

**BEFORE THE PUBLIC UTILITY COMMISSION**

**OF OREGON**

**UM 1971**

In the Matters of

WACONDA SOLAR, LLC,

Complainants,

v.

PORTLAND GENERAL ELECTRIC  
COMPANY,

Defendant.

MOTION FOR LEAVE TO FILE FIRST  
AMENDED COMPLAINT

Pursuant to ORS 756.500(4), OAR 860-001-0420 and ORCP Rule 23A, Complainant Waconda Solar, LLC respectfully moves the Oregon Public Utility Commission (“Commission”) for an Order granting leave to file Complainant’s First Amended Complaint. A redline version of the First Amended Complaint is attached as Attachment A.

Complainant conferred with Portland General Electric Company (“PGE”) and PGE has stated that it will determine whether it will oppose this motion after reviewing the filing.

Under ORS 756.500(4) the Commission can order the amendment of a complaint prior to the completion of taking evidence in a case, and under ORCP 23A, a pleading may be amended by a party once as a matter of course at any time before a responsive pleading is served. Under ORCP 23A, after a responsive pleading is served, a party may amend the pleading only by leave of the court or by written consent of the adverse party. Leave shall be freely given when justice

so requires.<sup>1</sup> A claim asserted in the amended complaint relates back to the original complaint if it arose out of the same conduct, transaction, or occurrence set forth in the original pleading.<sup>2</sup> Further, a complainant is permitted to dismiss a case one-time without prejudice.<sup>3</sup>

Here, the Commission should grant leave to file the First Amended Complaint because justice requires it and the proposed changes to the complaint arose out of the same conduct, transaction, or occurrence as set forth in the original complaint. The original complaint arose out of PGE's conduct in its interconnection application process and the transaction through which PGE will provide interconnection service to its customer, Waconda Solar. The First Amended Complaint adds greater specificity to the underlying facts and claims and additional citations to the claims in the original complaint, in light of the Commission's recent Order No. 19-218 granting a motion for summary judgment based on an interpretation of only the specific rule cited within the claim at issue.<sup>4</sup> Additionally, Complainant has included additional facts that pertain to the same conduct and transaction, but which arose after the filing of the original complaint (namely that PGE has provided a System Impact Study).

The Commission has previously cited four factors in connection with its consideration of a motion seeking leave to amend a complaint: (1) the proposed amendment's nature and relationship to the existing pleadings, (2) prejudice to the opposing party, (3) timing, and (4) the

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<sup>1</sup> ORCP 23A.

<sup>2</sup> ORCP 23C.

<sup>3</sup> *Bottlenose Solar, LLC et. al. v. PGE*, Docket No. UM 1877-1882, 1884-1886, 1888-1890, Order No. 19-001 (Jan. 2, 2019).

<sup>4</sup> *Sandy River Solar, LLC v. PGE*, Docket No. UM 1967, Order No. 19-218 at 1 (Jun. 24, 2019) ("Analyzing claim, we interpret the only rule cited there . . . To the extent that Sandy River argues that we have alternate statutory or contractual authority to reach different conclusions, we find that Sandy River did not plead such claims anywhere in the Amended Complaint to date and, consequently, that they are not properly before us.").

merit of the proposed amendment.<sup>5</sup> Each of these factors indicate that the amended complaint should be allowed.

First, in this case, the proposed amendments to the complaint do not add new claims against or new PGE actions that are challenged, other than to add greater specificity and that PGE has since provided a System Impact Study after the filing of the original complaint. This additional specificity relates to the same transaction as the original complaint regarding PGE's interconnection of Waconda Solar's project. The amendments primarily expand the statutory and other legal references upon which Complainant intends to rely in challenging PGE's actions. These additional references are appropriate to add in light of the Commission's recent Order No. 19-218, which implies that a Complainant should provide a basis, in its complaint, upon which it intends to argue that a utility has violated a general duty to act with reasonableness with respect to its customers.<sup>6</sup> Second, PGE is not prejudiced by the amendment of the complaint because the case is in its early stages, and PGE will have an opportunity to provide an answer to each amendment to the complaint. Third, the timing of the amended complaint is appropriate in light of the fact that the Commission's Order No. 19-218 was issued recently, on June 24, 2019. Finally, the amended complaint is meritorious because it adds a fuller citation of the statutory and other legal provisions upon which Complainant intends to rely in this case, and presents clearly to the Commission the basis upon which it asks that PGE be found to have violated its duties to Complainant.

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<sup>5</sup> See *Nw. Pub. Commc'ns Council v. Qwest Corp.*, Order No. 09-155 at 8 (May 4, 2009) (referring to *Forsi v. Hildahl*, 194 Or App 648, 652 (2004)).

<sup>6</sup> Order No. 19-218 at 25.

For all of the reasons above, Complainant asks that leave be granted to amend the complaint.

Dated this 8th day of July 2019.

Respectfully submitted,

A handwritten signature in cursive script, reading "Marie P. Barlow".

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**ATTACHMENT A –  
TO MOTION FOR LEAVE TO AMEND COMPLAINT**

**(Redlined Amended Complaint)**

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**BEFORE THE PUBLIC UTILITY COMMISSION  
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DOCKET NO. UM 1971—

FIRST AMENDED COMPLAINT

**I. INTRODUCTION**

This is a complaint (“Complaint”) filed by Waconda Solar, LLC (“Waconda Solar” or “Complainant”) with the Oregon Public Utility Commission (the “Commission” or “OPUC”) against Portland General Electric Company (“PGE”) under ORS 756.500 and OAR 860-001-0170. PGE failed to comply with the Commission’s rules in the processing of Waconda Solar’s interconnection application for its Waconda Solar project, which is a qualifying facility (“QF”) under the Public Utility Regulatory Policies Act of 1978 (“PURPA”). The parties have not yet executed an interconnection agreement. Waconda Solar is seeking three forms of relief from the Commission and asks that the

Commission require PGE to: 1) provide complete and accurate information in its Feasibility Study; 2) provide complete and accurate information of its existing system configuration, provide reasonable access, and reasonably cooperate so that Waconda Solar can obtain an independent System Impact Study; and 3) allow Waconda Solar, subject to PGE's reasonable oversight, to hire qualified and experienced third-party consultants to properly and safely complete the interconnection studies.

Under Oregon's administrative rules, interconnection customers have the right to an independent System Impact Study in addition to the one performed by the utility. Further, the utility and interconnection customer may agree to allow the customer to hire a third-party to conduct any of the studies in lieu of the utility. PGE previously agreed that PGE and an applicant could agree to allow the applicant to hire third-party consultants to complete any interconnection facilities and system upgrades. The Commission found that it is also appropriate to allow a utility and an applicant to agree to allow the applicant to hire third-party consultants to complete any required studies. Such work and studies are subject to PGE's review and approval, but this cannot be unreasonably withheld.

Waconda Solar requests that the Commission order PGE to allow Waconda Solar to hire its own third-party consultant to conduct the remaining two studies pursuant to OAR 860-082-0060(9) and order PGE to provide reasonable information about its system, so Waconda Solar can have an independent System Impact Study under OAR 860-082-0060(7)(h). PGE has a history of preparing interconnection studies that contain errors and inaccuracies, do not adequately contain all of the information required by the Commission's rules, and are delayed past the study timelines. Waconda Solar also

requests that it be allowed to hire its own third-party consultant because PGE made a number of errors in the initial Feasibility Study for the Waconda Solar project.<sup>1</sup> These numerous errors included but were not limited to basic information such as the total existing and proposed generation on the distribution line and the rating of the substation transformer (among others). Waconda Solar immediately inquired into these errors, and after a couple weeks of prodding, PGE finally admitted that it made some errors in the study. Then, only after Waconda Solar requested it, PGE finally provided a revised Feasibility Study more than a month after the initial study was provided. The revised Feasibility Study corrected some errors but still states two differing values for the total amount of generation on the substation transformer among other errors and inconsistencies. Waconda Solar immediately inquired into the errors in the Revised Feasibility Study, but as of the date of this filing, has not received a response.

The information contained in the interconnection studies is critical to understanding the feasibility of the projects and the potential impacts and costs of those impacts. It causes significant delays and costs on interconnection customers when studies are delayed, inaccurate, or incomplete. Interconnection customers should not be required to spend additional time and resources deciphering PGE's studies and prodding PGE for clarifications and revisions.

Waconda Solar also requests that the Commission order PGE to allow Waconda Solar to hire its own third-party consultant because the interconnection is a relatively

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<sup>1</sup> The Feasibility Study is the first of three studies in PGE's interconnection process. The second is the System Impact Study, and the third is the Facilities Study.



straightforward distribution level interconnection. This interconnection does not involve any major work such as a substation rebuild. As such, PGE should not have any concerns about having a third-party consultant perform the studies and the studies should also be straightforward.

Despite numerous requests, PGE has flatly refused to allow Waconda Solar to hire third-party consultants to complete the remaining two studies. Additionally, when Waconda Solar requested to simply have an independent System Impact Study performed in addition to PGE's study, PGE did not address the issue or provide any explanation.<sup>57</sup> ~~Despite~~ despite a request to explain under what conditions that it would allow Waconda Solar to hire a third party consultant. Thus, it is not clear if PGE is no longer willing to allow any interconnection customer to retain a third party consultant or if PGE has any specific concerns or objections relevant to Waconda Solar's request.

It is reasonable to allow Waconda Solar to hire a third party because, among other things, PGE itself sometimes hires third parties, PGE's small generator interconnection department is understaffed, the interconnection is relatively straightforward, and a third-party can likely complete the work more quickly and at higher quality. Yet, PGE has outright refused Waconda Solar's request giving no reasoned explanation whatsoever. Waconda Solar understands that any third-party consultant work would be subject to PGE's reasonable oversight and approval. With that, Waconda Solar requests that the Commission resolve this dispute between PGE and Waconda Solar and grant the relief requested herein.

## II. SERVICE

Copies of all pleadings and correspondence should be served on Complainant's counsel and representatives at the addresses below:

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In support of this Complaint, Complainant alleges as follows:

## III. IDENTITY OF THE PARTIES

1. PGE is an investor-owned public utility regulated by the Commission under ORS Chapter 757. PGE is headquartered at 121 Southwest Salmon Street, Portland, Oregon 97204.
2. Waconda Solar, a limited liability company organized under the laws of the state of Oregon, is the controlling owner and manager of the Waconda Solar project and will be the seller of the output from the Waconda Solar project. Waconda Solar's address is 3519 NE 15<sup>th</sup> Ave., Suite 325, Portland, OR 97212.

## IV. APPLICABLE STATUTES AND RULES

3. The Oregon statutes expected to be involved in this case include: ORS 756.040- 756.068, 756.500-756.558, 756.990, 757.020, 757.325 and 758.505-758.575.

The Oregon rules expected to be involved in this case include: OAR 860-001, 860-029, and 860-082.

4. The federal statute expected to be involved in this case is PURPA, 16 USC 824a-3. The federal rules expected to be involved in this case include: 18 CFR 292.101-292.602.

## **V. JURISDICTION**

5. FERC adopted regulations and policies governing utility purchases from QFs under PURPA. 18 CFR 292.101-292.602. State regulatory agencies are required to implement FERC's regulations. See 16 USC 824a-3(f); FERC v. Mississippi, 456 U.S. 742, 751 (1982).

6. Specifically, the state agencies that implement PURPA have authority to determine the manner for payment of interconnection costs by QFs. 18 CFR 292.306.

7. The Commission is the Oregon state agency that implements the state and federal PURPA statutes. ORS 758.505(3); OAR 860-029-0001; Snow Mountain Pine Co. v. Maudin, 84 Or App 590, 593 (1987). Public utilities are defined in ORS 758.505(7), and include PGE. The Commission has the power and jurisdiction to hear complaints by QFs against public utilities, including PGE. ORS 756.040, 756.500-756.558, and 758.505-758.555; OAR 860-001-0010(3), and 860-029-0030.

