



Portland General Electric

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December 1, 2023

Via Electronic Filing

Public Utility Commission of Oregon
Attention: Filing Center
PO Box 1088
Salem, OR 97308-1088

Re: Docket No. UM 2141, PGE Flexible Load Plan

Filing Center:

On November 30, 2023 Staff of the Public Utility Commission of Oregon (OPUC) and Portland General Electric Company (PGE or the Company) filed a joint letter in Docket No. UM 2141, seeking extension of the timeline articulated in Order No. 21-158 for filing the Company's Flexible Load Multi-Year Plan (MYP). As indicated in that joint letter, PGE now submits for Commission approval the attached supplemental MYP filing. The supplemental filing (the Supplemental) provides information regarding PGE's planned 2024 MYP activities and seeks authorization for a proposed 2024 MYP budget with incremental spending adjustments by pilot or program and forecasted megawatt acquisitions. Together with the joint letter filed previously, this filing reflects a timeline and review process discussed and agreed upon by PGE and Staff.

Budget and outcomes

The \$16.2 million budget described in the Supplemental continues existing flex load pilots and programs, with an incremental investment of \$1.7 million over 2023 spending levels. The budget also funds PGE's portion of support for the Northwest Energy Efficiency Alliance's End-Use Flex Load Project.

The Supplemental provides detail on PGE's Smart Grid Testbed activity as well, although this is offered for informational purposes and context only, as Testbed activity is funded separately via Docket No. UM 1976.

Approval of the Supplemental will provide flexible load program continuity through 2024 while allowing time for PGE, Staff and other stakeholders to continue discussions regarding enhanced coordination of the next full, two-year MYP (2025-2026) with the Company's next Distribution System Plan (DSP). This will also facilitate incorporation into the next MYP of final demand response goals from PGE's Integrated Resource Plan (IRP).

Conclusion

PGE thanks Staff and the Commission for their attention to this matter and respectfully requests approval of this Supplemental filing. Please direct any questions or requests for further information to Steven Corson at Steven.Corson@pgn.com.

Thank you,

/s/ Riley Peck

Riley Peck
Senior Manager, Regulatory Strategy and Engagement

ATTACHMENT

Cc: Sarah Hall, OPUC Staff
Natascha Smith, DOJ
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MYP Supplemental

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Chapter 1. Overview

1.1 Purpose of Supplemental

Portland General Electric (PGE or the Company) requests Public Utility Commission of Oregon (OPUC or Commission) approval of a \$16.2M budget to continue PGE’s Flex Load programmatic activity through 2024.¹ PGE expects the incremental investment of \$1.7M over 2023 will add an additional 13.5MW Flex Load, for a total of 110.0MW. The funding request is supported by end-of-year forecasts, which project the portfolio will achieve 97% and 94% of 2023 Summer and Winter MW acquisition goals at a cost-effectiveness of 0.77 total resource cost (TRC) and 0.97 TRC2.²

This Supplemental also provides context for PGE and Staff’s separate joint letter filed 11/30/23 (hereinafter Letter) with OPUC Staff to extend approval of the 2022-2023 Flex Load Multi-Year Plan (MYP). The genesis for the Letter was Staff’s Q2 2023 request that PGE not submit a MYP for consideration in 2023. PGE was amenable but noted that absent Commission action to extend its approval, funding for Flex Load activity would conclude by the end of the year. Combined, the Supplemental and Letter continue funding for Flex Load activity until Staff and PGE can identify the information needed, content, and timing of the next MYP filing.

The below table lays out the requested funding. Note that we provide the Smart Grid Testbed (SGTB or Testbed) for information purposes only as it is funded via UM 1976. Detail on both programmatic and project activity, and also the separately funded Testbed activity, are provided in subsequent sections.

Table 1. Summary of Requested Funding for 2024 Flex Load Activities

Flex Load Activity	2024 Forecasted Budget
Flex Load Pilots and Programs	\$15,841,515
New Flex Load Project (only Northwest Energy Efficiency Alliance’s (NEEA’s) End-Use Load Flex Project)	\$357,500
Funding Requested with this Filing	\$16,199,015

¹ The Company will file accompanying deferrals applications by December 31, 2023.

² PGE presents two TRC tests: the TRC test includes the value of service lost; the TRC 2 test does not include the value of service lost. This aligns with previous requests from Commission Staff.

1.2 Organization of Supplemental

The Supplemental is organized as follows:

- Chapter 1 provides an overview of and context for the request to fund continuation of Flex Load Programmatic resource megawatt procurement activities.
- Chapter 2 discusses the SGTB.
- 2.2.6 discusses in greater detail Flex Load Pilots, Programs, and Projects, providing forecasted 2023-2024 budgets, evaluations, and detail on our preliminary cost-effectiveness test, which will be finalized with the 2023 Flex Load Annual Report in March 2024.
 - o **Section 3.5 lays out budget for programmatic and project activity we request Commission action to approve**
- Chapter 4 discusses Flex Load activities in development, including product concepts and planned tariff updates.
- Chapter 5 lays out a conclusion and next steps in engagement with Commission Staff.
- Appendix A briefly describes each Flex Load Pilot and Program
- **Appendix A.8 details NEEA's End-Use Load Flex project, including budget we request Commission action to approve**

1.3 Regulatory Context

The Flex Load activities described herein are in service to the resource acquisition goals laid out in PGE's 2019 Integrated Resource Plan (IRP)⁴. As of writing, the Oregon Public Utility Commission (hereinafter the OPUC or Commission) is in the process of reviewing PGE's 2023 IRP and its associated acquisition goals⁵. PGE will develop a more detailed two-year multi-year plan for flex load acquisition after the conclusion of LC 80, PGE's 2023 IRP, and Clean Energy Plan (CEP).

This Supplemental and the accompanying Letter therefore serve several purposes. Firstly, they provide the sufficient detail in a "short form" for Commission Staff to review and approve

³ This filing does not include a request for funding of Testbed activity, which we include for informational purposes only to reflect the full breadth of Flex Load activity. The request for Testbed project approval will move through the process outlined in OPUC. *Docket No. UM 1976: PGE DEFERRAL OF EXPENSES ASSOCIATED WITH DEMAND RESPONSE TESTBED PILOT*, available here: <https://apps.puc.state.or.us/edockets/DocketNoLayout.asp?DocketID=21662>.

⁴ PGE. *July 2019 Integrated Resource Plan*, retrieved from <https://downloads.ctfassets.net/416ywc1laqmd/6KTPcOKFIlvXpf18xKNseh/271b9b966c913703a5126b2e7bbbc37a/2019-Integrated-Resource-Plan.pdf>.

⁵ OPUC. *Docket No. LC 80: PGE 2023 INTEGRATED RESOURCE PLAN (IRP) AND CLEAN ENERGY PLAN (CEP)*, available at <https://apps.puc.state.or.us/edockets/DocketNoLayout.asp?DocketID=23636>.

funding for the 2024 Flex Load portfolio. Secondly, they provide PGE the needed time to incorporate IRP analyses in the next "full form" MYP.

Chapter 2. Flex Load Demonstrations (Smart Grid Testbed)

The Smart Grid Testbed⁶ facilitates various demonstrations that test smart grid technology and customer programs that explore the use of more sustainable resources, how Distribution Side Management activities can help keep energy prices lower and explore pathways to invest in future projects that may create Oregon jobs and a healthier environment. The following table presents an overview of demonstration activities through 2024. PGE initially described these activities in 2021 under the UM 1976 SGTB Phase II Proposal and has filed subsequent detailed plans for underlying studies and demonstrations under the same docket.

Table 2. Smart Grid Testbed Activities (2023-2024)

Activity	Active in 2023	Planned for 2024
Activities with Approved Project Plans		
Testbed EV Charging Study	X	X
Testbed Smart Solar Study	X	X
Multi-family Bundle (New Construction) - Central Heat Pump Water Heater - Unitary Heat Pump Water Heater		X
Single Family Bundle (New Construction)		X
Flexible Feeder (overlaps with Department of Energy-funded SALMON project)	X	X
Activities Pending Project Plan Submission for Approval		
Vehicle-to-Everything (V2X)		X
C&I, Municipal Flex Load and Resiliency		-

⁶ OPUC Docket No. UM 1976 PGE DEFERRAL OF EXPENSES ASSOCIATED WITH DEMAND RESPONSE TESTBED PILOT available at <https://apps.puc.state.or.us/edockets/DocketNoLayout.asp?DocketID=21662>. Schedule 13 SMART GRID TESTBED PILOT, retrieved from https://assets.ctfassets.net/416ywc11aqmd/1FXchtG1UCoqK74YIOWBoF/699972c24ae1b34287acf24744206db9/Sched_013.pdf.

