



Portland General Electric
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April 15, 2022

Public Utility Commission of Oregon
Attn: Filing Center
201 High Street, S.E.
P.O. Box 1088
Salem, OR 97308-1088

RE: Advice No. 22-07, Schedule 25, Nonresidential Direct Load Control Pilot Update and Extension

Portland General Electric Company (PGE) submits this filing pursuant to Oregon Revised Statutes 757.205 and 757.210, and Oregon Administrative Rule (OAR) 860-022-0025, for filing proposed tariff sheets associated with Tariff P.U.C. No. 18, with a requested effective date of **June 1, 2022**:

Third Revision of Sheet No. 25-1
Fifth Revision of Sheet No. 25-2
Fourth Revision of Sheet No. 25-3
Seventh Revision of Sheet No. 25-4

PGE is requesting this tariff update to continue the Schedule 25 Nonresidential Direct Load Control Pilot for an additional three years. PGE has gained significant learnings over the last five years of the Pilot and will be using this knowledge to redesign portions of the pilot that will pave the path forward to making Nonresidential Direct Load Control a cost-effective asset to the Demand Response Portfolio. Given this knowledge, a three-year period should be sufficient to determine if the pilot can achieve targeted cost-effectiveness and begin to make the transition into a program.

In addition to extending the pilot, PGE is updating the participant cap to allow for additional participants, updating program incentives to be allocated by Site rather than by thermostat, and adding new special conditions to clarify operational aspects of the pilot.

Attachment A contains a memo detailing the pilot components in accordance with the OPUC Energy Resources and Planning group's *Utility Guidance: Pilots and Programs* framework. The specific focus of this memo is a description of the items described in section 3.2: *Pilot Proposal Components* of the above referenced document.

A redline of Schedule 25 is attached as a courtesy.

To satisfy the requirements of OAR 860-022-0025, PGE responds as follows:

The proposed revisions to Schedule 25, Nonresidential Direct Load Control Pilot, do not increase, decrease, otherwise change existing rates, or impact revenues; costs are being deferred in UM 1514 for later ratemaking treatment.

Please direct questions to Casey Manley at (503) 464-8258. Please direct all formal correspondence and requests to the following email address pge.opuc.filings@pgn.com

Sincerely,

\s\ Robert Macfarlane

Robert Macfarlane
Manager, Pricing and Tariffs

Enclosures
cc Kacia Brockman, OPUC

**SCHEDULE 25
NONRESIDENTIAL DIRECT LOAD CONTROL PILOT**

PURPOSE

This Direct Load Control Pilot is a demand response option for eligible nonresidential Customers. The Direct Load Control Pilot offers incentives to allow the Company to control thermostats during Direct Load Control Events while providing a customer override. The Company provides advance notice to participating Nonresidential Customers for Direct Load Control Events. The Pilot is expected to be conducted from December 1, 2017 through May 31, 2025.

(C)

DEFINITIONS

Central Air Conditioning – Air conditioner tied into a central ducted forced air system.

Direct Load Control – A remotely controllable switch that allows the utility to operate an appliance, often by cycling. In terms of this pilot, direct load control allows the Company to change the set point or cycle the Nonresidential Customer's heating or cooling through the Customer's Qualified Thermostat in order to reduce the Customer's energy demand.

Direct Load Control Event – A period of time in which the Company will provide direct load control.

Ducted Heat Pump – Heat pump heating and cooling system hooked into a central ducted forced air system.

Electric Forced Air Heating – An electrical resistance heating system tied into a central ducted forced air system.

Event Notification – The Company will issue a notification of a Direct Load Control Event to participating Customers. Participating Nonresidential Customers must choose at least one method for receipt of notification. Notification methods may include email, text, auto-dialer phone call, on thermostat display screen, or via mobile app notification. Notification may also be available on the Company's website.

Event Season – The pilot has two event seasons: the Summer Event Season and the Winter Event Season.

Holidays – The following are holidays for purposes of the pilot: New Year's Day (January 1), Martin Luther King Day (third Monday in January), President's Day (third Monday in February), Independence Day (July 4), Labor Day (first Monday in September), Thanksgiving Day (fourth Thursday in November), and Christmas Day (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.

SCHEDULE 25 (Continued)

DEFINITIONS (Continued)

Non-Ducted HVAC System Thermostat Demonstration – A demonstration within the smart grid test bed that meets Special Conditions 8 through 10. Demonstrations are limited in scope and will not interfere with the operations of the Nonresidential DLC Pilot.

Summer Event Season – Includes the successive calendar months June through September.

Winter Event Season – Includes the successive calendar months November through February.

Qualified Site – Nonresidential Customer building served under qualifying PGE rate Schedule (as defined in Applicable section below) with a unique PGE service address and utility meter. Additionally, Qualified Sites meet HVAC system requirements defined in Eligibility section below.

(N)
|
(N)

Qualified Thermostat – Thermostats that are Company-approved have been integrated with Company's demand response management system for event calling.

AVAILABLE

In all territory served by the Company.

