

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

Docket No. UM 2099

In the Matter of

PORTLAND GENERAL ELECTRIC
COMPANY,

Request for Approval of Agreement for
Net Metering and Interconnection
Services.

Staff's Comments

Introduction

Staff of the Oregon Public Utility Commission (Staff) presents its Comments in response to Portland General Electric's (PGE or Company) proposed Net Metering Agreement update. PGE's proposed update allows the Company to remotely disconnect certain net metering systems when local generation is predicted to exceed local load.

PGE developed its proposal as an alternative to the cost-prohibitive interconnection upgrades facing net metering applicants in constrained areas of its system. PGE's proposal is relatively low-cost and allows a net metering project installation to continue in these areas without interruption. However, this proposal introduces curtailment as a net metering interconnection solution, representing a major policy shift for net metered systems. Therefore, Staff seeks to carefully consider the trade-offs associated with the Company's proposal, explore concerns around operations, communication, and reporting, as well as the need to identify the appropriate permanent solution(s) in a transparent stakeholder process.

These comments summarize PGE's proposal, note key benefits and risks, and identify areas in which further explanation is required for Staff determine whether the benefits of this proposal outweigh the risks.

Background

PGE's Net Metering Constraints

Between November and December 2019, the Oregon Public Utility Commission (OPUC) received complaints from seven PGE customers seeking to interconnect small solar photovoltaic (PV) net metering projects. The complaints stemmed from the assignment of cost-prohibitive interconnection upgrades, which ranged from \$45,000 to \$693,000 per project.¹ Staff was not aware that PGE was facing broad issues interconnecting net-metering systems prior to these complaints, and customers and installers expressed that they were caught off-guard.

Feeder	System size (kW)	Upgrade Cost Estimate	Interconnection Upgrades as % of Est. Project Cost²	Reason for Upgrade Identified in System Impact Study
Newberg-Dundee	7.92	\$45,000	182%	Tips generation on feeder over 90% min. daytime load
Newberg-Dundee	14.40	\$45,000	100%	Behind higher queued net metering project that tripped 90% min. daytime load
Amity-13kV	8.88	\$100,000	360%	Tips generation over 100% of feeder min. daytime load ³
Amity-Bellevue	150.00	\$128,000	27%	Tips generation on feeder over 90% min. daytime load (\$118k); generation exceeds rating of transformer at customer site (\$10k)
Dayton-East	17.77	\$152,900	275%	Tips generation over 100% of feeder min. daytime load
Wallace-13k	11.77	\$430,300	1168%	Behind higher queued QF that tripped an upgrade
Turner-Cascade	7.80	\$693,600	2841%	Tips generation over 100% of feeder min. daytime load

More broadly, the complaints revealed that multiple areas of PGE's system are no longer able to accommodate additional net metering projects without major system upgrades. The constraint in each area of the system is based on PGE's determination that existing and planned generators will exceed local load during periods of high solar generation and low load (referred to as the minimum daytime load). When PGE determines that a generator will cause local generation to exceed 90 to 100 percent of local minimum daytime load, the Company requires the generator to fund additional protective equipment on the feeder breakers and, at times, at the distribution

¹ Under Oregon Administrative Rules (OAR) 860-039-0045(3), "If the public utility must install facilities in order to accommodate the interconnection of the net metering facility, the cost of such facilities will be the responsibility of the applicant."

² Residential solar net metering system installations receiving ETO incentives in 2019 averaged \$3.13/watt, meaning, for example, that a 7.92 kW system costs approximately \$25,000. See <https://www.energytrust.org/wp-content/uploads/2020/02/feb-2020-RAC-Package.pdf>, p. 55.

³ This customer did not receive a System Impact Study. PGE engineers indicated that the upgrade cost was likely \$100,000 and the customer did not chose to proceed with the system impact study.

substation transformer. This protective equipment mitigates a range of reliability, safety, and equipment damage risks.⁴

At the beginning of the complaint resolution process, Staff worked with PGE to examine the extent of the Company’s inability to accommodate new net metering generators. Originally, PGE identified 17 “generation limited feeders” on which any new net metering applicant would face prohibitive upgrade costs. PGE also identified 13 net metering applicants located on these feeders, who were facing similar issues but did not file a complaint with the Commission. In other words, there were 20 total affected net metering applicants facing prohibitive upgrade costs on the 17 originally identified generation limited feeders.

