



# Oregon

Kate Brown, Governor

## Public Utility Commission

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January 26, 2021



BY EMAIL

Portland General Electric Company

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RE: Advice No. 20-46

At the public meeting on January 26, 2021, the Commission adopted Staff's recommendation in this matter docketed as ADV 1097. The Staff Report and a receipted copy of the sheets in your advice filing are attached.

Nolan Moser

Chief Administrative Law Judge

Public Utility Commission of Oregon

(503) 378-3098

**PUBLIC UTILITY COMMISSION OF OREGON  
STAFF REPORT  
PUBLIC MEETING DATE: January 26, 2021**

REGULAR  CONSENT  EFFECTIVE DATE February 1, 2021

**DATE:** January 19, 2021

**TO:** Public Utility Commission

**FROM:** Kacia Brockman

**THROUGH:** Bryan Conway, JP Batmale, and Sarah Hall **SIGNED**

**SUBJECT:** PORTLAND GENERAL ELECTRIC:  
(Docket No. ADV 1097/Advice No. 20-46)  
Extends Multifamily Residential Demand Response Water Heater Pilot,  
Schedule 4.

**STAFF RECOMMENDATION:**

Approve Portland General Electric Company's (PGE or Company) Advice No. 20-46 effective with service on and after February 1, 2021, revising its Multifamily Residential Demand Response Water Heater Pilot, Schedule 4, to extend the term from January 31, 2021 to July 31, 2023, and to increase the cap on participating water heaters from 10,000 to 18,000.

**DISCUSSION:**

Issue

Whether the Commission should approve Advice No. 20-46, PGE's request for a 30-month extension, through July 31, 2023, and an 8,000-device expansion to the Multifamily Residential Demand Response Water Heater Pilot (Pilot or MFWH Pilot) to demonstrate a path to cost-effectiveness for the Pilot.

Applicable Law

Oregon Revised Statutes (ORS) 757.205 requires public utilities file to all rates, rules, and charges with the Commission.

ORS 757.210 establishes a hearing process to address utility filings and requires rates be fair, just, and reasonable.

ORS 757.220 provides that no change shall be made in any schedule, except upon 30 days' notice to the Commission prior to the time the changes are to take effect.

Oregon Administrative Rule (OAR) 860-022-0025 requires that filings revising tariffs include statements showing the change in rates, the number of customers affected and resulting change in annual revenue, and the reasons for the tariff revision.

## Analysis

### *Background*

The MFWH Pilot operates under PGE's Schedule 4. In the Pilot, PGE is given direct load control of electric domestic water heaters in participating multifamily residences during demand response events. PGE either retrofits existing water heaters with demand response control devices or, in the case of new water heaters, subsidizes the incremental cost between a standard water heater and a qualifying smart water heater. PGE also pays participation incentives both to the managers or owners of participating multifamily properties, and to the tenants residing in those properties who don't opt out of participating. As an added value, PGE monitors water heater performance and offers to notify property managers if abnormal conditions indicate a failed water heater or a leak.

The MFWH Pilot was initially authorized in 2017 to run for 30 months, through December 31, 2019.<sup>1</sup> The Pilot started slowly during this initial period, but performance improved significantly after PGE successfully increased Wi-Fi connectivity of the control devices and timed the event calls to be able to measure the load reduction impact from Advanced Metering Infrastructure (AMI) data. The Commission subsequently approved three short-term extensions to the Pilot.

- The first extension was for three months, through March 31, 2020. It allowed time for evaluation results to confirm PGE's progress with the pilot. It also authorized an increase to the number of participating water heaters from 8,000 to 10,000 in order to install more cell-enabled control devices, which have better connectivity rates than Wi-Fi-enabled devices.<sup>2</sup>

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<sup>1</sup> See UM 1827, Order No. 17-224, June 27, 2017.

<sup>2</sup> See ADV 1067, Staff Report, December 17, 2019.

- The second extension was for six months, through September 30, 2020. It gave PGE additional time to install the cell-enabled control devices, develop its Flexible Load Plan, and plan next steps for the pilot.<sup>3</sup>
- The third extension was for four months, through January 31, 2021. It granted additional time for PGE to finish installing the control devices it had procured and was unable to install earlier in 2020 due to the COVID-19 pandemic. PGE states that it is on track to complete those installations by January 31, bringing the total number of connected water heaters in the Pilot to 10,000.

In the Staff report recommending approval of the third extension, Staff noted that the Pilot showed promise based on continuous improvement in the evaluation results from the first three event seasons, and that the Pilot would need more operational time and new strategies to reach maturity. Staff recommended that PGE coordinate its next Pilot extension request with Staff in advance, and include in its filing updated pilot goals, implementation strategies, budget, and timeline.<sup>4</sup> Accordingly, PGE met with Staff twice during Q4 2020 to discuss its plan, and then filed Advice No. 20-46 on December 15, 2020, with the detail requested.

In the advice filing, PGE requests 1) to extend the Pilot 30 months through July 31, 2023; and 2) to expand the number of participating water heaters from 10,000 to 18,000. PGE forecasts a budget of \$4.96 million to implement the Pilot during this 30-month period. PGE will use this extension to demonstrate a path to cost-effectiveness that would allow a transition from pilot to program.

#### *Pilot Status*

The Pilot is fully subscribed with 10,000 connected water heaters across 99 different multifamily residential properties managed by 31 different property management companies. PGE reports that property managers are satisfied with the Pilot and have expressed interest in expanding their participation to additional properties, both retrofit and new construction. The Pilot has a cost-effectiveness of 0.82 under the Total Resource Cost method, which is short of its goal of 1.0. Water heaters in the Pilot achieved an average load reduction of 0.35 kW per event during the last winter event season, which is short of PGE's per-water heater goal of 0.5 kW in winter and 0.46 kW in summer.

