

**EXH. CAK-6 (Apx. C)
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 ___**

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

CATHERINE A. KOCH

ON BEHALF OF PUGET SOUND ENERGY

JANUARY 31, 2022

DISTRIBUTION INTEGRITY MANAGEMENT PROGRAM (DIMP)

ENERGY TYPE: GAS

1. SHORT DESCRIPTION

PSE's Distribution Integrity Management Program (DIMP), identifies the highest risk threats to the gas system and additional or accelerated actions are implemented in the form of maintenance programs. Programs are funded so that PSE can conduct field inspections to evaluate and carry out remediation options in order to reduce system risk.

2. BACKGROUND

Beginning in August 2011, the US Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) mandates that gas distribution pipeline operators implement a Distribution Integrity Management Program (DIMP). PSE's DIMP was developed to comply with this regulation and to reduce risks to its gas distribution system.

PSE monitors trends in system integrity data to identify new or existing threats to the gas distribution system. These threats are evaluated with respect to the specific assets in the gas system using a relative risk analysis to determine where additional or accelerated actions are required in order to reduce the risk. Programs are developed and implemented so that funding can be allocated effectively on specific risk reduction efforts. This information is updated annually in the Continuing Surveillance Report and Summary of Additional or Accelerated Actions.

3. STATEMENT OF NEED

DIMP programs are developed as additional or accelerated actions to mitigate higher risk threats in order to reduce hazardous leaks and to comply with the regulation.

3.1. NEED DRIVERS

Refer to the Summary of Additional or Accelerated Actions for individual program need drivers.

- **Safety:** DIMP programs address safety by remediating issues that may lead to damages or leaks.
- **Environmental:** DIMP programs reduce future methane emissions resulting from leaks.

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3.2. INTEGRATED STRATEGIC PLAN (ISP) ALIGNMENT

Refer to the Summary of Additional or Accelerated Actions for individual program details.

DIMP programs align primarily with the Processes & Tools category of the ISP:

- **System Reliability and Integrity:** The main driver for DIMP programs are to improve system integrity by identifying and remediating issues that lead to damages or leaks.
- **Extract and leverage value from existing technology:** The DIMP programs utilize existing equipment to optimize the costs to attain the program's goals and benefits.

4. PROGRAM DETAIL

4.1. PROGRAM SIZE/POPULATION

Refer to the Summary of Additional or Accelerated Actions for individual programs size and population.

4.2. PROPOSED COMPLETION DATE

Each DIMP program has a unique target date for completion or reaching steady state. Once at steady state, projects are completed within a year of being identified. Refer to the DIMP Risk Graphic for individual program details.

4.3. SUMMARY OF PROGRAM BENEFITS

- **Safety:** DIMP program benefits are determined by risk reduction for a given investment. Risk reduction is primarily accomplished by reducing individual program populations. As of year-end 2020 there were 525 risk points¹ remaining in the system with the target of risk to 150 risk points by 2030 to achieve steady state. Refer to the DIMP Risk Graphic for individual program risk reduction.
- **Stakeholder Relationships:** The DIMP programs demonstrate our commitment to safety to stakeholder groups such as UTC, Cities, and Customers through efforts to improve pipeline integrity
- **Methane Reduction:** Environmental safety benefit relative to methane emission reduction is measured by converting methane to carbon dioxide equivalent (CO₂e). The DIMP programs reduce emissions by addressing risks that would otherwise lead to leaks. By attributing leak causes to individual DIMP programs these programs have a potential reduction of 1,704 metric tons CO₂e.

¹ The benefit of risk reduction is quantified by using DIMP risk points. Through DIMP, plans are scored based on the probability of a failure or leak occurring and the consequence resulting from a failure or leak

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Table 1 - CO2e Emission Reduction Potential

Leaks With DIMP Programs Addressing Cause (5 year average)	Average CO2e Per Leak (metric tons)	Annual CO2e Emissions (metric tons)
142	12	1,704

4.4 PRIMARY IDOT CATEGORIES

PSE’s employs an Investment Decision Optimization Tool (iDOT) to evaluate benefits of projects and optimize the annual portfolios for construction. The top primary iDOT Categories the DIMP programs address are:

- Health and Safety
- Stakeholders

Table 2 – iDOT Benefit

2023 Forecast Cost (\$)	2023 iDOT Benefit (\$)	2023 Benefit / Cost Ratio
\$29,421,099	\$103,498,592	3.5

Cost benefit analysis is also performed using iDOT to compare the benefit to a dollar value. The forecasted costs and benefits were evaluated for 2023, excluding the PRP plans which have stand-alone business plan documents.

4.5. ESTIMATED COSTS

The programmatic costs to complete the DIMP programs are what is needed to bring them to steady state. PSE’s plan targets a reduction of about 40 risk points annually to a manageable steady state risk tolerance of 150 risk points by 2030. PSE estimates the investment to reach that target is approximately \$185 million, from 2022 to 2030, in addition to ongoing investments for routine programs already at steady state and to initiate programs in the early stages of development.