As the complaint resolution process escalated, PGE continued to refine its methodology for identifying generation limited feeders and assigning upgrades. Refining these methodologies narrowed the number of generation limited feeders from 17 to 10. This, in turn, reduced the number of net metering applicants facing upgrades.

At the same time, PGE continued to receive new net metering interconnection requests. Between the original 20 affected net metering applicants identified and the 35 additional net metering applications received during the complaint resolution process, 33 are located on the 10 remaining generation limited feeders.⁵

Table 2. Affected Net Metering Applicants as of June 2020⁶		
Currently Identified Generation Limited Feeders	Count of Affected Net Metering Applicants	Total Capacity Affected Net Metering Applicants (kW)
Redland-13kV	3	130.22
Yamhill-13kV	9	119.81
Canby-Zimmerman	5	98.36
Waconda-13kV	6	73.58
Wallace-13kV*	2	24.57
Indian-North	4	21.27
Turner-Cascade*	2	20.60
Scoggins-Laurelwood	1	13.23
Bethel-Geer	1	8.88
Total	33	510.52

*Indicates feeder with net metering applicant that was part of the original seven complaints.

Resolution Process

PGE took multiple steps to resolve the seven complaints filed at the OPUC and to help the other affected net metering applicants complete interconnection without cost-prohibitive upgrades.

⁴ For further technical explanation, see National Renewable Energy Laboratory’s *Prevention of Unintentional Islands in Power Systems with Distributed Resources*, August 24, 2016, available at: <https://www.nrel.gov/docs/fy16osti/67185.pdf>.

⁵ PGE identified 55 net metering applicants on a generation limited feeder at some point, but only 33 are located on feeders that are still considered constrained after the methodology update.

⁶Staff notes that not all net metering applicants on these feeders will be affected by PGE’s proposal in this docket. Further details on this aspect of PGE’s proposal are discussed later in these comments.

First, PGE increased transparency for existing and future net metering applicants on generation limited feeders through the following actions:

- Coordination: PGE contacted all affected net metering customers (including those that did not file a complaint with the Commission) to ensure awareness of the issue and explain that they are working to find affordable solutions. PGE also contacted known net metered PV system installation companies and engaged ETO to further raise awareness among solar installers.
- Transparency: PGE published map of generation limited feeders on the Company’s website and added detailed information about the net metering interconnection process that emphasizes generation limited feeders.⁷

Second, PGE was able to move some net metering customers through interconnection without upgrades by refining its analytical assumptions about solar PV generation and minimum daytime load.

Finally, for projects that still required upgrades, PGE identified a lower-cost hardware solution. This solution is intended to prevent net metering projects from causing an excess of generation when local load is low. PGE installs a second non-revenue advanced metering infrastructure (AMI) meter at the net metering customer’s site. The second meter allows PGE to remotely stop the net metering system from feeding excess solar production onto the system during times of low local load and high solar generation (hereinto referred to as the “two meter solution”). The customer must bear the cost of the second meter base and PGE supplies the meter.⁸

Of the total 55 net metered solar systems that PGE identified as affected by generation limited feeders since the complaint resolution process began, roughly 45 percent were able to proceed without the two-meter solution, 35 percent are required to agree to the two-meter solution, and 20 percent are still pending review to determine whether the two-meter solutions is required.

Table 3. Utilization of Two-Meter Solution for Net Metering Applicants Identified on Generation Limited Feeders as of June 2, 2020				
Net Metering Application Status	Two-Meter Not Required	Two-meter Required	Need for Two-meter Under Review	Total
Approved	15	17	8	40
Pending	8	3	3	14
Cancelled	N/A	N/A	N/A	1
Total	23	20	11	55

⁷ See PGE’s Net Metering web page, available at: <https://www.portlandgeneral.com/residential/power-choices/renewable-power/install-solar-wind-more/net-metering>.

⁸ Under Oregon Revised Statute (ORS) 757.300(2)(b), the utility installs net metering meters at its own expense.

