

**PUBLIC UTILITY COMMISSION OF OREGON
STAFF REPORT
PUBLIC MEETING DATE: November 3, 2020**

REGULAR X CONSENT EFFECTIVE DATE November 3, 2020

DATE: October 26, 2020

TO: Public Utility Commission

FROM: Caroline Moore

THROUGH: Bryan Conway and JP Batmale **SIGNED**

SUBJECT: PORTLAND GENERAL ELECTRIC:
(Docket No. UM 2099)
Request for Approval of Agreement for Net Metering and Interconnection Services.

STAFF RECOMMENDATION:

Approve the proposed change to Portland General Electric's (PGE or Company) Agreement for Net Metering and Interconnection Services (Net Metering Agreement) on a temporary basis and direct PGE to finalize its implementation plan for the two-meter solution with Staff and Stakeholders.

DISCUSSION:

Issue

Whether the Public Utility Commission of Oregon (Commission) should approve PGE's request to authorize PGE to require future net metering applicants located on a generation limited feeder to:

- Allow PGE to install a second Advanced Metering Infrastructure (AMI) meter upstream of the net metering system's inverter; and
- Allow PGE to use the second meter to perform temporary remote disconnection of the net metering project during periods of high generation and low customer demand on the feeder.

Applicable Rule or Law

Oregon Revised Statute (ORS) Section 757.300 requires electric utilities to provide net metering to customer-generators with renewable energy systems (net metering project).¹

ORS 757.300(4)(b) grants the Commission authority to adopt additional control and testing requirements for net metering systems to protect public safety or system reliability.

ORS 757.300(2)(b) allows electric utilities to install additional meters, at its own expense, to monitor the flow of electricity in each direction.

Oregon Administrative Rules (OAR) Chapter 860, Division 39, outlines the Commission's net metering policies.

OAR 860-039-0030 through 860-039-0040 describe the process for utilities to identify net metering project or utility facilities necessary for a net metering project to safely interconnect with the utility's system.²

OAR 860-039-0045 requires the net metering applicant pay for the cost of any facilities required to accommodate the net metering project.

Commission Order No. 07-319, which adopted the Division 39 rules, also required PGE to file a standard form net metering agreement.³ PGE filed a standard net metering agreement on September 24, 2007, and a revised version in 2008.⁴

Analysis

Background

PGE has more than 10,000 net metering projects connected to its systems and adds over 1,000 new projects every year.⁵ Approximately 99.5 percent of these net metering projects are solar photovoltaic systems (solar PV).⁶ In 2019, PGE began to identify

¹ ORS 757.300(1).

² OAR 860-039-0040 describes the level 3 interconnection process, which is for net metering applications that fail the level 1 and level 2 screening processes described in 860-039-0030 and 860-039-0035, respectively.

³ See Docket No. AR 515, Commission Order No. 07-319, July 24, 2007, p. 20.

⁴ See Docket No. AR 515.

⁵ See Docket No. RE 45.

⁶ Id.

areas of its system that could not connect additional net metering projects without the net metering customer funding the installation of cost-prohibitive protective equipment.⁷

In these areas, referred to as generation limited feeders, PGE determined that the additional net metering projects would cause local generation to exceed local load during periods of high solar output and low customer demand (referred to as the minimum daytime load or MDL). When a generator is anticipated to cause local generation to exceed the local MDL, PGE typically requires the following protective equipment:

- When generation is expected to exceed 90 percent of MDL on the feeder, PGE requires hot line blocking. This will prevent automatic reclosing of breakers on the feeder until generation on the feeder responds properly to the fault.
- When generation is expected to exceed 100 percent of MDL at the substation level, PGE requires 3v0 sensing. This will rapidly detect and mitigate damage from overvoltage if generation in the area backfeeds through the substation transformer when there is a fault on the high side of the transformer.⁸

The cost of this equipment can range from tens to hundreds of thousands of dollars and is too burdensome for these net metering project owners to bear.⁹ Staff notes that some parts of PGE's system already have this protective equipment in place, because a previous generator could bear the cost (such as a Qualifying Facility). Those areas are not considered generation limited.¹⁰

In late 2019, PGE began working with affected net metering applicants to identify alternative solutions for net metering projects on generation limited feeders. PGE coordinated this process with Energy Trust of Oregon (ETO) and Commission Staff (Staff.) The solutions that PGE chose to adopt include:

- *Refine generation limited feeder assumptions:* PGE was able to move several customers through the net metering process without expensive upgrades by refining its assumptions for solar PV generation and MDL.

