EXH. DJL-5 (Apdx. D)
DOCKETS UE-240004/UG-240005
2024 PSE GENERAL RATE CASE
WITNESS: DAVID J. LANDERS

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, **Complainant,** **v.** **PUGET SOUND ENERGY,** **Respondent.**	**Docket UE-240004** **Docket UG-240005**

APPENDIX D (NONCONFIDENTIAL) TO THE FOURTH EXHIBIT TO THE PREFILED DIRECT TESTIMONY OF

DAVID J. LANDERS

ON BEHALF OF PUGET SOUND ENERGY

FEBRUARY 15, 2024

PUGET SOUND ENERGY

Grid Modernization: Circuit Modernization

Corporate Spending Authorization (CSA)

Date Created:	Friday, February 10, 2023
Discretionary/ Non-Discretionary:	Discretionary
Multi Year Rate Plan:	Programmatic
Equity Impact:	Yes
Strategic Alignment:	Operate the Business-Reliability
Estimated In-Service Date:	Sunday, December 31, 2028
Current State (Business Need):	PSE has 1100 circuits, of which 135 are focused on under the Worst Performing Circuit business plan and the remaining (965) are reviewed for addressing reliability that optimizes the greatest benefit to cost under the Targeted Reliability business plan. PSE has set thresholds for reliability concerns relative to CMI (circuits with 3M CMI over 3 years or more than 750K CMI for 2 out of 3 years), SAIDI (more than 300 minutes for 2 out of 3 years), and SAIFI (more than 2.0 for 2 out of 3 years) and studies circuits to evaluate solutions. The Worst Performing Circuit business plan addresses circuits that meet this threshold as well as the 50 worst circuits reported to the Commission in the 2017 annual required Reliability Report based being ranked in the bottom 50 in the last 5 years. The focus of the worst performing circuits ensures customers that are experience on-going poor reliability performance are not ignored as a result of optimizing the reliability investments based on highest benefit to cost which is generally areas with high numbers of customers and inexpensive solutions. While these two plans focus on circuits as a whole, the Underground Conversion plan focuses on the 2900 miles of overhead feeder outages that contribute to about 36% of the total CMI due to the large number of customers impacted. Needs are additionally identified by screening the root cause analysis process findings, customer complaints and field and engineering input. This program mitigates issues that have already created outage impacts to customers. Analysis in 2021 identified 480 circuits that need to be addressed between 2022 -2026 in addition to addressing the 135 WPC. Poor reliability could be caused by tree limbs or whole tree fall in damage, deteriorating and aging assets that failure or are vulnerable to tree caused damage, assets located where damage can occur such as car pole accidents, lack of redundancy or backup, bird/animal interface, or potentially overloads.

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Grid Modernization: Circuit Modernization

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Desired State (Proposed Solution):

This circuit-based program identifies solutions include replacing infrastructure with treewire (covered conductor), a different conductoring, new poles or relocating as needed, adding isolation equipment to minimize extent of outage such as reclosers or automation, or converting from OH to UG or installing feeder ties. Solutions could also include vegetation management and the removal of hazard trees in addition to asset improvement as well as operational practice changes, use of mobile distributed generators to minimize planned outages, or DERs such as batteries. In addition to solutions that specifically address reliability, capacity needs are considered where load growth is known.

PUGET SOUND ENERGY

Grid Modernization: Circuit Modernization

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Outcome/Results (What are the anticipated benefits):	As the program address 480 targeted reliability circuits between 2022-2026, over 34.1M CMI will be avoided and by addressing the 135 WPC between 2021-2024, over 12.9M CMI will be avoided. The 135 WPC objective is to improve the reliability by 50% relative to the baseline threshold trigger. PSE only evaluated equity relative to 2023 projects of which 4/12 projects would benefit named communities (per IRP definition at the time). Additionally, 86 miles of feeder is proposed to be converted to underground, 3% of the feeder population prioritized by highest benefit that will avoid 14.7M CMI.

PUGET SOUND ENERGY

Grid Modernization: Circuit Modernization

Corporate Spending Authorization (CSA)

Dependencies: No

Dependencies comment: None.

Escalation Included: No, escalation has not been included.