Net Metering Agreement Update

Following the complaint resolution process described above, PGE requested Commission approval to update its Net Metering Agreement to facilitate the use of the two-meter solution for future net metering applicants located on generation limited feeders.⁹ The filing included only the following implementation details:

[I]f the applicant is on a generation-limited feeder...PGE may require the applicant to install a second meter base upstream of the inverter to allow temporary remote disconnection of the Net Metering Facility during periods of high generation and low customer demand on the feeder. The Company may remotely disconnect the Net Metering Facility from PGE's Electric Distribution System without notice to the applicant when PGE reasonably deems it is required during Feeder Minimum Load Conditions. Finally, the applicant is responsible for all costs to provide the secondary meter base.¹⁰

Staff hosted workshops on July 13, 2020 and August 4, 2020. The goals of the workshops were to identify and discuss the details behind PGE's proposed use of the two-meter solution and to gather stakeholder feedback on PGE's proposal.

Staff Response to PGE's Proposal

The remainder of these Staff comments will respond to PGE's proposal based on the information provided at the above mentioned workshops, including the benefits and risks of implementing the proposal and areas in which further explanation is required.

The two-meter solution has three key components:

- Utilization
- Generation Limited Feeder Criteria
- Event Dispatch Criteria

The following sections will respond to PGE's proposal in each category.

Utilization

Staff's believes that the two-meter solution should only be considered as a temporary solution, and that its use should be limited to the greatest extent possible until there is a transparent process to work through policy issues and long-term solutions.

Staff appreciates how quickly PGE worked with customers to refine its analysis and identify an affordable interconnection solution for those that still required upgrades. Staff also appreciates PGE's explanation in workshops that the two-meter solution is a near term fix until these areas of the system are upgraded as part of PGE's grid modernization and Distributed Resource Planning (DRP) efforts.

⁹ See Docket No. UM 2099 PGE's Request for Approval of Agreement for Net Metering and Interconnection Services.

¹⁰ *Id.*

PGE's proposal seems preferable to halting net metering altogether on constrained feeders. The proposal also allows parties to continue to focus on holistic planning, modernization, and interconnection reform efforts that will provide long-term, optimal solutions in the following dockets:

- **UM 1976 PGE's Demand Response Test Bed:** Provides opportunities to test advanced DER management strategies that do not rely on curtailment, including through the Battery Inverter System Pilot and any additional smart inverted demonstration projects that may be added over time. This will help PGE to learn how to safely and reliably harness the capabilities of advanced inverter technologies and customer-sited battery storage systems in a manner that reduces interconnection upgrade costs.
- **UM 2005 Distribution System Planning:** Will provide opportunities to vet the timing, prioritization, and sophistication of future upgrades to PGE's generation limited feeders. The DSP process will also include opportunities to pre-emptively identify interconnection issues and discuss distribution system investments that avoid future interconnection issues.
- **UM 2111 Investigation into Interconnection Practices and Policies:** Will provide opportunities to modernize net metering interconnection standards across utilities, which should consider any learning from the implementation of the two-meter solution and the demand response test bed, the incorporation of IEEE 1547-18, modernizing the Tier 1 and 2 screening criteria and the methodologies used in the system impact studies, consideration of the capabilities and benefits of customer sited storage and smart inverters, exploration substation upgrade cost sharing models, and additional smart technologies and practices.

However, PGE identified its two-meter solution without a process for Staff and stakeholders—including customers or solar installation companies—to vet the proposal or suggest alternatives. Further, PGE is introducing a policy shift with uncertainty about its impact on future net metering customers, system reliability, and when it will upgrade these areas of the system. While PGE and net metering customers already reserve the right to temporarily disconnect net metering systems for maintenance, emergency, and safety and reliability reasons, curtailment has not yet been used to avoid distribution system upgrades. PGE has not introduced specific criteria that, per its analysis, make it likely that curtailment events will occur, nor has the Commission established curtailment as a reasonable interconnection cost or a preferred solution to the use of modern technologies and other solutions, such as customer-sited storage and smart inverter capabilities.¹¹ Implementation of the two-meter solution as a short-term fix should not imply that ongoing DER management efforts will or should emphasize curtailment.

