

**EXH. CAK-6
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 ___

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

CATHERINE A. KOCH

ON BEHALF OF PUGET SOUND ENERGY

JANUARY 31, 2022

PUGET SOUND ENERGY

**FIFTH EXHIBIT (NONCONFIDENTIAL) TO THE
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CATHERINE A. KOCH**

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PUGET SOUND ENERGY

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1 **PUGET SOUND ENERGY**

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3 **PREFILED DIRECT TESTIMONY OF**
4 **CATHERINE A. KOCH**

5 **I. PUGET SOUND ENERGY’S PIPELINE MODERNIZATION**
6 **PROGRAMS SUPPORT SAFE, RELIABLE, AND CLEAN**
7 **ENERGY DELIVERY**

8 **A. Overview**

9 **Q. Please describe the investment programs presented in this case that sustain**
10 **and advance the modernization of Puget Sound Energy’s (“PSE”) gas**
11 **pipeline system.**

12 A. As discussed in Prefiled Direct Testimony of Catherine A. Koch, Exh. CAK-1T,
13 there are three overarching pipeline modernization programs:

- 14 1. **Pipeline Replacement Program**: Delivers PSE’s master pipeline
15 replacement plans.
- 16 2. **Pipeline Modernization Program**: Addresses asset risks and reduces
17 methane emissions.
- 18 3. **Major Projects Gas and Specific Backbone Infrastructure Program**:
19 Allows for strong intermediate and high-pressure pipeline systems.

20 **Q. Please describe how investments are managed under these three programs.**

21 A. Each of the three programs are broken down into investment categories. Eleven of
22 these investment categories are recurring and classified as “programmatic”
23 investments, meaning that the individual projects are designed and built to support
24 a common objective. Two of the programs are related to the gas system backbone

1 infrastructure and are non-recurring “specific” investments, meaning a clearly
 2 defined, identifiable, or discrete investment. Table 1 provides the overarching
 3 program, program plan, and used and useful category.

4 This testimony incorporates the Commission’s Used and Useful Policy guidance,
 5 which defines the type of investment that will be used and useful during the rate
 6 plan period and includes the estimated cost, a description of the investment and
 7 other existing documentation, offsetting factors, and expected date in service.¹
 8 Additionally, for programmatic investments, it demonstrates spending through
 9 historical trends related to the specific program.²

10 **Table 1. Used and Useful Categorization of Programs and Program Plans**

Overarching Program Objective	Program Plans	Used and Useful Category
Pipeline Replacement	Old Vintage PE Pipe Mitigation (aka. DuPont)	Programmatic
	Sewer Cross Bore Remediation	
	Buried Meter Set Assembly Remediation	
	Methane Emissions Reduction	
Pipeline Modernization	Advance Metering Infrastructure	Programmatic
	DIMP Additional and Accelerated Actions	
	Digital Monitoring	
	Renewable Natural Gas and Hydrogen Readiness	
	Enhanced Methane Emissions Reduction	
	System Reliability	
Major Projects Gas and Specific Backbone Infrastructure	Major Projects Gas – Initiation	Programmatic
	Marine Crossing - Vashon Resiliency	Specific
	LNG Distribution	

¹ *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) (“Used and Useful Policy”).

² *Id.* at ¶ 35.

1 **Q. Please provide PSE’s actual and planned capital investments relating to these**
2 **three programs over the six rate periods presented in this case.**

3 A. Table 2 provides the actual plant in service amounts from January 1, 2019 through
4 the end of the test year of June 30, 2021. The remaining periods are estimated
5 based on current programmatic plans.

6 **Table 2. Summary of Total Program Investments by Rate Period**

Program (\$ millions)	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
Pipeline Replacement	141	18.6	63.6	63.8	65.0	66.5
Pipeline Modernization	56.0	14.9	26.6	45.2	43.9	45.5
Major Projects Gas and Specific Backbone Infrastructure	15.3	5.6	20.5	7.0	10.0	10.5

7
8 Additionally, there is incremental Operations and Maintenance (“O&M”) related
9 to capital investment (“OMRC”) associated with the above rate periods of about
10 \$0.03 million.

11 **Q. Are there O&M cost reductions that are expected to result from these**
12 **program investments?**

13 A. Yes. The total O&M expense that is reduced by the three programs is
14 approximately \$2.4 million from 2022 to 2025 as a result of avoiding some
15 unplanned leak repairs, avoiding manual system adjustments during cold weather,
16 and reducing truck rolls for on-site maintenance. O&M expense includes

1 operating activities such as emergency response for odor calls and leaks,
2 metering, property and easement maintenance, pipeline integrity mitigation,
3 quality control, repair of damaged or leaking infrastructure, and patrols,
4 inspections, and survey work, much of which is driven by regulatory requirements
5 or operational activities that are not influenced by capital investments. This is also
6 because pipeline repairs are often a capital expense where equipment is replaced
7 in kind so the capital investment plan reduces other capital expenses more than
8 O&M expenses.

9 The following are several examples of capital investments that reduce specific
10 O&M expenses. The first example is by proactively replacing leak-prone pipe,
11 such as older vintage PE pipe which I discuss in section I.B.1, PSE avoids the cost
12 of reoccurring, regulation prescribed monitoring, and having to repair the leak as
13 an unplanned emergency. As a result, PSE will save approximately \$150,000
14 annually in reoccurring monitoring costs. Another example is system reliability
15 projects that eliminate the need for cold weather actions and manual field
16 adjustments during cold mornings, estimated at an O&M expense savings of
17 \$375,000.

18 These O&M expense reductions help to relieve the increasing O&M expense
19 pressures discussed in Koch, Exh. CAK-1T.

1 **Q. What is the total benefit of these programs?**

2 A. As discussed in Koch, Exh. CAK-1T, PSE uses a tool called the Investment
3 Decision Optimization Tool (“iDOT”) to evaluate portfolio benefits, including
4 both quantitative and qualitative benefits. The total benefit of the pipeline
5 modernization portfolio presented in this case is \$510.8 million.

6 **Q. Please describe each program and program plan.**

7 A. Each program and program plan will be discussed below, describing the
8 investment and core objectives and priorities, actual and forecasted investment
9 over the six rate periods of this rate case, work completed and anticipated to be
10 completed, basis for forecasted investment, and benefits realized and anticipated
11 through the rate plan. Additionally, the incremental OMRC associated with this
12 plan will be discussed in each plan discussion below. Generally, OMRC is
13 minimal when constructing gas infrastructure based on FERC property accounting
14 rules.

15 **Q. Please describe how cost estimates are developed that support these**
16 **programs.**

17 A. PSE’s Project Management Office (“PMO”) provides planners with cost
18 estimating tools that generally provide average costs based on historical projects
19 and unit pricing contracts. Planners estimate using these tools based on a planning
20 level scope of work. PSE’s PMO updates these tools periodically.

1 **Q. Please describe cost controls deployed to efficiently deploy capital**
2 **investments.**

3 A. The cost controls deployed by PSE for these programmatic and specific
4 investments are discussed in the Prefiled Direct Testimony of Roque B. Bamba,
5 Exh. RBB-1T.

6 **B. Pipeline Replacement Program**

7 **Q. Please describe the key program plans included in the Pipeline Replacement**
8 **Program.**

9 A. On June 1, 2021, PSE filed the 2021 Pipeline Replacement and Methane
10 Emissions Reduction Plan (“PRP”) with the Commission which included a master
11 plan and from that a two-year implementation plan that addresses three safety-
12 related and three methane emission reduction risk reduction efforts. The
13 Commission approved the 2021 PRP on August 26, 2021. The three safety related
14 areas are focused on addressing risks from older vintage PE pipe, sewer cross
15 bores, and buried meter set assemblies. The three methane emission reduction
16 efforts are focused on addressing methane release risks from excavation damage,
17 active leaks, and aboveground meter set assemblies. PSE’s approach to eliminate
18 methane releases aligns with requirements in the Protecting Our Infrastructure of
19 Pipelines and Enhancing Safety (“PIPES”) Act of 2020.