Table 3 – DIMP Programs Estimated Total Investment

	Program	Estimated Total Investment (CAP \$)
1	Bolt-On Service Tees	\$0*
2	Encroachment Remediation	\$0*
3	Extended Utility Facilities	\$1.0M

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4	Ground Faults and Lightning Strike Mitigation	\$0*
5	High Pressure Main Assessment	\$0*
6	Idle Risers	\$13.2M
7	Low Pressure Distribution Systems Remediation	\$22.0M
8	Mapping Accuracy	\$0*
9	Modified Farm Taps	\$25.0M
10	No Record Facility Remediation	\$15.0M
11	Older Wrapped Steel Pipe Mitigation	\$20.0M
12	Regulator Station Mitigation	\$30.0M
13	Rockwell IPH Mitigation	Completed in 2021
14	Wrapped Steel Main in Casing	\$20.0M
15	Wrapped Steel Service Assessment	\$6.0M
16	Bridge and Slide Remediation	\$2.0M
17	Celcon Service Tee Caps	\$0*
18	Docks and Wharves Assessment	Routine
19	Double Insulated Flanged Valves	Routine
20	Encroachment MHC Survey	\$1.0M
21	Excess Flow Valves	\$0*
22	Heater Maintenance	\$0*
23	High Pressure Valve Mitigation	Routine
24	High Voltage AC Mitigation	Routine
25	Industrial Meter Set Remediation	\$0*
26	Pipe on Pipe Supports	Routine
27	Shallow Main and Service Remediation	\$9.0M
28	Traffic Protection Enhancement	Routine
29	Damage Prevention	\$21.5M

*Strategy is in development and will require additional funding and resources

5. ALTERNATIVES

5.1. SOLUTION ALTERNATIVES

Refer to DIMP Summary of Additional or Accelerated Actions for individual program strategies.

Proactive Remediation: DIMP programs typically employ the proactive strategy of identifying and remediating the entire population.

Reactive Remediation: The other alternative would be to remediate issues once they lead to leak.

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5.2. FUNDING ALTERNATIVES

No Action: Without individual programs in place, PSE system risks would continue to increase.

Increased Funding: With increased funding, DIMP programs are able to be expedited or address issues that carry a higher cost.

Decreased Funding: Reducing funding levels results in fewer projects being completed in a given year or projects being deferred to future years.

5. HISTORY

Date	Reason(s) for Update	Summary of Significant Change(s)	Modified By
9/20/2021	Documented existing program strategy.	Initial	Parker Indorf
9/20/2021	Initial Program Documentation - New plan template	Initial Program Document – Summarize historical plans	Parker Indorf
12/17/2021	Annual Review	Minor word and format changes	Parker Indorf

6. SUPPORTING DOCUMENTATION

Document Name
DIMP SUMMARY OF ADDITIONAL AND ACCELERATED ACTIONS
DIMP CONTINUING SURVEILLANCE REPORT
DIMP RISK GRAPHIC
PIPELINE REPLACEMENT AND METHANE EMISSION REDUCTION PROGRAM PLAN

DIGITAL MONITORING

ENERGY TYPE: GAS

1. SHORT DESCRIPTION

The Digital Monitoring plan supports pipeline modernization by providing faster identification of issues, real time monitoring and response, and the replacement of antiquated monitoring equipment. The plan will continue to evaluate greater use of new technologies such as remotely controlled equipment and electronic monitoring, to provide real time response and control where needed.

2. BACKGROUND

PSE's emergency response and inspection historically consisted of manual field operations. PSE's control room operations consist of 98% monitoring and only 2% controllable points on the pipeline system. PSE has been replacing paper charts with electronic charts over the last six years. These charts allow near real time access to information as compared the manual reads which range from every 1 -2 weeks. , The business need requires acceleration of the the replacements in order increase monitoring and potentially responding to abnormal activity before it becomes an emergency situation. (i.e. over pressure, losing pressing, failure of equipment).

An increase in both physical and cyber security threats has resulted in the Transportation Security Authority (TSA) mandating increased cyber security requirements and strongly recommending physical security enhancements for critical infrastructure. PSE's legacy Remote Terminal Unit (RTU) will need to be replaced to meet federal requirements. Additional monitoring equipment will be needed for Tier 1 facilities.

3. STATEMENT OF NEED

PSE's ability to monitor and control the system remotely will need to change in order to safely operate and maintain the low carbon delivery system of the future. The objectives of this business plan include:

Security & Response

- TSA's guidelines and recommendations for critical sites. i.e. security cameras, perimeter status
- TSA's requirement to update legacy equipment that poses risk to IT security. i.e. replacing legacy RTUs

Real time monitoring

- PSE's system pressure monitoring requirements.
- Downstream gas quality

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- Leak detection
- Status of equipment / facilities (i.e. valve position or regulator settings)
- Cathodic Protection System

Remote Controlled and Automated Equipment

- TIMP requirements for automated valves.
- Controllable equipment for abnormal operations and CWA.

3.1. NEED DRIVERS

- **Transportation Security Administration (TSA) cybersecurity rules for pipeline companies**

As a result of the Colonial Pipeline Ransomware incident in 2021, a TSA directive requires pipeline companies to implement mitigation measures to protect against cyberattacks, to develop a cybersecurity contingency and recovery plan, and to conduct a cybersecurity architecture design review. During the review, it was determined that legacy equipment would need to be replaced.

- **Reliability** – Controllable equipment, automated equipment and digital monitoring increases reliability by having the ability to monitor real time and quickly respond to abnormal operating conditions.
- **Safety** – Remote/automated valves and real time leak detection help by being able to respond to an incident real time.

3.2. INTEGRATED STRATEGIC PLAN (ISP) ALIGNMENT

This program aligns primarily with the Processes & Tools category:

- **System Reliability and Integrity** – The main drivers for this program are to support provide operational flexibility, meet system security requirements, and improve the customer experience. The improvement to system reliability supports operational excellence and customer satisfaction.
- **Streamline processes to drive effectiveness and efficiency** – This program drives effectiveness and efficiencies by addressing multiple benefit streams within the same scope of work.
- **Extract and leverage value from new technology** – The program will utilize new equipment and technology to optimize the costs to attain the program’s goals and benefits.