Additional detail on the two Activities Pending Project Plan Submission for Approval:

- V2X activity: PGE is proposing a detailed project plan to the Demand Response Review Committee (DRRC), but it has not yet been approved. PGE expects to initiate this activity in 2024.
- C&I, Municipal Flex Load and Resiliency activity: PGE plans to draft and submit a detailed project plan to the DRRC but does not yet have a timeline initiate the activity

2.1 Smart Grid Testbed Budget

As noted above, this filing does *not* include a request for funding of Testbed activity, which we include for informational purposes only to reflect the full breadth of Flex Load activity. The request for Testbed project approval will move through the process outlined in the SGTB Phase II Project Proposal UM 1976.

The table below shows the SGTB Phase II actuals incurred in 2022 as well as expectations/forecasts for 2023 and beyond. The forecasted increase in 2024 spending of \$2.9M is a matter of project timing, with many of the activities moving to “in-flight” for evaluation next year.

The total SGTB budget comes to \$7.8M across 2022-2026; however, this forecast does not include the V2X and C&I projects, which are yet to be scoped (will add \$3.1M to this total). With those two projects included, the total project budget is expected to come in at \$10.9M.⁷

Table 3. Smart Grid Testbed Budget
[BEGIN CONFIDENTIAL]

Cost Category	Actuals	Forecasted				Total
	2022	2023	2024	2025	2026	2022-2026
Incremental Contract Labor						
Incremental PGE Labor						
DRMS Provider						
Evaluation						
Recruitment and Customer Outreach						

⁷ PGE (September 2023). *Smart Grid Testbed Phase II Proposal: Flexible Feeder Demonstration Supplement*, Section 1.2.2 and Appendix H3, and H7 describe coordination of SGTB activity with a \$6.65M Connected Communities grant from the Department of Energy. Retrieved from <https://edocs.puc.state.or.us/efdocs/HAH/um1976hah151930.pdf>.

Cost Category	Actuals	Forecasted				Total
	2022	2023	2024	2025	2026	2022-2026
Third-party Implementer						
Direct Installation/ Field Labor/ Materials						
Incentives						
Total						

[END CONFIDENTIAL]

The Testbed conducts demonstration activities and is not included in cost-effectiveness tests for the Flex Load portfolio. SGTB activities were not meant to be cost-effective, but rather to inform the development of pilots and programs, which would at that point be subject to cost-effectiveness.

2.2 Smart Grid Testbed Activities

2.2.1 Testbed EV Charging Study

The goal of this study is to better understand how and when customers charge their vehicles, and how PGE can collaborate with customers to optimize charging schedules in alignment with the needs of the distribution system. The study will explore how PGE can ensure vehicles are charged at optimal times for customers and the energy grid while always delivering the desired state of charge to the customer when they need it.

The study began in 2023 and is limited to 250 participants who receive a \$20 monthly bill credit for participation in addition to the one-time \$50 incentive upon enrollment and \$25 seasonal participation for PGE’s smart Charging Program.

PGE will continue operation of this study, including project management, deployment of customer incentives, collaboration with the existing PGE Smart Charging Program, data analysis, and evaluation. PGE is conducting this study in partnership with WeaveGrid who we use to set and communicate charge schedules to participating customer vehicles. Study is set to conclude December 31, 2024. Specific activities include:

- Complete testing of use cases by end-of-year 2024
- Ongoing data collection, review, and analysis
- Administer mid- and post-study participant survey
 - o Contract and administer Evaluation, Measurement, and Verification (EM&V)

For a more detailed review of these activities please see PGE's 2021 SGTB Phase II Proposal.⁸

2.2.2 Testbed Smart Solar Study

The goal of this study is to better understand how customer-owned solar systems can help contribute to a stronger and more reliable electricity grid. Currently, smart inverters can communicate with utility signals; this study will explore how PGE can optimize that connectivity to benefit the surrounding community.

The study began in 2023 and is limited to customers who live within our Testbed Smart Solar boundary and have a qualifying solar inverter.⁹ Participants receive a \$250 check upon enrollment delivered by mail from Energy Trust of Oregon plus a \$10 monthly bill credit for ongoing participation.

PGE will continue operation of this study, including project management, deployment of customer incentives, collaboration with study stakeholders, data analysis, and evaluation. PGE is conducting this study in collaboration with Enphase, a smart inverter manufacturer, to develop customized inverter settings and apply them to participating customer systems. Study is set to conclude December 31, 2024. Specific activities include:

- Complete testing of use cases by end-of-year 2024
 - o Assess feasibility of testing 2030.5 functionality
- Ongoing data collection, review, and analysis
- Inform UM 2111 discussion and decision of standardized inverter settings¹⁰
- Contract and administer EM&V

For a more detailed review of these activities please see PGE's 2021 SGTB Phase II Proposal.¹¹

2.2.3 Multi-family Bundle (New Construction)

While the multi-family market represents a major opportunity for demand flexibility and is critically important from an equity perspective, it presents programmatic challenges. This planned project seeks to explore how flexible load in the multi-family market can be unlocked and scaled by focusing on new products, bundles, and engagement strategies to increase adoption and participation.

⁸ PGE (2021). *Smart Grid Testbed Phase II Proposal*, Sections 2.2.3.5 and Appendix B. Available at <https://edocs.puc.state.or.us/efdocs/HAD/um1976had145212.pdf>.

⁹ Further detail on the PGE Test Bed Smart Solar Study page: <https://portlandgeneral.com/smart-grid-test-bed-solar-study>.

¹⁰ OPUC Docket No. UM 2111, *STAFF INVESTIGATION INTO INTERCONNECTION PROCESS AND POLICIES*, retrieved from <https://apps.puc.state.or.us/edockets/docket.asp?DocketID=22475>.

¹¹ PGE (2021). *Smart Grid Testbed Phase II Proposal*, Sections 2.2.3.3 and Appendix C. Available at <https://edocs.puc.state.or.us/efdocs/HAD/um1976had145212.pdf>.

Multi-family housing developers, design firms, and Mechanical, Engineering and Plumbing professionals determine water heating equipment type primarily based on building operating costs under their management, which is particularly critical in affordable housing developments. By providing these market actors with information, efficient water heating solutions, and cash incentives, PGE can guide them towards decisions that financially benefit building owners and tenants while also contributing operational value to the grid.

In this demonstration, the Testbed team will work with Energy Trust and the NEEA to provide information that will help developers select and install efficient and Flex Load capable domestic hot water systems. The grid assets will be incorporated into PGE's fleet of Distributed Energy Resource (DER) assets, with Heat Pump Water Heater (HPWH) systems joining the existing Multi-family Water Heater program portfolio. The installed DERs will be used in both traditional DR event calls and in specialized use cases focused on advanced grid services.

The demonstration seeks to enroll a "central" HPWH project that serves 50 or more units in new affordable multi-family housing and another "in-unit" HPWH project that serves 50 or more units in new multi-family housing and is expected to run for 18 months.

PGE will continue the full range of implementation activities, including project management, approval of and deployment of customer incentives, customer engagement, partnerships, and evaluation. Specific activities include:

- Complete contracting process with NEEA
- Complete participant recruitment and customer agreement process
- Develop best practice guide for installing HPWHs in multi-family applications
- Purchase and procure universal communication module (UCM) devices
 - o Establish device communication pathway and platform
- Schedule demand response (DR) events via existing multi-family program

For a more detailed review of these activities please see PGE's 2021 SGTB Phase II Proposal and the subsequent supplement.¹²

2.2.4 Single Family Bundle (New Construction)

This planned demonstration will explore the opportunities available for collaborating with residential new construction builders to ensure qualifying Flex Load-enabled technologies are installed and that homebuyers are adequately educated on the benefits of the technologies and the associated PGE DR programs. To achieve these goals, the project will

¹² PGE (2021). *Smart Grid Testbed Phase II Proposal*, Sections 2.2.3.4. Available at <https://edocs.puc.state.or.us/efdocs/HAD/um1976had145212.pdf>.

