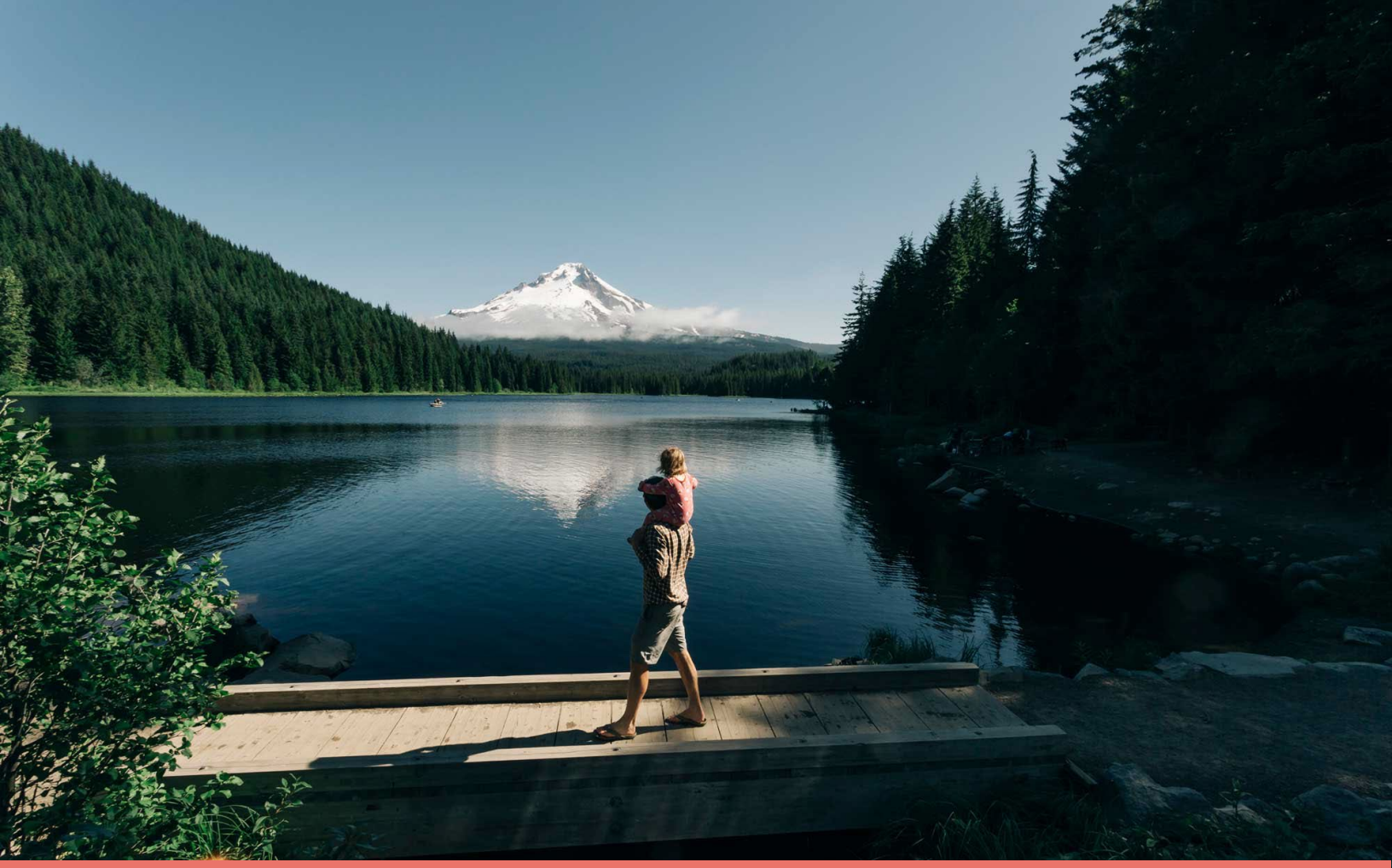

Flexible Load Multi-Year Plan
2025-2026

PGE

Table of Contents

Figures, Tables

Executive Summary

Portland General Electric (PGE or the Company) is an industry leader in the development of Flex Load and Demand Response (DR). Starting in 2016, PGE began development of this resource and incorporation of its capabilities into our resource stack. Since then, the Company has advanced our cost effectiveness perspectives, customer engagement, program operation, and tariff development. The 2025-2026 Multi-Year Plan (MYP) demonstrates our continued progression, with mature budget and resource management, maintaining budget levels while still increasing MW acquisition. New program activity focuses on electric vehicle (EV) load management, the emerging battery market, and collaboration with the Northwest Energy Efficiency Alliance's (NEEA) End Use Load Flex (EULF). We expect to continue to bring new activities over the next two years, engaging with stakeholders and the Commission Staff through our Demand Response Advisory Group (DRAG), Distribution System Plan (DSP) stakeholder meetings, and through the demonstration work of the Smart Grid Testbed and its Demand Response Review Committee (DRRC), where stakeholders work directly with PGE on the development of new technology and Flex Load activity.

PGE's 2023 Clean Energy Plan/Integrated Resource Plan (CEP/IRP) highlights the need to develop distributed energy resources (DERs) to meet load demands and achieve decarbonization goals cost-effectively. PGE's 2023 Integrated Resource Plan (IRP) notes that "[by] 2030, PGE aspires to be able to meet as much as 25 percent of the energy needed on the hottest and coldest days with power coming from customers and DERs[1]." This shift is driven by factors such as resource availability, valuation, and system delivery constraints. Policy initiatives like Community Based Renewable Energy (CBRE), Community Benefit Indicators (CBI), and small renewable mandates further emphasize the importance of investing in DERs. The Multi-Year Plan is central to PGE's DER development and is a key component of our forthcoming Distribution System Plan's Near-Term Action Plan. PGE will continue to refine its vision for distributed resources in the forthcoming DSP.

This MYP shows megawatt (MW) acquisitions increasing over the next two years (2025 116.3 MW, 2026 126.9 MW) while budget remains steady (2025 $16.4M, 2026 $18.0M). The portfolio of activity is cost effective, as illustrated by a 2.07 benefit cost ratio. PGE continues to pursue adjustments to non-cost-effective activity. PGE is also aligning our cost effectiveness calculation with regional and national best practices and updated avoided costs from docket UM 1893. The 2025-2026 MYP cost effectiveness chapter details these adjustments. PGE will continue to work with Staff on these updates and will supply additional updates within our Distribution System Plan.

The 2025-2026 Multi-Year Plan details our continued development of the Flex Load resource. This resource is a key component of PGE's all-resource build. Its mature pilots and programs are some of the first DERs to be enhanced through our Virtual Power Plant (VPP), unlocking grid services, dispatch capabilities, and improving the overall fidelity of information for these distributed resources. DERs are part of PGE's strategy to control overall costs to serve and balance the cost of a bi-directional grid with the benefits it, these programs, and their related resources bring to both customers and the PGE system.

[1] PGE (2023). *2023 Clean Energy Plan and Integrated Resource Plan, Section 1.4.2: Community and customer-sited solutions.* p. 22. Retrieved from https://assets.ctfassets.net/416ywc1laqmd/3pRvjUAdaEA6Wzk8yBUEsE/cafdf75509cf7c3432773e9809074954/2023_CEP-IRP_Ch_07.pdf.

Chapter 1. Introduction

With the filing of this Flex Load Multi-Year Plan, Portland General Electric requests Oregon Public Utility Commission (OPUC) approval of $34.3M in funding to support 2025-2026 Flex Load activity. This request includes $34.0M for existing pilots and programs and $357.5K for the market transformation work undertaken by the Northwest Energy Efficiency Alliance.

As with prior MYP filings, PGE also includes related Flex Load activities (for informational purposes only) to provide the Commission a holistic view of the Company's Flex Load activity. These related activities include Phase II of the Smart Grid Testbed (SGTB or Testbed) and the Residential Electric Vehicle Smart Charging pilot, respectively funded via dockets UM 1976 and UM 2033. PGE does not request funding approval for either of these activities with this filing.

Table 1. Summary of Flex Load Funding

Activity	2024 (previously approved)	2025 (proposed)	2026 (proposed)	2025-2026 (proposed)
Residential Smart Thermostats	$3,837,000	$3,756,000	$4,044,000	$7,800,000
Peak Time Rebates	$2,971,605	$2,913,610	$2,967,105	$5,880,715
Time of Day	$690,000	$666,500	$535,150	$1,201,650
Energy Partner on Demand	$5,406,410	$6,087,977	$6,055,727	$12,143,704
Multi-family Water Heating	$1,656,500	$1,170,250	$2,771,080	$3,941,330
Energy Partner Smart Thermostat	$1,280,000	$1,422,000	$1,573,460	$2,995,460
NEEA Market Transformation[2]	$357,500	$ 357,500	TBD	$ 357,500
Funding	$16,199,015	$16,373,837	$17,946,522	$34,320,359
Smart Grid Testbed[3]	*$2,940,315*	*$ 2,030,214*	*$ 1,254,288*	*$ 3,284,502*
Residential EV Charging[4]	*$1,945,313*	*$ 2,130,409*	*TBD*	*$ 2,130,409*
Holistic Flex Load Spending[5]	*$21,084,643*	*$20,534,460*	*$19,200,810*	*$39,735,270*

As illustrated above, the 2026 budget increase is chiefly attributable to the Multi-family Water Heating pilot, which we expect to re-enter growth mode that year (see Section 4.2.5 for supporting detail).

[2] While PGE expects NEEA's Market Transformation activity to continue past 2025, the scope and cost of that work remains to be determined. PGE will reengage with the Commission once PGE and other utilities have aligned on the scope and costs of that additional work and cost.
[3] Smart Grid Testbed figures are subject to change; those funding proposals and related filings can be found in UM 1976, available at https://apps.puc.state.or.us/edockets/DocketNoLayout.asp?DocketID=21662.
[4] Residential Smart Charging pilot is funded separately under UM 2033 and has yet to propose funding for 2026. The 2025 funding for this pilot reflects the most recent available: that filed with PGE's 2023 Final Transportation Electrification Plan under UM 2033, available at https://edocs.puc.state.or.us/efdocs/HAH/um2033hah15818.pdf.
[5] As noted in the prior footnotes, Smart Grid Testbed and Residential EV Charging activities are funded via separate dockets (UM 1976 and UM 2033, respectively) and are included for informational purposes only.

Table 2. Summary of Flex Load Capacity (forecasted for 2025-2026)

	Summer Capacity			Winter Capacity		
Activity	2024	2025	2026	2024	2025	2026
Residential Smart Thermostats	43.7	48.1	52.5	9.0	9.9	10.8
Peak Time Rebates	15.4	16.1	16.6	11.5	12.0	12.4
Time of Day[6]	2.5	4.1	5.6	–	–	–
Energy Partner on Demand	38.8	41.3	43.8	31.5	33.5	35.5
Multi-family Water Heating[7]	2.0	2.0	2.3	2.5	2.5	2.8
Energy Partner Smart Thermostat	2.2	2.1	2.8	0.5	0.6	0.7
Residential EV Charging[8]	1.8	2.6	3.3	1.9	2.7	3.5
Flex Load Capacity (MW)[9]	106.5	116.3	126.9	56.9	61.2	65.7

[6] Note that PGE does not forecast Winter MW for Time of Day
[7] See Table 37 in Section 4.2.5 for discussion of ~0.2 MW variance between capacity and cost effectiveness calculations.
[8] PGE includes Residential EV Charging capacity in Flex Load portfolio capacity totals as, despite the fact that it is funded through the Transportation Electrification Plan, it does contribute Flex Load capacity.
[9] Neither NEEA Market Transformation nor Smart Grid Testbed projects are included in Flex Load capacity figures as they only contribute indirectly thereto.

Table 3. Summary of Flex Load Cost Effectiveness (2023-2026)

Activity	TRC (2023)	TRC (2024)	TRC (2025-2026)
Residential Smart Thermostats	1.97	1.86	3.90
Peak Time Rebates	0.68	0.60	1.13
Time of Day	1.50	1.37	2.52
Energy Partner on Demand	1.29	1.48	2.59
Multi-family Water Heating	0.16	0.28	0.29
Energy Partner Smart Thermostat	0.22	0.12	0.64
Flex Load Portfolio[10]	0.97	1.00	2.07

Note that the above cost effectiveness calculations reflect the full lifecycle of each activity including legacy costs from startup through pilot and into outlying years of program operations. PGE is in the process of developing additional valuation perspectives in line with best practices employed by national, state, and local program administrators such as the Regional Technical Forum (RTF), the Energy Trust, and Bonneville Power Administration (BPA). These changes will focus on current performance and better inform ongoing investment (see Chapter 5) PGE looks forward to sharing these changes with Commission Staff in the coming months.

Additional requests

- Transition Residential Smart Thermostat and Peak Time Rebates activities from pilot to program, which meet OPUC guidance (see support in Section 4.2.1 and Section 4.2.2)
- Agreement to file 2026-2030 funding requests for NEEA's market transformation work through a letter order, similar to how SGTB projects are funded. At that time NEEA will have provided preliminary reports and will have a proposal for the additional work and costs (see Section 2.1.4.3)
- Approval of funding for a PGE, LBNL, US DOE project to develop a stakeholder portal and user interface for PGE's AdopDER forecasting model (see Section 3.2)

[10] Smart Grid Testbed and Residential EV Charging are not included in Flex Load cost effectiveness calculations as they are funded via separate dockets (UM 1976 and UM 2033, respectively). NEEA Market Transformation project is not included as it does not provide direct benefits to the portfolio.

Chapter 2. Planning

2.1 Policy

2.1.1 Regulatory Context

The Flex Load activities described herein are in service to the acquisition goals of 211MW Summer and 158MW winter demand response by 2028. These goals were laid out in PGE's 2019 IRP[11] and 2023 IRP/CEP[12], and associated Addendum[13].

Table 4. PGE's Flex Load Activities, Filings, Dockets, Deferrals, and Rate Schedules

Flex Load Activity	Filings and Docket(s)	Deferral(s)	Rate Schedule(s)[14]
Demonstrations and Small-scale Pilots (Smart Grid Testbed)	• 2018 Smart Grid Testbed Proposal • 2021 Smart Grid Testbed Phase II Proposal	Originally ADV 859[15], currently UM 1976[16]	Schedule 13
Programs and Larger Scale Pilots	• 2020 Flex Load Plan[17] • 2021 Flex Load Multi-Year Plan[18] • 2022 Flex Load Multi-Year Plan Update[19]	Costs for all pilots and programs are recovered via UM 2234[20] *except* Multi-family Water Heating via UM 1827[21] and	Schedules 4, 5, 7, 25, 26, with Schedule 135 serving as a balancing account

[11] PGE (2019). *PGE 2019 Integrated Resource Plan*. Retrieved from https://edocs.puc.state.or.us/efdocs/HAA/lc73haa162516.pdf.
[12] PGE (2023). LC 80 – Portland General Electric Company's 2023 Clean Energy Plan and Integrated *Resource Plan*. Retrieved from https://edocs.puc.state.or.us/efdocs/HTB/lc80htb8430.pdf.
[13] PGE (2023). LC 80 – Portland General Electric Company's 2023 Clean Energy Plan and Integrated *Resource Plan Addendum: Portfolio Analysis Refresh.* Retrieved from https://edocs.puc.state.or.us/efdocs/HTB/lc80htb16164.pdf.
[14] PGE. *Tariffs & Rate Schedules*. Retrieved from https://portlandgeneral.com/about/info/rates-and-regulatory/tariff.
[15] PGE (2018). *Testbed Proposal*. Retrieved from https://edocs.puc.state.or.us/efdocs/UAC/adv859uac113045.pdf.
[16] PGE (2021). *Smart Grid Testbed Phase II Proposal*. Retrieved from https://edocs.puc.state.or.us/efdocs/HAD/um1976had145212.pdf.
[17] PGE (2020). *Flexible Load Plan 2021*. Retrieved from https://edocs.puc.state.or.us/efdocs/HAA/haa125814.pdf.
[18] PGE (2021). *Flexible Load Plan 2022-2023.* Retrieved from https://edocs.puc.state.or.us/efdocs/HAD/um2141had16243.pdf.
[19] PGE (2022). *Flexible Load Plan Update*. Retrieved from https://edocs.puc.state.or.us/efdocs/HAD/um2141had163540.pdf (not taken up, as per PGE's request).
[20] OPUC. *UM 2234 Application for Deferral of Costs Associated with the Flexible Load Demand Response Pilots*. Retrieved from https://apps.puc.state.or.us/edockets/DocketNoLayout.asp?DocketID=23208.
[21] OPUC. *UM 1827 PGE Deferred Costs of Demand Response Water Heater Pilot*. Retrieved from https://apps.puc.state.or.us/edockets/DocketNoLayout.asp?DocketID=20726.

Flex Load Activity	Filings and Docket(s)	Deferral(s)	Rate Schedule(s)[14]
		Nonresidential Direct Load Control via UM 1514[22]	
Transportation Electrification pilots	• 2019 Transportation Electrification Plan • 2023 Transportation Electrification Plan	Residential Smart EV Charging via UM 2003[23]	Schedule 8
Other small-scale pilots	• 2020 Storage Potential Evaluation (for Smart Battery Pilot)	UM 2078[24]	Schedule 14
PGE+	• Voluntary Customer Information Platform[25] • Voluntary On-Bill Repayment Service[26]	n/a	Schedules 342 and 343, respectively

2.1.2 Related Filings

2.1.2.1 Distribution System Plan

The Distribution System Plan lays out PGE's plans and accompanying investment activity in its distribution system over the near-term (two-to-four years) and long-term horizons (ten years). The MYP is a component of the DSP's near-term action plan specific to flexible load customer programs[27]. These customer programs reflect PGE's investment in distributed energy resources and are part of the broader context of distribution investments contemplated in the DSP, including the build-out of a bi-directional energy platform, as well as required grid modernization and orchestration under a virtual power plant. PGE plans to file the DSP in December 2024.

2.1.2.2 Clean Energy Plan/Integrated Resource Plan

PGE is actively developing an Update to the 2023 CEP/IRP to be filed with the Oregon PUC. Throughout its development PGE will continue to hold monthly roundtable discussions to inform

[22] OPUC. *UM 1514 Application for Deferral of Incremental Costs Associated with Automated Demand Response*. Retrieved from https://apps.puc.state.or.us/edockets/DocketNoLayout.asp?DocketID=16575.
[23] OPUC. UM 2003 *PGE Deferral of Costs and Revenues Associated with EV Charging Pilots*. Retrieved from: https://apps.puc.state.or.us/edockets/docket.asp?DocketID=21817.
[24] OPUC. *UM 2078. PGE Deferral of Costs Associated with Residential Battery Energy Storage Pilot*. Retrieved from https://apps.puc.state.or.us/edockets/DocketNoLayout.asp?DocketID=22381.
[25] PGE (2024). *Schedule 343 Voluntary Customer Information Platform*. Retrieved from https://assets.ctfassets.net/416ywc1laqmd/4W5Cxc6lbwbMunIX7PSylE/14dae25fe495e9d97caafa7ea03180d7/Sched_343.pdf. Filed with *Advice No. 24-15 New Schedule 343*, in Docket No. UE 442, available here: https://apps.puc.state.or.us/edockets/docket.asp?DocketID=24256.
[26] PGE (2024). *Advice No. 24-16 New Schedule 342 PGE Voluntary On-Bill Repayment Service*. Retrieved from https://edocs.puc.state.or.us/efdocs/UAA/uaa330511025.pdf.
[27] Note that there is some overlap between the customer programs funded via the MYP and those funded via the Transportation Electrification Plan (more detail on the latter in Section 2.1.2.3, below).

stakeholders of plans and progress and to solicit feedback in the process of developing the CEP/IRP Update.

The CEP/IRP Update will focus on the changes made to emissions forecast modeling. It will include a comparison of the forecasted emissions from the 2023 CEP versus actual emissions and demonstrate PGE's continuous progress to reach emissions targets. Known major drivers of change include updated forecasts of demand, load, resource portfolio, emissions, and cost. Finally, this filing will include a conversation regarding changes in the planning environment, system needs, and resource options, and will include studies on the non-emitting energy market and transmission options.

2.1.2.3 Transportation Electrification Plan

One of the three strategic pillars of PGE's 2023 Transportation Electrification Plan (TEP) was to manage transportation electrification (TE) load:

- PGE seeks to effectively manage TE load, enabling and scaling managed charging with vehicle telematics and delivering flexible load and Virtual Power Plant MWs.
- PGE will structure TE rates and tariffs to incent "grid-friendly" behaviors, developing rates that motivate charging behavior, support grid health, load siting investment (e.g., make-ready), and meet policy requirements.[28]

PGE's TE activities are budgeted via UM 2033, but we include their Flex Load MW in the MYP portfolio totals to present a holistic picture of Flex Load across the portfolios. As of filing, Residential EV Charging already contributes Flex Load MW; other TE activities such as commercial fleet charging are being built as "managed charging ready" and are expected to contribute Flex Load in future cycles.

2.1.2.4 Smart Grid Testbed

The Smart Grid Testbed[29] 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.

Detail on SGTB activities can be found in Section 4.1.1 and Appendix B.

2.1.3 Related State and Federal Activity

With the passage of HB 2021 during the Oregon's 81st Legislative Session, PGE must meet decarbonization targets outlined in the legislation. The legislation carries with it significant policy changes. Local engagement and local energy infrastructure investment was a major theme of the Bill. PGE views flexible load as a major component in meeting the mandates and intent of the HB 2021 as

[28] PGE (2023). *2023 Transportation Electrification Plan*. Retrieved from https://edocs.puc.state.or.us/efdocs/HAH/um2033hah15818.pdf

[29] 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/416ywc1laqmd/1FXchtG1UCoqK74YIOWBoF/699972c24ae1b34287acf24744206db9/Sched_013.pdf.

flexible load development is inherently a non-emitting local customer resource capable of providing benefits to the customer, the community, and the electric system.

The (Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA)[30], both passed by Congress subsequent to PGE's last full MYP (filed in November 2021) and provide significant funding and incentives to support the adoption and integration of DERs and EVs. See Section 3.4.5 and Section 4.3 for detail on PGE's coordination with the Energy Trust and others on these opportunities.

In 2023, the United States Department of Energy (US DOE) awarded PGE a $50MM grant to accelerate and deploy grid edge computing, which will, amongst other benefits, enable the DER integration.[31]

PGE currently leverages Federal funding in its Flexible Feeder SGTB project (Appendix B.5) and in coordination efforts underway with the Energy Trust on measure co-deployment (Section 3.4.3). PGE also plans to leverage federal tax credits when we propose Phase 2 of the Smart Battery Pilot (expected mid-year 2025).

