, 2017), <https://www.utc.wa.gov/sites/default/files/2021-02/DER%20Planning%20Report%20-%20Final.pdf>.

⁴⁰ RCW 19.280.030; RCW 19.280.040; RCW 19.280.050.

⁴¹ RCW 19.280.060.

⁴² Washington State Department of Commerce, *Washington 2021 State Energy Strategy: Transitioning to an Equitable Clean Energy Future*, at 124 (Dec. 2020), <https://www.commerce.wa.gov/wp-content/uploads/2020/12/Washington-2021-State-Energy-Strategy-December-2020.pdf>.

⁴³ *Id.*

1 **Q. Exactly how is AMI necessary to meet CETA and the customer benefits**
2 **mandated within the rules?**

3 A. AMI is necessary for PSE to comply with CETA because it provides granular,
4 near real time data that allows PSE to optimize and operationalize demand side
5 management, renewable energy resources, and customer programs, all of which
6 are key components of PSE's CEIP. CETA requires each electric utility to file a
7 CEIP every four years beginning in January 2022 that includes a plan to meet the
8 long-term standards set by CETA; sets interim targets; describes specific targets
9 for energy efficiency, demand response, and renewable energy; and describes
10 specific actions that the utility will take to show progress towards meeting the
11 standards.⁴⁴ PSE's recently-filed CEIP targets DERs, demand response, and
12 energy efficiency programs as well as substantial utility scale renewable resources
13 as key methods of meeting the long-term CETA standards. Deploying AMI is
14 critical to PSE's CEIP because AMI will provide necessary data, be leveraged in
15 decision support tools, and feed real time operations of the programs envisioned
16 in the CEIP. Some examples include:

- 17 • **Utilizing data** – As a part of the CEIP, customer end use and DER
18 operational data will be collected to refine and maximize program
19 offerings and benefits. However, much of this data would be unavailable
20 or much less accurate without AMI. For example, PSE's time-varying
21 rate pilot is a key program included in the CEIP and could not proceed
22 without AMI because PSE must have access to granular data to set
23 varying rates, understand customer adoption, optimize program design,
24 and monitor how customer use changes over time.

⁴⁴ RCW 19.405.060.

- 1 • **Real-time operations** – Data will be fed into operational tools such as the
2 Virtual Power Plan, the Advanced Distribution Management System, the
3 Outage Management System, and the Energy Management System for
4 monitoring and real-time decisions as DERs turn on and off and customer
5 reliability and dispatch tradeoff decisions are needed. Additionally, with
6 Demand Response—another key program included in the CEIP—AMI
7 will be used to monitor real-time behavior relative to program event calls.
- 8 • **Decision support tools** – Customer end use AMI data will be used in
9 geospatial load forecast analysis tools and feed modeling and simulation
10 tools to predict and monitor operational conditions for near- and long-
11 term investment planning. Results will mature hosting capacity maps—
12 another tool included in the CEIP—to increase transparency regarding
13 where more demand-side management and DERs can be accommodated.

14 **VIII. RECOVERY OF PSE’S AMI INVESTMENT, INCLUDING A**
15 **RETURN ON ITS INVESTMENT, IS APPROPRIATE NOW**

16 **Q. What is the proper standard for earning a return on utility plant used to**
17 **provide service to customers?**

18 A. The longstanding standard for earning a return on utility plant is found in RCW
19 80.04.250, which provides that property or plant additions must be “used and
20 useful” to be included in rates. “Used” means that the investment (plant) is in
21 service, and “useful” means that a company has demonstrated that its investment
22 benefits Washington ratepayers.⁴⁵ Recent changes to RCW 80.04.250 also allow
23 the Commission to adjust rates for utility property that becomes used and useful
24 after the rate effective period.⁴⁶

⁴⁵ *WUTC v. PacifiCorp d/b/a Pac. Power & Light Co.*, Docket UE-130043, Order 05 ¶ 79 (Dec. 4, 2013).

⁴⁶ RCW 80.04.250(2).

1 **Q. Do the AMI network, meters, and modules installed to date meet the used**
2 **and useful standard?**

3 A. Yes. As noted above, over 1,106,981 PSE customers now have their energy use
4 measured and billed using AMI equipment. As of June 30, 2021, PSE's customers
5 have received 15,216,065 bills calculated from AMI data. At this point in the
6 deployment, PSE has installed more than 2.5 times the AMI assets than Avista's
7 total customer population in Washington State. PSE's AMI network, software,
8 and systems are fully functioning to serve PSE's AMI meters and modules.

