



**Portland General Electric**

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May 17, 2023

***Via Electronic Filing***

Public Utility Commission of Oregon  
Attention: Filing Center  
201 High Street SE, Suite 100  
Salem, OR 97301  
P.O. Box 1088  
Salem, OR 97308-1088

Re: UM 1976 – Portland General Electric Company’s Smart Grid Testbed Phase II Proposal

Dear Filing Center:

Consistent with Portland General Electric’s (PGE) approved Smart Grid Testbed (SGTB) Phase II proposal, PGE is submitting detailed project plans for two research areas for review by the Public Utility Commission of Oregon (OPUC). These plans provide the implementation details and associated budgets for single family and multifamily buildings demonstrations, consistent with the original SGTB Phase II proposal. These updated plans were developed in close coordination with stakeholders and vetted through the Demand Response Review Committee (DRRC) steering process, as described in this document.

This is the first of two anticipated SGTB implementation updates in 2023. PGE is currently developing the project plan and budget for the next phase of work in the Flex Feeder research area, which will be submitted later this year. To streamline project implementation, the two updates are being finalized and filed separately.

Should you have any questions or comments regarding this filing, please contact Sam Newman at 503-464-2112. Please direct all formal correspondence and requests to [pge.opuc.filings@pgn.com](mailto:pge.opuc.filings@pgn.com).

Sincerely,

*/s/ Riley Peck*

Riley Peck  
Senior Manager, Regulatory Strategy  
Regulatory Affairs & Strategy



# Smart Grid Testbed Phase II Proposal

Single Family and Multifamily  
Demonstration Supplement

May 2023



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# Smart Grid Test Bed Proposal Update

## 1.1 Update Context and Overview

PGE submitted a proposal for Phase II of Smart Grid Testbed (SGTB) implementation on October 1, 2021.<sup>1</sup> The proposal provided the overall framework for SGTB activities and presented a five-year budget of \$11 million for all testbed activities.

The Phase II proposal provided detailed plans for \$2.9 million of the total budget, associated with the first three demonstrations and the first 2-3 years of implementation. The Phase II proposal indicated that PGE would follow up with detailed plans for the next tranche of funds as implementation progressed.

This supplement to the Phase II proposal provides project plans for two research areas: single family new construction and multifamily bundle. The single family new construction project plan is outlined in a single demonstration project (**Appendix E**), while the multifamily research is spread across three distinct project plans, outlined in two demonstration projects (**Appendix F** and **Appendix G**). The rationale for both research areas were provided in the initial proposal; the additional detail provided as appendices in this supplement is consistent with that rationale and justification of need.<sup>2</sup>

For consistency, Table 1 below provides an update to the Table 1 of the original Phase II proposal, which breaks out the total project budget, the initial budget detail and the updated budget detail.

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<sup>1</sup> See OPUC Docket No. UM 1976, "PGE's Smart Grid Test Bed Phase II Proposal," available at <https://edocs.puc.state.or.us/efdocs/HAD/um1976had145212.pdf>.

<sup>2</sup> See Phase II proposal, section 2.2.3.1 "Single Family New Construction Bundle" (p 34-35) and 2.2.3.4 "Multifamily Bundle" (p 36-37).

Table 1 – Proposed Smart Grid Testbed Phase II Budget (May 2023 Update)

Research Area	Expected Budget	Initial Request (Approved by Order 21-444)	Updated Request (Total)
New Construction Bundle	\$500,000	\$0	\$500,000
C&I, Municipal Flexible Load & Resiliency	\$1,500,000	\$0	\$0
Distributed PV/Smart Inverters	\$1,000,000	\$1,000,000	\$1,000,000
Multifamily Bundle	\$1,250,000 <i>(Updated from \$1,000,000)</i>	\$0	\$1,250,000
Managed Charging/V2X	\$2,250,000 <i>(Updated from \$2,500,000)</i>	\$872,200	\$872,200
Flexible Feeder	\$4,500,000	\$985,000	\$985,000
Non-Wires Alternative	\$0	\$0	\$0
<b>Total</b>	<b>\$11,000,000</b>	<b>\$2,857,200</b>	<b>\$4,607,200</b>

As shown in Table 1, this request includes a reallocation of \$250,000 from the Managed Charging/V2X to the Multifamily Bundle research area budget. This change allows for better resourcing of the multifamily plan, while keeping the overall five-year budget in line with the approved amount.

This proposed update is not intended to modify elements of the approved Phase II plan related to program scope, staffing or other topics not specifically addressed below. PGE expects Schedule 13 to continue to serve as the primary tariff covering SGTB activities. Proposed updates to the tariff to add provisions specific to the new demonstration projects will be provided to OPUC in advance of implementation.

PGE requests the following action:

- Agreement that \$1.75M for the projects included in the Appendices E, F and G is reasonable. If approved, project expenditures will begin in 2023 and continue through the two to three year project timelines.
- Agreement to modify the originally approved research area budgets by reallocating \$250,000 in funding from the Managed Charging/V2X to the Multifamily Bundle research area.

## 1.2 Phase II Proposal Update

### 1.2.1 Single Family New Construction Bundle

This demonstration will explore the opportunities available for collaborating with builders to ensure qualifying flexible 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 estimated budget for this portion of the portfolio is \$500,000, with a goal of 25-150 participating homes. See **Appendix E** for detailed project plan.

### 1.2.2 Multifamily Bundle

Projects in this area will assess how to scale PGE's existing multifamily water heater offering while exploring new products, bundles, and engagement strategies to increase adoption and participation across a broader range of flexible load technologies within the segment. The effort will also test whole building load management strategies and rate design options.

The estimated budget for this portion of the portfolio is \$1,250,000, which includes two demonstrations:

- Multifamily Existing Affordable Housing: PGE will work with affordable housing owners and operators to guide them towards the selection and enrollment of efficient flex load capable systems, including water heating and HVAC. See **Appendix F** for detailed project plan.
- Multifamily New Construction Heat Pump Water Heater (HPWH) Systems: This research area seeks to explore how flexible load in the multifamily market can be unlocked and scaled by focusing on new products, bundles, and engagement strategies to increase technology adoption and participation in utility programs. It includes two tasks focused on two key aspects of the HPWH market: central equipment and in-unit devices. See **Appendix G** for detailed project plan.

## 1.3 Process for Project Development, Review and Approval

### 1.3.1 Project Concept Development

Descriptions for the research areas were provided in the Phase II proposal. Over the past year, PGE and its partners (NEEA and Energy Trust) have developed detailed project implementation plans. These plans have been presented to the Demand Response Review Committee (DRRC) at quarterly meetings, and DRRC members have been encouraged to submit detailed feedback on draft versions of the project scopes. Drafts of the latest projects were circulated to DRRC members in December 2022 and April 2023.