PGE (2023). *Smart Grid Testbed Phase II Proposal: Single Family and Multi-Family Demonstration Supplement*, Sections 1.2.2 and Appendices F and G. Available at <https://edocs.puc.state.or.us/efdocs/HAD/um1976had145212.pdf>.

explore leveraging incentives via two discrete but overlapping pathways: builder-based incentives and customer-based incentives. The builder-based incentives will be used to reduce the cost burden builders may face for installing qualifying equipment, whereas the customer-based incentive will be used to encourage enrollment and continued participation in DR programs.

The demonstration is projected to begin mid-2024 upon identification of an eligible builder with an upcoming community in the design phase and has an enrollment target of 25-150 participating homes.

PGE seeks to continue the full range of implementation activities, including project management, approval of and deployment of customer incentives, customer engagement, partnerships, and evaluation. Specific activities include:

- Establish customer recruitment strategy and enroll eligible builders
- Develop builder-based marketing materials of flex-load-enabled homes
- Enable requisite DR technology connectivity pathways for load control
- Establish customer awareness pathway of existing PGE DR programs
- Schedule DR events via existing programs

For a more detailed review of these activities please see PGE's 2021 SGTB Phase II Proposal and the subsequent supplement.¹³

2.2.5 Flexible Feeder

The goal of the Flexible Feeder project is to demonstrate the value of distributed energy resources (DERs)—including smart thermostats, storage, electric vehicle (EV) charging, and smart water heaters—to support grid operation. The project also examines the co-benefits of flexible load and efficiency, including how they can be jointly deployed to increase their impact, cost-effectiveness, and customer satisfaction. The project's linkage with PGE's Department of Energy (DOE) Connected Communities grant¹⁴ provides a significant opportunity—and also complexity—allowing an increase in project scope and learning and supporting the continuation of key workstreams.

In addition to SGTB funding, the project leverages the \$6.65M award from the DOE Connected Communities program for the SALMON project.

¹³ PGE (2021). *Smart Grid Testbed Phase II Proposal*, Sections 2.2.3.1. Available at <https://edocs.puc.state.or.us/efdocs/HAD/um1976had145212.pdf>.

PGE (2023). *Smart Grid Testbed Phase II Proposal: Single Family and Multi-Family Demonstration Supplement*, Sections 1.2.1 and Appendix E. Available at <https://edocs.puc.state.or.us/efdocs/HAD/um1976had145212.pdf>.

¹⁴ Detail on U.S. Department of Energy's *Connected Communities Funding Program* available at <https://www.energy.gov/eere/solar/connected-communities-funding-program>.

PGE will continue the full range of implementation activities, including project management, approval of and deployment of customer incentives, customer engagement, partnerships, special projects, contractors, and evaluation. Specific activities include:

- Campaign, marketing, and outreach launch
- Complete contracting for delivery of flexible feeder-specific work
- Deliver Home Energy Scores
- Conduct neighborhood canvassing and awareness campaign
- Launch Solarize campaign, a targeted education and delivery strategy with Energy Trust-approved contractors, including increased incentives for participants in a specific area
- Implement customer upgrade projects
- Conduct Contractor engagement and training
- Conduct pre-implementation surveys

For a more detailed review of these activities please see PGE's 2021 SGTB Phase II Proposal and the subsequent supplement.¹⁵

2.2.6 Vehicle-to-Everything (V2X)

This demonstration seeks to perform managed charging of electric vehicles using onboard telematics to optimize vehicle charging around grid considerations and utilize the V2X capabilities to shift and reduce customer load during peak times and provide advanced grid services during Peak Time Events. The demonstration will leverage the vehicle manufacturer's charge management software capable of sending customized vehicle charge/discharge signals to participant vehicles optimized to align with distribution grid benefit.

In this demonstration, PGE will enroll participants in Time of Use rates and will influence the timing of EV charging while ensuring that vehicles meet the operational needs of participants and will communicate optimal times for participant vehicles to provide whole home backup to reduce on-peak consumption. Additionally, the demonstration will leverage the format established by the Smart Battery Pilot where participating customers will be compensated for kWh exported from their vehicle batteries during specified periods aligning with Peak Time Events. The objective is to better understand how managed charging can reduce the negative impacts of high EV adoption rates and turn them into an operational asset.

PGE will recruit customers with compatible electric vehicles (those sold by participating vehicle manufacturer with V2X functionality) and who have installed the required charge management equipment. The V2X demonstration will be small (less than 20 participants) and

¹⁵ PGE (2021). *Smart Grid Testbed Phase II Proposal*, Sections 2.2.3.6 and Appendix A. Available at <https://edocs.puc.state.or.us/efdocs/HAD/um1976had145212.pdf>.
PGE (2023). *Smart Grid Testbed Phase II Proposal: Flexible Feeder Demonstration Supplement*. Available at <https://edocs.puc.state.or.us/efdocs/HAD/um1976had145212.pdf>.

aims to lay the foundation for PGE to understand the capabilities of V2X charge management, identify vehicle battery potential and review/approval within PGE's interconnections process, and establish a precedent for vehicle-to-grid export across the utility meter.

PGE will submit the project plan for Demand Response Review Committee approval, update PGE's Schedule 13¹⁶, and continue the full range of implementation activities, including project management, approval of and deployment of customer incentives, customer engagement, partnerships, and evaluation. Specific activities include:

- Complete contracting and supplier enrollment of partnering vehicle Original Equipment Manufacturer (OEM)
- Develop and submit project plan and budget to DRRC, OPUC
- File updated Schedule 13
- Update interconnection process and establish enrollment workflow
- Campaign, marketing, and outreach launch
- Schedule DR events in coordination with existing PGE peak-time events

¹⁶ PGE Schedule 13 *Opt-Out Residential Demand Response Testbed Pilot* available at https://assets.ctfassets.net/416ywc1laqmd/1FXchtG1UCoqK74YIOWBoF/699972c24ae1b34287acf24744206db9/Sched_013.pdf.

Chapter 3. Flex Load Pilots, Programs, Projects

This section reflects performance of the Flex Load portfolio through September 30, 2023, the latest data available as of writing. We have estimated acquisition (MW) through end-of-year and will provide full-year acquisition, enrollment, budget, and cost-effectiveness analyses with our 2023 Flex Load Annual Report at the March 2024 Demand Response Advisory Group (DRAG) meeting. This section provides context and background for the Commission Staff to better understand the activity within PGE's Flex Load portfolio in support of our request for 2024 funding of the same.

3.1 Flex Load Portfolio-level Activities

PGE's Flex Load Implementation team continues to refine and formalize practices and operations with an eye toward consistency, replicability, and cross-team knowledge sharing and support. The team started this journey in 2021 with the creation of dedicated daily operations support, documentation in the form of program implementation manuals, and cross-training schedules. 2022 expanded upon this approach, including cross-training on event dispatch and other support activities. 2023 has focused on up-leveling the visibility of the portfolio in PGE systems and enterprise projects, testing new outreach tactics, and developing a portfolio-level Distributed Energy Resource Management System (DERMS) strategy.

In 2024, PGE will undertake several large, cross-cutting initiatives to harmonize and simplify Flex Load operations. While synergies exist, we expect this will be a significant effort. Firstly, we released our first multi-pilot DERMS request for proposal (RFP) in Q4 of 2023. We will pursue out-of-the-box OEM integrations to eliminate costly, time-intensive customization. We also look to expand the number of qualified devices to more prevalent OEM devices, which, given the addition of the most prevalent devices in the market (specifically communication-enabled commercial thermostats and residential EV chargers), we expect will accelerate Flex Load enrollment. Secondly, PGE seeks to align implementation and delivery channels more common to the customer segment and technology to achieve lower implementation costs and achieve greater reach. To this end, PGE is exploring opportunities for PGE+ to leverage the Energy Trust of Oregon's trade ally network. This approach will guide our development as we re-bid our current non-residential pilots' third-party services in the first half of 2024.

The following table provides a brief overview of Flex Load Pilots and Programs; additional description can be found in [Appendix A](#).