The first 4,500 control devices installed in the pilot communicate via PGE-provided Wi-Fi. The subsequent 5,500 devices communicate via cellular network. The connectivity rate for both types of communication is now consistently over 90 percent, but the Wi-Fi is costlier to install and maintain. Therefore, the additional 8,000 units

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<sup>3</sup> See ADV 1097, Staff Report, March 23, 2020.

<sup>4</sup> See ADV 1097, PGE Advice No. 20-25, Staff Report, September 22, 2020.

proposed in this filing will all communicate via cellular network. PGE will continue to maintain the Wi-Fi network to ensure continued high connectivity rates for those water heaters.

*Path to Cost-effectiveness*

In an effort to achieve cost-effectiveness, PGE's extended Pilot proposal includes strategies to lower per-unit cost and increase per-unit performance.

To lower the per-unit cost, PGE proposes to:

- Encourage the installation of smart water heaters with CTA-2045 communications module ports for all new construction and replacements on burnout. The new CTA-2045 standard offers a plug-and-play interface that PGE expects to reduce the cost of installing control devices by 60 percent. Currently retrofits must be installed by an on-site licensed electrician. Cost-effectiveness will improve as the water heater fleet, over time, transitions to the CTA-2045 standard. PGE plans for 3,000 of the 8,000 new units in this pilot expansion to utilize CTA-2045.
- Explore using the device's telemetry to measure demand response capacity value as an alternative to the current methodology based on AMI data. Telemetry will likely be less expensive and more flexible in providing sub-hourly information, but the accuracy of the data needs to be validated.
- Leverage existing relationships with property management companies to lower customer acquisition costs, and leverage fixed infrastructure costs with added volume to lower per-unit operating costs.
- Monitor learnings from the Smart Grid Testbed demonstration about whether using a localized radio mesh network is a more cost-effective way to communicate with CTA-2045-equipped water heaters concentrated in a small geographic area, such as large multifamily residential properties.

To increase the per-unit performance, PGE proposes to:

- Adjust water heater operational thresholds to improve their ability to respond to calls during demand response events without increasing cold water complaints. PGE has demonstrated a 12 percent increase in call response in a sample of devices using this technique. PGE plans a firmware update to the majority of existing retrofit control devices to enable this kind of control across the entire fleet.
- Reduce snapback, the surge in demand after an event when curtailed devices simultaneously resume operation, by bringing water heaters back online in random groupings over an hour instead of a minute.

- Model the value of grid services the water heater fleet can offer as flexible load that can be dispatched multiple times a day. Currently, the Pilot's cost-effectiveness test considers only the water heater's value as a peak capacity resource. PGE states in its filing that valuing grid services is consistent with its Flexible Load Plan,<sup>5</sup> and that the Company plans to model the potential grid services from water heaters in its forthcoming Distribution System Plan.

#### *Pilot Budget*

The proposed \$4.96 million budget covers the cost to install and operate 8,000 new control devices and to continue operating the existing fleet of 10,000 units. The budget is comprised \$4.1 million in installation and operation costs and \$0.9 million in participant incentives. Expenses incurred under the MFWH Pilot are deferred for later ratemaking in Docket No. UM 1827. The costs for this and PGE's other demand response pilots are recovered through an automatic adjustment clause in Schedule 135.

As part of PGE's Flexible Load Plan, PGE will consolidate all of the Company's demand response/flexible load pilots, including the MFWH Pilot, into one comprehensive multi-year plan and budget. PGE plans to submit the consolidated multi-year flexible load pilot plan and budget for Commission approval in the summer of 2021.

#### *Pilot Justification*

The MFWH Pilot contributes to PGE's overall goal for demand response to provide peak load reduction of more than 77 MW in winter and 69 MW in summer by 2021. The projected peak capacity of the Pilot's planned fleet of 18,000 water heaters is 9 MW. Water heating is a promising demand response resource for PGE because it is a ubiquitous behind-the-meter device that can be controlled as a flexible load to provide both capacity and energy services without customer interruption.

Additionally, the Pilot serves the multifamily residential sector, which is often underserved by energy efficiency offerings because the tenant, not the property owner, enjoys the benefits of the property owner's investment. This Pilot provides benefits to both tenants and property owners. Often, the tenants in large multifamily residential properties include lower-income residents, a demographic historically underserved by energy programs. PGE expects a large low-income housing provider to participate in the Pilot expansion, further improving the equity of benefits offered by the Pilot.

#### *Reporting*

PGE will conduct evaluations of each summer and winter event season throughout the Pilot term, and has committed to present Pilot results to Staff quarterly.

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<sup>5</sup> See UM 2141, PGE Flexible Load Plan, filed December 23, 2020, section 4.4.1.

Conclusion

Staff finds that continuation and expansion of the Pilot is justified. Staff also finds that the projected costs are reasonable and that PGE has demonstrated a potential path to cost-effectiveness that should be tested. Staff appreciates the Company's proactive communication with Staff prior to this advice filing. Staff also appreciates the Company's commitment to tie learnings about water heating as a flexible resource to the Company's Flexible Load Plan and upcoming Distribution System Plan.

**PROPOSED COMMISSION MOTION:**

Approve PGE's Advice 20-46, effective with service on and after February 1, 2021.

**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)  
|  
(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.

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(C)  
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(C)  
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(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)  
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(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)  
(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)  
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(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)  
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(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)  
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(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**

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)

(N)

**TERM**

The duration of this pilot is through July 31, 2023.

(C)