Portland General Electric
121 SW Salmon Street · Portland, Ore. 97204

December 15, 2020

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

RE: Advice No. 20-46, Updating Schedule 4, Multifamily Water Heater Pilot 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 **February 1, 2021**:

Third Revision of Sheet No. 4-1
Fourth Revision of Sheet No. 4-2
First Revision of Sheet No. 4-3
Fourth Revision of Sheet No. 4-4
Original Sheet No. 4-5

The purpose of this filing is to extend the term of the Demand Response Water Heater Pilot, also known as the Multifamily Water Heater (MFWH) Pilot, update the participant cap to align with the pilot expansion and contribute to PGE's Integrated Resource Planning goals, and add language to better clarify practices for data collection and usage in this pilot. This filing covers the following:

- Overview
- Expected Learnings
- Requested Regulatory Action
- Expansion Technology Details
- Pilot to Program Progress
- Pilot Learnings in Action
- Implementation Updates
- Cost Effectiveness
- Proposed Expansion Budget
- Future Program Enhancements to Improve Performance
- Potential Multifamily Additions
- Collaboration from PGE's Single-Family Water Heater Demonstration
- Other Changes to Tariff

Overview

The MFWH Pilot is set to expire January 31, 2021. The program has 9,756 water heaters installed as of November 30, 2020, with another 244 contracted and to be installed by January 31, 2021, for a total of 10,000. These units represent approximately 5.0MW of capacity (0.5kW/unit as reported in the FLP) as per the PGE forecast.[1] PGE is requesting an extension of the current Pilot as well as an expansion of total installed units. This Pilot is important to PGE for several reasons:

- Water heaters represent the most approachable, ubiquitous, least cost, flexible load potential.[2]
- The Pilot infrastructure, including but not limited to the water heater control strategies, asset management system, DRMS platform, integrations with communication-, and water heater vendors, serves as backbone for the expansion of the DR-asset class into existing homes single family water- and new construction markets.
- The Pilot focuses on the most concentrated population of electric resistant water heaters: multifamily apartments. New control technology such as CTA2045 sockets on water heater tanks and CTA2045 communications modules are easiest deployed and tested in this market. PGE plans to contribute $25k to NEEA's CTA 2045 project.

PGE Expected Learnings:

1. Validate and improve cell connectivity and callability for multiple connected water heater devices.
2. Refine inputs to adjust threshold capabilities, helping reduce/prevent cold water calls as well and improving DR-capacity per connected water heater.
3. Test the capabilities of a communication module for CTA-2045 enabled smart water heaters (pending product availability), leveraging lessons learned from retrofit switches.
4. Explore and validate DR-capacity values using telemetry data as opposed to current methodology based on Advanced Metering Infrastructure (AMI) data. PGE will meet with Staff quarterly during the Pilot extension and share the status of the Pilot's initiatives.
5. Continue to engage and expand top Property Management Company (PMC) participation in DR to the benefit of PMCs and tenants.

This Pilot directly contributes capacity towards meeting the 2019 Integrated Resource Plan (IRP) 2025 demand response targets, involves an underserved customer segment

[1] Figure 1 in the UM1827 Navigant Evaluation of PGE Multifamily Water Heater Pilot Winter 2019-20 season filed on Aug 14, 2020

[2] PGE's Pathways to Decarbonization identified connected water heaters as possessing the single greatest cost-effective flexible load potential of any standard home appliance. Additionally, PGE 2016 IRP and 2019 IRP DR potential studies identified water heater DR as a necessary component to reaching long term load shifting and flexible load goals.

(multifamily tenants), and plays an important role within the DR portfolio by addressing value beyond capacity through flexible load.

Requested Regulatory Action

PGE seeks approval for a 30-month extension, adding up to 8,000 devices for a total fleet of up to 18,000 connected water heaters. This fleet is valued at up to 9MW in a season (0.5 per unit) The forecasted budget of $4.9M represents the incremental cost to install the 8,000 devices, as well as the cost to maintain and operate the entire fleet of 18,000 connected water heaters. The Pilot will evaluate three connected water heater technologies:

1. Apricity's cell-enabled switch, which features mesh capabilities and advanced algorithms;
2. Aquanta's updated switch using cellular signals instead of Wi-Fi; and
3. New Smart Water Heaters enabled with CTA-2045 communication modules (expected to be available via customer order by mid-2021). These include water heaters installed for new construction, as well as individual or full fleet replacements with current program participants.