⁷ See Docket No. UM 2099, Staff's Comments (hereinto referred to as Staff's Comments), August 21, 2020, pp. 2-4.

⁸ PGE Comments, p. 9.

⁹ Staff's Comments, p. 2, Table 1.

¹⁰ See Docket No. UM 2099, PGE's Workshop Materials (hereinto referred to as PGE's Workshop Materials), Attachment B, slide 10.

- *Prevent generation from exceeding load:* For the more than 20 existing net metering projects that still triggered the thresholds for hot line blocking or 3v0 sensing as of June 2020, PGE and the customer agreed to a lower cost equipment option referred to as the “two meter solution.” Under the two-meter solution, PGE installs a second AMI meter at the customer’s site, and the customer allows PGE to remotely disconnect the net metering project from grid during times when PGE believes that generation could exceed load. Consistent with statute, PGE pays for the second meter. The net metering customer is responsible for installing the second meter base on site.¹¹
- *Provide preemptive information:* PGE published a map of generation limited feeders and additional resources that help future net metering customers understand and avoid the generation limited feeder issue.¹² PGE has refined the map as its assessment of generation limited feeders evolves.

Between the solutions listed above, PGE has been able to accommodate all existing net metering requests, except for one withdrawal.¹³

On May 21, 2020, PGE filed a request to integrate the two-meter solution into its standard net metering agreement, presumably to enable broader use. PGE’s standard net metering agreement allows PGE to temporarily (manually) disconnect net metering projects under emergency conditions or for maintenance or repairs.¹⁴ PGE’s proposed update adds the ability to require the two-meter solution for any net metering applicant on a generation limited feeder (allowing PGE to remotely disconnect the net metering project from grid during times when PGE believes that generation could exceed load).¹⁵

Stakeholder and Staff Review

Following PGE’s request to modify its standard net metering agreement, Staff and Stakeholders held a scoping workshop on July 13, 2020, and a technical workshop on August 4, 2020. These workshops were followed by a round of comments by Staff and the Oregon Solar Energy Industries Association (OSEIA) on August 21, 2020. PGE

¹¹ PGE considered cost sharing between affected net metering customers and the installation of other equipment that prevents net metering systems from ever exporting to the grid, such as a reverse power flow relay. These solutions were deemed less desirable than the two-meter solution, which only limits exports under specific circumstances. A reverse power flow relay with a battery was also considered, but does not minimize upfront costs like the two-meter solution.

¹² See PGE’s Net Metering web page, accessed on October 22, 2020 at:

<https://www.portlandgeneral.com/residential/powerchoices/renewable-power/install-solar-wind-more/net-metering>.

¹³ Staff’s Comments, p. 4, Table 3.

¹⁴ See Docket No. UM 2099, PGE’s Initial Application, Attachment C, p. 2.

¹⁵ Id.

provided reply comments on September 22, 2020, and parties held a final technical workshop on September 30, 2020.

Staff and Stakeholders' primary concern with PGE's proposal was the severe lack of information provided. Although PGE had already begun connecting net metering customers under the two-meter solution, it had not established critical implementation details, including:

- *Utilization*: Parties raised concerns that PGE did not specify whether it would be treated as a temporary or long-term solution. Parties cautioned that PGE should not rely on remote curtailment of net metering projects as a long-term solution to generation limited feeders and encouraged PGE to focus on exploring a broader range of long-term opportunities to mitigate the risks of increasing levels of generation on the distribution system.
- *Generation limited feeder criteria*: Parties raised concerns that PGE had not presented any information about the criteria it will use to determine whether net metering applicants will be required to use the two meter solution, or how net metering applicants will know their location's status. Parties also asked for information about PGE's process to update its generation limited feeders and share that information with Stakeholders.
- *Event dispatch criteria*: Parties raised concerns that PGE did not present any information about the criteria or process it would use to call curtailment events, which net metering systems would be curtailed, how long they would be curtailed, and how PGE would report and refine this criteria over time.