1 The Pipeline Replacement Program³ is essentially the 2021 PRP and anticipated
2 PRP-like plans moving forward. Appendix A is the 2021 PRP. The Pipeline
3 Replacement Program is supported by three safety related business plans,
4 provided in Appendix B, which provide project background, statement of need,
5 scope, benefits, cost estimate, alternatives, and funding risk. The 2021 PRP
6 discusses these plans and the three methane emission reduction efforts in detail.

7 **Q. Do the planned investments in this program support clean energy initiatives?**

8 **If so, how.**

9 A. Yes. Methane emissions reduction helps to address the “climate crisis” as
10 expressed most recently in the White House U.S. Methane Emissions Reduction
11 Action Plan.⁴ Clean energy is furthered by PSE’s Pipeline Replacement Program,
12 approved in PSE’s 2021 PRP, because it directly reduces the risk of fugitive
13 methane emissions by eliminating leaks resulting from brittle-like cracking and
14 fusion failure in older vintage PE pipe, pipe damaged when clearing blocked
15 sewers due to cross bores, buried meter set assembly corrosion, excavation
16 damage, and fittings on above ground piping. Additionally, it includes provisions
17 to decrease leak durations by addressing active leaks faster.

³ May be referred to as “Pipe” Replacement program in other witness’s testimony.

⁴ The White House Office of Domestic Climate Policy, *U.S. Methane Emissions Reduction Action Plan*, at 8 (Nov. 2021) (“Despite this challenging fact pattern, when aging or damaged gas distribution pipelines are repaired or replaced, methane emissions can be cut by up to 90%. These improvements are good for consumers, safety, and the climate. That is why the Biden-Harris Administration is confronting the serious environmental and safety issues associated with methane emissions and ruptures in distribution pipelines.”), <https://www.whitehouse.gov/wp-content/uploads/2021/11/US-Methane-Emissions-Reduction-Action-Plan-1.pdf>.

1 **Q. Please describe the performance metrics that this program investment**
2 **impacts.**

3 A. This program generally impacts one corporate performance metric, Average Gas
4 Safety Response Time, by decreasing the number of leaks that must be responded
5 to over time.

6 **Q. Please describe each of the Pipeline Replacement Program plans in more**
7 **detail.**

8 A. The four Pipeline Replacement Program plans, of which the first two-year plans
9 are approved in PSE's 2021 PRP, are discussed below.

10 **1. Older Vintage PE Pipe Mitigation Business Plan**

11 **Q. Please describe PSE's Older Vintage PE Pipe Mitigation Business Plan and**
12 **core objectives and priorities.**

13 A. The Older Vintage PE Pipe Mitigation Business Plan addresses the integrity risks
14 on 1-1/4" diameter and larger PE pipe used for mains and services that was
15 manufactured in or before 1985. The primary plan strategy is targeted pipe
16 replacement of the entire population of DuPont Aldyl High-Density PE pipe
17 ("DuPont"), which is susceptible to brittle-like cracking and fusion failure. The
18 plan utilizes the results from field reports, leak repairs, and material failure
19 analysis to prioritize remediation. PSE had over 435 miles of DuPont installed in
20 the system as of 2010 and plans to replace it all by 2032. PSE has replaced 182

1 miles of this pipe as of year-end 2020. Please see Appendix B, starting at page 2,
2 for the specific Older Vintage PE Pipe Mitigation Business Plan in support of this
3 investment.

4 **Q. Please provide PSE’s actual and planned Older Vintage PE Pipe Mitigation**
5 **Business Plan capital investments over the six rate periods presented in this**
6 **case.**

7 A. Table 3 provides the actual plant in service investments from January 1, 2019
8 through the end of the test year of June 30, 2021. The remaining periods are
9 estimated based on current programmatic plans.

10 **Table 3. Summary of Older Vintage PE Pipe Mitigation Business Plan**
11 **Investments by Rate Period**

Plan	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
Capital investment (\$ Millions)	130.2	16.8	54.8	55.7	56.4	57.6
Asset addressed (miles)	47.5	10.0	19.0	19.0	19.0	19.0

12
13 **Q. Please describe the work completed and anticipated through the end of the**
14 **rate plan.**

15 A. PSE replaced over 47 miles of DuPont since the last rate case and through the end
16 of the current test year period. PSE anticipates replacing 86 miles of DuPont from
17 July 1, 2021 through December 31, 2025, cumulatively completing 62.8 percent
18 of the master plan.

1 **Q. Please describe the basis for the forecasted Older Vintage PE Pipe Mitigation**
2 **Business Plan investment in more detail.**

3 A. Since the beginning of the plan, PSE has averaged 20 miles a year, ranging from
4 about ten miles to 40 miles a year depending, in part, on specific project
5 conditions and, in part, on the managing the impact of the PRP on ratepayers.⁵
6 PSE's plan continues to invest at this programmatic pace, targeting about 19 to 20
7 miles per year, based on capacity of third-party resources, customer intensive
8 coordination, permitting processes, and street restoration requirements. The
9 programmatic cost to replace the entire population of DuPont per the Older
10 Vintage PE Pipe Mitigation Business Plan is approximately \$981.9 million. The
11 cost is estimated based on current contractual unit pricing and overall average
12 historical costs adjusted by traditional escalators such as inflation, labor,
13 materials, and contract.

14 **Q. Have benefits been realized from the Older Vintage PE Pipe Mitigation**
15 **Business Plan?**

16 A. Yes. Confidence in future plan benefits can be based on historical benefits
17 realized. Since the last rate case and through the end of the current test year

⁵ RCW 80.28.420(2) requires: "A gas company seeking an interim recovery between rate cases may submit to the commission, as part of . . . a commission-approved interim rate treatment mechanism regarding the replacement of pipeline facilities, a description . . . As part of the proposal, the gas company must address the expected impact to ratepayers"

1 period, the plan reduced the inherent integrity management risk⁶ by 22.7 percent
2 from the 2018 risk baseline.

3 **Q. Please describe the benefits PSE’s Older Vintage PE Pipe Mitigation**
4 **Business Plan will deliver for customers through the rate plan.**

5 A. PSE’s primary benefits of the plan are increased safety due to replacing pipe that
6 is prone to failure and a reduction in methane emissions from avoided leaks.
7 Table 4 provides the benefits of risk reduction and metric tons of methane
8 emissions, in terms of carbon dioxide equivalent, reduced over the six rate periods
9 presented in this case.

10 **Table 4. Summary of Older Vintage PE Pipe Mitigation Business Plan**
11 **Benefits by Rate Period**

Type of Benefit	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
Pipeline safety and integrity risk reduction (%)	22.7%	3.2%	6.3%	6.3%	6.3%	6.3%
Methane emissions reduction (metric tons CO ₂ e)	290	45	110	110	110	110

12

⁶ The Distribution Integrity Management Plan program measures risk across many factors for a given threat which is quantified numerically for risk comparison with other threats. Reducing this risk number for a given program means the threat is decreasing, but is it a relative analysis.

1 **2. Sewer Cross Bore Remediation Business Plan**

2 **Q. Please describe PSE’s Sewer Cross Bore Remediation Business Plan and core**
3 **objectives and priorities.**

4 A. The Sewer Cross Bore Remediation Business Plan mitigates integrity risks from
5 gas pipelines that were inadvertently installed through unmarked sewer pipe. The
6 plan utilizes sewer inspections to identify and remediate cross bores and a public
7 awareness plan to publicize PSE’s cross bore plan to prevent cross bore damage
8 from clearing a blocked sewer line. The primary plan strategy includes increased
9 public awareness and outreach, inspection of legacy facilities, stopping new cross
10 bores from being left after new construction, response training, and pipe
11 replacement. By 2029, PSE will have inspected 60,000 legacy segments identified
12 as higher risk for cross bore and remediated any findings, which is 15 percent of
13 the estimated total population of possible cross bores. Upon completion, PSE will
14 evaluate additional legacy areas that have lower risk for cross bore and expand the
15 plan moving forward. PSE is also continuing to inspect approximately 13,000
16 sewer lines after construction of new infrastructure each year to confirm no new
17 cross bores have been installed. Finally, through public outreach and a program to
18 respond to blocked sewer lines, customers and plumbers can call when a blocked
19 sewer is suspected and PSE will inspect their sewer line in advance of the line
20 being cleared. PSE responds to approximately 300 blocked sewer calls a year and
21 finds approximately 27 percent to have cross bores. Please see Appendix B,

1 starting at page 6, for the specific Sewer Cross Bore Remediation Business Plan
2 in support of this investment.