This requested extension and expansion provides PGE the opportunity to better identify a cost-effective path for connected water heaters via a series of necessary learnings to increase unit performance and connectivity.

This extension and expansion allows PGE to continue to test control algorithms in preparation for the market standardization and facilitate the installation of CTA-2045 enabled Smart Water Heaters. The timeline gives PGE adequate time for equipment procurement and installations and additional third-party evaluations. The additional switches will ensure PGE maintains existing relationships with PMCs that are testing the program with one property and have indicated an interest in expanding their participation with additional properties.

PGE currently has 12 properties in the Top 25 and four of those have contracted one of their properties with the expectation that they will sign-up their remaining fleet if the initial property has a smooth install and minimal tenant disruption through the season. One of those properties has stated readiness to sign-up an additional 7 properties representing 2,744 units and delivering approximately 1.3MW savings. This ongoing engagement will also allow PGE to support more rapid uptake of Smart Water Heater technology for new construction and replace-on-burnout as PMCs see the benefit of participation in demand response.

Expansion Technology Details

The requested addition of 8,000 units is planned as follows:

Figure 1 – 3-Year Expansion Plan

3-Year Expansion Plan

	2020 Jan-Jan'21	2021 Feb-Dec	2022 Jan-Dec	2023 Jan-July
Install new cell retrofit switches		2,000	2,000	1,000
Install Smart CTA-2045 comms		500	1,000	1,500
Total New	**0**	**2,500**	**3,000**	**2,500**
Cumulative Wi-Fi switches	4,452	4,452	4,452	4,452
Cumulative Cell switches	5,548	7,548	9,548	10,548
Cumulative CTA-2045		500	1,500	3,000
Total Cumulative Fleet	**10,000**	**12,500**	**15,500**	**18,000**

The 30-month plan detailed in Figure 1, above, will allow PGE enough time to procure new equipment, integrate into our DRMS, and install the equipment and evaluate a full summer and winter season, as well as an additional summer season to ensure adequate number of units (as less than 200 units are expected to be installed in time for the Summer 2021 event season).

The following outlines the estimated evaluation schedule:

- Summer 2021 Evaluation Report: due ~March 2022
- Winter 2021-22 Evaluation Report: due ~August 2022
- Summer 2022 Evaluation Report: due ~March 2023

PGE expects to have meaningful updates that will become available in early 2023 after the Summer 2022 evaluation report. The pilot to program criteria will be re-examined with a clear timeline of moving into that next phase.

Pilot to Program Progress

In June 2017, the Commission approved the original deferral filing and related advice filing establishing Schedule 4 for PGE's MFWH Pilot. The Pilot intended to test various technologies and networks in order to control water heater energy consumption during peak times. In support of the initial filing, PGE shared eight pilot-to-program criteria as guiding principles for sustainable growth. At this time the Pilot is not ready to transition from pilot to program because several metrics have not been achieved. PGE anticipates that all metrics will be achieved by the end of this requested expansion.

Table 1, below, lays out the metrics and PGE's progress towards them.

Table 1 – Pilot-to-Program Criteria

	Status	Metric	Progress
1	✓	Communications up-time of 80%+ during Pilot	Connectivity rates have stabilized to 90%+
2	✓	Adoption of 10% of the 50 largest multifamily PMCs in PGE service territory	26% of the 50 largest multifamily PMCs are participating in Pilot (47% of 15 largest)
3	✓	Control equipment defects of less than 5% annually	Equipment defect rate is 0.74% *(only 63 defective devices)*
4	✓	Stable customer satisfaction ratings with participating tenants	> Tenant overall satisfaction rated 7.4 out of 10. > Communication satisfaction rated 8.0 out of 10. > Installation satisfaction rated 9.2 out of 10.[3]
5	✓	Increase customer satisfaction among PMCs	Due to COVID PGE did not conduct a PMC Satisfaction Survey for the Winter 2019-20 season. However, 56% of multifamily PMCs have multiple participating properties (14 out of 25)
6	□	Cost effectiveness reached when Phase 3 is completed or earlier	Achieved 0.82 Total Resource Cost (TRC) by April 2020[4]
7	□	Verification of capacity at > 0.5kW/water heater or better[5] > 4.0MW capacity; 8,000 electric WHs	PGE has yet to verify 0.5kW/water heater but have made great progress from season to season improving from 0.135 to 0.35.