Table 4. Flex Load Pilots and Programs: Overview

Deferral Docket	Activity	Summary
UM 2234	Smart Thermostat Pilot	Residential direct load control pilot targeting HVAC load curtailment with the help of smart thermostats.
	Peak Time Rebates (PTR) Pilot	Residential Behavioral DR pilot with “pay-for-performance” customer incentives
	Time of Day (TOD) Pilot	Residential Time-Varying Rate
	Energy Partner on Demand (Large C&I) Program	Performance-based DR program designed for large customers and custom curtailment strategies. Incentive design includes energy performance and reservation capacity incentives.
UM 1827	Multi-family Water Heater Pilot in Design Transition	Multi-family Residential direct load control pilot targeting Water Heater load curtailment.
UM 1514	Energy Partner Commercial Thermostats Pilot in Design Transition	Direct load control pilot targeting HVAC load curtailment with the help of smart thermostats.

3.2 Flex Load Pilots, Programs: 2024 Activities

The following table describes the activities PGE expects to undertake for each Flex Load activity in the coming year.

Table 5. Flex Load Pilots and Programs: 2024 Activities

Maturing Pilots	2024 Activities
Residential Smart Thermostat	<p>Following the 2023 Q4 DERMS RFP, work through system integration details</p> <p>Continue to work in close coordination with Energy Trust of Oregon to deploy thermostat incentives as part of the “bring your own thermostat” (BYOT) channel</p> <p>Complete pilot learnings and prepare for transition to program</p>
Peak Time Rebates	<p>Define optimal program pathways</p> <p>Identify beneficial cross-enrollment customer experiences, impacts and net benefits across residential pilot-programs</p>
Time of Day	<p>Expand recruitment efforts to additional customer segments</p> <p>Utilize new systems/tools available to enhance the customer experience</p>
Energy Partner on Demand (Sch 26)	<p>Assess remaining market potential and address performance gaps (tariff updates, collect customer feedback on program and participation barriers)</p> <p>Reconfigure program resourcing to optimize the enablement journey and drive customer engagement and re-bid third-party implementer services</p>
Pilots in Design Transition	2024 Activities
Multi-family Water Heater	<p>Maintain existing fleet and reconfigure program resourcing and re-bid third-party implementer services</p> <p>Work with Smart Grid Testbed and NEEA and engage OPUC Staff to begin pilot redesign for technical and market channel learnings</p>

Energy Partner Smart Thermostats (Sch 25)	<p>Update Sch 25 to include BYOT and trade ally delivery channels work in close coordination with Energy Trust of Oregon</p> <p>Following the 2023 Q4 DERMS RFP, work through system integration details</p> <p>Reconfigure program resourcing and re-bid third-party implementer services</p>
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3.3 Flex Load Projects: Proposed NEEA End-Use Load Flex Project

NEEA will convene utilities and energy efficiency organizations from the Pacific Northwest to align on Flex Load principles and leverage a regional market transformation portfolio to develop standards, influence stakeholders, prioritize scalable products/designs that meet utility and grid needs, and deliver efficiencies of scale on behalf of the region.

PGE's portion of 2024 funding for the project comes to \$357,500. NEEA's proposal in its entirety can be found in [Appendix A.8](#).

3.4 Flex Load Pilots and Programs: Capacity and Enrollment

Table 6. Flex Load Pilots and Programs: Capacity (MW)¹⁷

Pilot Programs	2023 Summer MW Actuals + Forecast	2023 Winter MW Actuals + Forecast	2024 Forecast Summer MW	2024 Forecast Winter MW
Residential Smart Thermostat	39.1	8.5	42.4	9.3
Peak Time Rebates	14.5	12.2	15.6	13.4
Time of Day	1.7	-	4.4	-
Energy Partner on Demand (Sch 26)	36.4	29.0	40.4	31.9
Multi-family Water Heater ¹⁸	2.0	2.6	2.2	2.8
Energy Partner Smart Thermostats (Sch 25)	0.8	0.3	2.6	0.3
Res EV Smart Charging	2.1	2.1	2.4	2.4
Flexible Load Portfolio Total	96.5	54.6	110.0	60.1

PGE's 2024 Flex Load incremental MW acquisition goals are 13.5 MW Summer and 5.5 MW Winter capacity; the incremental differences are reflected in the above table. This is in addition to maintaining the current fleet of 90+MW of Flex Load resources. We anticipate some refinement of these numbers as we close 2023, with the final MW, incorporation of updated planning values, and other updates to cost calculations flowing from the 2023 IRP.

Note that the 2024 forecast reflects a doubling of TOD Summer MW, which we attribute to its early pilot ramp based on the current pilot planning value. The 2024 forecast also reflects a trebling of Energy Partner Smart Thermostat (Sch 25) Summer MW based on an assumed

¹⁷ MW targets may change based on 2023 EOY MWs and planning value updates.

¹⁸ Assumes redesign in Q3 2023 and enrollment begins.

increase in planning value and a significant uptick in enrollment with Honeywell’s BYOT and direct installation channels.

Table 7. Flex Load Pilots and Programs: Enrollment

Pilots and Programs	2023 Goal	2023 Actuals + Forecast	2024 Goal
Residential Smart Thermostat	43.7K thermostats	48.2K thermostats	52.4K thermostats
Peak Time Rebates	131K customers	123.2K customers	132K customers
Time of Day	17K customers	13.5K customers	23K customers
Energy Partner on Demand (Sch 26)	This program targets large commercial customers and therefore has MW instead of enrollment targets	See MW table 85 customers across 274 sites	See MW Table
Multi-Family Water Heater	11.2K water heaters	11K water heaters	11.5K water heaters
Energy Partner Commercial Thermostats (Sch 25)	3.5K thermostats	2.1K thermostats	3.5K thermostats
Residential EV Smart Charging Pilot	3.9K customers	4.5K chargers/vehicles	7.5K chargers/vehicles

2023 Flex Load enrollments have continued to grow through our efforts to increase retention and add new participants. We anticipate to close 2023 with an eight percent year-over-year increase in residential program enrollment. That said, we do acknowledge PTR’s 2023 under-enrollment due in part to a leveling-off of that program, but also due to the impact of move-in/move-out, and migration to the Residential Smart Thermostat; 2024 goal reflects these factors.

3.5 Flex Load Pilots, Programs, Projects: Budgets

In addition to the 2023 forecasted budget for programmatic activity, this section contains detail on the proposed funding of 2024 programmatic activity for which we request Commission action.

2024 budget forecast portfolio expenditures are a modest increase from the 2023 forecasted budget, which we provide for reference below.

Table 8. Flex Load Pilots, Programs, Projects: Budget¹⁹

Pilot Programs	2023 Forecasted Budget	2024 Forecasted Budget
Residential Smart Thermostat	\$2,613,077	\$3,837,000
Peak Time Rebates	\$2,859,000	\$2,971,605
Time of Day	\$749,000	\$690,000
Energy Partner on Demand (Sch 26)	\$5,675,000	\$5,406,410
Multi-family Water Heater ²⁰	\$1,226,467	\$1,656,500
Energy Partner Smart Thermostats (Sch 25) ²¹	\$1,357,000	\$1,280,000
Flexible Load Portfolio Total	\$14,479,544	\$15,841,515
NEEA End-Use Load Flex Project (see Appendix A.8)		\$357,500
Request for Commission Action		\$16,199,015

¹⁹ Note as of May 9, 2022, these budgets do not include incremental PGE labor costs, in line with the 2022 General Rate Case (UE 394).

²⁰ Note that Pilots in Design Transition had Q2 filings due in separate dockets. These pilots' 2023 forecasted budgets were on different fiscal year cycles. The upcoming filing will conclude the movement of these deferrals onto a calendar year cycle:

- Energy Partner Smart Thermostats (Sch 25) fiscal year was June 1, 2022 - May 31, 2023, with reauthorization (UM 1514) filed earlier this year for funding through December 2023.
- Multi-family Water Heater fiscal year was August 1, 2022 - July 31, 2023, reauthorization (UM 18279) was filed in April 2023 for funding through December 2023.

²¹ Ibid.

Smart Thermostats continues at a steady trajectory, whereas Energy Partner on Demand, with a much longer lead time, has built momentum and critical insights which we expect to translate into MW acquired in 2024.