Total Estimated Costs: $420,323,871

Estimated Five Year Allocation:

Funds Type	ID	Line Item Description	Previous Years Actuals	Fiscal 2024 Requested	Fiscal 2025 Requested	Fiscal 2026 Requested	Fiscal 2027 Requested	Fiscal 2028 Requested
O&M	79228	5-Year Plan 7.7.23	$ -	$ -	$ -	$ -	$ -	$ -
Capital	W_R.10009.08.02.10	E OH Syst Rel Upgrades UG Convers Dist	$ -	$ 28,500,000	$ 5,000,000	$ -	$ -	$ -
O&M	79416	E OH Syst Rel Upgrades UG Convers Dist	$ -	$ -	$ -	$ -	$ -	$ -
Capital	W_R.10009.08.02.07	E OH Sys Rel Upgrades Outage Dist	$ -	$ 44,820,000.00	$ -	$ -	$ -	$ -
Capital	W_R.10009.08.02.05	E OH Clearance Alley Syst Dist	$ -	$ 29,665,224.00	$ 65,312,569.00	$ 43,622,000.00	$ 57,800,000.00	$ 61,900,000.00
Capital	PRJ_000390	PLACEHOLDER WBS 9: E UG Feeders	$ -	$ -	$ -	$ -	$ -	$ -

Incremental O&M: No

Qualitative Benefits:

The primary benefit of this program is addressing outages, specifically avoiding CMI, and with that customer complaints and energy quality.

Quantitative Benefits:

Quantitative Benefits	Benefit Type	Previous Years	Fiscal 2024	Fiscal 2025	Fiscal 2026	Fiscal 2027	Fiscal 2028	Fiscal 2029	Remaining Costs	Life Total
Reliability - Avoided CMI	Other	$ 553,320,000	$ 286,493,000	$ 235,393,000	$ 235,393,000	$ -	$ -	$ -	$ -	$ 1,310,599,000

Risk Summary:

Project risk includes permitting challenges. Underground conversion projects have been deferred to meet GRC settlement.

Benefit risk is minimized as benefits are realized upon completion of the project and backcasting verifies solutions deliver expected benefit 99-100% of the time.

System risk exists as outages occur and PSE is unable restore due to overloads or lack of redundancy.

PUGET SOUND ENERGY

Grid Modernization: Circuit Modernization

Corporate Spending Authorization (CSA)

Change Summary:

Planning Cycle	Change Summary	Last Update Date
2022 Baseline Cycle	This CSA has been migrated into the EPPM tool at go-live as part of the Phase 1 EPPM implementation effort. The projects in this CSA were previously approved for the 2023-2027 capital plan. Please refer to the original CSA document for additional information (if available.)	2/10/2023
2023 Cycle 1	Updated from current business plan information	3/15/2023

PUGET SOUND ENERGY

Grid Modernization: Circuit Modernization

Corporate Spending Authorization (CSA)

Approval History:

Approved By	Date Approved
Approved by Cost Center Owner: Lambert , Ryan	3/30/2023
Approved by Cost Center Owner: Lambert , Ryan	4/3/2023
Approved by Director Sponsor: Landers , David	4/7/2023
Approved by Executive Sponsor: Jacobs , Josh	4/8/2023
CSA Status changed to Approved	4/8/2023
Approved by Cost Center Owner: Shrum , Bailey	12/4/2023
Approved by Director Sponsor: Shrum , Bailey	12/4/2023
Approved by Executive Sponsor: Shrum , Bailey	12/4/2023
CSA Status changed to Approved	12/4/2023
Approved by Cost Center Owner: Lambert , Ryan	1/29/2024
Approved by Director Sponsor: Landers , David	1/29/2024
Approved by Executive Sponsor: Jacobs , Josh	2/2/2024
CSA Status changed to Approved	2/2/2024

TARGETED RELIABILITY

ENERGY TYPE: ELECTRIC

1. SHORT DESCRIPTION

The Targeted Reliability plan (formally Reliability Roadmap) supports distribution electric reliability needs that have been evaluated using project benefits and achieve positive benefit-cost ratios. This plan includes Overhead (OH) or Underground (UG) Rebuilds, Tree Wire Upgrades, UG Conversion, Feeder Ties, root cause analysis (RCA) identified improvements, mobile distributed generators to minimize planned outages, battery systems that could run in an island configuration to reduce outage duration and severity, and other reliability improvements.