Pilot Learnings in Action:

Pilot learnings have directly informed the pilot-to-program criteria. Below are several key findings and the actions taken to improve implementation and the Pilot's design:

- <u>Improved connectivity rates of Wi-Fi devices by 42%</u>
  - Winter 18-19 64%
  - Summer 19 75%
  - Winter 19-20 91%

  While cellular connectivity has always met the minimum uptime threshold, Wi-Fi enabled switches were below the desired threshold. In response to evaluation findings, the implementation team performed maintenance to improve the connectivity of 1,975 Wi-Fi devices, or approximately one quarter of the installed Aquanta fleet. The goal was to improve connectivity to a rate such that the properties would be at 90% or higher. Properties that received maintenance displayed an average 27% improved connectivity, for an average of 93% per property.

[3] Ratings from the W2018-19 and Summer 2019 surveys.
[4] As per PGE's Flexible Load Plan, draft filed 06/19/20.
[5] Based on 2017 initial Pilot planning value assumptions (seasonal average of 0.5kW).

Increased statistically significant events

The PGE implementation team worked with the third-party evaluator to identify consistent event windows along with test group schedules. As a result, pre-determined non-event days were created to ensure baselining was properly adjusting for the AMI load impact regression model.

For the Summer 2020 season, the Pilot also layered in weekly All-Call events[6] and looks forward to validating the performance of the entire fleet.

- Improved tenant communications
  To ensure tenants were properly aware and educated on the MFWH Pilot, the implementation team created a *Program Overview for New Tenants* document. This material is given to property managers for their new tenant packets to inform new tenants about the device within their unit and the purpose of the demand response program.

- Streamlined system integrations
  Past integrations utilized a waterfall development methodology dependent on each party completing their requirements before a handoff occurred. As of the latest integration, PGE and its implementation partners used an agile approach where requirements were facilitated in tandem. In turn, this shortened development time required for system integrations to be completed.

Implementation Updates

Currently, the Pilot is fully subscribed with 31 property management companies participating across 99 properties. Property managers and tenants remain highly satisfied with the installation process (9.2 out of 10) and we've had less than 1% of the fleet report equipment failures or cold-water treatments (defect rate). The implementation team has been responsive to feedback from property managers and tenants throughout the Pilot, refining communications related to demand response awareness and what to expect during an installation.

[6] The Pilot is split into 2 Groups, A and B, with only one group being called at a time while the other group serves as a control group. An "All-Call event" is when both groups are called at the same time and a non-participating control group is used.

Pilot updates include:

- 9,756 retrofitted switches installed through November 2020
- 244 additional installations are scheduled and pending any further COVID delays- will be installed by January 2021
- Connectivity for the fleet reached and has maintained ≥90 percent since December 2019
- Impact per controlled device during the Winter season has improved by 260%; and
- Per-unit installation costs have decreased by 30 percent since the Pilot launched and are now stabilized

PGE has significantly grown program participation and several key PMCs have contracted trial properties with the expectation that their remaining fleet will subscribe in 2021. The Pilot has also made a substantial improvement in event performance since the first season (Winter 2018-19). Key results from Guidehouse's (formerly Navigant) Winter 2019-20 season evaluation are summarized in Table 2, below (along with comparison data from the summer 2019 and winter 2018-19 season evaluations):

Table 2 – Key Results from the Pilot's Winter 2019-20 Evaluation

Metric	*season average per event*		
	Winter 2018-19	**Summer 2019**	**Winter 2019-2020**
Percentage of water heaters ***Connected***	64%	75%	91%
Percentage of water heaters ***Controlled***	36%	46%	62%
Impact per controlled device	0.135	0.15	0.35

Despite the wins in event performances, PGE has identified a series of cost challenges embedded in the program. With changes to capacity costs, PGE is concerned that the present Pilot structure will not be able to meet cost effectiveness during the next funding cycle and wants to take a more conservative approach to building this measure and are therefore proposing a small expansion of the MFWH Pilot. This expansion will incorporate new CTA-2045 enabled smart water heaters, as well as additionally investing in 5,000 number of cellular and cellular mesh enabled units. This investment will enable PGE to determine whether a cost-effective measure structure can be identified within the 2019 IRP Flexible Load build cycle (through 2025).