Staff supported the temporary use of remote disconnection as a relatively quick to implement alternative to halting net metering altogether, and pressed PGE to limit its use of the two-meter solution to the greatest extent possible. Staff also committed to prioritizing discussions that would accelerate long-term solutions to generation limited feeders in scoping UM 2111.¹⁶

OSEIA agreed that this solution should be temporary and expressed concerns that, once new systems are in place, they are less likely to be changed. OSEIA also noted long-term alternatives that PGE should consider, including solar-fed vehicle charging, and noted PGE's plans to test the use of smart inverters and better integrate storage technology. Finally, OSEIA expressed concerns with:

¹⁶ Id., p. 7.

- the lack of stakeholder engagement when PGE originally identified the two-meter solution;
- a lack of transparency as to whether and when planned upgrades to PGE's distribution system would mitigate the need for the two-meter solution; and
- whether current utility practices and interconnection cost-allocation policies fairly recognize the benefits that solar provides to the system.¹⁷

Throughout the workshops and comment process, PGE worked with parties to establish the missing implementation details noted above.¹⁸ This process was iterative, with more information presented with each touchpoint. Staff greatly appreciates PGE's ongoing efforts to evolve its proposal and share with parties. Significant progress has been made since PGE's initial filing and the majority of concerns have been addressed. That said, important details related to the curtailment strategy remain under development.

The next sections of this Staff memorandum summarize the current status of PGE's proposal, and provide recommendations for PGE to finalize its strategy before it expects to call curtailment events.

Review of PGE's Current Proposal

PGE's plan to implement the two-meter solution has improved significantly through a collaborative process with Stakeholders and Staff. In addition, this process reinforced the importance of policy discussions and pilot projects underway or slated for other dockets.

A summary of PGE's current proposal is provided below, along with Staff's response and recommendations.

Utilization

PGE plans to require the two-meter solution for all net metering applicants under 25 kW that are located on a generation limited feeder.¹⁹ Larger commercial net metering applications, including those taking three-phase power will be reviewed on an individual basis.²⁰ PGE will determine location on a generation-limited feeder based on the map published on PGE's website.²¹ The map allows the user to search a specific address to

¹⁷ See Docket No. UM 2099, OSEIA's Comments (hereinto referred to as OSEIA's Comments), August 21, 2020.

¹⁸ PGE's Workshop Materials.

¹⁹ PGE's Workshop Materials, Attachment D, p. 1.

²⁰ PGE's Workshop Materials, Attachment B, slide 12.

²¹ See PGE's Generation-limited Feeder Map website, accessed October 22, 2020 at: <https://www.portlandgeneral.com/residential/power-choices/renewable-power/install-solar-wind-more/net-metering/net-metering-map>.

determine if they “may be on a limited feeder.” The webpage also directs potential net metering customers to contact PGE for more information before submitted an application.

PGE agrees that that the two-meter solution will be used on a temporary basis.²² PGE has not proposed a specific date or other milestone at which it will stop using it, but notes several long-term solutions that would mitigate the need for it:

- A generator, such as a QF, funds hot line blocking of 3v0 sensing on a particular part of the system.²³
- Oregon adopts the IEEE 1547-2018 standard, which will provide a framework for PGE to utilize smart metering capabilities.²⁴ It’s Staff’s understanding that smart meters can be used to perform a similar function to the PGE’s remote disconnection. OSEIA notes that PGE is working on a smart inverter pilot with ETO.²⁵
- PGE’s customer-sited storage pilots lead to broader use of storage control systems to mitigation over-generation in a local area.²⁶
- PGE implements its overall grid modernization strategy that is anticipated to include an advanced distributed energy management system in place in 2025.²⁷
- Significant changes to the feeder load profile that remove a feeder from generation limited status.²⁸ OSEIA also suggested electric vehicle charging may be a more flexible means to manage excess generation.²⁹

At the September 30, 2020 workshop, parties also discussed placing a 6, 12, or 24 month limit on PGE’s ability to require the two-meter solution.