7.8. The Commission has the jurisdiction to represent the customers of any public utility, including interconnection customers, in all controversies respecting rates, valuations, service and all matters of which the Commission has jurisdiction, and has the jurisdiction to protect customers, and the public generally, from unjust and unreasonable

exactions and practices and to obtain for them adequate service at fair and reasonable rates. ORS 756.040.

## **VI. FACTUAL BACKGROUND**

8.9. The Waconda Solar project will be a 2.25 megawatt (“MW”) nameplate capacity solar QF located in Marion County, Oregon.

9.10. Waconda Solar sent a complete Interconnection Application to PGE on March 20, 2018.

10.11. PGE assigned the Waconda Solar project queue number SPQ0172.

11.12. PGE never notified Waconda Solar in writing whether or not its interconnection application was complete.

12.13. PGE held a scoping call on April 11, 2018.

13.14. The Waconda Solar interconnection is a relatively straightforward distribution level interconnection.

14.15. On April 12, 2018, PGE sent Waconda Solar a Feasibility Study Agreement.

15.16. On April 17, 2018, Waconda Solar emailed the executed Feasibility Study Agreement and placed a hard copy in the mail with the deposit check. (Attached hereto as Attachment A)

16.17. The Feasibility Study Agreement states that PGE shall perform the Feasibility Study consistent with OAR 860-082-0060(6).

17.18. The Feasibility Study Agreement states that the results shall be transmitted to Applicant within sixty (60) calendar days after the agreement is signed by the parties.

19. On May 21, 2018, Waconda Solar executed a Standard Renewable In-System Variable Power Purchase Agreement (“Power Purchase Agreement” or “PPA”) with PGE, which PGE counter-signed on June 4, 2018 (available at: <https://edocs.puc.state.or.us/efdocs/HAQ/re143haq164533.pdf>).

20. The PPA provides for a commercial operation date of February 1, 2020.  
~~18.21.~~ At the time the commercial operation date was selected, it allowed for a reasonable amount of time to compete the interconnection.

~~19.22.~~ On July 10, 2018, PGE provided a Feasibility Study (attached hereto as Attachment BA).

~~20.23.~~ There are a number of errors and inconsistencies in PGE’s Feasibility Study dated July 10, 2018.

~~21.24.~~ The Feasibility Study starts out stating that Waconda Solar’s interconnection application was received April 23, 2018, which is incorrect since the interconnection application was sent a month prior to that on March 20, 2018 and the Feasibility Study Agreement was provided by PGE before that date on April 12, 2018.

~~22.25.~~ The Feasibility Study states that “As set forth in the Oregon Administrative Rules 860-082-0085(29), PGE has assigned queue number SPQ0172 to the Interconnection Request.” No such administrative rule exists.

~~23.26.~~ The Feasibility Study included sections on “Feasibility Study Scope,” “Feasibility Study Assumptions,” “Feasibility Study Interconnection Requirements,” a “Cost Estimate,” and a “Schedule.”

~~24.27.~~ The Feasibility Study stated that it “normally consists of the following,” and then lists a number of items including documentation of impacts observed in meeting

North American Electric Reliability Corporation and Western Electricity Coordination Council system performance criteria; however, nowhere in the study is there documentation of any impacts.

25.28. The Feasibility Study states that the proposed and existing generation on the distribution line is 15.47 MW, but that the proposed and existing generation at the substation is somehow lower at 12.45 MW; this is incorrect because the sum of the generation on all the distribution lines feeding into the transformer cannot exceed the total generation on at that transformer.

26.29. The Feasibility Study further stated that the substation transformer was rated at 14 MW with proposed and existing generation of 15.47 MW; this is incorrect because the transformer is actually rated 25 MW.

27.30. The Feasibility Study does not contain any information on any studies that were performed, the results of those studies, or the analysis of those studies.

28.31. The Feasibility Study estimated the costs of the interconnection at \$650,000 for “distribution modifications,” and \$300,000 for “protection requirements” for a total of \$950,000.

29.32. The Feasibility Study does not provide any detail associated with the estimated interconnection costs for “distribution modifications,” or for “protection requirements.”

30.33. It is not clear what PGE means in its Feasibility Study by “distribution modifications” and “protection requirements.”

31.34. The Feasibility Study estimated that it will take approximately 18 months to design, procure and construct the facilities.

~~32.35.~~ At the same time PGE provided the Feasibility Study on July 10, 2018, PGE also provided the System Impact Study Agreement, indicating that it is due in 15 business days on July 31, 2018, if Waconda Solar “elect[s] to proceed.”

~~33.36.~~ On July 12, 2018, Waconda Solar emailed PGE asking that PGE provide the actual studies and analysis behind the interconnection requirements in the Feasibility Study and for PGE to clarify some of the errors and inconsistencies in the study.

~~34.37.~~ PGE delayed responding to Waconda Solar’s questions.

~~35.38.~~ PGE also delayed significantly in responding to questions from Waconda Solar’s same developer, TLS Capital, Inc. (“TLS Capital”), on other projects; in one instance (Mt. Hope Solar) PGE did not respond for at least 57 days to TLS Capital’s questions on one study, despite TLS Capital following up with PGE on numerous occasions.

~~36.39.~~ Waconda Solar followed up with PGE on July 17, July 25 and July 27, 2018 asking PGE to please respond to its questions.

~~37.40.~~ In its July 27, 2018 email, Waconda Solar returned the executed System Impact Study Agreement to PGE “solely to preserve Waconda Solar’s position in the interconnection queue.” ([Attached hereto as Attachment C](#)).

~~38.41.~~ In its July 27, 2018 email, Waconda Solar also requested that PGE allow it to hire third-party consultants for the remainder of the studies “because of the inconsistencies within the Feasibility Study and the fact that portions of it are simply not correct.”

~~39.42.~~ On July 27, 2018, PGE responded that it was in the process of addressing Waconda Solar’s questions.

~~40.~~43. On July 27, 2018, Waconda Solar replied again stating that it would like to hire a third-party consultant complete the remaining studies.

~~41.~~44. On July 27, 2018, PGE responded that “[t]here are some errors that I can clear up.”

~~42.~~45. PGE erred in the Feasibility Study by stating that the proposed and existing generation on the distribution line is 15.47 MW; it should have read 11.65 MW.

~~43.~~46. PGE erred in the Feasibility Study by stating that the substation transformer was rated at 14 MW; it should have read 25 MW.

~~44.~~47. PGE erred in the Feasibility Study by incorrectly stating the portion of the distribution line that would need to be re-conducted.

~~45.~~48. On July 27, 2018, Waconda Solar replied to PGE and requested that PGE provide an updated Feasibility Study to correct the errors.

~~46.~~49. In its July 27 email, Waconda Solar also again asked that PGE agree to allow Waconda Solar to hire third-party consultants to complete the remainder of the studies.

~~47.~~50. In its July 27 email Waconda Solar also asked PGE further clarifying questions.

~~48.~~51. On August 9, 2018, PGE responded that it is “unwilling to agree” to Waconda Solar’s request for have future studies conducted by a third-party consultant.

~~49.~~52. On August 16, 2018, PGE provided a Revised Feasibility Study (attached hereto as Attachment ~~DB~~).

~~50.~~53. PGE’s Revised Feasibility Study still contained errors and inconsistencies.



51.54. The Revised Feasibility Study corrects a statement that the proposed and existing generation totals 11.65 MW on the distribution line.

52.55. The Revised Feasibility Study corrects a statement that the substation transformer is rated at 25 MW.

53.56. The Revised Feasibility Study included new sections of the distribution line to be re-conducted.

54.57. The Revised Feasibility Study added a statement that the total amount of generation on the substation transformer is 15.95 MW, but still contained an inconsistent statement that the amount of existing and proposed generation on the substation transformer totals 12.45 MW.

55.58. The Revised Feasibility Study included sections on “Feasibility Study Scope,” “Feasibility Study Assumptions,” “Feasibility Study Interconnection Requirements,” a “Cost Estimate,” and a “Schedule.”

56.59. The Revised Feasibility Study stated that it “normally consists of the following,” and then lists a number of items including documentation of impacts observed in meeting North American Electric Reliability Corporation and Western Electricity Coordination Council system performance criteria; however, nowhere in the study is there documentation of any impacts.

57.60. The Revised Feasibility Study does not contain any information on any studies that were performed, the results of those studies, or the analysis of those studies.

58.61. The Revised Feasibility Study estimated the costs of the interconnection at \$650,000 for “distribution modifications,” and \$300,000 for “protection requirements” for a total of \$950,000.

~~59.62.~~ It is not clear what PGE means in its Revised Feasibility Study by “distribution modifications” and “protection requirements.”

~~60.63.~~ The Revised Feasibility Study does not provide any detail associated with the estimated interconnection costs for “distribution modifications,” or for “protection requirements.”

~~61.64.~~ The Revised Feasibility Study estimated that it will take approximately 18 months to design, procure and construct the facilities.

~~62.65.~~ On August 17, 2018, Waconda Solar emailed PGE asking that PGE provide an accurate and correct study and to clarify some of the errors and inconsistencies in the Revised Facility Study.

~~63.66.~~ PGE has not responded to Waconda Solar’s August 17, 2018 email.

~~64.67.~~ PGE has a history of making errors in its interconnection studies.

~~65.68.~~ TLS Capital experienced PGE’s errors and inconsistencies in a number of other studies for other projects.

~~66.69.~~ For Mt. Hope Solar, PGE gave Mt. Hope Solar an interconnection study that double counted some upgrades or requirements.

~~67.70.~~ For Eola Solar, PGE gave Eola Solar a facility study where the estimated costs nearly doubled from the system impact study despite no changes in the requirements; PGE claims that this was the result of PGE’s clerical error.

~~68.71.~~ For Brush College Solar, PGE gave Brush College Solar a facility study with 61% higher costs than what was in the system impact study again, despite there being no changes to any of the requirements.

~~69.72.~~ For Brush College Solar, PGE provided Brush College Solar with a facility study but when Brush College Solar questioned PGE on certain aspects of the study, PGE determined that voltage regulator was not actually needed.

~~70.73.~~ For Sandy River Solar, PGE provided Sandy River Solar with a system impact study that required a recloser that was not actually needed, and PGE removed that requirement in the facility study.

~~71.74.~~ For Mountain Meadow Solar, PGE provided Mountain Meadow Solar with a feasibility study that did not identify all adverse system impacts and the study was not accurate; it said the project would cause backfeed into the substation despite a load on the line that far exceeded the total generation.

~~72.75.~~ In short, TLS Capital, who is the developer working on the Waconda Solar project, has experienced a number of errors and inconsistencies in PGE's interconnection studies.

~~73.76.~~ PGE has a history of making errors in its studies.

~~74.77.~~ PGE has a history of missing interconnection application timelines and study timelines.

~~75.78.~~ PGE has a history of providing inadequate studies that do not contain the information required by the Commission's rules.

~~76.79.~~ PGE's errors result in dramatically different cost estimates.

~~77.80.~~ PGE's delays in the interconnection process cause financial harm to QFs.

~~78.81.~~ PGE's interconnection department is understaffed.

~~79.82.~~ Waconda Solar needs to make informed business decisions about its project.

~~80.~~83. Waconda Solar believes that it will get more accurate and more detailed interconnection studies from a third-party consultant.

~~81.~~84. Waconda Solar believes that it will be better able to make informed business decisions with interconnection studies performed by a third-party consultant.

85. PGE itself hired third-party consultants.

86. PGE has hired third-party consultants to complete interconnection studies.

~~82.~~—PGE's interconnection processing has slowed over time.

~~83.~~87. On August 24, 2018, Waconda Solar again asked PGE to allow it to hire a third-party consultant to complete the remainder of the studies under OAR 860-082-0060(9).

~~84.~~88. Also, on August 24, 2018, Waconda Solar informed PGE of its intent to have an independent System Impact Study performed under OAR 860-082-0060(7)(h) in addition to PGE's own study, and requested that PGE provide the existing system configuration.

~~85.~~89. On September 7, 2018, PGE responded that it denies Waconda Solar's request to hire a third-party consultant under OAR 860-082-0060(9).

