EXH. DJL-5 (Apdx. H)
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 H (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

CEF3 Living Lab

Corporate Spending Authorization (CSA)

Date Created:	Friday, February 10, 2023
Discretionary/ Non-Discretionary:	Non-Discretionary
Multi Year Rate Plan:	Programmatic
Equity Impact:	Yes
Strategic Alignment:	Evolve the Business-Clean
Estimated In-Service Date:	Tuesday, December 31, 2024
Current State (Business Need):	PSE has made a commitment to provide affordable and reliable service to all customers while working towards a carbon-free generation portfolio by 2045 in compliance with the Clean Energy Transformation Act. One of the initiatives to achieve this aggressive goal is to make strategic investments in new products and renewable resource development to allow higher renewable penetration in the form of Distributed Energy Resources (DER). In recent years, increasing customer requests for DER and microgrid interconnections have brought to light the need for a DER interconnection process that is transparent and efficient while taking into consideration the impacts on PSE's distribution system. A more robust interconnection process requires the results of demonstration projects of new technologies to analyze real world impacts to our electric system. Currently, the review of interconnection requests for DERs is more reactive than proactive, and as such, focuses most immediately on system limitations and reliability rather than enabling DER integration that could be beneficial to the distribution system moving forward. Telecommunication and internet technology have evolved to make available real-time data that could be harvested and utilized to deliver power more efficiently, reliably, and affordably. Technologies offer immediate benefits in planning, operations and asset management, and a fully modernized grid can support more renewable integrations and more dynamic interactions with customers/energy providers. On the other hand, grid modernization, especially for a major utility like PSE, is going to be costly, so the challenge lies in determining the suitability and cost-effectiveness of a variety of technologies with many possible application schemes corresponding to PSE's system characteristics. A comprehensive demonstration project, or "Living Lab", would allow PSE to gain first-hand knowledge of the benefits of smart grid technologies, understand the steps and costs required for implementation, and align with PSE's Integrated Strategic Plan (ISP).

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Corporate Spending Authorization (CSA)

Desired State (Proposed Solution):

Through the implementation of a tool called Hosting Capacity Analysis (HCA), PSE could speed the interconnection process for third parties while creating opportunity for PSE planners to meet system needs and build a modern grid using DERs. Given that each utility has unique system characteristics and different objectives for the types and penetration levels of DERs, utilities must define their own requirements for DER interconnection and develop a methodology to address relevant impact factors. As the first step of the technology-enabling Living Lab, SCALE can bring all the technologies, such as HCA and DER interconnecting as system assets, microgrid interconnection and optimal operations, at one location with live circuits, and the associated technical and financial evaluations are essential for PSE to define cost-effective use cases and application guidelines before system-wide deployment. The SCALE project will implement a microgrid consisting of a 1MW/2MWh Battery Energy Storage System (BESS) and corresponding 150kW solar array at the Blumaer substation to support the adjacent high school that currently has existing rooftop solar. The project will also implement a 500kW/1MWh battery energy storage system near a neighborhood at the end of a feeder in order to test use cases such as reliability and voltage management. The major components of this project will consist of the following: - Battery Energy Storage System - Solar Array - Reclosers - Microgrid control system in combination with a battery control system - Balance of Plant - Substation upgrade (if applicable) - Hosting Capacity Analysis Tool CEF 3 will provide a matching investment of up to $2,746,239*, which substantially increases the cost-effectiveness of PSE's investment on this project. The Living Lab will be PSE's ongoing center of innovations and experiments as technology evolves and new solutions become available for improving system performance and customer service.

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Corporate Spending Authorization (CSA)

Outcome/Results (What are the anticipated benefits):	See the "Desired State" section and "Qualitative Benefits" section for information.

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Corporate Spending Authorization (CSA)

Dependencies: No

Dependencies comment: None.

Escalation Included: No, escalation has not been included.