The largest challenge the Pilot faces is the cost for licensed electricians to install retrofit switches. PGE made significant headway, with a 39% reduction in installation costs since the inception of the Pilot. This decrease was attributable to improved efficiency in installations, as well as reductions in installation time due to the changeover from Wi-Fi switch installs ($545) to cell switch installs ($330).

PGE anticipates an even larger cost savings once installations of the CTA communications module begin, as it is highly likely that PGE will no longer need to hire licensed electricians and the expect installation time will drop to about 5 minutes, from almost 15 minutes for cell and 25-40 minutes for Wi-Fi. PGE continues to look for additional administrative and operational efficiencies with our internal processes and third-party vendor.

Cost-Effectiveness

Cost effectiveness compares the program's benefits and costs over its economic life. This November 2020 model update assumes a longer timeframe than the proposed three-year extension (2021-2023). The model assumes ten years of investment in water heaters (2020-2029), in order to capture the economies of scale that future program growth will enable. The energy service benefits provided by the equipment is modeled to extend through 2040 (2029 as the last year of new investment + 12-year economic life). Program growth is assumed as follows:

Table 3 – Pilot 9-year Projection

	Current Expansion									
	2021	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**TOTAL**
NEW Cell switches	2,000	2,000	1,000							**5,000**
NEW CTA-2045 comms	500	1,000	1,500	2,000	2,500	3,000	3,000	3,000	3,000	**19,500**
Total New	**2,500**	**3,000**	**2,500**	**2,000**	**2,500**	**3,000**	**3,000**	**3,000**	**3,000**	**24,500**
Existing by Jan 2021										**10,000**
									Cumalitive Program Total	**34,500**

The four cost:benefit ratios that PGE has historically employed are reported below. A ratio above 1.00 indicates that the benefits exceed the cost.

Table 4 – PGE Cost:Benefit Tests

Test	Test Perspective	Results
TRC: Total Resource Cost Test	Utility + Participants	0.82
PAC: Program Administrator Test	Utility	0.58
RIM: Ratepayer Impact Measure	Non-Participating Ratepayers	0.56
PCT: Participation Cost Test	Program Participants	11.40

Cost effectiveness is generally improved by low costs and high load impact. Key inputs in these results include:

- Number of water heaters. Through the proposed extension, fixed costs are close to 50% of total program costs. The more water heaters across which these costs are spread, the more cost effective the program. In the November 2020 model, anticipated program growth (in above table) is conservative, reflecting uncertainty in the multi-family construction forecast.

- Water heater operational results, including connectivity, callability, and load impact. The November 2020 model assumes that, through additional event calling protocols (i.e., All Calls and start/stop time), the fleet achieves load impacts of 0.46 kW/summer and 0.50 kW/winter.

- Technology costs. In the November 2020 model, retrofit equipment + installation costs were held constant at $291 (2020 average). CTA2045 costs were assumed to fall from $165 to $132 over the three-year extension timeframe.

- Administrative costs. Includes PGE staffing, vendor contracts, and DERMS platform. The lower the costs, the higher the benefit:cost ratio.