2. BACKGROUND

In 2017, PSE reviewed circuits with high non-major event day (non-MED) CMI, non-MED SAIDI, and non-MED SAIFI to ensure the view of the Worst Performing Circuits (WPC) was holistic. Through that process, PSE identified high priority circuits that had more than 3 million CMI over three years, circuits with more than 750,000 CMI for at least two out of three years, circuits with SAIDI greater than 300 minutes (five hours) and circuits with SAIFI of two or more interruptions in two of three years as well[1].

The 135 circuits on the WPC list either meet the pre-2017 "area concern" circuit criteria or the new criteria that was established in 2017. See Table 1 below for a summary of the WPC triggers.

Table 1: Summary of triggers for reliability studies – non-MED

METRIC	STUDY TRIGGER
Circuit 3 year CMI	3,000,000 CMI over 3 years
Circuit Annual CMI	CMI > 750,000 for 2 out of 3 years
Circuit Annual SAIDI	SAIDI > 300 minutes for 2 out of 3 years
Circuit SAIFI	SAIFI > 2 for 2 out of 3 years

While the WPC plan targets the 135 worst performing circuits defined in 2017, outside of the WPC plan PSE also targets needs on the other 965 circuits. These needs are reliability and operational flexibility.

Previously, the Targeted Reliability plan included reclosers/gang operated switches, Fusesavers, Distribution Automation FLISR, and Copper Replacement. These types of projects now have their own business plans.

[1] Analysis based on 2013-2015 non-MED results and does not include transmission related outages or distribution circuits with less than 50 customers

3. STATEMENT OF NEED

PSE Planners identify system needs by screening reliability performance and getting input from the root cause analysis (RCA) process, customer complaints and Operations/Regional Engineering to target the needs of circuits outside of the WPC plan. The scope of this plan is:

- Feeders or laterals experiencing a lower level of reliability resulting in customer complaints.
- Individual customers or smaller pockets of customers experiencing a lower level of reliability.
- Operational flexibility to better support customers during planned work and outages.

Examples of operational flexibility are distribution feeder ties, distribution lateral ties, SCADA and adding another phase.[2]

SCADA upgrades and Distribution Automation are not part of the targeted reliability plan as these types of projects each have their own business plan.

To screen potential reliability projects PSE Reliability Planners:[3]

- Review customer complaints and input from PSE Operations and Regional Engineers and identify reliability needs.
- Perform annual review of the 5 year average reliability circuit performance to identify risks.
- Perform 5 year average reliability circuit reviews for "at risk" circuits which include those targeted RCA, Customer Complaint and Operations/Regional Engineering Recommendations.
- Review equity and customer needs for both highly impacted communities and vulnerable populations.

3.1. NEED DRIVERS

- **Grid Modernization –**
  - **Reliability** – This plan aims to improve reliability for those customers that experience poor performance.
  - **Resiliency –** System Upgrades can improve the ability of the electric system to withstand and recover from a major disruption, such as storm events, natural disasters, deliberate attacks, or accidents.
  - **Smart & Flexible** – System Upgrades support operational flexibility to allow for integration of Distributed Automation and other Grid Modernization plans.
  - **Safety** – System Upgrades improve reliability by upgrading aging or exposed equipment that can be considered a safety risk.

[2] PSE Distribution Planning Guidelines 2020 – Chapter 7 Capacity Planning: 7.3.3.1 Feeder Assessment
[3] PSE Distribution Planning Guidelines 2020 – Chapter 9 Reliability and Resiliency Planning: 9.2 Reliability Study Thresholds

3.2. EQUITY

PSE evaluates equity in the planning process with consideration of the four core tenets of energy justice: Recognition Justice, Procedural Justice, Distributional Justice, and Restorative Justice in various steps of the process.

As specific studies are performed and projects proposed to further a business plan, planners review system, customers, and now equity data to recognize the specific customer burdens, whether there are highly impacted or vulnerable customers that are or will be affected by addressing the specific business need. Planners must prioritize where to focus study each year, thus the full understanding of the historic and ongoing inequities for the entire business plan is extrapolated at this time, maturing over time which greater tools and data.