2.1.4 Related Regional Activity

2.1.4.1 Wholesale and Regional Market Activity

The Western Energy Imbalance Market (WEIM) offer two participation models for Demand Response:

Table 5. Demand Response in the Western Energy Imbalance Market

Participation Model	Description	Model Requirements
Local Forecast Adjustment	Also known as non-Participating, load-modifying, non-market	Allow entities control of dispatch and hourly scheduling and are not directly price responsive. This model does not have metering, telemetry, or performance methodology requirements, opting to instead provide program accountability via company attestation.
Supply-side Demand Response	Includes Proxy Demand Response (PDR), Reliability Demand Response, DER Aggregation, and Non-Generating Resource	Dispatched by real time market prices/conditions and are bid into the market. These programs have Settlement Quality Metering Data, telemetry and performance methodology requirements.

[30] 117th Congress (2021-22). *House Rule 5376 Inflation Reduction Act of 2022*. Retrieved from https://www.congress.gov/bill/117th-congress/house-bill/5376.
[31] US DOE: Grid Deployment Office (2023). *Fact Sheet: Grid Resilience and Innovation Partnerships Program*. Available at https://www.energy.gov/sites/default/files/2023-11/DOE_GRIP_2123_Portland%20General%20Electric%20Company_v4_RELEASE_508.pdf.

Today, PGE represents all Demand Response programs in WEIM in the Load Forecast Adjustment model. This model best aligns with PGE's current demand response program when considering metering, telemetry, and customer program design. The Load Forecast Adjustment model allows PGE's DR to account for reductions to PGE's load in the WEIM Resource Sufficiency Evaluations (RSE). When PGE calls a DR event, the California Independent System Operator (CAISO) established process, as stated in the CAISO DR Business Practice Manual, requires entities to submit demand response forecast one day prior to the event to the CAISO Short Term Forecasting team. After which, the process can follow two distinct paths, determined by that team and communicated back to PGE via email: a) CAISO makes an adjustment to the Short-Term Load Forecast, or b) entities enter the event in CAISO's tools:

- Short Term Load Forecast Adjustment: CAISO has stated when they make the adjustment to the Short-Term Load Forecast, they adjust the full amount of load reduction provided in the forecast. Therefore, the DR event is represented in the RSE by virtue of reduction in the load forecast used for the RSE calculations. CAISO does not have a defined process to modify the values after the decision is made.
- Real Time Base Schedule DR Conformance in Balancing Authority Area Operations Portal: After PGE receives notification from CAISO's Short Term Load Forecasting team to enter the DR event in the portal, a PGE Balancing Authority Operator enter the values. The RTBS adjustment allows for the Authority to enter both hourly and 15-minute interval DR Conformance values. These values are used in CAISO's RSE calculations, in accordance with the CAISO Business Process Manual, and therefore provide us credit for our DR events in the RSE tests.

In both above cases, CAISO's Persistence in their Load Forecast Models will see the reduction in load and will therefore adjust future intervals to account for the change in load. This introduces an additional unknown variable and makes it challenging for PGE to accurately represent our DR programs after the initial load reduction starts. Additionally, this issue also occurs at the end of a DR event, after the load comes back, impacting the accuracy of the load forecasts after the event.

PGE has partnered with other WEIM entities to facilitate discussions with CAISO on opportunities to improve DR programs within WEIM allowing for greater participation and transparency. Improvements include improving the Load Adjustment model to represent DR as a non-participating resource, clearly delineating load forecast and resources. This would allow better transparency in load forecasts for current and future intervals when Load Adjustment models participate and reduce modeling inefficiencies. Additional improvements to the Load Forecast Adjustment model include capability of modeling programs at a fifteen-minute granularity to better accommodate ramping and more precise use of programs. In addition to the improvements to the Load Forecast Adjustment model, PGE is also recommending a DR feedback mechanism to CAISO's Persistence Short-Term Load Forecasting System. There are currently different ideas about how this should be implemented, but the general idea is to represent the reduction of load to the Persistence Forecast Model so it does not attempt to adjust the load forecast, which will improve its accuracy during DR events.

PGE has also expressed support for a WEIM Demand Response working group model that allows for WEIM entities to define problem statements related to WEIM participation that could be used to drive CAISO stakeholder initiatives. CAISO is just finishing their process to determine the upcoming year's priority of initiatives via the Annual Policy initiatives roadmap process. This process will help define stakeholder's priorities and enable CAISO to commit resources to the effort.

2.1.4.2 Demand Response and the Western Resource Adequacy Program

PGE is participating in discussions regarding the Western Resource Adequacy Program (WRAP). The WRAP is a regional collaborative meant to help the region collectively plan for capacity needs. PGE has advocated for demand response to receive credit for its capacity contribution through WRAP's Resource Adequacy Participants Committee process. This resource adequacy credit is another source of valuation or benefit that can be ascribed to PGE's demand response and Flex Load investments. Within WRAP, demand response programs can receive credit in one of two ways: submitted as a Qualifying Resource or as a load shaving capability in the forward showing demonstration.

To date, PGE has submitted demand response as load shaving capability. In doing so, PGE's peak load demonstration + Planning Reserve Margin is lowered by the amount claimed in the forward showing. To claim DR as a load shaving capability, PGE must demonstrate the load reduction capability in an actual event, or a Capability Test every five years during a peak season. The load reduction must be greater than 1MW and the duration of the load shaving can be a period anywhere from one hour to up to five hours. The Qualifying Capacity Contribution value of the DR is determined by multiplying the capability test load reduction in MWs by the number of hours the resource can demonstrate load reduction capability divided by five. An Operational Test must be conducted annually during a peak season and at a minimum of 50% of the DR program's claimed load reduction capability for a minimum of one hour.

2.1.4.3 Northwest Energy Efficiency Alliance: Market Transformation

PGE provides core funding to the Northwest Energy Efficiency Alliance via its funding agreement with the Energy Trust of Oregon. In addition to this long-standing commitment and investment in energy efficiency market transformation, PGE is contributing funding to a NEEA special project, the 2024-2025 End Use Load Flex Project, leveraging NEEA's expertise advancing flexible load management in the Pacific Northwest. The EULF Project brings together utility funders from Oregon and Washington (in addition to PGE, Avista Utilities, Chelan Public Utility District (PUD), Clark PUD, Emerald PUD, Pacific Power, Puget Sound Energy, Seattle City Light, Snohomish PUD, Tacoma Power are also funders).

The EULF Project's goals are to identify regional interests and enable sharing of information to amplify efforts and avoid duplication. NEEA and the funding utilities will develop a comprehensive EULF Market Transformation Portfolio that will 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. NEEA will apply its expertise in market transformation to influence stakeholders, prioritize scalable products/designs that meet utility and grid needs, and deliver efficiencies of scale on behalf of the region. Key accomplishments by end of Q3 2024 include the following:

Task 1 EULF Flexibility Steering Committee and Portfolio:

- Convened Steering Committee of representatives from all funding utilities, ratified workplan and charter, convened monthly
- Spotlighted individual utility program portfolios and key learnings (4 to date)
- Defined EULF Portfolio vision and prioritized grid value drivers
- Conducted one Regional Meeting open to stakeholders from across the region, providing project updates

Task 2 Flexible Demand Solutions (Emerging Technology):

- Established guiding principles for EULF market transformation design
- Conducted "Connectivity Fundamentals" training, open to all employees from all funders
- Established three product workstreams and associated work groups of utility members to study efficient pathways to drive open-source connectivity, identify needed technology features to enable/enhance load flex capabilities, and examine the motivational messages and incentives required to achieve market adoption. Most projects are ahead of schedule with in-field activity started by Q3 or planned for Q4.
    - Residential Water Heaters
    - Multi-Family Line Voltage Thermostats
    - Commercial Water Heaters
- Kicked off two enabling projects to study individual performance of embedded controls technology in dominant water heater brands and to assess the cyber security of various communication protocols

Task 3 Product Prioritization & Initial Insights Research:

- Completed inventory Pacific Northwest load flex pilots, programs and time varying rates /TOD rate details
- Completed draft inventory national load flex pilots, programs and time varying rates/TOD rate details (prioritized by reported results)

For the remainder of 2024 and 2025, NEEA will continue to convene the Steering Committee in service to the above objectives of the project, further develop the load flex market transformation portfolio; continue field studies, analyze results, and pursue implementation of recommendations with the market; and leverage national load flex inventory to complete primary research on customer attitudes and needs.

PGE and NEEA continue to explore opportunities for targeted activity in the PGE service area. We will engage Staff on any resulting proposal (and funding) through our quarterly Demand Response Advisory Group meetings.

2.1.4.4 Regional Technical Forum

The Regional Technical Forum is a "technical advisory committee to the Northwest Power and Conservation Council (NWPC or Council) established in 1999 to develop standards to verify and evaluate energy efficiency savings"[32]. During the 2020-2024 funding cycle, the RTF expanded its core

[32] Northwest Power and Conservation Council (retrieved August 7, 2024). *Regional Technical Forum page*. Retrieved from https://rtf.nwcouncil.org/.

mission to include conducting technical analysis on technologies which provide both energy efficiency and demand response potential, the goal being to assist the Council in assessing the technical potential of these technologies in a holistic manner.

To assist the region with flexible load development, PGE and the RTF partnered on an application to the US DOE's Connected Communities Funding Opportunity Announcement. This work includes co-deployment, alongside NEEA and the Energy Trust, of measures capable of providing both EE and flexible load.

In the 2025-2029 funding cycle, in addition to the demand response budget for specific analysis around DR products, the RTF Policy Advisory Committee agreed to use some demand response funds to analyze energy efficiency measures which also provide demand response potential (i.e., flexible measures). The RTF will estimate the per-unit technical demand impact potential for technologies, independent of specific product design considerations. The purpose of this work is to provide an additional input into Council and utility demand response supply curves. The work in the 2025 to 2029 funding cycle builds upon the RTF's previous work on demand response, enhancing those analytical capabilities, maintaining modeling tools for demand response, and also regional support. The demand response work in the first year of this funding cycle (2025) will focus on the update of the existing demand response technologies and development of shapes for common demand response program types.

2.2 Rates and Regulatory

2.2.1 Standardize Seasons, Holidays (Schedules 5, 7 option, 8, and 25)[33]

As PGE's VPP resources grow in scale and importance there is an emerging opportunity to make some adjustments to standardize the customer experience across programs, as well as to increase the flexibility and value realized by these programs. The activities being considered for adjustment include Smart Thermostat (Schedule 5), Peak Time Rebates (Schedule 7), Residential EV charging (Schedule 8), Energy Partner Thermostat (Schedule 25), and Energy Partner On-Demand (Schedule 26).

Seasons

PGE has four seasonal programs, Smart Thermostat, Peak Time Rebates (PTR), Energy Partner Thermostat, and Energy Partner On-Demand. The first proposed change is to standardize the seasons across programs and participants, which simply includes adding November to the Winter season for Smart Thermostat customers to align it with the other programs.

The second proposed seasonal change is to give PGE flexibility as to the beginning and ending of the seasons depending on meteorological or grid system conditions. For example, should there be a heat event either at the end of May or the beginning of October PGE would have the flexibility to dispatch its programs to preserve grid reliability and manage customer prices[34].

[33] Note that Schedule 4 (Multifamily Water Heating) does not contain seasons or holiday stipulations.
[34] Due to the reservation payment structure of Energy Partner On Demand this program is not being adjusted to include the seasons flexibility provision at this time.

Table 6. Proposed Schedule/Tariff Summer and Winter Seasons[35]

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Smart Thermostat	❄	❄				☀	☀	☀	☀		❄	❄
Peak Time Rebates	❄	❄				☀	☀	☀	☀		❄	❄
Energy Partner Thermostat	❄	❄				☀	☀	☀	☀		❄	❄
Energy Partner On-Demand	❄	❄				☀	☀	☀	☀		❄	❄

Above highlighted cells reflect proposed changes.

Holidays

Currently most of the flexible load programs have provisions in the tariffs prohibiting dispatch/call on holidays, including the Monday after the holiday if the holiday occurs on a weekend. PGE proposes to standardize the declared holidays among all programs and remove the restriction of program dispatch of the closest weekday for holidays that fall on a weekend.

Customer Research Regarding Potential Schedule Changes

PGE conducted survey research from February 2024 to May 2024 and received over 1,100 responses across the two programs. We found that Peak Time Rebates and Smart Thermostat participants were overwhelmingly amenable to expanding the schedule to allow for dispatch during extreme events, as illustrated in Figure 1, below.

[35] As noted in the preceding paragraphs, we propose seasons which would typically begin at these times, with latitude to accommodate meteorological outliers and/or grid system conditions.

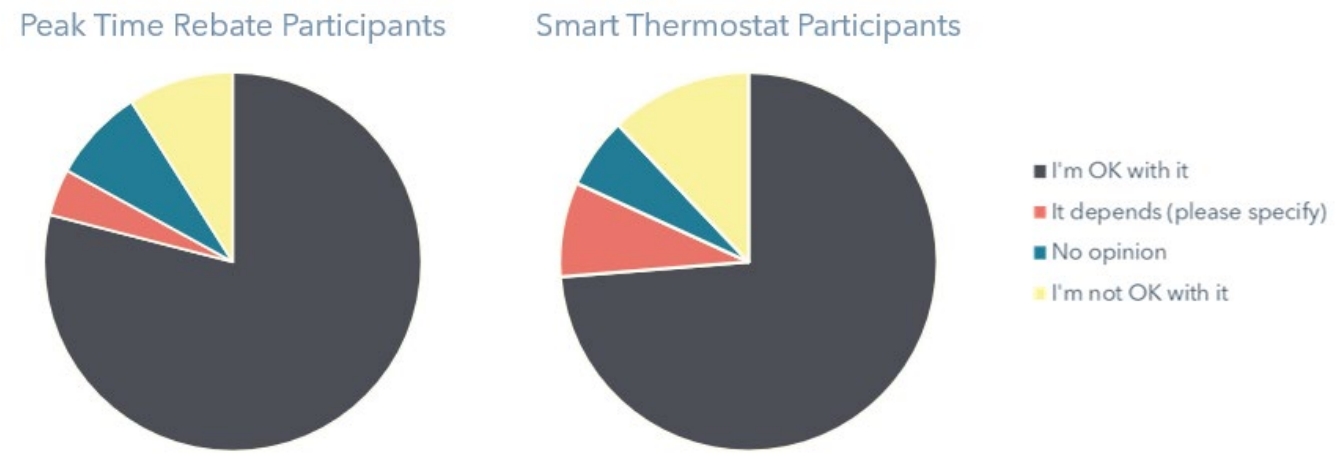

Figure 1. Participant Receptiveness to Changes in Demand Response Event Scheduling

When asked for open ended feedback on why a customer would not be amenable to the change, a few customers were hesitant to agree to events on major holidays. More information and more opportunities for rebates may have influenced customers' responses.

The final questions asked customers if there was anything else they would like to share about the proposed program changes. Customers used the opportunity to discuss issues with their thermostats, dissatisfaction about rate increases, and other comments related to the programs in general, however few mentioned their thoughts on the expansion of the program days.

A full report of the survey findings can be found in Appendix C.

2.2.2 Smart Grid Testbed (Schedule 13)

Schedule 13 provides availability, enrollment, and participation information for PGE Smart Grid Testbed demonstrations, which in some cases include additional incentives available to customers participating in the rate schedules described above. Schedule 13 is updated as required as subsequent demonstrations are scoped in collaboration with the Demand Response Review Committee and approved by the OPUC (via Docket No. UM 1976). Schedule 13 was updated on July 10, 2024 with Vehicle to Everything implementation details. PGE expects to continue to make updates to Schedule 13 as needed for implementation of the Smart Grid Testbed activities discussed in Appendix A but has not put forward updates as part of this plan.

2.2.3 Public Charging Rate (Schedule 50)

Schedule 50 is PGE's retail rate for public charging at PGE owned fast charging and level 2 chargers. Schedule 50 currently has a peak price adder of $0.19/kWh from 3 PM to 8 PM Monday through Friday to encourage customers to charge outside of system peak timeframes. The current rate is based on PGE's legacy Schedule 7 time varying rates rate which was the active time varying rates program when the schedule was created. PGE is working to update the peak timeframe and peak cost to align with the company's currently approved Schedule 7 time of day rate. This would shift the on-peak timeframe to 5-9 PM Monday through Friday and update the peak price adder to $0.28/kWh.

2.2.4 Commercial Time-of-Use (Schedules 38, 83, 85, and 89)

Commercial customers have a peak period and rate applicable to all customers in the rate class. Peak is currently 6 PM to 10 PM Monday through Saturday. In the 2024 rate settlement, the OPUC directed PGE to update peak pricing to more accurately reflect power costs as part of any upcoming rate case.

In the 2025 rate review, PGE proposed to move from a two-tier to a three-tier time varying rates for Schedules 38, 83, 85, and 89. PGE is implementing the proposed changes, which require that ~2,000 meters be physically replaced, ~12,000 meters be re-programed, and that updates be made to billing and customer IT systems to transition these rates to interval billing. PGE expects these efforts to conclude by the end of 2024.

2.2.5 Voluntary Customer Information Platform (Schedule 343)

PGE also appreciates the Commission's ongoing engagement as we prepare Voluntary Customer Information Platform schedules[36] to facilitate continued growth of the residential Flex Load activity.

[36] PGE (2024). *Schedule 343 Voluntary Customer Information Platform*. Retrieved from https://assets.ctfassets.net/416ywc1laqmd/4W5Cxc6lbwbMunIX7PSylE/14dae25fe495e9d97caafa7ea03180d7/Sched_343.pdf. Filed with *Advice No. 24-15 New Schedule 343*, in Docket No. UE 442, available here: https://apps.puc.state.or.us/edockets/docket.asp?DocketID=24256.
PGE (2024). *Advice No. 24-16 New Schedule 342 PGE Voluntary On-Bill Repayment Service*. Retrieved from https://edocs.puc.state.or.us/efdocs/UAA/uaa330511025.pdf.

Chapter 3. Foundations

3.1 Customer Flex Load Journey

PGE must continue to scale the Flex Load resource to meet 2030 decarbonization goals. Doing so requires the Company reevaluate the accompanying customer journeys and experiences, simplifying and mitigating barriers to enrollment and participation. PGE will continue to explore means by which to unify, personalize, and simplify the customer experience. The resulting new engagement strategies will help PGE expand Flex Load participation and make inroads into harder-to-reach market segments.

In 2021 through 2022, PGE conducted research regarding the barriers to enrollment and participation in its Flex Load programs. This work leveraged PGE's past research regarding underserved communities, a rapid needs assessment, and also discussions with stakeholders and Commission Staff in forums like PGE's Learning Lab and DRAG.

From that research, PGE identified the following opportunities to better support customers in their Flex Load journey:

- Provide a singular location for customers to learn about the technology, associated programs, and applicable rebates and incentives
- Offer rebates and incentives at point-of-sale to mitigate up-front costs, which can be a barrier to entry for many customers
- Connect customers with vetted, knowledgeable installers who offer fair pricing
- Connect those customers who struggle to obtain financing with third-party financing agencies who offer financing beyond the traditional lending requirements

PGE concluded that two complementary platforms were best suited to educate customers on Flex Load technology and guide them through associated programs, rebates, and incentives. The following sections provide detail on those platforms.

3.1.1 PGE+ Platform

PGE+ is a one-stop-shop platform where customers can:

- Learn about the right technology
- Get tips on installation decisions that affect costs
- Get connected with a vetted installer
- Receive applicable rebates (e.g., from the Energy Trust or manufacturer)
- Enroll in a Flex Load program (e.g., PGE's Smart Thermostat program)

At the end of 2023, the Company rolled out its first PGE+ solution, focusing on Level 2 (L2) EV charging. This solution targets both customers purchasing a qualified level 2 EV charger and those who may have already purchased a charger from a third party and now want help with installation. Should the customer opt to proceed with the PGE+ offering, they are automatically enrolled into PGE's Smart Charging program, with applicable charger rebates paid upfront.

The PGE+ platform also helps customers determine if they qualify for higher rebates based on their household size and income. Note that customers are not required to use PGE+ to enroll in the Smart Charging program and receive its rebates. PGE is exploring the opportunity to extend this support into other residential product categories such as HVAC, rooftop solar, home backup batteries, and

water heating. During exploration, PGE will collaborate with stakeholders such as OPUC Staff, Energy Trust, NEEA, and community action agencies to determine the best customer experience.

PGE will discuss significant new offerings on PGE+ or a new platform with Staff via Demand Response Advisory Group (DRAG) meetings.

3.1.2 Marketplace

The second platform available to customers is Marketplace. PGE launched the Marketplace platform in 2020. It primarily serves as an acquisition channel to pre-enroll customers into the Residential Smart Thermostat offering. Customers can also receive energy efficiency rebates from the Energy Trust for products such as smart thermostats and air purifiers. PGE will continue to evaluate products which could be offered via Marketplace to help customers become resilient, improve cooling/air quality, and adopt micro-mobility.

PGE believes it is important to share developments in the PGE+ and Marketplace platforms as they are key to the continued growth of the Flex Load resource. Note that PGE does not request funding within the MYP for these platforms, whose operational development is funded via capital investment. Similarly, funding for rebates/incentives are via Commission-approved programs linked to from these platforms. Manufacturers or installers may fund promotional discounts, which will automatically be offered to customers on the applicable platform.

PGE will continue to explore products/services and features which could be added to these platforms in support of customers' energy efficiency, flexible load, resilience, and electrification goals.

3.2 DER Modeling

PGE engaged Resilient Edge to develop the AdopDER modeling tool to provide DER adoption forecast, load impacts, and locational load forecasts. AdopDER estimates site-level, 8760-hour load impacts from the adoption and interaction of a broad range of distributed energy resources such as solar, storage, building electrification, transportation electrification, demand response, and flexible loads.

In 2024, PGE and Resilient Edge have coordinated on a US DOE project proposal to develop a public graphical user interface and other capabilities to extend AdopDER modeling. To provide this, PGE would provide a set level of access to the tool allowing stakeholders to develop planning scenarios for their advocated position or interests. This would lower the bar to entry for sophisticated modeling and demonstrate how shared access to such sophisticated tools better informs and effectively influences the utility planning and investment and regulatory decisions.