Proposed Expansion Budget

Table 5 – MFWH Pilot Deferral Expansion Budget

MFWH Budget Deferral									
					end of current program budget		Expansion Budget Request		
	2017 Actual	2018 Actual	2019 Actuals	2020 Actuals Jan- Oct	2020 remaining	2021 Jan 1 month	2021 Feb-Dec 11 months	2022 Jan-Dec 12 months	2023 Jan-July 7 months
Incremental FTE	$ 1,328	$ 71,553	$ 197,913	$ 128,848	$ 25,000	$ 20,000	$ 180,000	$ 100,000	$ 50,000
Third Party Administrator	$ 46,470	$ 475,205	$ 375,101	$ 446,174	$ 177,889		$ 300,000	$ 330,000	$ 363,000
Recruitment	$ 285	$ 10,565	$ 7,760	$ 4,382	$ 1,000	$ 1,000	$ 9,000	$ 10,000	$ 10,000
DRMS* (Implementation)	$ 12,500	$ 5,000	$ 17,500	$ 37,500	$ -	$ -	$ 10,000	$ -	$ -
DRMS (Platform)				$ -	$ 48,234	$ 7,880	$ 86,682	$ 126,460	$ 169,118
Evaluation	$ -	$ 101,500	$ 94,000	$ 84,500	$ -	$ -	$ 94,000	$ 94,000	$ 50,000
Fixed Costs (switches)		$ 404,805	$ 2,268,867	$ 820,415	$ 174,250	$ 100,000	$ 700,000	$ 770,000	$ 616,000
NEEA contribution	$ -	$ -	$ -	$ -	$ -	$ -	$ 25,000	$ -	$ -
Total Install Costs	**$ 60,583**	**$ 1,068,628**	**$ 2,961,141**	**$ 1,521,818**	**$ 426,373**	**$ 128,880**	**$ 1,404,682**	**$ 1,430,460**	**$ 1,258,118**
Smart WH Incentive	$ -	$ -	$ -	$ -	$ -	$ -	$ 35,000	$ 70,000	$ -
PMC Incentive	$ -		$ 34,740	$ 73,920	$ 60,940	$ 16,843	$ 185,277	$ 252,120	$ 312,120
New Customer Incentives	$ -	$ 4,995	$ 3,330	$ -	$ 4,995	$ -	$ 5,000	$ 5,000	$ 5,000
Total Incentives	**$ -**	**$ 4,995**	**$ 38,070**	**$ 73,920**	**$ 65,935**	**$ 16,843**	**$ 225,277**	**$ 327,120**	**$ 317,120**
Total Deferral Amounts	**$ 60,583**	**$ 1,073,623**	**$ 2,999,211**	**$ 1,595,738**	**$ 492,308**	**$ 145,724**	**$ 1,629,958**	**$ 1,757,580**	**$ 1,575,238**
							$4,962,777		
Retro-Fit Installs	**0**	**1,788**	**4,870**	**2,584**					
Retro-fit Forecasted	*0*	*0*	*0*		*864*		*2,000*	*2,000*	*1,000*
CTA Forecasted	*0*	*0*	*0*	*0*	*0*	*0*	*500*	*1,000*	*1,500*
Total Installed	**0**	**1,788**	**6,658**	**9,242**	**10,106**	**10,106**	**12,606**	**15,606**	**18,106**
Cost per switch		**$ 226.40**	**$465.89**	**$288.48**			**$280.00**	**$256.67**	**$246.40**

Future Program Enhancements to Improve Performance

A key aspect to PGE's investigation and piloting of the MFWH program is intra-hour energy services capability represented by an aggregation of smart water heaters. Our current activity has shown that our present units can respond to event performance call multiple times per day. Though MFWH is presently justified as a capacity resource, it has also demonstrated capability to operate as an energy resource. The idea of a water heaters being able to perform grid services beyond capacity is not new.[7] In 2016, RMI estimated that grid services from water heater represented a $3.6B/year value in part through energy arbitrage, energy savings, renewable integration and avoided generation.[8] Similarly Jim Lazar of the Regulatory Assistance Project found extraordinary value in building a fleet of grid enabled water heaters to address the dreaded "duck curve."[9] PGE is pursuing the development of grid enabled water heaters to meet the promise identified by RMI, RAP, LBNL, BPA and others.

As PGE wrote in our Flexible Load Plan, it plans to pursue values of demand response beyond capacity, value of flexible load whereby smart appliances can provide a host of potential energy or as defined in PGE's Flexible Load Plan Grid Service. Table 5 below, from the Flexible Load Plan, outlines the Grid Service flexible load can provide by program type. MFWH are represented as DLC Daily. With an asset such as MFWH operating in the field, connected and communicating, PGE plans to investigate these grid services and model them in our forthcoming DSP, and thereby inform IRP modeling and assumptions of services to be provided, performance, and thus value. Without a Pilot like MFWH in the field, this work would not be possible, especially at the cost proposed here. Only one other flexible load resource, energy storage, is able to provide similar performance. These devices are much more expensive and not nearly as ubiquitous as water heaters. A definition and discussion of each grid service seen in table 5 below can be found in Chapter 3 of the Flexible Load Plan.