The 2024 portfolio budget is proportionally similar to the prior year, taking into account the change in planning values, as well as increasing MW and enrollment targets. The net increase in the 2024 forecasted budget is primarily customer incentives scaling with enrollments and performance. PGE also continues to negotiate costs with vendors at regular intervals to keep administrative costs low. The 2022 selection of a single evaluator for the maturing pilots has helped reduce administrative costs for the portfolio.

Earlier this year, PGE worked with Staff to realign pilots in design transition from separate fiscal years to the MYP calendar year filing. PGE will seek to include these pilots in design transition in the next MYP.

3.6 Flex Load Pilots and Programs: Preliminary Cost Effectiveness

Table 9. Flex Load Pilots and Programs: Preliminary Cost Effectiveness

Pilot Programs	2022		2023	
	TRC	TRC2 ²²	TRC	TRC2 ²³
Residential Smart Thermostat	1.41	1.83	1.53	1.97
Peak Time Rebates	0.50	0.64	0.56	0.68
Time of Day	1.24	1.24	1.50	1.50
Energy Partner on Demand (Sch 26)	1.07	1.99	0.84	1.29
Multi-family Water Heater	0.12	0.12	0.15	0.16
Energy Partner Smart Thermostats (Sch 25)	0.30	0.65	0.17	0.22
Flexible Load Portfolio Total	0.83	1.15	0.77	0.97
Residential EV Smart Charging Pilot	n/a	n/a	n/a	n/a

²² TRC2 excludes the value of service lost, which TRC includes. This aligns with previous requests from Commission Staff.

²³ Ibid.

Cost-effectiveness of the portfolio of Flex Load pilots and programs has decreased from that presented in the 2022 Flex Load Annual Report. Since March, there have been slight increases in benefit-cost ratios for Residential Smart Thermostats and Time of Day, while there was little change in PTR and Multi-family Water Heater. The decline in cost-effectiveness can chiefly be attributed to Energy Partner Smart Thermostats (Sch 25) and Energy Partner on Demand (including storage) (Sch 26). The primary drivers are slow enrollment growth and incorporation of the latest impact results into the cost-effective calculations.

Please note that this cost-effectiveness methodology is based on the 2019 IRP and includes legacy pilot costs. Once approved, updated 2023 IRP values are expected to affect cost-effectiveness. PGE looks forward to engaging with Staff on this issue in forthcoming DRAG meetings. In the meantime, PGE seeks to mitigate these impacts by continuing our focus on operational effectiveness and portfolio-level efficiencies (see [Sections 3.1](#) and [3.2](#), above), as well as by working with Staff on the redesign of pilots in design transition.

Chapter 4. Flex Load Activities in Development

The purpose of this section is to inform the Commission Staff of Flex Load work in the pipeline, which PGE will present through the DRAG or other engagement forums before submitting a proposal for Commission action. These are not part of the funding request found in this immediate filing.

4.1 Concept: Commercial Behavioral Demand Response

PGE is working to increase both the percentage of C&I customers engaged in Flex Load programs. However, a frequent issue in engaging C&I customers is the seemingly infinite number of unique system configurations in commercial spaces and the complexity of the tenant-to-ownership relationships, and the ensuing difficulty in establishing who is able to authorize device installation or changes required for dispatchable flex load integration.

For larger customers, the effort to engage on a one-on-one basis through programs like Energy Partner on Demand is justified by the amount of flex load that individual customers provide. Small and medium businesses cannot deliver the same flex load and therefore it would not be economical to engage in the same manner as larger customers. To engage small and medium businesses, there is a need to be able to offer a flex load program engagement opportunity which allows for technology-agnostic demand response as well as the flexibility to offer engagement paths regardless of the specific tenant to building ownership situation.

To allow for this engagement PGE is evaluating a Commercial Behavioral Demand Response program through PGE's Program Lifecycle Management (PLM) program and given the continued successful progress through established PLM stage gates, a draft tariff proposal is anticipated in Q2 of 2024. PGE will keep Staff and stakeholders informed about this program concept before requesting action from the Commission on any component of the program concept.

4.2 Concept: Strategic Custom Offering

PGE is observing a growing number of distribution-sited unique resources that potentially represent cost-effective opportunities to acquire flexible load resources but are outside the bounds of current flex load programs and would be most effectively engaged with through a semi-custom engagement strategy. Examples of these resources include:

- Manufacturing facilities that have large thermal tanks that effectively shift energy load but once engaged are best suited to shift load for several days and cannot effectively and efficiently participate in multi-hour programs given the time required to restart.
- Campuses with central utility plants that can engage in prolonged and repeated thermal load shifting.
- Real estate developments that are proposing to develop large stand-alone battery systems in advance of large district-scale developments but would not be considered utility customers.

PGE is evaluating a programmatic approach to these opportunities whereby there is a consistent structure to enter into agreements for the various flex load resources the opportunities represent.

The proposed Strategic Custom Offering is being developed through PGE's Program Lifecycle Management (PLM) program and given the continued successful progress through established PLM stage gates, a draft tariff proposal is anticipated in late Q1 of 2024.

4.3 Concept: Tariff Alignment

PGE will report to Commission Staff at the January 2024 Demand Response Advisory Group regarding our planned updates to Flex Load pilot and program tariffs standardizing the customer experience and increasing the portfolio's realized flexibility and value. The concepts currently under consideration include:

- **Standardize seasons** as Winter: November-April and Summer: May-October. As conceived, this would affect Smart Thermostat (Schedule 5), Peak Time Rebates (Schedule 7), and Energy Partner Thermostat (Schedule 25). The goal would be to allow for seasonal participation where applicable without "gap" months where DR capabilities are unavailable.
- **Remove dispatch windows**, replacing restrictions with communications of typical dispatch windows to customers. As conceived, this would affect Peak Time Rebates (Schedule 7).
- **Add ability to dispatch on weekends and holidays**. As conceived, this would affect all Flex Load customer programs.
- **Remove specific installation channel requirements** in tariffs. As conceived, this would affect Smart Thermostat.

PGE does not anticipate that the above updates will have budgetary implications. Standard operating procedures governing customer experience, grid needs, and program economics would remain in place. These updates intend to create flexibility so PGE can rely on customer programs as a year-round resource and react to changing market, technology, and energy needs in a responsive manner.

The only program not included in this conceived update is PGE Energy Partner on Demand (Schedule 26). This is due to its complicated reservation structure, which would result in budget impacts where seasons or dispatch windows change. Any updates to Schedule 26 would therefore be addressed separately.

Chapter 5. Conclusion

PGE thanks the Commission for their engagement and guidance on the separate joint Letter to extend approval of the 2022-2023 MYP, which affords the utility the time needed to plan for the IRP Flex Load acquisition targets the Commission directs the utility to pursue.

With this Supplemental, PGE requests approval of \$16.2M budget to continue the Flex Load pilot and program activity through 2024, when we will file the next Flex Load MYP. This request is supported by the performance of the Flex Load portfolio, which we forecast will end the year at 97% and 94% of Summer and Winter acquisition targets, respectively, and which reflects a preliminary cost-effectiveness of 0.77 TRC and 0.97 TRC2.

PGE looks forward to ongoing engagement with the Commission leading up to our filing of the 2024 Flex Load MYP. We anticipate discussion at the January DRAG regarding new product concepts and tariff updates, presentation of the 2023 Flex Load Annual Report at the March DRAG, and review of draft MYP content at the June DRAG.

Appendix A. Descriptions of Flex Load Pilots, Programs, Projects

A.1 Residential Smart Thermostats

Regulatory Reference: Sch 5 Residential Direct Load Control Pilot (Deferral UM 2234)

Customers may enroll online in PGE's DR program by purchasing a new qualifying thermostat via the PGE Marketplace or another retailer or using an existing qualifying thermostat attached to a qualifying HVAC system. Customers receive up to \$25 as an enrollment incentive and \$25 for each DR season that they are able to participate in (defined as 50% of the DR hours called within a season). Customers are permitted to opt out of any or all events.

The Direct Load Control Smart Thermostat pilot aims to enroll and operate connected residential thermostats to control electric heating and cooling load, providing PGE with firm capacity. To participate in the program, PGE customers must have a qualifying HVAC system (ducted heat pump, electric forced-air furnace, or central air conditioner).