3.3 Stakeholder Engagement

3.3.1 Demand Response Advisory Group and Flexible Load Advisory Stakeholder Group

PGE has hosted quarterly Demand Response Advisory Group meetings since 2018. The DRAG serves as a venue for PGE to discuss flexible load activities with OPUC staff. DRAG topics include updates on concepts in pipeline, recent launches, upcoming filings, evaluations underway, technology challenges, and lessons learned, as well as market research findings and budget and savings review.

PGE also hosted quarterly Flexible Load Advisory Stakeholder (FLASH) meetings until mid-2022. The FLASH served as a venue for PGE to discuss Flex Load activities with interested stakeholders. Attendees included the Citizens Utility Board (CUB), Energy Trust of Oregon, Northwest Energy

Coalition (NWEC), Community Energy Project, Alliance of Western Energy Consumers (AWEC), Idaho Power, Pacific Power (PAC), Northwest Energy Efficiency Alliance, Northwest Power and Conservation Council, municipal partners, and various stakeholders.

In 2022, to streamline engagements on behalf of our stakeholders, PGE consolidated the FLASH into the Learning Lab.

3.3.2 Learning Labs and Distribution System Workshops

PGE's Learning Labs and Distribution System Workshops provide stakeholders with a deeper understanding of PGE's key planning initiatives, including the Clean Energy Plan, Distribution System Plan, Transportation Electrification Plan, Flex Load Multi-Year Plan, and Integrated Resource Plan.

PGE strives to engage less technical stakeholders in discussions and provide a space for them to be informed and influence the different plans. We have used storytelling, real-world examples, and visual aids, to make complex technical concepts more accessible to a broad audience. The sessions have been held regularly and utilize various communication tools, such as email updates, Zoom meetings, and collaborative surveys, to ensure continuous engagement and feedback. Feedback collected during these sessions is valuable, helping to refine our plans and align them more closely with community needs and expectations. PGE continues this work with our Distribution System Workshops.

PGE's vision for community engagement continues to evolve to meet the needs of our stakeholders, communities, and customers. PGE recognized during our DSP engagements that there is a need for a variety of methods to meet the needs of different audiences. PGE is pivoting to engagement models which better meet the needs of our stakeholders, communities, and customers.

In addition to the abovementioned quarterly DRAG meetings with OPUC staff, PGE also held the following broader stakeholder engagements[37]:

- June 15, 2023, Learning Lab: Flex Load 101
- July 27, 2023, Learning Lab: Flexible Load Multi-Year Plan Update[38] and also Flexible Load Customer Journeys
- September 7, 2023, Learning Lab: Flexible Load Customer Journeys
- December 13, 2023, Learning Lab: Distributed Energy Resources Integration Opportunity
- February 8, 2024, Learning Lab: PGE+ On-Bill Payments
- May 8, 2024, Distribution System Workshop: Distributed Energy Resources Forecast
- July 25, 2024, Distribution System Workshop: Flex Load/Multi-Year Plan Update, followed by a series of open hours thereafter to address follow-on questions

PGE's vision for the Learning Labs continues to evolve to meet the needs of our stakeholders, communities and customers. Community education and awareness and community partnerships are key to equitable engagement. We seek to develop relevant and relatable "people-centered" content

[37] Supporting materials for these meetings (e.g., slide decks and videos) can be found at https://portlandgeneral.com/about/who-we-are/resource-planning/resource-planning-engagement.
[38] PGE (2023). *Learning Lab: Flexible Load Multi-Year Plan Update*. Slide deck and video available at https://assets.ctfassets.net/416ywc1laqmd/2qldrqECZtBeDmPBNpOwAC/87c8f45cb430fbe29ffd0599af145db3/Learning_Lab_7.27.23.pdf#page=6 and https://www.youtube.com/watch?v=eRyfUDmqZPQ&t=471s, respectively.

with input from community-based and culturally specific organizations, to be shared with our communities and customers.

3.3.3 Industry Engagement

PGE will continue to engage influencers of customer education and enrollment in PGE Flex Load offerings where we see opportunities to grow the Flex Load resource. To date, these efforts have focused on associations such as the Home Builders Association, the Urban Land Institute, the Commercial Real Estate Development Association, and other market actors such as equipment manufacturers, installers, or EV dealerships. These engagements help PGE better understand underlying market and customer needs and ultimately support education and remove barriers to building decarbonization, electrification, resilience, and grid interactivity.

3.4 Coordination on Affordability

This section describes efforts which PGE, the Energy Trust of Oregon, and other regional entities are undertaking to coordinate planning and co-deployment of solutions to address affordability. This work reduces energy burden for affected customers, in part by supporting affected customers' ability to participate in PGE's Flex Load offerings and participate in the bi-directional grid.

3.4.1 Multi-Year Planning: Affordability Pillars

Navigating the trilemma of affordability, reliability, and decarbonization is complex. Recent legislation has the potential to transform long held approaches to serving customer needs. House Bill (HB) 3141 (2021) revised public purpose charge (PPC) allocations, established equity metrics and evolved low-income electric bill payment assistance. HB 2475 (2021) allows the OPUC to consider customer characteristics that affect affordability when approving programs and energy rates charged by regulated utilities. Both bills invite reconsideration of the treatment of cost-effective energy efficiency and demand response resources as described in Oregon Revised Statute (ORS) 757.054.

PGE's ratepayer investment in energy efficiency is effectuated by Energy Trust of Oregon since 2002. The annual budget includes both cost-effective programs and non-cost-effective programs by way of measure exception. The latter is subject to criteria as provided in the docket progression: UM 551 (1994) Order No. 94-590, then UM 1622 – Gas and Electric Exceptions (2012) then, UM 1696 – Electric Exceptions (2014) Order No. 15-029. Generally, measure exceptions serve as a pathway to a cost-effective offering, however, they also serve to provide incentives for traditionally hard to reach customers. In addition to exceptions, PGE ratepayers fund the program delivery infrastructure to deliver these incentives to traditionally hard to reach customers via community partner organizations. This investment in both non-cost-effective measures and community partner capacity building represents a larger portion of the Energy Trust of Oregon budget since the passage of HB 3141 and HB 2475, and though necessary to increase participation, are a deviation from standard practice, a contributor to recent budget increases and therefore rate impacting for non-participants.

To manage the rate impact of energy efficiency investment and successfully garner the participation of customers who might otherwise experience barriers to participation, a more holistic approach is needed. This holistic approach must leverage and braid the federal, state, and local funds which have become available to reduce the costs to customers. PGE's approach includes work with the Energy Trust to cobrand and reach hard to serve customers to ensure our lowest income customers benefit.

PGE sees affordability as a mandate for all customers, however, of the approximately 800,000 residential customers that PGE currently serves, it is estimated that 20% are energy burdened – with bills that represent at least 6% of income. Numerous utility and state agency programs exist for the benefit of lower income customers and navigating these programs is challenging across multiple organizations and eligibility requirements.

To meet the needs of *all* residential customers, PGE proposes a holistic approach to affordability, built upon the following three pillars:

1. Bill Assistance – Participation in Public Purpose Charge (Sch 108), low-income assistance (Sch 115), and other state agency programs that fund low-income housing, weatherization, and bill payment assistance.

   Between 2014 and 2023 PGE's public purpose charge disbursement and low-income assistance funding supported more than $235M in weatherization upgrades and electric bill assistance, including Energy Conservation Helping Oregonians and Oregon Energy Assistance Program funding, for income qualified households and delivered via Community Action Agencies.

2. Bill Discount – PGE's Income Qualified Bill Discount (IQBD) (Sch 18) tiers of discounts afforded to income eligible PGE customers.

   On docket UM 2211 PGE conducted engagement on the IQBD proposal through the Fall and Winter of 2021, ultimately filing the Company's proposal on January 13, 2022. The proposed IQBD was the result of several evolutions informed by stakeholder feedback and met most Staff baseline evaluation criteria. The program is applicable to all PGE residential customers with a gross household income at or below 60 percent of Oregon state median income (SMI), adjusted for household size. Monthly bill discounts are calculated as a percentage of bill, and are offered at five tiers, based on the enrolled Customer's household income as a percentage of SMI. Total enrollment and expenditures in 2023 were approximately 70,000 and approximately $14.5M, respectively.

3. Bill Reduction – Participation in energy efficiency (Sch 109/110) and/or Flexible Load programs to reduce consumption and the decrease in investment via braiding of federal, state and local public sector incentives.

   To ensure prudent investments PGE is required, per statute, to plan for and pursue all available energy efficiency resources that are cost effective, reliable, and feasible. The intent of this investment in energy efficiency is to promote lower energy bills, protect the public health and safety, and improve environmental benefits, and similarly, the intent of the utility investment in demand response resources is to reduce the need for procuring new power generating resources, which, in turn, reduces energy bills, protects the public health and safety, and improves environmental benefits.

   Distributed energy resources activation is a part of an all-resource solution to least cost service and an increasing contributor to meeting PGE's decarbonization goals as articulated in its recent Integrated Resource Plan. Also, per Section 7 of enrolled HB 2475, in addition to comprehensive classifications, tariff schedules, rates and bill credits, the Public Utility Commission may address the mitigation of energy burdens through bill reduction measures

or programs that may include, but need not be limited to, demand response or weatherization.

An inventory of bill assistance, bill discount and bill reduction programming, and associated income eligibility as a percent of SMI, is provided in Table 7 below.

Table 7. Income Eligible Program Inventory

Program Name	Customer Outcome	Administrator	Funding Source	Eligibility Criteria	2023 Annual $
Low-Income Home Energy Assistance - Energy Conservation Helping Oregonians and Low-Income Housing	Bill Assistance, Bill Reduction	Oregon Housing and Community Services	PGE schedule 108: PPC	< 60% SMI	~$36M in aggregate[39]
Oregon Energy Assistance Program	Bill Assistance	Oregon Housing and Community Services	PGE schedule 115: Low-Income Assistance	< 60% SMI	
Low-Income Home Energy Assistance - Weatherization Assistance Program	Bill Reduction	Oregon Housing and Community Services	PGE schedule 108: PPC	< 80% SMI	
Income Qualified Bill Discount	Bill Discount	PGE	PGE customer rates via non-participants	< 60% SMI	~$14.5M
PGE Flexible Load Management/ Demand Response Programs	Bill Reduction	PGE	PGE customer rates	n/a	Subset of ~$15.6M
Energy Efficiency Programs	Bill Reduction	Energy Trust	PGE schedule 109		Subset of ~$87M
Renewable Energy	Bill Reduction	Energy Trust	PGE schedule 108: PPC		Subset of ~$16M
Solar/ Savings Within Reach and on bill financing	Bill Reduction	Energy Trust	PGE customer rates and PPC	< 120% SMI	*Incl'd in Energy Efficiency & Renewable program spend*
Solar for All	Bill Reduction	ODOE, Energy Trust, Bonneville Env. Foundation	Public – Federal Braiding opportunity	tbd	$87M total beginning 2025/2026

[39] Report to Legislative Assembly on Public Purpose Charge Receipts and Expenditures Report Prepared by Evergreen Economics Period: July 1, 2021 – June 30, 2023; As well as retrieved from remittance on PGE Schedules 108 and 115.

Program Name	Customer Outcome	Administrator	Funding Source	Eligibility Criteria	2023 Annual $
Portland Clean Energy Community Benefits Fund (PCEF)	Bill Reduction	Grant recipients for single family, affordable multi-family and small business projects	Public – Local Braiding opportunity	tbd	tbd; MOU with Energy Trust re: deferred maintenance pending
Home Electrification (IRA Sec. 50122)	Bill Reduction	ODOE via Energy Trust	Public – Federal Braiding opportunity	< 80% SMI	$52M total beginning 2025
Home Efficiency (IRA Sec. 50121)	Bill Reduction	ODOE via Energy Trust	Public – Federal Braiding opportunity	< 80% SMI	$52M total beginning 2025

3.4.2 Action Planning with the Energy Trust

As a result of legislative direction in HB 3141 (2021), codified as ORS 757.746(e), Energy Trust of Oregon was required to, "with public utilities, jointly develop public utility specific budgets, action plans and agreements that detail the entity's public utility-specific action plan (USAP), resources, including coordinated activities that require joint investment and deployment." Also, per the legislation, "Each action plan must reflect stakeholder feedback gathered through a public process managed by the entity and the relevant public utility as overseen by the commission." This statutory direction required modification to Energy Trust's current budget development process, with more utility-specific coordination. In June of 2022, following a series of work sessions with OPUC, Energy Trust, utility funders and ratepayer advocates, a Budget Process Coordination and Action Plan Memorandum (the "HB 3141 Budget Coordination Memo") was formed. This memorandum represented a joint planning framework that articulated stepwise activities to support annual budget and utility-specific action planning.

Building on this plan development process the Energy Trust and PGE propose evolving from a two-year cycle to a multi-year (2026-2030) time horizon and from an activity-based plan to an outcomes-based co-deployment framework. Doing so affords the two organizations the opportunity to better maximize value for our shared customers, accelerate procurement as determined in the PGE Integrated Resource Plan in compliance with HB 2021, as well as align based on organizational and program readiness.

3.4.3 Co-Deployment with the Energy Trust

Co-deployment with the Energy Trust encompasses a shared strategy, with common marketing, outreach, and messaging, to efficiently deliver complementary energy services to shared customers. Through co-deployment of complementary services, customers benefit from behind-the-scenes coordination with streamlined participation and total delivery cost reduction for all ratepayers. To start, co-deployment will include targeting priority high energy burdened customers with services that lead to meaningful bill reduction and advance the shared objective of reducing energy burden. The timing of this effort is aligned with implementation of HB 2475 through the OPUC Docket No UM 2211, with the goal of reducing energy burden and the anticipated availability of public sector funding. Co-deployed services will initially consist of existing, feasible offerings provided by each organization today. Over time, additional services and deployment forms or pathways will be added to the framework as each organization is ready to bring in more services to market. The framework will evolve to focus on different configurations of candidate screening and more targeted delivery.

Co-deployment may take a variety of forms and pathways:

- Community outreach: Shared program marketing collateral and tabling events together
- Co-funding: A methodological approach in which PGE provides complementary funding for flex value (e.g., residential thermostats)
- Bill reduction: Referral of IQBD customers to increase EE program participation (also provides flex potential for future co-funding opportunities)
- Solar+ storage: Aligning PGE smart battery roadmap with the U.S. Environmental Protection Agency Greenhouse Gas Reduction Fund Solar for All grant funding timing
- Pilot to program: Ensuring that tested collaboration yields a hand-off to product and measure development

Potential services and timing for co-deployment based on understood organizational and program readiness as laid out in Table 8, below:

Table 8. Potential Services and Timing for Co-Deployment with Energy Trust

	2025	2026-2027	2027-2028
Energy Trust	For single family residences: insulation, no cost heat pumps, heat pump water heaters, ductless heat pumps, targeted to replace electric resistance heating; For multifamily residences: strategic energy management	Solar plus storage (solar for all and PCEF combination); Develop and/or deploy co-funded measures for efficiency and flex value, learning from SGTB and flex feeder experiences; Co-evaluation of framework, recommendations for improvements For multifamily residences: line voltage thermostats	Evaluation of framework and impacts; Expand to other customers and/or geographical areas
PGE	Energy Burden Needs Assessment recommendations regarding UM 2211 New Discount Program	Alignment on solar+storage and midstream heating ventilation and air conditioning via PGE+, continue residential and non-residential thermostat co-funding, support new building demand response design and technical assistance	Co-fund or otherwise co-deploy "on-line" voltage thermostats and midstream HPWH

3.4.4 Governance with the Energy Trust

This section describes a new approach to coordination with the Trust. This governance structure clarifies and formalizes the roles of each partner and lays out a process to articulate priorities through utility-specific action planning.

A joint commitment by each organization is key to success, and an agreed upon process for decision-making, role definition and annual updates to the multi-year framework provide the guidance for stakeholders to understand the intent and accountability associated with co-deployment.

Though short, intermediate, and long-term outcomes are provided in the logical model, the processes that support those outcomes or impacts represent the key elements. Each of these elements needs to be clearly defined at both the organizational and project levels to support consistent management processes and achieve the intended outcomes.

Table 9. Energy Trust of Oregon Coordination

Decision (why)	Key Element (what)	Delivery Partners (who)	Energy Trust Inputs	PGE Inputs	Activities (how)	Outputs (where)
Objectives/ Priorities	Co deployment plan design	Contribute and/or Co-Create	Co-Lead	Co-Lead	Development of multi-year outcomes and governance	Frame-work
Planning/ Policies	Determining Market and/or Resource Potential	Contribute	Co-Lead (EE/RE)	Co-Lead (Flex Load/DR)	Define resource requirements	USAP
Planning/ Policies	Budget Development/ Forecasting	Contribute	Co-Lead	Contribute	Identify research objectives and co-deployment opportunities and locations	USAP
Administration / Delivery	Budget Monitoring and Tracking	Contribute	Lead	Awareness/ Contribute	Discuss pipeline management and variance	USAP
Administration / Delivery	Budget Reporting and Narrative	Contribute	Lead	Contribute	Discuss pipeline management and variance	USAP
Administration / Delivery	Program management	Lead and/or Contribute	Lead	Contribute	Identify delivery channels and operational efficiencies	USAP
Planning/ Policies	Delivery partner engagement	N/A	Lead	Contribute	Identify relevant partners based on opportunities and locations	USAP
Planning/ Policies	Marketing plan development	Contribute and/or Co-Create	Co-Lead	Co-Lead	Identify delivery channels and operational efficiencies	USAP
Planning/ Policies	Marketing implementation	Contribute	Co-Lead	Co-Lead	Identify relevant partners based on opportunities and locations	USAP
Planning/ Policies	Customer Outreach	Co-Lead	Co-Lead	Co-Lead	Identify referral and tabling opportunities	USAP

Decision (why)	Key Element (what)	Delivery Partners (who)	Energy Trust Inputs	PGE Inputs	Activities (how)	Outputs (where)
Administration / Delivery	Customer Enrollment	N/A		N/A	Identify relevant partners based on opportunities and locations	USAP
Administration / Delivery	Managing Contractors & Trade Allies	Contribute and/or Co-Lead (depending on partner)	Lead	Contribute	Define resource requirements and operational efficiencies	USAP
Administration / Delivery	Project installation	Lead/Co-Lead	Lead/Co-Lead		Identify delivery channels and operational efficiencies	USAP
Administration / Delivery	Reporting, Tracking Outcomes	Contribute	Co-Lead	Co-Lead	Share metrics on outcomes	USAP
Administration / Delivery	Manage 3rd Party Evaluation		Lead	Contribute	Identify operational efficiencies	USAP

3.4.5 History of Regional Partnership

PGE sees the value of a holistic approach which includes co-deployment of bill reduction programs with the Energy Trust of Oregon, in concert with bill assistance and bill discount programs, and observes the sizeable amount of public sector funding expected to deploy in Oregon in 2025 and beyond. Higher public sector incentives are expected for the same income eligible customers on PGE's IQBD, many of which benefit from Energy Trust measure exception, so an opportunity exists to braid and amplify. As Energy Trust is the Oregon Department of Energy (ODOE)-designated implementer of Inflation Reduction Act funds, and co-implementer of EPA Solar for All funds, it is in a unique position to braid and deploy to the customers for whom the incentives are intended.

Higher incentives for energy efficiency and renewable energy offered in specific geographic areas is not a new approach. There is a legacy of partnership in co-deploying at the neighborhood level with Energy Trust of Oregon, Northwest Energy Efficiency Alliance, national labs, Community Energy Project, and other members of the Demand Response Review Committee in the Smart Grid Testbed since 2019. Additionally, Energy Trust has pursued targeted load management (TLM) projects independent of PGE since 2018. An inventory of these projects is provided in Table 10. Lessons learned from these demonstration projects may be brought to bear on new locational co-deployment approaches.

Table 10. Demonstration Project Summary[40]

Project	Dates	Location	Evaluator	Measures
NW Natural – Energy Trust Geographically Targeted Energy Efficiency (GeoTEE)	2019 - 2022	Cottage Grove, Creswell	Apex Analytics, LLC	Furnaces, HVAC, insulation, windows, fireplaces
PGE Smart Grid Testbed Project	2019 - 2021	Portland, Hillsboro, Milwaukie	Cadmus Group	Peak Time Rebates (PTR), Thermostats, EV charging
Pacific Power – Energy Trust TLM Pilot	2018 - 2021	Medford area	Pivot Advising, LLC	Solar, weatherization, thermostats, central air conditioning, energy saver kits, lighting, food service equipment, HVAC systems controls and O&M (e.g., heat pumps)
Pacific Power – Energy Trust TLM Pilot	2016 - 2018	North Santiam Canyon	Navigant Consulting	HVAC, water heating, lighting, cooking, refrigeration

Table 11, below, provides an analysis and synthesis of process and impact evaluations conducted by third party evaluators of demonstration projects in Oregon. Review of these reports was conducted to highlight lessons learned and identify themes across the various projects. The intent in cataloging findings from these multi-phase demonstration projects is to both promote awareness of the increase in participation the result of targeted geographic deployment, and the resulting organizational capabilities built that may be leveraged because of this local partnership work.