4. PROGRAM DETAIL

4.1. PROGRAM SIZE/POPULATION

The plan includes paper charts and legacy RTUs with known populations. Other elements are being evaluated to include additional automated remote controlled

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valves, increased security and monitoring, leak detection devices, and remote control equipment for cold weather action bypass. As requirements are solidified the business plan will be updated.

- Estimated 188 paper charts to be replaced with electronic devices
- Estimated 140 legacy RTUs that need to be replaced per TSA’s requirement.

4.2. SUMMARY OF PROGRAM BENEFITS

- **Reliability and Safety** – Digital monitoring increases reliability by having the ability to monitor the system real time and quickly respond to incidents.
- **Stakeholders** – The primary stakeholder for digital monitoring is the TSA. TSA requires that devices connected to critical infrastructure meet today’s technology standards. Devices that do not meet these standards, such as PSE’s legacy RTUs, must be put on a replacement plan.

4.3. PRIMARY iDOT CATEGORIES

PSE’s employs an Investment Decision Optimization Tool (iDOT) to evaluate benefits of projects and optimize the annual portfolios for construction. The top primary iDOT Categories this plan addresses are:

- Health and Safety
- Stakeholders
- Outages
- Cost Avoidance

Table 1 – iDOT Benefit

Forecasted Cost (\$)	iDOT Benefit (\$)	2023 Benefit / Cost Ratio
\$17,000,000	\$23,864,299	1.9

4.4. ESTIMATED COSTS

High level estimated costs are roughly \$17MM to be completed by 2030. This is based on existing resources to replace legacy RTUs and paper charts. As the program elements expand and mature, and more resources become available, costs will adjust accordingly to account for these changes.

5. ALTERNATIVES

5.1. SOLUTION ALTERNATIVES

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Proactive Remediation: The alternative to meeting TSA’s requirement is to revert back to manual paper monitoring charts.

Reactive Remediation: The alternative not selected is to wait for the consequences handed down from TSA for not meeting their security requirements

5.2. FUNDING ALTERNATIVES

No Action: If no action is taken, the response time and identification of issues will remain at current levels as the rest of the industry continues to improve in these areas. In addition, PSE will not be able to meet TSA’s Security requirements.

Increased Funding: With increased funding, PSE would be able to recognize and be alerted to issues more quickly.

Decreased Funding: Delayed implementation schedule.

6. PLAN DOCUMENT HISTORY

The current version of the project summary supersedes all previous versions.

Date of Project Summary Revision	Reason(s) for Update	Summary of Significant Change(s)	Modified By
9/20/2021	Documented existing program strategy.	Initial	Phil Puzon
12/17/2021	Annual Review	Minor word and format changes. Updated benefits	Phil Puzon

7. SUPPORTING DOCUMENTATION

Document Name

ALTERNATE FUELS

ENERGY TYPE: GAS

1. SHORT DESCRIPTION

The alternate fuels plan is a pipeline modernization initiative to prepare PSE's system for low carbon fuels including Renewable Natural Gas (RNG) and Hydrogen. This plan describes PSE's future planned demonstrations, pilots and improvement activities needed to safely and efficiently operate the system of the future.

2. BACKGROUND

PSE's pipeline delivery system has supported and integrated RNG sources to the system since the 1990s. There are currently two significant RNG facilities connected to the distribution system with a third coming on line in 2022. The current facilities receive RNG from waste water treatment plants and a landfill. PSE currently receives approximately one feasibility request per year for RNG connections and with the proposed legislation, PSE is anticipating an increase in feasibility requests and will be pursuing process enhancements to standardize and streamline the process.

PSE has been reviewing its design, construction, and maintenance plans to support a variety of fuel blends that may be possible the future. Preliminary studies identified several categories of prudent analysis that will need to be performed prior to the blending of alternate fuels on the distribution system. In 2021, PSE began its net zero carbon journey with a series of Hydrogen demonstrations and pilots in test environments to gain practical experience working with Hydrogen, validate information from research, and begin determining the impact of those blends on the distribution system.

PSE has been partnering with other utilities, conducting existing industry research, and seeking alternate funding to advance our knowledge base and technology/research capabilities. Through the American Gas Association, Western Energy Institute, and HyReady Consortium working groups, PSE was able to leverage research and lessons learned from other utilities. In 2021, PSE applied for and was awarded a Clean Energy grant to conduct a feasibility study using a reduced carbon fuel source (RNG or Hydrogen) in a backup generator at Tenino high school in Washington State. The research and engineering information obtained from this study will advance PSE's knowledge of reduced carbon fuels and will specifically inform customers of the benefits of utilizing Hydrogen as an alternative fuel source to reduce emissions.

3. STATEMENT OF NEED

PSE's delivery system and workforce will need to change in order to safely operate and maintain the low carbon delivery system of the future. The objectives of this business plan

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are to perform demonstrations and pilots in test environments and on the pipeline system to determine and ensure:

- Current pipeline investments including materials and design will support the alternate fuels of a decarbonized future.
- Operational readiness requirements (processes, procedures, standards, skills, and training) can meet the needs of these alternate fuels
- Tools and technologies needed to operate and maintain the system are adequate.
- Customer communication strategy and impacts (including appliances) have been researched.
- Impacts of longer range system improvement plans to support increased percentages and distribution of blended fuels are known.
- Alternate fuels interconnection processes and studies that reduces obstacles to interconnections are streamlined.