Customers who enrolled through the direct installation delivery channel (closed to new enrollment as of May 30, 2022) received a free or discounted and professionally installed smart thermostat but are not eligible for the up to \$25 enrollment incentive or \$25 seasonal incentive.

A.2 Peak Time Rebates

Regulatory Reference: Sch 7 Flex 2.0 (Deferral UM 2234)

The Peak Time Rebates activity is a cornerstone of PGE's residential Flexible Load portfolio. The pilot relies on individual customer participation to reduce electrical demand during Peak Time Events by shifting energy consumption to non-peak periods or through conservation. As such, it is a behavioral DR pilot. There is no up-front equipment investment making it the ideal platform by which to introduce our residential customers to the concept and value of DR, educate them about the role they can play in supporting a reliable, greener grid for the community, and reward them financially for their efforts in doing so. PTR serves as the gateway to a deeper engagement with PGE's energy-shifting products and services. It is also our first behavior-based DR resource and is proving to be a reliable, consistent resource that will support PGE's Flexible Load acquisition goals.

The PTR pilot provides educational energy-saving tips and rewards customers for shifting their energy use during three- to four-hour event periods when energy costs are higher and renewable energy sources are less plentiful. Customers are notified a day prior to the event via text and/or email, based on their preference, and encouraged to shift usage during the event hours the next day. On the day of the event, they may also receive a same-day reminder. After the event, they are notified of the result of their specific effort and, if applicable, their earned incentive. Customers earn \$1.00 for every kWh they shift during an event, and the rebate appears as a credit on their next monthly bill. There is no penalty if a customer uses more energy than expected during an event, making PTR a no-risk, "win-only" offering for our customers.

A.3 Time of Day

Regulatory Reference: Sch 7 Flex 2.0 (Deferral UM 2234)

Residential customers want more choice, information, and control to help them manage their energy use and costs. The Time of Day pricing plan gives customers more control over their electric bills and offers opportunities to save money by shifting energy use away from the peak hours when power costs more and renewable resources are less plentiful.

Time of Day also helps reduce system peak loads and reduce associated carbon footprint and greenhouse gas emissions. Aligning on-peak hours with capacity constraints encourages customers to shift usage during energy peaks, reduces need for construction of new power plants and supports a reliable grid. TOD is one way our customers can partner with PGE and play an active role in grid management to enable a cleaner, greener energy future for all.

A.4 Energy Partner on Demand (Large C&I) Demand Response (Sch 26)

Regulatory Reference: Sch 26 (Deferral UM 2234)

Energy Partner Schedule 26 is focused on large customers via custom load curtailment plans with monthly incentive payments during Winter and Summer seasons, and event-based incentives for shifting their energy consumption during seasonal Peak Time Events. Energy Partner Schedule 26 provides firm capacity and will evolve to provide intra-hour grid services to support resiliency and renewables integration now that the Tariff update to Schedule 26 was approved by the Commission.

In its current form, Schedule 26 customers can elect to participate in up to 20, 40, or 80 hours of events per season and customize their participation schedule by selecting one or more event windows such as 7-11 am (winter), and 11 am to 4 pm, 4-8 pm, 8-10 pm (summer and winter). Customer compensation opportunities are also more favorable relative to the previous pilot: the same selections as the prior pilot now earn 22% more, and the maximum hour / maximum window option pays 76% more.²⁴

The program is operated with sales and engineering staff (provided by our third-party implementer) who work on-site with customers to identify opportunities for curtailment, enable manual and auto DR and support ongoing customer needs. Unlike residential DR efforts leveraging a “mass market” approach, business customers require individualized, ongoing focus to ensure their operations are not disrupted by DR events (e.g., nominations may require adjustments, and questions may arise as to how to optimize participation during events).

A.5 Multi-family Residential Water Heater Pilot

Regulatory Reference: Sch 4 Multi-family Residential Demand Response Water Heater Pilot (Deferral UM 1827)

The Multi-family Water Heater (MFWH) pilot aims to enable and operate electric water heaters for demand flexibility. This program provides capacity as well as intra-hour energy and lays the foundation for PGE's DR programs to offer intra-hour grid services to support reliability and renewables integration.

This program aims to provide Flexible Load resources in a way that is unobtrusive to the customer. This pilot enables residents of multi-family buildings to participate in energy programs that are often not available due to the limitations of renters to make investments in equipment or building shell improvements.

Property managers receive annual incentives of \$20 per installed device for five years.

A.6 Energy Partner Commercial Thermostats Pilot

Regulatory Reference: Sch 25 Nonresidential Direct Load Control Pilot (Deferral UM 1514)

The Schedule 25 Smart Thermostat pilot was launched on December 1, 2017 to complement Schedule 26. The pilot design includes customer recruitment and direct installation of qualified smart thermostats. Schedule 25 created an opportunity for small and medium-sized businesses to participate in DR through a turnkey direct load control pilot. The advent of Schedule 25 created additional opportunities for customers who lack adequate process-based load and/or the operational ability to curtail load via Schedule 26.

Participants receive a qualified thermostat for signing up for the direct installation channel. Participants may receive multiple qualified thermostats for separate spaces subject to verification by PGE. A Customer co-pay of up to \$60 per installed thermostat is required for participation. Customers receive up to \$60 per Qualified Site for each Event Season they participate. A Customer participating in all Event Seasons receives up to \$120 per Qualified Site per Pilot year. Incentives are paid to the Customer with an automated clearing house (ACH,) check, bill credit, or generic gift card. To receive payment for an Event Season, all Qualifying Thermostats at the Qualified Site must participate in at least 50% of the event hours for which the Customer is eligible to participate in that Event Season.

A.7 Residential Electric Vehicle Smart Charging (Sch 8)

Regulatory Reference: See Transportation Electrification Plan

PGE's residential EV Smart Charging pilot offers qualifying residents of single-family homes a \$300 rebate towards the purchase and installation of qualified L2 at-home charger (\$1,000 income-qualified rebate) or a \$50 rebate for customers who enroll through a qualifying vehicle telematics provider. The pilot also offers a \$25 seasonal incentive (six-month season; Oct-Mar, Apr-Sep) for allowing PGE to pause EV charging during peak loads. In addition to the above, PGE's Monthly Meter Charge funds panel upgrade rebates and trade ally network development.

Although funding for the pilot is provided through PGE's Transportation Electrification activities, we include it here as it contributes to PGE's flex load acquisition. Further detail on the pilot can be found in PGE's 2023 Transportation Electrification Plan²⁵



2024/2025 End-Use Load Flex Project – Final Draft

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Summary

The 2021 Northwest Power Plan projects as much as 3,500 MW of additional coal plant retirements by 2029. The expected addition of 3,500 MW of renewable resources by 2027 will help to mitigate this loss¹. However, renewable resources with variable generation cannot begin to replace the firm capacity of retired regional coal plants on a one-to-one basis². Flexible end-use load resources can help with system integration of the renewable resources and contribute to filling an expanding capacity gap by helping to meet system peaks and allowing for more flexibility in load control.

As a Market Transformation organization with a 25-year history of delivering permanent market change, the alliance can play an important role in helping the region accelerate adoption of new end-use technologies that enable more flexible, efficient operation of the electric system and increased integration of renewable energy. By pooling resources and working together as an alliance, the Northwest can:

- Mitigate the cost and risks of individual utility load flexibility efforts.
- Aggregate influence with global market actors and influence the national supply chain.
- Provide economies of scale.