APPLICABLE

To qualifying Nonresidential Customers served under Schedules 32, 38, 47, 49, 75, 83, 85, 89, and 90. The Company will limit participation to 7,000 Qualified Thermostats. Nonresidential Customers will remain on their base schedule and will be eligible for the incentives described in this schedule.

(C)

ELIGIBILITY

Eligible Nonresidential Customers must have a Network Meter. Nonresidential Customers must have a Qualified Thermostat connected to the internet and the heating or cooling system at their expense, except as provided in the Incentives section of this schedule. To participate in the Winter Event Season, the Nonresidential Customer must have a Ducted Heat Pump or Electric Forced Air Heating. To participate in the Summer Event Season, the Nonresidential Customer must have Central Air Conditioning or a Ducted Heat Pump.

(M)

SCHEDULE 25 (Continued)

DIRECT LOAD CONTROL EVENT

Direct Load Control Events occur for one to five hours. The Company may call two events per day but will not exceed five cumulative hours for the day. During Direct Load Control Events the Customer may allow the Company to control their thermostat for the duration of the event. The Customer has the option not to participate by overriding the temperature setpoint via the thermostat. The Company initiates Direct Load Control Events with Event Notification. The Company will call Direct Load Control Events only during the Event Seasons. Direct Load Control Events will not be called on weekends or Holidays. Reasons for calling events may include but are not limited to: energy load forecasted to be in the top 1% of annual load hours, forecasted temperature above 90 or below 32, expected high generation heat rates and market power prices, and/or forecasted low or transitioning wind generation. The Company will call no more than 150 event hours per Event Season.

(M)

(T)

(M)

ENROLLMENT

The Customer may enroll at any time but must participate for the minimum number of hours described in the incentive section.

INCENTIVE

Participating Customers receive a Qualified Thermostat for signing up for the Direct Load Control Pilot. A Customer may receive multiple Qualified Thermostats for separate spaces subject to verification by the Company. In addition, Customers receive up to \$60 per Qualified Site for each Event Season they participate. A Customer participating in all Event Seasons receives up to \$120 per Qualified Site per Pilot year. Incentives are paid to the Customer with an automated clearing house (ACH,) check, bill credit, or generic gift card. To receive payment for an Event Season, all Qualifying Thermostats at the Qualified Site must participate in at least 50% of the event hours for which the Customer is eligible to participate in that Event Season.

(C)

(C)

(C)

SPECIAL CONDITIONS

1. Customers that reenroll in the program are not eligible for additional Qualified Thermostats for signing up. A Customer continuing service at a new location is not considered a new enrollment.
2. If the participating Customer moves to a different location, the Customer may continue participation if the new location meets the eligibility requirements.
3. The Company will defer and seek recovery of all pilot costs not otherwise included in rates.
4. The Company is not responsible for any direct, consequential, incidental, punitive, exemplary, or indirect damages to the participating Customer or third parties that result from Air Conditioning Cycling or changing the thermostat set point.

(C)

(M)

SCHEDULE 25 (Concluded)

SPECIAL CONDITIONS (Continued)

5. The Company shall have the right to select the cycling schedule and the percentage of the Customer's heating or cooling systems to cycle at any one time, up to 100%, at its sole discretion. (M)
|
(M)
6. The Company shall have the right to pre-heat or pre-cool the Site as part of the Direct Load Control event in order to thermally condition the space to increase occupant comfort for the duration of the event. (N)
|
(N)
7. The provisions of this schedule do not apply for any period that the Company interrupts the Customer's load for a system emergency or any other time that a Customer's service is interrupted by events outside the control of the Company. The provisions of this schedule will not affect the calculation or rate of the regular service schedule and associated charges. (T)(M)
|
(M)
8. PGE has the right to remove a Customer from the pilot when good cause is shown including, but not limited to, poor customer responsiveness, consistent customer non-participation in called events, or issues with customer equipment that impact customer's participation. (T)
(T)
9. PGE will administer a Non-Ducted HVAC System Thermostat Demonstration within the Smart Grid Test Bed for Nonresidential Customers who have a non-ducted, electric HVAC systems, which are compatible with the Flair Puck. Eligible Customers must:
a. be aligned with rates schedules defined in Applicable section;
b. be located within the Smart Grid Testbed boundary located on PGE's webpage regarding the "Smart Grid Testbed";
c. have the ability to connect Flair Puck to Internet at own expense;
d. and have a Networked Meter. (T)
10. Non-Ducted Thermostat Demonstration events will follow the same requirements outlined in the Direct Control Load Event section, however; (T)
a. Customers do not need to meet the minimum number of hours to be eligible for an incentive; (T)
b. Customers with ductless heat pumps (DHP) or package terminal heat pumps (PTHP) are eligible for both winter and summer seasons; \$20 per season;
c. Customers with electric heating or cooling only equipment are eligible for either the winter or summer season incentive; \$20 per season;
d. Customers participating in the demonstration may be eligible for Nonresidential DLC Pilot incentives.
11. The Non-Ducted Thermostat Demonstration will be capped at 100 units and is separate from the Schedule 25 cap of 7,000 thermostats. (T)
(C)

TERM

This pilot term is December 1, 2017 through May 31, 2025. (C)

PGE Advice No. 22-07
Schedule 25, Nonresidential Direct Load Control Pilot
Update and Extension

Attachment A

Appendix A:

Schedule 25 Pilot to Program Guidance

April 1, 2022

1 Introduction

This memo is designed to address requirements laid out in the *Utility Guidance: Pilots to Programs* document created by the OPUC Energy Resources and Planning team. The specific focus of this memo is a description of the items described in *section 3.2: Pilot Proposal Components* of the above referenced document.