PSE is building process and tools to enable procedural inclusion in defining the need and solutions through engagement with specific communities and community based organizations, increasing understanding of local needs and consequences to inform specific study development as well as options to address need. Maturity in where and how this occurs will increase over the next several years. Business plans will be updated as informed this collective engagement to reflect broader equity benefits and burdens as this engagement increases over time.

As specific projects are proposed, PSE investment decision optimization tool captures equity benefits. An optimized portfolio of projects across many business plans ensures the distribution of benefits and burdens are spread across all segments of the community and aim to ensure that marginalized and vulnerable communities do not receive an inordinate share of burdens or are denied access to benefits. As an initial step, PSE leverages Customer Benefit Indicators ("CBI") and information established as part of the 2021 Clean Energy Implementation Plan ("CEIP") to identify an equity framework to evaluate system projects. The CBI approach was developed through an iterative process that was coordinated with the Equity Advisory Group. These CBI span the core tenets of energy justice and provide a framework to evaluate the comparative equity benefit of each solution alternative considered. Refer to Table 1 for a brief description of the CBIs that address equity and the applicable benefits for the Targeted Reliability program. PSE will continue to adjust and refine equity consideration in projects when necessary as the process continues to mature.

Projects will be evaluated on each CBI category and a total equity benefit score will be provided.

Table 2: Equity Applicable Benefits

Customer Benefit Indicator	Description	Program Applicable Benefit
Customer Energy Savings	Solutions that lead customers to use less energy, which leads to less energy that must be purchased and potentially a reduction in planned system upgrades.	No
Greenhouse Gas Emissions	Solutions that lead to a reduction of greenhouse gas emissions, either directly or indirectly	No

Enables Cleaner Energy	Solutions that either directly integrate DER on the system or enable the grid to more readily accommodate future DER.	No
Air Quality	Solutions that either directly eliminate the source of a common pollutant or reduce the risk that could cause a common pollutant to increase, such as enabling Electric Vehicle or DER adoption	No
Resilience	Solutions that address major event outages or harden critical facilities to prevent catastrophic events from creating long duration outages.	Yes
Cost Reduction	Solutions that identify least cost alternatives and therefore reduce costs for all customers	No
Clean Energy Jobs	Solutions that increase clean energy jobs by furthering clean energy technology application, as described in the CEIP	No
Home Comfort	Solutions that deploy residential energy efficiency in either a targeted solution area or by leveraging load reduction from system wide energy efficiency installations	No

The program addresses system reliability through a variety of system improvements which will reduce outages and is programmatically optimized based on total benefit value to cost. Specific program projects are identified based total benefit to cost with named communities receiving additional scored benefit based on vulnerable population designation and highly impact community characteristics, ensuring investments are distributed appropriately to named communities.

Business plans in isolation do not address restorative justice, but continued planning process improvements which include considerations of data, tools, and documentation as well as operational practices will help to restore equity over time.

4. PLAN DETAIL

4.1. PLAN SIZE/POPULATION

This plan addresses emerging reliability needs across PSE's entire population of ~1,100 distribution circuits. Previously the 135 circuits in the WPC plan were reviewed more closely, however with significant progress made under the WPC program,going forward the WPC plan will sunset and the 135 Worst Performing Circuits will be reviewed for reliability projects will all other circuits under Targeted Reliability.

4.2. PROPOSED COMPLETION DATE

This plan is on-going and addresses emerging system needs. It is expected this plan will go on indefinitely to account for the continual changes with system performance, physical plant and customer needs which will account for PSE's highest distribution reliability system needs.

4.3. SUMMARY OF PLAN BENEFITS

PSE's highest distribution reliability needs will be targeted with this plan. As the WPC plan approaches its completion year of 2024, the Targeted Reliability Upgrades Plan will provide consistent ongoing benefits system-wide with prioritization considerations for advancements in energy equity. The reliability benefits align to and are being calculated based on the PSE plan pool benefits of "reliability overhead, underground and tree wire projects"[4].