3.1. NEED DRIVERS

a) Climate Action

National, state, and municipal policies and customer will require natural gas delivery systems to emit far lower carbon emissions in the future. For example, the Washington Climate Commitment Act, which was signed into law by Governor Jay Inslee in May 2021, solidifies Washington state as a national climate. Additionally, the State Energy Strategy, legislative proposals and municipal actions demonstrate the growing interest in increasing the urgency toward decarbonization. To meet these drivers an maintain safety and prudence, PSE must conduct the necessary analysis that will enable the pipeline system to accommodate the changes necessary for decarbonization while ensuring our most vulnerable customers are not left behind.

b) Beyond Net Zero Carbon pledge

On January 21, 2021, PSE announced its Beyond Net Zero Carbon pledge, setting an aspirational goal to reach net zero carbon emissions for natural gas sales by 2045, with an interim target of a 30% carbon emissions reduction by 2030. The objective of this goal is to reduce PSE's residential, commercial, and industrial natural gas carbon emissions. The planned method for this reduction will be through a combination of energy efficiency, low carbon fuel sources and blending of RNG, synthetic natural gas, and Hydrogen, and to reduce emissions from PSE's gas and electric operations and supply.

3.2. INTEGRATED STRATEGIC PLAN (ISP) ALIGNMENT

This program aligns primarily with the Processes & Tools & People categories:

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- System Reliability and Integrity – Alternate fuels, specifically hydrogen, requires modifications to the distribution system as blends are increased. Future proofing to ensure system reliability and integrity is needed so that these fuels can be transported safely and confidently through the natural gas system.
- Extract and leverage value from existing technology – The program will utilize existing equipment where prudent to optimize the costs to attain the program’s goals and benefits.
- Establish a culture that embraces ownership, innovation and continuous improvement: – As the fuel blends are proposed and changed, new processes, procedures, equipment, and training will be needed to safely operate the delivery system.

4. PLAN DETAIL

4.1. PLAN SIZE/POPULATION

The plan includes RNG interconnection process improvements and a series of demonstrations and pilots with alternate fuels targeting 1-3 per year. The demonstrations and pilots will vary in complexity and initially be conducted in a test environment with the goal of moving them onto sections of the distribution system. As requirements are solidified, additional business plans will be created for larger implementation. The extent of this plan is to scope, develop, and determine the requirements (training, skills, tools, safety protocols) to operate the system of the future relating to reduced carbon fuels.

Table 1 – Alternative Fuels Plan

Plan	2022	2023	2024	2025	2026
# of Demonstration Projects	1	1-3	1-3	1-3	1-3

4.2. PROPOSED COMPLETION DATE

The current target is to complete RNG interconnection improvements, the demonstrations and pilots, and be operationally ready for alternate fuels by 2026. It is expected that there will be advances in low carbon fuels that may alter or extend the pilot phase which will be outlined in revised plans as needed.

4.3. SUMMARY OF PLAN BENEFITS

- Methane Reduction – Environmental benefits are achieved through the carbon reduction of hydrogen blending and RNG. PSE’s primary benefit of these

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demonstrations and pilots is learning and developing efficient transformation of the pipeline system.

Table 2 – Pilot Methane Emission Reduction

Type of Benefit	2022	2023	2024	2025	2026
Methane Emission Reduction Potential (CO ₂ e %)	0%	Up to 10%			

- **Reliability** – The Alternate Fuel plan ensures that PSE is able to transport lower carbon fuels through its pipeline distribution system.
- **Stakeholder Relationships** – The plan demonstrates our commitment to environmental safety to stakeholder groups such as UTC, Cities, and Customers.
- **Public and Employee Safety** – Safety benefits are achieved by ensuring both the pipeline system and the employees are able to use and operate alternate fuels

4.4. PRIMARY IDOT CATEGORIES

PSE’s employs an Investment Decision Optimization Tool (iDOT) to evaluate benefits of projects and optimize the annual portfolios for construction. The top primary iDOT Categories this plan addresses are:

- Environment
- Stakeholders

Table 3 – iDOT Benefit

Forecasted Cost (\$)	iDOT Benefit (\$)	2023 Benefit / Cost Ratio
6,270,000	\$14,209,218	2.66

4.5. ESTIMATED COSTS

Costs estimates for this plan are based on the quantity of demonstrations and pilots, estimated labor, materials and potential partnerships. Each pilot/demonstration will have a detailed scope and updated budget. PSE’s intent will be to manage pilots scope and subsequent actions within the total budget of \$6.3 million through 2026. The cost estimate is based on alternate fuel project proposals adjusted for traditional escalators

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5. ALTERNATIVES

5.1. SOLUTION ALTERNATIVES

Proactive Remediation: The alternative is to invest in other decarbonization methods such as reducing customer demand. However, this alone may not be enough to meet PSE’s decarbonization goals.

Reactive Remediation: The alternative not selected is to not invest in decarbonization. The risk associated with this is possible fines, loss of trust with the public/WUTC/stakeholders, and prolonging climate change issues.

5.2. FUNDING ALTERNATIVES

No Action: If not funded, the carbon reduction goal will be difficult to achieve and accomplishing the PSE 2030 strategy will be challenging.

Increased Funding: With increased funding, PSE would be able to implement planned strategies sooner.

Decreased Funding: Decreased funding may prolong the timeline of the plan and PSE may miss goal targets.

6. PLAN DOCUMENT HISTORY

The current version of the project summary supersedes all previous versions.

Date of Project Summary Revision	Reason(s) for Update	Summary of Significant Change(s)	Modified By
9/20/2021	Documented existing program strategy.	Initial	Phil Puzon
12/17/2021	Annual Review	Minor word and format changes. Updated benefits	Phil Puzon

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7. SUPPORTING DOCUMENTATION

Document Name

ENHANCED METHANE EMISSION REDUCTION

ENERGY TYPE: GAS

1. SHORT DESCRIPTION

The Enhanced Methane Emission Reduction plan will investigate new technologies and operating procedures to further reduce methane emissions. This plan, in coordination with the 2021 Pipeline Replacement Plan and the Distribution Integrity Management Program, addresses PSE’s approach to reducing methane emissions from the delivery system. The plan includes advanced leak detection, recompression technology, tools to improve locating buried gas facilities, and other operational improvements.

