



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

December 29, 2020

Public Utility Commission of Oregon
Attention: Filing Center
P.O. Box 1088
Salem, OR 97308-1088

RE: UM 2099 In the Matter of PGE's Request for Approval of Agreement for Net Metering and Interconnection Services

Dear Filing Center;

In accordance with UM 2099 Order No. 20-402 enclosed for filing is Portland General Electric Company's (PGE) report outlining the remaining details for implementing the two-meter solution on an interim basis.

Thank you for your assistance in this matter. If you have any questions or require further information, please call Chris Pleasant at (503) 464-2555.

Please direct all formal correspondence, questions, or requests to the following e-mail address: pge.opuc.filings@pgn.com.

Sincerely,

\s\ Robert Macfarlane

Robert Macfarlane
Manager, Pricing & Tariffs

Enclosures

Response 1. Detailed criteria for calling curtailment events, including specific temperature ranges and cloud cover levels.

PGE will curtail net metering projects with the two-meter solution whenever generation exceeds load on the feeder. Curtailments will be based on real time monitoring based on actual conditions on the transformer/feeder. Conditions that may lead to this situation, where generation exceeds load on a feeder, depend on several factors. These factors may include, but are not limited to, the following: time of year (season), time of day, day of week (weekends versus weekdays), cloud cover, and temperature. For each generation-limited feeder, hourly data over a period of twelve months was analyzed to provide insight into the actual conditions that may result in backfeed events and the likely timing, frequency, and duration of these events. **Table 1** summarizes the results of this analysis by providing the current number of customers who participate in the Two Meter Solution (TMS), the capacity (name plate) of the TMS customers' systems, and the expected conditions that may be associated with a curtailment event. Additional details associated with each feeder are included in **Appendix 1**.

Table 1: Generation-Limited Feeders

Feeder (Monitoring)	# of Customers	kW	Frequency of Backfeed (Days)	Month	Min Hour	Max Hour	Lo Temp	Hi Temp	Day of Week	Cloud Cover
1 Scoggins-Laurelwood (SCADA)	2	21.3	5	April	1pm	3pm	65	74	All	Sunny
			2	May	10am	2pm	67	80	All	Sunny
			6	June	11am	3pm	66	76	All	Sunny
			3	August	10am	1pm	67	74	All	Sunny
2 Waconda-River (SCADA)	0	0	1	March	1pm	2pm	56	63	Weekend	Sunny
			6	April	11am	3pm	55	67	Weekend	Sunny
3 Waconda-Waconda 13 (SCADA)	1	7.6	1	March	1pm	2pm	56	63	Weekend	Sunny
			6	April	11am	3pm	55	67	Weekend	Sunny
4 Yamhill-Yamhill 13 (MV90)	3	39	1	May	1pm	4pm	65	69	All	Sunny
			1	June	1pm	4pm	69	74	All	Sunny
5 Bethel-Geer (SCADA)	4	56.1	These feeders qualify as Generation-Limited feeders based on the ratio of generation to load, i.e., >90%. PGE has not observed backfeed events on these feeders, and will continue to monitor them.							
6 Canby-Zimmerman (MV90)	1	23								
7 Estacada-North Fork (SCADA)	1	21								
8 Redland-Redland 13 (MV90)	2	126.5								
9 Wallace-Wallace 13 (SCADA)	3	31.1								
Total	17	325.6								
		Average	3	NA	NA	NA	62	71	NA	NA

Response 2. Detailed criteria for setting the duration of the event.

The estimated dates and durations of curtailment events are outlined in the **Table 1** above. The actual curtailment will occur in real-time, based on actual conditions on the transformer/feeder. The real-time conditions will be monitored through the Distributed Network Protocol 3 (DNP3)¹ protocol using real-time monitoring devices and software such as SCADA and MV90 systems.