9 **Q. Is full AMI deployment necessary for AMI to be used and useful?**

10 A. No. An AMI meter or module is used and useful and serving a customer when it
11 is connected to the AMI network. Once connected to the network, it makes no
12 difference whether the entire AMI system is installed. As noted above, at this
13 point, some PSE customers have had AMI meters installed and fully operating
14 since 2018. There is no "function" that needs to be installed after the last meter or
15 module is installed that makes the AMI system function differently than it is
16 today; only more customers will have been transitioned.

1 **Q. Has the Commission provided guidance on the changes to the used and**
2 **useful standard within a multiyear rate period?**⁴⁷

3 A. Yes. As noted above, recent changes to the used and useful standard provides that
4 the Commission may now value property “used and useful for service in this state
5 by or during the rate effective period.”⁴⁸ The Commission’s Used and Useful
6 Policy addresses the process used to identify, review, and approve public service
7 company property that becomes used and useful for service in this state on or after
8 the rate effective date.⁴⁹ The policy states that in identifying an investment, either
9 specific or programmatic that will be used and useful during the rate plan period,
10 it must include the estimated cost, a description of the investment as well as other
11 existing documentation, offsetting factors, and expected date in service.⁵⁰ For
12 programmatic investments, utilities should demonstrate their spending through
13 historical trends related to the specific program.⁵¹

14 **Q. Does PSE’s ongoing AMI investment meet the new used and useful**
15 **standard?**

16 A. Yes, it does. PSE’s AMI deployment is programmatic. It is very similar to PSE’s
17 cable remediation program or pole replacement program as it replaces a discrete
18 number individual failure prone assets, such that over time the entire population

⁴⁷ *In the Matter of the Commission Inquiry into the Valuation of Public Service Company Property that Becomes Used and Useful after Rate Effective Date*, Docket U-190531, Policy Statement on Property that Becomes Used and Useful After Rate Effective Date (Jan. 31, 2020).

⁴⁸ *Id.* at ¶ 7.

⁴⁹ *Id.* at ¶ 19.

⁵⁰ *Id.* at ¶ 34.

⁵¹ *Id.* at ¶ 35.

1 has been programmatically addressed. As each asset is replaced, it is placed in
 2 service and becomes used and useful and provides benefit. The Used and Useful
 3 Policy also affirms the inclusion of investment plans that are related to the Smart
 4 Grid Technology Report⁵² of which AMI was identified as foundational
 5 technology even in PSE’s first report submitted to the Commission in 2010.

6 **Q. Please provide the actual and planned capital investments over the six rate**
 7 **periods.**

8 A. Table 6 provides the actual plant in service amounts from January 1, 2019 through
 9 the end of the test year of June 30, 2021. The remaining periods are estimated
 10 based on current programmatic plan. AMR network decommissioning in 2023
 11 and 2024 is included in the AMI network plan.

12 **Table 6. Summary of Capital Investment by Rate Period**

Program (\$ millions)	Up to the Current Test Year 1/1/2019 – 6/30/2021	Proforma 7/1/2021 – 12/31/2021	Gap Year 2022	Rate Plan Year 1 2023	Rate Plan Year 2 2024	Rate Plan Year 3 2025
Electric Meters	37.9	16.7	43.8	31.6	0	0
Gas Modules	17.9	13.5	25.5	20.9	1.0	0
AMI Network	14.6	3.0	2.5	1.6	1.5	0

13 **Q. Please describe the basis for the programmatic cost for AMI in more detail.**

14 A. As discussed in my 2019 General Rate Case testimony, PSE analyzed different
 15 AMI deployment schedules and determined a six-year deployment brings the

⁵² *Id.* at ¶ 34, n. 37.

1 greatest value. The programmatic investment is based on the six-year deployment
2 plan and is estimated based on an annual work plan to meet that deployment plan
3 and unitized meter/module replacement costs.

4 **Q. Please describe the cost controls employed to efficiently deploy AMI.**

5 A. The cost controls deployed by PSE for AMI are discussed in the Prefiled Direct
6 Testimony of Roque B. Bamba, Exh. RBB-1T, which follow industry best
7 practices and are based on PSE's Infrastructure Project Lifecycle Phase/Gate
8 Model.

9 **Q. Are there O&M expense reductions that are expected to result from this**
10 **programmatic investment?**

11 A. Yes. Customers are beginning to benefit, or are already benefiting, from
12 reductions in O&M expense and power costs as a result of the AMI deployment.