3 **Q. Please provide PSE's actual and planned Sewer Cross Bore Remediation**
4 **Business Plan capital investments over the six rate periods presented in this**
5 **case.**

6 A. Table 5 provides the actual plant in service investments from January 1, 2019
7 through the end of the test year of June 30, 2021. The remaining periods are
8 estimated based on current programmatic plans.

9 **Table 5. Summary of Sewer Cross Bore Remediation Business Plan**
10 **Investment by Rate Period**

Plan	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
Capital investment (\$ Millions)	1.0	0.09	0.5	0.5	0.5	0.5
Asset addressed (#)	14,213	3091	7,300	7,300	7,300	7,300

11 Additionally, the plan requires an incremental O&M expense of about \$4.7
12 million annually associated with the above rate periods.

14 **Q. Please describe the work completed and anticipated through the end of the**
15 **rate plan.**

16 A. PSE eliminated the risk of cross bore by inspecting 14,213 locations, confirming
17 whether a cross bore existed and replacing the small percentage of cross bores
18 found, since the last rate case and through the end of the current test year period.

1 PSE anticipates inspecting 32,291 cross bore legacy pipe installation locations
2 and replacing any cross bore discoveries from July 1, 2021 through December 31,
3 2025, cumulatively completing 75.6 percent of the master plan.

4 **Q. Please describe the basis for the forecasted Sewer Cross Bore Remediation**
5 **Business Plan investments in more detail.**

6 A. PSE estimates it has nearly 400,000 total sewer segments to investigate, with the
7 goal of evaluating 60,000 by 2029. Since the beginning of the plan, PSE has
8 averaged about 2,000 sewer segment inspections a year, ranging from 300 to
9 8,000 a year. PSE's plan to invest at an accelerated pace of about 7,300 annually
10 is due to the continuing significant risk discussed and approved in the 2021 PRP
11 provided in Appendix A. Using historical project execution success from
12 completing over 15,793 legacy inspections to date, the programmatic cost to
13 complete 60,000 legacy segments per this plan is approximately \$41 million, the
14 majority of which is O&M expense. The cost estimate is based on contractual unit
15 pricing and overall average historical costs per inspection adjusted for additional
16 costs for jurisdictions that have multiple sewer segments per parcel.

17 **Q. Have benefits been realized from the Sewer Cross Bore Remediation**
18 **Business Plan?**

19 A. Yes. Confidence in future plan benefits can be based on historical benefits
20 realized. Since the last rate case and up through the end of the current test year

1 period, the plan has effectively eliminated 874 gas cross bore risks and reduced
2 the inherent integrity management risk by 6.1 percent from the 2018 risk baseline.

3 **Q. Please describe the benefits that the Sewer Cross Bore Remediation Business**
4 **Plan will deliver for customers through the rate plan.**

5 A. PSE’s primary benefit of less sewer cross bores is increased safety. Table 6
6 provides the benefits of risk reduction and metric tons of methane emissions, in
7 terms of carbon dioxide equivalent, reduced over the six rate periods presented in
8 this case.

9 **Table 6. Summary of Sewer Cross Bore Remediation Business Plan Benefits**
10 **by Rate Period**

Type of benefit	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
Pipeline safety and integrity risk reduction	6.1%	0.9%	1.7%	1.7%	1.7%	1.7%
Methane emissions reduction (metric tons CO2e)	0	0	2	2	2	2

11 **3. Buried Meter Set Assembly Remediation Business Plan**

12 **Q. Please describe PSE’s Buried Meter Set Assembly Remediation Business**
13 **Plan and core objectives and priorities.**

14 A. The Buried Meter Set Assembly Remediation Business Plan mitigates the
15 integrity risks on a meter set assembly where the fittings are unintentionally
16 buried which results in corrosion. The plan utilizes the results from routine leak
17

1 surveys and subsequent field inspections to prioritize the remediation. The Buried
 2 Meter Set Assembly Remediation Business Plan is based on addressing 40,000
 3 buried meters. However, the total number of new reports of buried meters
 4 increased in 2021 based on a number of factors, and the overall plan may be
 5 revised over the next few years. Please see Appendix B, starting on page 11, for
 6 the Buried Meter Set Assembly Remediation Business Plan in support of this
 7 investment.

8 **Q. Please provide PSE’s actual and planned Buried Meter Set Assembly**
 9 **Remediation Business Plan capital investments over the six rate periods**
 10 **presented in this case.**

11 A. Table 7 provides the actual plant in service investments from January 1, 2019
 12 through the end of the test year of June 30, 2021. The remaining periods are
 13 estimated based on current programmatic plans.

14 **Table 7. Summary of Buried Meter Set Assembly Remediation**
 15 **Business Plan Investment by Rate Period**

Plan	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
Capital investment (\$ Millions)	9.7	1.7	5.0	5.9	6.2	6.5
Asset addressed (#)	13,866	2,178	7,000	7,000	7,000	7,000

16 Additionally, the plan requires an incremental O&M expense of about \$1.0
 17 million annually associated with the above rate periods.
 18

1 **Q. Please describe the work completed and anticipated through the end of the**
2 **rate plan.**

3 A. PSE remediated 13,866 buried meters since the last rate case and up through the
4 end of the current test year period. PSE anticipates addressing 30,178 buried
5 meters from July 1, 2021 through December 31, 2025, cumulatively completing
6 100 percent of the master plan.

7 **Q. Please describe the basis for the forecasted Buried Meter Set Assembly**
8 **Remediation Business Plan investments in more detail.**

9 A. PSE had identified an initial population of 40,000 buried meters in the June 2019
10 PRP, with the intent of replacement of this population by 2025. Since the
11 beginning of the plan, PSE has averaged remediation of about 3,000 buried meters
12 a year, ranging from 500 to 6,200 per year. PSE's plan to invest at an accelerated
13 pace of about 7,000 buried meters remediated annually is due to the continuing
14 significant risk discussed and approved in the 2021 PRP. Using historical project
15 execution success from remediating 24,343 buried meters as of year-end 2020, the
16 programmatic cost to complete 40,000 per this plan is approximately \$35 million.
17 The cost estimate is based on contractual unit pricing and overall average
18 historical costs adjusted for additional costs for those meter set risers in hard
19 surface that require a saw cut to remediate and by traditional escalators.

1 **Q. Have benefits been realized from the Buried Meter Set Assembly**
2 **Remediation Business Plan?**

3 A. Yes. Confidence in future plan benefits can be based on historical benefits
4 realized. Due to a significant increase in new reports during the test year, the
5 inherent risk has increased by 19 percent. With no investment in this plan, the risk
6 would have increased by 60.1 percent, compared to the 2018 risk baseline.

7 **Q. Please describe the benefits that the Buried Meter Set Assembly Remediation**
8 **Business Plan will deliver for customers through the rate plan.**

9 A. PSE's primary benefit of Buried Meter Set Assembly Remediation Business Plan
10 is improving safety by reducing corrosion leaks at the building wall from
11 unintentionally buried meter set assembly components. Table 8 provides the
12 benefits of risk reduction and metric tons of methane emissions, in terms of
13 carbon dioxide equivalent, reduced over the six rate periods presented in this case.