2. BACKGROUND

PSE has been working to reduce active nonhazardous natural gas leaks by repairing the oldest leaks first to reduce the population being monitored. Utilizing PSE’s Distribution Integrity Management Program (DIMP), those assets that have been identified as a risk due to leaking are scheduled for replacement to minimize any future leaks.

By repairing nonhazardous leaks more quickly, PSE has learned how to better identify non-pipeline gas sources and been able to pinpoint and repair very small leaks on the system. Those small leak repairs help to educate and feed into PSE’s DIMP that help PSE know how the system is aging and what components are beginning to leak.

PSE is also focusing on the things that produce the most emissions like third party excavation damages in the distribution system. These are preventable actions that PSE is working to reduce by incorporating new computer risk modeling to help prioritize locate tickets. In addition, PSE will hire new damage prevention field representatives to monitor digging of the contractors that damage PSE’s facilities the most.

PSE evaluated its practices and over 30 methane reduction ideas. Items that prioritized safety and were ready to implement were identified and added to the 2021 PRP and some were directly implemented as Standards updates. Items that were new technology or needed to be further analyzed are included in this Enhanced Methane Emission Reduction plan. The remaining tactics have been evaluated and may be incorporated in the future.

Table 1 – Opportunities for Methane Emission Reduction

	Tactic	Status
	Leak prevention and management	
1	Leak repair methodology - Repair leak upon discovery	2021 PRP
2	Leak survey frequency change based on pipe type; geographic location; year installed, etc.	Evaluated
3	Nonhazardous release of gas (NARGS) management	2021 PRP

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	Tactic	Status
4	Advanced Leak detection technology	Enhanced Methane Emission Reduction
5	Evaluate results from Material Failure Analysis lab -Proactively Replace Bolt-On Tees	Evaluated
6	Evaluate results from Material Failure Analysis lab -Proactively Replace Caps	Implemented
7	Evaluate results from Material Failure Analysis lab -Use new Continental Punch Tee retirement cap	Implemented
8	Leverage AMI (methane sensor in module; real-time monitoring)	Evaluated
Damage Prevention		
9	Reduce locate related damages	Enhanced Methane Emission Reduction
10	Reduce homeowner damages through advertising	Evaluated
11	Expand damage prevention team to reduce 3rd party contractor damages	2021 PRP
12	Improve accuracy and timeliness of maps used in locating	Evaluated
Intentional Release of Gas		
13	Meter change out purging practices	Evaluated
14	Review purging practices; continued refinement of purging procedures, use of nitrogen	Enhanced Methane Emission Reduction
15	Evaluate flaring and recompression for methane impact; methane capture tools	Enhanced Methane Emission Reduction
16	Pipeline replacement construction practices	Enhanced Methane Emission Reduction
17	Partner with Williams on their purging procedures	Implemented
Emergency Release of Gas		
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)	Evaluated
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	Evaluated
20	Emergency response process that considers reducing broken and blowing time	Evaluated
21	Equipment we should install for shut down processes; e.g., retrofitting services with EFVs	Evaluated
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	Evaluated
Engineering Design and Standards		
23	Valve requirements (install more valves)	Evaluated
24	Meter change out philosophy (when to replace a meter during pipeline replacement)	Evaluated
25	Meter philosophy of SAP improvements, meter replacements/maintenance, avoid unnecessary meter change-outs	Evaluated
26	Risers, soil to air interface (SAI): to replace or to repair in the field	Evaluated
27	Replace threaded fittings with flanges on MSA	Evaluated
28	Evaluate IMO Design to replace relief and minimize leakage points	Implemented

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	Tactic	Status
29	Evaluate RS design to minimize leakage points and prove relief has minimal leakage	Evaluated
30	Evaluate current commodities for methane release potential over time and phase them out	Evaluated
31	Atmospheric corrosion SAI inspection process (soil to air interface on steel risers)	Evaluated
32	Riser designs	Evaluated

The Enhanced Methane Emission Reduction plan includes changing procedures and processes to reduce the amount of methane emissions during normal operations. The methods include using advanced leak detection equipment, utilizing recompression to capture methane during field operations, tools to improve locating in order to reduce pipeline damages, and other operational improvements.

Table 2 - Enhanced Methane Emission Reduction Plan

Strategy	Description
Advanced Leak Detection	Emerging technologies used to identify leaks faster than existing methods.
Recompression / Vacuum Technologies	Devices that capture methane releases that would otherwise be vented into the atmosphere through normal operations. This includes purging and flaring during pipeline replacement.
Tools to Improve Locating	Ground penetrating radar and other emerging technologies to locate pipe where the tracer wire or the mapping are inadequate.
Other operational improvements	Emerging tools, technologies and methods to reduce intentional methane releases during operations or to identify leaks. Includes meter exchanges and AMI leak notification.

3. STATEMENT OF NEED

The Enhanced Methane Emission Reduction plan was initiated in response both PSE’s Beyond Net Zero Carbon pledge and to new legislation requiring pipeline operators to prioritize identifying and eliminating leaks and operational releases of methane in order to reduce the impact on the environment. PSE is addressing this need through the Pipeline Replacement Plan, DIMP Accelerated Actions, and the Enhanced Methane Emission Reduction plan.