The pilot has undergone significant changes that, when taken in the context of the pilot design and performance to date, represent a “reset” that warrants a description of the new pilot proposal components.

Discussion of the pilot’s readiness to transition to a program are proposed to be addressed in future filings when the pilot has proven that the new design warrants consideration for such a transition to occur.

2 Pilot Purpose

The purpose of the Schedule 25 Direct Load Control Pilot, hereafter referred to as “Energy Partner Smart Thermostat” (EPST), is to grow PGE’s Flex Load resource capacity. The pilot seeks to understand the capacity value of directly curtailing energy load from nonresidential electric cooling and/or heating systems during times of high system energy demand by adjusting the temperature setpoint of participating thermostats. Commercial thermostats are a critical piece of PGE’s overall Flex Load resource potential and represent an opportunity to engage small- to medium-sized businesses (SMBs) in contributing to PGE’s Flex Load resource goals. SMBs have historically proven to be a difficult market segment to engage with on cost effective programs. The EPST pilot is intended to provide a cost-effective engagement opportunity to grow Flexible Load within this market segment.

3 Research Questions

The EPST pilot seeks to answer the following research questions:

- What is the Flex Load capacity (measured in kilowatts, or kW) that can be obtained per participating thermostat?
- Who are the optimal non-residential participants to deliver Flex Load capacity via Direct Load Control using Smart thermostats? Is the forecast of optimal customers and capacity potential derived from the recent market potential research valid?
- What are effective outreach and marketing strategies to encourage enrollment and participation?

- How does participation in Peak Time Events vary based on different event parameters (e.g., event duration, time of day event occurs, ambient temperature, event season, etc.)?

4 Pilot Design Strategy

The pilot design encourages participation by making a compelling offer to upgrade a business' thermostat(s) via reduced cost installation and ongoing incentives for participation in Peak Time Events. The pilot relies primarily on a direct installation model in which PGE installs the thermostats at customer businesses. The pilot will also seek to enroll customers with eligible thermostats installed by Trade Allies, who provide customer leads to PGE outreach staff. The overarching strategy of the pilot redesign is to identify customers who are most likely to contribute Flexible Load capacity during Peak Time Events based on load profile and operating hours and align customer costs and incentives with mutual customer and utility value.

4.1 Changes from Previous Design

The following changes are proposed in the new pilot design:

- Customers shall be charged a \$50 copay per installed thermostat under the direct installation channel. Previous pilot design offered unlimited thermostats installed at the customer's business at zero cost.
- The seasonal incentive is shifting from \$60 per *thermostat* to \$60 per *site*. The incentive will no longer be tied to how many thermostats exist at the customer location.
- A new Trade Ally referral channel is being introduced. PGE will partner with local HVAC companies who will be incentivized by PGE to provide leads of eligible customers who have qualifying thermostats installed at their business. PGE will then perform outreach directly to these customers to enable their previously installed thermostats into the pilot. Participants in this channel will be eligible for ongoing seasonal incentives.

4.2 Major Design Components

A participant satisfaction survey conducted in fall 2021 indicates that the highest value is derived from a free thermostat upgrade, installation provided by the program, the flexibility to opt out of events, and a commitment to contributing to a clean energy future. The redesign took the customer feedback into account while considering changes.

There are two channels for enrolling in the program: Direct Install and, new this year, the Trade Ally Referral channel.

The direct installation model is being preserved in the new pilot design. Direct install is a design feature that was rated as the most positive attribute to the pilot, and there are a range of benefits to this delivery mechanism:

- Direct installation allows for PGE to target its marketing to customers most likely to deliver demand response capacity to the pilot, which maximizes Flex Load benefit and improves cost effectiveness.
- Direct installation aligns with PGE marketing strategies focused on engaging small to medium sized business customers to develop lasting relationships that may translate to increased participation in complementary demand response and Energy Trust efficiency programs.

- Based on contractor feedback and financial analysis, the direct install model can deliver more installed thermostats at lower cost than a purely trade ally model; contractor incentives that would be needed to drive trade ally participation would create incremental costs relative to the updated direct installation cost model.

In an effort to increase participation volume, PGE proposes to implement a trade ally referral model that relies on HVAC contractors to provide PGE outreach staff with direct leads of businesses who have qualifying thermostats installed at their businesses. There is an opportunity to utilize trade allies who are installing thermostats through their existing sales and service channels. PGE plans to obtain leads from trade allies at low cost; PGE outreach staff can follow up with customers with qualifying thermostats to sign them up for the pilot, as well as discuss and promote additional energy efficiency opportunities. Additionally, engagement with customers to enroll existing thermostats into the pilot is expected to provide an opportunity to research a future “bring your own thermostat” (BYOT) model.