### **1.3.2 Project Review**

PGE continues to use the demonstration project review template, which was developed as a collaboration between PGE and OPUC Staff during SGTB Phase I, for the development and refinement of project plans. The format includes the following elements:

- An overview of key information including the number of customers, the technology of market intervention being tested, funding source(s) and amount(s), the period of performance, as well as any contractor(s) and/or partner(s) supporting the effort
- A narrative description of the planned activities, including among other things the project goals, research questions, as well as roles and responsibilities of partner organizations
- The target population for project, specifying the targeted customer segments, enrollment goals, and the reasoning behind these selections
- A discussion of optional activities and the alternatives considered
- Information on how the project fulfills the goals of the Testbed and informs product development, including the long-term transition to Pilot and/or Program
- Total Costs and funding sources, with anticipated O&M expenses and revenues broken down by FERC account, capital costs, and the number of FTE employees and contractors
- A timeline of activity, milestones, risks, and a risk mitigation plan
- A description of benefits to customers and ratepayers, including how the plans contribute to environmental, emissions, and community impact objections in support of Executive Order 20-04
- The evaluation strategy and performance metrics on which the effort will be measured.

### **1.3.3 Project Approval**

The appendices provided in this update include detailed project plans for three demonstration projects for Commission consideration and approval. Additional work to be completed in SGTB Phase II is not outlined here, as it will be scoped and reviewed with the DRRC as SGTB continues. This will ensure alignment with approved portfolio goals, then be submitted to the OPUC using the proposal template.

# Appendices

This proposal serves as an addendum to PGE’s original SGTB Phase II proposal, in which Appendices A, B and C provide project proposals for initial funding; Appendix D included interim evaluation results, so here we start with Appendix E.

## Appendix E Testbed Demonstration Project Activity: Single Family New Construction Bundle

<b>Subject:</b>	<b>Date:</b>
<b>Flexible Load Pre-enablement in Single Family New Construction</b>	May 17, 2023

### E.1 Summary of Project Dashboard

Number of Customers Involved	Technology Being Tested	Funding Source	Funding Amount	Time Period	Contractor and/or partner
25 - 150 homes	Demand Response enabled home appliances (e.g., water heaters, space heating/cooling, etc.)	SGTB Phase II Funding	\$500,000	July 2023 - December 2025	Energy Trust of Oregon, Northwest Energy Efficiency Alliance, Earth Advantage

### E.2 Description of Demonstration Project (Statement of the Research Question)

PGE seeks to engage the residential single family new construction market to encourage the incorporation of flexible load technologies into the design and construction process of new communities and to develop a process to drive new homebuyer enrollment in PGE demand response (DR) programs at the time of account set-up.

Currently, PGE primarily recruits new home buyers into DR programs via marketing campaigns directed to customers after they have moved into their home; however, this is done with no influence over the as-built conditions of the home related to flex load measures and with limited understanding of customer eligibility for participation. This demonstration will create a new pathway to work directly with builders, ensuring qualifying technologies are intentionally installed in the participating communities, allowing PGE to employ targeted



marketing of the pre-enabled DR programs to the qualifying homebuyers, increasing the likelihood that these customers enroll, and will remain enrolled, in PGE’s DR programs.

In implementing this demonstration, the project team will collaborate with stakeholders who promote energy efficiency integration in the residential new construction market (e.g., Energy Trust of Oregon, Northwest Energy Efficiency Alliance, Earth Advantage, etc.) to identify builders likely to participate in the demonstration and to better understand what drives builders to choose, or not choose, DR enabled technologies. PGE will subsequently set up an internal process that allows PGE’s Account Services team to identify new customers located within these participating communities and market the available DR programs at the time of initial account set-up.

To drive maximum participation of homebuyer enrollment in PGE DR programs, the participating builders will be required to meet the following installation requirements of DR enabled technologies and building practices to qualify for incentives:

*Table 2: Demand Response Technologies of Interest and Program Requirements*

<b>Technology/Building Practice</b>	<b>Project Requirement?</b>
Homes receive an EPS from Energy Trust of Oregon*	Required
Air Source Heat Pump w/ connected qualifying Smart Thermostat*	Required
Level III Heat Pump Water Heater Installed	Required
Solar + Storage Ready* (Alternatively, Solar Ready + smart electric panel installed)	Required
Electric Vehicle Ready*	Required
Solar + Storage Installed	Encouraged
Electric Vehicle Service Equipment (EVSE) installed	Encouraged
Electric Appliances installed (induction cooktop, electric fireplace, etc.)	Encouraged

*\* Energy Trust of Oregon to be leveraged to define installation requirements and verify builder compliance.*

This demonstration will explore the opportunities available for collaborating with builders to ensure qualifying flexible 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 builder-based incentives will be deployed to ensure the installation of flex load technologies in the selected communities and to encourage collaboration with PGE on

marketing materials. The builder-based incentives may take the following forms, or some combination thereof:

- Model home upgrade incentive: There are builders already installing many of the flex load technologies sought after in this demonstration but still find installing solar + battery storage and electric vehicle service equipment (EVSE) in the model home to be cost prohibitive. Program staff will explore the appetite of potential builders of leveraging a larger, upfront incentive to buy down the cost of installing solar, storage, and EVSE in the model home. A fully equipment model home will act to inspire homebuyers to invest in similar technologies.
- Incremental cost-per-home incentive: If a builder is close to meeting the technology requirements of participation but historically chooses an alternative, non-qualifying technology due to incremental cost savings (e.g., tankless gas water heat over a heat pump water heater, or a standard electric panel over a smart electric panel, etc.), program staff will explore the opportunity to allocate a per-home participation incentive to assist the builder with overcoming the cost barrier of installing the preferred technologies. Program staff will also explore the opportunity to repackage existing customer focused equipment buy-down offerings to be paid upfront to the builder for the installation of said measures. These buy-down incentives are to be derated to account for the uncertainty in customer enrollment in the associated DR programs. Post occupancy participation will be tracked to understand customer enrollment behavior following occupancy which will inform future program design.
- Development of marketing materials: Program staff will explore the opportunity to use incentive funds to assist with the development of customer-facing marketing materials to be utilized by the participating builders that highlight the benefits of the installed DR enabled technologies and the associated PGE programs available. Additionally, collaborating stakeholder groups will be leveraged to provide existing, pre-developed marketing materials (e.g., Energy Trust of Oregon).

The customer-based incentive will be considered to encourage customer enrollment in existing PGE demand response programs at the time they set up the electric service for the qualifying newly built home. The customer-based incentive may take the following form:

- DR program enrollment kicker: The project team will explore the benefit of establishing an upfront incentive paid to the qualifying customer if they choose to enroll in multiple DR programs at the time of account set-up (e.g., if a customer enrolls in two DR programs, they will receive a \$100 incentive via bill credit). The PGE service coordination team will be made aware of the communities where this offer is available and will help market the flexible load benefits of the newly purchased home.

The study is designed to layer onto existing energy efficiency programs available in the single-family new construction market (Energy Trust's Energy Performance Score, Earth Advantage, etc.) where there is an existing channel of communication to the builder on the benefits of energy efficiency and flex load technologies. PGE will integrate within the existing workstreams to demonstrate that we are a trusted presence in the market to builders and

homebuyers, and will assist with educating the audience on the benefits of demand response enabled technologies.