3.1. NEED DRIVERS

- **Protecting our Infrastructure of Pipelines and Enhancing Safety (PIPES Act) of 2020:** On December 27, 2020, the President signed into law pipeline safety reauthorization legislation “Protecting our Infrastructure of Pipelines and Enhancing Safety (PIPES Act) of 2020”. Included within this act are new mandates for PHMSA to require leak detection and repair programs to consider the environment, the use of advanced leak detection practices and technologies, and for operators to be able to locate and categorize all leaks that are hazardous to human safety, the environment, or can become hazardous.
- **Beyond Net Zero Carbon pledge:** On January 21, 2021, PSE announced its Beyond Net Zero Carbon pledge, setting an aspirational goal to reach net zero carbon emissions for natural gas sales by 2045, with an interim target of a 30% emissions reduction by 2030. As part of that goal, PSE aspires to transform its natural gas distribution business to reduce carbon emissions for natural gas use in customer homes and businesses, through a combination of energy efficiency, use of low carbon fuel sources and blending (renewable natural gas and hydrogen), among other things and to reduce emissions from PSE’s gas and electric operations and supply with focus on leak reduction.

3.2. INTEGRATED STRATEGIC PLAN (ISP) ALIGNMENT

This plan aligns primarily with the Processes & Tools & People categories of the ISP:

- **System Reliability and Integrity:** The main driver for this plan is to improve system integrity by reducing leaks and emissions from operational activities.
- **Extract and leverage value from existing technology:** The plan will utilize existing equipment to optimize the costs to attain the plan’s goals and benefits.
- **Establish a culture that embraces ownership, innovation and continuous improvement:** Previous practices and operations were focused on natural gas safety. As PSE strives to eliminate methane emissions from operations, new processes, procedures, equipment, and training are needed to safely operate the delivery system.

4. PLAN DETAIL

4.1. PLAN SIZE/POPULATION

The population for the Enhanced Methane Emission Reduction plan includes all aspects of operating the natural gas system excluding DIMP Accelerated Action or tactics in the Pipeline Replacement Plan.

4.2. PROPOSED COMPLETION DATE

The current target is to implement all elements of the Enhanced Methane Emission Reduction plan by 2026. There continue to be advances in emission reduction technology, after 2026, additional methane tactics may be prioritized for completion as needed and outlined in a revised plan.

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4.3. SUMMARY OF PLAN BENEFITS

- **Methane Reduction:** Environmental safety benefits relative to methane emission reduction is measured by converting methane to a carbon dioxide equivalent (CO₂e). The plan reduces CO₂e emissions by an estimated 4,300 metric tons each year, and will increase as other tactics are adopted and incorporated.

Table 3 - CO₂e Emission Reduction

Strategy	Estimated Annual Emission Reduction (metric tons CO₂e)
Advanced Leak Detection	2,400
Recompression / Vacuum Technologies	500
Tools to Improve Locating	1,400
Other operational improvements	Evaluate as implemented

- **Stakeholder Relationships:** The plan demonstrates our commitment to environmental safety to stakeholder groups such as UTC, Cities, and Customers through efforts to replace pipe with an elevated risk of methane emissions
- **Safety:** A secondary benefit of the Enhanced Methane Emission Reduction plan is improvement to pipeline safety by reducing leaks from damages.

4.4. PRIMARY IDOT CATEGORIES

PSE’s employs an Investment Decision Optimization Tool (iDOT) to evaluate benefits of projects and optimize the annual portfolios for construction. The top primary iDOT Categories this plan addresses are:

- Health and Safety
- Environment
- Stakeholders

Table 4 – iDOT Benefit

2023 Forecast Cost (\$)	2023 iDOT Benefit (\$)	2023 Benefit / Cost Ratio
\$5,400,000	\$19,283,906	3.57

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4.5. ESTIMATED COSTS

The programmatic cost to complete the Enhanced Methane Emission Reduction plan from 2022 to 2026 is approximately \$10.1 million. The cost is based on estimates from peer utilities and additional research for the identified focus areas. PSE estimates are based on the goal of up to 30% of PSE’s construction work leverages recompression technology by 2025. After 2026, additional funding may be requested as needed to implement additional methane reduction tactics or to implement the technology that has been evaluated.

5. ALTERNATIVES

5.1. SOLUTION ALTERNATIVES

Implement Plan: The selected alternative is implement the Enhanced Methane Emission Reduction plan to identify and eliminate leaks, reduce operational emissions, and improve locating of buried gas pipe.

Status Quo: The alternative not selected would be to not implement the Enhanced Methane Emission Reduction plan. This would lead to more methane emissions.

5.2. FUNDING ALTERNATIVES

Increased Funding:

With increased funding, PSE would be able to implement additional methane emission reduction tactics.

Decreased Funding:

Decreased funding may prolong the timeline of the plan and PSE may miss goal targets.

6. HISTORY

Date	Reason(s) for Update	Summary of Significant Change(s)	Modified By
9/20/2021	Documented existing program strategy.	Initial	Parker Indorf
12/17/2021	Annual Review	Minor word and format changes. Updated benefits	Parker Indorf

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7. SUPPORTING DOCUMENTATION

Document Name
PIPELINE REPLACEMENT AND METHANE EMISSION REDUCTION PROGRAM PLAN

HIGH PRESSURE SYSTEM RELIABILITY

ENERGY TYPE: GAS

1. SHORT DESCRIPTION

High pressure system reliability investments reinforce the high pressure system and ensure that high pressure equipment and regulator stations function properly to meet customer demand on a peak hour design day. The high pressure gas reliability needs have been evaluated using the IDOT benefits and achieve positive benefit-cost ratios.