The incentive structure is being updated to better align with the value that participants are providing to the Flex Load portfolio. The pilot is transitioning from a seasonal incentive per thermostat to a seasonal incentive per customer site. In so doing, PGE is compensating participants for the flexible load capacity value from the site’s heating and/or cooling system. The incentive amount better aligns with the value that a typical customer is contributing to the pilot’s purpose of reducing site load during Peak Time Events. The previous incentive model compensated customers based on how many thermostats were installed, which often resulted in incentive payments exceeding the value of the capacity resource.

5 Potential benefits to the ratepayer

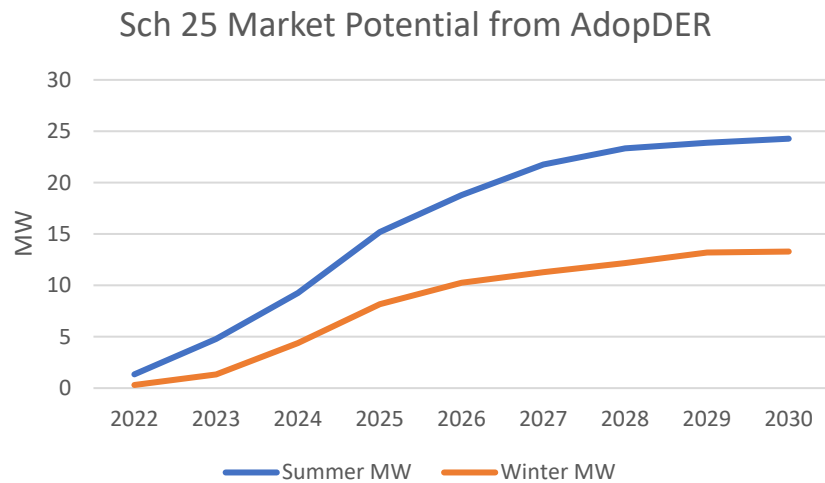
5.1 Portfolio consideration

The PGE Distributed Resource Planning (DRP) team completed a Distributed Energy Resource (DER) and Flexible Load study in 2021 for PGE’s Integrated Resource Plan and Distribution System Plan that quantifies the long-run resource potential for various Flex Load offerings using the AdopDER model.¹ Commercial thermostats are a critical piece of the resource potential, being the largest non-cost-effective (current state) resource in the supply-curve of all Flex Load products. The study considers changes to building stock based on the corporate load forecast, equipment changes over time as customers adopt new technologies upon failure, and factors in considerations of PGE system avoided costs and program delivery costs.

The results from the study for Schedule 25 commercial thermostats are shown in Figure 1:

¹ The report is available as an appendix to our DSP on the PGE website (found as Appendix G) here: [Distribution System Planning | PGE \(portlandgeneral.com\)](https://www.portlandgeneral.com/dsp/dsp-appendix-g)

Figure 1: AdopDER Market Potential



The DRP Team is currently gearing up to refresh the AdopDER model with updated inputs, including past market participation data, updated program and device costs, and new load forecasts. This work will be completed by early April and will be done in time to inform the Flex Load Multiyear Plan update filing in summer 2022.

Given the significant size of the resource potential relative to other potential resource options, PGE is committed to continuing the pilot with a new, more cost-effective design in order to capture the large market potential from EPST and incorporate the resource into its overall Flexible Load strategy.

5.2 GHG emissions impacts as a direct result of this pilot

Based upon the current energy capacity curtailment model and forecasted annual thermostat enrollments, peak energy load curtailment is modeled to be 73 MWh in 2023. Energy load is modeled to be reduced by 309 MWh by 2035 as a result of this pilot. Greenhouse gas emissions associated with the avoided capacity from peaker plants will be reduced as a direct result of the pilot; The direct emissions reduction that is forecasted to occur as a result of avoided energy use has not yet been quantified.

5.3 Impacts to vulnerable populations or impacted communities

PGE is coordinating with Energy Trust of Oregon (ETO) to participate in a community outreach initiative focused on minority owned businesses in historically underserved communities throughout the PGE service territory. PGE staff is hopeful that a strong partnership with ETO on this initiative will result in higher participation rates than the pilot has been able to capture to date within these communities.

6 Context

The first iteration of the Schedule 25 tariff contained several design elements that resulted in suboptimal performance, a lack of clarity related to delivered capacity values, and poor cost effectiveness. The past twelve months were spent identifying the nature and root cause of known and newly uncovered issues with the pilot design, creating solutions, and updating the pilot delivery model to address cost effectiveness. The issues and associated resolution pathway are as follows:

Issue: Prior to January 2021, Schedule 25 administration costs were combined with PGE’s Schedule 26 program, and cost effectiveness of EPST as a standalone pilot was unknown. Once modeled on its own, it became clear that the current design model does not meet cost effectiveness criteria in the pilot’s current form. Cost effectiveness in 2021 was 0.54 based upon Total Resource Cost Test, with no Value of Service Lost.