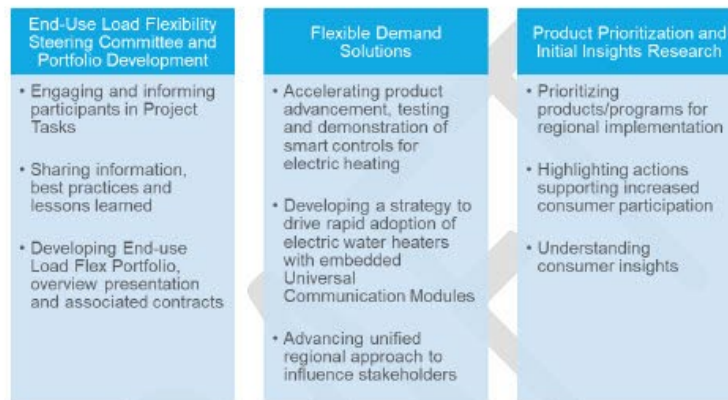
In January 2023, NEEA hosted a regional End-Use Load Flex workshop to gauge regional interest in a collaborative end-use load flexibility effort. At that time, several stakeholders expressed interest in NEEA evaluating near-term opportunities that could be initiated beginning in 2024. After further discussions with these stakeholders, NEEA staff has developed this proposal, which combines input from stakeholder interviews with the experience and perspective of subject matter experts. NEEA proposes a 2024-2025 End-Use Load Flex Project (the Project) consisting of three tasks supporting and exploring Market Transformation opportunities to enhance the region's capacity to manage electric loads. *(Note: Originally four tasks were proposed. The fourth task, Innovative Storage and Load Shifting, required more exploration and regional discussion as a potential opportunity. An overview is included in appendix.)* NEEA staff have prioritized opportunities that focus on improving the efficiency,

¹ https://www.nwcouncil.org/fi/17680/2021powerplan_2022-3.pdf

² See: U.S. Capacity Factor by Energy Source 2021 in <https://www.energy.gov/ne/articles/what-generation-capacity> (source: U.S. DOE)

connectivity, and controllability of end-use devices and leverage NEEA’s existing market relationships and product development expertise, research and analytics capabilities and role as a regional convener.

The three tasks are summarized with additional detail on subsequent pages. Key activities of each task are detailed below:



The total budget for the Project is approximately \$3.5M (\$1.67M annually) and it will run from the first quarter of 2024 to the end of 2025.

With this Project, NEEA seeks to catalyze innovation and Market Transformation towards a more flexible and reliable energy system. The near-term goal is to expedite the integration of features that enable end-use load flexibility and gain insight into related opportunities. Although the initial focus will be on residential end-use technologies, future activities may extend to commercial/ non-residential end-use applications. Results and learnings from the Project are intended to inform a longer-term End-Use Load Flexibility Market Transformation Portfolio (the Portfolio), as shown in the draft timeline below:



Task 1: End-Use Load Flexibility Steering Committee and Portfolio Development

Introduction

NEEA will convene participating organizations (participants), including Northwest utilities and energy efficiency organizations, to share information and best practices and align on collective end-use load flexibility priorities. This facilitated connection will enable the region to move the market forward faster and more cost-efficiently than any one organization could do alone.

A key deliverable of this group will be translating lessons learned from the Project into a longer-term regional End-Use Load Flexibility Market Transformation Portfolio (the Portfolio) that NEEA would manage on behalf of the region. Outputs from this task include progress summaries, notes and action items, and an End-Use Load Flexibility Market Transformation Portfolio and funding proposal.

Goals

The main goals of this task are to bring together participants to identify regional interests and needs, share information to amplify efforts and avoid duplication, successfully execute the Project, develop a comprehensive End-Use Load Flexibility Market Transformation Portfolio, and establish funding mechanisms and associated contracts.

Activities

- Convening Steering Committee (and relevant workgroups) to:
 - Share information and updates on Project tasks
 - Further understand interests/needs related to a longer-term regional End-Use Load Flexibility Market Transformation Portfolio.

Working sessions will be designed to encourage dialogue, debate, exploration of different ideas, and will inform development of the Portfolio.

- Communicating progress and opportunities to participants outside of regularly scheduled work sessions. Communication with participants will be maintained throughout the Project

to keep them informed of progress and opportunities to contribute. This will include routine updates via email, phone, and virtual meetings.

- Developing long-term Portfolio and overview presentation: Based on the work sessions, a Portfolio will be developed that outlines the goals, objectives, and scope of the longer-term effort. This will include a comprehensive analysis of the region's strengths, weaknesses, opportunities, and threats, as well as a clear set of priorities and goals. A presentation that provides an overview will also be created and shared with participants.
- Developing funding mechanism and associated contracts: A funding mechanism and associated contracts will be developed to support both the Project and the Portfolio. This will involve identifying potential funding structures and developing contracts that outline the roles and responsibilities of participants.

Deliverables

- Steering Committee and workgroup session summaries, notes, and action items.
- Portfolio: A detailed document outlining the goals, objectives, and scope of the End-Use Load Flexibility Market Transformation Portfolio will be developed.
- Portfolio Overview presentation: An overview presentation that summarizes the portfolio and highlights key features will be developed.
- Draft participant contracts: A draft contract that outlines the roles and responsibilities of participants will be developed.

Estimated Budget

The total two-year estimated budget for Task 1: End-use Load Flexibility Steering Committee and Portfolio Development is \$475,000.

Task 2: Flexible Demand Solutions (Emerging Technology)

Introduction

This task aims to promote the integration of demand response features into various energy-consuming products by leveraging open-source flexible demand solutions, resulting in early wins for grid benefits. The primary objective is to influence manufacturers and the market to adopt open-source Universal Control Module (UCM)/smart controls in products for the key target markets of water heating and space conditioning. Specifically, this includes electric water heaters and universal solutions for HVAC systems and line voltage control of resistance loads. This task builds upon NEEA's previous work in water heating, specifically with heat pump and electric resistance technologies, by utilizing the open standard CTA 2045 (EcoPort™). Additionally, the task will leverage ongoing collaboration with multiple thermostat manufacturers accelerating incorporation of demand response features.

NEEA will collaborate closely with manufacturers and technology developers to encourage the commercialization of UCM/smart controls and embedding intelligence in end-use appliances and equipment. Additionally, pilot installations will be conducted to demonstrate the successful operation and control of these features. These activities will accelerate product advancement and facilitate testing of smart controls for electric heating. They will also inform the development of a strategy to drive widespread adoption of electric water heaters (both resistance and heat pump) embedded with UCM.

Working with manufacturers and the supply chain, the strategy will provide a clear path to market for both new construction and retrofit installations, ultimately creating solutions that can be delivered at a fraction of the cost and provide future-proofed solutions to grid operators.

***Note: An appendix with additional context and details is provided at the end of this document**

Goals

The goals of this task are to promote technologies inclusive of open-source communication standards that can be leveraged by utilities and aggregators for the benefit of the grid without impacting the customer experience. Many of these standards exist but are not always widely accepted and or implemented due to the manufacturers concern of picking the right pathway to

market. This task will build bridges across gaps between manufacturer business case, consumer experience and utility value.

The task will begin building an inventory of “connectable” efficient end-use technologies that can be enabled by simply sending out a UCM and asking the customer to plug it in. An additional goal of this task is to develop a unified regional approach for use in influencing stakeholders outside the region such as the California Energy Commission, ENERGY STAR®, and DOE on the connectivity standards much like what has been completed with other relevant NEEA activities including influencing the AHRI 1430 standard for Demand Flexible Electric Storage Water Heaters as well as the Washington Department of Commerce and Oregon Department of Energy’s requirement that all water electric water heaters shipped to the region be connectable.

Activities

- Leveraging End Use Load Research (EULR) study, NEEA’s current product portfolio and participant input to finalize initial product/technology selection.
- Expanding ongoing and fostering new collaborations with multiple manufacturers, trade associations and technology developers to encourage the commercialization of products with integration of demand response enabling features.
- Accelerating prototype solutions by performing lab tests and performance simulations; analyzing results.
- Providing results to manufacturers and participants, collecting feedback, and adjusting solutions to ensure expected outcomes are achieved.
- Deploying field installations in participant territories (as desired). Field studies will be fully instrumented and evaluated for both customer and grid performance.
- Developing a platform/strategy for scaling selected technologies, including identifying potential barriers to adoption, developing strategies to overcome them and designing structures for larger field studies prior to full roll out.
- Leveraging existing relationships, voluntary and required standards, and/or marketplace drivers to influence development of a unified/regional path forward for broad adoption of products with open-source connectivity.
- Collaborating with utility participants to initiate activities and developing incentive programs to promote efficient and connectable products.

Deliverables

- Summary of products/technologies selected for initial activities, including selection rationale, barriers, opportunities, and suggested implementation strategies to mitigate barriers.
- Lab testing reports/performance simulations, shared with manufacturers and participants including verification the product(s) can receive and process control signals.
- Field test design and reports, evaluating performance and projecting anticipated aggregated savings potential.
- Draft platform for scale-up

Estimated Budget

The total two-year estimated budget for Task 2: Flexible Demand Solutions is \$2.05M.