~~86.~~90. PGE provided no explanation as to why it was denying the request.

91. PGE's September 7 letter did not respond to Waconda Solar's request to have an independent System Impact Study performed under OAR 860-082-0060(7)(h).

92. Prior to Waconda Solar commencing this action, PGE refused to give its consent for Waconda Solar to hire a third-party consultant to complete the System Impact Study and the Facilities Study.

93. Prior to Waconda Solar commencing this action, PGE refused Waconda Solar's request to have an independent engineer perform a System Impact Study in addition to PGE's own System Impact Study.

94. Prior to Waconda Solar commencing this action, PGE refused to provide Waconda Solar with data sufficient to have an independent engineer perform a System Impact Study in addition to PGE's own System Impact Study.

95. Prior to Waconda Solar commencing this action, PGE refused to provide Waconda Solar with physical access to PGE's system sufficient to have an independent engineer perform a System Impact Study in addition to PGE's own System Impact Study.

96. Prior to Waconda Solar commencing this action, PGE refused to provide Waconda Solar with its interconnection standards.

97. Since commencing this action, PGE continues to refuse to give its consent for Waconda Solar to hire a third-party consultant to complete the System Impact Study and the Facilities Study.

98. Since commencing this action, PGE continues to refuse Waconda Solar's request to have an independent engineer perform a System Impact Study in addition to PGE's own System Impact Study.

99. Since commencing this action, PGE continues to refuse to provide Waconda Solar with data sufficient to have an independent engineer perform a System Impact Study in addition to PGE's own System Impact Study.

100. Since commencing this action, PGE continues to refuse to provide Waconda Solar with physical access to PGE's system sufficient to have an independent engineer perform a System Impact Study in addition to PGE's own System Impact Study.

101. Since commencing this action, PGE continues to refuse to provide Waconda Solar with its interconnection standards.

102. The information necessary for an independent engineer to perform a System Impact Study is not publicly available.

103. An independent engineer cannot obtain the necessary information to perform a System Impact Study without PGE's cooperation.

104. The locations on PGE's system necessary for independent engineer to perform a System Impact Study are not accessible by the public.

105. An independent engineer cannot obtain the necessary access to PGE's system to perform a System Impact Study without PGE's cooperation.

106. An independent engineer requires access to PGE's interconnection standards to perform a System Impact Study.

107. The original complaint in this matter was filed on September 28, 2018.

108. On October 25, 2018, PGE provided Waconda Solar with a System Impact Study (Attached hereto as Attachment E).

~~87.~~109. PGE's System Impact Study is incomplete.

## **VII. LEGAL CLAIMS**

### **Complainant's First Claim for Relief**

**Waconda Solar is entitled to relief because PGE failed to provide complete and accurate information in ~~both~~ its Feasibility Study, ~~and~~ revised Feasibility Study, and System Impact Study.**

~~88.~~110. Complainant re-alleges all the preceding paragraphs.

~~89.111.~~ PGE is obligated to purchase a QF's net output that is directly or indirectly made available to PGE. 18 CFR 292.303(a), 292.304(d); ORS 758.525(2), 758.535(2)(a)&3(b); OAR 860-029-0030(1).

~~90.112.~~ PGE is obligated to make interconnections with any QF that may be necessary to accomplish the required purchases. 18 CFR 292.303(c); OAR 860-029-0030(3).

~~91.113.~~ PGE is obligated to provide a copy of the Feasibility Study to Waconda Solar. OAR 860-082-0060(6)(g).

~~92.114.~~ PGE is obligated to provide reasonably accurate information to Waconda Solar and correct its errors.

115. PGE is obligated to in its Feasibility Study, identify any potential adverse system impacts on its transmission or distribution system that may result from the interconnection of the Waconda Solar project. OAR 860-082-0060(6)(e).

116. PGE is obligated to provide a copy of the System Impact Study to Waconda Solar. OAR 860-082-0060(7)(i).

117. PGE is obligated to, in its System Impact Study, identify and detail the impacts on PGE's transmission or distribution system or on an affected system that would result from the interconnection of the small generator facility if no modifications to the small generator facility or system upgrades were made; the system impact study must include evaluation of the adverse system impacts identified in the feasibility study and in the scoping meeting. OAR 860-082-0060(7)(e).

118. PGE is obligated to in its System Impact Study, include a short circuit analysis; a stability analysis; a power flow analysis; a voltage drop and flicker study; a

protection and set point coordination study; grounding reviews. OAR 860-082-0060(7)(g).

119. PGE has an obligation of good faith and fair dealing in the performance of its agreements to perform the Feasibility Study and the System Impact Study.

93.—PGE has an obligation of good faith and fair dealing to facilitate performance of the contracts it signs, including its power purchase agreement and interconnection study agreements with Waconda Solar, where it is consistent with and in furtherance of the agreed-upon terms of the contracts or where it effectuates the reasonable contractual expectations of the parties. See, e.g. *Sheets v. Knight*, 308 Or 220, 233 (1989);

120. *Klamath Off-Project Water Users, Inc. v. PacifiCorp*, 237 Or App 434, 445 (2010); *Electric Lightwave, Inc. v. US West Communications, Inc.*, Docket No. UC 377, Order No. 99-285 at 8 (1999); *Xcel Energy Services, Inc. v. Southwest Power Pool, Inc.*, 118 FERC ¶ 61,232 at P. 27 (2007).

121. PGE is obligated to furnish adequate and safe interconnection service to its customers for a reasonable and just charge. ORS 757.020.

122. PGE is obligated to treat its interconnection customers without undue preference, unreasonable preference or advantage to any particular person, and without undue or unreasonable prejudice or disadvantage in any respect. ORS 757.325.

94.—PGE is obligated to refrain from engaging in unjust and unreasonable practices with respect to its customers, including interconnection customers, and the public generally. ORS 746.040.



95.123. PGE violated the Commission's rules by failing to provide a Feasibility Study with accurate information.

96.124. PGE violated the Commission's rules by failing to identify and articulate the results of its studies in either the Feasibility Study or the Revised Feasibility Study.

125. PGE violated its duty of good faith and fair dealing by failing to provide a Feasibility Study with accurate information, the information required under the Commission's rules, and in a form that facilitates the implementation of PGE's agreements with Waconda.

126. PGE violated the Commission's rules by failing to identify the potential adverse system impacts in either its Feasibility Study or revised Feasibility Study that are driving the interconnection requirements.

127. PGE violated the Commission's rules by failing to provide a System Impact Study with accurate information.

128. PGE violated its duty of good faith and fair dealing by failing to provide a System Impact Study with accurate information, the information required under the Commission's rules, and in a form that facilitates the implementation of PGE's agreements with Waconda.

129. PGE violated the Commission's rules by failing to, in its System Impact Study, identify and detail the impacts on PGE's transmission or distribution system or on an affected system that would result from the interconnection of the small generator facility if no modifications to the small generator facility or system upgrades were made;

the system impact study must include evaluation of the adverse system impacts identified in the feasibility study and in the scoping meeting.

97.130. PGE violated the Commission's rules by failing to, in its System Impact Study, include a short circuit analysis; a stability analysis; a power flow analysis; a voltage drop and flicker study; a protection and set point coordination study; grounding reviews

98.131. Waconda Solar is entitled to relief because PGE's failure to provide a complete and accurate Feasibility Study and System Impact Study is in violation of the Commission's rules.

### **Complainant's Second Claim for Relief**

**Waconda Solar is entitled to relief because PGE unreasonably withheld its consent to allow Waconda Solar to hire a third-party consultant to complete the remainder of its interconnection studies or to complete an independent System Impact Study.**

99.132. Complainant re-alleges all the preceding paragraphs.

100.133. PGE may contract with a third-party consultant to complete a feasibility study, system impact study, or facilities study. OAR 860-082-0060(9).

101.134. PGE and Waconda Solar may agree in writing to allow Waconda Solar to hire a third-party consultant to complete a feasibility study, system impact study, or facilities study, subject to PGE's oversight and approval. OAR 860-082-0060(9).

135. Waconda Solar has a right to have an independent System Impact Study completed. OAR 860-082-0060(7)(h).

136. PGE is obligated to furnish adequate and safe interconnection service to its customers for a reasonable and just charge. ORS 757.020.

137. PGE is obligated to treat its interconnection customers without undue preference, unreasonable preference or advantage to any particular person, and without undue or unreasonable prejudice or disadvantage in any respect. ORS 757.325.

140.—PGE is obligated to refrain from engaging in unjust and unreasonable practices with respect to its customers, including interconnection customers, and the public generally. ORS 746.040.

138.\_\_\_\_\_

139. PGE has an obligation of good faith and fair dealing to facilitate performance of the contracts it signs, including its power purchase agreement and interconnection study agreements with Waconda Solar, where it is consistent with and in furtherance of the agreed-upon terms of the contracts or where it effectuates the reasonable contractual expectations of the parties. See, e.g. *Sheets v. Knight*, 308 Or 220, 233 (1989); *Klamath Off-Project Water Users, Inc. v. PacifiCorp*, 237 Or App 434, 445 (2010); *Electric Lightwave, Inc. v. US West Communications, Inc.*, Docket No. UC 377, Order No. 99-285 at 8 (1999); *Xcel Energy Services, Inc. v. Southwest Power Pool, Inc.*, 118 FERC ¶ 61,232 at P. 27 (2007).

~~103.~~140.\_\_\_\_\_ PGE has an obligation to not unreasonably refuse to grant its consent to allow Waconda Solar to hire a third-party consultant to complete the interconnection studies.

~~104.~~141.\_\_\_\_\_ The Commission's policy is that it is appropriate to allow applicants to hire third-party consultants.

~~105.~~142.\_\_\_\_\_ PGE has an obligation to provide a list of approved third-party consultants.

~~106.~~143. PGE has an obligation to inform Waconda Solar of the process upon which PGE will review any third-party consultant selected by Waconda Solar to determine whether they are qualified and have the experience and knowledge to properly and safely perform the studies.

~~107.~~144. PGE has an obligation to provide reasonable information and reasonable access to its system so that an independent System Impact Study can be performed.

145. An independent System Impact Study cannot be performed without PGE's cooperation.

~~108.~~146. PGE has not provided any explanation regarding why it has refused to provide its consent for Waconda Solar to hire a third-party consultant to complete the interconnection studies.

147. PGE violated its duty of good faith and fair dealing when it unreasonably withheld its consent to allow Waconda Solar to hire a third-party consultant to complete the remainder of its interconnection studies or to complete an independent System Impact Study.

148. PGE violated its duty to act reasonably with respect to its customers when it withheld its consent to allow Waconda Solar to hire a third-party consultant to complete the remainder of its interconnection studies or to complete an independent System Impact Study.

~~109.~~149. PGE unreasonably refused to consider and grant its consent to allow Waconda Solar to hire third-party consultants because PGE made numerous errors in Waconda Solar's Feasibility Study.

~~110.~~150. PGE unreasonably refused to consider and grant its consent to allow Waconda Solar to hire third-party consultants because PGE still made numerous errors in Waconda Solar's revised Feasibility Study.

~~111.~~151. PGE unreasonably refused to consider and grant its consent to allow Waconda Solar to hire third-party consultants because PGE cannot respond in a timely manner to Waconda Solar's questions.

~~112.~~152. PGE unreasonably refused to consider and grant its consent to allow Waconda Solar to hire third-party consultants because PGE's interconnection department is understaffed.

~~113.~~153. PGE unreasonably refused to consider and grant its consent to allow Waconda Solar to hire third-party consultants because PGE has and continues to provide interconnection studies with inconsistent and erroneous information.

~~114.~~154. PGE unreasonably refused to consider and grant its consent to allow Waconda Solar to hire third-party consultants because PGE itself has been hiring third-parties.

~~115.~~155. PGE unreasonably refused to consider and grant its consent to allow Waconda Solar to hire third-party consultants because PGE has a history of providing inaccurate studies.