Solution: A deep dive into vendor costs and participant incentives revealed that a pathway to cost effectiveness exists with a streamlined pilot model that includes customer contributions and reduced incentive payments. The cost effectiveness model of the revamped pilot design is projected to be 1.15.

Issue: Prior to March 2022, the pilot was unable to review reliable event curtailment results until third-party evaluation reports were completed following the conclusion of the event season. The lack of post-event performance visibility posed reporting challenges and prevented active management and adjustment of event calling strategies. Several individual challenges contributed to this overarching issue:

Solution 1: Throughout most of the past tariff cycle, the pilot’s demand response management system (DRMS) did not have a baseline set to measure thermostat performance. The absence of a baseline meant that curtailment values reported out of the DRMS were inaccurate and unusable. PGE worked with its implementer and the DRMS vendor to select and implement a baseline methodology effective July 2021. The methodology uses similar days (the 10 non-holiday weekdays prior to the event day) to determine the Customer Baseline Load (CBL) value, and the baseline adjustment is the difference between specified hourly average load on similar days and the load on the event day.

Solution 2: The average peak time event kW impact estimate (e.g., capacity planning value) was used by the pilot’s DRMS software to calculate alongside telemetry to determine system load reduction during events. The use of the capacity planning value as “Delivered Capacity” for the purpose of estimating event curtailment proved to be an inaccurate measure of the capacity being delivered during events. DRMS inputs needed to be modified to reflect the system’s rated power draw; total system rated power was added to calculate the Delivered Capacity accurately, rather than the estimated kW impact per system per event.

HVAC system data is gathered in the field during installation (model number, tonnage, etc.) as part of routine pilot operations. As of February 2022, the pilot now uses this data to determine system rated power to input into the DRMS. The rated power draw is calculated by multiplying tonnage and a proxy value per ton (1.052kW). The proxy kW value is based on data derived from over 17,000 units participating in the implementer’s commercial HVAC tune-up program in multiple utilities across the country.

Solution 3: Prior to March 2022 the DRMS vendor did not have a method for reporting event curtailment results out of the DRMS for PGE’s use. Priority was not initially placed on obtaining this reporting given the known issues (addressed in Solutions 1 & 2) but following their resolution PGE specified a report and worked with its implementer and the DRMS vendor to refine a detailed event report that was finalized in March 2022. The report will contain hourly participation rates at the thermostat level, hourly kW curtailment, and other useful indicators of event success.

Issue: Thermostat telemetry data (heat/cool/fan/off mode and runtime per mode) used to calculate capacity savings from one of the thermostat manufacturers representing 50% of the thermostat fleet reported a faulty API during the summer 2021 season, which led to incorrect reporting of telemetry data and associated event curtailment values- for over half of the thermostat fleet.

Solution: While the fix for this issue is nearing deployment, the thermostat vendor has been able to provide a corrected telemetry dataset to the pilot that can be added retroactively into the DRMS to correctly calculate event performance. Effective March 2022, the DRMS vendor's new reporting feature allows for the addition of this data so accurate event performance is available via the DRMS for upcoming event seasons.

Issue: Thermostats installed at sites with multiple PGE meters may be associated with the incorrect Service Point ID (SPID), e.g., utility meter. When it is not possible to ascertain what meter is tied to the customer's HVAC system, technicians have historically made a best guess. Consequently, up to 546 thermostats at 89 customer sites may not be accurately represented in evaluation data; mis-association of meters may result in sites showing zero curtailment during events since the meter data is not necessarily reflecting HVAC load at the site. The SPID misalignment has negative impacts to both modeled event performance in the DRMS and 3rd party evaluation savings estimates.

Solution: The pilot implementer is reviewing customer interval usage data to determine whether seasonal load variations match typical heating and/or cooling load profiles. The implementer is analyzing load data for each SPID associated with a service address with more than one SPID present to identify the SPIDs that should be linked to program thermostats and used for evaluation. This project will be completed in April 2022.

Issue: From the inception of the pilot to summer 2021, the marketing plan was focused on delivering a high volume of thermostat installations. In spring 2021, PGE commissioned a study by its implementer to conduct a market potential study to determine market size. The study also attempted to determine customer propensity to participate and contribute energy capacity to the pilot. The results of the study were planned to serve as a guide for marketing and outreach planning. However, the available customer account and energy usage data was limited to 2020 data, and pandemic business operations compromised the efficacy of the data to predict typical customer operations. As a result, PGE's outreach team found that customers identified as "high potential" in the study often did not actually have the high-performance characteristics (operational hours during typical event times, electric heating/cooling) predicted in the study model. The misalignment was significant to the extent that the PGE marketing and outreach team deemed it to be insufficient to commit outreach and marketing resources, which in turn delayed and reduced thermostat installations throughout the past year. Given low confidence in the study results and within the context of concerns about pilot cost-effectiveness, PGE did not commit outreach and marketing resources to pursue target customers which in turn delayed and reduced thermostat installations.

Solution: PGE marketing staff engaged with the Company's data science team to revisit the market potential study in February 2022. The data science team leveraged the additional year of customer usage data collected in 2021 and developed a participant propensity model that identifies customer energy capacity potential. The study created high confidence results that will serve as the basis for the pilot outreach plan in the coming year. The results of the market study are outlined in Section 7: Research Plan and will guide future marketing and outreach for the pilot.