### **E.3 Participation and Type of Participant Targeted (Provide reasoning for the number)**

PGE will recruit one to two single family new construction builders that demonstrate a history of installing some of or all of the minimum required DR enabled technologies/building practices (Table 1) and who already market the benefits of energy efficiency to their customers. The targeting of existing above-code builders will have multiple benefits:

1. Allow the project team to focus allocation of incentives to drive maximum adoption of desired DR enabled technologies,
2. Ability to influence, support, and improve upon existing builder-owned marketing materials to include the benefits of PGE DR programs,
3. Allow PGE to develop a streamlined customer enrollment workflow for DR programs by leveraging a customer base that is already educated on the benefits of DR via the builder's marketing materials.

The targeted builders will construct the participating homes within discrete, contiguous communities rather than single homes dispersed over large areas, as commonly seen with infill development. For the purposes of the demonstration, the builder-based recruitment incentives will be dynamic based on the type and size of community to be constructed. These community types are to be generalized into two categories and will be assigned different incentive structures: >15 home community with model home, and <15 home community with no model home.

The goal of this demonstration will be to recruit one of each community type from one to two builders total, likely resulting in approximately 40 participating homes. This number may be larger if two of the >15 home communities are selected, or less if two of the <15 home communities are selected. Priority will be placed on identifying the cooperative builder/builders first, then incentives will be finalized depending on what types of communities are in their project pipeline within the demonstration timeline.

### **E.4 Optional Activities or Alternatives Considered**

In addition to meeting the installation requirements (Table 1), the project team will collaborate with the participating builders to install the "encouraged" items. While these may be optional for participation, our goal is to maximize the DR enabled technologies installed at time of construction and over the life of the home, including the installation of solar + storage and EV chargers. Due to these additional measures proving to be cost prohibitive for the builder to manage up front, the demonstration will consider incentivizing the installation of solar + storage and EV charging in the model home, if present, to market the make-ready benefits that the builder has included in their homes (i.e., Solar + Storage Ready, Electric Vehicle Ready). We anticipate this will result in an increased installation of solar + storage and EVSE in the communities after homebuyers move in.

### E.5 How this Demonstration Project Fulfills Testbed Proposal Work

The overall goal of this effort is to better understand how PGE can increase overall flexible load by working with builders to incorporate flexible load technology into the design/build process, securing low-cost demand flexibility potential before the customer even occupies the home. Additionally, this demonstration seeks to increase participation in available DR programs by educating new customers on the benefits of the technologies installed in their homes and by establishing a streamlined process for PGE to market the available DR programs to the customer at time of account set-up.

### E.6 How the Demonstration Project informs Pilot and Program Development (Including potential scale)

This demonstration will expand PGE’s ability to coordinate and communicate with builders to increase the reach of PGE DR programs, while also assisting the builders with marketing the DR-enabled equipment installed in their homes to their customers. Currently PGE does not have a mechanism for marketing these DR programs directly to qualifying new homebuyers, so this demonstration will also drive expanded coordination between PGE’s grid products, operations teams, and account services, ensuring that this structure can continue to be implemented for future iterations.

### E.7 Funding Source and Total Costs (Including: O&M expenses and revenues, broken down by FERC account, capital costs, number of FTE employees, and number of contractors.)

The PGE is seeking \$500,000 in SGTB Phase II funding to support this 2.5-year demonstration; the table below represents the details of this request.

Table 2: Single Family New Construction Bundle Budget

Budget Item	Amount	Notes
PGE Staffing	\$160,000	Project Coordinator staff
Customer Incentives	\$140,000	Builder-based and Customer-based incentives
Software & Controls	\$75,000	Enablement of DR technologies connectivity pathways
Contractor Support	\$75,000	Builder market insights and marketing materials
Evaluation	\$50,000	Third party evaluation contractor
<b>Total</b>	<b>\$500,000</b>	

### E.8 Timeline of Activity (Including: Milestones and evaluation)

#### E.8.1 Project Planning and Preparation (Q1-Q3)

The Testbed team will consult with industry stakeholders and local builders to gather information on current market trends in technology selection, homebuyer priorities, incremental cost of desired technology installation, and marketability of demand response in

residential new construction, and how best to apply the demonstration's incentive packages to achieve the goals. The information gathered here will inform the builder recruitment stage, clarifying which builders are to be recruited and the size of the communities to participate. During this phase, the collective DR program offerings are to be inventoried and channels of communication are to be established between the Testbed team, Product Offerings Teams, and Account Services for future stages of the demonstration. Once incentive structures are finalized, PGE's Legal and Regulatory Affairs teams will be engaged to update the existing Schedule 13 Tariff language.

*Milestone:* Complete stakeholder and builder market assessment to pre-identify the builders and the associated communities likely to participate, and establish the demonstration's incentive package structures.

### *E.8.2 Builder Recruitment and Implementation (Q2-Q5)*

The SGTB team will continue to engage the builders identified in the Project Planning and Preparation phase to ensure the required technologies are to be installed and the incentive packages developed will be effective in influencing the design of the desired participating communities. The project team will recruit the builder(s) via tailored incentive packages based on the participating communities' characteristics (e.g., upfront model home incentive, incremental cost-per-home incentives, etc.) and will deploy marketing materials describing the available PGE DR programs available to the homebuyers. As homes in the participating communities complete construction, homebuyers will be recruited into the pre-enabled DR programs by PGE's Account Services teams at time of account set up.

*Milestone:* Successfully recruit one to two builders to participate on their next communities and finalize the incentive structures to be employed based on the characteristics of the participating communities.

*Risk and Mitigation Strategy:*

- Risk that builders do not participate in the offer  
Mitigation Strategy - Continually engage local builders and stakeholders during the formation of the demonstration's installation requirements and incentive structures to understand the residential new construction market and to ensure feedback is incorporated into the demonstration's design. The project team will tailor the demonstration to specific builders to maximize the likelihood the demonstration supports the builder's needs and their customer base.

### *E.8.3 Customer Recruitment into DR Programs (Q4-Q10)*

As the builder(s) completes qualifying homes in the participating communities, the customers (home buyers) will begin moving in and setting up their utility services. Project staff will establish a process for PGE's Account Services team to identify customers within these communities, market the available DR programs at the time of account set up, and offer the demonstration incentive for participation, if offered. Customer uptake of DR programs will be monitored throughout the remainder of the demonstration, specifically tracking customer retention in the DR programs. If new DR programs go live during the demonstration, the

Testbed team will ensure the details are incorporated into the customer recruitment process as well.

*Risk and Mitigation Strategy:*

- Risk that customers do not enroll in DR programs or unenroll after short period

Mitigation Strategy - The Testbed team will establish a streamlined, easy to reference system to be employed by the Account Services team that allows for quick and accurate identification of customers within participating communities. Upfront incentives may be employed to encourage customer enrollment in DR programs at time of account set up, and the financial benefits of continued enrollment in the DR programs will be communicated to the customer. Additionally, project staff will work with builders and other stakeholders to provide customers with marketing materials that educate them on the benefit of the available DR programs, increasing the likelihood that customers ask about the programs at time of move-in.

### **E.9 Lessons to be learned (Learning Objectives)**

The primary goal of this project is to increase the flexible load resource available to PGE in single family new construction by establishing a process to encourage builders to install desired DR-enabled technologies in their homes and to market the DR programs available to customers prior to homebuyer move-in.