~~116.~~156. PGE unreasonably refused to consider and grant its consent to allow Waconda Solar to hire third-party consultants because PGE has a history of providing inadequate studies that are missing the information required by the Commission's rules.

~~117.~~157. PGE unreasonably refused to consider and grant its consent to allow Waconda Solar to hire third-party consultants because PGE has a history of providing studies late or missing the study timelines.

~~118.~~158. PGE unreasonably refused to consider and grant its consent to allow Waconda Solar to hire third-party consultants because a third-party can provide more accurate and more detailed reports.

~~119.~~159. PGE unreasonably refused to consider and grant its consent to allow Waconda Solar to hire third-party consultants because a third-party can complete reports more quickly.

~~120.~~160. It is reasonable to allow Waconda Solar to hire a third-party to complete the remaining studies because PGE has made errors and inconsistencies in its studies prepared in-house.

~~121.~~161. It is reasonable to allow Waconda Solar to hire a third-party to complete the remaining studies because this interconnection is a relatively straightforward distribution level interconnection.

~~122.~~162. If PGE does not have the bandwidth to timely respond to questions regarding errors and inconsistencies in its own studies, then it is reasonable to allow Waconda Solar to hire a third party to complete the remaining studies.

163. It is appropriate for PGE to allow Waconda Solar to hire third-party consultants.

~~123.~~164. PGE's failure to cooperate with Waconda Solar, by providing the necessary information and access to PGE's system, violated Waconda Solar's legal right to have an independent System Impact Study performed.

~~124.165.~~ Waconda Solar is entitled to relief because PGE's failures to reasonably consider and grant its request to hire a third-party consultant violate the Commission's rules and policies, which result in Waconda Solar incurring additional cost and delay.

### **Complainant's Third Claim for Relief**

**Waconda Solar is entitled to relief because PGE failed to meet interconnection application deadlines required under the Commission's rules and because PGE's interconnection processing has slowed.**

~~125.166.~~ Complainant re-alleges all the preceding paragraphs.

~~126.167.~~ PGE is obligated to make interconnections with any QF that may be necessary to accomplish the required purchases. 18 CFR 292.303(c); OAR 860-029-0030(3).

~~127.168.~~ PGE is obligated to meet "all applicable deadlines in the small generator interconnection rules unless the deadlines have been waived by agreement." OAR 860-082-0025(7)(g).

~~128.169.~~ If PGE cannot meet an applicable deadline, then PGE is obligated to provide written notice to Waconda Solar explaining the reasons for the failure to meet the deadline and an estimated alternative deadline. OAR 860-082-0025(7)(g).

~~129.170.~~ PGE is required to provide written notice regarding the completeness of its application to interconnect to Waconda Solar within 10 business days of receipt. OAR 860-082-0025(7)(a).

~~130-171.~~ PGE violated the Commission's rules by failing to notify Waconda Solar that its interconnection application was complete within 10 business days.

~~131-172.~~ PGE is required to make reasonable, good-faith efforts to follow the schedule set forth in the Feasibility Study Agreement. OAR 860-082-0060(6)(d).

173. PGE is obligated to furnish adequate and safe interconnection service to its customers for a reasonable and just charge. ORS 757.020.

174. PGE is obligated to treat its interconnection customers without undue preference, unreasonable preference or advantage to any particular person, and without undue or unreasonable prejudice or disadvantage in any respect. ORS 757.325.

175. PGE is obligated to refrain from engaging in unjust and unreasonable practices with respect to its customers, including interconnection customers, and the public generally. ORS 746.040.

176. PGE has an obligation of good faith and fair dealing to facilitate performance of the contracts it signs, including its power purchase agreement and interconnection study agreements with Waconda Solar, where it is consistent with and in furtherance of the agreed-upon terms of the contracts or where it effectuates the reasonable contractual expectations of the parties. See, e.g. *Sheets v. Knight*, 308 Or 220, 233 (1989); *Klamath Off-Project Water Users, Inc. v. PacifiCorp*, 237 Or App 434, 445 (2010); *Electric Lightwave, Inc. v. US West Communications, Inc.*, Docket No. UC 377, Order No. 99-285 at 8 (1999); *Xcel Energy Services, Inc. v. Southwest Power Pool, Inc.*, 118 FERC ¶ 61,232 at P. 27 (2007).

~~132-177.~~ PGE did not make reasonable, good-faith efforts to follow the schedule set forth in the Feasibility Study Agreement.



~~133.~~178. PGE has an obligation to respond within a reasonable amount of time to Waconda Solar's questions so as to not unduly delay the interconnection process.

179. PGE failed to respond to Waconda Solar's questions within a reasonable amount of time.

~~134.~~180. PGE violated its duty of good faith and fair dealing by failing to meet interconnection application deadlines and because PGE's interconnection processing has slowed.

~~135.~~181. Waconda Solar is entitled to relief because PGE's slowed interconnection processing, failures to meet the Commissions deadlines and reasonably follow its study timeline and respond to questions result in Waconda Solar incurring additional cost and delay.

#### **Complainant's Fourth Claim for Relief**

**Waconda Solar is entitled to relief because PGE subjected Waconda Solar to undue or unreasonable prejudice or disadvantage and treated other people and PGE's own projects with undue or unreasonable preference or advantage.**

~~136.~~182. Complainant re-alleges all the preceding paragraphs.

~~137.~~183. PGE cannot make or give undue preference, unreasonable preference or advantage to any particular person, or subject any particular person to any undue or unreasonable prejudice or disadvantage in any respect. ORS 757.325

184. PGE is obligated to furnish adequate and safe interconnection service to its customers for a reasonable and just charge. ORS 757.020.

185. PGE is obligated to treat its interconnection customers without undue preference, unreasonable preference or advantage to any particular person, and without undue or unreasonable prejudice or disadvantage in any respect. ORS 757.325.

186. PGE is obligated to refrain from engaging in unjust and unreasonable practices with respect to its customers, including interconnection customers, and the public generally. ORS 746.040.

~~138.~~187. PGE subjected Waconda Solar to undue and/or unreasonable prejudice or disadvantage by not processing its interconnection application in a timely manner.

~~139.~~188. PGE gave undue preference and/or unreasonable preference to itself and other interconnection applicants by hiring third-party consultants to complete its own interconnection studies or for other interconnection applications.

~~140.~~189. PGE subjected Waconda Solar to undue and/or unreasonable prejudice or disadvantage by refusing to give its consent to allow Waconda Solar to hire third-party consultants to complete the interconnection studies.

~~141.~~190. Waconda Solar is entitled to relief because PGE's undue and unreasonable prejudice against Waconda Solar and PGE's undue and unreasonable preference for its own interconnections and other interconnection applications violates the Oregon Revised Statutes and will subject Waconda Solar to additional cost and time delay.

## **VIII. PRAYER FOR RELIEF**

WHEREFORE, Complainant respectfully requests the Commission issue an order:

1. Finding PGE in violation of its obligation to provide a complete and accurate Feasibility Study including the results of its studies in the Feasibility Study and the potential adverse system impacts that are driving the interconnection requirements.

2. Finding PGE in violation of its obligation to reasonably consider and consent to Waconda Solar's request to hire a third-party consultant to complete its interconnection studies.

3. Finding PGE in violation of its obligation to provide reasonable information and access so that an independent System Impact Study can be performed.

4. Finding PGE in violation of Waconda Solar's right to have an independent System Impact Study performed.

4.5. Finding PGE in violation of its obligation to meet interconnection application deadlines.

6. Finding PGE in violation of its obligation to not make or give undue preference, unreasonable preference to any other person or itself, or subject Waconda Solar to undue or unreasonable prejudice or disadvantage in any respect.

5.7. Finding that relief is warranted due to PGE's slowed interconnection process.

6.8. Requiring that PGE provide a complete and accurate Feasibility Study including a complete and accurate Feasibility Study including the results of its studies in the Feasibility Study and the potential adverse system impacts that are driving the interconnection requirements.

7.9. Requiring that PGE allow Waconda Solar to hire a third-party consultant to complete its interconnection studies.

8.10. Requiring that PGE provide reasonable information and access so that an independent System Impact Study can be performed.

11. Requiring that PGE allow Waconda Solar's request to have an independent System Impact Study performed.

9.12. Requiring that PGE grant an extension of Waconda Solar's power purchase agreement commercial operation date and termination date to account for the delayed in-service date PGE caused.

13. Granting Waconda Solar an extension of its power purchase agreement commercial operation date to coincide with its actual interconnection in-service date.

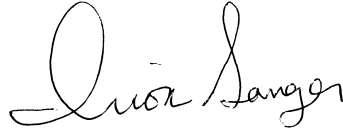
10.14. Requiring that PGE not make or give undue preference, unreasonable preference to any other person or itself, or subject Waconda Solar to undue or unreasonable prejudice or disadvantage in any respect.

11.15. Instituting penalties up to \$10,000 pursuant to ORS 756.990 against PGE and paid by PGE's shareholders for each violation of ORS 758.525(2), 758.535(2)(b)&(3)(b), 18 CFR 292.303(a)&(c), 292.304(d), OAR 806-029-0030(1)&(3), 806-082-0025(7), 806-082-0060(5)- (8), and Commission Order Nos. 09-350.

12.16. Granting any other such relief as the Commission deems necessary.

Dated this 28th day of ~~September~~ July 2019~~8~~.

Respectfully submitted,



---

Irion A. Sanger  
Marie P. Barlow  
Sanger ~~Law~~Thompson, PC  
~~1117 SE 53rd Avenue~~  
1041 SE 58th Place  
Portland, OR 97215  
Telephone: 503-756-7533  
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irion@sanger-law.com

Of Attorneys for Waconda Solar, LLC

## CERTIFICATE OF FILING

I certify that on ~~September~~July 28, 201~~98~~9, I filed the foregoing Complaint on behalf of Waconda Solar, LLC with the Oregon Public Utility Commission by electronic communication as consistent with OAR 860-001-0170.



---

Marie P. Barlow  
Sanger ~~Law~~Thompson, PC  
~~1117 SE 53rd Avenue~~  
1041 SE 58th Place  
-Portland, OR 97215  
Telephone: 503-420-7734  
Fax: 503-334-2235  
marie@sanger-law.com

**Attachment A**

**Feasibility Study Agreement for Waconda Solar  
Dated April 17, 2018**



**Small Generator Facility  
Feasibility Study Agreement**

This Agreement is made and entered into this 17<sup>th</sup> day of April (*month and year*) by and between Waconda Solar, LLC, ☐ an individual ☒ a company, ("Applicant") and Portland General Electric Company, a corporation existing under the laws of the State of Oregon, ("PGE"). Applicant and PGE each may be referred to as a "Party," or collectively as the "Parties."

**Recitals:**

**Whereas**, Applicant is proposing to develop a Small Generator Facility or adding generating capacity to an existing Small Generator Facility consistent with the Application completed on March 23, 2018; and

**Whereas**, Applicant desires to interconnect the Small Generator Facility with PGE's Transmission & Distribution (T&D) System; and

**Whereas**, Applicant has requested for PGE to perform a Feasibility Study to assess the feasibility of interconnecting the proposed Small Generator Facility to PGE's T&D System.

**Now, therefore**, in consideration of and subject to the mutual covenants contained herein the Parties agree as follows:

1. When used in this Agreement, with initial capitalization, the terms specified shall have the meanings set forth in this Agreement or as given in OAR 860-082-0005 through 860-082-0085 and to the extent that this Agreement conflicts with the Rules, the Rules shall take precedence.
2. Applicant elects and PGE shall cause to be performed a Feasibility Study consistent with OAR 860-082-0060(6).
3. The scope of the Feasibility Study shall be subject to the assumptions set forth in the Rule and detailed in Attachment A to this Agreement.
4. The Feasibility Study shall be based on the technical information provided by Applicant in its Application, as may be modified as the result of the Scoping Meeting. PGE reserves the right to request additional technical information from Applicant as may reasonably become necessary consistent with Good Utility Practice during the course of the Feasibility Study. If, in the course of the Study, Applicant finds it necessary to modify the Application, the time to complete the Feasibility Study may be extended.