¹¹ See Docket No. UM 2099 PGE's Request for Approval of Agreement for Net Metering and Interconnection Services, Attachment A, p. 4.

In addition, PGE connected more than 1,200 net metering systems per year for the past three years and has already identified twenty customers requiring this solution to date (See Table 3 above).¹² Given the potential scale of affected net metering systems, PGE should focus on minimizing the use of this solution until a transparent process to implement long-term solutions occurs.

Therefore, Staff recommends that PGE work with Staff and Stakeholders to closely monitor the use of the two-meter solution and continue to vet and refine its use. Staff can recommend modifications or suspension of the two-meter solution and provide upgrades on insights and data gathered in this docket or in UM 2111. Staff also commits to prioritizing discussions that would accelerate the transition away from this interim solution in scoping UM 2111.

Recommendation #1: PGE should file a quarterly report in this docket that contains the following data and host a workshop to review the findings with Staff and stakeholders:

- 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.

Recommendation #2: In its reply comments, PGE should explain why the two-meter solution is preferable at this time, compared to other alternative solutions, such as smart inverter capabilities and customer sited storage.¹³

Recommendation #3: In its reply comments, PGE should explain, in as much detail as possible, the timeline in which the current generation limited feeders are scheduled to receive the upgrades required to mitigate the need for the two-meter solution. PGE should also indicate how the utilization of the two-meter solution will be considered in its distribution system planning efforts, DRP efforts, and interconnection studies for Oregon small generators and community solar generators.

Recommendation #4: In its reply comments, PGE should indicate whether it will continue to curtail generators after the required system upgrades and other DER management technologies are deployed.

¹² See Docket No. RE 45.

¹³ Staff notes that net metering customers may still be able to install customer sited storage to avoid curtailment events, but this would require coordination with PGE and an understanding of the likely temporary disconnection events to weigh the costs and benefits of this option.

Recommendation #5: In its reply comments, PGE should explain in detail if there is a point of penetration at which the two meter solution will no longer allow additional net metering generators to interconnection safely and reliably without additional upgrades. PGE should address how reaching that point would affect customers with the two-meter solution in place.

Generation Limited Feeder Criteria

Having the generation limited feeder criteria as finely tuned as possible is critical to limiting the utilization of the two-meter solution in the near-term.

In its filing, PGE states that it *may* require net metering applicants located on generation limited feeders to utilize the two-meter solution.¹⁴ During workshops, PGE clarified that it will require the two-meter solution for net metering applicants located on a generation limited feeder listed on the Company's net metering website at the time of application if:

- Generation is projected to exceed 90 percent of feeder minimum daytime load with the addition of that generator and the feeder does not already have the appropriate protective equipment at the feeder breakers (e.g., hotline blocking capabilities); or
- Generation is projected to exceed 100 percent of feeder minimum daytime load without the addition of that generator and the distribution substation does not already have the appropriate protective equipment at the distribution transformer (e.g., 3V0 protection).

Staff appreciates PGE's efforts to publish and continue to refine its generation limited feeders, along with the distribution system data posted to its OASIS site.¹⁵ Staff understands the safety and reliability risks that an imbalance of generation to load creates on the distribution system, but notes that advanced technologies are changing the sophistication with which these criteria are measured and the thresholds at which utilities consider there to be safety and reliability risks.¹⁶

Therefore, Staff finds it's important that PGE provide more detailed information about 1) its specific criteria for identifying generation limited feeders; and 2) its specific criteria for determining which generators on a generation limited feeders. Further, this criteria should be clearly posted on PGE's net metering website along with other net metering resources, and shared with Staff and stakeholders for review now and on an ongoing basis. Staff will also consider how to prioritize UM 2111 discussions that examine generation limited feeder inputs, such as minimum daytime load calculations.

¹⁴ See Docket No. UM 2099 PGE's Request for Approval of Agreement for Net Metering and Interconnection Services.

¹⁵ Available at <https://www.oasis.oati.com/pge/>.

¹⁶ For example, See National Renewable Energy Laboratory's Library of resources related to Interconnection Standards, Application Management, and Technical Screening, available at: <https://www.nrel.gov/dgic/interconnection.html>.