In addition to the overarching goals, the project will also:

- Inform PGE of the motivations behind builders selecting certain technologies and why they might opt for non-DR enabled technologies,
- Inform PGE of the receptiveness of customers to DR enabled technologies in new construction,
- Provide feedback regarding if an up-front customer engagement strategy is more a more effective form of recruitment than the traditional approach of marketing to existing homeowners,
- Establish a communications channel between PGE and the residential new construction market to better communicate PGE's flexible load goals,
- Determine what forms of incentives (monetary, marketing, etc.) are most impactful to achieve demonstration goals.

### **E.10 Benefit to Customers and Ratepayers**

Currently, PGE does not administer a comprehensive single family new construction offering for builders who want support in integrating flexible load technologies into their homes' design and construction. This study will help guide PGE in identifying and overcoming obstacles that deter builders from installing flexible load enabled technologies in their homes and how PGE can encourage and support customers to opt into the programs available that will reduce their energy demand and save them on their utility bill. This study will establish support for the residential new construction market and will derive learnings that can be applied to existing and new offerings that are tailored to what customers ultimately want, need, and will use.

This demonstration will assist with customer awareness of and education on the PGE programs available while also improving the operations of the distribution system. Working with builders to install desired technologies in homes at time of construction will preempt the possibility that the homebuyer must spend additional money and resources to retrofit their homes with additional/alternate technologies to become eligible for DR program participation in the future. Additionally, PGE will facilitate a smoother customer experience by having a synchronized, streamlined pathway to communicate the benefits of participation in DR programs. Finally, this project will provide important insights on proactive recruitment of customers into flex load programs, instead of traditional approaches which rely on mass marketing and imprecise data on the presence of eligible technology.

This study will support the greenhouse gas (GHG) reduction goals set out in Executive Order 20-04 directly by supporting the development of a flexible load resource that can be leveraged to shed demand during peak load times, reducing PGE's reliance on traditional, GHG intensive energy generation methods used to meet peak load, and indirectly by using that same load flexibility to enable the integration of additional intermittent renewable generation. Additionally, this study will encourage builders to incorporate electric appliances into the design and construction of their homes (air source heat pumps, heat pump water heaters, etc.) which will transition the homeowners off on-site natural gas consumption for space heating/water heating. At scale, residential building electrification reduces on-site emissions and advances EO 20-04 goals enacted through Oregon's Climate Protection Program.

This study will be a small, targeted offering that will prioritize recruitment of collaborative, production scale builders. Pending the success of the study, the findings, learnings, and program support structures from the study will be applied to fit a larger portion of the single-family new construction market in future iterations, including vulnerable and/or impacted communities. When entering the recruitment stage of builders, PGE will make a concerted effort to include an affordable housing builder, if possible.

### **E.11 Evaluation Strategy (Including a Final Report)**

Following the completion of the demonstration, the SGTB team will present to the Commission an evaluation of project activities and results: These findings will include results related to:

- Receptiveness of builders and customers to the demonstration goals, qualifying technology requirements, and recruitment strategies,
- Quantities and types of participating installed DR enabled technologies,
- Data on number of customers that enrolled in DR programs at time of account set-up,
- Data on the number of customers retained in the enrolled DR programs throughout the demonstration duration,
- Insight into if demonstration is feasible to scale to a product pilot.

The SGTB team will issue an RFP for a third-party evaluator to conduct an analysis of demonstration impact to standard residential new construction market characteristics and how effective the marketing materials provided to builders/homebuyers are to recruiting into

PGE DR programs. PGE is requesting \$50,000 to conduct this evaluation, which will be completed within 3 months of project completion.

In addition to the formal evaluation, the project team will report to the DRRC and Commission at least quarterly on the status of the project, including any major accomplishments, barriers, and/or proposed changes to scope.



## Appendix F Testbed Demonstration Project Activity: Multifamily Bundle (Existing Affordable Housing)

<b>Subject:</b>	<b>Date:</b>
<b>Multifamily Existing Affordable Housing</b>	May 17, 2023

### F.1 Summary of Project Dashboard

Number of Customers Involved	Technology Being Tested	Funding Source	Funding Amount	Time Period	Contractor and/or partner
200 units within Existing Multifamily Affordable Housing	Flex load water heaters with CTA-2045; Flex load spaces heating & cooling	SGTB Phase II Funding	\$500,000	July 2023 - December 2025	Energy Trust

The multifamily market segment represents a major opportunity for demand flexibility and is critically important from an equity perspective, with a disproportionate number of low income and other underserved customers occupying this building type. However, this market segment also presents significant programmatic challenges; multifamily buildings often have high turnover rates that impact customer enrollment and retention, building designs that can impede device communications, and business models/ownership structures that create split incentives for asset owners and program participants. This research area seeks to explore how flexible load in the multifamily market can be unlocked and scaled by focusing on new products, bundles, and engagement strategies to increase adoption and participation.

### F.2 Description of Demonstration Project (Statement of the Research Question)

Affordable housing owners and operators periodically make investment and maintenance decisions related to mechanical systems that determine the efficiency and flexibility of the buildings under their management. By providing these market actors with resources and support, PGE can guide them towards decisions that drive financial benefits to their tenants and operational value to the grid. In this portion of the demonstration, the Testbed team will work with affordable housing owners and operators to guide them towards the selection and enrollment of efficient flex load capable systems, including water heating and HVAC.

Recent energy code changes will soon require that all new water heaters sold in Oregon come equipped with a CTA-2045 socket and communication protocol. This change represents a significant opportunity to increase load flexibility in water heater loads. To help realize this potential, PGE will work with property managers, owners, and maintenance staff to educate and assist them in understanding CTA-2045 technology, the operation of these

units, and incentives available for participating in flexible load programs. These efforts will help ensure that new water heaters installed during building renovations or replaced due to equipment failure will be enrolled in eligible programs. In addition to water heater loads, the team will also engage these same stakeholders on space conditioning technology.

Space conditioning in multifamily properties has historically not included cooling and has relied on zonal heating systems, like in-wall and radiant baseboard heaters, that are low cost, inefficient, and inflexible. There is now, however, increased attention and funding directed towards equitable access to cooling in multifamily housing, driven by increased prevalence of extreme weather events in the region. This represents an opportunity to guide property owners, managers, and their funders towards heat pump technologies that provide dual season flexibility. In support of this goal, PGE will coordinate with ongoing regional efforts, including those currently underway at NEEA, to identify and assess low cost, easily deployable heat pump technologies, like saddle window air conditioners, which are also grid enabled and capable of providing flexible load.

Once complete, this research will provide important insights into how best to engage affordable housing owners and managers in PGE's flexible load efforts, ensuring the enrollment of new, code compliant systems, as well as the assessment and potential adoption of dual season heat pump technologies.

### **F.3 Participation and Type of Participant Targeted (Provide reasoning for the number)**

PGE will collaborate with affordable housing providers and other local multifamily stakeholders to identify and recruit housing projects to participate in the demonstration. The team will target properties with between 50-100 units per building, with an overall goal of enrolling a study population of at least 200 units. This study population size will provide ample opportunity to explore the impacts of different unit floor plans, configurations, and household sizes. Enrollments will not be targeted to specific portions of the service territory as project goals are focused on the enrollment process and customer education rather than grid impacts. However, the project team will seek to align across programs should the opportunity present itself, such as enrolling a building in the Flexible Feeder study area.