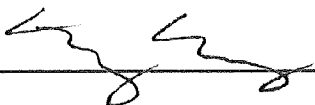


5. In performing the study, PGE will rely, to the extent reasonably practicable, on existing studies of recent vintage. Applicant will not be charged for such existing studies. OAR 860-082-0035 details cost responsibility associated with any new study or modifications to existing studies that are reasonably necessary to perform the Feasibility Study.
6. The Feasibility Study report shall provide the following information:
  - 6.1 An identification of the potential Adverse System Impacts on PGE's transmission and/or distribution system or any Affected System.
  - 6.2 Preliminary identification of any circuit breaker short circuit capability limits exceeded as a result of the interconnection,
  - 6.3 Preliminary identification of any thermal overload or voltage limit violations resulting from the interconnection, and
  - 6.4 Preliminary description and non-bonding estimated cost of facilities required to interconnect the Small Generator Facility to PGE's T&D System and to address the identified short circuit and power flow issues.
7. As required by OAR 860-082-0060(8)(a), the public utility will provide scope for the Facilities Study, a reasonable schedule for completion of the study, and a good-faith, non-binding cost estimate to perform the study (Attachment B). The Feasibility Study shall be completed and the results shall be transmitted to Applicant within sixty (60) calendar days after this Agreement is signed by the Parties unless an alternate schedule has been agreed to by parties. Attachment B shall be incorporated as part of this Agreement.
8. Study fees will be based on actual costs in accordance with the provisions of the Rule as detailed in 860-082-0035 and as follows:
  - 8.1 The non-binding good faith estimate of the cost to complete the Feasibility Study is \$4,000. Applicant is required to pay a deposit of fifty (50) percent this estimate or \$1,000, whichever is less, prior to start date of study.
  - 8.2 Any study fees shall be based on PGE's actual costs and will be invoiced to Applicant after the study is completed and delivered and will include a summary of professional time.
  - 8.3 Applicant must pay any study costs that exceed the deposit without interest within thirty (30) calendar days on receipt of the invoice or resolution of any dispute. If the deposit exceeds the invoiced fees, PGE shall refund such excess within thirty (30) calendar days of the invoice without interest.

**Signatures:**

In witness whereof, the Parties have caused this Agreement to be executed by their respective duly authorized representatives.

For APPLICANT:

Signature: \_\_\_\_\_

Printed Name: Troy Snyder

Title (if any): Manager

Date: April 17, 2018

For PORTLAND GENERAL ELECTRIC COMPANY:

Signature: \_\_\_\_\_

Printed Name: BRUCE BARNEY

Title: SPECIALIZED PROGRAMS  
MANAGER

Date: APR 26 2018

**Attachment A**  
**Feasibility Study Agreement**  
**Assumptions Used in Conducting the Feasibility Study**

The Feasibility Study will be based upon the information set forth in the Application and agreed upon in the Scoping Meeting held on April 11, 2018 (*write "N/A" if Scoping Meeting was waived by both Parties*).

Below to be completed by PGE in consultation with Applicant.

1. Designation of Point of Interconnection and configuration to be studied.

As detailed in Site Plan submitted with Interconnection Application.

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2. Designation of alternative Point(s) of Interconnection and configuration.

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3. Other Assumptions.

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**Attachment B**  
**Feasibility Study Agreement**  
**PGE Provided Scope, Schedule and Budget for Feasibility Study**

PGE will study the existing distribution (up to and including PGE's sub-transmission system) system to identify if the proposed generation system can interconnect safely and reliably with the existing facilities. If it is determined that a safe and reliable interconnection cannot occur an initial scope of work to PGE's system will be identified. The scope of work will detail the necessary interconnection requirements.

PGE estimates the study will cost \$4,000.00. PGE will need at least 60 business days to complete the study from the time we receive both the signed study agreement and the initial study deposit of \$1000.00.

**Attachment B**

**Feasibility Study for Waconda Solar**

**Dated July 10, 2018**

# Portland General Electric



## Feasibility Study

Interconnection Request:

Waconda Solar – 2.25 MWAC

SPQ0172

July 10, 2018



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## **1. Introduction**

On April 23, 2018, Portland General Electric (PGE) received a completed Small Generator Interconnection Request. The Interconnection Request seeks to interconnect a 2.25 MWAC solar facility located in Marion County, Oregon at GPS coordinates 45.072629, -122.913603. The interconnection point will be on PGE's Waconda-13 distribution feeder connected to the Waconda substation.

As set forth in the Oregon Administrative Rules 860-082-0085(29), PGE has assigned queue number SPQ0172 to the Interconnection Request.

On April 26, 2018, PGE received an executed Feasibility Study Agreement with the appropriate deposit from the Interconnection Customer.

The Feasibility Study provides the study results based on the information provided in the Interconnection Request.

The Interconnection Customer will operate this generator as a Qualify Facility as defined by the Public Utility Regulatory Policies Act of 1978 (PURPA).

## **2. Feasibility Study Scope**

The primary purpose of the Feasibility Study is to preliminarily evaluate the feasibility of the Interconnection Request at the designated Point of Interconnection. PGE will also identify any required system additions necessary to accommodate the request. The study normally consists of the following:

- Documentation of any impacts observed in meeting the NERC/WECC System Performance Criteria that are adverse to the reliability of the electric system as a result of the interconnection.
- Documentation of other providers' to the transmission or distribution systems that are impacted, and identification of these providers as Affected Systems. Note, no Affected Systems were identified for this study.
- Documentation of fault interrupting equipment with short circuit capability limits that are exceeded as a result of the interconnection.
- A list of facility additions and upgrades which the applicable power flow, and short circuit analyses determine to be required to accommodate the interconnection.
- A non-binding, good faith estimate of cost responsibilities for making the required additions and system upgrades necessary to accommodate the interconnection.





- A non-binding, good faith estimate of the time to construct the required additions and system upgrades necessary to accommodate the request.

The Feasibility Study considers all generating facilities that, on the date the study was commenced: (i) were directly interconnected to PGE's Distribution System; (ii) were interconnect to Affected Systems and may have an impact on the Interconnection Request; (iii) generating facilities having a pending higher queued Interconnection Request to interconnect to the Distribution System.

### **3. Feasibility Study Assumptions**

The Feasibility Study considerations include the following assumptions for system conditions for all stages and seasons:

- Generating Facilities and identified PGE electrical system upgrades associated with higher queued Interconnection Requests.
- Waconda Solar was modeled at its maximum capability of 2.25 MWac.
- The Point of Interconnection will be on PGE's Waconda-13 distribution feeder.
- The nominal voltage level at the Point of Interconnection will be 13 kV.
- The Interconnection Customer will design, permit, build and maintain all facilities on the customer's side of the Point of Interconnection.
- Line reconductor or fiber underbuild required on existing poles will be assumed to follow the most direct path on the Distribution System. If during detailed design the path must be modified it may result in additional cost and timing delays for the Interconnection Customer.
- Generator tripping may be required under certain outages.
- The Generating Facility is expected to operate during daylight hours every day 7 days a week, 12 months per year. The Point of Interconnection power factor range studied was unity power factor or 1.0 as identified by the Interconnection Customer's Small Generator Interconnection Request.
- The interconnection was studied with eighteen (18) CPS, SCH125TL-DO/US-600 inverters with reactive power capabilities as shown in the provided Small Generator Interconnection Request.
- This report is based on information available at the time of the study.



## **4. Feasibility Study Interconnection Requirements**

The Interconnection Request was studied such that 100% of the output of the Generation Facility can be delivered to PGE's Distribution System without displacement of existing or higher queued Interconnection Requests.

### **Distribution System Modifications**

With the addition of Waconda Solar the amount of proposed generation will exceed the thermal limits of the existing conductor. The conductor is currently rated at 336 AAC which has a summer load carrying capacity of 10 MW. Waconda Solar will need to re-conductor approximately 2.5 miles of overhead lines starting at the intersection of Waconda Rd and 50th Ave to the point of interconnection. When you include Waconda Solar the amount of proposed and existing generation totals 15.47 MW.

In addition to the conductor work one capacitor bank and an existing recloser will need to be replaced as they become overloaded with the installation of Waconda Solar. They will be replaced with electronic reclosers.

The installation of a new primary service and metering package will also be needed to service the site.

### **Protection Requirements**

The daytime minimum load on the Waconda-13 feeder is 0.18 MW which occurred on 4/22/2018 at 3:08 pm. Additionally the daytime minimum load on the Waconda BR1 substation transformer is 1.79 MW which occurred on 5/13/2018 at 1:28 pm. The Waconda BR1 substation transformer is rated at 14 MW. When you include Waconda Solar the amount of existing and proposed generation on the BR1 substation transformer totals 12.45 MW.

Under the conditions outlined above the generation can carry the entire BR1 transformer load and will backflow into the transmission system. This causes the potential for the individual generators to feed one another and slows their response time for disconnection during a fault condition. To ensure the generation is offline within 2 seconds a transfer trip protection scheme is required. Transfer trip requires running a fiber optic line from the Waconda Substation to the point of interconnection which is approximately 3 miles.

Additionally, to accomplish transfer trip an RTAC will need to be added at the substation. The RTAC allows PGE to expand the communication connections.



## 5. Cost Estimate

The following estimate represents only the scopes of work that will be performed by the Distribution Provider. Costs for any work being performed by the Interconnection Customer are not included.

<b>Distribution Modifications</b>	\$650,000.00
<b>Protection Requirements</b>	\$300,000.00
<b>Total</b>	<b>\$950,000.00</b>

## 6. Schedule

PGE estimates it will require approximately 18 months to design, procure and construct the facilities described in this report following the execution of an Interconnection Agreement. The schedule will be further developed and optimized during the System Impact Study.

**Attachment C**

**System Impact Study Agreement for Waconda Solar  
Dated July 27, 2018**



**Small Generator Facility  
System Impact Study Agreement**

This Agreement is made and entered into this 27<sup>th</sup> day of July 2018 (*month and year*) by and between Waconda Solar, LLC, ☐ an individual ☒ a company, ("Applicant") and Portland General Electric Company, a corporation existing under the laws of the State of Oregon, ("PGE"). Applicant and PGE each may be referred to as a "Party," or collectively as the "Parties."

**Recitals:**

**Whereas**, Applicant is proposing to develop a Small Generator Facility or adding generating capacity to an existing Small Generator Facility consistent with the Application completed on March 23, 2018; and

**Whereas**, Applicant desires to interconnect the Small Generator Facility with PGE's Transmission & Distribution (T&D) System; and

**Whereas**, PGE has completed a Feasibility Study and provided the results of said study to Applicant (This recital to be omitted if the Parties have agreed to forego the Feasibility Study.); and

**Whereas**, Applicant has requested PGE perform a System Impact Study to assess the impact of interconnecting the Small Generator Facility to PGE's T&D System.

**Now, therefore**, in consideration of and subject to the mutual covenants contained herein the Parties agree as follows:

1. When used in this Agreement, with initial capitalization, the terms specified shall have the meanings set forth in this Agreement or as given in OAR 860-082-0005 through 860-082-0085 and to the extent that this Agreement conflicts with the Rules, the Rules shall take precedence.
2. Applicant elects and PGE shall cause to be performed a System Impact Study consistent with OAR 860-082-0060(7).
3. The Parties shall set out the assumptions to be used in conducting the System Impact Study in Attachment A which is incorporated as part of this Agreement.
4. The System Impact Study will be based upon the results of the Feasibility Study, if applicable, technical information provided in the Application, and by Attachment A to this Agreement. PGE reserves the right to request additional technical information from Applicant as may reasonably become necessary consistent with Good Utility Practice during the course of the System Impact Study. If Applicant modifies its

designated Point of Interconnection, Application, or the technical information provided therein is modified, the time to complete the System Impact Study may be extended.