Recommendation #6: In its reply comments, PGE should provide a detailed explanation of the criteria that it uses to identify generation limited feeders, including customer type, its methodology for calculating minimum daytime load and estimating solar PV generation, as well as, whether protective/sensing equipment is included in this criteria.

Recommendation #7: In its reply comments, PGE should provide a detailed explanation of the criteria it will use to determine whether an individual net metering applicant on a generation limited feeder is required to utilize the two-meter solution.

Recommendation #8: In its reply comments, PGE should commit to a schedule on which it will update its generation limited feeders and notify the solar installation community. PGE should also refine its generation limited feeder list and methodologies with actual data following dispatch events.

Event Dispatch Criteria

Similar to the generation limited feeder criteria, ensuring that the event dispatch criteria are as well-honed as possible will mitigate the impact of curtailment events on net metering generators.

In its initial application, PGE indicated that, “the Company may remotely disconnect the Net Metering Facility from PGE’s Electric Distribution System without notice to the applicant when PGE reasonably deems it is required during Feeder Minimum Load Conditions.”¹⁷ In workshops, PGE explained that generation limited feeders do not have the sensing equipment required to detect an excess of generation on a feeder in real time, so PGE proposes to use predictive criteria to identify likely over-generation conditions on each generation limited feeder and manually signal the remote disconnect meters when the predictive parameters are met. PGE provided the following details about the event dispatch criteria:

- Daytime Minimum (Net) Load
- Daytime Minimum (Disaggregated) Load
- Anticipated Generation based on:
 - Time of Year
 - Hour of Day
 - Ambient Temperature
 - Cloud Cover

PGE also committed to continuous monitoring and refinement of the methodology with goal of minimizing events, which Staff strongly supports.

PGE noted in workshops that the existing net metering agreement allows temporary disconnection for emergencies, maintenance, or to prevent disruption or deterioration

¹⁷ See Docket No. UM 2099 PGE’s Request for Approval of Agreement for Net Metering and Interconnection Services.

of service to other customers and damage to PGE's system.¹⁸ Further, the agreement states that, in such event, PGE shall provide the Applicant supporting documentation used to reach the decision to disconnect the facility upon the Applicant's request.¹⁹ PGE suggested that it would apply to same communication policy to customers temporarily disconnected under the two-meter solution.

Staff understand that PGE is continuing to establish the process and criteria for calling these events. However, these details are critical to understanding whether the benefits of PGE's proposal will outweigh the risks. PGE needs to share detailed information about its event dispatch criteria in this docket and with potential net metering applicants. Further, PGE must provide additional justification for the appropriateness of its approach.

Recommendation #9: In its reply comments, PGE should provide a detailed explanation of its event dispatch criteria, including all assumptions and formulas, and an explanation of how and why it determined these criteria are the most appropriate for use in this solution.

Recommendation #10: In its reply comments, PGE should explain why it is necessary and appropriate to disconnect net metering generators every time generation exceeds load, and whether other factors can be included in the predictive analysis that limit the need for curtailment. PGE should also indicate if all generators will be curtailed when an event is called, or if there is an order in which it will send disconnect signals on a given feeder.

Recommendation #11: In its reply comments, PGE should clarify whether the ability to automate the event dispatch and the criteria for a generation limited feeder are mutually exclusive.

Recommendation #12: In its reply comments, PGE should propose a communication strategy to inform affected net metering customers within 48 hours of a temporary disconnection event under the two-meter solution. This communication should, at minimum, include the following details about the event:

- Date
- Start time
- End time
- Predicted feeder generation
- Predicted disaggregated load
- Predicted net load
- Actual net load

¹⁸ *Id.*, Attachment A, p. 4.

¹⁹ *Id.*

Conclusion

Staff appreciates the opportunity to work with PGE and Stakeholders to determine if PGE should continue to implement the two-meter solution as a temporary solution for net metering applicants on generation limited feeders.

PGE has presented a relatively low cost and easy to implement solution, but additional details and discussion are required to determine if the benefits of PGE's proposal outweigh the risks.

This concludes Staff's comments.

Dated at Salem, Oregon, this 21st of August, 2020

/s/ Caroline Moore

Caroline Moore

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