### **F.4 Optional Activities or Alternatives Considered**

PGE's existing Multifamily Water Heater Program has an established track record of successfully deploying controls to turn electric resistance water heaters into a grid-connected flex load resource, an effective, albeit labor intensive, approach. As new control options have become available, the program is now considering a pivot towards the use of the embedded controls found in CTA-2045 water heaters. While this change will drive significant cost reductions in both labor and equipment, it still relies on customer acquisition and early retirement of water heaters. This demonstration project provides a new pathway for the acquisition of flexible water heater load by working with building owners/managers to incorporate program enrollment into standard unit replacement practices. The project also provides insights into load flexibility in space conditioning, a critical area of research given the potential growth in this space.

With the lessons from this work, the region can better capitalize on organic growth in enrolled flexible load as legacy water heaters are replaced with CTA-2045 units. In addition, the project will help focus equitable cooling initiatives towards technologies that deliver critical services to customers, while ensuring that these benefits are delivered in a way that does not exacerbate the region’s growing summer peak.

#### F.5 How this Demonstration Project Fulfills Testbed Proposal Work

The overall goal of this demonstration is to integrate water heater load flexibility into multifamily affordable housing by incorporating it into the standard maintenance/equipment replacement process. Additionally, the project will assess new opportunities for HVAC controls, helping to identify opportunities to ensure that investments in equitable cooling also deliver load flexibility. Both of these activities support the overall Testbed goal of expanding PGEs flexible load resource base through technology demonstration and the exploration of new customer engagement strategies.

#### F.6 How the Demonstration Project informs Pilot and Program Development (Including potential scale)

This project will provide important insights on how to capture new flexible water heater load as it comes online, saving rate payers the incremental costs of marketing and recruitment. It also provides insights into a potential new source of load flexibility that has the potential to grow in the coming years as equitable cooling efforts expand regionally.

#### F.7 Funding Source and Total Costs (Including: O&M expenses and revenues, broken down by FERC account, capital costs, number of FTE employees, and number of contractors.)

The PGE is seeking \$500,000 in SGTB Phase II deferral funding to support this 2.5 year demonstration; the table below represents the details of this request.

Table 1: Existing Affordable Multifamily Budget

Budget Item	Amount	Notes
PGE Staffing	\$110,000	Project Coordinator staff
Hardware	\$200,000	HVAC Equipment
Software & Controls	\$85,000	UCMs, integration costs, and cloud service fees
Customer Incentives	\$55,000	Up front and on-going incentives
Recruitment & Outreach	\$25,000	Customer awareness and recruitment campaign launch
Evaluation	\$25,000	Third party evaluation contractor
<b>Total</b>	<b>\$500,000</b>	

## F.8 Timeline of Activity (Including: Milestones and evaluation)

### F.8.1 Project Planning and Preparation (Q1-Q4)

The project team will consult with stakeholders active in the affordable housing market (e.g. Energy Trust, NEEA, various CBOs) in order to gather insights into current practices and collect contacts for potential host properties. This information will be used to shape the engagement and educational material as well as to inform subsequent property owner/manager recruitment activities. In parallel to this process, the team will begin its market scan of flexible, retrofit HVAC solutions for multifamily. This scan will involve significant coordination with NEEA's Emerging Technology group for updated information on their portable heat pump work; understanding and incorporating findings related to equipment performance, limitations, and flex load capabilities. Once complete, the team will document and finalize the measure package, then begin finalizing the customer facing (e.g., incentives and recruitment strategy), technical (e.g., integrations, OEM contracting), and regulatory (e.g., tariff updates) aspects of the project.

*Milestone:* Identify target affordable housing property owners/managers, finalize selection of HVAC equipment to be tested, and begin addressing customer, technical, and regulatory requirements.

### F.8.2 Customer Recruitment and Implementation (Q3-Q6)

Recruitment efforts will begin by conducting outreach to property owners/managers to explain the financial and non-economic benefits of the project. Once building owners/managers have expressed interest and formally enrolled in the demonstration, the team will educate company staff and interested building occupants on the project details, incentives, technology being tested, and participation terms and conditions. Next, the project team will schedule trainings with building maintenance staff on the features, operation, and controls of CTA-2045 water heaters and connected HVAC equipment. The team will then work with staff on the installation of UCMs and HVAC systems, connecting them to PGE's DERMS platform, thereby enabling remote monitoring and control of system operation.

*Milestone:* Recruit affordable housing properties that have a total of at least 200 units and begin education, installation, and integration of flexible load measures

*Risk and Mitigation Strategy:*

- Risk that property owners/managers do not participate in the offer

Mitigation Strategy - Leverage existing connections within the affordable housing community to support outreach and recruitment efforts, including Energy Trust, affordable housing CBOs, funding agencies (e.g., PCEF).

### F.8.3 Dispatch and Operation (Q5-Q10)

As water heater and HVAC units are installed and integrated into the DERMS, they will be incorporated into PGE's fleet of DER assets, with water heaters joining the existing Multifamily Water Heater portfolio and HVAC systems assigned to a dedicated resource pool for

specialized testing. The installed DERs will be used in both traditional DR event calls, as well as dispatched in specialized use cases focused on advanced grid services.

Risk and Mitigation Strategy:

- Risk that customers drop out of program

Mitigation Strategy - Regularly engage customers in the research and finds, providing updates on energy savings and incentives earned. The project team will monitor customer retention and consider adjusting the frequency and content of this messaging if necessary.

### **F.9 Lessons to be learned (Learning Objectives)**

The primary goal of this project is to increase the flexible load resource available to PGE in multifamily buildings by providing a pathway to enroll new flex load at the time of measure installation/retrofit.

- In addition to the overarching goals, the project will also:
- Inform PGE of existing processes and behaviors of multifamily affordable housing owners/managers related to mechanical system maintenance and replacement schedules,
- Provide insights into the performance of CTA-2045 technology in multifamily building,
- Inform PGE of options for HVAC controls related to equitable cooling initiatives,
- Establish and strengthen relationships with key stakeholders in the affordable housing community that can be used for future program and customer engagement needs

### **F.10 Benefit to Customers and Ratepayers**

This demonstration will help PGE increase participation among a historically underserved customer segment, delivering potential bill savings and incentive payments. The project will also provide a new pathway for cost effective enrollment of new flexible load, increasing program impact at reduced cost to ratepayers. Additionally, the project has the potential to identify new value streams for HVAC controls related to cooling initiatives, which could help buy down the first cost of these measures, potentially expanding program reach and impact.

This study will support the greenhouse gas (GHG) reduction goals set out by Executive Order 20-04 directly by establishing a transition plan for affordable housing owners to identify and install the non-GHG emitting water heating and space heating options available when replacing existing gas fueled appliances, and indirectly by increasing the appeal of on-site renewable energy generation sources leveraged to offset the energy demand of the newly installed electric appliances. Further, by capturing the flexible load potential of these newly installed devices, PGE can shave off steep demand peaks, reducing PGE's reliance on traditional, GHG intensive energy generation methods used to meet peak demand.