14 **Table 8. Summary of Buried Meter Set Assembly Remediation Business Plan**
15 **Benefits by Rate Period**

Type of benefit	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
Pipeline safety and integrity risk reduction	19.0%	2.5%	5%	5%	5%	5%
Methane reduction (metric tons CO ₂ e)	1	0	1	1	1	1

1 **4. Methane Emission Reduction Business Plan**

2 **Q. Please describe PSE’s Methane Emission Reduction Business Plan and core**
3 **objectives and priorities.**

4 A. PSE targeted three objectives in the 2021 PRP: Active Leakage Reduction,
5 Excavation Damage Prevention Measures, and Aboveground Meter Set
6 Remediations. PSE’s core objective is to keep every molecule of natural gas in the
7 pipes and deliver it safely to the customers for use. This plan focuses on reducing
8 methane emissions through accelerating repair of active non-hazardous (Grade
9 “B” and Grade “C”) below ground leaks, implementing tactics to reduce
10 excavation damages that emit the largest amount of methane to the atmosphere,
11 and accelerating repair of active non-hazardous aboveground meter set releases.
12 In 2016, PSE joined the EPA Natural Gas STAR Methane Challenge Program,
13 committing to reducing damage caused by excavation and overhauling
14 compressor operations at Jackson Prairie. Additionally, PSE plans to achieve net
15 zero methane emissions by the end of 2022 on our local distribution gas system
16 through leak reduction, system improvements, and a series of offset investments
17 including renewable natural gas and energy efficiency. This commitment is
18 achieved by eliminating the historic backlog of grade “C” leaks that PSE began to
19 address in 2016. Table 9 provides the definition of PSE’s leak grades.

Table 9. PSE’s Leak Grade Definitions

Leak Grade	Description
Grade “A”	Hazardous, immediate repair required.
Grade “B”	Non-hazardous, scheduled repair required
Grade “C”	Non-hazardous, repair not required but scheduled repair is best practice
Non-hazardous aboveground releases of gas (“NARG”)	Non-hazardous, repair not required but scheduled repair is best practice

PSE’s largest release of gas and methane emissions comes from excavation damages where contractors and homeowners accidentally damage the gas facilities and cause a leak. Excavation damages can be challenging to repair quickly due to the environment created by how and where the damage occurred, resulting in prolonged emissions. PSE can reduce the number of damages to the distribution system by implementing a new risk prioritization tool and adding five new damage prevention field representatives to visit excavation sites and educate about safe digging.

The next largest emissions come from non-hazardous belowground leaks, Grade B and C leaks, that are monitored until an opportunity to remediate with another construction project occurs. These leaks are not a public safety concern but can be an environmental safety concern due to the release of methane, depending on the duration of the leak. As new C leaks arise, PSE will address these more timely than historically per this plan.

PSE’s operating practice of waiting until an opportunity to repair with another project creates a backlog of leaks being monitored and results in methane emissions over many years that could be avoided with repair. PSE will be able to

1 eliminate the on-going monitoring of active non-hazardous leaks by accelerating
2 repair to within four months of discovery.

3 The third plan to reduce methane emissions is accelerating the repair of
4 aboveground leaks on meter sets with gas releases at threaded joints. These gas
5 releases are very small and typically only detectable by sensitive leak detection
6 instruments. PSE investigated the population of releases and found that some of
7 them are larger and do contribute to methane emissions over time. Please see
8 Appendix A, the 2021 PRP, starting on page 17, in support of this investment.

9 **Q. Please provide PSE's actual and planned Methane Emission Reduction**
10 **Business Plan capital investments over the six rate periods presented in this**
11 **case.**

12 A. Table 10 provides the actual plant in service investments from January 1, 2019
13 through the end of the test year of June 30, 2021. The remaining periods are
14 estimated based on current programmatic plans.

15 **Table 10. Summary of Methane Emission Reduction Business Plan**
16 **Investment by Rate Period**

Plan	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
Capital investment (\$ million)	0	0	3.3	1.8	1.9	1.9
Asset addressed (#)	0	0	94	94	94	94
Assets maintained (#)	0	0	1,776	3,364	1,188	1,188

1 Additionally, the plan requires an incremental O&M expense of about \$5.0
2 million to \$6.0 million annually associated with the above rate periods.

3 **Q. Please describe the work completed and anticipated through the end of the**
4 **rate plan.**

5 A. This plan will begin in 2022 based on the approved 2021 PRP, so PSE has begun
6 preparation during the proforma period. By implementing these new methane
7 emissions reduction tactics, PSE anticipates completing 1,500 below ground non-
8 hazardous leak repairs, 6,392 aboveground meter set leak repairs, and avoiding
9 370 damages between July 1, 2021 and December 31, 2025, reducing methane
10 emissions by 14,000 metric tons of CO₂e, cumulatively completing 80 percent of
11 the master plan.

12 **Q. Please describe the basis for the forecasted Methane Emission Reduction**
13 **Business Plan investments in more detail.**

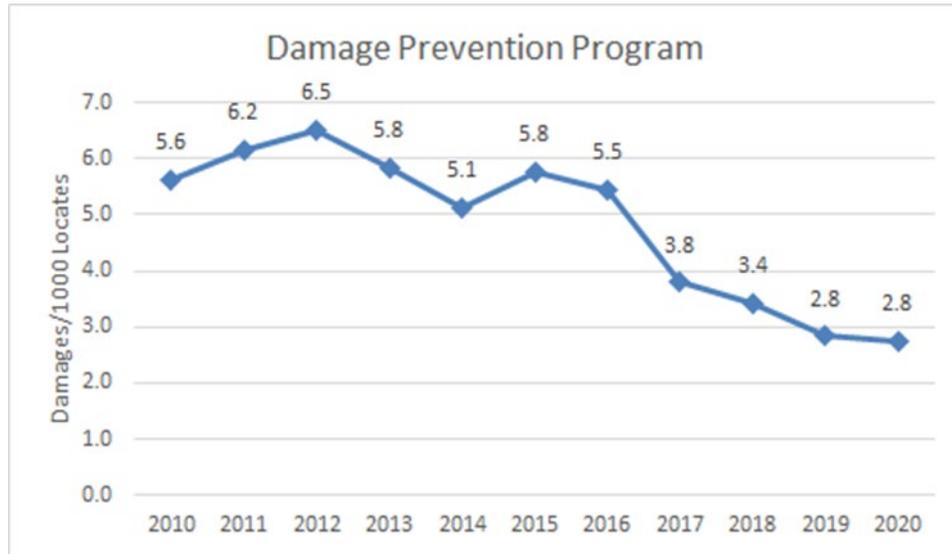
14 A. The basis for the forecasted investments is different for each of the three tactics
15 described above. The investment related to accelerating repair of active non-
16 hazardous (Grade “B” and Grade “C”) below ground leaks is based on historical
17 leak rates, current backlog, and cost to repair as defined by contractual unit
18 pricing. PSE’s master plan will address the backlog of these non-hazardous below
19 ground leaks by 2026, a total capital and expense investment of approximately
20 \$22 million. This plan does not increase the cost of this repair work, but
21 acceleration reduces repeat monitoring and reevaluation site visits. Year to year

1 the costs to repair remain relatively the same but decrease as leak-prone pipelines
2 are replaced through other PRP or Distribution Integrity Management Plan
3 (“DIMP”) investments, as described in section C.2 below. The investment related
4 to damage prevention is based on labor rates of five new staff and software
5 estimates provided by the vendor for a new predictive analytics tool. This is an
6 on-going annual O&M expense investment of about \$1 million. The investment
7 related to accelerating repair of active non-hazardous aboveground meter set
8 releases is estimated based on known backlog, cost to repair, and resource
9 management. PSE’s master plan will address the large and medium non-
10 hazardous aboveground leaks by the end of 2026, a total expense investment of
11 approximately \$3.6 million. All components of this programmatic estimate are
12 adjusted by traditional escalators.

13 **Q. Have benefits been realized from the Methane Emission Reduction Business**
14 **Plan?**

15 A. No, not specifically per this plan, because it was only recently included in the
16 2021 PRP. However, PSE has confidence there will be future benefits based on
17 the improvements gained through previous work. For example, five damage field
18 representatives have been added since 2017 to help reduce damages and, as a
19 result, PSE damages per 1,000 locates has already dropped 49 percent, as shown
20 in Figure 1.