5. The System Impact Study report shall provide the following information:

5.1 Identification of any circuit breaker short circuit capability limits exceeded as a result of the interconnection,

5.2 Identification of any thermal overload or voltage limit violations resulting from the interconnection,

5.3 Identification of any instability or inadequately damped response to system disturbances resulting from the interconnection, and

5.4 Description and good faith non-binding cost estimate of facilities required to interconnect the Small Generator Facility to PGE's T&D System and to address the identified short circuit, instability, and power flow issues.

6. As required by OAR 860-082-0060(7)(a), Attachment A to this Agreement provides a detail of the scope for the System Impact Study, a reasonable schedule for completion of the study, and a good-faith, non-binding estimate of the cost to perform the System Impact Study. The System Impact Study shall be completed and the results transmitted to the Applicant within sixty (60) business days after this Agreement is signed by the Parties unless otherwise agreed to as part of this Agreement. Attachment A shall be incorporated as part of this Agreement.

7. PGE may require a study deposit as described OAR 860-082-0035 of the Rule.

8. Study fees and cost responsibility are described in OAR 860-082-0035 of the Rule and will be based on actual costs and as follows:

8.1 The non-binding good faith estimate of the cost to complete the System Impact Study is \$5,000. Applicant is required to pay a deposit of fifty (50) percent of estimate or \$1,000, whichever is less, prior to start date of study.

8.2 Any study fees shall be based on PGE's actual costs and will be invoiced to Applicant after the study is completed and delivered and will include a summary of professional time.

8.3 Applicant must pay any study costs that exceed the deposit without interest within thirty (30) calendar days on receipt of the invoice or resolution of any dispute. If the deposit exceeds the invoiced fees, PGE shall refund such excess within thirty (30) calendar days of the invoice without interest.

9. Cost responsibility is detailed in OAR 860-082-0035 of the Rule.

**Signatures:**

In witness whereof, the Parties have caused this Agreement to be executed by their respective duly authorized representatives.

For APPLICANT:

Signature: 

Printed Name: Troy Snyder

Title (if any): Manager

Date: 7/27/2018

For PORTLAND GENERAL ELECTRIC COMPANY:

Signature: 

Printed Name: BRUCE BARNEY  
SPECIALIZED PROGRAMS  
Title: MANAGER

Date: AUG 1 0 2018

**Attachment A**

**System Impact Study Agreement  
PGE Provided Scope, Schedule, and Budget for System Impact Study**

Pursuant to 860-082-0060(7)(g) the System Impact Study will consist of a short circuit analysis, stability analysis, power flow analysis, voltage drop and flicker studies, protection and set point coordination studies, and grounding reviews as necessary.

The System Impact Study shall be completed and the results transmitted to the Applicant within sixty (60) business days.

The non-binding good faith estimate of the cost to complete the System Impact Study is \$5,000. Applicant is required to pay a deposit of fifty (50) percent of estimate or \$1,000, whichever is less, prior to start date of study.



**Attachment D**

**Feasibility Study for Waconda Solar**

**Revised August 16, 2018**

# Portland General Electric



## Feasibility Study

Interconnection Request:

Waconda Solar – 2.25 MWAC

SPQ0172

Revised August 16, 2018



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## **1. Introduction**

On April 23, 2018, Portland General Electric (PGE) received a completed Small Generator Interconnection Request. The Interconnection Request seeks to interconnect a 2.25 MWAC solar facility located in Marion County, Oregon at GPS coordinates 45.072629, -122.913603. The interconnection point will be on PGE's Waconda-13 distribution feeder connected to the Waconda substation.

As set forth in the Oregon Administrative Rules 860-082-0085(29), PGE has assigned queue number SPQ0172 to the Interconnection Request.

On April 26, 2018, PGE received an executed Feasibility Study Agreement with the appropriate deposit from the Interconnection Customer.

The Feasibility Study provides the study results based on the information provided in the Interconnection Request.

The Interconnection Customer will operate this generator as a Qualify Facility as defined by the Public Utility Regulatory Policies Act of 1978 (PURPA).

## **2. Feasibility Study Scope**

The primary purpose of the Feasibility Study is to preliminarily evaluate the feasibility of the Interconnection Request at the designated Point of Interconnection. PGE will also identify any required system additions necessary to accommodate the request. The study normally consists of the following:

- Documentation of any impacts observed in meeting the NERC/WECC System Performance Criteria that are adverse to the reliability of the electric system as a result of the interconnection.
- Documentation of other providers' to the transmission or distribution systems that are impacted, and identification of these providers as Affected Systems. Note, no Affected Systems were identified for this study.
- Documentation of fault interrupting equipment with short circuit capability limits that are exceeded as a result of the interconnection.
- A list of facility additions and upgrades which the applicable power flow, and short circuit analyses determine to be required to accommodate the interconnection.
- A non-binding, good faith estimate of cost responsibilities for making the required additions and system upgrades necessary to accommodate the interconnection.



- A non-binding, good faith estimate of the time to construct the required additions and system upgrades necessary to accommodate the request.

The Feasibility Study considers all generating facilities that, on the date the study was commenced: (i) were directly interconnected to PGE's Distribution System; (ii) were interconnect to Affected Systems and may have an impact on the Interconnection Request; (iii) generating facilities having a pending higher queued Interconnection Request to interconnect to the Distribution System.

### **3. Feasibility Study Assumptions**

The Feasibility Study considerations include the following assumptions for system conditions for all stages and seasons:

- Generating Facilities and identified PGE electrical system upgrades associated with higher queued Interconnection Requests.
- Waconda Solar was modeled at its maximum capability of 2.25 MWac.
- The Point of Interconnection will be on PGE's Waconda-13 distribution feeder.
- The nominal voltage level at the Point of Interconnection will be 13 kV.
- The Interconnection Customer will design, permit, build and maintain all facilities on the customer's side of the Point of Interconnection.
- Line reconductor or fiber underbuild required on existing poles will be assumed to follow the most direct path on the Distribution System. If during detailed design the path must be modified it may result in additional cost and timing delays for the Interconnection Customer.
- Generator tripping may be required under certain outages.
- The Generating Facility is expected to operate during daylight hours every day 7 days a week, 12 months per year. The Point of Interconnection power factor range studied was unity power factor or 1.0 as identified by the Interconnection Customer's Small Generator Interconnection Request.
- The interconnection was studied with eighteen (18) CPS, SCH125TL-DO/US-600 inverters with reactive power capabilities as shown in the provided Small Generator Interconnection Request.
- This report is based on information available at the time of the study.



## **4. Feasibility Study Interconnection Requirements**

The Interconnection Request was studied such that 100% of the output of the Generation Facility can be delivered to PGE's Distribution System without displacement of existing or higher queued Interconnection Requests.

### **Distribution System Modifications**

With the addition of Waconda Solar the amount of proposed generation will exceed the thermal limits of the existing conductor. The conductor is currently rated at 336 AAC which has a summer load carrying capacity of 10 MW. Waconda Solar will need to re-conductor approximately 2.5 miles of overhead lines. There are two sections which will need to be reconducted. The first section starts on Waconda Rd near the address of 4307 Waconda Rd NE and ends at Portland Rd. The second section that will need to be reconducted starts near the address of 7020 Wapato St NE and continues south along 71st Ave NE to the point of interconnection.

When you include Waconda Solar the amount of proposed and existing QF generation totals 11.65 MW on the feeder. The total amount of generation on the Waconda BR1 substation transformer is 15.95 MW.

The study identified two protective devices which become overloaded with the installation of Waconda Solar. The first device is an existing hydraulic recloser located on Wapato St NE. The hydraulic recloser is not capable of handling the two-way flow of power. The second device is a 65T Fuse located on pole 1351. Pole 1351 is adjacent to the point of interconnection on Waconda Rd NE. The fuse will become overloaded due to an increase in amps. The increase in amps will exceed the fuse rating with the installation of the generator. Both will need to be replaced with electronic reclosers.

The installation of a new primary service and metering package will also be needed to service the site.

### **Protection Requirements**

The daytime minimum load on the Waconda-13 feeder is 0.18 MW which occurred on 4/22/2018 at 3:08 pm. Additionally the daytime minimum load on the Waconda BR1 substation transformer is 1.79 MW which occurred on 5/13/2018 at 1:28 pm. The Waconda BR1 substation transformer is rated at 25 MW. When you include Waconda Solar the amount of existing and proposed generation on the BR1 substation transformer totals 12.45 MW.

Under the conditions outlined above the generation can carry the entire BR1 transformer load and will backflow into the transmission system. This causes the potential for the



individual generators to feed one another and slows their response time for disconnection during a fault condition. To ensure the generation is offline within 2 seconds a transfer trip protection scheme is required. Transfer trip requires running a fiber optic line from the Waconda Substation to the point of interconnection which is approximately 3 miles.

Additionally, to accomplish transfer trip an RTAC will need to be added at the substation. The RTAC allows PGE to expand the communication connections.

## 5. Cost Estimate

The following estimate represents only the scopes of work that will be performed by the Distribution Provider. Costs for any work being performed by the Interconnection Customer are not included.

<b>Distribution Modifications</b>	\$650,000.00
<b>Protection Requirements</b>	\$300,000.00
<b>Total</b>	<b>\$950,000.00</b>

## 6. Schedule

PGE estimates it will require approximately 18 months to design, procure and construct the facilities described in this report following the execution of an Interconnection Agreement. The schedule will be further developed and optimized during the System Impact Study.

**Attachment E**

**System Impact Study for Waconda Solar  
Dated October 25, 2018**



# Portland General Electric



## System Impact Study

Interconnection Request:

Waconda Solar – 2.25 MWAC

SPQ0172

October 25, 2018



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## **1. Introduction**

On March 23, 2018, Portland General Electric (PGE) received a completed Small Generator Interconnection Request for Waconda Solar. The Interconnection Request seeks to interconnect a 2.25 MWAC solar facility located in Marion County, Oregon at GPS coordinates 45.072629, -122.913603. The interconnection point will be on PGE's Waconda-13 distribution feeder connected to the Waconda substation.

As set forth in the Oregon Administrative Rules 860-082-0015(29), PGE has assigned queue number SPQ0172 to the Interconnection Request.

On July 31, 2018, PGE received an executed System Impact Study Agreement with the appropriate deposit from the Interconnection Customer.

The System Impact Study provides the study results based on the information provided in the Interconnection Request.

The Interconnection Customer will operate this generator as a Qualify Facility as defined by the Public Utility Regulatory Policies Act of 1978 (PURPA).

## **2. System Impact Study Scope**

The primary purpose of the System Impact Study is to identify and detail the impacts of the Interconnection Request at the designated Point of Interconnection. This includes identifying and detailing any impacts of the Interconnection Request on PGE's transmission or distribution systems and on any affected systems. This also includes evaluation of any adverse system impacts identified in the feasibility study or the scoping meeting. PGE will identify any required system additions necessary to accommodate the request. The study normally consists of the following:

- Documentation of any impacts observed in meeting the NERC/WECC System Performance Criteria that are adverse to the reliability of the electric system as a result of the interconnection.
- Documentation of other providers' to the transmission or distribution systems that are impacted, and identification of these providers as Affected Systems. Note, no Affected Systems were identified for this study.
- Documentation of fault interrupting equipment with short circuit capability limits that are exceeded as a result of the interconnection.
- A short circuit analysis and power flow analysis. Note: The results of this analysis is reported in Attachment A.



- Protection and set point coordination studies. Note: The results of these studies are reported in Attachment A.
- Voltage drop, flicker and grounding reviews. Note: The result of these reviews are reported in Attachment A.
- A list of facility additions and upgrades which the applicable power flow, and short circuit analyses determine to be required to accommodate the interconnection.
- A non-binding, good faith estimate of cost responsibilities for making the required additions and system upgrades necessary to accommodate the interconnection.  
Note: The total non-binding, good faith estimate of cost is \$1,002,700.00.
- A non-binding, good faith estimate of the time to construct the required additions and system upgrades necessary to accommodate the request. Note: The total non-binding, good faith estimate of time to construct is 24 months.