### **F.11 Evaluation Strategy (Including a Final Report)**

Following the completion of the demonstration, the SGTB team will present to the Commission an evaluation of project activities and results: These findings will include results related to:

- Receptiveness of affordable housing owners/managers and customers to participation in flexible load programs,
- The flex load value of high efficiency space conditioning heat pump technologies,
- The operational strategies and flex load value of CTA-2045 water heaters,
- Insight into if demonstration is feasible to scale to a product pilot.

The SGTB team will issue an RFP for a third-party evaluator to conduct an analysis of demonstration impact to standard residential new construction market characteristics and how effective the marketing materials provided to builders/homebuyers are to recruiting into PGE DR programs. PGE is requesting \$25,000 to conduct this evaluation, which will be completed within 3 months of project completion.

In addition to the formal evaluation, the project team will report to the DRRC and Commission at least quarterly on the status of the project, including any major accomplishments, barriers, and/or proposed changes to scope.

## Appendix G Testbed Demonstration Project Activity: Multifamily Bundle (New Construction Heat Pump Water Heater Systems)

<b>Subject:</b>	<b>Date:</b>
Heat Pump Water Heater systems in new multifamily construction projects	May 17, 2023

### G.1 Summary of Project Dashboard

	Number of Customers Involved	Technology Being Tested	Funding Source	Funding Amount	Time Period	Contractor and/or partner
<b>Task 1:</b> Central HPWH in New Affordable Multifamily Housing	50+ units	Design & installation solutions for grid connected HPWH with storage for load flexibility for up to 4 -12 hours of shifting.	SGTB Phase II Funding	\$385,000	June 2023 - December 2025	Energy Trust, NEEA
<b>Task 2:</b> In-Unit HPWH in New Multifamily Housing	50+ units	Design & installation solutions for grid connected in unit HPWHs with Temperature Mixing Valves and CTA 2045 (EcoPort). Monitor comfort and regular load shifting capabilities	SGTB Phase II Funding	\$365,000	July 2023 - December 2025	Energy Trust, NEEA

The multifamily market segment represents a major opportunity for demand flexibility and is critically important from an equity perspective, with a disproportionate number of low income and other underserved customers occupying this building type. However, this market segment also presents significant programmatic challenges for load flexibility programs;

multifamily buildings often have high tenant turnover rates that impact customer enrollment and retention, building designs that can impede device communications, and business models/ownership structures that create split incentives for asset owners and program participants. This research area seeks to explore how flexible load in the multifamily market can be unlocked and scaled by focusing on new products, bundles, and engagement strategies to increase technology adoption and participation in utility programs.

## **G.2 Description of Demonstration Project (Statement of the Research Question)**

Multifamily housing developers, design firms, and Mechanical, Engineering and Plumbing (MEPs) professionals determine water heating equipment type primarily based on building operating costs under their management, amongst a variety of other considerations. This operating cost 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 Northwest Energy Efficiency Alliance (NEEA) to provide information that will help developers select and install efficient and flex load capable domestic hot water systems. The grid assets will be incorporated into PGE's fleet of Distributed Energy Resource (DER) assets, with Heath Pump Water Heater (HPWH) systems joining the existing Multifamily Water Heater program portfolio. The installed DERs will be used in both traditional Demand Response (DR) event calls and in specialized use cases focused on advanced grid services.

It is anticipated that upcoming energy code changes in Oregon will soon require that all new water heaters sold in Oregon come equipped with a CTA-2045 socket, which utilities can leverage to communicate with water heaters to shift or reduce electricity usage during times of peak demand and to heat water when there is a surplus of renewable energy on the grid. This change represents a significant opportunity to increase water heater load flexibility in both multifamily central systems and unitary in-unit applications. To help realize this potential, PGE is developing a flex load program that supports designers, MEPs, contractors, property managers, owners, and maintenance staff with education and assistance in understanding CTA-2045 technology, the operation of these units, and the incentives available for participating in flexible load programs. These efforts will help ensure that newly installed water heaters are optimized for efficiency, comfort, and load flexibility.

Technical aspects of the two tasks are as follows:

### **Task 1: Central HPWH Systems in Multifamily Buildings**

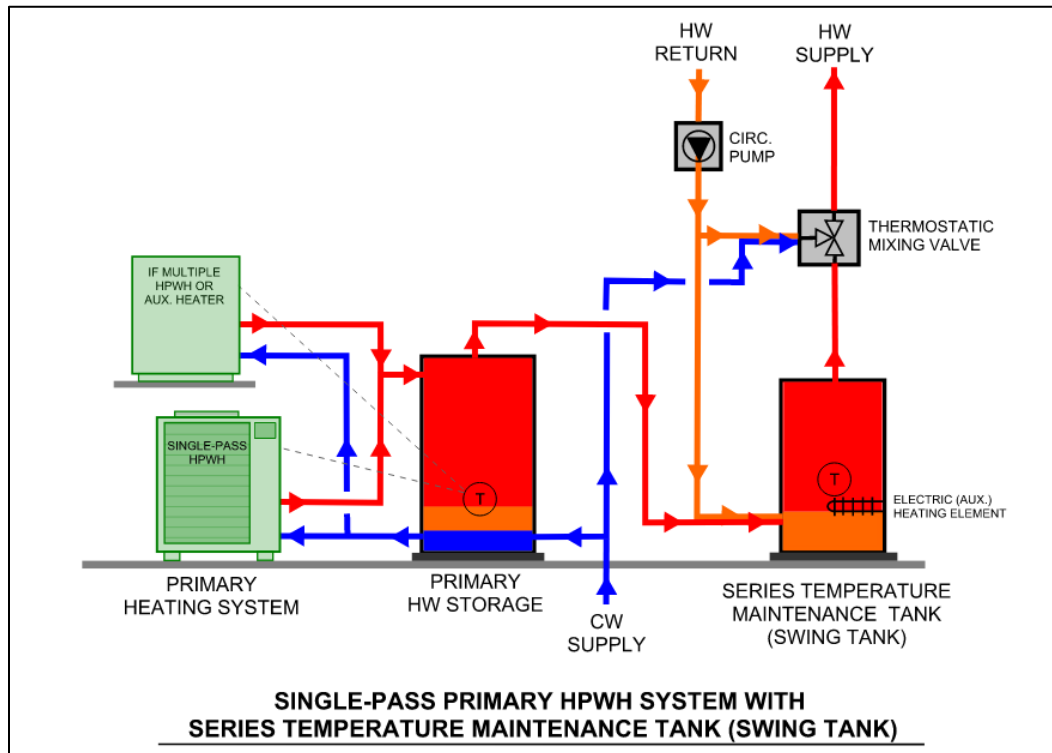
The goal of this project is to identify barriers and provide solutions to developers, designers, MEPs, contractors and owners in designing and constructing low to middle income multifamily housing projects that utilize central HPWHs.

NEEA will assemble a technical assistance team for the developer and their contractors to design and install a connected central HPWH system. NEEA/Energy Trust will provide design assistance for the central HPWH water system (includes engine, storage, mixing valves, recirculation loop pump, controls and demand response technology) (See Figure 1 below)



and cost benefit analysis for the installation of efficient equipment over other less efficient and/or carbon intensive options.