4.4. INVESTMENT DECISION BENEFITS

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

- Outage Concern
- Energy Quality[5]
- Flexibility

Table 3: Summary of Plan Benefits, Population and iDOT B/C Score

	Total Projects	Total Plan ($M)	Miles of OH/ UG	Non-MED CMI Saved	iDOT B/C Score
2025- 2026	11	$18.1	20	1,072,990	1.51

4.5. ESTIMATED TOTAL COSTS

For Electric System Planning, estimated costs are generated based on historical costs of similar types of projects, with allowances for variations in project scope, increases in project cost due to inflation, and added contingency to account for unforeseen conditions associated with the projects.

Costs will vary widely and some circuits may need more improvements than others due to variability of the type of improvements needed. For example, a specific project might require treewire reconductor, pole replacements, adding reclosers and partial underground conversion to name a few.

5. ALTERNATIVES

5.1. SOLUTION ALTERNATIVES

The risk of not pursuing a more aggressive approach is that existing plans alone will fail to adequately improve system performance enough to noticeably impact targeted

[4] http://team/sites/Reliability/Distribution%20Planning/Documents/ERP/Project%20Tracking.xlsx?csf=1&e=AYYF6

[5] Analysis of customer inquiries reveals the majority are from non-named community customers. As a result, PSE is re-evaluating the intent of this benefit.

customers' quality of service. With development of each individual project within the plan, alternative solutions are considered. These solutions can include both maintenance options and a variety of different capital construction options. Typical alternatives considered are: enhanced vegetation management, bird/animal guards, tree wire, underground conversion, feeder ties, fuse savers, reclosers, distribution automation, and battery systems. The solution that provides the highest cost benefit ratio is submitted as part of the plan.

5.2. NO ACTION

There is risk of customer dissatisfaction in areas experiencing frequent outages that could be reasonably addressed by this plan. There is also lost opportunity to restore power to a variety of feeder and lateral outages, including customers impacted by certain types of planned outages related to construction.

FUNDING ALTERNATIVES

Increased Funding from proposed - With increased funding, the triggers for identifying customer's reliability could be expanded to accommodate the needs of more customers.

Decreased Funding from proposed - Decreased funding would result in fewer circuits seeing overall circuit improvement in the near-term. There is also potential risk of customer dissatisfaction in areas experiencing frequent outages that could be reasonably addressed by this plan.

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
5/18/2020	Original Program Documentation - New plan template	Initial Plan Document – Summarize historical plans	Karen Pavletich
4/2/2021	2021 Updates	Data updated to reflect most recent 5 Year Plan Dollars	Karen Pavletich
5/6/2021	Addt'l 2021 Updates	Data updated to reflect additional updates to the 5 Year Plan Dollars	Karen Pavletich
5/7/2021	OMRC Update	Budget plan reflects latest estimate from Project Management	Karen Pavletich
12/15/2021	Revision Update with current information and Used and Useful Policy guidance	Addition of RCA, CBD and remote DG to the plan. Update iDOT Benefits and updated Program Plan Dollars and Metrics. Add alternative and cost information	Karen Pavletich
12/1/2021	Annual Review	Minor word and format changes	Karen Pavletich
12/1/2023	Revision	Added Equity, deleted ISP section, added batteries as a solution, moved Fusesavers, DA-FLISR, and Copper to separate business plans.	Fremont Aguinaldo
12/5/2023	2024 MYRP Update	Added footnote to Energy Quality benefit. Updated Program Summary Table to align with 2025-2026 project submittals. Deleted the Benefit Allocation chart.	Krista Malmgren

7. SUPPORTING DOCUMENTATION

BUSINESS PLAN

Document Name
2019 SERVICE QUALITY PROGRAM AND ELECTRIC SERVICE RELIABILITY FILING
HTTP://TEAM/SITES/PLANNINGMGT/IDOT/IDOT%20REFRESH/PROJECTS%20AND%20PROGRAMS.XLSX?CSF=1&E=SQGQIR http://team/sites/Reliability/Distribution%20Planning/Documents/ERP/Project%20Tracking.xlsx?csf=1&e=AYYF6W
PSE DISTRIBUTION PLANNING GUIDELINES 2020

UNDERGROUND CONVERSIONS

ENERGY TYPE: ELECTRIC

1. SHORT DESCRIPTION

This plan will convert to underground a targeted subset of PSE's backbone overhead electric distribution system and include a focus on converting in areas of the PSE system with high risk areas for wildfire. This plan improves system reliability by reducing hazard exposure, reduces risk of wildfire ignition, and substantially enhances resiliency of the distribution system during major events.