2. BACKGROUND

PSE is expected to provide a firm level of service to customers on an extreme cold weather day by maintaining a reliable gas system¹ (PSE GOS 2575.1300). PSE planners identify system needs through the Delivery System Planning process and through system performance criteria. Gas delivery system performance criteria is defined as:

- The temperature at which the system is expected to perform (52DD Peak Hour) and is also outlined in the IRP
- The minimum pressure that must be maintained in the system

Customer growth, changes in regulation, and system requirements (including future fuel blends used within the distribution system) impact PSE's ability to reliably and cost effectively serve customers. When the system approaches peak demand, temporary cold weather actions (CWAs) are deployed to reinforce the system if permanent infrastructure is not in place. However, the amount of CWAs that can be deployed are limited by the number of trained personnel, available CWA equipment, and the action itself carries a higher reliability risk of operating the system manually.

As projects are planned, the most cost effective solution is identified to support the need. If a pipeline solution is required, this High Pressure System Reliability programs ensures it can support the downstream intermediate pressure system to meet the system performance criteria.

Typical projects include both pipeline (mains and regulator stations) and non-pipeline (pressure increase, uprates, and CNG/LNG) installation solutions. Projects that fall within this program have a lower cost and mature solution. The complex and higher cost projects will follow the initiation process.

¹ WUTC: WAC 480-90-148, federal regulations: CFR 192.739, and industry recommendations from AGA establish the guidelines used to serve the customer.

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3. STATEMENT OF NEED

PSE's Delivery System Planning analysis has identified multiple projects needed to reinforce the pipeline system and meet customer demand. These areas are currently supported by CWA plans. While these are an effective immediate fix, PSE is limited by the amount of CWAs that can be deployed due to training, staffing, and the large service area needed to be covered on the coldest of days. Once all CWAs are exhausted, the next action is to intentionally isolate and shut in portions of the gas system as system pressures reach zero as it approaches peak demand. System reinforcements help avoid these situations and ensure PSE provides reliable service to firm customers. The estimated need date is when firm customer demand exceeds system capacity and/or design requirements.

3.1. NEED DRIVERS

Reliability – The high pressure system supports the downstream intermediate system to provide a firm level of gas service in the least cost method. In the future, these facilities will allow the transportation of lower carbon fuels, such as renewable natural gas and hydrogen, to customers.

3.2. INTEGRATED STRATEGIC PLAN (ISP) ALIGNMENT

This program aligns primarily with the Processes & Tools category:

- **System Reliability and Integrity** – The main drivers for this program are to support established peak load growth, provide operational flexibility and overall improve the customer experience. The improvement to system reliability supports operational excellence and customer satisfaction.
- **Streamline processes to drive effectiveness and efficiency** – This program drives effectiveness and efficiencies by addressing multiple benefit streams within the same scope of work. For example, rebuilding a regulator station to increase capacity may also help with improving aging infrastructure and safety.

4. PROGRAM DETAIL

4.1. PROGRAM SIZE/POPULATION

The long range system studies have identified 8 high pressure system reinforcement projects that will be needed to support the system in the next 5 years costing approximate \$20MM dollars. The system is re-evaluated annually and the projects are prioritized by need. PSE will often identify a need up to 10 years out but is currently installing projects when the need is immediate.

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4.2. SUMMARY OF PROGRAM BENEFITS

- **Reliability** – The High Pressure Reliability program ensures that PSE is able to meet the obligation to provide gas service to firm customers.
- **Stakeholder Relationships** – The program improves our public perception from stakeholder groups such as WUTC, Cities, and Customers through efforts to meet the federal regulations for system reliability and safety.

The primary iDOT categories this program addresses gas outages, stakeholders, and miscellaneous metrics that include gas curtailments and CWA efforts saved. Additionally, these reinforcements enable the system to continue to support peak loads and ensure the system can handle lower carbon fuels like hydrogen blends.

Table 1 – iDOT Benefit

Forecasted Cost (\$)	iDOT Benefit (\$)	Benefit / Cost Ratio
\$20,000,00	\$36,691,325	2.08

4.3. ESTIMATED COSTS

Estimated costs are \$20MM total in the next five years based on 8 identified high pressure projects.

5. ALTERNATIVES

5.1. SOLUTION ALTERNATIVES

Proactive Remediation: Manual system operations, known as Cold Weather Actions (CWA), is the next alternative to system reinforcements. When all CWAs become exhausted, the next step is to shut in and isolate parts of the system as temperatures get colder.

Reactive Remediation: The alternative not selected is to wait until firm outages occur as temperatures approach the design day. This could also lead to hazardous inside leaks because pilot lights could go out and when the system recovers after the peak, pipes will become re-pressurized.

5.2. FUNDING ALTERNATIVES

No Action: PSE could face customer outages on the coldest days of the year. If not implemented, the risks remain at elevated levels, operations and maintenance costs will increase, and the system will not efficiently support the PSE 2030 strategy.

Increased Funding: With increased funding, PSE would be able to complete the backlog of work that has accumulated over the past few years. This will significantly reduce the reliability risk on cold weather days.

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Decreased Funding: All CWA resources have been allocated. Decreased funding will raise the risk of more outages and will occur and at warmer temperatures.

6. PLAN DOCUMENT HISTORY

The current version of the project summary supersedes all previous versions.

Date of Project Summary Revision	Reason(s) for Update	Summary of Significant Change(s)	Modified By
5/6/2021	Initial Program Documentation - New plan template	Initial Program Document – Summarize historical plans	Philip Puzon
9/20/2021	Used and Useful Policy guidance	Updated benefits. Added alternative and cost information	Phil Puzon
12/1/2021	Annual Review	Minor word and format changes	Philip Puzon

7. SUPPORTING DOCUMENTATION

Document Name
2021 LONG RANGE PLAN
2020-2021 COLD WEATHER ACTION PLAN

INTERMEDIATE PRESSURE SYSTEM RELIABILITY

ENERGY TYPE: GAS

1. SHORT DESCRIPTION

The Intermediate Pressure System Reliability program supports distribution gas reliability needs that have been evaluated using the IDOT benefits and achieve positive benefit-cost ratios. This program includes reinforcing the intermediate pressure system to meet customer demand on a peak hour design day.