Total Estimated Costs: $11,790,025

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
Capital	W_R.10059.01.01.01	E Smart Grid Living Lab	$ 828,533	$ 5,646,661	$ 300,000	$ -	$ -	$ -

Incremental O&M: Both

Qualitative Benefits:

Financial: DER/microgrid interconnection with potential system upgrades as a service to DER/microgrid owners; potential earning opportunities with new rate structure; avoided costs for system upgrades by identifying locational benefits of DERs and directing DERs to more cost-effective interconnection points; centralized testbed set up for piloting various technologies and sharing learnings across the utility organization in a coordinated fashion Customer: New DER assets can improve power quality and reliability for some customers (reduced SAIDI and SAIFI) if controlled properly. First demonstration of a microgrid that includes customer asset. Both PSE and customer objectives need to be satisfied harmoniously through active customer engagement, collaboration, and proper control scheme design. Sets up a framework for customer-owned or partially-owned DER assets to be controlled by PSE. Formalized interconnection process and control standards for microgrids to facilitate efficient response to microgrid-related customer service requests and hosting capacity enhancement. Highlight PSE's commitment to applying new technologies for grid modernization and renewable integration. Promoting green energy jobs and providing training opportunities through Living Lab demonstration to the public. Process and Tools: HCA can offer great value in streamlining the DER interconnecting process by providing transparency of the hosting capacity data on distribution lines to DER developer's feasible locations for interconnection per the generation capacity. Hosting capacity data typically are published in the form of a "heat map," which will be set up and tested in this project. Another process improvement by HCA is the planning for system-wide DER adoption based on hosting capacity limitations, DER locational benefits, and NWA facilitation for capacity upgrades. Readily available visibility to circuit hosting capacity along with forecasts, when incorporated in the planning process, allows System Planning team to take a proactive approach for optimizing solutions for system improvements (including reliability) and for customer DER adoption. This will become an integrated step in System Planning's Grid Modernization Capability Development Project. PSE currently does not have microgrid interconnection procedures and operation strategies in place, for both utility- and customer-owned microgrids. Interconnecting procedures will be developed for microgrids with utility and customer-owned components to illustrate the interconnection condition requirements, steps and parties involved from defining microgrid operation objectives, equipment selection and sizing, to installation and commissioning. This pilot will enable microgrid related service to become part of PSE's future service portfolio and a non-wired solution for System Planning. People: The Living Lab is a grid-scale testbed that offers first hand experience to PSE employees on state-of-the-art power system technologies. Employees have the opportunities to work with top industry experts on system modeling,

Quantitative Benefits:

Quantitative Benefits	Benefit Type	Previous Years	Fiscal 2024	Fiscal 2025	Fiscal 2026	Fiscal 2027	Fiscal 2028	Fiscal 2029	Remaining Costs	Life Total
NA	-	$ -	$ 5,740,587	$ 304,990	$ -	$ -	$ -	$ -	$ 10,978,055	$ 17,023,632

Risk Summary: This is new technology for PSE and we are learning as we go.

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CEF3 Living Lab

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

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CEF3 Living Lab

Corporate Spending Authorization (CSA)

Approval History:

Approved By	Date Approved
Approved by Cost Center Owner: Pagano , Tony	4/3/2023
Approved by Director Sponsor: Roque Bamba	4/6/2023
Approved by Director Sponsor: Roque Bamba	4/6/2023
Approved by Director Sponsor: Landers , David	4/7/2023
Approved by Executive Sponsor: Koch , Dan	4/18/2023
CSA Status changed to Approved	4/18/2023
Approved by Cost Center Owner: Lim , Thina	12/5/2023
Approved by Director Sponsor: Lim , Thina	12/5/2023
Approved by Executive Sponsor: Lim , Thina	12/5/2023
CSA Status changed to Approved	12/5/2023
Approved by Cost Center Owner: Pagano , Tony	1/25/2024
Approved by Director Sponsor: Bamba , Roque	1/26/2024
Approved by Executive Sponsor: Vargo , Michelle	2/1/2024
CSA Status changed to Approved	45323.73105

PUGET SOUND ENERGY

CEF4: Tenino Alternative Renewable Backup Generator

Corporate Spending Authorization (CSA)