The System Impact Study considers all generating facilities that, on the date the study was commenced: (i) were directly interconnected to PGE's Distribution System; (ii) were interconnected to Affected Systems and may have an impact on the Interconnection Request; (iii) generating facilities having a pending higher queued Interconnection Request to interconnect to the Distribution System.

### **3. System Impact Study Assumptions**

The System Impact Study considerations include the following assumptions for system conditions for all stages and seasons:

- Generating Facilities and identified PGE electrical system upgrades associated with higher queued Interconnection Requests.
- Waconda Solar was modeled at its maximum capability of 2.25 MWAC.
- The Point of Interconnection will be on PGE's Waconda-13 distribution feeder.
- The nominal voltage level at the Point of Interconnection will be 13 kV.
- The Interconnection Customer will design, permit, build and maintain all facilities on the customer's side of the Point of Interconnection.
- Line reconductor or fiber underbuild required on existing poles will be assumed to follow the most direct path on the Distribution System. If during detailed design the path must be modified it may result in additional cost and timing delays for the Interconnection Customer.
- Generator tripping may be required under certain outages.
- The Generating Facility is expected to operate during daylight hours every day 7 days a week 12 months per year. The Point of Interconnection power factor range



studied was unity power factor or 1.0 as identified by the Interconnection Customer's Small Generator Interconnection Request.

- The interconnection was studied with eighteen (18) CPS, SCH125TL-DO/US-600 inverters with reactive power capabilities as stated in the provided Small Generator Interconnection Request.
- This report is based on information available at the time of the study.

#### **4. System Impact Study Interconnection Requirements**

The Interconnection Request was studied such that 100% of the output of the Generation Facility can be delivered to PGE's Distribution System with consideration to existing or higher queued Interconnection Requests.

##### **Distribution System Modifications**

With the addition of Waconda Solar the amount of proposed generation will exceed the thermal limits of the existing conductor in two locations. Currently, the conductor along Waconda Road is primarily rated at 336 AAC with some limited lengths of conductor rated at 556AAC. Waconda Solar will need to pay for the reconductoring of two segments of conductor line. The first segment that must be re-conducted is an approximately 2.13 mile segment of overhead conductor, starting 15 feet East of the Rail Road overheard to underground transition, which is near the intersection of Portland Road and Waconda Road. The reconductor will extend to the point of interconnection. The second segment that will need to be reconducted starts near the address of 7020 Wapato St NE and continues south along 71st Ave NE to the point of interconnection, which is approximately .17 miles.

The study identified two protective devices which become overloaded with the interconnection of the Waconda Solar project. The first device is an existing hydraulic recloser (#8425) located on Wapato St NE, which will need to be replaced with an electronic recloser. The second device is a 65T Fuse located on pole 1351 which is adjacent to the point of interconnection on Waconda Rd NE. The existing fuse will be replaced with a 100T fuse.

In addition to the required reconductoring and the replacement of the two protective devices discussed above, the system impact analysis determined that during light and heavy load conditions the Generation Facility may cause voltage flicker issues on the feeder. The Interconnection Customer will be required to use dynamic reactive current support to mitigate this concern.



The cost associated with dynamic reactive current support will be borne by the Interconnection Customer and is not included in PGE's cost Estimate.

The installation of a new primary service and metering package will also be needed to service the site.

### **Protection Requirements**

The daytime minimum load on the Waconda-13 feeder is 0.18 MW which occurred on 4/22/2018 at 3:08 pm. Additionally the daytime minimum load on the Waconda BR1 substation transformer is 1.79 MW which occurred on 5/13/2018 at 1:28 pm. The Waconda BR1 substation transformer is rated at 25 MW. When you include Waconda Solar the amount of existing and proposed generation on the BR1 substation transformer totals 12.95 MW.

### **Transfer Trip**

Under the conditions outlined above the generation can carry the entire BR1 transformer load and will backflow into the transmission system. This causes the potential for the individual generators to feed one another and slows their response time for disconnection during a fault condition. To ensure the generation is offline within 2 seconds a transfer trip protection scheme is required.

When there is ground fault on the high side of the substation transformer, the line relays will trip the line breakers leaving the substation primary without a ground reference. The DER back-feeding to the primary will create an overvoltage condition on the unfaulted phases of up to 173% of normal phase-ground voltage. Until the fault is cleared and the back feed interrupted, the arresters on the un-faulted phases will be exposed to this overvoltage, and will continuously conduct, leading to thermal runaway and arrester failure. The overvoltage condition can also damage the transformer and the line insulators. At low DER penetration the relatively large stranded load facilitates rapid cessation of the DER; at higher penetration levels the DER removes itself increasingly slowly.

There are two approaches to address this fault induced overvoltage condition:

1. Prevent it by making the substation transformer appear to the transmission system as an effectively grounded source; this would require replacement of the substation transformer with a different configuration or in the installation of a grounding bank.
2. Rapidly detect the overvoltage condition and remove the transformer as a source; this is referred to as 3V0 sensing or as 59N protection.



The first approach is preferable, but considerable more expensive than the second approach. The first approach may be implemented during substation rebuilds; the second approach is how existing substations are being adapted for high penetrations of DER.

Once the DER is separated from the transmission system, it is essential that the DER be tripped to allow the transmission system to reenergize the distribution system without risk of closing in out-of-phase to still energized portions.

To rapidly detect the overvoltage condition, remove the transformer as a source and trip the DER the follow is required:

- Transfer trip to the DER via Mirror Bits

Transfer trip requires running a fiber optic line from the Waconda Substation to the point of interconnection which is approximately 3.6 miles. Proposed preceding interconnections take a similar path from the substation and will cover approximately 2.3 miles of this distance should the projects be constructed. If the higher-queued projects are built and provide for 2.3 miles of fiber optic line, then Waconda Solar would be responsible for the remaining fiber optic line extension of approximately 1.3 miles. If the higher queued projects are not built, Waconda Solar would be responsible for the entire approximately 3.6 miles of fiber optic line extension.

Additionally, to accomplish transfer trip an RTAC will need to be added at the substation. The existing connections are accounted for by higher preceding interconnections. The RTAC allows PGE to expand the communication connections.

## 5. Cost Estimate

The following estimate represents only the scopes of work that will be performed by the Distribution Provider. Costs for any work being performed by the Interconnection Customer are not included.

<b>Distribution Modifications</b>	\$817,000.00
(Recloser, Fuse and Reconductor with RR crossing)	
<b>New Service Metering</b>	\$30,000.00
<b>Communications Requirements</b>	\$121,600.00
(Fiber for Transfer trip)	
<b>Protection Requirements</b>	\$34,100.00
(Work in substation to facilitate Transfer Trip, RTAC)	
<b>Total</b>	<b>\$1,002,700.00</b>



## 6. Schedule

PGE estimates it will require approximately 24 months to engineer, procure and construct the facilities described in this report following the execution of an Interconnection Agreement. The schedule will be further developed and optimized during the Facility Study.

## 7. Higher Queued Projects

All active higher queued generation Interconnection Requests will be considered in this study and are identified below. If any of these requests are withdrawn, PGE reserves the right to restudy the request, as the results and conclusions contained within the study could significantly change.

Currently there are three higher queued Interconnection Requests on Waconda-13 feeder, in addition to one 3.0 MW generation site that has withdrawn from the queue.

SPQ0028	2.2 MW	(higher queued)
SPQ0048	2.5 MW	(higher queued)
SPQ0142	3.0 MW	(withdrawn)
SPQ0158	2.5 MW	(higher queued)
SPQ0172	2.25MW	Waconda Solar, LLC

## 8. Attachment A - Detailed System Impact Study Report (attached below)



Waconda Solar  
Prepared for PGE by POWER Engineers, Inc.

## SYSTEM IMPACT STUDY FOR SPQ0172

Waconda Solar

Prepared for Portland General Electric Company by  
POWER Engineers, Inc.

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## INTERCONNECTION INFORMATION

### Customer Information

Queue Position	SPQ0172
Applicant Name	Waconda Solar
System Impact Study Commitment Date	10/04/2018
Size of Proposed Facility (MW)	2.250 MW
Coordinates or Facility Location	45.072629, -122.913603
Inverter Type(s)	CPS SCH 125KTL-DO-US-600
Engineer Performing SIS	POWER Engineers, Inc
Accounting Work Order (AWO)	1000008370

### Interconnection Summary

System Impact Study was performed for Waconda Solar. Equipment was monitored for voltage, loading, and short circuit violations.

Based on the study results, the following are the distribution related impacts pertaining to this interconnection request:

- Replace hydraulic recloser 8425 with electronic recloser
- Add Dynamic VAR support for flicker
- Install one (1) 300-amp Solid-Blade cutouts and service metering at DER lateral

An operational contingent condition will necessitate a mainline reconductor of 2.13 miles on Waconda Road from about 0.15 feet east of the rail road to overhead/underground transition west of Portland Rd NE.

Depending on POI, if located east of the fuse on Pole No. 1351 (located Waconda Rd NE, east of 72<sup>nd</sup> Ave NE), the existing 65T fuse will need to be replaced with a 100T fuse. Also, an upgrade of up to three spans of A-#2 ACSR, BC- #6 CU will potentially be needed from Pole 1351 to Pole 1354 (900 ft).

The maximum primary voltage fluctuation was measured to be ~4.3% during light loading conditions with upgrades and ~6.6% during heavy loading conditions with upgrades, thus Dynamic VAR Support has been recommended to mitigate these voltage flicker issues.

With the installation of SPQ0172 the amount of existing and proposed generation will exceed the daytime minimum load of the substation transformer.

**Note:** Provide description of how this interconnection will affect the distribution system if no upgrades are made. This section is to be filled out after studies are complete.

### Distribution Line Related Upgrades

Description	Estimated Cost
Recloser Replacement (8425)	\$60,000
Waconda Road Reconductor	\$700,000
Fuse Replacement; 900' of tapline reconductor	\$57,000
New Primary Service and Metering Package	\$30,000

**Note:** This information is solely based on the SIS performed by distribution or planning engineers. Section to be filled out after studies are complete.

Total Estimated Distribution Line Cost					
INTERCONNECTION REQUESTS ASSOCIATED WITH THIS SUBSTATION					
Queue Pos #	Name	Feeder Name	Xfmr Pos #	DER Size (MW AC)	Status
SPQ0003	Redacted	Waconda-Waconda 13	BR1	2.200	Completed
SPQ0028	Redacted	Waconda-Waconda 13	BR1	2.200	Under Construction
SPQ0048	Redacted	Waconda-Waconda 13	BR1	2.500	Interconnection Agreement
SPQ0142	Redacted	Waconda-River	BR1	3.000	Withdrawn
SPQ0158	Redacted	Waconda-Waconda 13	BR1	2.500	Facility Study
SPQ0172	Waconda Solar, LLC	Waconda-Waconda 13	BR1	2.250	System Impact Study

### BASE CASE INFORMATION FOR LIGHT LOADING CONDITIONS

Substation Name	Waconda
Interconnecting Feeder Name	Waconda 13
Substation Transformer Position # (e.g. WR1, BR1)	BR1