Figure 1. Summary of PSE’s Damages per 1000 locates from 2010-2020



Q. Please describe the benefits that the Methane Emission Reduction Business Plan will deliver for customers through the rate plan.

A. The primary benefit of reduced methane emissions is reduced metric tons CO2 equivalent. Table 11 provides the metric tons of emissions savings, number of non-hazardous leak repairs, number of non-hazardous meter leaks repaired, and number of avoided damages through the six rate periods presented in this case.

Table 11. Summary of Methane Emission Reduction Business Plan Benefits by Rate Period

Type of Benefit	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
Emissions Savings (metric tons CO2e)	0	0	3,108	3,849	3,560	3,588
Non-hazardous leaks repaired (#)	0	0	375	375	375	375
Non-hazardous meter leaks repaired (#)	0	0	1,495	3,083	907	907
Avoided damages (#)	0	0	42	82	122	124

1 **C. Pipeline Modernization Program**

2 **Q. Please describe the key program plans included in the Pipeline**
3 **Modernization Program.**

4 A. PSE's Pipeline Modernization Program⁷ strengthens safety, efficiency, reliability,
5 and flexibility of the pipeline system, minimizes methane release, and supports
6 low carbon fuels. The key plans include: Advanced Metering Infrastructure
7 ("AMI"), DIMP Additional and Accelerated Actions, Digital Monitoring,
8 Alternate Fuels Readiness, Enhanced Methane Emissions Reduction, and System
9 Reliability. This program is also supported by several business plans, provided in
10 Appendix C, that provide project background, statement of need, scope, benefits,
11 cost estimate, alternatives, and funding risk.

12 **Q. How do the planned investments in this program support clean energy**
13 **initiatives?**

14 A. Clean energy is furthered by PSE's Pipeline Modernization Program because it
15 directly reduces the methane emissions by enhancing PSE's operational practices
16 such as intentional release during construction, acquires new tools to help detect
17 methane emissions at even smaller levels, and builds system capability to increase
18 timely shutdowns when failure occurs. Digitizing monitoring equipment means
19 fugitive emissions can be detected more quickly and possible leaks addressed
20 sooner. In addition, this program furthers low carbon fuels in PSE's pipelines

⁷ May be referred to as "Gas" Modernization program in other witness's testimony.

1 through improvements in the Renewable Natural Gas (“RNG”) interconnection
2 process and guaranteeing the system is sized and designed to operate reliably with
3 more RNG and hydrogen blended fuels, so customers receive cleaner energy to
4 burn in appliances.

5 **Q. Please describe the performance metrics these investments impact.**

6 A. These investments generally impact one corporate performance metric, Average
7 Gas Safety Response Time, by decreasing the number leaks that must be
8 responded to over time.

9 **Q. Please describe each of the program plans in more detail.**

10 A. The six plans of the Pipeline Modernization program are discussed below.

11 **1. Advanced Metering Infrastructure**

12 **Q. Please describe PSE’s AMI plan and core objectives and priorities.**

13 A. AMI is the current standard for metering technology for both gas and electric
14 meters, replacing the end-of-life Automated Meter Reading system. It uses two-
15 way communication and on-board memory to send more detailed and accurate
16 meter data through a secure wireless network. AMI supports pipeline
17 modernization by providing granular data to implement customer programs such
18 as demand response to reduce peak gas demand. PSE’s AMI plan is explained in
19 detail in Exh. CAK-7.

1 **2. DIMP Additional and Accelerated Actions Business Plan**

2 **Q. Please describe PSE’s DIMP Additional and Accelerated Actions Business**
3 **Plan and core objectives and priorities.**

4 A. PSE’s DIMP plan identifies the highest risk threats to the system and identifies
5 potential additional or accelerated maintenance actions to address these risks.
6 Plans are funded so that PSE can conduct field inspections to evaluate and carry
7 out remediation options to reduce system risk. PSE currently administers 29
8 additional and accelerated plans in addition to the ones captured in the 2021 PRP.
9 These are included in Table 12, as follows:

10 **Table 12. PSE’s DIMP Additional and Accelerated Actions**

1	Bolt-On Service Tees
2	Encroachment Remediation
3	Extended Utility Facilities
4	Ground Faults and Lightning Strike Mitigation
5	High Pressure Main Assessment
6	Idle Risers
7	Low Pressure Distribution Systems Remediation
8	Mapping Accuracy
9	Modified Farm Taps
10	No Record Facility Remediation
11	Older Wrapped Steel Pipe Mitigation
12	Regulator Station Mitigation
13	Rockwell IPH Mitigation
14	Wrapped Steel Main in Casing
15	Wrapped Steel Service Assessment
16	Bridge and Slide Remediation
17	Celcon Service Tee Caps
18	Docks and Wharves Assessment
19	Double Insulated Flanged Valves
20	Encroachment MHC Survey
21	Excess Flow Valves
22	Heater Maintenance

23	High Pressure Valve Mitigation
24	High Voltage AC Mitigation
25	Industrial Meter Set Remediation
26	Pipe on Pipe Supports
27	Shallow Main and Service Remediation
28	Traffic Protection Enhancement
29	Damage Prevention

1
2 Please see Appendix C, starting on page 1, for the DIMP Additional and
3 Accelerated Actions Business Plan in support of this investment.

4 **Q. Please provide PSE's actual and planned DIMP Additional and Accelerated**
5 **Actions Business Plan capital investments over the six rate periods presented**
6 **in this case.**

7 A. Table 13 provides the actual plant in service investments from January 1, 2019
8 through the end of the test year of June 30, 2021. The remaining periods are
9 estimated based on current programmatic plans.

10 **Table 13. Summary of DIMP Additional and Accelerated Actions Investment**
11 **by Rate Period**

Plan	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
Capital investment (\$ millions)	32.1	10.7	18.9	24.3	24.9	25.2
Assets Addressed through number of projects (#)	547	324	1,030	1,330	1,930	1,930

12 Additionally, the plan requires an incremental O&M expense of about \$14.4
13 million to \$16.6 million annually associated with the above rate periods.
14

1 **Q. Please describe the work completed and anticipated through the end of the**
2 **rate plan.**

3 A. PSE completed 547 projects since the last rate case and through the end of the
4 current test year period. PSE anticipates completing approximately 6,500 projects
5 from July 1, 2021 through December 31, 2025. This is an on-going risk
6 management program that is anticipated to continue as new risks arise.

7 **Q. Please describe the basis for the forecasted DIMP Additional and**
8 **Accelerated Actions Business Plan investments in more detail.**

9 A. PSE's DIMP requires PSE to identify and reduce pipeline safety and integrity
10 risks. PSE assigns each additional and accelerated action into low, moderate-high,
11 and top priority risks as shown in Table 14.

12 **Table 14. Summary of DIMP Plan Mitigation Prioritization**

DIMP Program Priority	Program Requirements	Resource Requirements	Pipeline safety risk
Top Priority	Defined plan to reduce risk	High	High
Moderate-high Priority	Defined plan to reduce risk	Medium	Medium
Low Priority	Monitored for increasing risk	Low	Low

13
14 Since the beginning of the plan, PSE has remediated an average of 500 projects
15 per year investing approximately \$18 million annually. The rate plan focuses on
16 newer programs with more individual units that will gradually increase over the
17 plan period. Some DIMP programs are absorbed into normal operations practices
18 or within the implementation of new materials to address specific issues. PSE's

1 plan continues to invest at this programmatic pace, targeting a reduction of about
2 40 risk points annually to a manageable steady risk tolerance of 150 risk points
3 across PSE's entire pipeline system by 2030. PSE estimates the investment to
4 reach that risk level (150 risk points) is approximately \$185 million in addition to
5 on-going investments for programs already at steady state and to initiate programs
6 in the early stages of development. The DIMP Additional and Accelerated
7 Actions address thousands of individual projects annually across various
8 programs, taking into account the capacity of third-party resources, customer
9 intensive coordination, and permitting processes. The cost estimate is based on
10 contractual unit pricing and overall average historical costs per project adjusted
11 for traditional escalators.