2. BACKGROUND

Sustained feeder outages where overhead conductor is identified as the affected equipment account for roughly 4% of all outages by outage count, yet they contribute roughly 36% of the total (All-in) CMI due to the larger number of customers typically impacted by a feeder outage. From 2017 through 2019, feeder outages (identified where the protective device was a substation circuit breaker or recloser and the affected equipment was overhead conductor) totaled 2.5 billion all-in customer minutes and 478 million non-MED minutes. Feeder routes that follow high speed traffic corridors may also be vulnerable to car pole accidents. From 2017 through 2019, an average of 33 car pole accidents per year involved poles on the feeder system.

Along with a dedicated approach to reduce feeder outages, concerns regarding wildfire continue to increase. Historically, large wildfires have occurred predominantly in Eastern Washington and have impacted neighboring utilities at a much higher rate than experienced within PSE service territory. This scenario has changed in recent years due, in part, to effects of climate change, past forest management practices, as well as continued growth of population centers within the Wildland-Urban-Interface areas. Between 1990 and 2010, populations classified as Wildland-Urban-Interface have expanded by 41%. These communities are at the highest risk for wildfire damage and some of these communities have limited egress paths to facilitate evacuation. Taking actions to convert overhead conductor to underground in these high wildfire risk areas will reduce risk of wildfire ignition and increase system resiliency.

3. STATEMENT OF NEED

PSE is committed to providing safe, clean, reliable energy service to our customers. PSE is also integrating reliability initiatives with measures to modernize the grid. Underground systems are more modern and resilient to storms than overhead systems. This is an aggressive effort to gain significant reliability and resiliency benefits by reinforcing the electric distribution system backbone.

3.1. NEED DRIVERS

- **Grid Modernization –**
  - **Reliability** – Conversion of exposed overhead feeders to underground eliminates outages caused by vegetation, car pole accidents, wildlife, and phase slapping. Due to the high CMI of feeder outages, a reduction of feeder outages will reduce SAIDI. Also, system outages, predominantly vegetation-based, can ignite surrounding brush. Therefore, preventing outages is directly tied to reducing ignition risks. While some wildfire activities may have negative reliability aspects as safety and ignition prevention supersedes immediate restoration in wildfire threat environments, these small negatives are expected to be less of an impact than reliability improvements associated with system hardening.
  - **Resiliency –** Underground systems have a strong history of resiliency during major and minor storms and wind events that the Pacific Northwest frequently experiences.
  - **Safety** – Underground systems remove pole hazards from the right-of-way resulting in a decrease of car pole accidents. Underground systems also help reduce risk of wildfires that may endanger lives through fire and smoke spreading quickly and causing damage to infrastructure and communities.

3.2. EQUITY

PSE evaluates equity in the planning process with consideration of the four core tenets of energy justice: Recognition Justice, Procedural Justice, Distributional Justice, and Restorative Justice in various steps of the process.

As specific studies are performed and projects proposed to further a business plan, planners review system, customers, and now equity data to recognize the specific customer burdens, whether there are highly impacted or vulnerable customers that are or will be affected by addressing the specific business need. Planners must prioritize where to focus study each year, thus the full understanding of the historic and ongoing inequities for the entire business plan is extrapolated at this time, maturing over time which greater tools and data.

PSE is building process and tools to enable procedural inclusion in defining the need and solutions through engagement with specific communities and community based organizations, increasing understanding of local needs and consequences to inform specific study development as well as options to address need. Maturity in where and how this occurs will increase over the next several years. Business plans will be updated as informed this collective engagement to reflect broader equity benefits and burdens as this engagement increases over time.