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Task 3: Product Prioritization and Initial Insights Research (Research/Analysis)

Introduction

This task will establish a foundational knowledge base to identify, document key considerations for, and then prioritize products/programs characteristics to support future investment in end-use flexible load Market Transformation programs. In this effort, secondary research will attempt to identify common characteristics of programs that have high participation and product acceptance that could lead to scalable program designs. It will also identify gaps in the existing knowledge base that would require further, primary research activities in support of the goal of scaled, high participation rate load flexibility programs.

This task will enable a narrowed and more strategic focus on products and programs for a future investment in end-use flexible load Market Transformation opportunities. A key deliverable will be an easy-to-digest matrix comparing end-use products with features that enable end-use flexibility, and combinations of these products where applicable, against a host of key attributes (such as product cost/price, relative consumer demand, flex load shifting in terms of deferred consumption, etc.)

Possible future activities that will leverage findings from this work including development of regionalized messaging toolkits that utilities can tailor driving adoption in their territories.

Goals

The three primary goals of this task are to:

1. Utilize existing research and technical expertise to identify and prioritize products and program designs for consideration and discussion for the regional stakeholder group under Task 1.
2. Identify characteristics of specific products and programs that have resulted in high consumer acceptance and program participation resulting in a scalable model of effective, substantive flexible load management to meet utility and grid needs.
3. Identify gaps in existing knowledge or experience and make recommendations on future research or analysis needed to support the needs of the longer term load flexibility effort being designed in Task 1.

Activities

- Collaborate with Steering Committee and Workgroup participants to confirm desired outcomes, identify existing research, align on key product and program attributes and ranking criteria for consideration.
- Establish work plan, resource requirements, timeline and deliverables and vet with workgroup participants.
- Conduct secondary research; identify programs and products and their key characteristics that are similar across high participation outcomes identified by the workgroup
- Facilitate workgroup identification of up to five products and/or programs to be the basis for consumer insights research.
- Gather consumer insights to identify attitudes and experiences with a prioritized set of flexible load products and programs, including such elements as:
 - What is the benefit to the customer?
 - What rewards are motivating?
 - What drives high participations rates?
 - What are the barriers to customer participation?
 - What is the appropriate degree and scope of engagement?
- Drafting and finalizing reporting deliverables and presenting findings

Deliverables

- Program/products in a matrix format, including:
 - Prioritization matrix including products and programs. The matrix will identify the products and programs most likely to optimize both customer engagement and grid flexibility.
 - In addition, common characteristics with high participation rates will be summarized in a memo to the workgroup.
- Summary report on research on customer attitudes related to select products and programs in these areas.

- Recommendations for potential future research that could fill identified gaps in existing knowledge base.

Estimated Budget

The total two-year estimated budget for Task 3: Product Prioritization and Initial Insights Research is \$310,000.

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Appendix A – Additional Detail: Flexible Demand Solutions

Background:

The integration of energy-efficient products with demand response capabilities is a key focus of this task. Open-source software is being leveraged to ensure both efficiency and grid benefits. One intervention involves encouraging manufacturers to include Universal Control Modules (UCMs) or smart controls in their products and promoting their adoption in the market. Another future solution could include leveraging Distributed Energy Resource Management Systems (DERMS), which have various functions such as aggregating and simplifying control and management of DERs.

Product Considerations:

The task also explores extending the work done by NEEA in water heating to other areas, such as variable capacity HVAC systems, resistance loads, VHE DOAS, Roof Top Units (RTUs), pool pumps, electric vehicle chargers, battery chargers, solar inverters, and lighting control circuits. The aim is to develop universal solutions based on the open standard such as CTA 2045 (EcoPort™).

Changing Energy Landscape:

The integration of renewables, DERs, and DERMS, as well as the pressure to decarbonize, are rapidly changing the utility landscape. Utilities are now adapting to variable resources, loads, and fluctuating market prices. Two-way communication of information is crucial for successful integration, and open-source universal communication standards play a key role. However, the marketplace is crowded with solutions and providers, lacking uniform standards. NEEA aims to mitigate risks and provide reliable solutions for the present and future.

Balancing Customer, OEM, and Grid Operator Needs:

The task acknowledges the challenges in balancing the needs of customers, original equipment manufacturers (OEMs), and grid operators. OEMs often prioritize customer experience and provide low-cost solutions, which may not align with the grid's long-term needs. OEMs

commonly rely on technologies like Wi-Fi, Zigbee, or Bluetooth for customer experience but may offer expensive and complex solutions for utilities and grid operators. The task aims to promote technologies that meet open-source communication standards, benefiting both utilities and aggregators while preserving a positive customer experience.

Incorporating Universal Communication Modules:

One potential solution is the incorporation of Universal Communication Modules (CTA 2045 "EcoPort™") in the HVAC market. Currently, the recognized specification for HVAC equipment is AHRI 1380, which provides two communication pathways: CTA 2045 "or" OpenADR. However, most OEMs choose the OpenADR pathway, which has limitations such as reliance on customer Wi-Fi and potential security issues. Shifting the requirement to an "and" and providing funding for the inclusion of the CTA 2045 port can lead to an open-source solution that benefits the region and the entire country.

Benefits and Connectivity:

Implementing the proposed solution would create an inventory of connectable, efficient end-use products. Customers would simply need to plug in a Universal Communication Module (UCM) to enable communication with the device. This communication can occur through secure and reliable pathways such as cellular networks, FM, AMI, Localized Scada, or Power Line carrier. As communication technology evolves, grid operators can provide updated UCMs to customers without the need for on-site visits or extensive customer service. This approach eliminates the limitations of traditional load switches.

Advisory Role and Standards:

Additional benefits of the task include positioning NEEA as an advisor to organizations such as the California Energy Commission, ENERGY STAR®, and the Department of Energy (DOE) on connectivity standards. This advisory role would mirror NEEA's successful influence on the AHRI 1430 standard for Demand Flexible Electric Storage Water Heaters. Furthermore, NEEA's efforts have led to the requirement that all electric water heaters shipped to the Washington and Oregon regions must be connectable. By leveraging this expertise, NEEA can contribute to the development of robust connectivity standards for the industry.

Appendix B – Optional task for further exploration: Innovative Storage and Load Shifting

Introduction

The Innovative Storage and Load Shifting task would focus on electric school buses as a means to demonstrate electric fleet vehicles as a flexible load that can also provide energy storage, emissions and maintenance cost reductions. This task could leverage current interest and funding for electric school buses to demonstrate the potential of fleet vehicles to store energy while benefiting school systems across the region, including in rural and low-income communities. There will be a specific focus on understanding paths to utilize federal funding for Northwest projects. **NEEA will continue to refine this task over the upcoming months and develop an updated opportunity assessment.**

Goals

The primary goal of this task is to demonstrate the feasibility of electric school bus energy storage and load shifting. The task would seek to show that the school bus energy storage system is scalable and can benefit communities across the region. Another goal of this task would be to develop a scalable program that other schools in the region can adopt and benefit from.

Activities

- Reviewing previous and current electric school bus vehicle to grid programs and demonstrations.
- Conducting research to determine the most efficient and cost-effective means of integrating school buses into the grid.
- Identifying market barriers and opportunities, including available federal funding.
- Designing and implementing a pilot program in a school district in the region.
- Analyzing results of pilot program to identify areas for improvement.

Deliverables

- Pilot demonstration of the effectiveness of the energy storage and load shifting system.
- Report documenting the lessons learned and related opportunities.
- Draft platform for a scalable regional program, including guidelines and best practices for other schools in the region to follow and tactics to secure federal funding for regional projects.

Estimated Budget

The estimated budget for the Optional Task: Innovative Storage and Load Shifting is \$1.5M.

DRAFT

CERTIFICATE OF SERVICE

I hereby certify that I have this day caused **Portland General Electric Company's CONFIDENTIAL Supplemental Multi-Year Plan** to be served by electronic mail to those parties whose e-mail addresses appear on the attached service list for OPUC Docket UM 2141.

Dated at Portland, Oregon, this 1st day of December, 2023.

/s/ Danielle McCain

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