13 A significant O&M expense reduction came from lower meter read fees that was
14 negotiated for both AMR and AMI as a result of the decision to transition to AMI,
15 a decrease of 47 percent per meter read fee effective as of 2017. Customers have
16 been experiencing this benefit for almost four years. The current O&M plan
17 already captures this reduction.

18 Relative to benefits that will come from AMI, the avoided AMR obsolescence
19 investment benefit as well as DA over AMI benefit directly avoid additional
20 O&M expense. The AMI Benefits Report calculates many other customer benefits
21 primarily through the lens of avoided costs associated with generation capacity,

1 transmission and distribution capacity, energy, transmission and distribution
2 losses, and avoided additional power purchase costs. Like the core benefits, these
3 are costs PSE does not have to add to the plan as a result of this investment.
4 Where CVR has been deployed, customers are using less energy and thus
5 benefiting from this conservation program. It is also benefiting customers by
6 avoiding power purchases due to its impact on power demand over time.
7 Finally, by 2024, AMR repair expenses will no longer be necessary, saving
8 customers thousands in O&M.

9 **Q. Will PSE have completed the AMI deployment before the end of this rate**
10 **plan filing?**

11 A. Yes. PSE will complete the AMI deployment by 2023.

12 **Q. Should the Commission approve the recovery of PSE's AMI investment?**

13 A. Yes. The Commission should approve the recovery of PSE's AMI investment up
14 to the current test year and pro forma period as this programmatic investment
15 meets the used and useful standard, it is known and measurable, in service, and
16 delivering benefits to Washington customers now. In addition, the Commission
17 should approve a rate plan that includes forward recovery of PSE's AMI
18 investment through the rate plan period supported by my testimony and details
19 that meet the guidance of the Used and Useful Policy.

1 **Q. Has PSE presented a formal plan or proposal maximizing AMI benefits as**
2 **guided by the Commission's order in PSE's 2019 General Rate Case and**
3 **Avista's GRC?**

4 A. Yes. This testimony describes PSE's AMI benefit development, evaluation, and
5 process to sustain and maximize its AMI investment. In addition, Brattle's AMI
6 Benefits Report provides reasonable and realistic quantification of benefits
7 associated with many use cases, and specifically addresses the six uses cases from
8 the ACEEE report. Finally, Appendix C contains PSE's AMI Benefit
9 Implementation Plan, which describes PSE's plan for implementing and
10 maximizing AMI, as well as a template for tracking and reporting AMI benefits,
11 and proposed performance metrics.

12 **Q. Does AMI need to be fully deployed before a benefits plan can be accepted or**
13 **benefit realization proceed?**

14 A. No. As explained above, PSE's AMI system is already serving over one million
15 PSE customers who have AMI installed and those customers are benefiting from
16 AMI. PSE is also now able to leverage system wide benefits through AMI, which
17 benefit all customers, including those who have not yet been transitioned. As
18 explained above, these benefits include CVR, DA, smart street lights, and other
19 system wide benefits that benefit all customers.

1 **Q. Should the Commissions approve recovery of the return on the AMI**
2 **investment?**

3 A. Yes. PSE has a fully functioning AMI system in place that is benefiting customers
4 now. As described above, PSE has met the requirements for AMI recovery as set
5 forth by the Commission in the 2019 General Rate Case Order, the Avista GRC
6 order, and the Commission's Used and Useful Policy. This includes:

- 7 • Substantial deployment of its AMI system, including that deployment will
8 be complete in 2023 during the multiyear rate plan;
- 9 • PSE is already realizing and is on track to achieve the "core" AMI benefits
10 presented in PSE's 2019 General Rate Case;
- 11 • PSE has a clear plan and has devoted internal resources to maximize the
12 AMI use case benefits identified by the Commission in the 2019 General
13 Rate Case order;
- 14 • PSE has identified and has a plan to achieve additional AMI use case
15 benefits;
- 16 • PSE has a plan for tracking and reporting AMI benefits and proposed
17 performance metrics; and
- 18 • PSE has retained Brattle to advise and assist PSE in AMI maximization.

19 **IX. RECOVERY OF PSE'S LEGACY AMR METERS IS**
20 **APPROPRIATE NOW**

21 **Q. Is it appropriate to recover the legacy AMR meters in this rate case?**

22 A. Yes. Full deployment of AMI will be completed by 2023 and PSE is requesting
23 that it be allowed recovery of, and a return on, AMR beginning in 2023. The
24 Prefiled Direct Testimony of Susan E. Free, Exh. SEF-1T, discusses this recovery
25 request.