As specific projects are proposed, PSE investment decision optimization tool captures equity benefits. An optimized portfolio of projects across many business plans ensures the distribution of benefits and burdens are spread across all segments of the community and aim to ensure that marginalized and vulnerable communities do not receive an inordinate share of burdens or are denied access to benefits. As an initial step, PSE leverages Customer Benefit Indicators (“CBI”)

and information established as part of the 2021 Clean Energy Implementation Plan ("CEIP") to identify an equity framework to evaluate system projects. The CBI approach was developed through an iterative process that was coordinated with the Equity Advisory Group. These CBI span the core tenets of energy justice and provide a framework to evaluate the comparative equity benefit of each solution alternative considered. Refer to Table 1 for a brief description of the CBIs that address equity and the applicable benefits for the Underground Conversion program. PSE will continue to adjust and refine equity consideration in projects when necessary as the process continues to mature.

Projects will be evaluated on each CBI category and a total equity benefit score will be provided.

Table 1: Equity Applicable Benefits

Customer Benefit Indicator	Description	Program Applicable Benefit
Customer Energy Savings	Solutions that lead customers to use less energy, which leads to less energy that must be purchased and potentially a reduction in planned system upgrades.	No
Greenhouse Gas Emissions	Solutions that lead to a reduction of greenhouse gas emissions, either directly or indirectly	No
Enables Cleaner Energy	Solutions that either directly integrate DER on the system or enable the grid to more readily accommodate future DER.	No
Air Quality	Solutions that either directly eliminate the source of a common pollutant or reduce the risk that could cause a common pollutant to increase, such as enabling Electric Vehicle or DER adoption	No
Resilience	Solutions that address major event outages or harden critical facilities to prevent catastrophic events from creating long duration outages.	Yes
Cost Reduction	Solutions that identify least cost alternatives and therefore reduce costs for all customers	No
Clean Energy Jobs	Solutions that increase clean energy jobs by furthering clean energy technology application, as described in the CEIP	No
Home Comfort	Solutions that deploy residential energy efficiency in either a targeted solution area or by leveraging load reduction from system wide energy efficiency installations	No

The program addresses wildfire risk and improves system reliability and resiliency by undergrounding sections of feeder and is programmatically optimized based on total benefit value to cost. Specific program projects are identified based total benefit to cost with named communities receiving additional scored benefit based on vulnerable population designation and highly impacted community characteristics, ensuring investments are distributed appropriately to named communities.

Business plans in isolation do not address restorative justice, but continued planning process improvements which include considerations of data, tools, and documentation as well as operational practices will help to restore equity over time.

4. PLAN DETAIL

4.1. PLAN SIZE/POPULATION

There are an estimated 3,150 circuit miles of overhead feeder conductor, divided among 1124 distribution circuits on PSE's distribution system.

An analysis of company-wide outage data over a three-year period (2020-2022) finds the following system averages:

Feeder outages: 0.42 outages/mile/year ALL-IN

Feeder outages: 0.23 outages/mile/year NON-MED

Average CMI per feeder outage: 313K per outage ALL-IN

Average CMI per feeder outage: 147K per outage NON-MED

A feeder failure rate of 0.42 outages per overhead feeder mile per year (or 1 outage every 2.4 years per mile) assumes that outages are evenly distributed across the overhead system, which clearly, they are not. Sections of feeders with more exposure to hazards will experience higher failure rates, while some feeder sections see virtually no outages.

4.2. PROPOSED COMPLETION DATE

This plan is open-ended due to the extensive amount of overhead feeder on the distribution system and ongoing evolution of wildfire risk. This plan would convert roughly 86 miles of overhead feeder to underground over the first 10 years of the plan (starting in year 2). This is roughly 3% of the feeder population. It is anticipated that by prioritizing conductor by customer counts, exposure risks, and lack of redundancy, after 10 to 20% of the population is completed, diminishing returns may end the plan. Since only 3% will be completed in 10 years, this plan will continue beyond 10 years.

4.3. SUMMARY OF PLAN BENEFITS

Improved Customer Reliability -The primary benefit of the plan is improved reliability for PSE customers. While feeder outages are less frequent, they are a significant contributor to overall company SAIDI, so decreasing feeder outages will have a measurable impact at the overall system level. Since system outages and wildfires are interconnected, by reducing outages we reduce likelihood of electrical discharges that can trigger wildfire ignition. Significant additional reliability and resiliency benefits are anticipated during major weather events. Annual non-MED CMI and SAIDI savings during the plan will vary depending on the make-up of the project portfolio, and focus on wildfire risk mitigation may result in prioritization of projects with lower expected reliability benefit if they address identified wildfire risk mitigation needs.