[40] PGE (March 2022). *SGTB Phase I – Final Evaluation Report*. Retrieved from SGTB Phase I - PGE SGTB Final Evaluation Report - FINAL VERSION - 31MAR2022 - CLEAN.pdf - All Documents (sharepoint.com)

Apex Analytics LLC (June 2023). *Northwest Natural – Energy Trust Geographically Targeted Energy Efficiency (GeoTEE).* Retrieved from https://www.energytrust.org/wp-content/uploads/2023/07/GeoTEE-Phase-3-Evaluation-Report_REVISED_2023.06.05_Final.pdf

Pivot Advising (September 2021). *Pacific Power - Energy Trust Targeted Load Management Medford Pilot Process Evaluation*. Retrieved from https://www.energytrust.org/wp-content/uploads/2023/03/Final_PAC-TLM-Evaluation-Report_2021.pdf

Navigant Consulting (March 2020). *Pacific Power - Energy Trust Targeted Load Management Pilot North Santiam Canyon Summary Report*. Retrieved from https://www.energytrust.org/wp-content/uploads/2023/04/PAC_N.Santiam_TLM_SummaryReport_Final.pdf

Table 11. Demonstration Project Evaluation Themes

Category	Evaluation Theme
Research Objectives	An effort focused solely on maximizing peak reductions might take a different approach than an effort that also prioritizes reaching underserved customers In contrast to TLM and GeoTEE projects the SGTB objectives went beyond strictly load reduction and included an assessment of customer participation in, motivations for, and comfort levels with demand response as well as the best methods to engage.
Customer Value/ Participation	Spurred by increased incentives based on local avoided costs, in pilot areas identified by the utility, the TLM and GeoTEE pilots all realized an increase in residential participation over baseline For SGTB, it was observed that default opt-in enrollment in PTR also increased participation in firmer kinds of demand response (e.g., self- enrolled thermostats) Also, auto-enabling customers in PTR lifted enrollment rates for environmental justice community (EJC) groups and reduced disparities in program delivery for those who may have faced barriers to self-enrolling.
Equity	Unequal customer treatment was identified in concerns both arising from making offerings available to customers in the pilot area but not to those outside the boundary, and the extent to which offerings reach communities that have historically been underserved It was noted that less intuitive boundaries, those not defined by zip code but instead by the electric distribution infrastructure, invite issues from those outside the boundary In the SGTB PGE Community Outreach Consultants (COC) worked with ETO and Community Energy Project to deliver weatherization and cooling workshops to low-income renters and homeowners.
Planning and Alignment	Given energy efficiency program delivery requires a distinct set of considerations it was recommended that ETO and its utility partners factor in the amount of demonstration project scopes the work needed to build relationships and understand community needs Providing quantitative savings targets specific to each program to help program implementers gauge their success An up-front local market analysis to inform marketing, outreach, and design SGTB targeted marketing of the Smart Thermostat program based on customer HVAC data increased the effectiveness of PGE's marketing
Marketing and Outreach	Efforts like email outreach played a larger role in building awareness of ETO than in directly motivating upgrade projects SGTB pursued five customer value proposition (CVP) marketing campaigns over the course of the pilot which explored engagement from a variety of perspectives - awareness, incentives, donating PTR earnings to a select non-profit, avoided carbon emissions, and renewables messaging Important to bring marketing into the conversation during the initial program design so that the approach is fully integrated
Org. Capabilities	ETO was able to develop systems and processes to coordinate special offerings and track the resulting uptake within targeted geographic areas It was suggested that the pilot's project manager be provided more authority to communicate directly with implementers rather than routing communications through staff from each program. Interviewees shared that key stakeholders should be consulted about their preference for the type and frequency of reporting that would be most useful to them

The DOE also awarded PGE a grant to accelerate and deploy grid edge computing, which will be effective October 1, 2024.[41] The first edge computing meter installs thereunder are targeted for 2025, with 90K units expected by end of 2028. This work includes establishing a new DER gateway capability, DER disaggregation software, and options for customer facing applications/data. As noted on PGE's website, these investments "will help PGE maintain resilient grid operations during severe weather events and achieve progress toward our decarbonization targets. Grid edge technologies improve resilience, enable the integration of distributed energy resources, and maximize customer investments in home energy solutions." [42]

It bears acknowledging that there are active demonstration projects from which additional lessons will be learned (see Table 12). Those projects include the PGE Smart Grid Testbed Collaboration (SALMON) and associated Flex Feeder, Smart Solar and Smart Battery pilots, pursued in partnership with Energy Trust, NEEA, NREL, and Community Energy Project, as well as the NEEA End Use Load Flexibility project for which PGE is one of several regional utility funders.

Table 12. Scope of Regional Partnership

Scope	Goals	Partners	Budget	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29
End Use Load Flexibility	Accelerate the adoption of grid-enabled end-use technologies through market transformation	*NEEA and another nine utilities across the region*	$0.7M (6-yr)											
SGTB Phase II DOE Connected Communities Project SALMON aka SGTB Collaboration	Build a 1.4 MW Flex Load resource within the project area and integrate the Flex Load devices into PGEs' ADMS and DERMS.	*Energy Trust, Community Energy Project, NREL*	$6.7M (5-yr)											
SGTB Phase II Flex Feeder Measure Development Incentive Delivery	Understand how best to integrate efficiency with other DERs in the planning, forecasting, & design of DSM programs, help PGE manage loads during periods of high demand.	*NREL, Energy Trust. NEEA serves as stakeholder*	$4.3M (5-yr)											
SGTB Phase II Smart Solar	Study how solar smart inverters can provide additional grid benefits via applying customized smart inverter settings	*NREL, Energy Trust*	$1.0M (2-yr)											
PGE Smart Battery	Explore the ability of distributed assets to provide grid services	*Energy Trust*	$1.1M (5-yr)											
SGTB Phase I	To accelerate the development of DR and to acquire it "at scale."	*PNNL, NWPC, NEEA, CUB, ODOE, Energy Trust, cities, and CBOs*	$5.8M (2.5 yr)											

Legend

Pilot period

Impact evaluation to determine savings realized

[41] U.S. Department of Energy, Grid Deployment Office. *Fact Sheet: Grid Resilience and Innovation Partnerships Program*. Retrieved from https://www.energy.gov/sites/default/files/2023-11/DOE_GRIP_2123_Portland%20General%20Electric%20Company_v4_RELEASE_508.pdf.

[42] PGE. *Funding the Future of Reliable, Affordable and Clean Energy; PGE awarded grant to accelerate and deploy grid edge computing.* Retrieved from https://portlandgeneral.com/about/who-we-are/clean-energy-future/funding-the-future-of-reliable-affordable-and-clean-energy.

Defining time-based outcomes provides the end state necessary to understand the inputs, activities and outputs required to meet those targets. PGE collaborated with Energy Trust to identify Co-Deployment Logic Model outcomes and then presented them to PGE's Community Benefits and Impact Advisory Group (CBIAG) to inform the inputs, activities, and outputs. This approach ensured both that organizations were at a state of readiness to pursue stated outcomes and that those outcomes aligned with the CBIAG's understanding of our shared customers' needs. It is anticipated that PGE and Energy Trust will replicate this approach annually, in support of the utility specific action plan process, for intermediate and long-term outcomes.

Through a series of work sessions PGE and Energy Trust staff agreed that affordability represented the most urgent customer need and therefore it was appropriate to identify this as the short-term outcome. Co-deployment serves not only to address the affordability outcome but also serves as the first step toward locational deployment to address grid constraints and locational distribution value. That is, research objectives related to customer engagement in the short-term are therefore intended to inform the grid assessment criteria in the long-term. Put differently, a locational program-only approach in the short-term serves to address planning needs in the long-term.

Through a July 2024 workshop PGE and Energy Trust co-presented this logic model framework and proposed short- term outcomes to the CBIAG. Given PGE had completed and socialized an Energy Burden Needs Assessment with the group the request was to understand what program delivery approaches will be necessary to realize higher participation in customer segments that have historically been hard to reach.

It is anticipated that EPA Solar for All funding and IRA will begin to flow in 2025 and 2026, respectively.[43] Given 40% of those dollars are earmarked for environmental justice communities, including income-eligible customers there is an opportunity to amplify ratepayer funded energy efficiency and renewable energy incentives as well as increase participation in PGE's IQBD in communities for whom these programs are intended. An inventory of measures that meet both identified customer need and carry multiple funding opportunities are provided in Table 13, below.

Table 13. Prioritized Co-Deployment Measures

Measure	Objective	Energy Trust-Exception	Energy Trust-Pilot	RTF-Flex[44]	Public Sector Braiding[45]
All Insulation/ Weatherization	Affordability, DERs Activation	Expires March 2028		2025-2029	IRA HEAR, 25C

[43] Wozniacka, G. (2024, October 7). *Oregonians won't see $113M in promised clean energy rebates until late 2025 or 2026*. OregonLive. Retrieved from https://www.oregonlive.com/environment/2024/10/oregonians-wont-see-113m-in-promised-clean-energy-rebates-until-late-2025-or-2026.html.

[44] The Regional Technical Forum is a technical advisory committee to the Northwest Power and Conservation Council established in 1999 to develop standards to verify and evaluate energy efficiency savings. In the 2025-2029 Funding Levels the RTF has included in its business plan priority energy efficiency and demand response technologies.

[45] The IRA includes the Home Electrification Appliance Rebate (HEAR) program which provides funding for incentives to flow state energy offices. In addition, there exists IRS sections 25C and 25D for energy-efficient home improvements and residential clean energy credits.

Measure	Objective	Energy Trust-Exception	Energy Trust-Pilot	RTF-Flex[44]	Public Sector Braiding[45]
Low-Income Insulation/ Weatherization	Affordability	Expires March 2028		2025-2029	IRA HEAR, 25C
Ducted Heat Pumps	Affordability, DERs Activation	Expires Dec 2026 (Fixed Promotion)	No-Cost Program Delivery Pilot (PDP)	2025-2029 upgrades/ conversions	IRA HEAR, 25C
Ductless Heat Pumps	Affordability, DERs Activation	Expires March 2025	No-Cost Program Delivery Pilot (PDP)	2025-2029 + Small Commercial	IRA HEAR, 25C
Extended Capacity Heat Pump	DERs Activation	Expires Jan 2026			IRA HEAR, 25C
Manufactured Home Replacement	Affordability	Expires March 2025			
New Buildings	DERs Activation	Expires March 2024			
Heat Pump Water Heater	Affordability, DERs Activation		No-Cost Program Delivery Pilot (PDP)	2025-2029 + Commercial	IRA HEAR, 25C
Connected Thermostat	DERs Activation	Equity Metrics < $500		2025-2029 + Commercial	
Line Voltage Thermostat	DERs Activation			2025-2029	
Level 2 Electric Vehicle Service Equipment	DERs Activation			2025-2029	25D
Irrigation Pump Controls	DERs Activation			2025-2029	
Battery	DERs Activation				ODOE, 25D
Inverter	DERs Activation				ODOE, 25D

Public sector dollars may be braided with PGE customer dollars, bill discounts and programs, combined with Energy Trust measure exceptions (e.g., insulation, ductless heat pumps) and Energy Trust Savings and Solar Within Reach programs to increase participation in identified census block groups, and, if applicable, PCEF-funded deferred maintenance[46]. Numerous energy burden maps exist including: DEQ Disadvantaged Communities (DACs), HB 2165 electric vehicle charging for priority populations, and the Biden Administration's Climate and Economic Justice Screening Tool (CEJST) apart of the Justice40 initiative and the basis for deployment of IRA funds. A co-deployment on an identified census block group provides an opportunity to maximize value for the customers for

[46] Up to 30-50% of PCEF project funding can be used for health, safety, accessibility, or enabling repairs and serve to complement other funding sources for equipment and components.

whom these dollars are intended in a manner that draws inspiration from previous demonstration project successes and furthers PGE and Energy Trust's affordability objectives.

Therefore, in support of short-term affordability outcomes—and given limited inputs (or resources)—locations and implementation plans are provided in the UM 2211 Energy Burden Needs Assessment recommendations, informed by that rich dataset and the feedback elicited from the CBIAG.

3.5 Evaluation Practice

To keep pace with PGE's growing variety of flexible loads and expanded utilization of DERs through establishment of the Virtual Power Plant, PGE is developing evaluation standards and practices to ensure:

- Evaluation materials clearly document key program strategies, tactics, and pilot learnings used to assess pilots' overall progress toward their goals.
- Evaluation, Measurement, and Verification (EM&V) approaches can feasibly (i.e., technically and cost effectively) measure impacts
- Assessments qualitatively characterize DERs and quantify both the direct and indirect impacts created by PGE's resource stacking/dispatch strategies and use of advanced grid control capabilities

Although programs may target various energy, grid, and non-energy benefits, PGE employs the following general evaluation framework based on the maturation process of the Flex Load activity:

- ***Demonstration phase***: in this phase PGE seeks to deploy DERs to a limited number of customer sites to test *resource functionality*--PGE's ability to control the resource via integration with dispatch systems and/or OEM grid enablement features, capability of OEMs and DERMS to log and deliver needed resource data, user acceptance of DER performance, and PGE control over their devices/equipment. Other customer centric initiatives are also evaluated here through engagement, study and survey work. These generally include the customer journey and the customer value proposition.
- ***Pilot phase***: as DERs are more broadly distributed, PGE seeks to test the suitability of implementation plans and learn how perceptions and experiences of the pilot affect market acceptance of the implementation as designed. Initial learnings from the demonstration implementation will be used to stage/schedule evaluation research plans (e.g., market and participant surveys, program interviews, and impact analyses) as well as to develop logic models and metrics. *Formative evaluation* activities involve recommendations regarding the measurement of pilot metrics, logic models, and research plans and methods until the pilot arrives at a stable implementation design. To document resource performance under a greater range of real-world conditions, the evaluation may also recommend additional conditions under which the pilot could dispatch the resource.
- **Program acceptance and maintenance**: A *conclusive evaluation* is a summative assessment of pilot performance relative to the accepted goals, metrics, and criteria detailed in the updated logic model. This document includes findings from past and current evaluations to validate the overall dependability of the resource relative to metric outcomes under specified operational conditions, with past and ongoing program satisfaction and resource impact performance informing any pilot modifications. Once program status is conferred, the evaluation will conduct the following activities, as appropriate, to ensure overall resource stability: A) process analysis involving program and implementer interviews at a minimum, and B) impact analysis of resource performance at a cadence determined by PGE.

Further, PGE is monitoring the California Public Utility Commission's Distribution Investment Deferral Framework (DIDF) where the Commission and IOUs are addressing the technical EM&V challenges impact studies encounter–from load disaggregation of DERs collocated at customer sites to measurement of locational benefits. DER providers in California's energy markets

experience technical challenges in both measuring and valuing DER outcomes. We anticipate PGE will also face similar EM&V challenges as its DER portfolio grows in depth and breadth. The DIDF process convenes[47] to oversee the development of evaluation criteria and metrics for each program. PGE will monitor and assess the potential benefits of this work and how it might be used in our approach to evaluation and program development.

[47] Further discussion of CPUC's DIDF and evaluation criteria adoption practices are outlined in: *Order Instituting Rulemaking to Create a Consistent Regulatory Framework for the Guidance, Planning and Evaluation of Integrated Distributed Energy Resources*. Decision 18-02-004 February 8, 2018.

Chapter 4. Flex Load Activity

4.1 Demonstrations and Small-Scale Pilots

PGE launched a Strategic Innovation function in 2022 to manage the portfolio of early-stage demonstrations of new technology. Through this approach, PGE has been able to centralize visibility of the decisions made to allocate PGE resources and R&D dollars while simultaneously accelerating the process of conducting demonstrations end-to-end. In doing so, PGE ensures that new technology demonstrations such as those articulated in this section are well-aligned to customer, grid, and business needs and that dollars committed to demonstration activities across the company are coordinated and visible to different groups. This type of internal coordination is expected to inform and share while also identifying opportunities for shared learnings, and where possible how projects might improve through co-location, co-funding or sharing of resources.

4.1.1 Smart Grid Testbed

The Smart Grid Testbed[48] 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 are the SGTB 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.

- Testbed EV Charging Study
- Testbed Smart Solar Study
- Multi-family Bundle (New Construction) - Central Heat Pump Water Heater, Unitary Heat Pump Water Heater
- Single Family Bundle (New Construction)
- Flexible Feeder (overlaps with Department of Energy-funded SALMON project)
- Vehicle-to-Everything (V2X)
- C&I, Municipal Flexible Load and Resiliency

[48] 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/416ywc1laqmd/1FXchtG1UCoqK74YIOWBoF/699972c24ae1b34287acf24744206db9/Sched_013.pdf.

Table 14. Smart Grid Testbed Forecasted Phase II Budget[49]

Category	2025	2026	2025-2026
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
Total	$2,030,214	$1,254,289	$3,284,502

Further detail on SGTB activities can also be found in Appendix B.

4.1.2 Smart Battery Pilot

The Smart Battery Pilot was launched in 2020 under docket UM 1856. The pilot is paid for under UM 2078 and will continue to operate thereunder until its mandated June 31, 2025 expiration. At that point PGE will evaluate transition into the Flex Load portfolio as the technology and market continues to mature.

The pilot objective is to understand how best to incorporate residential energy storage into PGE's power operations, customer acceptance and experience, and programmatic operation. PGE has already made several adjustments informed by pilot findings:

- Provided customers more options regarding the amount of battery capacity utilized by PGE
- Streamlined enrollment and outreach processes, including automatically sending enrollment links to qualified customers through PGE's PowerClerk tool (used interconnection applications)
    - Automatically sent pilot information to customers as they progress through the interconnection process
    - Created a process for customers to enroll in the pilot even if their transformer was "export limited"
    - Published pilot enrollment link on our public website, allowed those additional eligible customers to enroll

The pilot has always been vendor agnostic. PGE is expanding the qualified products list (QPL), with requirements based on the following features: UL listed, commercially available in PGE's service territory, and dispatchable by PGE's Distributed Energy Resource Management System (DERMS). PGE has onboarded three additional brands, and the QPL now allows 97% of existing battery devices in PGE's service territory to participate.

[49] The forecasted Testbed budget does not yet include an allocation for the C&I, Municipal Flex Load, and Resiliency project.

PGE will continue to pursue enhancements as the pilot moves into its final year of operations under UM 1856, and later under the Flex Load portfolio.

The process evaluation of the Pilot's performance can be found as the appendix of the 2023 Annual Energy Storage Update filed with the OPUC[50]. PGE will file the second comprehensive process evaluation for close-out of the Pilot.

The UM 1856 pilot expires July 31, 2025, amidst the summer demand response season. So as to avoid interruption of the resource, PGE will seek to extend the date to September 30, 2025. This extension would allow the pilot to continue through the summer DR season uninterrupted and give the program team the fall shoulder season to transition customers to the next iteration of the Pilot.

Continued Iteration

After the conclusion of the UM 1856 pilot, PGE seeks to continue operating and growing the resource. For clarity this document will refer to the first Pilot associated with UM 1856 as "Phase 1" and the continuation as "Phase 2". Phase 1 is currently funded through the Schedule 138 Energy Storage Cost Recovery Mechanism.

While PGE has made significant progress in stabilizing and growing the pilot over the past four years, the market remains nascent and relatively small, with about 8 MW of total nameplate capacity among all residential customers. PGE seeks to continue to tailor the offering and pursue market transformation to grow the overall adoption as well as expanding participation.

Options under consideration for Phase 2 of the pilot include:

- Allowing small non-residential customers to participate with a qualifying dispatchable battery. Currently, businesses with residential-scale devices (e.g., a Tesla Powerwall installed at a small vineyard) are enrolled in Energy Partner On-Demand.
- Adjustments to the incentive structure based on what has been learned from Phase 1.
- How to further optimize the value of customer rooftop solar when paired with batteries.
- A rebate to income-qualified customers participating in the Oregon Solar For All[51] grant program to pair their solar project with an eligible battery.
- Investigating options to increase the rate of market adoption of battery storage technology, including alternative paths to procurement and distribution.

Budget and Uptake

The pilot will seek cost-effectiveness in its operations and will be evaluated bi-annually to measure performance and cost-effectiveness and identify areas for continued improvement.

We provide the following preliminary MW and funding estimates for informational purposes only. PGE does not request funding for Phase 2 of the Smart Battery Pilot with this filing.

[50] https://edocs.puc.state.or.us/efdocs/HAD/um1856had151748.pdf
[51] https://www.oregon.gov/energy/Incentives/Pages/Solar-for-All.aspx

Table 15. Preliminary MW and Cost Estimates for Smart Battery Pilot Phase 2 (2025-2029)

Year	Estimated Cumulative MW	Estimated Incremental Cost ($MM)
2025[52]	1.4	$0.30
2026	2.3	$1.22
2027	3.3	$1.43
2028	4.0	$1.20
2029	4.7	$1.55

4.1.3 Energy and Emissions Estimator

In September 2023, in response to an increasing number of questions from customers with commercial real estate projects around the potential for energy and emissions savings from various design choices PGE launched a web tool to visualize and estimate impact from various design choices. This web tool, referred to as the Energy and Emissions Estimator, allows users to model design approaches on five common real estate project types. Examples of these design choices include on-site solar, systems choices like efficient electric heat pump heating or hot water and building performance improvements like window and wall efficiency upgrades or heat recovery ventilation.

The Estimator provides education around flexible loads and the value of incorporating flexible load systems into project design. The Estimator then uses the inputs made on type and size of building project, as well as selections made on typical design as well as potential building systems and performance improvements to give the user an estimate of emissions reductions, energy savings and associated cost improvements possible with the incorporation of the selected improvements into their project. The tool provides options for the five most common types of commercial building projects in PGE's service territory.

Users of the tool have the option to request further engagement with PGE including a pathway into the Energy Partner Design offering for projects that could benefit from additional support through that program.

In the nine months since launch, the Estimator has received 2,100 unique site visits with 202 visitors exploring projects. Patterns emerging in the use are a small level of seasonal variation and a surge of interest following targeted promotion of the tool to the commercial real estate audience.

4.1.4 Energy Partner Design

Energy Partner Design (EPD) was launched in Q2 of 2023 in response to positive feedback that PGE received following efforts to support unique projects, like the development of the Broadway Corridor. Customers found value in PGE evaluation of the lifecycle benefits of electric building systems and

[52] 2025 costs reflect three months of operations.

designing with an intent for grid interactivity. PGE continued to receive requests from similar projects for this type of design assistance engagement.

The target market for this service are large commercial real estate projects (+100K SF or +100 units of multifamily) in a conceptual/design phase. EPD analysis surfaces options for the use of efficient electric building systems, and also shows the expected impacts on energy and emissions from the selection of the same. EPD also provides information regarding how to configure those building systems for the unique attributes of the project. Where appropriate for the project, EPD also evaluates the use of a battery energy storage system (BESS) for the project's resilience needs and provides options for BESS integration through a one-line drawing. As part of the BESS evaluation, EPD evaluates BESS sizing options, optimizing to meet project needs as well as enrollment in the appropriate PGE customer flex load program.

The complex and unique nature of projects at this scale requires robust customer engagement, which begins with a review of the project's building systems engineering. This ensures that the project is at a stage where design engagement is warranted and also provides a scope of work identifying the project needs. From here, the team develops a project report, which includes a project plan laying out options as well as guidance on incorporation into PGE flex load programs. The report also provides guidance on expected energy usage and emissions impacts. The engagement concludes with a review and issuance of the report.

EPD was introduced in a "limited launch", with the intent of interacting with a smaller number of projects and validate outcomes. Based on those learnings, the team set a 2024 goal to engage with eight projects and provide six BESS evaluations. As of August, the EPD team has completed six reports on building systems (one of which included a BESS analysis and recommendation) as well as one standalone BESS report. As might be expected, PGE has observed that interest in the EPD service has tracked with fluctuations in commercial real estate development activity.