12 **Q. Have benefits been realized from the DIMP Additional and Accelerated**
13 **Actions Business Plan?**

14 A. Yes. Confidence in future plan benefits can be based on historical benefits
15 realized. Since the last rate case and up through the end of the current test year
16 period, the plan has effectively reduced the inherent integrity management risk by
17 8.4 percent out of the plan's 423 total risk points from the 2018 baseline.

1 **Q. Please describe the benefits that the DIMP Additional and Accelerated**
2 **Actions Business Plan will deliver for customers through the rate plan.**

3 A. PSE’s primary benefit is to mitigate pipeline safety and integrity risk. Table 15
4 provides the benefits of risk reduction and metric tons of methane emissions, in
5 terms of carbon dioxide equivalent, reduced over the six rate periods.

6 **Table 15. Summary of DIMP Additional and Accelerated Actions Business**
7 **Plan Benefits by Rate Period**

Type of Benefit	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
Pipeline Safety and Integrity Risk Reduction (%)	8.4%	1.7%	3.4%	3.4%	3.1%	2.2%
Methane Emissions Reduction (Metric Tons CO2e)	6,340	350	700	700	700	700

8
9 **3. Digital Monitoring Business Plan**

10 **Q. Please describe PSE’s Digital Monitoring Business Plan and core objectives**
11 **and priorities.**

12 A. The Digital Monitoring Business Plan core objective is to modernize PSE’s
13 monitoring and response tools to provide faster identification of issues, provide
14 real time monitoring and response, and allow for replacement of antiquated
15 monitoring equipment. The plan will continue to evaluate greater use of new
16 technologies such as remotely controlled equipment and electronic monitoring to
17 provide real time response and control where needed. Please see Appendix C,

1 starting on page 6, for the Digital Monitoring Business Plan in support of this
2 investment.

3 **Q. Please provide PSE’s actual and planned Digital Monitoring Business Plan**
4 **capital investments over the six rate periods presented in this case.**

5 A. Table 16 provides the actual plant in service investments from January 1, 2019
6 through the end of the test year of June 30, 2021. The remaining periods are
7 estimated based on current programmatic plans.

8 **Table 16. Summary of Digital Monitoring Business Plan Investments by Rate**
9 **Period**

Plan	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
Capital investment (\$ millions)	2.0	0.2	0.7	2.0	1.4	1.4
Assets addressed (#)	79	9	16	42	36	36

10
11 **Q. Please describe the work completed and anticipated through the end of the**
12 **rate plan.**

13 A. PSE completed 79 projects since the last rate case and up through the end of the
14 current test year period. PSE anticipates completing 139 projects from July 1,
15 2021 through December 31, 2025, cumulatively completing 42 percent of the
16 plan.

1 **Q. Please describe the basis for the forecasted Digital Monitoring Business Plan**
2 **investments in more detail.**

3 A. The programmatic plan accelerates PSE’s focus on replacing antiquated Remote
4 Telemetry Units (“RTU”) and paper charts with modern electronic monitoring
5 technologies. Over the last six years, PSE replaced 88 paper charts, an average of
6 15 per year. This plan accelerates this pace to 36 per year to meet recent
7 Transportation Security Authority requirements, an investment of \$14 million in
8 total through 2030. Additionally, this plan begins to evaluate the benefits of
9 installing more real time monitoring, remote control and automated equipment,
10 and improvements to controls, alarms, and features, so PSE estimated an
11 additional \$1 million annually to evaluate these technologies. The cost estimate is
12 based on contractual unit pricing and average historical costs per project adjusted
13 for traditional escalators.

14 **Q. Have benefits been realized from the Digital Monitoring Business Plan?**

15 A. Yes. Confidence in future plan benefits can be based on historical benefits
16 realized. Since the last rate case and up through the end of the current test year
17 period, the plan has replaced 88 charts with digital equipment, reducing time in
18 the field and response times. Paper charts take one week to be collected and
19 reviewed whereas digital equipment takes only one day. Also, legacy RTUs that
20 have been replaced with newer modern RTUs have shown an increase in data

1 quality and a reduction in false alarms by ten percent coming into the Gas
2 Operations Control Room.

3 **Q. Please describe the benefits that the Digital Monitoring Business Plan will**
4 **deliver for customers through the rate plan.**

5 A. PSE's primary benefit is reliability and safety by reducing response time. Table
6 17 provides the number of days per site that the response time was reduced and
7 percentage of reduced false alarms over the six rate periods.

8 **Table 17. Summary of Digital Monitoring Business Plan Benefits by Rate**
9 **Period**

Type of Benefit	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
Reduction in Response Time (days per site)	6	6	6	6	6	6
Reduction in False Alarms	10%	0%	5%	5%	5%	5%

10
11 **4. Alternate Fuels Readiness Business Plan**

12 **Q. Please describe PSE's Alternate Fuels Readiness Business Plan and core**
13 **objectives and priorities.**

14 A. PSE's pipeline system has RNG in several places, mostly from waste treatment
15 plants. With the objective of clean energy and with the Climate Commitment Act
16 recently approved, PSE's system must be ready to accept and encouraging of
17 more alternate fuels. PSE is actively reviewing its design, construction, and
18 maintenance plans so that the pipeline system is ready to accept any blend of fuels

1 needed in the future. Preliminary analysis identified seven system locations to
2 explore and pilot operations with a blend of various percentages of hydrogen gas
3 mixed with the natural gas to lower the carbon impact of pipeline energy and
4 decarbonize the natural gas system. The objective of the plan is to perform
5 demonstrations and pilots in test environments and then its operating system to
6 determine workforce operational readiness, customer impact including
7 communication and any specific appliance impact, and longer range system
8 improvements as needed to support increased percentages and distribution of
9 blended fuels. Most importantly, this plan guarantees current pipeline
10 investments, including materials and design, will support a decarbonized future
11 effectively and streamline and remove obstacles for the alternate fuels
12 interconnection processes and studies. Please see Appendix C, starting on page
13 10, for the Alternate Fuels Readiness Business Plan in support of this investment.

14 **Q. Please provide PSE's actual and planned Alternate Fuels Readiness Business**
15 **Plan capital investments over the six rate periods presented in this case.**

16 A. Table 18 provides the actual plant in service investments from January 1, 2019
17 through the end of the test year of June 30, 2021. The remaining periods are
18 estimated based on current programmatic plans.

Table 18. Summary of Alternate Fuels Readiness Business Plan Investment by Rate Period

Plan	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
Capital investment (\$ millions)	0	0	0.3	1.5	1.5	1.5
Demonstration projects (#)	0	1	2	1-3	1-3	1-3

Q. Please describe the work completed and anticipated through the end of the rate plan.

A. No capital projects were completed since the last rate case and through the end of the current test year period, but PSE did complete one hydrogen demonstration and research study during the proforma period. PSE anticipates completing five demonstration/pilot projects from July 1, 2021 through December 31, 2025, cumulatively completing 50 percent of the plan.

Q. Please describe the basis for the forecasted Alternate Fuels Readiness Business Plan investments in more detail.

A. This new programmatic plan is based on estimates for pilots, including labor and materials and potential partnerships that will need refinement as each pilot is scoped. PSE intends to manage pilot scope and subsequent actions within the total budget of \$5.7 million through 2025. The cost estimate is based on hydrogen project proposals adjusted for traditional escalators.

1 **Q. Have benefits been realized from the Alternate Fuels Readiness Business**
 2 **Plan?**

3 A. No, not specific to this plan. However, confidence in future plans can be based on
 4 the successful completion of the first demonstration of blended hydrogen fuel,
 5 which began the evaluation of operational and customer benefits. The
 6 demonstration engaged engineering and field personnel, expanded the
 7 understanding and skill of PSE’s workforce, broadened PSE’s understanding of
 8 the pipeline impacts associated with blended hydrogen, and affirmed that this
 9 operating approach is attainable for customer benefits of clean energy.