Date Created:	Wednesday, May 3, 2023
Discretionary/ Non-Discretionary:	Non-Discretionary
Multi Year Rate Plan:	Specific
Equity Impact:	Yes
Strategic Alignment:	Evolve the Business-Clean
Estimated In-Service Date:	Thursday, December 31, 2026
Current State (Business Need):	Puget Sound Energy (PSE) is implementing a Distributed Energy Resource (DER) project under a WA Department of Commerce Clean Energy Fund (CEF) 3 Grant [Contract 19-92201-003]. This capital project includes the development of one (1) solar photovoltaic (PV) array and one (1) battery energy storage system (BESS) in Tenino's Blumaer substation in conjunction with the Tenino High School (THS); and one (1) BESS in Bucoda. In partnership with the City of Tenino, PSE is developing a microgrid or islanding capability for the THS so that it may serve as an emergency shelter for the community and opened to the public during a crisis. Seasonal climate variation coupled with low solar incidence angles resulting from geographic location in the Pacific Northwest severely limit the operational characteristics of the proposed microgrid resource in the wintertime. Through this project PSE will engage in a study to assess the economic and technical feasibility of alternative backup power generation that would support the THS emergency shelter in island-mode. Alternative generator fuels to be considered include 100% renewable hydrogen and renewable natural gas (RNG) plus 15% renewable hydrogen mix.

PUGET SOUND ENERGY

CEF4: Tenino Alternative Renewable Backup Generator

Corporate Spending Authorization (CSA)

Desired State (Proposed Solution):

Capital Project Objectives:
1.Medium and Long-duration outage resilience
a.Internal PSE analysis shows that the proposed DER solution at THS will not provide adequate resiliency during a prolonged (+24 hr) loss of grid power.
b.This project will identify alternative fuel and generation technologies that fit within the Washington Clean Energy Transformation Act of 2019. To list cost and carbon emissions of every fuel type considered.
2.Demonstrate innovative hydrogen fuel cell and/or hydrogen/RNG generator technology
3.Determine characteristics for a control system capable of optimizing microgrid operation and integration with the alternative fuel generator presented within this scope.
4.Address issues with hydrogen and RNG handling, creation, storage, sourcing, transportation, system reliability, safety protocol, and other regulations.
5.Analyze the market for alternative fuels, including production, distribution and storage or RNG and Renewable Hydrogen.
a.Engage vendors of hydrogen technology, renewable hydrogen and renewable natural gas producers, and PSE's Gas Division in the project.
b.Model a "local energy ecosystem" composed of local producers of clean hydrogen or renewable natural gas.
6.Determine what type of environmental permits would be associated with either option.
7.If other viable options other than the two listed are available, please include in the study.

Major Components to Be Evaluated
1.Renewable backup generator (Hydrogen fuel cell, spark ignition engine powered by hydrogen or renewable natural gas plus a target minimum 15% hydrogen mix) (target of 150 kW capacity)
2.Local Hydrogen storage (target of sufficient capacity for 48 hour generator run time)
3.Generator controller/equipment for integration with existing solar + storage microgrid

PUGET SOUND ENERGY

CEF4: Tenino Alternative Renewable Backup Generator

Corporate Spending Authorization (CSA)

Outcome/Results (What are the anticipated benefits):

Capital Project Objectives:
1.Medium and Long-duration outage resilience
a.Internal PSE analysis shows that the proposed DER solution at THS will not provide adequate resiliency during a prolonged (+24 hr) loss of grid power.
4.This project will identify alternative fuel and generation technologies that fit within the Washington Clean Energy Transformation Act of 2019. To list cost and carbon emissions of every fuel type considered.
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3.Determine characteristics for a control system capable of optimizing microgrid operation and integration with the alternative fuel generator presented within this scope.
4.Address issues with hydrogen and RNG handling, creation, storage, sourcing, transportation, system reliability, safety protocol, and other regulations.
5.Analyze the market for alternative fuels, including production, distribution and storage or RNG and Renewable Hydrogen.
a.Engage vendors of hydrogen technology, renewable hydrogen and renewable natural gas producers, and PSE's Gas Division in the project.
Outcome/Results (what are the anticipated benefits)
b.Model a "local energy ecosystem" composed of local producers of clean hydrogen or renewable natural gas.
6.Determine what type of environmental permits would be associated with either option.
7.If other viable options other than the two listed are available, please include in the study.