At the close of 2024, PGE will complete an evaluation of the Energy Partner Design activity. The evaluation will include interviews with the project teams and assess whether EPD was successful in driving adoption of options presented. Given the typical design to construction timeline, the system benefits from the projects engaging with the program in 2024 are anticipated in late 2025 and beyond.

4.1.5 Smart Panel

In Q4 of 2023, PGE partnered with a third party to conduct a single-unit demonstration on a smart panel device. The goal of this demonstration was to evaluate whether a smart panel, installed at a residential home, would maximize load served while minimizing the cost of electrical upgrades necessary to serve that load, and to assess the potential value of using a home energy management system to avoid electrical upgrades.

Electrical upgrades in this context included possible changes to the customer premises—such as service entrance upgrades—as well as distribution equipment whose costs might be borne by the individual customer or spread across utility rate payers.

Overall, the results indicated that the smart panel functioned effectively in dynamically managing household electrical loads. It maintained a balance between energy demand and the panel's capacity, thereby enhancing the overall efficiency and safety of the electrical system. This functionality is particularly relevant in modern households with high electrical consumption due to devices such as

EV chargers and may offer an avenue to electrification for homeowners where it previously was only possible with an electrical service upgrade. This is an important issue where equity of electrification is a concern as removing upfront cost barriers through utilization of a smart panel proves beneficial to both the utility and the customer.

PGE will continue to monitor this technology as part of its continuing assessment of emerging opportunities (see Section 4.4).

4.1.6 Grid-Enabled Window AC

In 2024, PGE undertook a demonstration to assess the demand response capabilities of a Windmill Air grid-enabled window AC unit. Utilities in New York (Con Edison and PSEG Long Island) and California (San Diego Gas & Electric, Pacific Gas & Electric, and Southern California Edison) have programs using these devices. Five employees who reside in rentals lacking permanent cooling are part of this demonstration work.

During the demonstration, PGE will determine whether demand response communication is feasible with these units, confirm grid reliability, and establish a proposed planning value during peak events. Due to their portable nature, these devices will be suitable for renters or homes that lack sufficient cooling in certain areas. Should PGE determine that these devices are viable for demand response events, a pilot design could be proposed by Q2 2025 in preparation for the 2025 cooling season. No requests for funding this activity are being made at this time.

4.2 Programs and Larger Scale Pilots

Regulatory Reference	Capacity (forecasted for end of year 2026)	Proposed Funding (2025-2026)[53]	Cost Effectiveness (TRC)
PGE Flexible Load Plan (UM 2141)	Summer 128.5 MW Winter 65.3 MW	$34,320,359 (Admin 48%, Incentives 51%)	2.07

As part of this MYP filing, PGE seeks authorization to fund operations of the existing Flex Load portfolio for 2025-26, advance the current initiatives, and acquire an additional 22 MW of customer-sited resources by the end of 2026. PGE remains committed to the continued acceleration of Flexible Load growth, as well as continued advance of program maturity, performance, and portfolio operations. Cost recovery for both pilots and programs is funded through Schedule 135.

PGE's comprehensive Flexible Load portfolio includes the following key pilots and programs:

[53] We include the $357,500 in proposed 2025 funding for the NEEA Market Transformation activity for consistency's sake, as, despite the fact that it is not a customer program or pilot, it is included in portfolio total proposed funding and cost effectiveness.

- Energy Partner on Demand Schedule 26: This program targets large commercial and industrial customers, providing incentives for custom load curtailment strategies and event-based energy shifts. The offering is technology agonistic and flexible, with a mix of behavioral/manual participants and other customers who opt for direct load control.
- Residential Smart Thermostat: A direct load control offering aimed at residential HVAC systems, utilizing smart thermostats to manage and optimize energy usage.
- Peak Time Rebates (PTR): A behavioral/manual DR offering which incentivizes residential customers to reduce energy consumption during peak times without the need for up-front equipment investment.
- Time of Day (TOD): A residential time-varying rate offering designed to encourage customers to shift their energy use to off-peak times, reducing overall demand during peak periods.
- Energy Partner Commercial Thermostats Schedule 25: A direct load control offering which targets small and medium-sized businesses, using smart thermostats to manage HVAC loads.
- Multi-family Water Heater: An offering targeting multi-family residences to control water heater loads, providing significant demand response potential in an underserved market segment.

Of these pilot programs, Energy Partner On-Demand Schedule 26, Residential Smart Thermostats, and Peak Time Rebates account for ninety percent of portfolio megawatt capacity. These offerings were instrumental to support grid reliability during last August's heatwave and have demonstrated their critical contribution to managing peak demands and ensuring uninterrupted service during extreme weather events. This contribution underscores the importance of continuing and expanding these offerings for our system's resilience and operational efficiency.

The Commission approved the transition of Energy Partner Schedule 26 pilot to program as of PGE's November 2021 MYP. Given the continued growth and stability of impact of the PTR and Residential Smart Thermostat pilots, this filing now proposes a transition of those offerings to full-scale programs. This transition acknowledges the maturity of these offerings as they enter their 5th and 6th year, respectively, and also their significant contributions to our flexible load capacity during event seasons. Both offerings encourage energy-saving and -shifting behaviors through financial incentives, which contributes to grid stability during peak periods, and have proven effective at delivering at scale to residential customers. With transition of Residential Smart Thermostat and PTR, fully one half of PGE's Flex Load activities will have graduated to "programhood", reflecting the maturity of the portfolio.

PGE will continue to operate Time of Day, Energy Partner Commercial Thermostats, and Multi-family Water Heater pilots and will accelerate pace to complete learnings and address barriers to scale. PGE intends to progress these pilots to programs in the 2025-26 MYP cycle.

Continued focus on growth and scale

Since 2021, existing pilot and program capacity has grown +20%, forecasted to end 2024 with an additional 9.7 summer MW and 1.9 winter MW. PGE seeks to continue to grow existing pilot and program capacity with an additional 20.4 summer MW and 8.8 winter MW by the end of 2026. This performance represents both growth and retention of the portfolio.

Flex Load capacity acquisitions are summarized in Table 16, below, with detail for the underlying offerings in the subsections thereunder.

Table 16. Flex Load Portfolio: Forecasted Capacity (MW)

	2023 (actual)	2024 (forecast)	2025 (forecast)	2026 (forecast)
Summer MW	96.8	106.5	116.3	126.9
Winter MW	55.0	56.9	61.2	65.7
Summer Incremental MW	–	9.7	9.8	10.6
Winter Incremental MW	–	1.9	4.3	4.5

From 2021-2023 the number of customers served by existing residential offerings grew 19%. We forecast to add another 16.4K customers in 2024 and seek to add a further 48.8K customers by the end of 2026. While the number of customers served by existing commercial offerings has been flat since 2021—due chiefly to two pilots in design transition[54]—we forecast to add 2.4K customers in 2024 and seek to add a further 4.0K customers by the end of 2026. This performance represents the continued growth in residential enrollment, and stability of commercial enrollment, for which we anticipate a return to growth in 2024 and beyond.

Flex Load customers served are summarized in Table 17, below, with detail for the underlying offerings in the subsections thereunder.

Table 17. Flex Load Portfolio: Customers Served

Customers Served	2023 (actual)	2024 (forecast)	2025 (forecast)	2026 (forecast)
Residential Offerings	188,187	204,629	229,847	253,430
Commercial Offerings	13,162	15,602	17,512	19,578

PGE will continue to deliver on growth and scale, executing on the following portfolio-wide efforts:

[54] Energy Partner Smart thermostat and Multi-family Water Heating are the two pilots in design transition. Note also that PGE does not include Energy Partner on Demand (Sch 26) in the number of commercial customers served, as that program serves large C&I customers, whose size and longer enrollment cycles make MW a better measure of growth.

- Enhance portfolio durability with a "continuous improvement" approach to managing offerings and operations
- Focus on portfolio-level education and outreach campaigns to ensure we are reaching customers at strategic points in their energy journey, encourage both their selection of grid-enabled technology and ongoing event participation
- Highlight individual customer impacts and progress and greater transparency in our work
- Expand and refine enrollment channels, qualified products lists of grid-enabled devices capable of integration into DERMS platforms, and also partnerships with regional stakeholders
- Increase utilization of the customer-sited DERs and load shifting this grid resource (which was key to PGE's grid management strategies during the 2021 "heat dome" and August 2023 heatwave)

Improved flexibility of portfolio operations

PGE continues to pursue opportunities to improve the flexibility of portfolio operations by executing on the following portfolio-wide efforts:

1. Drive consistency across operating tariffs (detailed in Section 2.2.1)
2. Align customer journeys (detailed in Section 3.1)
3. Reconcile of customer programs impacts with the regional market and resource adequacy programs in which PGE participates (detailed in Sections 2.1.4.1 and 2.1.4.2)

Table 18, below, describes the activities PGE expects to undertake for each Flex Load activity in this MYP cycle; the subsections thereafter contain additional detail for each activity.

Table 18. Flex Load Programs and Larger Scale Pilots Activities 2025-2026

Maturing Activities	2025-2026 Activities
Residential Smart Thermostat	Enhance customer event notification capabilities Monitor heat pump manufacturer development of demand response capable proprietary thermostats 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
Peak Time Rebates	PGE will continue with the current outreach strategy to recruit customers with substantive load shifting capacity and propensity to participate PGE will also explore (or test) a winter focused outreach to customers with the high potential for load shifting capacity in the winter season
Time of Day	Continue to expand recruitment efforts including leveraging new channels for all customer segments Identify process and system enhancements that can improve the customer experience for existing and potential Time of Day customers Continue to work with other pilots/programs to identify cross-enrollment opportunities that are beneficial to our customers

Maturing Activities	2025-2026 Activities
Energy Partner on Demand (Sch 26)	Revisit and simplify the program notification and incentive structure to address customer barriers to participation and encourage participation Work with third party implementer to enhance the customer experience with technical sales support and outreach activities

Pilots in Design Transition	2025-2026 Activities
Multi-family Water Heating	Utilize NEEA Learnings and stakeholder feedback to grow existing program Continue to operate the existing program and capture learning related to dispatch strategies Conclude the assessment of the pilot program redesign utilizing NEEA and Testbed learnings, stakeholder engagement Once redesigned and reopen the pilot to new enrollments
Energy Partner Smart Thermostats (Sch 25)	Expand work with Energy Trust and their Trade Ally network to increase enrollments Work with third party implementer to enhance customer experience with technical sales support and outreach activities Assess the 2024 expansion of the qualified grid-enable thermostats list. Conduct proactive outreach to customer with thermostat models slated for discontinuation by manufacturer

4.2.1 Residential Smart Thermostats

Regulatory Reference	Capacity (forecasted for end of year 2026)	Proposed Funding (2025-2026)	Cost Effectiveness (TRC)
Schedule 5 Residential Direct Load Control Pilot (Deferral UM 2234)	Summer 52.5 MW Winter 10.8 MW	$7,800,000 (Admin 41%, Incentives 59%)	1.97 (2023) 1.86 (2024) 3.90 (2025)

Table 19. Residential Smart Thermostats: Budget

Category	2024 (previously approved)	2025 (forecasted)	2026 (forecasted)	2025-2026 (current funding request)
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total	$3,837,000	$3,756,000	$4,044,000	$7,800,000

Table 20. Residential Smart Thermostats: Overview of Activity

Activity	Residential Smart Thermostat program
Connection to PGE's Flex Load Strategy	Flexible Load has become critical to both operate the grid and give customers the tools they need to manage their bills, contribute to decarbonization efforts, and become more resilient. Residential Smart Thermostat program adds heating systems and rapidly increasing cooling systems to PGE's flexible DER necessary to meet PGE's VPP goals.
Description	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 may enroll online in PGE's DR program by purchasing a new qualifying thermostat via the PGE Marketplace or another retailer or using an

Activity	Residential Smart Thermostat program
	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).[55] Customers are permitted to opt out of any or all events. This customer value proposition is complemented by Energy Trust rebates of up to $165 on new smart thermostats.
Product Phase	PGE proposes to transition this pilot to a program. The following paragraphs describe how the activity meets OPUC guidance for transition[56]. PGE launched the residential Smart Thermostat pilot in 2015 with the Bring-Your-Own-Thermostat delivery channel. PGE collaborated with the Energy Trust of Oregon to recruit customers receiving energy efficiency incentives for smart thermostats into the demand response pilot. In 2018, PGE expanded eligibility by launching a Direct Install (DI) delivery channel, offering customers a free or discounted smart thermostat device with complimentary installation from a technician to remove the barriers of the hardware cost, installation cost, and the difficulty of self-installation. Energy Trust of Oregon provided DI customers with a smart thermostat energy efficiency incentive, which when combined with the PGE incentives, helped reduce the customer cost of the thermostat and installation to between $0 and $150 depending on the heating and cooling system and choice of thermostat model. In 2022, PGE made the proposal, and OPUC Staff agreed[57], to close the DI channel to new enrollees based on performance and gradually transition the existing 6K DI customers into the BYOT channel as they reach five years in the program. This decision was made based on declining enrollments and the fact that the BYOT offers a more effective and cost-effective means of enrollment. Third-party evaluations have been performed annually since the pilot began and critical recommendations have been implemented.[58] Given its status and tenure as a mature and stable pilot, PGE requests Staff's review to transition the residential Smart Thermostat pilot into a program. PGE does not expect this transition to affect underlying operation of the activity. The pilot has achieved predictable peak energy reduction and customer satisfaction. Impact values have been stable across the years with some variation due to weather, event start time and length. Average per participant kW impact is 0.81 in summer and 0.73 in winter when averaged across all pilot seasons. The

[55] 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.
[56] OPUC (October 2020). OPUC Requirements for Pilots and Programs.
[57] OPUC (2022). *Docket No. ADV 1384/ADVICE NO. 22-04, REMOVE DIRECT INSTALLATION CHANNEL*. Retrieved from https://edocs.puc.state.or.us/efdocs/HAU/adv1384hau21565.pdf.
[58] Historical evaluation reports are filed under UM 1708, forthcoming evaluation reports will be filed under UM 2234.

Activity	Residential Smart Thermostat program
	pilot has also achieved consistent customer satisfaction scores averaging 86% across evaluation reports (6 or higher on 0 – 10 scale). PGE employs well defined and repeatable processes for ongoing implementation, including enrollment, dispatch, incentive payment, reporting and customer engagement communications. Dispatch of thermostats during direct load control events is stable. Customers enrolled in the residential Smart Thermostat pilot cannot be simultaneously enrolled in Peak Time Rebates, thereby ensuring customers are not paid incentives twice for the same peak energy reduction. In addition, the pilot has achieved a TRC of greater than 1, demonstrating cost effectiveness.
Target Market	Residential customers with eligible heating and cooling equipment who have or are willing to purchase a qualified smart thermostat.
Coordination	Continue to work in close coordination with Energy Trust of Oregon to deploy thermostat incentives as part of the BYOT channel
Changes since last filing, if applicable	See Section 2.2.1 for detail on standardization of seasons and holidays across the Flex Load portfolio.
Objectives	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.
Evaluation	Current third-party evaluator develops load impacts by using a matched comparison group and difference-in-differences panel regression modeling using hourly time series consumption data.

Table 21. Residential Smart Thermostats: Flex Load Acquisition (MW)

Flex Load Acquisition (MW)	2023	2024 Forecast	2025 Forecast	2026 Forecast
Summer	40.0	43.7	48.1	52.5
Winter	8.7	9.0	9.9	10.8

Table 22. Residential Smart Thermostats: Customers Served

Customers Served	2023	2024 Forecast	2025 Forecast	2026 Forecast
Residential Smart Thermostats	49,452	55,394	60,934	66,418

4.2.2 Peak Time Rebates

Regulatory Reference	Capacity (forecasted for end of year 2026)	Proposed Funding (2025-2026)	Cost Effectiveness (TRC)
Schedule 7 Flex 2.0 (Deferral UM 2234)	Summer 16.6 MW Winter 12.4 MW	$5,880,715 (Admin 33%, Incentives 67%)	0.68 (2023) 0.60 (2024) 1.13 (2025)

Table 23. Peak Time Rebates: Budget

Category	2024 (previously approved)	2025 (forecasted)	2026 (forecasted)	2025-2026 (current funding request)
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total	$2,971,605	$2,913,610	$2,967,105	$5,880,715

Table 24. Peak Time Rebates: Overview of Activity

Activity	Peak Time Rebates
Connection to PGE's Flex Load Strategy	Flexible Load has become more critical than ever, both for operating the grid and for giving customers the tools they need to manage their bills, contribute to decarbonization efforts, and become more resilient. We envision a future where customers can easily participate in an optimized energy system, and how their contribution not only enables their individual goals but also the region's broader climate and reliability goals. Today, approximately 15% of PGE's customers participate in Peak Time Rebates as a Flexible Load offering. PTR is accessible to most residential customers and serves as a gateway to broader participation and adoption of existing and future Flexible Load options. PTR also delivers consistent and reliable load shifting to meet both summer and winter capacity needs, providing a significant contribution to PGE's Flexible Load acquisition goals.
Description	Peak Time Rebates is a behavioral DR activity and a cornerstone of PGE's residential Flexible Load portfolio. The pilot relies on individual customer

Activity	Peak Time Rebates
	participation to reduce electrical demand during Peak Time Events by shifting energy consumption to non-peak periods or through conservation. There is no up-front equipment investment making it the ideal platform 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. Events are limited to the hours of 7:00 a.m. – 11:00 a.m. and 3:00 p.m. to 9:00 p.m. PGE is not permitted to call events on more than two consecutive days.
Product Phase	Peak Time Rebates has formally existed in its current state since its inception as the Flex 2.0 Pilot in the summer of 2019. As it reaches its fifth year in market, PTR is delivering consistent benefits and a stable enrollment base. In this submittal, PGE requests formal transition to Program status. The following paragraphs describe how the activity meets OPUC guidance for transition[59]. In 2016, PGE tested 12 different pricing design options aimed at reducing residential peak demand during summer and winter months via an activity known as the Flex 1.0 pilot. Starting in April 2019, PGE revised the pilot to offer a larger-scale opt-in behavioral demand response pilot to residential customers as part of a Flex 2.0 pilot, which was highly coordinated with PGE's Smart Grid Testbed research project. Based on earlier learnings, this pilot featured rapid scaling and growth in program enrollment. Now entering its fifth year, the Peak Time Rebates pilot has stabilized around 124,000 enrolled customers. Given its status and tenure as a mature and stable pilot, PGE requests Staff's review to transition Peak Time Rebates into a Program based on the following: Peak Time Rebates fulfills a unique role within PGE's flexible load portfolio as the most accessible demand response option for residential customers. There are no

[59] OPUC (October 2020). OPUC Requirements for Pilots and Programs.

Activity	Peak Time Rebates
	up-front costs or economic barriers to participation. PTR provides a gateway experience to help customers understand demand response and encourage subsequent migration to other flexible load options. In 2023 alone, nearly 2,800 customers migrated from PTR to PGE's Smart Thermostat Program. PTR also captures demand response capacity where residential customers do not want to grant PGE control of their in-home device or have a device that does not meet requirements for other offerings. PGE has successfully operated the pilot through eight demand response event seasons. The systems for recruitment, managing customer enrollments, notifying customers of events and processing rebates are stable and scalable. Customer performance in Peak Time Events has been evaluated by a third-party for the life of the pilot. As the pilot has grown and stabilized, so too have the per participant average kW impacts. Notably, event impact results for the Summer 2022 season were remarkably consistent across all six events PGE called for Peak Time Rebates, averaging 0.13 kW per participant. Hourly averages demonstrated a similar level of consistency. Winter season results feature lower impacts and slightly more variability due to fewer events, inclusion of morning events and optimizing recruitment for summer performance. There are remaining barriers to cost effectiveness inherent to the design of the pilot. Reducing or eliminating pilot administrative costs does not have a significant impact on elevating the TRC value. Notably, the key benefits that are core to the Peak Time Rebates pilot are not systematically quantified or measured within the cost effectiveness calculation. These include providing an accessible participation option available to most residential customers, driving broad-scale awareness of demand response amongst PGE's customer base and supporting customer migration to higher value offerings within the portfolio. Cost effectiveness for the Peak Time Rebates pilot is currently measured as TRC 1.19.
Target Market	The vast majority of PGE's residential customer base is eligible to participate in this voluntary pilot. Now, in its fifth year, the program has stabilized around 124,000 enrolled customers. Almost Approximately 15% of PGE's residential customers are enrolled in PTR. While Peak Time Rebates is open to most residential customers, PGE targets its marketing approach to focus on customers with the highest propensity to save energy through making event-based behavioral changes. PGE partners with a data science vendor to identify customers who have the highest propensity to be successful in the pilot. This ensures the program is optimizing for both performance and customer experience. Enrollment rates have slowed as the pilot has matured. In the 2023 calendar year, enrollment flattened with declines in some months. In 2024, enrollment growth has averaged about 0.4% monthly enrollment growth. One point worth mentioning is that the pilot added several thousand customers this summer via a

Activity	Peak Time Rebates
	direct mailing, which we attribute to the unique nature of that communication in an increasingly crowded digital space. The primary drivers of enrollment loss are customers leaving the service territory or moving within the service territory, loss of customer's event notification contact channel, and migration to other DLC programs where cross-enrollment is not permitted. In 2023, nearly 2,800 customers migrated from PTR to the Smart Thermostat program. This is a net benefit to the overall Flexible Load portfolio and an intended positive outcome but can impact enrollment growth for PTR specifically. Similar to other large-scale, mature programs that feature ongoing customer engagement, annual enrollment growth must outpace annual attrition to continue to grow the enrolled customer base. With a pilot program of this size the net result can be with little to no topline growth. For PTR, enrollment growth does not track directly with growth in adoption of new technologies in the same way that it does for programs centered around devices like a smart thermostat or home battery. So, no new rapid growth is expected at this time. However, as home electrification increases, participation in PTR becomes more appealing to customers adding electrical load in their homes, such as conversions to heat pump for heating and cooling. PTR remains a valuable participation option, particularly for customers who are not receptive to direct control options or who have devices that are incompatible with existing direct control options.
Coordination	Peak Time Rebates is accessible to most residential customers and features a simple enrollment process. The ease of enrollment and participation provides customers with a positive no-cost and no-risk first exposure to demand response. The pilot serves as a gateway to other Flexible Load offerings, particularly the Smart Thermostat program, Time of Day rate and the Smart Battery pilot. Additionally, Peak Time Rebates captures demand response capacity for customers who are not receptive to direct control options or who have devices that are incompatible with existing direct control options.
Changes since last filing, if applicable	Enrollment growth for PTR has slowed since 2022 as the pilot has matured and stabilized. This is common and expected for a program that is not based on new technology adoption and has been in-market for nearing five years. As such, enrollment and impact projections have been revised downward, though some modest growth is still possible as the service territory continues to grow. PGE will continue to target optimal customers who can contribute substantive load shifting capacity and who will also be the most satisfied with their participation. PGE may begin to target customers who have high potential for load shifting capacity in winter season as well. See Section 2.2.1 for detail on the standardization of seasons and holidays for schedules 5, 7, 8, and 25).
Objectives	The key objectives for Peak Time Rebates remain the same since inception of the Flex 2.0 pilot:

Activity	Peak Time Rebates
	• Design and deploy a large-scale DR program that equitably and cost-effectively contributes a substantial DR amount to PGE's IRP goals • Provide DR offering that is easy for residential customers to engage in • Provide a DR offering that serves as a gateway for adoption of other Direct Load Control offerings, primarily to the Smart Thermostat program
Evaluation	PGE has used a third-party vendor to evaluate the Peak Time Rebates pilot annual for the entirety of its lifespan. These evaluations typically consist of evaluating seasonal event impacts, process evaluation and measuring customer experience. In addition to third-party evaluation, PGE regularly monitors customer feedback via ongoing customer surveys to assess areas for improvement as well as overall satisfaction.