A curtailment event will be called when the substation transformer is experiencing backfeed from a feeder, i.e., when the flow of electricity goes negative (<0) at the transformer. An alarm will be set in PGE's Energy Management System (EMS) to alert a Grid Operator that the transformer loading has become negative (backfeed). PGE will curtail the affected set of meters for one hour. If after an hour

¹ DNP3, or DNP 3.0, is a communications protocol used in SCADA and remote monitoring systems. It is widely used because it is an open standard protocol.

the alarm is cleared, the curtailed meters will be returned to operation. The curtailment will be managed in one-hour increments in this manner until the backfeed condition has ended. PGE does not expect the duration of the curtailment event to exceed eight (8) hours in the next year.

[Response 3. Further explanation for which net metering customers on a feeder need to be curtailed and how PGE would prioritize or otherwise match the curtailment practice to the potential scale of over-generation.](#)

The current number of customers is outlined in the **Table 1** above. PGE's TMS will curtail only net-metered customers that have a TMS meter installed on a feeder or substation transformer experiencing backfeed conditions described in **Response 1**. PGE will not call events on an individual customer basis. Nor will TMS customers be partially curtailed to match curtailment to the scale of overgeneration. Curtailment events will be determined on a per-feeder or a per-substation transformer basis. PGE will call events based on the specific conditions of each feeder or substation transformer. When a curtailment event is called, only TMS customers served by the associated feeder or substation transformer will be affected.

Existing customers who do not have the TMS will not be affected by curtailment events. Customers who do have the TMS but are not connected to the feeder or substation transformer experiencing backfeed, will not be affected by curtailment events.

[Response 4. Additional refinement of solar generation assumptions \(as discussed in the Generation Limited Feeder section above\)](#)

PGE and Energy Trust of Oregon (ETO) met on December 4, 2020 to discuss the current approach to operating PGE's two-meter solution. During these meetings, PGE and ETO identified possible opportunities to:

- Coordinate between projects/data using PowerClerk,
- Develop a shared understanding of data that can assist in the design of "DER ready" substations, and
- Investigate tools that can be leveraged to support hosting capacity, interconnections and other DERs.

PGE and ETO plan to meet in January of 2021 to continue discussing opportunities to coordinate and share data.

[Response 5. The status of its analysis of historic feeder-by feeder data and an analysis of the frequency and events that may occur in 2021.](#)

PGE's Data Solutions Team collected data from PGE's Solar Payment Option (SPO) Program which provided measured generation information for a sampling of customers. The purpose of this analysis is to provide guidance at a macro level to inform customer communication and provide inputs into system operation planning. This analysis also may be used as an alternative in the event real-time data is unavailable.

This data was analyzed to determine solar generation factors for each SPO customer while overlaying weather, location, and other related features. Models were then developed to estimate hourly generation for all net-metering customers for a sampling of feeders and applied to actual conditions during from 1/1/2019 to 1/1/2020. PGE's Distribution Planning Team compared and verified these

outputs to the hourly data as presented in PGE's PI historian. These outputs were then filtered on a per-month basis and compared to nameplate capacity data of the customer net-metering systems to provide an estimated monthly solar factor for PV facilities.

This data was used to determine approximate solar output for distribution feeders and provides a baseline aimed at answering the following questions:

- In which month(s) will feeder curtailment typically occur?
- What are the historic ambient temperature ranges associated with feeder curtailment?
- What will be the likely duration of a feeder curtailment event?
- Will curtailment likely occur on a weekday, on a weekend, or both?

Data utilized to answer these questions included hourly loading data at the specific feeder-breaker level from PGE's PI historian, nameplate capacity information of net-metering customers for the corresponding feeders and associated hourly information such as ambient temperature. Feeder generation was determined on a monthly basis by utilizing customer nameplate capacity information and associated factors as described within this response. Known future generation data also was incorporated to provide a glimpse of how new generation will affect the associated feeder. The resultant output led to determining likely minimum load consumption and potential generation-to-load ratio on a per-month basis.

These results allowed for further analysis of instances that daytime minimum load will likely meet thresholds relating to a high generation-to-load ratio. Additional data such as ambient temperature, hours of day, duration, and day of week also were captured and analyzed for those occurrences. This information allowed for guidelines to be set for generation curtailment, providing guidance regarding time of year, time of day, day of week, and temperature range for triggering a curtailment event.