Improved Customer Satisfaction/Experience - Improved reliability for customers will result in an improved customer perception of PSE as well as provide the value to customers of avoided outages. Increased reliability also has an overall public benefit when critical and public services are not disrupted, and commercial businesses can operate normally.

Improved PSE Operations – All customers benefit where crews are freed from major feeder restoration work during major events to focus on other smaller outages.

4.4. INVESTMENT DECISION BENEFITS

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

- Energy Quality[1]
- Outage Concern
- Strategic Infrastructure

Table 2. Summary of Plan Benefits, Population and iDOT B/C Score

	Total Projects	Total Plan ($M)	Miles of OH/UG	Non-MED CMI Saved	iDOT B/C Score
2025 -2026	10	$42.4	21	1,232,322	2.22

4.5. ESTIMATED TOTAL COSTS

Electric System Planning estimated costs are generated based on historical costs of similar types of projects, with allowances for variations in project scope, increases in project cost due to inflation, and added contingency to account for unforeseen conditions associated with the projects. Average historical cost of underground conversions range from $1.5M - $3.5M per mile due to variability in the complexity of projects and site conditions. For the purpose of this business plan, $2.57M per mile is used to estimate cost.

The estimated capital cost is $215M to complete a targeted proactive population of overhead feeder.

[1] Analysis of customer inquiries reveals the majority are from non-named community customers. As a result, PSE is re-evaluating the intent of this benefit.

5. ALTERNATIVES

5.1. SOLUTION ALTERNATIVES

No Action - Feeder outages have a substantial impact to Company-wide SAIDI (particularly All-in SAIDI). Costs would be borne by other proactive plans, such as vegetation management or reactive plans, such as Targeted Reliability Upgrades (tree wire reconductor) after performance degrades on feeder sections. These alternatives may not see benefits, such as car-pole accident prevention. Alternatively, WSDOT driven control zone work may remove poles from risk of car pole accidents, but increase vegetation risks as pole lines are pushed off of state right-of-ways.

With no enhanced plan in place to proactively convert to underground, PSE would only perform mitigation under existing plans. This alternative would not provide an effective means to mitigate risk in wildfire threat areas. Response to wildfire risks would be managed through reactive means such as public safety power shutoffs (PSPS) versus the proposed proactive underground conversions identified in this plan that can improve public safety by maintaining ability to provide reliable electric service in threatened areas.

Since this plan focuses on proactively convertign overhead system to underground, alternative solutions such as reconductor to overhead feeder tree wire would be evaluated under the Targeted Reliability Upgrades business plan, for example. The Targeted Reliability Upgrades solutions can include both wired and non-wired solutions. Typical alternatives considered are: switching, energy efficiency, rebuild or extend existing facilities, new feeders and distributed energy resources. The solution that provides the highest cost benefit ratio is ultimately submitted as part of the project portfolio.

5.2. FUNDING ALTERNATIVES

Increase Funding from Proposed: With increased funding, benefits of outage reduction could be achieved in earlier years. This is complex work, however, and it is heavily impacted by permitting requirements, so risks of accelerating too much funding consist primarily of externally caused delays.

Decrease Funding from Proposed: Decreased funding would result in fewer locations converted, which would result in lower resiliency and a decrease in risk abatement for wildfire circuits. Only converted areas would see some outage reduction benefits and the company-wide outage reduction metrics and wildfire mitigation would see less improvement overall.

6. PLAN DOCUMENT HISTORY

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

Date	Reason(s) for Update	Summary of Significant Change(s)	Modified By
June 1, 2020	Initial Document	Initial Document	Kit Maret
12/1/2021	Annual Review	Minor word and format changes	Kit Maret
12/1/2023	Revision	Added Equity, removed ISP, updated costs, added wildfire mitigation as a benefit	Fremont Aguinaldo
12/5/2023	2024 MYRP Update	Updated Top 3 Primary iDOT categories and Program Summary Table to align with 2025-2026 project submittals. Deleted the Benefit Allocation chart.	Krista Malmgren

7. SUPPORTING DOCUMENTATION

Document Name
N/A