[7] https://www.utilitydive.com/news/utilities-in-hot-water-realizing-the-benefits-of-grid-integrated-water-hea/445241/
[8] http://blox.rmi.org/blog_2016_02_24_water_heaters_as_sexy_as_a_tesla
[9] https://www.raponline.org/event/teaching-the-duck-to-fly-second-edition-webinar/

Table 5 – PGE Flexible Load Plan

Resources							
Grid Service	**DLC Daily**	**DLC Seasonal**	**Behavioral DR**	**Res Battery**	**C&I Battery**	**EV**	**PV Smart Inverters**
Distribution Services							
Volt/Var control				Current	Current		
Frequency response				Current	Current	Near-term	
Outage Mitigation and Upgrade Deferral	Near-term	Near-term	Near-term	Near-term	Near-term	Near-term	
Transmission Services							
Congestion and Upgrade Deferral	Near-term	Near-term	Near-term	Near-term	Near-term	Near-term	
Generation Services							
Capacity	Current	Current	Current	Current	Current	Current	
Value of Energy	Current	Near-term	Near-term	Current	Current	Current	
Flexibility services							
Contingency Reserves							
Spinning reserves	Current			Current	Current		
Non-spinning reserves	Current	Near-term		Current	Current		
Load following / Energy Imbalance	Longer-term	Longer-term		Near-term	Current	Near-term	
Regulation				Near-term	Current	Near-term	
Voltage support	Current				Current		Current
Black start	Current			Current	Current		
Participant Benefits							
Power reliability	Current	Current	Current	Current	Current		
Outage mitigation				Current	Current	Longer-term	Current
TOU charge reduction				Current			
Demand charge reduction					Current		

During the 30-month extension of the MFWH program, PGE will be collecting data and calling events to inform value identification of the services list in the table above. The MFWH team will be working closely with the DSP Team to delineate the activity necessary to investigate and model these grid services to inform value and thus update performance and cost effectiveness of this important measure. PGE will update Commission Staff on the progress of this work.

Potential Multifamily Additions

PGE is also exploring how complementary multifamily offerings could leverage the current MFWH Pilot. Just as the COVID-19 pandemic was starting, PGE received an initial inquiry from a PMC regarding a combined MFWH control and Line Voltage Thermostat offering. Given the uncertainties introduced by COVID-19, the PMC requested PGE revisit the concept with them in early 2021. Potential efficiencies exist for incorporating Line Voltage Thermostat switches using the MFWH Pilot's installed Wi-Fi and/or cell retrofit communications portals; using the same communications methods may save installation time, money, and integrations.

Collaboration from PGE's Single-Family Water Heater Demonstration

The MFWH program serve as backbone for future expansions of water heater programs in single family existing homes and single-family new construction. While the MFWH program is primarily focused on activating electric resistant water heaters, future single-family oriented programs will allow for electric resistant water heaters as well as heat pump water heaters to join the program. The key elements that MFWH and single-family programs share are:

- Software integrations between water heater manufacturers, asset management-, and DRMS-platforms;
- CTA2045 communication technology;
- Joint procurement for CTA2045 communication modules; and
- Channel management regarding water heater manufacturers, distributors, and trade allies.

PGE is currently conducting a Single-Family Water Heater (SFWH) demonstration project. This activity is focused on:

- Exploring communication technology: Wi-Fi, Neighborhood area network via CTA2045, 4G LTE via CTA2045.
- Enablement and demonstration of demand response using heat pump water heaters.

This Pilot extension is supported by PGE's application to reauthorize the deferral, submitted April 15, 2020 in UM 1827. The proposed extension and expansion keep the Pilot costs within the Commission cost-effectiveness requirements for the Pilot[10] and continues the cost-effectiveness and program-cost assumptions as proposed in the original Pilot proposal.

[10] Commission has required the Pilot to demonstrate cost effectiveness via a TRC of 0.7 to 1.0. The Pilot currently delivers a 0.82 TRC.

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

The proposed revisions to Schedule 4, Multifamily Water Heater Pilot do not increase, decrease, otherwise change existing rates, or impact revenues; costs are being deferred in UM 1827 for later ratemaking treatment. As of January 2021, PGE has installed or is forecasted to install 10,106 dispatchable water heaters representing 31 PMCs across 99 different properties.