1 **Q. Please describe how PSE has been appropriately transitioning the AMR**
2 **system to retirement.**

3 A. Appropriate transition starts with the planned deployment of AMI. PSE's AMI
4 deployment schedule is based on AMR failure rates to replace equipment before
5 failure occurs. For network installation, this schedule was adjusted based on
6 permitting timelines.

7 When transitioning from AMR to AMI, PSE first installs the AMI network
8 equipment in a defined area. Once network installs reach 98 percent, then electric
9 meters can be installed. Gas module exchanges can begin in a dual fuel sector
10 once electric meter installs reach 90 percent so that the network communication
11 mesh allows modules to communicate.

12 In addition to the mass deployment, PSE field crews carry AMI meters and
13 modules and when possible, based on network effectiveness, replace failed AMR
14 meters or modules. This accounts for about four percent of the AMI meters and
15 0.2 percent of the AMI modules installed. One last means of transition occurs
16 when PSE installs new services or modifies existing services where construction
17 crews can install an AMI meter or module at the time of meter hookup, based on
18 network effectiveness. Field and construction crews are informed on where AMI
19 transition can take place to provide for appropriate transition.

20 PSE's transition strives to minimize AMR costs where possible. In some places,
21 an isolated AMR failure cannot yet be replaced with AMI even if PSE's AMI

1 network is completely installed because the communication depends on the mesh
2 capabilities. As discussed in my 2019 General Rate Case testimony, failed electric
3 AMR meters are removed and, if possible, replaced with a refurbished AMR
4 meter where PSE has not yet transitioned to AMI. This approach is necessary
5 because of the lack of available new AMR equipment available.

6 Retirement management is also important. As AMR meters are removed, if they
7 cannot be refurbished, they are retired from the fixed asset accounting system
8 shortly after the completion of the service notification. For gas modules that are
9 retired, a monthly batch process occurs to retire them from the fixed asset
10 accounting system. As designated areas have been fully transitioned to AMI,
11 AMR network communication assets will be removed from the field and retired at
12 the end of each calendar year.

13 **Q. Has PSE removed any AMR network devices?**

14 A. PSE is beginning to remove and retire AMR network devices. Over 8,900 AMR
15 network devices will be retired starting in late 2021, with completion planned for
16 early 2024.

17 **Q. What is the undepreciated book value of AMR?**

18 A. The current undepreciated book value of AMR assets is \$124 million. PSE
19 estimates by full AMI deployment, December 31, 2023, the undepreciated book
20 value of AMR assets will be \$113 million.

1 **Q. Could PSE have avoided having undepreciated plant on the books for this**
2 **type of mass asset transition?**

3 A. No. As I discussed in the 2019 General Rate Case, replacing mass assets almost
4 always result in overlapping and undepreciated book value simply due to the
5 logistics. It would be unrealistic to expect a transition plan of this magnitude to be
6 perfectly timed with full depreciation of the mass asset. That would require,
7 among other things, that the asset being replaced required no ongoing
8 maintenance, and the depreciation schedule aligned perfectly with the useful life
9 of the mass asset. It would also mean that PSE could install the AMI system
10 immediately, which is not possible given the significant number of AMI meters
11 and modules PSE has to install.

12 In addition, while PSE is implementing AMI in accordance with its deployment
13 schedule, because of AMR obsolescence, the AMR system has required
14 maintenance expenses which increases book value. The AMR system will
15 continue adding book value until all AMR system components are removed due to
16 the inherent maintenance costs of the system.

17 These factors together demonstrate that PSE could not have avoided there being
18 undepreciated book value for AMR.

19 **Q. Should PSE be allowed to recover the undepreciated book value?**

20 A. Yes. Installing AMR in 1998 was prudent. While AMR is obsolete now, the
21 system functioned well for years and benefited customers as it allowed PSE to

1 reduce O&M by reducing its meter reading staff as well as other benefits. At this
2 time, the system is now beyond its 15-year useful life and needs to be replaced,
3 just like any other utility plant asset. Denying PSE recovery of its undepreciated
4 book value would be inappropriate given that AMR was a prudently incurred
5 asset that benefited customers. See Free, Exh. SEF-1T, for a discussion on how
6 the Commission has treated undepreciated plant assets in recent years.

7 **X. CONCLUSION**

8 **Q. Does this conclude your prefiled direct testimony on AMI?**

9 A. Yes, it does.