²² PGE explains in its comments that, “PGE’s proposed two-meter solution is intended to be a temporary solution that enables customers to connect to constrained feeders in the least-risk and lowest-cost way possible. This near-term approach does not preclude future alternative solutions and is not intended to eliminate or circumvent a transparent process for implementing longer term solutions.” (Docket No. UM 2099, PGE Reply Comments, p. 2, hereinto referred to as PGE Comments).

²³ This was discussed at the September 30, 2020 Workshop.

²⁴ PGE Comments, p. 4.

²⁵ OSEIA Comments, p. 2.

²⁶ PGE Comments, p. 4.

²⁷ PGE Workshop Materials, Attachment B, slides 7 and 8.

²⁸ PGE Comments, p. 5.

²⁹ OSEIA Comments, p. 1.

Staff Response: The two-meter solution is a low-cost option to prevent net-metering from halting on generation limited feeders until longer-term solutions are implemented. It should, however, be treated as a temporary solution and limited to the greatest extent possible until further analysis of the effect of curtailment on net metering customers and the system is conducted. Staff recognizes that the utilization of smart inverters and customer storage may still involve some level of curtailment, but are likely to do so in a more sophisticated manner that 1) can harness additional benefits from distributed generation; and 2) limit the financial impacts of curtailment on net metering customers. Staff plans to prioritize the implementation of IEEE 1547-2018 in its UM 2111 scoping process. In addition, all parties should consider findings from of the two-meter solution when exploring the capabilities of customer storage and other distributed energy resource management tools in UM 2005 and PGE's Flexible Load Plan.

Finally, Staff appreciates OSEIA's discussion of distribution system upgrades that could eliminate the need for a single generator to bear the cost of system protective equipment. Absent the implementation of advanced distributed resource management systems, PGE relies on hot line blocking and 3v0 sensing. These "bolt on" protective schemes are specific to mitigating adverse system impacts from over-generation of distributed resources. Under current Commission policy, these costs are to be borne by the generators that trigger their need.³⁰ The costs and benefits of incorporating this type of upgrade into PGE's regular distribution system upgrades is a broader policy discussion that requires more deliberate and robust exploration with stakeholders. Along similar lines, models to share these costs among generators have been raised in the context of Community Solar.³¹ Both should be considered in the scoping of UM 2111.

For these reasons, Staff is comfortable recommending that the Commission approve the two-meter solution on a temporary basis with ongoing reporting and refinement with stakeholders. Staff supports the use of a time limit and recommends that the Commission allow PGE to include the two-meter solution in its net metering agreement through December 31, 2021. During the next 14 months, PGE should report regularly on its implementation, discuss findings, and refine its approach. Staff makes detailed recommendations for this in the event dispatch criteria discussion further in this memorandum. If the two-meter solution is still in place in December 2021, Staff should make a recommendation to the Commission at a public meeting to extend, modify, or terminate its use.

³⁰ OAR 860-039-0045.

³¹ See Docket No. UM 1930, Commission Order No. 19-392, November 8, 2019.

Generation Limited Feeder Criteria

PGE's proposed criteria for generation limited feeders begins with identifying the following for each feeder or substation:

- *MDL*: PGE looks at the previous year's 8760 hourly loading data points to identify the lowest hourly value for a feeder or substation transformer. PGE removes "abnormal" conditions and overlays a range from 9:00 am to 4:00 pm to reflect daytime hours (2920 hours of data). Generation can be disaggregated from this net load to isolate 'pure' customer demand. To do this, PGE makes assumptions about hourly generation from solar PV on the feeder or up to the substation. PGE estimates solar output during these hours based on a fixed percentage of nameplate capacity per month. PGE uses a different percentage for solar PV generators above or below 500 kW.³² PGE has not provided the monthly fixed percentages it assumes.
- *Existing protective equipment*: Whether the feeder or substation has hot-line blocking and 3v0 sensing equipment.