The pilot has made significant progress over the past year to correct many of the fundamental issues that emerged during the initial years of the pilot. Currently, the issues identified herein have either been corrected or are on a flight path to a solution in the coming months. PGE is confident that the pilot is now inherently stable and primed for a strategic pivot to a model that is cost effective, focused on delivery to customers able to deliver value to the pilot, and capable of measuring energy savings capacity during Peak Time Events.

7 Research Plan

7.1 Learning Objectives

The objectives of the updated pilot are to determine:

- An appropriate model to forecast Flex Load capacity of participating customers
- An appropriate update to evaluation methodology that incorporates thermostat telemetry data in addition to participant interval meter data
- Efficacy of market potential study in determining appropriate customers to target for participation
- The grid value benefits that can be achieved from reducing participating customers' peak time loads via Smart Thermostats

7.2 Participation target

The pilot will continue to target small to medium business (SMB) segment, with specific focus on customers taking service on PGE rate schedules 32 and 83. The initial pilot was conceived as an opportunity to engage SMBs with a Flexible Load offering that would complement the large commercial and industrial customer-focused Energy Partner Schedule 26 Flexible Load program.

In the past year, two distinct market analyses were conducted to identify customer segments likely to participate and delivery energy capacity savings via the pilot. The analyses leveraged meter-level energy interval data to identify customers with a high likelihood of having electrical heating and/or cooling equipment. The pilot will target these customers with marketing and outreach resources. Market potential research also identified business types with the highest likelihood to participate and deliver capacity savings.

7.3 Potential Scale

In March 2022, PGE Data Science staff created a participant propensity model using customer energy interval data to predict qualifying customer meters capable of delivering energy capacity savings during typical Peak Time event hours.

The model forecasts 31.4 megawatts (MW) of expected summer demand response potential by 2050 when limiting meter data to the 5,114 meters where predicted kW savings in each interval was less than the calculated temperature dependent load in each interval for all event hours. The PGE Data Science model results closely align with the predictions from the Cadeo AdopDER model, as shown in Table 1:

Table 1: Comparison to Cadeo AdopDER Model 2050 Forecasts

Model	Load Scenario	Adoption Scenario	MW Potential	Count Adopters	Mean kW/Adopter
Cadeo	Reference	Reference	24.71 MW	3992	6.18 kW
Cadeo	Reference	High	38.03 MW	5511	6.90 kW
PGE Data Science	Actual	N/A	31.41 MW	5114	6.14 kW

In addition, the model identified 18,552 qualifying meters capable of delivering capacity savings during at least half of typical event hours. Participation in more than 50 percent of event hours was chosen as a metric to align with the customer incentive qualification requirement. The median predicted savings in the top quartile (4,638 meters) is 5.55 kW per meter. The second quartile (4,638 additional meters) has median predicted savings of 2.35 kW per meter. Full results are shown in Table 2:

Table 2: Distribution of Positive Savings Predictions for Meters Participating in 50% or more Event Hours

Quartile	Predicted Savings (kW)				Meter Count
	Min	Mean	Median	Max	
First	0.00	1.25	1.31	1.47	4638
Second	1.48	1.64	1.64	1.86	4638
Third	1.86	2.41	2.35	3.22	4638
Fourth	3.22	9.53	5.55	321.96	4638

7.4 Number of participants or test subjects

The pilot forecasts 1,350 annual thermostat installations via the direct installation channel. The forecast is based on the estimated volume of thermostats that can be installed by 1 full time technician. Additionally, the pilot will leverage leads generated from trade allies to enable additional thermostats into the pilot.

The number of participating thermostats in the overall pilot is proposed to increase from the approximately 2,140 thermostats that are currently enrolled to a maximum of 7,000 enabled thermostats by June 2025.

7.5 Evaluation strategy

As PGE’s Schedule 25 program continues to grow, an accurate and realistic determination of the program’s load reduction is important both to determine cost effectiveness and evaluate the program’s potential to serve both service territory-wide and feeder-level grid operations.

Recent third-party program evaluations were conducted using an AMI data-based regression analysis process and yield average performance values (0.1 to 0.2 kW per ton of HVAC capacity). that the evaluation results are significantly lower than demand savings results derived from other utility commercial sector HVAC programs operated in other parts of the United States (0.4 to 0.6 kW per ton of HVAC capacity). In response to this discrepancy, the program implementer conducted a preliminary device-data based analysis of program performance, analyzing the difference in runtime before and

during event. The implementer's analysis yielded results that were both higher than the evaluation results and more aligned with evaluated results in other programs².