Major Components to Be Evaluated
1.Renewable backup generator (Hydrogen fuel cell, spark ignition engine powered by hydrogen or renewable natural gas plus a target minimum 15% hydrogen mix) (target of 150 kW capacity)
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3.Generator controller/equipment for integration with existing solar + storage microgrid

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CEF4: Tenino Alternative Renewable Backup Generator

Corporate Spending Authorization (CSA)

Dependencies: Yes

Dependencies comment: CEF3

Escalation Included: No, escalation has not been included.

Total Estimated Costs: $1,400,000

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	PRJ_000538	Project	$ -	$ -	$ -	$ -	$ -	$ -
Capital	W_PLACEHOLDER_189	CEF4: Tenino Alternative Renewable Backup Generator	$ -	$ 100,000	$ 250,000	$ 750,000	$ 250,000	$ -

Incremental O&M: Both

Qualitative Benefits:

Capital Project Objectives:
1.Medium and Long-duration outage resilience
a.Internal PSE analysis shows that the proposed DER solution at THS will not provide adequate resiliency during a prolonged (+24 hr) loss of grid power.
4.This project will identify alternative fuel and generation technologies that fit within the Washington Clean Energy Transformation Act of 2019. To list cost and carbon emissions of every fuel type considered.
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3.Determine characteristics for a control system capable of optimizing microgrid operation and integration with the alternative fuel generator presented within this scope.
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5.Analyze the market for alternative fuels, including production, distribution and storage or RNG and Renewable Hydrogen.
a.Engage vendors of hydrogen technology, renewable hydrogen and renewable natural gas producers, and PSE's Gas Division in the project.
b.Model a "local energy ecosystem" composed of local producers of clean hydrogen or renewable natural gas.
6.Determine what type of environmental permits would be associated with either option.
7.If other viable options other than the two listed are available, please include in the study.

Quantitative Benefits:

Quantitative Benefits	Benefit Type	Previous Years	Fiscal 2023	Fiscal 2024	Fiscal 2025	Fiscal 2026	Fiscal 2027	Fiscal 2028	Remaining Costs	Life Total

Risk Summary: None.

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CEF4: Tenino Alternative Renewable Backup Generator

Corporate Spending Authorization (CSA)

Change Summary:

Planning Cycle	Change Summary	Last Update Date
2023 Cycle 1	Initial CSA	5/8/2023

PUGET SOUND ENERGY

CEF4: Tenino Alternative Renewable Backup Generator

Corporate Spending Authorization (CSA)

Approval History:

Approved By	Date Approved
Approved by Cost Center Owner: Pagano , Tony	5/8/2023
Approved by Director Sponsor: Landers , David	5/8/2023
Approved by Director Sponsor: Mannetti , John	5/8/2023
CSA Status changed to 'Concept Approved'	5/8/2023
Approved by Cost Center Owner: Pagano , Tony	5/8/2023
Approved by Director Sponsor: Roque Bamba	5/8/2023
Approved by Director Sponsor: Landers , David	5/8/2023
Approved by Executive Sponsor: Koch , Dan	5/8/2023
Approved by Executive Sponsor: Jacobs , Josh	5/23/2023
CSA Status changed to Approved	5/23/2023
Approved by Cost Center Owner: Lim , Thina	12/5/2023
Approved by Director Sponsor: Lim , Thina	12/5/2023
Approved by Executive Sponsor: Lim , Thina	12/5/2023
CSA Status changed to Approved	45265.1123
Approved by Cost Center Owner: Pagano , Tony	45321.20424
Approved by Director Sponsor: Bamba , Roque	45321.67852
Approved by Executive Sponsor: Vargo , Michelle	45323.74181
CSA Status changed to Approved	45323.74181