10 **Q. Please describe the benefits that the Alternate Fuels Readiness Business Plan**
 11 **will deliver for customers through the rate plan.**

12 A. PSE’s primary benefit of these demonstrations and pilots is learning and
 13 developing efficient transformation of the pipeline system. Table 19 provides the
 14 carbon reduction potential tested by alternate fuels pilots planned over the six rate
 15 periods.

16 **Table 19. Summary of Alternate Fuels Readiness Business Plan Benefits by**
 17 **Rate Period**

Type of Benefit	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
Carbon Reduction potential tested by pilots (CO2% reduction)	0	0	0	Up to 10		

1 **5. Enhanced Methane Emissions Reduction Business Plan**

2 **Q. Please describe PSE’s Enhanced Methane Emissions Reduction Business**
3 **Plan and core objectives and priorities.**

4 A. This plan picks up with methane emissions reductions from where the 2021 PRP
5 leaves off. The objective of this plan is environmental safety. PSE evaluated its
6 practices, evaluated over 30 methane reduction ideas that had the largest emission
7 impact and could be implemented, and identified those methane reduction ideas in
8 the 2021 PRP, as allowed by RCW 80.28.420. Additional practices and
9 technology that require more evaluation and planning are pursued through this
10 plan to eliminate all possible methane emissions and evaluate benefit for
11 customers. PSE's approach to eliminate fugitive methane releases aligns with
12 requirements in the PIPES Act. Opportunities for enhanced practices include
13 recompression technology, tools to improve locating, introducing advanced leak
14 detection, and incorporating other technology. Table 20 provides more detail and
15 initial status of each opportunity that will be further evaluated.

16 **Table 20. Opportunities for Methane Emissions Reduction**

Tactic		Status
<i>Leak prevention and management</i>		
1	Leak repair methodology - Repair leak upon discovery	2021 PRP
2	Leak survey frequency change based on pipe type; geographic location; year installed, etc.	Preliminary evaluation
3	Nonhazardous release of gas (NARGS) management	2021 PRP
4	Advanced Leak detection technology	Enhanced Methane Emissions Reduction
5	Evaluate results from Material Failure Analysis lab -Proactively Replace Bolt-On Tees	Preliminary evaluation
6	Evaluate results from Material Failure Analysis lab -Proactively Replace Caps	Implement

7	Evaluate results from Material Failure Analysis lab -Use new Continental Punch Tee retirement cap	Implement
8	Leverage AMI (methane sensor in module; real-time monitoring)	Preliminary evaluation
<i>Damage Prevention</i>		
9	Reduce locate related damages	Enhanced Methane Emissions Reduction
10	Reduce homeowner damages through advertising	Preliminary evaluation
11	Expand damage prevention team to reduce 3rd party contractor damages	2021 PRP
12	Improve accuracy and timeliness of maps used in locating	Preliminary evaluation
<i>Intentional Release of Gas</i>		
13	Meter change out purging practices	Preliminary evaluation
14	Review purging practices; continued refinement of purging procedures, use of nitrogen	Enhanced Methane Emissions Reduction
15	Evaluate flaring and recompression for methane impact; methane capture tools	Enhanced Methane Emissions Reduction
16	Pipeline replacement construction practices	Enhanced Methane Emissions Reduction
17	Partner with Williams on their purging procedures	Implement
<i>Emergency Release of Gas</i>		
18	Expand valve inspections and accessibility for shut-down in lieu of dig up and squeeze (e.g., emergency section valves that shut off too many customers, redefining "critical" so more valves are inspected)	Preliminary evaluation
19	Dynamically scheduled valve inspections - ID valves on either side of third party excavations and create work orders to inspect them prior to construction, so we can shut breaks down more efficiently	Preliminary evaluation
20	Emergency response process that considers reducing broken and blowing time	Preliminary evaluation
21	Equipment we should install for shut down processes; e.g., retrofitting services with EFVs	Preliminary evaluation
22	Adding valve locations to material tracking and traceability, GPS coordinates for valve locations, proactive approach to newly installed; add installed locations during scheduled asphalt restoration, at site visits	Preliminary evaluation
<i>Engineering Design and Standards</i>		
23	Valve requirements (install more valves)	Preliminary evaluation
24	Meter change-out philosophy (when to replace a meter during pipeline replacement)	Preliminary evaluation
25	Meter philosophy of SAP improvements, meter replacements/maintenance, avoid unnecessary meter change-outs	Preliminary evaluation
26	Risers, soil to air interface (SAI): to replace or to repair in the field	Preliminary evaluation
27	Replace threaded fittings with flanges on MSA	Preliminary evaluation
28	Evaluate IMO Design to replace relief and minimize leakage points	Implemented
29	Evaluate RS design to minimize leakage points and prove relief has minimal leakage	Preliminary evaluation
30	Evaluate current commodities for methane release potential over time and phase them out	Preliminary evaluation

31	Atmospheric corrosion SAI inspection process (soil to air interface on steel risers)	Preliminary evaluation
32	Riser designs	Preliminary evaluation

Please see Appendix C, starting on page 16, for the Enhanced Methane Emissions Reduction Business Plan in support of this investment.

Q. Please provide PSE’s actual and planned Enhanced Methane Emissions Reduction Business Plan capital investments over the six rate periods presented in this case.

A. Table 21 provides the actual plant in service investments from January 1, 2019 through the end of the test year of June 30, 2021. The remaining periods are estimated based on current programmatic plans.

Table 21. Summary of Enhanced Methane Emissions Reduction Business Plan Investment by Rate Period

Plan	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
Capital investment (\$ millions)	0	0	0	5.4	2.0	2.8
Opportunities pursued (#)	0	0	1-3	1-3	1-3	1-3

Q. Please describe the work completed and anticipated through the end of the rate plan.

A. No capital projects were completed during the test year period, but PSE has evaluated over 30 opportunities and performed preliminary financial and feasibility review. PSE anticipates implementing four to six opportunities that

1 drive changes in operating practices and design from July 1, 2021 through
2 December 31, 2025, cumulatively completing 33 percent of the proposed tactics.

3 **Q. Please describe the basis for the forecasted Enhanced Methane Emissions**
4 **Reduction Business Plan investments in more detail.**

5 A. This new programmatic plan will develop the opportunities identified in Table 20
6 that were not ready to be included in the 2021 PRP. The cost is based on estimates
7 from peers regarding advanced leak detection, tools to improve locating,
8 experience and information regarding recompression and vacuum technology,
9 potential partnerships for reevaluating operating practices, and striving for about
10 30 percent of PSE's construction work to leverage recompression technology by
11 2025.

12 **Q. Have benefits been realized from the Enhanced Methane Emissions**
13 **Reduction Business Plan?**

14 A. No, not specific to this plan. However, PSE has used some of these enhanced
15 practices successfully. For example, PSE used a vacuum truck to capture methane
16 associated with a pipeline purging operation. The methane reduction benefit was
17 not tracked specifically, but PSE was able assess the viability of the technology
18 and its practical application to reducing PSE's carbon footprint.

1 **Q. Please describe the benefits that the Enhanced Methane Emissions Reduction**
2 **Business Plan will deliver for customers through the rate plan.**

3 A. PSE’s primary benefit of these improvements is a pipeline system and operations
4 that further environment safety. Table 22 provides the methane emission
5 reduction through recompression opportunities over the six rate periods.