The reason for the discrepancy in analysis results is not clear, and, for both program economics and grid operations, the value of the program's capacity and the drivers of that capacity need to be clear. Using data from program operations to date, PGE and its implementer will work with the program evaluator to come to agreement on the methodology(ies) to be used for evaluating delivered capacity and the process for completing and reviewing the evaluation after each demand response season. Included in this analysis may be a comparison of device and/or AMI-based methodologies, and determination of the drivers for program performance and grid impact or a subset metering solution with sampling, with accompanying review by PGE's grid operations team. Potential evaluation methods and their benefits include:

AMI-based analysis

- Shows reduction at the meter level
- Includes both program thermostat performance and other non-program changes in load

Thermostat Device-based data

- Shows reduction at the device level
- Can show load reduction that is a function of specific aspects of device operations
- Reveals device operational details

Joint analysis

- Combines positive aspects of both analysis types
- Allows analysis of both device and other (behavioral or device-driven) load

Device (HVAC) Level Metering

- Creates more granular data with live, monitorable data
 - Uses sampling to pinpoint behavioral shifts and overall performance
 - Allows for real-time curtailment analysis and ongoing comparison with both AMI and device data feeds

All the above approaches can be used with either like day averages, regressions, or other methodology approaches as it is the source of data input. Each will be explored to better understand the experience evaluated discrepancies and finalize on both program performance and evaluation methods moving forward.

8 Schedule

The pilot reauthorization proposes a three-year extension to the tariff. Given the significant re-design, the pilot is seeking to "reset" from the previous model; as such, a three-year extension provides the

² PGE's evaluation staff and the independent evaluation firm have not assessed CLEAResult's energy model or their analysis of reported DR savings

time needed to implement the proposed changes and gather sufficient data to properly evaluate whether the pilot is viable to continue long-term as a mature program.

9 Budget

The pilot budget will be reported in the Schedule 25 deferral reauthorization filing due June 1, 2022.

10 Decision points

The pilot will undergo annual third-party evaluation of both impact and process to help determine whether any changes to the pilot scope are necessary. Additionally, annual deferral reauthorizations (June 1) will be used to monitor budget, adjust forecast, and determine value to customers.

11 Reporting requirements

PGE proposes bi-annual progress and results reporting via workshop meetings with OPUC staff throughout the pilot extension period. Since April 2021, PGE has met with staff on a quarterly basis to provide pilot re-design status updates. The transparency and open dialogue that these workshops facilitated were invaluable in overcoming pilot barriers, keeping OPUC staff apprised of opportunities and changes, and led to joint solutions that moved the redesign process forward. Continuation of these workshops can help to keep the pilot on track and gives OPUC staff an opportunity to provide input in a manner outside of formal filings.

PGE Advice No. 22-07
Schedule 25, Nonresidential Direct Load Control Pilot
Update and Extension

Courtesy Redline

SCHEDULE 25
NONRESIDENTIAL DIRECT LOAD CONTROL PILOT

PURPOSE

This Direct Load Control Pilot is a demand response option for eligible nonresidential Customers. The Direct Load Control Pilot offers incentives to allow the Company to control thermostats during Direct Load Control Events while providing a customer override. The Company provides advance notice to participating Nonresidential Customers for Direct Load Control Events. The Pilot is expected to be conducted from December 1, 2017 through May 31, ~~2022~~2025.

DEFINITIONS

Central Air Conditioning – Air conditioner tied into a central ducted forced air system.

Direct Load Control – A remotely controllable switch that allows the utility to operate an appliance, often by cycling. In terms of this pilot, direct load control allows the Company to change the set point or cycle the Nonresidential Customer's heating or cooling through the Customer's Qualified Thermostat in order to reduce the Customer's energy demand.

Direct Load Control Event – A period of time in which the Company will provide direct load control.

Ducted Heat Pump – Heat pump heating and cooling system hooked into a central ducted forced air system.

Electric Forced Air Heating – An electrical resistance heating system tied into a central ducted forced air system.

Event Notification – The Company will issue a notification of a Direct Load Control Event to participating Customers. Participating Nonresidential Customers must choose at least one method for receipt of notification. Notification methods may include email, text, auto-dialer phone call, on thermostat display screen, or via mobile app notification. Notification may also be available on the Company's website.

Event Season – The pilot has two event seasons: the Summer Event Season and the Winter Event Season.

Holidays – The following are holidays for purposes of the pilot: New Year's Day (January 1), Martin Luther King Day (third Monday in January), President's Day (third Monday in February), Independence Day (July 4), Labor Day (first Monday in September), Thanksgiving Day (fourth Thursday in November), and Christmas Day (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.

SCHEDULE 25 (Continued)

DEFINITIONS (Continued)

Non-Ducted HVAC System Thermostat Demonstration – A demonstration within the smart grid test bed that meets Special Conditions 8 through 10. Demonstrations are limited in scope and will not interfere with the operations of the Nonresidential DLC Pilot.

Summer Event Season – Includes the successive calendar months June through September.

Winter Event Season – Includes the successive calendar months November through February.

Qualified Site – Nonresidential Customer building served under qualifying PGE rate Schedule (as defined in Applicable section below) with a unique PGE service address and utility meter. Additionally, Qualified Sites meet HVAC system requirements defined in Eligibility section below.

Qualified Thermostat – Thermostats that are Company-approved have been integrated with Company's demand response management system for event calling.

AVAILABLE

In all territory served by the Company.