Additionally, PGE is updating tariff language to clarify the interaction between PGE, the Multifamily Property Owners, and Residential Customers. Lastly, to improve visibility into the pilot, PGE is adding language to better clarify practices for blind data collection for analysis purposes.

Should you have any questions or comments regarding this filing, please contact Santiago Beltran Laborde at (503) 464-7902.

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

Enclosure
cc Kacia Brockman, OPUC

SCHEDULE 4
MULTIFAMILY RESIDENTIAL DEMAND RESPONSE WATER HEATER PILOT

PURPOSE

The Multifamily Residential Demand Response Water Heater Pilot is a demand response option for eligible Multifamily Properties. The objectives of the Multifamily Residential Demand Response Water Heater Pilot are: (C)

- To quantify the energy consumption that can be shifted to different times from:
  - Water heaters equipped with a communication interface that supports Direct Load Control Events, or
  - Water heaters retrofitted with a control switch in the power supply to the tank
- To inform further the program design for a water heater demand response program;
- To determine an appropriate incentive level for Multifamily Property Owners and Residential Customers who choose to participate in a demand response program for water heaters; (C) (C)
- To integrate and test different technologies; and
- To implement different demand response dispatch strategies.

DEFINITIONS

Customer Override – The ability for the Residential Customer to temporarily suspend Direct Load Control for a period of 24 hours. (C)

Direct Load Control – The means for a utility to remotely control an appliance. In terms of this pilot, direct load control allows the Company to control when the water heater uses electricity to heat water.

Direct Load Control Event – A period in which the Company will provide Direct Load Control.

Conventional Electric Resistance Water Heater – Multifamily Property Owners' existing electric resistant water heaters will be retrofitted to be demand response enabled. Water heaters that require replacement will be replaced with smart electric resistance water heaters with the approval of the Multifamily Property Owners. (C) (C)

Heat Pump Water Heater – Models compatible with the Company's available hardware, software, and communication technology that can engage in direct load control events. (C)

AVAILABLE

In all territory served by the Company where the Company's demand response communication networks are available. (C)

SCHEDULE 4 (Continued)

APPLICABLE

Subject to selection by the Company, Multifamily Property Owners may participate in the pilot. Residential Customers in multifamily residences (MFRs) will be the primary target of the pilot. In cases of rental properties, the pilot will be structured as an opt-out program, meaning Residential Customers will be automatically enrolled in the pilot if their Multifamily Property Owners enrolls in the pilot and the Residential Customer must withdraw from the program if they do not want to participate. (C)

Residential Customers will be given notice about this pilot at the time of installation of the communication interface or at the start of their service. The Company will provide Residential Customers with information that they will be automatically enrolled in the pilot if they do not opt out. The notice will also provide the Residential Customer the contact information and instructions on how to opt out of the pilot at the time of installation or at the start of their service. If a Residential Customer chooses to opt out of this pilot, the installed communication interface and any other installed Company equipment will remain on the water heater. A Residential Customer that has elected to opt out will be removed from the dispatch of direct load control events. As new Residential Customers move into a participating MFR. The Company will be aware of a new Residential Customer based on customer data from the Company's Customer Information System (CIS). The number of eligible Residential Customers to participate in the pilot is 18,000 customer households. Residential Customers will remain on Schedule 7 and will be eligible for the incentives described in this schedule. (C)

ELIGIBILITY

For MFRs, the Company will initially select large complexes, negotiating with Multifamily Property Owners or their property manager for the installation of retrofit devices as well as new demand response enabled water heaters. At the Company's discretion, the Company will select qualifying properties based on number of apartments, size of apartments, occupancy, and size of existing water heater. (C)

DIRECT LOAD CONTROL EVENT

During the pilot there will be no limitation on the hours of Direct Load Control Events. This pilot will offer the ability for the Residential Customer to override a direct load control event, under the terms listed in Special Condition 4 of this pilot. (C)

ENROLLMENT

The MFR enrollment period will be through July 31, 2023. PGE will enroll MFRs by contracting with the Multifamily Property Owners or their property manager. Unless this pilot is otherwise terminated, MFRs and participating Residential Customers will be enrolled for the entire pilot term. (C)