6 **Table 22. Summary of Enhanced Methane Emissions Reduction Business**
7 **Plan Benefits by Rate Period**

Type of Benefit	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
Emissions Savings (Metric tons CO2e)	0	0	0	500	2,500	3,000

8
9 **6. System Reliability Business Plan**

10 **Q. Please describe PSE’s System Reliability Business Plan and core objectives**
11 **and priorities.**

12 A. Over the next five years, the High-Pressure System Reliability Business Plan and
13 the Intermediate-Pressure System Reliability Business Plan (“System Reliability
14 Business Plan”) will address current pipeline constraints on 24 systems that
15 require manual real time field adjustments. PSE has identified multiple projects
16 needed to reinforce the pipeline system and confirm the customers’ needs are met
17 today. All of the areas that this plan addresses are areas currently supported by
18 cold weather actions (“CWA”), meaning the areas are currently facing reliability
19 concerns should the manual adjustments of CWA fail, such as inability to get an

1 injection truck to the injection site due to road conditions or not being able to
2 open a valve in time. PSE's modeling of system concerns is not perfect and PSE
3 anticipates, based on previous experiences, that two additional systems will need
4 to be reinforced once paper charts are pulled from the field. The core objective is
5 to provide firm tariff service to existing customers by ensuring the high pressure
6 system infrastructure, the intermediate pressure system infrastructure, and
7 regulating stations and equipment are adequate to serve the load on a peak hour
8 design day condition without creating greater risk as a result of an overextended
9 cold weather action plan. While these are effective immediate fixes, PSE is
10 limited by the amount of CWAs that can be deployed due to training, staffing, and
11 the large service area needed to be covered on the coldest of days. Once all CWAs
12 are exhausted, the next action is to intentionally isolate and shut in portions of the
13 gas system as the system approaches peak demand. System reinforcements help
14 avoid these situations and guarantee PSE can provide reliable service to firm
15 customers. Please see Appendix C, starting on page 23, for the High-Pressure
16 System Reliability Business Plan and starting on page 27, for the Intermediate-
17 Pressure System Reliability Business Plan in support of this investment.

18 **Q. Please provide PSE's actual and planned System Reliability Business Plan**
19 **capital investments over the six rate periods presented in this case.**

20 A. Table 23 provides the actual plant in service investments from January 1, 2019
21 through the end of the test year of June 30, 2021. The remaining periods are
22 estimated based on current programmatic plans.

Table 23. Summary of System Reliability Business Plan Investments by Rate Period

Plan	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
Capital investment (\$ millions)	12.3	3.9	6.4	11.5	13.6	14.0
Projects (#)	46	3	6	9	9	9

Q. Please describe the work completed and anticipated through the end of the rate plan.

A. PSE has completed 46 projects since the last rate case and up through the end of the current test year period. PSE anticipates completing 36 projects from July 1, 2021 through December 31, 2025, cumulatively completing 100 percent of the plan.

Q. Please describe the basis for the forecasted System Reliability Business Plan investments in more detail.

A. PSE has historically addressed, on average, ten reliability concerns per year. This plan continues that pace for now, but PSE maturity of non-pipe alternative analysis or changes in peak load forecasts, technology adoption, and policy dictation may require plan adjustment. The forecast is based potential solutions associated with known needs using historic average costs per project adjusted for traditional escalators. Each project within this plan is evaluated using iDOT and must achieve positive benefit-cost ratios.

1 **Q. Have benefits been realized from the System Reliability Business Plan?**

2 A. Yes. Confidence in future plan benefits can be based on historical benefits
3 realized because the plan has completed projects and has shown system
4 performance improvements verified through real time monitoring, reducing the
5 poor pressure/outage risk for over 4,500 customers. The improvements align with
6 the expected outcomes of the modeling software. In addition, cold weather actions
7 are being eliminated as a result of this plan.

8 **Q. Please describe the benefits that the System Reliability Business Plan will**
9 **deliver for customers through the rate plan.**

10 A. PSE's primary benefit is to provide firm tariff service to customers on a peak hour
11 design day without creating greater risk as a result of an overextended cold
12 weather action plan. Table 24 provides the reduction in customer outages over the
13 six rate periods.

14 **Table 24. Summary of System Reliability Business Plan Benefits by Rate**
15 **Period**

Type of Benefit	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
Reduction in Customer Outages (#)	4,585	1,100	2,300	4,800	4,800	4,800

1 **D. Major Projects Gas and Specific Backbone Infrastructure Program**

2 **Q. Please describe the key plans that advance pipeline modernization in the area**
3 **of backbone infrastructure.**

4 A. The Major Projects Gas and Specific Backbone Infrastructure (“Backbone
5 Infrastructure Plan”) work is focused on high pressure pipelines, gate stations, and
6 other infrastructure that allow for safe and reliable delivery to the distribution
7 system. These major backbone infrastructure projects are driven by system need,
8 which is defined by the ability to serve customers on a design day and by
9 reliability concerns. There are two specific backbone major projects that are
10 greater than \$10 million that are discussed by Bamba, Exh. RBB-1T. One is the
11 Marine Crossing, which addresses the needed resiliency for Vashon Island and
12 Gig Harbor as a result of the potential failure of the underwater pipelines that
13 provide service to this area, and the second is the LNG Distribution investments,
14 specifically a 12” high pressure pipeline and Golden Givens Gate station.

15 In addition to known specific projects, PSE’s Initiation process will review seven
16 known system deficiencies and, based on affirming need and completing a
17 solution assessment, will proceed with project planning and implementation. At
18 completion of initiation, PSE will establish a specific project and project
19 management protocol. Bamba, Exh. RBB-1T, discusses these investments in more
20 detail. Once initiation is completed, funding adjustments may be needed to
21 account for solutions that will be implemented.

1 **Q. Please provide PSE’s actual and planned Backbone Infrastructure Plan**
2 **capital investments over the six rate periods as presented in this case.**

3 A. Table 25 provides the actual plant in service amounts from January 1, 2019
4 through the end of the test year of June 30, 2021. The remaining periods are
5 estimated based on current programmatic initiation plans and specific project
6 plans.

7 **Table 25. Summary of Backbone Infrastructure Plan Investment by Rate**
8 **Period**

Plan	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
Capital investment (\$ millions)	15.3	5.5	20.5	7.0	10.0	10.5
Projects placed in service (#)	1	0	1	2	2	3

9
10 **Q. Please describe the work completed and anticipated through the end of the**
11 **rate plan.**

12 A. PSE completed the LNG Distribution work in 2020 since the last rate case and up
13 through the end of the current test year period. For the initiation work, PSE
14 anticipates initiating evaluation on seven specific area needs from July 1, 2021
15 through December 31, 2025. PSE expects to complete the immediate supply
16 concern associated with the Vashon – Gig Harbor Long Term Solution by 2022
17 with long term solution planning and project development occurring through the
18 end of the rate plan.

1 **Q. Please describe the basis for the forecasted Backbone Infrastructure Plan**
2 **investments in more detail.**

3 A. PSE provides the actual investment associated with the completed LNG
4 Distribution work. The forecasted investment estimate for the short term supply
5 solution of the Vashon – Gig Harbor Long Term Solution project is based on
6 design and permitting specifications. The Initiation investment is estimated based
7 on historical cost averages for similar potential solutions and optimistic schedules.
8 Due to the preliminary nature of these projects, the total annual budget is
9 programmatically adjusted to a lower total number to account for uncertainty that
10 generally impacts schedule including undefined permit conditions, potential
11 variability from permit conditions based on historical trends, stakeholder
12 engagement, property acquisition challenges, schedule deferrals due to emergent
13 company priorities or resource constraints, and shifts in schedule due to changes
14 in need drivers such as load growth assumption changes.

15 **Q. Have benefits been realized from the Backbone Infrastructure Plan?**

16 A. Yes. With the LNG Distribution investment completed, customers benefit from
17 increased reliability on the South Tacoma High-Pressure System. The benefit of a
18 refined project development process, called Initiation, that evaluates proposed
19 projects in detail before launching brings increased confidence and likelihood in
20 the customers' benefits. This phase provides that the need is fully understood, and
21 PSE is well prepared to implement the recommended solution.

1 **Q. Please describe the benefits that the Backbone Infrastructure Plan will**
2 **deliver for customers through the rate plan.**

3 A. PSE's primary benefit is to provide firm tariff service to customers on a peak hour
4 design day without creating greater risk as a result of an overextended cold
5 weather action plan. Table 26 provides the anticipated reduction in customer
6 outages over the six rate periods.

7 **Table 26. Summary of Backbone Infrastructure Plan Benefits by Rate Period**

Type of Benefit	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
Reduction in Customer Outages (#)	4,600	11,000	2,300	4,800	4,500	4,500

8

9 **II. CONCLUSION**

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

11 A. Yes, it does.