PGE will identify a feeder as generation limited if:

- The feeder's existing and proposed generation exceeds 90 percent of the feeder MDL; *and/or*
- Existing and proposed generation up to the substation transformer exceeds 100 percent of the transformer MDL; *and*
- The required hot line blocking or 3v0 sensing is not in place.

PGE plans to update this analysis twice a year, in the summer and winter. Datasets utilized for winter updates will include January 1 of the previous year up to and including December 31 of that year. Datasets utilized for summer updates will include June 1 of the previous year up to and including June 30 of the analysis year.³³

Staff Response: Staff believes that PGE's methodology is reasonable and consistent with its current interconnection study analysis. PGE has continued to refine this methodology and reduced generation limited feeders from 17 to 10.³⁴ Staff appreciates PGE's commitment to a specific update schedule and looks

³² PGE Workshop Materials, Attachment D.

³³ PGE's Workshop Materials, Attachment D, p, 2.

³⁴ Staff's Comments, p. 3.

forward to continued refinement and discussion of this approach with PGE and Stakeholders.

To Staff's knowledge, the two-meter solution has facilitated the most in depth discussion of utility MDL methodology since the utilities published feeder-by-feeder distribution system data under UM 2001.³⁵ MDL and generation-to-MDL thresholds are major components of interconnection and distribution system planning and operations. Continued evaluation and refinement of PGE, PacifiCorp, and Idaho Power's MDL methodology is needed. Staff will consider this discussion as a priority when scoping UM 2111.

At the September 30, 2020 Workshop, parties also agreed that PGE's assumptions about hourly solar PV generation warrant additional refinement. Staff agrees with OSEIA that this should include coordination with ETO. Staff recommends that PGE work with ETO, Staff, and other Stakeholders to continue to refine its assumptions about solar generation shapes in the context of assessing distributed generation interconnections.

Finally, the generation limited feeder information is valuable to stakeholders outside of net metering. Staff recommends that PGE add a field for generation limited feeder (Y/N) to the Company's existing UM 2001 distribution system data posted to OASIS. Staff recommends that PGE update the field when the Company updates its generation limited feeder list twice per year.

Event dispatch process and criteria

PGE proposes to disconnect net-metering customers when the Company detects or anticipates backfeed (over-generation) at the feeder or distribution substation transformer level.³⁶ PGE indicates that, where there is SCADA, PGE can detect these conditions real time.³⁷ In areas without SCADA, PGE will use predictive analytics to identify the potential risk of backfeeding based on anticipated load and generation. These factors will be assessed using assumptions about:

- Time of Year: Solar irradiance also changes on a month-to-month basis, with greater prominence during late spring/summer months than the remainder of the year.
- Time of Day: peak solar times occur during daylight hours. Hours between 9:00 AM to 5:00 PM were selected as these are hours that solar irradiance is at the

³⁵ See Docket No. UM 2001, Commission Order No. 19-217.

³⁶ PGE's Workshop Materials, Attachment C, p. 2.

³⁷ PGE Comments, p. 10.

highest.

- Ambient Temperature: Ambient temperature is considered as an indicator of customer behavior. Daytime minimum load events occur when heating/HVAC usage is low.
- Cloud Cover: (Near) full solar PV output occurs only when there is minimal cloud cover.³⁸

At the September 30, 2020 Workshop, PGE indicated that it only anticipates curtailment events will occur in the Spring and Fall, and that it is currently analyzing when these events might occur on a feeder-by-feeder basis.

PGE plans to disconnect all net metering customers on the feeder or substation when a curtailment event is called.³⁹ The Company has not presented any plans to stage or prioritize disconnections to match the potential scale of over-generation.

PGE has committed to notifying customers of curtailment events within 48 hours, including:

- Date,
- Start Time,
- End Time, and
- Actual Net Load.⁴⁰

PGE has also committed to providing ongoing reporting about curtailment events to Staff and Stakeholders. PGE proposes to report twice annually and include:

- Event duration,
- Number of affected facilities,
- Lessons learned, and
- Identification of alternative solutions.⁴¹

Staff Response: Staff began this process highly concerned that PGE was offering a solution to net metering customers without a detailed plan for utilizing it or for minimizing its effect on customers. Throughout the workshops and comments, PGE has presented an increasingly thoughtful implementation plan. This plan

³⁸ PGE Comments, pp. 8-9.