Table 25. Peak Time Rebates: Flex Load Acquisition (MW)

Flex Load Acquisition (MW)	2023	2024 Forecast	2025 Forecast	2026 Forecast
Summer	14.6	15.4	16.1	16.6
Winter	12.3	11.5	12.0	12.4

Table 26. Peak Time Rebates: Customers Served

Customers Served	2023	2024 Forecast	2025 Forecast	2026 Forecast
Peak Time Rebates	123,789	126,289	131,967	136,066

4.2.3 Time of Day

Regulatory Reference	Capacity (forecasted for end of year 2026)	Proposed Funding (2025-2026)	Cost Effectiveness (TRC)
Schedule 7 Flex 2.0 (Deferral UM 2234)	Summer 5.6 MW	$1,201,650 (Admin 100%, Incentives 0%)	1.50 (2023) 1.37 (2024) 2.52 (2025)

Table 27. Time of Day: Budget

Category	2024 (previously approved)	2025 (forecasted)	2026 (forecasted)	2025-2026 (current funding request)
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total	$690,000	$666,500	$535,150	$1,201,650

Table 28. Time of Day: Overview of Activity

Activity	Time of Day
Connection to PGE's Flex Load Strategy	Time of Day 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. PGE see a larger role for time varying rates in the future as we build the Virtual Power Plant and encourage customers to adopt DERs. Time varying rates also help customer manage their total energy costs as it provides a pricing signal to use electricity when costs are low. Time varying rates are also a great way for customers who drive EVs to control their transportation fuel costs.
Description	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

Activity	Time of Day
	money by shifting energy use away from the peak hours when power costs more and renewable resources are less plentiful. Time of Day operates under Schedule 7 and all pricing plan details are provided in the tariff. Main pricing details are provided below: 1. On-Peak 5:00 p.m. to 9:00 p.m. Monday-Friday 2. Mid-Peak 7:00 a.m. to 5:00 p.m. Monday-Friday 3. Off-Peak 9:00 p.m. to 7:00 a.m. Monday-Friday; All day. Saturday, Sunday and holidays 4. Holidays: New Year's Day on January 1; Memorial Day, the last Monday in May; Independence Day on July 4; Labor Day, the first Monday in September; Thanksgiving Day, the fourth Thursday in November; and Christmas Day on December 25. If a holiday falls on a Saturday, the preceding Friday will be designated the holiday. If a holiday falls on a Sunday, the following Monday will be designated the holiday. See Section 2.2.1 for more detail.
Product Phase	Time of Day is currently in pilot status and has been since its inception in May 2021. This pilot will be assessed for transition to Program status in Q3-4 2025.
Target Market	All of PGE's residential customer base is eligible to participate in Time of Day. It is a voluntary pricing plan that has been offered to customers since May 2021. Time of Day is still in the learning phase and working to increase enrollments in various customer segments. As of end of May 2024, approximately 2.5% of PGE's residential customers are enrolled in Time of Day. To achieve desired load impact, TOD must benefit a sufficient number of residential customers to encourage adoption. In this instance, customer benefit is measured by the amount a customer *could* save on the new pricing plan versus the Basic Service. Our rate modeling analysis forecasts ~46% of our residential customers could save 1% or more of their monthly bill without making any changes to their usage by transitioning from Basic Service to Time of Day. An additional 10% more could save on TOD by making shifts in usage during peak hours. While the Serviceable Obtainable Market is ~430,000 customers (56% of the 772,000 eligible customer residential population), up to this point we have focused our marketing on customers who have the highest savings impact and the greatest likelihood of adopting a time-varying pricing plan. The focus for marketing going forward will mainly include customers who could save on TOD by shifting their usage away from peak hours.
Coordination	Time of Day is a critical component in the company's overall energy engagement and DR strategy. It is a foundational element that can bind multiple products and services together (Smart Thermostat, EV Charging pilot, and PTR) in a way that delivers a curated experience for a customer. That said, PGE (and the industry) are still learning about the impact of interactions between TOD and other DR programs. We want to ensure the viability of existing products alongside or in

Activity	Time of Day
	combination with TOD while also ensuring that customers have a great experience in their adoption of Time of Day. As TOD adoption scales, PGE is exploring how best to stage or combine offers and may enlist support from a third party to assist. PGE will also continue to gather customer feedback, industry best practices, and utilize our outreach channels to deliver a clear customer journey toward this product bundling future.
Changes since last filing, if applicable	A comprehensive third-party evaluation report (both process and impact analysis) for Time of Day was discussed in our previous MYP. The impact analysis portion of this evaluation report was inconclusive, specifically around the load impact accuracy, given the low number and types of customers enrolled in the pricing plan at the time of the evaluation. Due to this discovery, TOD will not begin another third-party evaluation until 2025, by when we expect sufficient customers and customer segments enrolled to perform such a study.
Objectives	The key objectives for Time of Day remain the same since the pilot's inception in 2021: • Support PGE's IRP Goals: Help reduce peak load and support decarbonization goals and use of more renewables. Contribute 5.6 MW of capacity value by EOY 2026 to support PGE's residential Flexible Load goals. • Deliver an exceptional customer experience (target 80% customer satisfaction score). • Deliver personalized, relevant educational tools and energy savings tips to help customers achieve their maximum savings potential. • Ensure unenrollment remains below 3% annually (exempting those targeted un-enrollments or those who move outside the service territory) • Work to create a clear, compelling customer journey that paves the pathway toward adoption of complementary DLC products (specifically Smart Thermostat) for increased DR value. • Build a flexible and extensible program foundation that can enable future time-varying offers.
Evaluation	See "Changes since last filing, if applicable" in this table, above

Table 29. Time of Day: Flex Load Acquisition (MW)

Flex Load Acquisition (MW)	2023	2024 Forecast	2025 Forecast	2025-2026 Forecast
Summer	1.6	2.5	4.1	5.6
Winter	-	-		-

Table 30. Time of Day: Customers Served

Customers Served	2023	2024 Forecast	2025 Forecast	2026 Forecast
Time of Day	14,946	22,946	36,946	50,946

4.2.4 Energy Partner on Demand (Sch 26)

Regulatory Reference	Capacity (forecasted for end of year 2026)	Proposed Funding (2025-2026)	Cost Effectiveness (TRC)
Schedule 26 (Deferral UM 2234)	Summer 43.8 MW Winter 35.5 MW	$12,143,704 (Admin 46%, Incentives 54%)	1.29 (2023) 1.48 (2024) 2.59 (2025)

Table 31. Energy Partner on Demand (Schedule 26): Budget

Category	2024 (previously approved)	2025 (forecasted)	2026 (forecasted)	2025-2026 (current funding request)
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total	$5,406,410	$6,087,977	$6,055,727	$12,143,704

Note the above material increase in incentives budget from 2024 to 2025, which reflects an investment in participant communication to drive higher participation during event seasons.

Table 32. Energy Partner on Demand: Overview of Activity

Activity	Energy Partner on Demand (Schedule 26)
Connection to PGE's Flex Load Strategy	Energy Partner on Demand serves a key constituency and is the one of the largest contributors to Flex Load capacity and PGE's VPP goals. As such, the program is critical to PGE's strategic imperatives to electrify, perform, and decarbonize. It enhances grid reliability and efficiency, supports significant emissions reductions, and engages customers in the transition to a cleaner energy future.
Description	Energy Partner Schedule 26 is focused on large customers via custom load curtailment plans with monthly reservation incentive payments during Winter and Summer seasons, and event-based incentives for shifting their energy

Activity	Energy Partner on Demand (Schedule 26)
	consumption during seasonal Peak Time Events. Energy Partner Schedule 26 provides firm capacity and will evolve to provide intra-hour grid services. 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). The program is operated with technical sales and engineering staff (provided by our third-party implementer) who work on-site with customers to identify opportunities for and create a load curtailment plan. 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). This program offering is technology agonistic and flexible, with a mix of behavioral/manual participants and other customers who opt for direct load control. The energy storage component of the program[60] is managed in-house and does not utilize the third-party implementor other than for minor operational tasks such as sending earned incentive checks to customers.
Product Phase	The Energy Partner Schedule 26 transitioned from pilot program to a fully implemented program status effective January 1, 2022.[61]
Target Market	This program targets large commercial and industrial customers. Given the high variation and large end use loads this program, and similar to energy efficiency programs, targets are set by MW and measured by customer curtailment nominations. Current there are 117 customers across approximately 274 sites enrolled in the program. Program growth trends point to new enrollments coming from the addition of new sites and increase in customer curtailment nominations.
Coordination	As the opportunities within the large customer market begin to plateau, 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. PGE has been engaging in new customer marketing and recruitment activities targeted at small and medium businesses with our Energy Partner Smart

[60] Energy storage continues to be a small but emerging non-residential market, and PGE is taking steps to improve the technical functionalities through new dispatch strategies and to continue to support market education and awareness. These efforts will be dispatched through Schedule 26 and funded from Schedule 135 deferral as in the past, however due to the nascent nature of this technology within the larger more mature portfolio, Energy Storage efforts will be kept as a separate segment until they are more mature. See also Section 4.1.2.

[61] PGE (2021). *UM 2141 Flexible Load Multi-Year Plan 2022-202, Appendix B*. Retrieved from https://edocs.puc.state.or.us/efdocs/HAD/um2141had16243.pdf.

Activity	Energy Partner on Demand (Schedule 26)
	Thermostat pilot in order to continue the growth of the resource while retaining current customers by increasing event performance.
Changes since last filing, if applicable	The program did not meet its 2023 41.1 MW target but continues to grow, albeit at a slower rate than in previous years primarily due to its maturity within the current market. PGE is focused on engagement and participation. We have enhanced the approach to seasonal readiness meetings and outreach tactics. See Section 2.2.1 for detail on standardization of seasons and holidays across the Flex Load portfolio
Objectives	This program is currently not in the demonstration/ pilot phase as it has transitioned into a program as January 2022.
Evaluation	At the conclusion of each event year, the Energy Partner On Demand Program is evaluated by an independent firm.

Table 33. Energy Partner on Demand: Flex Load Acquisition (MW)

Flex Load Acquisition (MW)	2023	2024 Forecast	2025 Forecast	2026 Forecast
Summer	36.4	38.8	41.3	43.8
Winter	29.0	31.5	33.5	35.5

Table 34. Energy Partner on Demand: Customers Served [62]

Customers Served	2023	2024 Forecast	2025 Forecast	2026 Forecast
Energy Partner on Demand	n/a	n/a	n/a	n/a

[62] Energy Partner on Demand (Sch 26) target market is large C&I customers, with extended enrollment cycles which may not align with calendar year. As such, PGE measures program MW rather than enrollments.

4.2.5 Multi-family Water Heating

Regulatory Reference	Capacity (forecasted for end of year 2026)	Proposed Funding (2025-2026)	Cost Effectiveness (TRC)
Schedule 4 Multifamily Water Heater (Deferral UM 1827)	Summer 2.3 MW Winter 2.8 MW	$3,941,330 (Admin 84%, Incentives 16%)	0.16 (2023) 0.28 (2024) **0.29 (2025)**

Table 35. Multi-family Water Heating: Budget

Category	2024 (previously approved)	2025 (forecasted)	2026 (forecasted)	2025-2026 (current funding request)
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total	$1,656,500	$1,170,250	$2,771,080	$3,941,330

Subsequent to the approval of 2024 budget, the decision was made to continue to operate the pilot in "maintenance mode" (see Table 36 for detail).

Table 36. Multi-family Water Heating: Overview of Activity

Activity	Multi-family Water Heating
Connection to PGE's Flex Load Strategy	The Multifamily Residential Demand Response Water Heater Pilot aligns with PGE's strategic goal to plan, serve, and manage Flex Load. By integrating demand response technology into multifamily residences, the pilot enhances grid reliability and efficiency while supporting significant reductions in emissions. This initiative enables multifamily buildings to participate in demand response programs, contributing to PGE's flexible DER goals. PGE remains committed to maintaining an efficient and effective seasonal dispatch of the existing fleet.
Description	The Multi-family Residential Demand Response Water Heater pilot aims to retrofit existing water heaters in multifamily residences with demand response enabled technology. Launched in 2018, this pilot focuses on electric resistance water

Activity	Multi-family Water Heating
	heaters with a communication interface supporting Direct Load Control Events or a retrofitted device with a control switch in the power supply. Property managers receive annual incentives of $20 per installed device for five years. The program provides capacity and intra-hour energy flexibility, supporting reliability. Multi-family Property Owners can enroll their properties in this opt-out pilot, automatically enrolling residential customers unless they choose to withdraw. Notifications and instructions for opting out are provided at installation or when the resident moves in.
Product Phase	PGE launched the pilot in 2018. The pilot has been in design transition since 2022. Since January 2023, the pilot has been in maintenance mode, closed to new participants. PGE continues to operate the fleet of Wi-Fi and cell-enabled switches. Maintenance includes supporting currently enrolled participants and program management and dispatch of the existing fleet. PGE continues to test and assess learnings from dispatch strategies. PGE proposes to continue to operate the pilot in maintenance mode until such time as the pilot has been approved for re-opening to new enrollments on the following rationale: This pilot operates as an integral part of PGE's demand response portfolio. As one of the only programs able to provide consistent daily dispatch, the Pilot 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. This program also provides Flexible Load resources in a way that is unobtrusive to the customer. Water heaters are ubiquitous and, unlike other DERs such as batteries, thermostats, and rooftop solar, are rarely monitored or adjusted by the owner. 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. The combination of a dispatchable Flex Load resources that is unobtrusive to the customer and daily dispatch is of increasing value as PGE dispatches its Flex Load portfolio in response to energy conditions during multi-day weather events. In line with the Pilot objectives PGE will conduct efforts to better understand the energy consumption that is being shifted with the current fleet. PGE will also continue to evaluate dispatch strategies for the current fleet. These efforts, combined with testing underway by PGE's Smart Grid Testbed as well as regional efforts underway, will inform development of an expanded water heater program.
Target Market	At the onset of the pilot, PGE conducted an in-depth analysis of the residential water heater market, estimating an 87% market share for electric water heaters in multifamily residential buildings. This stability is due to property owners' and

Activity	Multi-family Water Heating
	managers' preference for decentralized systems, which allow them to avoid carrying utility costs and invoice tenants through their rent. Initially, PGE targeted owners and property managers of large multifamily buildings with 50 or more units for enrollment. As the pilot progressed and technology evolved, the focus expanded to include owners and builders of new construction multifamily properties. However, as noted in PGE's 2023 deferral filing[63]: *. . . due to continuous delays in the effective date of the CTA-2045 code, the Pilot extended cellular retrofits through 2022, with code finally taking effect in July 2023.* *Faced with persistent delays of the planned code change making CTA-2045-enabled water heaters the new baseline, the Pilot entered maintenance mode in 2023, focusing on managing the existing fleet."*
Coordination	PGE deployed this pilot with a third-party implementor. Throughout the pilot, PGE has collaborated with switch manufacturers to identify necessary capabilities, integrate communication features, and ensure proper functionality to achieve targeted demand reductions without inconveniencing customers. Our efforts have also included working with water heater manufacturers to integrate communication modules into more affordable units. Initially, only high cost "smart" water heaters had these capabilities, but technological advancements now offer broader connectivity options. PGE remains dedicated to evaluating the pilot in conjunction with a program redesign. Collaboration is key, and we prioritize engagement with stakeholders such as OPUC Staff and the Northwest Energy Efficiency Alliance to ensure a thorough evaluation and inform our program redesign based on technical insights and market channel learnings. Future program design may include expanding to both multi-family and single-family water heaters, and we plan to test these approaches within the PGE Smart Grid Testbed to gather more insights. One of the primary benefits of the pilot has been the opportunity to forge close partnerships with property and maintenance managers of participating properties. These relationships are essential for effective collaboration and successful program implementation.
Changes since last filing, if applicable	Our impacts have stabilized at approximately 0.20 kW per controlled device, indicating consistent performance. Notably, the removal of properties with low-connectivity Wi-Fi devices has significantly improved our outcomes. Despite these improvements Wi-Fi device connectivity challenges have continued to persist with the aging Wi-Fi fleet and we are actively collaborating

[63] PGE (2023). UM 1827 PGE's Application to Reauthorize Deferred Accounting of Incremental *Costs Associated with the PGE Demand Response Water Heater* Pilot. Retrieved from https://edocs.puc.state.or.us/efdocs/HAQ/um1827haq325933054.pdf.

Activity	Multi-family Water Heating
	with properties and stakeholders to address these connectivity issues. The deployment of more devices during events has resulted in higher kW impacts, demonstrating the efficacy of our strategies. We have continued to manage the existing fleet of both Wi-Fi and cellular connect switches and have made additional attempts to reset Wi-Fi routers at properties with ongoing connectivity problems. Some properties with persistent issues have been unenrolled since the beginning of the year. Additionally, we have been working with Grid Operations to determine the best dispatch strategies, particularly in relation to the "snapback effect" on the grid, to avoid spikes in load after a DR event. This work continues and will inform future dispatch strategies. In 2024, PGE performed a sensitivity test for MFWH cost-effectiveness to assess its economic viability and identify potential adjustments for future scalability. PGE continues to operate the pilot in lower cost maintenance mode as we seek additional means to reduce costs while still supporting grid stability and energy shifting objectives.
Objectives	The objectives of the Multifamily Residential Demand Response Water Heater Pilot are to quantify the energy consumption that can be shifted to different times from water heaters equipped with a communication interface supporting Direct Load Control Events or retrofitted with a control switch in the power supply to the tank. The pilot aims to further inform the design of a comprehensive water heater demand response program, determine appropriate incentive levels for multifamily property owners and residential customers, integrate and test various technologies, and implement different demand response dispatch strategies. Through these efforts, the pilot seeks to enhance the effectiveness and scalability of demand response initiatives for multifamily residences. In line with the Pilot objectives PGE will conduct efforts to better understand the energy consumption that is being shifted with the current fleet. PGE will also continue to evaluate dispatch strategies for the current fleet. These efforts, combined with testing underway by PGE's Smart Grid Testbed as well as regional efforts underway, will inform development of an expanded water heater pilot.
Evaluation	The impact evaluation provided a comprehensive assessment of DR impacts and informed future program improvements. Demand reductions from events in Summer 2022 and Winter 2022-23 have stabilized at 0.20 kW per controlled device as the program has matured. PGE continues to implement changes based on key findings and recommendations identified in the evaluation. These recommendations will inform the future implementation of a water heater program. Key points include addressing Wi-Fi connectivity issues, assessing cost-effective approaches for installation and maintenance, considering alternative delivery methods such as midstream incentives to promote CTA-2045 water heaters, and surveying existing customers for future design insights.

Table 37. Multi-family Water Heating: Flex Load Acquisition (MW)

Flex Load Acquisition (MW)	2023	2024 Forecast	2025 Forecast[64]	2026 Forecast
Summer	2.0	2.0	2.0	2.3
Winter	2.5	2.5	2.5	2.8

Table 38. Multi-family Water Heating: Customers Served

Customers Served	2023	2024 Forecast	2025 Forecast	2026 Forecast
Multi-family Water Heating	10,895	10,254	10,844	11,910

[64] Note that the Multi-Family Water Heating pilot's 2025 summer and winter capacity may vary by ~0.2 MW from that used in cost effectiveness calculations due to estimates of enrollment, unit savings, and attrition.

4.2.6 Energy Partner Smart Thermostat (Sch 25)

Regulatory Reference	Capacity (forecasted for end of year 2026)	Proposed Funding (2025-2026)	Cost Effectiveness (TRC)
Schedule 25 Nonresidential Direct Load Control Pilot (Deferral UM 1514)	Summer 2.8 MW Winter 0.7 MW	$2,995,460 (Admin 81%, Incentives 19%)	0.22 (2023) 0.12 (2024) 0.64 (2025)

Table 39. Energy Partner Smart Thermostat (Schedule 25): Budget

Category	2024 (previously approved)	2025 (forecasted)	2026 (forecasted)	2025-2026 (current funding request)
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total	$1,280,000[65]	$1,422,000	$1,573,460	$2,995,460

[65] Note the 2024 MYP Supplemental reflected a 2024 budget of $1,280,000; this updated to $1,700,000 for the subsequent deferral to account for incremental incentives, a DERMS integration for the BYOT channel, and significant increase in evaluation costs. The difference is mitigated by savings in year-to-date pilot operations. PGE (2023). UM 1514 PGE's Application for Reauthorization of Deferral of Incremental Costs *Associated with Non-Residential Direct Load Control Pilot.* Retrieved from https://edocs.puc.state.or.us/efdocs/HAQ/um1514haq325935054.pdf.