Figure 1. Single-Pass Primary HPWH with Series Temperature Maintenance Tank System (Swing Tank)



NEEA's contractor, Ecotope, will provide construction consultation during the project and will work with suppliers and installers on the nuances of the installation, and will also provide a summary report of findings to NEEA to inform the evaluation.

Ecotope will provide commissioning and verification of performance of the installed central system compared to the specified performance. Ecotope will be responsible for ensuring that metering, monitoring, and CTA-2045 controls are installed at the time of commissioning. Ecotope will monitor performance for two months to establish a performance baseline and provide a modeled energy use forecast of a baseline electric resistance system. Once the baseline is established and modeled forecast created, Ecotope will activate the CTA-2045 module and allow PGE to enroll the asset into the flexible load program for regular load shifting events ranging from 4-12 hours.

Ecotope will monitor the performance of the water heating system while events are being deployed and provide resulting performance metrics. Performance metrics will include: system coefficient of performance, maximum peak demand, kWh storage potential and kW shiftability for blocks of time, in addition to response time from commands sent by PGE. The building operator will be in regular contact with PGE's Program Operations and SGTB teams if challenges surface, and the PGE team will work to provide resolution.

Ecotope will develop a summary report after one full year of monitoring of the central water heating system that will provide insight into energy savings and load profiles for the project that will be compared to a baseline electric resistance in-unit configuration.

## **Task 2: Unitary HPWHs in Multifamily Buildings**

The project team will work with developers, designers, MEPs, contractors and building owners on the nuances of installing unitary HPWHs in a one heater per one unit application. The project team will work with market actors to integrate unitary HPWHs into each unit during the design phase of the multifamily project. This work will leverage three key areas of NEEA's recent HPWH work: 1) best practices design and installation guides, 2) solutions from a study on installation space constraints, and 3) findings from a Q4 2022 Design Charrette for low rise multifamily. Technical experts will guide the designers and MEPs toward workable solutions that have been tested in other NEEA research projects.

NEEA, their contractors and Energy Trust of Oregon trade ally services will work with installers on installation best practices and incorporating metering equipment at the time of installing the heat pump water heater, in addition to the commissioning process of the individual CTA Universal Communication Module (UCM) on each water heater. UCMs will be installed on all water heater units installed in the participating multifamily building.

Once the unit is occupied, NEEA's technical contractor will monitor performance and collect two months of energy use data to establish a baseline. The NEEA team will collect data regarding the units' power demand (kW), energy consumption (kWh), and the flow and temperature of water through the thermostatic mixing valve.

Once the baseline is established, the PGE team will run DR and load shifting events through the UCM. PGE and its project partners will utilize the monitoring equipment to evaluate performance, snap back, storage capability, and customer override, as well as document customer reaction and feedback to called events. Metering data will be collected by NEEA's contractor and shared with the project team to assess performance and reaction to called events. Performance data will be monitored for one full year for all sites that have monitoring equipment. Monitored data will be delivered to the evaluation team for integration into the evaluation report. The project team will continue to refine the DR event process through the end of the project.

A summary report will be developed by NEEA contractor, Ecotope, after one full year of monitoring for all units in the multifamily complex that will provide insight into the project's energy savings and load profiles. This data is to be compared against similar units using modeled Residential Building Stock Assessment (RBSA) and Regional Technical Forum (RTF) data. This summary report will be provided to NEEA to inform the evaluation.

### **G.3 Participation and Type of Participant Targeted (Provide reasoning for the number)**

Energy Trust will work with multifamily developers to identify and recruit multifamily new construction projects to participate in this study. For the central HPWH work, the team will look for affordable housing projects that will include a central HPWH system to increase water heating efficiency, lower cost of operations and construction, and increase flex load

capabilities available to PGE. For in-unit HPWH, the team will look for multifamily housing projects of 50 units or more that are interested in designing for in-unit HPWH installation. This study size will allow for exploring the impacts of different unit floor plans, configurations, and household sizes. Enrollments will not be targeted to specific portions of the service territory as project goals are focused on the project design process, stakeholder engagement and education process, testing and event calling process, enrollment process and end user customer education rather than the overarching impact to the utility grid, though that will also be monitored.

#### **G.4 Optional Activities or Alternatives Considered**

PGE's existing Multifamily Water Heater Program has an established track record of successfully deploying controls to turn existing electric resistance water heaters into a grid-connected flex load resource, an effective, albeit labor intensive, approach. As new control options have become available, the program is now considering a pivot towards the use of the embedded controls found in CTA-2045 enabled water heaters. While this change will drive significant cost reductions in both labor and equipment, it still relies on customer acquisition and early retirement of water heaters. This SGTB demonstration project provides a new pathway for the acquisition of flexible water heater load by working with building owners/managers to incorporate program enrollment into standard unit replacement practices.

With the lessons from this work, the region can better capitalize on organic growth in enrolled flexible load as legacy water heaters are replaced with CTA-2045 units. Key lessons to be learned on this project include a better understanding of what the design community, owners, installers and maintenance staff need to deploy the best practices for installing HPWHs that maximize efficiency and load flexibility. Once educational resources and best practice have been identified, NEEA, the Energy Trust and PGE will update specifications, technical manuals, training and messaging to reflect lessons learned.

#### **G.5 How this Demonstration Project Fulfills Testbed Proposal Work**

The overall goal of this demonstration is to increase efficient flex load resources available to PGE in multifamily buildings. Learnings from this demonstration will inform best practice design and installation guidance to optimize these systems and ensure occupant satisfaction.

Additional learning objectives include:

- Understanding efficient water heating design and installation best practice, and decision-making processes for multifamily developers,
- Providing insights into the performance of CTA-2045 technology in multifamily building for both unitary and central HPWHs,
- Assessing occupant satisfaction with unitary and central system HPWH solutions in multifamily developments,
- Building scalability for future widespread PGE load flex programs by establishing and strengthening relationships with key stakeholders and providing best practice guidance to optimize efficient water heating systems and load flex capability,
- Understanding the magnitude of shiftable load and storage capability.

## **G.6 How the Demonstration Project informs Pilot and Program Development (Including potential scale)**

This project will provide important insights on how to capture new flexible water heater load as it comes online, saving rate payers the incremental costs of marketing and recruitment. This study will expand the market for the existing multifamily water heater program and expand PGE's insight into new building types, customer segments, and water heating technologies.

Flex load resources developed in this demonstration will be integrated into the DERMS platform currently used in multifamily program delivery. This will allow for multifamily programs teams to familiarize themselves with the performance of the new resources, as well as provide a smooth transition of the resources to sustained operation following the completion of the project.

## **G.7 How the Demonstration Project Contributes to Meeting Goals Set by EO 20-04**

This study will contribute a positive impact on greenhouse gas (GHG) reduction goals set out by EO-20-04 via supporting the multifamily construction market with resources to transition away from natural gas based water heating systems in exchange for heat pump technologies that include load shifting potential. While heat pump adoption in multifamily buildings is currently slow, the success of this study will enable the market to more readily adopt the technology, meaning PGE will have a larger resource of flexible load to control to shift and minimize peak demand times, reducing reliance on traditional, GHG intensive energy generation methods used to meet peak demand.