³⁹ PGE Comments, p. 5.

⁴⁰ PGE Comments, p. 10.

⁴¹ PGE Workshop Materials, Attachment C, p. 4.

has evolved to a point at which Staff is confident that 1) PGE will minimize harm to customers; 2) Parties will be able to reach agreement on the remaining details before PGE anticipates the need to begin calling curtailment events in the Spring of 2021; and 3) The ongoing process to understand and refine the event dispatch criteria will surface valuable learnings for use across multiple Commission efforts.

In order to finalize these details and address remaining concerns, Staff proposes the following:

- By December 31, 2020, PGE should file a report in this docket with the remaining details for implementing the two-meter solution on an interim basis. This plan should include:
 - Detailed criteria for calling curtailment events, including specific temperature ranges and cloud cover levels;
 - Detailed criteria for setting the duration of the event;
 - 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;
 - Additional refinement of solar generation assumptions (as discussed in the Generation Limited Feeder section above);
 - The status of its analysis of historic feeder-by-feeder data and an analysis of the frequency and duration of events that may occur in 2021;
 - Detailed explanation of how events will be called, including differences between areas with SCADA and without;
 - Detailed explanation of how PGE will notify customers of events, either prior or after the event.
- Following the report, PGE should host at least one workshop to review its proposal with stakeholders and solicit additional input.
- PGE should file a report and host a workshop by July 31, 2021, to review the implementation of the two-meter solution to date, including:

- Location and size of net metering applicants required to utilize the two-meter solution;
- Date, time, duration, location, number of systems affected for each event called;
- Any modifications to the implementation of the two-meter solution, including generation limited feeder criteria and event dispatch criteria; and,
- Any other relevant insights, including whether the imbalance generation and load actually occurred and any customer feedback received.

As parties work together to find solutions to complex emerging issues like generation limited feeders, Staff looks forward to continued collaboration, iteration, and consideration of learnings across related dockets.

Conclusion

PGE's proposal has come a long way since its initial request to update the standard net metering agreement. The process to evolve a two-meter solution implementation plan has sparked important policy conversations beyond this temporary proposal. Staff finds that PGE's current proposal is appropriate until long-term solutions are developed in other venues, such as UM 2111, UM 2005, and the development of PGE's Flexible Load Plan. Staff is comfortable recommending approval of PGE's request to modify its net metering agreement on a temporary basis, with continued review and refinement.

PGE is still in the process of finalizing its implementation plan, including its event dispatch criteria. PGE has indicated that it is also in the process of analyzing the potential for curtailment events on a feeder-by-feeder basis. Staff recommends additional process to finalize these elements before PGE may begin calling events in the spring of 2021.

Summary of Staff's recommendations:

- *Use of the two-meter solution:* Staff recommends that the Commission approve PGE's request to implement the two-meter solution in its net metering agreement until December 31, 2021.

- By December 31, 2020, PGE should file a report in this docket with the remaining details for implementing the two-meter solution on an interim basis.
- Following the report, PGE should host at least one workshop to review its proposal with stakeholders and solicit additional input.
- PGE should file a report and host a workshop by July 31, 2021, to review the implementation of the two-meter solution to date.
- *Identification of generation limited feeders:* Staff recommends that PGE refine and update its generation limited feeder analysis twice annually, starting in January and July.
 - PGE should work with ETO to refine its assumptions about solar PV generation interconnection analysis.
 - PGE should add a field for generation limited feeder (Y/N) to the Company's existing UM 2001 distribution system data posted to OASIS, and update the field when the Company updates its generation limited feeder list twice per year.

PROPOSED COMMISSION MOTION:

Approve the proposed change to Portland General Electric's Agreement for Net Metering and Interconnection Services on a temporary basis and direct PGE to finalize its implementation plan for the two-meter solution with Staff and Stakeholders.