Table 40. Energy Partner Smart Thermostat: Overview of Activity

Activity	Energy Partner Smart Thermostat (Schedule 25)
Connection to PGE's Flex Load Strategy	The Nonresidential Direct Load Control Pilot embodies PGE's strategic imperatives to electrify, perform, and decarbonize. It enhances grid reliability and efficiency, supports significant emissions reductions, and engages customers in the transition to a cleaner energy future. By integrating demand response into its operations, PGE can better manage its clean energy resources, meet regulatory targets, and continue to lead in innovative, sustainable energy solutions. The Energy Partner Smart Thermostat program is critical to this effort, enabling commercial and industrial customers and small-to-medium business (SMB) customers, which typically use more energy than residential customers, to contribute to PGE's VPP goals.
Description	The Direct Load Control Pilot targets HVAC load curtailment using smart thermostats for commercial customers. Launched in 2017 and redesigned in 2022, Energy Partner Smart thermostats (Schedule 25) complements Energy Partner on Demand (Schedule 26), recruiting customers and installing qualified smart thermostats directly. This pilot allows small and medium-sized businesses to participate in demand response through a turnkey approach. Participants let PGE manage their thermostats during events, with the option to opt out. To qualify, customers need a qualifying rate schedule, a PGE network meter, an internet-connected thermostat, and a suitable heating or cooling system (ducted heat pump or electric forced air heating for winter; central air conditioning or ducted heat pump for summer). Event Limits: Up to two events per day, not exceeding five hours per day. Event Seasons: Events occur only during designated seasons, not on holidays, with a cap of 150 event hours per season. Incentives: Participants receive a free thermostat upon signing up through direct installation. They can earn up to $60 per site per season (up to $120 per year). Payments are made via ACH, check, bill credit, or gift card. To qualify for payment, thermostats must participate in at least 50% of event hours per winter and/or summer season. The Energy Partner Smart Thermostat program extends impact to commercial businesses, many of whom already participate in a residential demand response pilot or program. This program helps businesses reduce costs and earn incentives. Customers can get a free smart thermostat with professional installation from PGE and explore ways to save money, time, and energy. In May 2024, PGE launched the BYOT channel, offering a $100 reward for businesses enrolling with a qualifying thermostat. Customers in the direct installation channel receive a free thermostat but are not eligible for the $100 BYOT incentive.
Product Phase	Pilot in Design Transition (for detail, see "Changes since last filing, if applicable" section of this table)

Activity	Energy Partner Smart Thermostat (Schedule 25)
Target Market	The primary target market for the Direct Load Control Pilot are commercial customers with eligible heating and cooling equipment who either have or are willing to purchase a qualified smart thermostat. The introduction of the BYOT channel has leveraged industry OEM experience to engage customers who already own a qualified device. The program continues to grow steadily as we focus on increasing retention and adding new participants. There are over 69,000 eligible commercial customers based on Commercial SPIDs on Rates 32, 38, 47, 49, 75, 83, 85, 89, and 90. Applying a 20% awareness factor, consistent with best practices for managed accounts and those with qualifying heating or cooling systems, the addressable market includes at least 28,000 sites. At the end of 2023, PGE reported 2,250 thermostats enrolled. Our goal is to enroll at least 2,800 new thermostats per year. However, this has been challenging due to the economic effects of inflation. To boost enrollments, we eliminated the customer co-pay in 2024 and introduced the BYOT delivery channel. These changes are part of our expanded recruitment efforts to align the program with broader outreach strategies and increase participation.
Coordination	We will continue working closely with our third-party implementer to deploy thermostat incentives through the BYOT channel, alongside enhanced outreach and education efforts to engage commercial customers. The latter includes a holistic customer experience, direction outreach, and OEM marketing. Collaboration with the Energy Trust of Oregon is crucial to ensure installations meet energy efficiency eligibility requirements, thereby offsetting thermostat and installation costs. This coordination aims to eliminate the co-pay for commercial customers, which has previously hindered program growth. We plan to continue cost-sharing into 2025 with the Energy Trust, enhancing cost-effectiveness and reducing expenses for customers.
Changes since last filing, if applicable	In 2024, PGE filed a tariff update, incorporating a BYOT option for commercial customers. We pursued OEM integrations with our provider to eliminate costly and time-intensive customizations, expanding the number of qualified devices from 2 to 15, including prevalent communication-enabled commercial thermostats. This is expected to accelerate Flex Load enrollment. By aligning implementation and delivery channels with customer segments and technology, PGE aims to lower implementation costs and attract additional customers to the pilot. PGE expects additional efficiencies with an implementation RFP in Q3 2024. As program growth continues, the limited availability of qualified thermostats in the commercial space are expected to lead to higher direct costs for thermostats in the direct install segment. Another important thing to note is that the discontinuation of the ecobee EMS-si will necessitate replacement thermostats for Direct Install customers as early as 2025, as they will no longer be supported for demand response dispatch after losing ecobee support.

Activity	Energy Partner Smart Thermostat (Schedule 25)
	See Section 2.2.1 for detail on the standardization of seasons and holidays for Schedules 5, 7, 8, and 25).
Objectives	The Direct Load Control Pilot aims to enroll and manage connected commercial thermostats to control electric heating and cooling loads, providing PGE with firm capacity. PGE is focusing on growth by collaborating with an additional demand response management system software vendor and introducing an additional 15 qualified thermostats, expected to drive increased enrollment due to Honeywell's substantial market share. The strategy includes shifting from prioritizing new installations to broader enrollment strategies, reducing costs, and leveraging existing customer equipment. Enhanced outreach and education efforts aim to boost total enrollment, informed by understanding customer drivers for thermostat adoption. Insights from these efforts will be used to improve program performance, with continued stakeholder collaboration ensuring efficiency savings contribute to organizational goals. By the end of Q3, PGE plans to reconfigure program resources and rebid third-party implementer services to support these initiatives.
Evaluation	The results of the evaluation (not yet filed) are inconclusive, with a downward bias. It is challenging to measure the load impacts of thermostats in commercial spaces due to the variation in configuration and uncertainty in load patterns compared to large commercial and industrial (C&I) DR programs. To address this, evaluation of this pilot relies on a statistical modeling approach to develop load impacts.

Table 41. Energy Partner Smart Thermostat: Flex Load Acquisition (MW)

Flex Load Acquisition (MW)	2023	2024 Forecast	2025 Forecast	2025-2026 Forecast
Summer	0.6	2.2	3.5	4.4
Winter	0.2	0.5	0.2	0.3

Table 42. Energy Partner Smart Thermostat: Customers Served

Customers Served	2023	2024 Forecast	2025 Forecast	2026 Forecast
Energy Partner Smart Thermostat	2,267	5,348	6,668	7,668

4.2.7 Residential EV Charging

Regulatory Reference	Capacity (forecasted for end of year 2026)	Approved Funding (2025)[66]	Cost Effectiveness (TRC)
Schedule 8 Residential Electric Vehicle Charging Pilot, funded via Transportation Electrification Plan (UM 2033)	Summer 3.3 MW Winter 3.5 MW	$2,130,409 (Admin 53%, Incentives 47%)	N/A

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.

4.3 Grants

The Smart Grid Advanced Load Management and Optimized Neighborhood (SALMON) is a regional collaboration with Energy Trust of Oregon, Community Energy Project, NEEA, and the National Renewable Energy Lab. The project was funded, in part, by a $6.65M grant from the US DOE and seeks to demonstrate the value of distributed energy resources in grid operation. To accomplish this, the project aims to retrofit ~580 community buildings, with a mix of DERs, including efficiency measures, connected devices, distributed solar, energy storage, and smart charging, improving efficiency by an average of 10%, while building up to 1.4 MW of flexible load. The project is focused within the Overlook/Arbor Lodge area, a historically underserved community, and is being implemented within PGE's Smart Grid Testbed Program portfolio.

The Flex Load resources developed through this project will be integrated into PGE's Advanced Distribution Management System (ADMS)/Distributed Energy Resource Management System and optimized by the National Renewable Energy Lab (NREL) to demonstrate bulk services, including energy, capacity, and frequency response, as well as distribution services, including capacity relief, power quality, and Volt/Var optimization, including Conservation Voltage Reduction (CVR).

The results of this work will be shared regionally and could spur a realignment of utility planning and operation. In addition, the results could drive a market change for efficiency and load flexibility in the Pacific Northwest region by accounting for the full value of Distributed Energy Resources as an operational resource. This effort will also provide valuable insights into how utilities must plan for and

[66] Funding for Residential EV Charging pilot is provided through the Transportation Electrification Plan. We include a brief overview of the pilot here in the interest of presenting a holistic picture of Flex Load activity, to which the pilot contributes. Note also that since the funding cycles of the MYP and TEP differ, we only include 2025 pilot funding (2026 pilot funding has not yet been proposed). Further detail on the pilot can be found in PGE's 2023 Transportation Electrification Plan (UM 2033).

integrate these assets; the co-benefits of efficiency and flexibility measure adoption; the challenges and solutions needed for contractors to participate in this new market; and how historically underserved communities can be effectively engaged in flexible load programs.

The project timeframe is June 2021–August 2027, with goals, objectives, and budgets approved on a roughly annual cadence. Learnings thus far include implementation of our ADMS at NREL's testbed facility; determining validity of community modeling and ability to estimate DER scenario impacts to the project area grid; testing program design elements and effectiveness of co-delivery strategy to drive customer participation.

4.4 Emerging Opportunities

PGE continuously assesses additional Flex Load opportunities. This section describes several opportunities under consideration and the factors which might inform a decision to pursue the activity.

4.4.1 Commercial Behavioral Demand Response

PGE continues to look for opportunities to increase both the percentage of C&I customers engaged in Flex Load programs as well as the MW of DR contributed. Some barriers to C&I enrollment which PGE has encountered thus far are the large variation of commercial system configurations, the complexity of the tenant-to-ownership relationships, and the ensuing difficulty establishing who can authorize device installation and/or changes required for dispatchable Flex Load integration.

One potential solution under consideration is a DR solution that does not require technology to participate. Under this concept, PGE would notify customers of an upcoming event and they would self-select their participation level and manually adjust HVAC and/or lighting level. PGE could pay for performance by measure participation by comparing interval data to baseline.

The target market under consideration would be small and medium non-residential customers who take service under Schedules 32, 83, and 85. PGE estimates a serviceable and addressable market size of 11,000.

A behavioral approach provides C&I customers who have control over their operations but not their building or building systems (e.g., a business in a multi-tenant space) a means to participate in demand response and decarbonization.

4.4.2 Standard Custom Commercial Offering

PGE has observed a growing number of distribution-sited resources which fall outside the bounds of current Flex Load programs, but which might be reached via a semi-custom engagement strategy. Examples include:

- Manufacturing facilities that have large thermal tanks and can effectively shift energy load, but are not good candidates for existing multi-hour programs given their time to dispatch and longer periods of load shift
- Campuses with central utility plants which could engage in prolonged and repeated thermal load shifting
- Real estate developments considering large, standalone battery systems as part of district-scale project

PGE could develop a consistent structure by which to value specific flexibility parameters such as the $/kW paid for controls, the maximum paid per capacity avoidance, and the means by which energy reduction would be valued. While the structure of agreement could be established at a programmatic level, specific details such as dispatch limitations would be unique to each agreement.

Such an offering is best suited to large C&I customers, as well as developers and operators of assets offering flexibility at the distribution system level. As currently conceived, the offering could be applicable to both customers and property owners within PGE's service territory.

PGE will continue to monitor this emerging opportunity to assess the full market potential.

4.4.3 Single Family Water Heating

PGE will explore the development of a single-family water heater pilot based on results from NEEA's End Use Load Flexibility project. We will incorporate learnings from the Multifamily Water Heater Pilot, Smart Grid Testbed, and previous single-family water heater proposals. Pilot design is expected to begin in 2025, and a pilot proposal will be brought for review. As PGE identifies and assigns values to the grid services demonstrated from water heater we expect our assessment of cost effectiveness of water heater to demonstration a viable pathway for deployment. We will update Staff through the Demand Response Advisory Group.

4.4.4 Renter + Landlord Engagement

PGE understands that the split incentive between renter and landlord is a market issue which significantly hinders renters' participation in flexible load programs. Renters currently represent about 50% of residential customers in PGE's service area. PGE will be exploring requirements in 2025. Any offering must address customer data privacy, access, and use. Proposals to address the renter/landlord split incentive issue would be expected no earlier than Q1 2026.

4.4.5 Additional Means to Simplify and Expand Flex Load Participation

As PGE engages additional market segments, we will explore how to simplify Flex Load participation. PGE is evaluating whether a single, multi-faceted program might simplify customers' enrollment and participation experience. Additional research and an assessment of feasibility is required.

PGE will also explore alternatives to expand flex load participation such as gamification including points-based rewards/credits, as well as local "cooling partner" businesses during Flex Load events, other non-monetary rewards, or rewards outside of event participation.

Should PGE determine that these concepts are worthy of further exploration, we look forward to discussions with stakeholders in forums such as the DSP workshops and/or DRAG meetings in Q2 2025 or later.

4.5 Related Activity

4.5.1 Transportation Electrification

PGE's Transportation Electrification strategy is to plan, serve and manage EV load equitably.[67] PGE is currently conducting several pilots to manage EV charging. These pilots test PGE's ability to shift EV charging to off-peak time periods while still meeting customer's charging needs (e.g., timing of charge).

The Residential Smart Charging pilot (see Section 4.2.7) provides an upfront incentive to residential customers to shift EV charging via the customer's home Level 2 EV charger or via their vehicle through telematics.

PGE has also undertaken two TE demonstrations in the Smart Grid Testbed:

- An EV Charging Study (see Appendix B.1) to better understand how and when customers charge their vehicles and how PGE can collaborate with customers to optimize charging schedules with the needs of the distribution system.
- A Vehicle-to-Everything (V2X) demonstration (see Appendix B.6), which seeks to perform managed charging of electric vehicles using onboard telematics. It seeks to optimize vehicle charging around grid considerations and utilize the V2X capabilities to shift and reduce customer load during peak times and also provide advanced grid services during Peak Time Events. This demonstration runs from 2024 and early 2025. Past vehicle-to-grid (V2G) demonstrations of technical feasibility have shown the functionality is new and requires further technology advances in order to provide the services through a pilot. The learnings from the demonstrations will be utilized to determine the potential value of V2G and if a pilot would be beneficial to prove out the value further.

PGE is also testing the efficacy incentives for commercial EV fleet customers to shift their charging outside of on-peak time periods while still meeting their business needs. These tests will explore strategies such as time-of-use education, demand response, and optimized charge management. PGE understands that there won't be one-size-fits-all solution and expects to provide multiple future options to fleet customers due to the various fleet use cases of how vehicles are utilized to support their business needs.

PGE will also test the feasibility of shifting commercial managed charging to more grid-beneficial times for non-fleet use cases. PGE will investigate a commercial EV-specific time varying rates, workplace demand response, as well as continued research into how to manage and shift charging at multifamily sites.

PGE has determined to manage public charging through rate structures rather than programs. Many public charging sites will charge an off-peak and on-peak rate based on factors of electricity costs and charger availability. PGE owns seven fast charging sites and has started installing additional level 2 pole chargers in residential neighborhoods to support the TE transition for those customers without access to EV charging in their driveway or garage. PGE-owned chargers utilize Schedule 50 (see Section 2.2.3) to encourage customers to charge outside of peak timeframes. PGE will continue to assess commercial time varying rate schedules' effectiveness to incent non-PGE owned public charging to occur outside of peak timeframes.

[67] PGE (2023). *Transportation Electrification Plan*. Retrieved from https://edocs.puc.state.or.us/efdocs/HAH/um2033hah15818.pdf.

Chapter 5. Cost Effectiveness Practice

This section describes PGE's cost effectiveness practice. For results of the benefit cost analyses and ratios presented in the body the document, see Table 3 and Section 4.2.

Chapter 7 of PGE's 2022-2023 Flex Load Multi-Year Plan[68] featured an in-depth discussion of benefit-cost analysis (BCA) for the resource, as well as a review of relevant National Standard Practice Manual (NSPM)[69] standards. In their conclusory report, Staff noted that they "appreciate[] PGE's efforts to evaluate cost effectiveness and look[] forward to hearing PGE's recommended changes to the methodology."[70]

The changes presented herein further that discussion, and better align PGE's cost effectiveness practice with regional, local, and industry-wide best practice. In addition to providing new perspectives on the economic value of the Flex Load resource, PGE also anticipates these changes may inform future activities such as non-wire solutions.

The following sections present current adjustments to PGE's cost effectiveness practice for Flex Load, spanning refinement of incremental costs, incorporation of a broader set of values used to assess other demand side management resources, and the time frame of analysis. The chapter then concludes with brief discussion of prospective adjustments also under consideration.

5.1 Current Adjustments

5.1.1 Current Adjustment I. Recalculate TRC Costs to Account for Energy Trust of Oregon Incentives

*Note that this adjustment **is** reflected in the benefit cost analyses and ratios presented in the body the document (Table 3 and Section 4.2).*

This adjustment to the cost effectiveness methodology of Flex Load programs addresses the treatment of incremental costs for Energy Trust of Oregon incentives and participant costs.

Historically, cost effectiveness evaluations for Flex Load programs co-deployed with external parties have not accounted for funding from those sources. Such external funding has only been accounted for in the participant cost test's (PCT) measure of direct financial benefits to a customer's household; it is missing from the total resource cost test (TRC).

[68] PGE (2021). *Flexible Load Multi-Year Plan 2022-2023.* Retrieved from https://edocs.puc.state.or.us/efdocs/HAD/um2141had16243.pdf.

[69] The National Standard Practice Manual provides a comprehensive framework for evaluating the cost-effectiveness of distributed energy resources. It emphasizes the identification, incorporation, and documentation of benefits and costs in DER program assessments. The framework is intended to ensure that the cost-effectiveness evaluation of these resources is comparative to alternatives such as high-cost market purchases and traditional utility investments. Case studies on the application of the manual by utilities and regulatory bodies can be found at https://www.nationalenergyscreeningproject.org/national-standard-practice-manual/nspm-application-by-state/.

[70] OPUC (2022) *Staff Report: PGE's 2022-2023 Flexible Load Multi-Year Plan*. https://apps.puc.state.or.us/orders/2022ords/22-023.pdf.

In 2018, OPUC staff provided guidance to the Trust regarding the co-mingling of incentives with specific non-PPC funds.[71] That guidance states that, where present, complementary funds should be treated as cost reductions in TRC calculations. Eligible sources of complementary funding include:

- Tax credits for energy efficiency measures
- Governmental grant programs, such as the Portland Clean Energy Fund
- Non-governmental grant programs, such as those offered by Community Based Organizations (CBOs)
- Ratepayer funds complementary to energy efficiency, such as those provided by utility demand response programs
- Low-income energy efficiency funding within specific frameworks defined in UM 2025[72]

Accounting for energy efficiency incentives and other non-DR funding makes PGE's benefit-cost analyses symmetrical with Energy Trust of Oregon's treatment of DR incentives in their valuation of energy efficiency without double counting cost credits. Adoption of this approach has a significant TRC impact for direct install programs, which bear the full costs associated with participation.

PGE has adjusted its treatment of Flex Load programs co-deployed with Energy Trust of Oregon (such as Residential Smart Thermostats and Energy Partner Smart Thermostat), now deducting Energy Trust of Oregon incentives from program costs. In the past the incentives provided by the Energy Trust were not accounted for in TRC cost calculations. Accounting for these types of incentives in the TRC results in a reduction of costs, thereby properly accounting for the benefit of non-DR incentives based on OPUC guidance.

PGE is also exploring additional adjustments to the treatment of costs for co-funded or co-deployed programs, as detailed in Prospective Adjustment III, below.

5.1.2 Current Adjustment II. Incorporate UM 1893 Energy Efficiency Avoided Cost Values

*Note that this adjustment **is** reflected in the benefit cost analyses and ratios presented in the body the document (Table 3 and Section 4.2).*

Current PGE demand response avoided costs consist of avoided generation capacity and line loss values, which are a subset of the input suite for energy efficiency avoided cost calculations in UM 1893.

This adjustment to cost effectiveness methodology incorporates all UM 1893 avoided cost values used by Energy Trust of Oregon including transmission and distribution deferral credits, risk reduction value, and the regional conservation credit, detailed below. PGE reviewed the application of both the transmission and distribution deferral and avoided costs in other jurisdictions, and also their calculation in the PGE Avoided Cost Study (submitted as part of the GRC). We believe the application of the T&D avoided cost value in UM 1893 should be revised to better reflect to direct impact of demand side management resources to the distribution and transmission system generally.

[71] OPUC (2018). UM 2025, Order No. 19-232 *Memo: Guidance for Combining Funds Between Energy Efficiency Ratepayer Money and Other Sources of Money*. Retrieved from https://apps.puc.state.or.us/orders/2019ords/19-232.pdf.

[72] OPUC (2019). UM 2025, Order No. 19-232 Recommendations to Establish a Methodology for Reviewing Collaborations between Energy Trust of Oregon and Other Organizations Who Are Funding Low Income Energy Efficiency. Retrieved from https://apps.puc.state.or.us/orders/2019ords/19-232.pdf.

PGE plans to provide a new perspective and approach for review by the Commission and stakeholders in our upcoming DSP filing.

Note that this filing reflects PGE's initial application of these UM 1893 values to this resource. PGE recognizes that while demand response and energy efficiency are similarly situated customer resources, they operate differently. Therefore, PGE will, prior to the next MYP, explore the efficacy of using the T&D deferral value for this analysis and whether a different T&D deferral methodology for demand response is warranted. Should a different value arise, PGE will share it OPUC Staff.

5.1.2.1 Transmission and Distribution Deferral Credits

PGE proposes incorporating transmission and distribution infrastructure deferral values to its benefit-cost testing methods. This change reflects the comprehensive value which these programs offer to the electric grid. Transmission and distribution systems constitute a significant portion of utility infrastructure costs, and any reduction or deferral in the need for these investments can result in substantial cost savings. The inclusion and use of these UM 1893 avoided cost submission values in demand response cost effectiveness analysis is in line with California Demand Response Cost Effectiveness Protocols[73], which the Commission Staff directed PGE to use beginning in 2016.[74] It is also in line with UM 1893 avoided costs, and the Northwest Power Conservation Council's 8th Power Plan[75], which incorporated regional demand response and the National Standards Practice Manual for Distributed Energy Resources.

5.1.2.2 Risk Reduction Value

To align more closely with local energy efficiency avoided cost valuation, PGE is incorporating the risk premium $/MWH submitted with UM1893 avoided cost updates. This value represents demand-side management's contribution to reducing exposure to market volatility, over and above forecasted energy prices, during high load hours.

