

**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.