PGE's Distribution Planning Team will regularly perform this analysis and will utilize the expertise of PGE's Distribution Operations and System Protection Engineering Teams to verify and approve the results. On a semi-annual basis (i.e., beginning January 2021), the Distribution Planning Team will perform systemwide analyses of minimum load and daytime minimum load at the feeder level. During this analytical time period, the Distribution Planning Team will perform more detailed analyses on the generation limited feeders to forecast when generation likely will exceed load. A summary of this analysis, based on partial year data, is included in **Appendix 1**.

Response 6. Detailed explanation of how events will be called, including differences between areas with SCADA and without.

For calling curtailment events, PGE will use a combination of real-time data and near real-time data. There are two different types of substation/feeder communication devices, SCADA and MV90. MV90 substations do not have real-time communications but can send data to the EMS every 15 minutes. Once an alarm is triggered for an MV90 substation, the same process is followed as the SCADA substations.

SCADA stations use real-time communication protocols to continuously communicate with the on-site relays or meters. Once the real-time values are communicated to the Energy Management System (EMS), an alarm will alert PGE's Grid Operators that a curtailment event needs to be initiated. PGE's Advanced Metering Infrastructure (AMI) and Regional Network Interface (RNI) system will be used to curtail the meters related to the feeder for which the alarm was triggered. When the event is over, the

AMI system will be used to make sure the generation meter disconnects are closed, reactivating the net-metered installation.

Table 1 identifies which feeders are SCADA-monitored and which are MV90-monitored. Historical data suggest that few, if any, curtailment events are expected in the near-term. Nonetheless, PGE is investigating improvements (e.g., Sentient MM3 monitors) to the remote sensing system for implementation by the end of 2021 on the MV90 monitored feeders (i.e., currently, three). These improvements will allow PGE to communicate real-time data back to EMS. Once these improvements are made, all generation-limited feeders will have real-time data needed for operational awareness.

[Response 7. Detailed explanation of how PGE will notify customers of events, either prior or after the event.](#)

Response 1 describes the expected conditions that may lead to a future curtailment event. As illustrated in **Table 1**, currently there are 17 customers that have TMS installations and may be subject to TMS curtailment events. Given the limited number of customers and temporary nature of the TMS, PGE is proposing a simplified communication framework.

PGE plans to share information with affected TMS customers in a seasonal communication that describes the curtailment process. At the beginning of each season (e.g., Spring and Fall), and prior to the timeframe during which curtailment events may occur, PGE will send out an email communication to TMS customers informing them that their system may be curtailed if over-generation occurs. For example, TMS customers on the Waconda-Waconda 13 feeder may receive a communication that summarizes the likely conditions that will lead to curtailment of TMS meters on that feeder:

“The distribution feeder that supports your net-metering installation has experienced conditions in the past year that require curtailment of your net metering generation. Curtailment of your net metering generation will not adversely impact electricity services or your use of electricity. Generally, the conditions that lead to curtailment are sunny, weekend, spring days during the late morning or early afternoon hours when the temperature is in the 55-67 degree range. In the past year, there have been certain hours during seven days that met these conditions have occurred during:

- *Sunny, weekend days in March, from 1pm to 2pm when the temperature was between 56 and 63 degrees and*
- *Sunny, weekend days in April, from 11am to 3pm when the temperature was between 55 and 67 degrees.”*

If a curtailment event is called, PGE will communicate the impact, such as the timing and duration of the event, to the affected customers and will provide the following details:

- Date of event,
- Start Time,
- End Time, and
- Actual Net Load.

PGE is investigating an automatic communication process that will be similar to its Dispatchable Standby Generation program and unplanned outages; however, due to the limited number for customers and events, this solution is currently cost-prohibitive. On a semi-annual basis, PGE will evaluate this communication protocol and, with input from Stakeholders, will determine whether modifications need to be made.