PGE will explore avenues to refine the value of avoided market purchases of energy during DR events to better define the risk reduction value of flexible load resources. PGE recognizes this potential value, as does Staff, which recently requested the historic market prices during periods where PGE's demand response portfolio was dispatched.

5.1.2.3 Regional Conservation Credit

The NW Power Act credit was written with electric energy efficiency in mind but does not exclude its application to other demand side management resources.[76] Both the Regional Technical Forum's measure guidelines and UM 1893 apply the 10% credit to natural gas and electricity to incorporate difficult-to-quantify benefits associated with demand side management practices. Demand response

[73] California Public Utility Commission (2016). *2016 Demand Response Cost Effectiveness Protocols*, *Section 3B: Avoided Costs of Supplying Electricity, pp.26-29*. Retrieved from https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/demand-response/cost-effectiveness/2016-dr-cost-effectiveness-protocols---clean.docx.
[74] See Oregon public Utilities Commission Dockets UM 1708 and UM 1514 (2016)
[75] Northwest Power Conservation Council (2021). *The 2021 Northwest Power Plan*. Retrieved from https://www.nwcouncil.org/fs/17680/2021powerplan_2022-3.pdf.
[76] Northwest Power Conservation Act of 1980 Section 839d(a)

and Flex Load are similarly situated to energy efficiency in regard to benefits of the activity, which are at present difficult to quantify.

Usage of the Power Act credit is core to Northwest Power and Conservation Council (NPCC) energy planning efforts. Several utilities and entities across the Pacific Northwest have implemented the 10% conservation credit under the Northwest Power Act. Notable examples include Bonneville Power Administration (the largest power supplier in the region), which incorporated the credit to reduce peak demand and avoid construction of new power plants and Seattle City Light (one of the largest public utilities), which heavily invested in DSM and benefits from the credit. Smaller utilities such as Clark Public Utilities and Eugene Water and Electric Board have also utilized the credit to encourage investments in efficiency. The Northwest Energy Efficiency Alliance has also played a key role in regional adoption of these measures.

The application of the regional conservation credit to demand response resources aligns with its application to other demand side management practices. A recent example of this was PGE's 2023 Integrated Resource Plan, which utilized the credit to account for unknown, unquantified benefits of DSM measures in its modeling of Community Based Renewable Energy serving vulnerable communities.

The application of the regional conservation credit to demand response resources aligns with its application to other demand side management practices. A recent example of this was PGE's 2023 Integrated Resource Plan, which utilized the credit to account for unknown, unquantified ancillary benefits of DSM measures in its modeling of Community Based Renewable Energy[77] serving vulnerable communities.

In line with the latest UM 1893 update[78], PGE applies the regional credit to all components of the avoided costs considered in BCA.

5.1.3 Current Adjustment III. Time Frame of Benefit-Cost Analysis

*Note that this adjustment **is not** reflected in the benefit cost analyses and ratios presented in the body the document (Table 3 and Section 4.2). Rather it provides an additional perspective to consider when making decisions regarding incremental investment.*

This adjustment to our cost effectiveness methodology for Flex Load programs adds a forward-looking benefit-cost perspective. This change aligns with the national standard practice manual approach to valuing distributed energy resources.[79]

To date, PGE's Flex Load programs have been evaluated for cost-effectiveness solely on a "full lifecycle" methodology. Such treatment includes the net present value (NPV) of all benefit and cost streams back to the first year of a program's economic life through to its anticipated sunset. This view

[77] Portland General Electric. *2023 Clean Energy Plan and Integrated Resource Plan, Chapter 7: Resource Options.* Portland General Electric, 2023, p. 143. Retrieved from https://assets.ctfassets.net/416ywc1laqmd/3pRvjUAdaEA6Wzk8yBUEsE/cafdf75509cf7c3432773e9809074954/2023_CEP-IRP_Ch_07.pdf.
[78] Oregon Public Utility Commission. (April 24, 2024). *Staff Report on UM 1893, p.7.* Retrieved from https://edocs.puc.state.or.us/efdocs/HAU/um1893hau328091055.pdf.
[79] National Efficiency Screening Project (2020). *National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources*. Page 2-6. National Efficiency Screening Project. Retrieved from https://www.nationalenergyscreeningproject.org/wp-content/uploads/2019/06/NSPM-for-DERs.pdf.

is useful when comparing DR programs to other long-lived capital assets. The time horizon considered in the full lifecycle analysis is shown below in Table 43.

Table 43. Flexible Load Full Lifecycle Time Horizon Considered in Cost Effectiveness Evaluation

Flex Load Pilot/Program	Full Lifecycle Benefit-Cost Start Year	Full Lifecycle Benefit-Cost End Year
Residential Smart Thermostat	2017	2036
Peak Time Rebates	2019	2030
Time of Day	2021	2030
Energy Partner on Demand (Sch 26)	2017	2042
Multi-Family Water Heater	2018	2042
Energy Partner Smart Thermostats (Sch 25)	2023	2032
Flexible Load Portfolio	2017	2042

The addition of a forward-looking perspective accounts for the present value of benefits and costs from a base year through to the program's anticipated sunset. For this MYP submission, the base years considered in the forward-looking analysis will be the funding years 2025 and 2026.

This approach more closely mirrors Integrated Resource Plan modeling of the future costs and benefits of energy generation and acquisition, energy efficiency, and also demand reduction options.[80]

While past costs and benefits are useful to assess lessons learned and relative performance of a program over time, relying solely on a full lifecycle benefit-cost analysis has drawbacks for program decision-making. Attempts to tie specific values of portfolio costs over the full lifecycle can result in erroneous conclusions about current and potential cost-effectiveness. This is because, as a program ages, the preponderance of past costs and benefits increasingly outweigh the impact of any current design changes, which interferes with incremental investment decision-making. A forward-looking perspective provides the needed lens to make appropriate decisions regarding applicable incremental investment.

[80] IRP modeling does not generally consider past expenditures or sunk costs in decision-making, instead emphasizing the prudence and public interest of future investments.

Table 44. Additional Cost Effectiveness Perspective III: a Forward-Looking Time Frame

Activity	Full Lifecycle TRC (2025-2026)	Forward-Looking TRC (2025-2026)
Residential Smart Thermostats	3.90	5.00
Peak Time Rebates	1.13	2.41
Time of Day	2.52	4.40
Energy Partner on Demand	2.59	4.19
Multi-family Water Heating	0.29	0.69
Energy Partner Smart Thermostat	0.64	0.75
Flex Load Portfolio	2.07	3.45

Table 44, above, illustrates the impact which a "forward-looking" perspective can have on benefit cost analyses. Consider the implications for Multi-family Water Heating, where a "full lifecycle" TRC of 0.29 might indicate significant issues with the current approach and, perhaps, that the pilot be discontinued. Such a decision would have particularly dire consequences for the portfolio, as Multi-family Water Heating is one of the only offerings able to provide consistent, daily dispatch, providing capacity, intra-hour energy, and a foundation for other DR programs to offer intra-hour grid services to support reliability. When reconsidered independent of historical costs, the TRC improves to 0.69. This "forward-looking" perspective indicates improved recent performance and helps support the case for continued investment in this important resource.

Note that a "forward-looking" perspective may also benefit those activities with a "full lifecycle" TRC already greater than one. If that perspective unlocks additional incremental investment, it could allow the utility to reach hitherto untapped segments of the market, contributing to the continued growth of the resource.

PGE is also exploring additional adjustments to the level of cost effectiveness analysis, as detailed in Prospective Adjustments section, below.

5.2 Prospective Adjustments to Cost Effectiveness

This section outlines additional adjustments opportunities to explore the additional value Flex Load programs provide to both consumers and the grid.

5.2.1 Prospective Adjustment I. Level of Benefit-Cost Analysis

This prospective change to cost effectiveness for Flex Load programs addresses the level of benefit-cost analysis.

Thus far, cost-effectiveness testing has relied on forecasting all non-incentive costs to a high degree of specificity at the program level and well beyond the funding cycle of many programs. This approach can lend itself to large "swings" in the Total Resource Cost Test of individual programs. For example, a program may be carrying the cost of yearly or bi-yearly evaluations. While evaluations

yearly or every six months may be initially warranted, it is financially burdensome to assume such costs will be carried similarly throughout the lifecycle of the program. Carrying the assumed costs of yearly or bi-yearly evaluations through a life-cycle cost effectiveness assessment of the program might lead one to conclude, erroneously, that the program activity is non-cost effective and should be shuttered. Administrative costs are likely to be overestimated if cost effectiveness methodologies assume said costs are not reduced on a proportional basis through program maturation.

PGE proposes to address this issue by reallocating costs not directly associated with ground-level program operation to the portfolio level, (e.g., planning and evaluation services, marketing, program administration) and redistributes them based on the avoided costs achieved by each program.

Under this approach, costs are fully accounted for whether they are evaluated at the program or portfolio level. Note that this method *does not* exclude non-specific program costs when assessing the cost-effectiveness of an individual program – such as program management contractors. This change more closely aligns with National Standard Practice Manual guidance which recommends non-variable costs be moved up within a DSM portfolio.[81]

Energy Trust of Oregon uses a similar practice, which allocates internal costs based on incentive and contractor expenses within its portfolio and programs.[82]

Figure 2, below, is an example of Energy Trust's electric efficiency internal costs following the combined contractor and incentive expenditure.

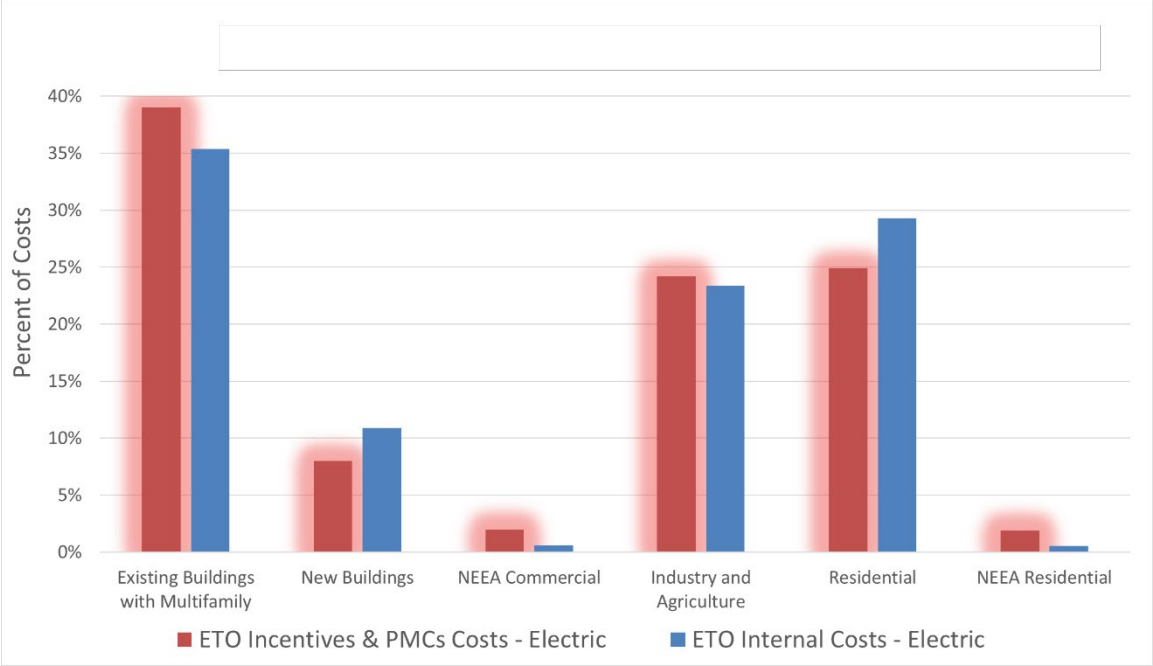

Figure 2. Expenditures by Major Program and Utility[83]

[81] National Efficiency Screening Project. *National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources*. Section H.1.6, page H-4. National Efficiency Screening Project, August 2020.
[82] Energy Trust of Oregon (2024). *Final Proposed Financial Reports 2024-2025*. pp 11-12. Retrieved from https://www.energytrust.org/wp-content/uploads/2023/10/Financial-Reports_2024-2025.pdf.
[83] Ibid, p.6 for examples of Energy Trust's internal costs allocated using this method.

This approach to cost allocation is in line with Staff's support to shift planning to a portfolio-level[84]. Note that PGE will continue to provide program-level cost effectiveness, which incorporates the perspective developed above.

5.2.2 Prospective Adjustment II. Add a Marginal One-year, Forward-looking Perspective

Consider adding marginal one-year perspectives on program benefits and costs in line with the Regional Technical Forum, and also the established budgeting practice of the Energy Trust[85]. This perspective would allow for directly comparable valuation of DSM resources between Energy Trust of Oregon and PGE, which should assist in co-deployment/co-development of measures which carry both energy efficiency and demand response benefits.

A further benefit of this approach is that the costs and benefits are well known and immediate, helping assess the viability of the near-term activity and identify miscounted benefit or costs to inform more prompt programmatic changes if need be. Note this approach also requires program cost reallocation to understand how the activity and the immediate program changes affect the total portfolio costs.

5.2.3 Prospective Adjustment III. Leverage the UM 1893 Energy Trust of Oregon Updated Avoided Cost Tool to Accelerate DR/EE

As noted in Prospective Adjustment I., above, assessment of potential DR offerings where devices are both controllable and more efficient than baseline, co-funding should be prioritized. This increases the value to both customers and the grid within that program design or framework (e.g., ENERGY STAR demand response-enabled room air conditioners or portable heat pumps).

Access to the UM 1893 Energy Trust of Oregon updated avoided cost tool could provide an opportunity to accelerate DR/EE co-deployment. This tool could facilitate "back of the envelope" calculations to estimate DR avoided cost value, as well as EE value by using regional approved savings, measure life, and incremental cost values (e.g., RTF, California DEER database) to identify opportunities to bridge cost gaps.

5.2.4 Prospective Adjustment IV. Quantifying Flex Load's Mitigation of Market Insufficiency

In addition to the values noted above, PGE is exploring real-time market risk reduction value or dispatch value of demand response. As discussed, with Current Adjustment II., this could include the creation of more precise estimates of avoided market costs during specific DR event hours.

PGE recognizes that demand response resources can help bridge periods of market insufficiency, where PGE might otherwise be forced into an emergency position or bridge these periods of market resource scarcity. While this value can be hard to quantify, recent events where resource scarcity and transmission pathway congestion nearly precipitated an emergency grid event, the demand response resource's load reduction was sufficient to mitigate the emergency, thus foregoing service disruptions. PGE is not currently capable of quantifying this value but is actively working to address

[84] OPUC (2021). *UM 2141 – Order 21-158: Acceptance of Flexible Load Plan*, Appendix A, Page 4. Retrieved from https://apps.puc.state.or.us/orders/2021ords/21-158.pdf.
[85] See footnote 82.

this gap and will update Commission Staff on our progress through our Demand Response Advisory Group meetings.

5.2.5 Prospective Adjustment V. Locational Value

PGE's assessments of Non-Wires Solutions within the Distribution System Plan have surfaced the inherent locational value of distributed energy resources such as Flex Load and demand response. We look to extend this work by integrating our AdopDER model outputs with the CYME distribution system model. This integration will help PGE better understand the potential locational value signals of DER investment, and ultimately help direct DER investment.

PGE efforts to define avoided costs based on geographic areas are ongoing. This work will allow for more specific avoided costs related to targeted deployment and utilization of Flex Load and demand response. PGE expects these insights to help focus customer outreach and recruitment on those areas of the service territory which would provide greater value to the entire customer base.

5.2.6 Prospective Adjustment VI. Demand Response Credit towards Western Resource Adequacy Program Obligations

PGE is also exploring the value of DR contributions to Western Resource Adequacy Program (WRAP). PGE is working with the WRAP, whose obligations become a binding in 2027, to have DR resources meet some portion of PGE's WRAP obligations. As discussions mature, PGE will update Staff on the credit which demand response may receive through this process. Should demand response be granted this credit, PGE will attempt to quantify and include it in assessments of cost effectiveness.

Note that, in addition to being a compliance requirement, DR's contribution to WRAP obligations is an incremental benefit in addition to the marginal avoided generation capacity needed to meet PGE's current system peak demand.

5.3 Next Steps

PGE believes the above current and prospective changes to Flex Load cost effectiveness methodology represent incremental steps to more appropriately value the resource. PGE wishes to thank Staff and stakeholders for their contributions to the work and looks forward to further engagement on the issue.

Appendices

Appendix A. Portfolio Budgets by Category

The following are an alternative presentation of information provided in Section 4.2 organized here by cost category across the portfolio:

Table 45. Portfolio Budget: Incentives

Category	2024 (previously approved)	2025 (proposed)	2026 (proposed)	2025-2026 (proposed)
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 46. Portfolio Budget: Program Operations

Category	2024 (previously approved)	2025 (proposed)	2026 (proposed)	2025-2026 (proposed)
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 47. Portfolio Budget: Evaluation

Category	2024 (previously approved)	2025 (proposed)	2026 (proposed)	2025-2026 (proposed)
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 48. Portfolio Budget: Education and Outreach

Category	2024 (previously approved)	2025 (proposed)	2026 (proposed)	2025-2026 (proposed)
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Appendix B. Detail on Smart Grid Testbed Activity

B.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
    - Contract and administer EM&V

For a more detailed review of these activities please see PGE's 2021 SGTB Phase II Proposal.[86]

B.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.[87] 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:

[86] 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.
[87] Further detail on the PGE Testbed Smart Solar Study page: https://portlandgeneral.com/smart-grid-test-bed-solar-study.

- Complete testing of use cases by end-of-year 2024
    - Assess feasibility of testing 2030.5 functionality
- Ongoing data collection, review, and analysis
- Inform UM 2111 discussion and decision of standardized inverter settings[88]
- Contract and administer EM&V

For a more detailed review of these activities please see PGE's 2021 SGTB Phase II Proposal.[89]

B.3 Testbed 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.

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 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:

[88] 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.
[89] 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.

- 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
    - Establish device communication pathway and platform
- Schedule demand response 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.[90]

B.4 Testbed 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 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 Q4-2024 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.[91]

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[90] 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.

[91] 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.

B.5 Testbed Flexible Feeder

The goal of the Flexible Feeder project is to demonstrate the value of distributed energy resources—including smart thermostats, storage, electric vehicle 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 grant[92] 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 $6.6M award from the DOE Connected Communities program for the SALMON project.

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:

- Launched general awareness campaign, marketing, and outreach
- Completed contracting for delivery of flexible feeder-specific work
- Conducted neighborhood canvassing and awareness campaign
- Ran a Solarize campaign that included targeted education and delivery strategy with Energy Trust-approved contractors, including increased incentives for participants in the project area
- Conducted Contractor engagement and training
- Delivering Home Energy Scores
- Implementing customer upgrade projects
- Conducting pre-implementation surveys

For a more detailed review of these activities please see PGE's 2021 SGTB Phase II Proposal and the subsequent supplement.[93]

B.6 Testbed Vehicle-to-Everything (V2X)

In May 2024, the Commission adopted Staff's recommendation to approve the V2X project plan for Demand Response Review Committee approval and PGE filed an accompanying update to Schedule 13[94].

This demonstration seeks to perform managed charging of electric vehicles using onboard telematics. It seeks to optimize vehicle charging around grid considerations and utilize the V2X capabilities to shift and reduce customer load during peak times and also provide advanced grid

[92] Detail on U.S. Department of Energy's *Connected Communities Funding Program* available at https://www.energy.gov/eere/solar/connected-communities-funding-program.
[93] 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.

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

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 varying 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 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.

For a more detailed review of these activities please see PGE's 2021 SGTB Phase II Proposal and the subsequent supplement.[95]

[95] 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.

Appendix C. Tariff Alignment Customer Research Results

PGE conducted survey research to better understand customer sentiment toward tariff changes pilot/program seasons (see Section 2.2.1 for detail). PGE conducts regular surveys among customers who enroll in certain flexible load programs and added the following questions to the Peak Time Rebates and Smart Thermostat re-contact surveys:

> *Before going further, we'd like to ask you a couple questions about some potential adjustments to the [Peak Time Rebates / Smart Thermostat] program. Please read the description and answer the questions that follows. Thank you!*
>
> *Currently, in the [Peak Time Rebates / Smart Thermostat] program, Peak Time Events are called within the designated months of the winter and summer seasons. Events are not called during the months of October, [November for Smart Thermostat], March, April, nor May, and are never called on major holidays. These rules were set by PGE and the Oregon Public Utility Commission (OPUC). In the past, there have been days in which conditions called for a Peak Time Event, however, the date restrictions prevented PGE from doing so. PGE would like to amend the program allowing for events to be called on currently-restricted dates, but only under extreme weather conditions where the reliability or stability of the regional grid may be threatened. As always, participation in Peak Time Events in the [Peak Time Rebates / Smart Thermostat] program is never mandatory. You always have the option not to participate in Peak Time Events.*
>
> *How would you feel about PGE expanding the ability to call events during holidays and/or days outside the current Peak Time Event seasons under extreme weather conditions?*
>
> - I'm OK with it
> - It depends (please specify)
> - I'm not OK with it
> - No opinion
>
> *If you'd like to leave additional comments about the potential changes to the [Peak Time Rebates / Smart Thermostat] program, please feel free.*

PGE fielded the survey in February 2024, and as of the beginning of March, 347 customers responded for Peak Time Rebates and 391 responded for Smart Thermostat. Results were largely favorable, with more than seven in ten customers for both programs saying they were okay with the proposed change. More Peak Time Rebates customers favored the proposed change than Smart Thermostat customers. One in ten Peak Time Rebates customers and just over one in ten Smart Thermostat customers stated they are not okay with the adjustments.

In the Smart Thermostat open-end responses most of the positive sentiments reflect an understanding of PGE's flexible load efforts and familiarity with the program. Most negative sentiments were related to PGE's rates or general comments with the program's functionality, rather than the proposal to dispatch the thermostats under emergency situations. Only one negative response was about the proposed seasonal and holiday alignment.

Similar to Smart Thermostat positive customer sentiments, Peak Time Rebates participants are eager to help the grid in the event of extreme circumstances. Among participants with negative Peak Time Rebates sentiments, more were relevant to the proposed change than was seen in the Smart

Thermostat customer survey. These comments reinforce the need for continued transparency about customer choice and control during Peak Time Events, the lack of penalties for non-participation, and the collective impact that small actions can have.

PGE will continue monitoring customer satisfaction after implementing these changes and plans to provide communications, so customers understand the narrow scope of the proposal.