2. BACKGROUND

PSE is expected to provide a firm level of service to customers on an extreme cold weather day by maintaining a reliable gas system¹ (PSE GOS 2575.1300). PSE planners identify system needs through the Delivery System Planning process and through system performance criteria. Gas delivery system performance criteria is defined as:

- The temperature at which the system is expected to perform (52DD Peak Hour) and is also outlined in the IRP
- The minimum pressure that must be maintained in the system (15 psig)

Peak load growth, changes in regulation, and system requirements (including future fuel blends used within the distribution system) impact PSE's ability to reliably and cost effectively serve customers. When the system approaches peak demand, temporary cold weather actions (CWAs) are deployed to reinforce the system if permanent infrastructure is not in place. However, the amount of CWAs that can be deployed are limited by the number of trained personnel, available CWA equipment, and the action itself carries a higher reliability risk of operating the system manually.

As projects are planned, the most cost effective solution is identified to support the need. If a pipeline solution is required, this programs ensures natural gas is delivered safely to customers' meters.

3. STATEMENT OF NEED

PSE's Delivery System Planning analysis has identified multiple projects needed to reinforce the pipeline system and ensure the customers' needs are met. Many of these areas are currently supported by CWA plans. While these are an effective immediate fix, PSE is limited by the amount of CWAs that can be deployed due to training, staffing, and the large service area needed to be covered on the coldest of days. Once all CWAs are exhausted, the

¹ WUTC: WAC 480-90-148, federal regulations: CFR 192.739, and industry recommendations from AGA establish the guidelines used to serve the customer.

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next action is to intentionally isolate and shut in portions of the gas system as system pressures reach zero as it approaches peak demand. System reinforcements help avoid these situations and ensure PSE provides reliable service to customers.

3.1. NEED DRIVERS

Reliability – Intermediate pressure reinforcements provide a firm level of service on an extreme cold weather day. Gas Operating Standards² require when load studies predicts insufficient pressure or capacity to serve firm customers, appropriate corrective action shall be proposed to achieve adequate operating pressures and capacities.

3.2. INTEGRATED STRATEGIC PLAN (ISP) ALIGNMENT

This program aligns primarily with the Processes & Tools category:

- **System Reliability and Integrity** – The main drivers for this program are to meet customer load growth, provide operational flexibility and overall improve the customer experience. The improvement to system reliability supports operational excellence and customer satisfaction.
- **Extract and leverage value from existing technology** – The program will utilize existing equipment to optimize the costs to attain the program’s goals and benefits.

4. PROGRAM DETAIL

4.1. PROGRAM SIZE/POPULATION

The long range system studies have identified 16 intermediate pressure system reinforcement projects needed to support the system immediately. They are mitigated through CWAs. Additionally, the long range plan PSE currently identifies on average 10 new IP projects a year varying in size and complexity through 2032. Using the DSP process, the system is reevaluated annually and the projects are prioritized by need.

The number of reinforcements needed may change depending on actual peak load growth and requirements to support future fuel blends used within the distribution system.

4.2. SUMMARY OF PROGRAM BENEFITS

- **Reliability** – The Intermediate Pressure Reliability program ensures that PSE is able to meet the obligation to provide gas service to firm customers.
- **Stakeholder Relationships** – The program improves our public perception from stakeholder groups such as WUTC and Customers to maintain system reliability and safety.

The primary iDOT categories this program addresses gas outages, health and safety, stakeholders, and miscellaneous metrics that include gas curtailments and CWA efforts saved. Additionally, these reinforcements enable the system to continue to support peak

² PSE GOS 2575.1300 Section 5.3

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loads and ensure the system can handle lower carbon fuels like hydrogen and RNG blends.

Table 1 – iDOT Benefit

Forecasted Cost (\$)	iDOT Benefit (\$)	Benefit / Cost Ratio
\$29,000,00	54,841,411	2.14

4.3. ESTIMATED COSTS

Estimated costs are \$29MM for the next 5 years based on 20 projects.

* Program cost estimates are Planning Level estimates in current year dollars for five year totals.

5. ALTERNATIVES

5.1. SOLUTION ALTERNATIVES

Proactive Remediation: Manual system operations, known as Cold Weather Actions (CWA), is the next alternative to system reinforcements. When all CWAs become exhausted, the next step is to shut in and isolate parts of the system as temperatures get colder.

Reactive Remediation: The alternative not selected is to wait until firm outages occur as temperatures approach the design day. This could also lead to hazardous inside leaks because pilot lights could go out and when the system recovers after the peak, pipes will become re-pressurized.

5.2. FUNDING ALTERNATIVES

No Action: PSE could face customer outages on the coldest days of the year. If not implemented, the risks remain at elevated levels, operations and maintenance costs will increase, and the system will not efficiently support the PSE 2030 strategy.

Increased Funding: With increased funding, PSE would be able to complete the backlog of work that has accumulated over the past few years. This will significantly reduce the reliability risk on cold weather days.

Decreased Funding: All CWA resources have been allocated. Decreased funding will raise the risk of more outages and will occur and at warmer temperatures.

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6. PLAN DOCUMENT HISTORY

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Document Name
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2020-2021 COLD WEATHER ACTION PLAN