APPLICABLE

To qualifying Nonresidential Customers served under Schedules 32, 38, 47, 49, 75, 83, 85, 89, and 90. The Company will limit participation to ~~7,000~~^{3,800} Qualified Thermostats. Nonresidential Customers will remain on their base schedule and will be eligible for the incentives described in this schedule.

ELIGIBILITY

Eligible Nonresidential Customers must have a Network Meter. Nonresidential Customers must have a Qualified Thermostat connected to the internet and the heating or cooling system at their expense, except as provided in the Incentives section of this schedule. To participate in the Winter Event Season, the Nonresidential Customer must have a Ducted Heat Pump or Electric Forced Air Heating. To participate in the Summer Event Season, the Nonresidential Customer must have Central Air Conditioning or a Ducted Heat Pump.

SCHEDULE 25 (Continued)

DIRECT LOAD CONTROL EVENT

Direct Load Control Events occur for one to five hours. The Company may call two events per day but will not exceed five cumulative hours for the day. During Direct Load Control Events the Customer may allow the Company to control their thermostat for the duration of the event. The Customer has the option not to participate by overriding the temperature setpoint via the thermostat. The Company initiates Direct Load Control Events with Event Notification. The Company will call Direct Load Control Events only during the Event Seasons. Direct Load Control Events will not be called on weekends or Holidays. Reasons for calling events may include, but are not limited to: energy load forecasted to be in the top 1% of annual load hours, forecasted temperature above 90 or below 32, expected high generation heat rates and market power prices, and/or forecasted low or transitioning wind generation. The Company will call no more than 150 event hours per Event Season.

ENROLLMENT

The Customer may enroll at any time but must participate for the minimum number of hours described in the incentive section.

INCENTIVE

Participating Customers receive a Qualified Thermostat for signing up for the Direct Load Control Pilot. A Customer may receive multiple Qualified Thermostats for separate spaces subject to verification by the Company. In addition, Customers receive up to \$60 per Qualified ~~Thermostat Site~~ for each Event Season they participate. A Customer participating in all Event Seasons receives up to \$120 per Qualified ~~Site Thermostat~~ per Pilot year. Incentives are paid to the Customer with an automated clearing house (ACH,) check, bill credit, or generic gift card. To receive payment for an Event Season, all Qualifying Thermostats at the Qualified Site~~Customer~~ must participate in at least 50% of the event hours for which the Customer is eligible to participate in that Event Season.

SPECIAL CONDITIONS

1. Customers that reenroll in the program are not eligible for ~~additional a second~~ Qualified Thermostat~~s~~ for signing up. A Customer continuing service at a new location is not considered a new enrollment.
2. If the participating Customer moves to a different location, the Customer may continue participation if the new location meets the eligibility requirements.
3. The Company will defer and seek recovery of all pilot costs not otherwise included in rates.
4. The Company is not responsible for any direct, consequential, incidental, punitive, exemplary, or indirect damages to the participating Customer or third parties that result from Air Conditioning Cycling or changing the thermostat set point.

SCHEDULE 25 (Concluded)

SPECIAL CONDITIONS (Continued)

5. The Company shall have the right to select the cycling schedule and the percentage of the Customer's heating or cooling systems to cycle at any one time, up to 100%, at its sole discretion.
6. The Company shall have the right to pre-heat or pre-cool the Site as part of the Direct Load Control event in order to thermally condition the space to increase occupant comfort for the duration of the event.
- 6.7. The provisions of this schedule do not apply for any period that the Company interrupts the Customer's load for a system emergency or any other time that a Customer's service is interrupted by events outside the control of the Company. The provisions of this schedule will not affect the calculation or rate of the regular service schedule and associated charges.
- 7.8. PGE has the right to remove a Customer from the pilot when good cause is shown including, but not limited to, ~~for~~ poor customer responsiveness, consistent customer non-participation in called events, or issues with customer equipment that impact customer's participation.
- 8.9. PGE will administer a Non-Ducted HVAC System Thermostat Demonstration within the Smart Grid Test Bed for Nonresidential Customers who have a non-ducted, electric HVAC systems, which are compatible with the Flair Puck. Eligible Customers must:
 - a. be aligned with rates schedules defined in Applicable section;
 - b. be located within the Smart Grid Testbed boundary located on PGE's webpage regarding the "Smart Grid Testbed";
 - c. have the ability to connect Flair Puck to Internet at own expense;
 - d. and have a Networked Meter.
- 9.10. Non-Ducted Thermostat Demonstration events will follow the same requirements outlined in the Direct Control Load Event section, however;
 - a. Customers do not need to meet the minimum number of hours to be eligible for an incentive;
 - b. Customers with ductless heat pumps (DHP) or package terminal heat pumps (PTHP) are eligible for both winter and summer seasons; \$20 per season;
 - c. Customers with electric heating or cooling only equipment are eligible for either the winter or summer season incentive; \$20 per season;
 - d. Customers participating in the demonstration may be eligible for Nonresidential DLC Pilot incentives.
- 10.11. The Non-Ducted Thermostat Demonstration will be capped at 100 units and is separate from the Schedule 25 cap of 7,000~~3,800~~ thermostats.

TERM

This pilot term is December 1, 2017 through May 31, 2025~~2~~.