SCHEDULE 4 (Continued)

INCENTIVES

Multifamily Property Owners or their property managers will receive an annual incentive in the form of: a monetary payment, and/or a specified number of replacement water heaters and/or, a monetary contribution toward water heater servicing/replacement costs. PGE will negotiate specifics with participating Multifamily Property Owners or their property managers based on their preferences. (C) (C) (C)

PGE will also incentivize the costs for new smart electric water heaters for Multifamily Property Owners or their property managers in situations when the existing water heater is too old to be retrofitted cost effectively and/or when an existing electric water heater fails. PGE will pay the incremental cost between a water heater with a standard six (6) year warranty and a qualifying smart water heater. Incentives should cover all or most of the cost difference between a standard electric water heater and a smart electric water heater. The incentive will substantially reduce the costs of making the water heater demand response enabled. (C) (C) (T)

The Residential Customer will also receive an incentive. The incentive that the Residential Customer receives may differ from the incentive of the Multifamily Property Owners or their property managers. The incentive amounts for each MFR, Multifamily Property Owners or their property managers will be determined based on the total number of demand response enabled water heaters installed or active participation levels in demand response events. (C) (C)

SCHEDULE 4 (Continued) (T)

SPECIAL CONDITIONS

Residential Customer (C)

1. The Residential Customer may terminate participation under this pilot voluntarily. The Residential Customer will not receive a participation incentive if they withdraw or are removed from the pilot. The Residential Customer must notify the Company to withdraw from the pilot. (C) (C)

2. If a Residential Customer withdraws or is removed from the pilot, the Residential Customer is not eligible for reenrollment during the pilot. (C)

3. If the Residential Customer moves from the enrolled residence during the term of the pilot, they are no longer eligible for the pilot. (C)

4. The Residential Customer may activate a 24-hour suspension from the pilot by notifying PGE through a pilot specific customer service phone number on the Company's website. A Residential Customer may be removed from the pilot if they implement the override option excessively; an example of excessive is override use for more than 100 days, or more than 15 days in any 30-day period. (C) (C)

5. To receive a participation incentive, the Residential Customer must respond to seasonal surveys regarding the pilot. (C) (C)

Company (C)

6. The Company has the right to remove a MFR or Residential Customer from the pilot at any time, for any reason. (C)

7. The Company is not responsible for any direct, consequential, incidental, punitive, exemplary, or indirect damages to the participating MFR, Multifamily Property Owners and their property managers, Residential Customer, or third parties that result from Direct Load Control Events. (C) (C)

8. Communication interfaces installed onto the water heater will remain the property of the Company before, during and after the conclusion of the pilot. (C)

9. The provisions of this schedule do not apply for any time period that the Company interrupts the Residential Customer's load for a system emergency or any other time that a Residential Customer's service is interrupted by events outside the control of the Company. (C) (C)

SCHEDULE 4 (Concluded)

DATA COLLECTION **(N)**

In consideration for being allowed to participate in the Pilot, Multifamily Property Owners and Residential Customers agree that the Company or its representative may collect certain information from Multifamily Property Owners and Residential Customer's participation in the Pilot and use such information as described herein. Such information may include, but is not limited to, general energy usage and associated account and billing data (such information includes, but is not limited to, consumption and billing data, billing records, billing history, meter usage data, and rate information), name, email address, service address, account number, appliance serial number, activation date, runtime data, set-points, application and survey information. This data will be retained by the Company and its representatives for an indefinite amount of time. Multifamily Property Owners and Residential Customer agree that the Company and its Pilot representatives may use the information obtained through Pilot participation (a) to operate, administer, market, evaluate, analyze, change or improve the Pilot or utility services, (b) for the Company to prepare and present general, aggregated or anonymized results and information about the Pilot to third parties, including governmental entities such as the electricity system regulatory bodies, (c) for the Company to understand and evaluate participant habits and to inform the development and creation of utility programs and load planning, and (d) to inform Multifamily Property Owners and their property managers of irregularities associated with a given water heater. The Company and its Pilot representatives and agents will not use the data collected in the Pilot except as provided herein and will not otherwise disclose, transfer or sell this data. **(N)**

TERM

The duration of this pilot is through July 31, 2023. **(C)**