This study specifically targets affordable multifamily housing, meaning that the study will have a positive impact on vulnerable and impacted communities in its current scope and in any subsequent iterations if expanded for wider adoption.

## **G.8 Funding Source and Total Costs (Including: O&M expenses and revenues, broken down by FERC account, capital costs, number of FTE employees, and number of contractors.)**

PGE is seeking a total of \$750,000 in SGTB Phase II funding to support this 2.5-year demonstration across two project types; the table below represents the details of this request.

Table 1: Multifamily New Construction Heat Pump Water Heater Budget

Budget Item	Central System	Unitary System	Total Amount	Notes
PGE Staffing	\$55,000	\$55,000	\$110,000	PGE Project Coordinator staff
Subcontracting	\$25,000	\$25,000	\$50,000	NEEA staff
Equipment, Software & Controls	\$88,000	\$22,000	\$110,000	UCM devices + associated IT; flow meters; data loggers; tempering valves; metering and monitoring equipment
Incentives	\$100,000	\$155,000	\$255,000	Incentive budget for in-unit and central system projects
Engineering Support	\$87,000	\$63,000	\$150,000	Contract costs to support EM&V, energy modeling, design review, and equipment commissioning
Consulting, Evaluation, and Report	\$30,000	\$45,000	\$75,000	Multi-party evaluation plan led by NEEA
<b>Total</b>	<b>\$385,000</b>	<b>\$365,000</b>	<b>\$750,000</b>	

Collaboration and support will be provided by Energy Trust and NEEA, both entities being funded either directly or indirectly by ratepayers in the Northwest. NEEA anticipates contributions to the project totaling \$235,000, \$50,000 from NEEA staff labor and \$185,000 from contracted technical support (design consulting, commissioning, metering/monitoring, analysis, etc.) In addition to the PGE-funded incentive budget detailed above, Energy Trust’s New Buildings program will provide \$100,000<sup>3</sup> in incentives for the in-unit and central system projects, as well as staff time to support delivery of the project scope

## G.9 Timeline of Activity (Including: Milestones and evaluation)

### G.9.1 Project Planning, Customer Identification and Preparation (Q1-Q2)

Energy Trust Outreach Managers will review projects enrolled or soon-to-be enrolled in the New Buildings Program and identify those multifamily developments that fit the parameters

<sup>3</sup> The incentive for the Energy Trust New Buildings program is an estimate that is being driven by energy modeling of the anticipated HPWH technology to be selected and installed.

of this study. The team will also review NEEA’s Emerging Technology market assessments, design charrettes, best practices materials, confined space research, relationships with the OEMs and MEPs and the Residential Building Stock Assessment (RBSA). This information will be used as educational material and support the property owner/manager recruitment activities.

For central HPWH, affordable multifamily projects will be the focus. For in-unit HPWH, market rate multifamily will be the focus.

*Milestone:* Identify potential projects and begin addressing customer and technical requirements.

### *G.9.2 Customer Recruitment and Implementation (Q3 – Q8)*

Recruitment efforts will begin by conducting outreach to property owners/managers to explain the financial and non-economic benefits of the project. Once building owners/managers have expressed interest and formally enrolled in the demonstration, the team will educate company staff and interested building occupants on the project details, incentives, technology being tested, and participation terms and conditions. Next, the project team will schedule trainings with building maintenance staff on the features, operation, and controls of CTA-2045 water heaters and connected HVAC equipment. The team will then work with staff on the installation and commissioning of UCMs and HVAC systems, connecting them to PGE’s DERMS platform, thereby enabling remote monitoring and control of system operation.

*Milestone:* Recruit new MF projects that fit the project participation criteria and begin education, installation, and integration of flexible load measures.

*Risk and Mitigation Strategy:*

- Risk that property owners/managers do not participate in the offer  
Mitigation Strategy - Leverage existing connections within the affordable housing community to support outreach and recruitment efforts, including Energy Trust, affordable housing CBOs, funding agencies (e.g., PCEF).

### *G.9.3 Dispatch and Operation (Q9-Q10 2025)*

As buildings are completed and connected by CTA-2045 UCM (both unitary and central system), monitoring will commence to establish a baseline of use without grid commands for a period of two months occupancy for both applications.

*Risk and Mitigation Strategy:*

- Risk that customers drop out of program  
Mitigation Strategy - Create a pathway to collect and respond to customer feedback related to flex load events calls, including but not limited to:
  - Cold water events
  - Noise complaints
  - Vibration annoyance
  - Fully satisfied response after a DR event

Mitigation Strategy – Regularly engage customers in the research and findings. The project team will monitor customer retention and consider adjusting the frequency and content of this messaging if necessary.

### **G.10 Lessons to be learned (Learning Objectives)**

The primary goal of this project is to increase the efficient flexible load resource available to PGE in multifamily buildings by providing a pathway to enroll new participants into the flex load program.

In addition to the overarching goals, the project will also:

- Inform PGE of existing processes and behaviors of multifamily housing developers related to mechanical system design and water heating equipment selection.
- Provide insights into the performance of CTA-2045 technology in multifamily building.

### **G.11 Benefit to Customers and Ratepayers**

This demonstration will provide PGE with insights on how to better serve a historically underserved customer segment, delivering potential occupant bill savings by lowering the operating costs and developer incentive payments for installing a HPWH. The project will also provide a new pathway for cost effective enrollment of new flexible load, increasing program impact at reduced cost to ratepayers. Additionally, the project has the potential to identify new value streams for water heating initiatives, which could help lower the first cost of these measures and expand program reach and impact.

This study will support the greenhouse gas (GHG) reduction goals set out in Executive Order-20-04 directly by supporting the multifamily construction market with resources to transition away from natural gas based water heating systems in exchange for heat pump technologies that include load shifting potential, and indirectly by increasing the appeal of on-site renewable energy generation sources leveraged to offset the energy demand of the HPWH systems. While heat pump adoption in multifamily buildings is currently slow, the success of this study will enable the market to more readily adopt the technology, meaning PGE will have a larger resource of flexible load to control to shift and minimize peak demand times, reducing reliance on traditional, GHG intensive energy generation methods used to meet peak demand.

This study specifically targets affordable multifamily housing, meaning that the study will have a positive impact on vulnerable and impacted communities in its current scope and in any subsequent iterations if expanded for wider adoption.

### **G.12 Evaluation Strategy (Including a Final Report)**

Following the completion of the demonstration, the SGTB team will present to the Commission an evaluation of project activities and results. These objectives will include an assessment of:

- The receptiveness of multifamily developers to participation in flexible load programs

- The operational strategies and flex load value of CTA-2045 water heaters
- Customer perception of and response to flex load events
- Insight into whether demonstration is feasible to scale to a product pilot

PGE will manage the scoping and delivery of the project evaluation, with support from NEEA, Energy Trust, and project contractor Ecotope. In addition to the formal evaluation, the project team will report to the DRRC and Commission at least quarterly on the status of the project, including any major accomplishments, barriers, and/or proposed changes to scope.