#### Light Loading Information

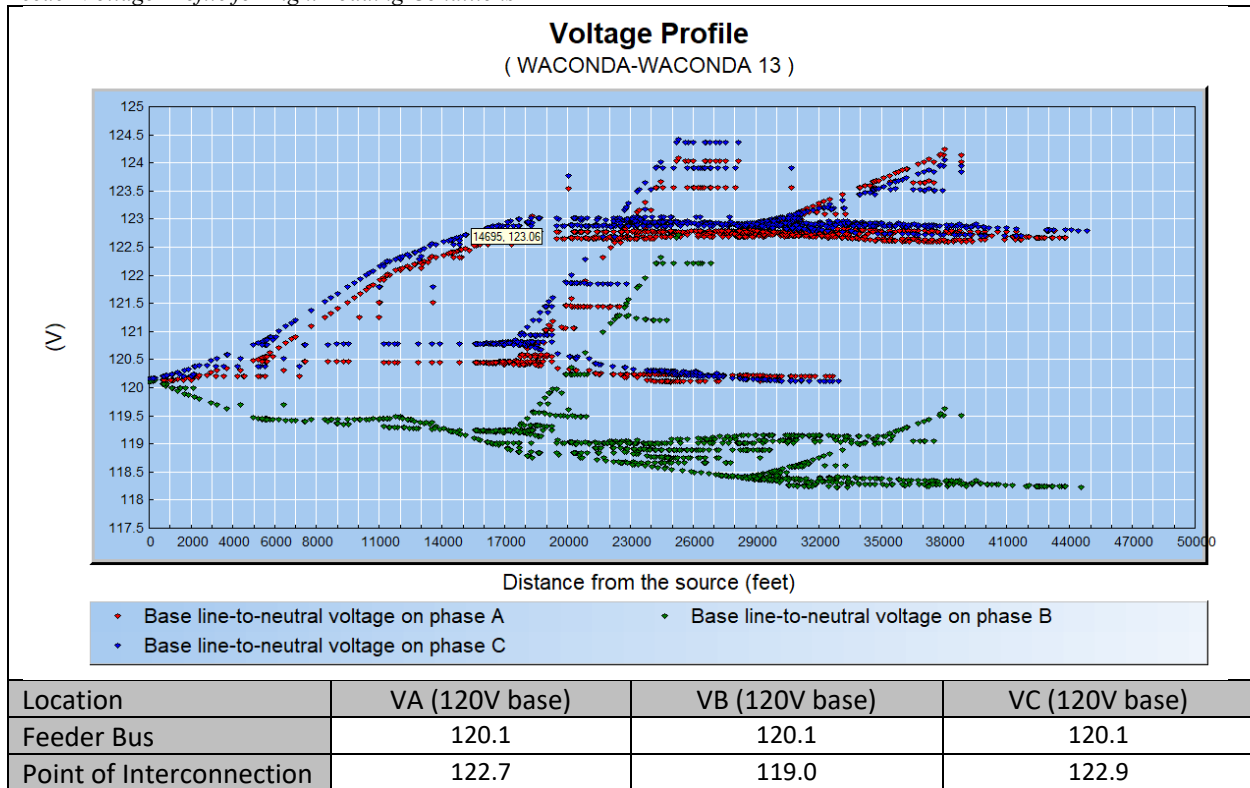
Simulated Date	5/27/2018
Simulated Hour	13:00

#### Feeder Loading Information

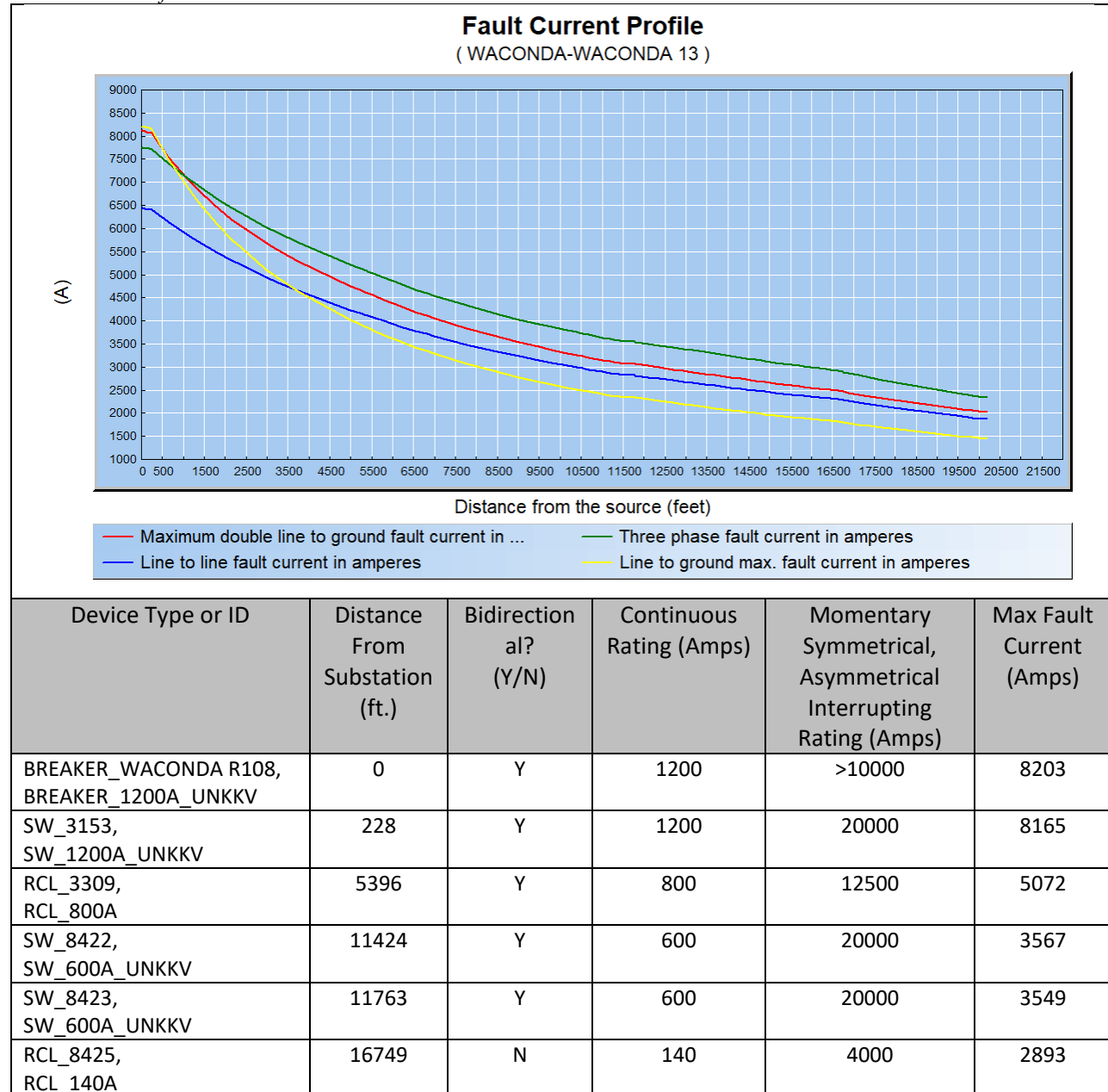
Feeder Name	Transformer Position	Loading (KW)	Loading (KVAR)
Waconda - River	BR1	2671	486
Waconda 13	BR1	562	-720

**Note:** List feeders served from the associated transformer or bus of the interconnecting device

#### Feeder Voltage Profile for Light Loading Conditions



*Fault Current Profile*



**Note:** List devices between proposed point of interconnection and the feeder breaker. Include feeder regulator(s), feeder breaker, fuses, reclosers, switches, sectionalizers, and line regulators

*Pertinent Violations*

Device Type	General Location	Violation Type	Comments
Fuse, FUSE_14892	Portland Road NE and Riverton St NE	Overload	100T fuse at the Portland Road NE and Riverton St NE has C phase overloaded at 100.2% (100.2A at 100A rated ampacity). Upgrade to mitigate overload fuse not the responsibility of interconnect developer.
Fuse, FUSE_15136	POI lateral and NE Portland Rd intersection	Overload	40T fuse at the POI lateral and NE Portland Rd intersection is overloaded at 280.7% (112.3A at 40A rated ampacity). Upgrade to mitigate overload fuse not the responsibility of interconnect developer.
Recloser, RCL_3309	On Waconda Rd NE at bypass switch 3309	Reverse Power Flow	800A recloser on Waconda Rd NE at bypass switch 3309 has reverse power flow and recloser controller needs to be checked for bidirectional capabilities. Upgrade of recloser control not the responsibility of interconnect developer.

**Note:** Only list violations for the feeder with the proposed DER. Violations include Overloads, Under-Voltage, Over-Voltage, or Short Circuit Rating. Only list violations for cable, conductors, and equipment on the primary circuit or in the substation.

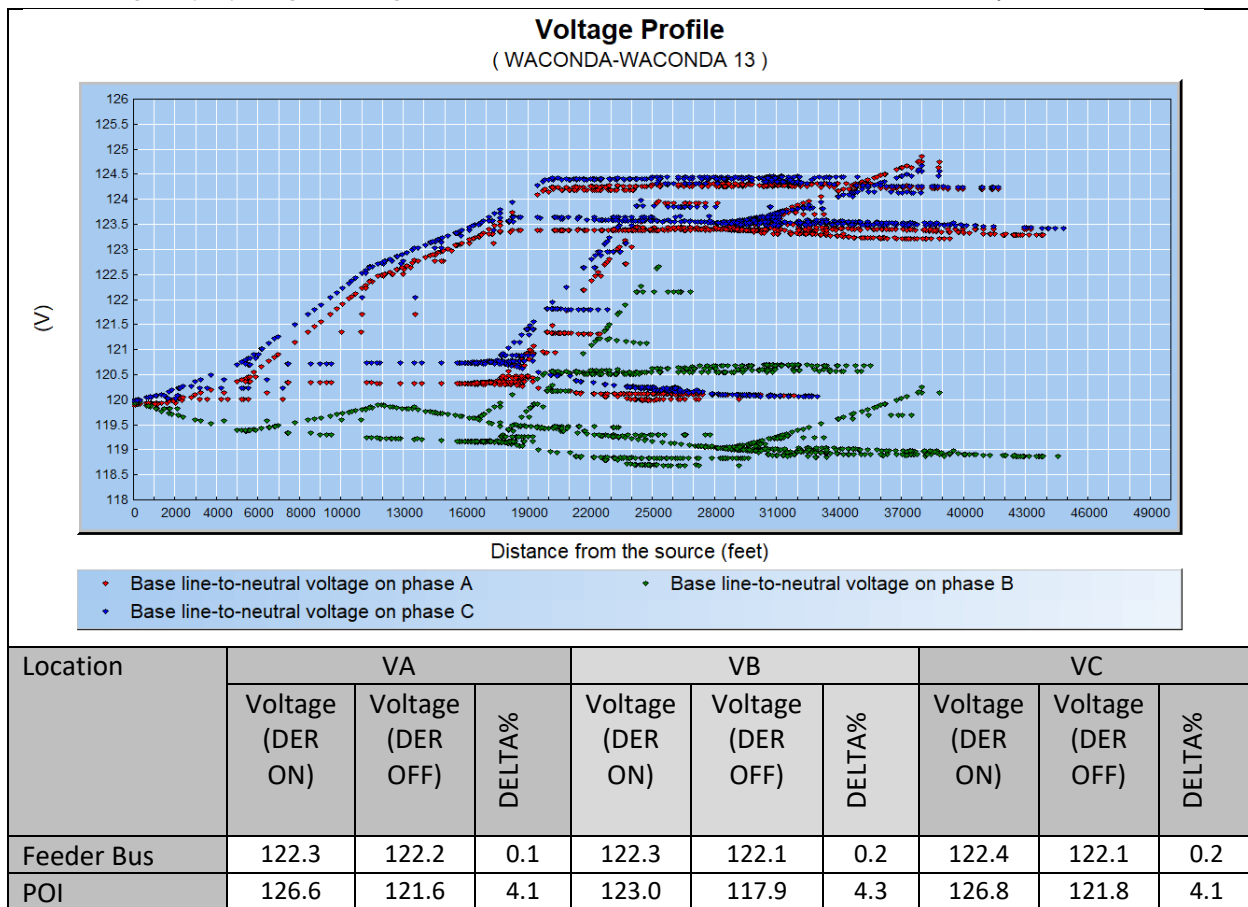


# **DER INTERCONNECTION – LIGHT LOADING** (DER is connected and in service @ unity)

## *DER Location*

DER Location	
Latitude (DD)	Longitude (DD)
<b>45.072629</b>	<b>-122.913603</b>

## *Feeder Voltage Profile for Light Loading Conditions* (DER is connected and in service @ unity)



**Note:** POI = Point of Interconnection. Will need to turn on/turn off DER and run load flow to determine voltage fluctuation.

*System Backfeed* (Record loading at the source side of the proposed DER facilities' feeder breaker, and at the distribution power transformer).

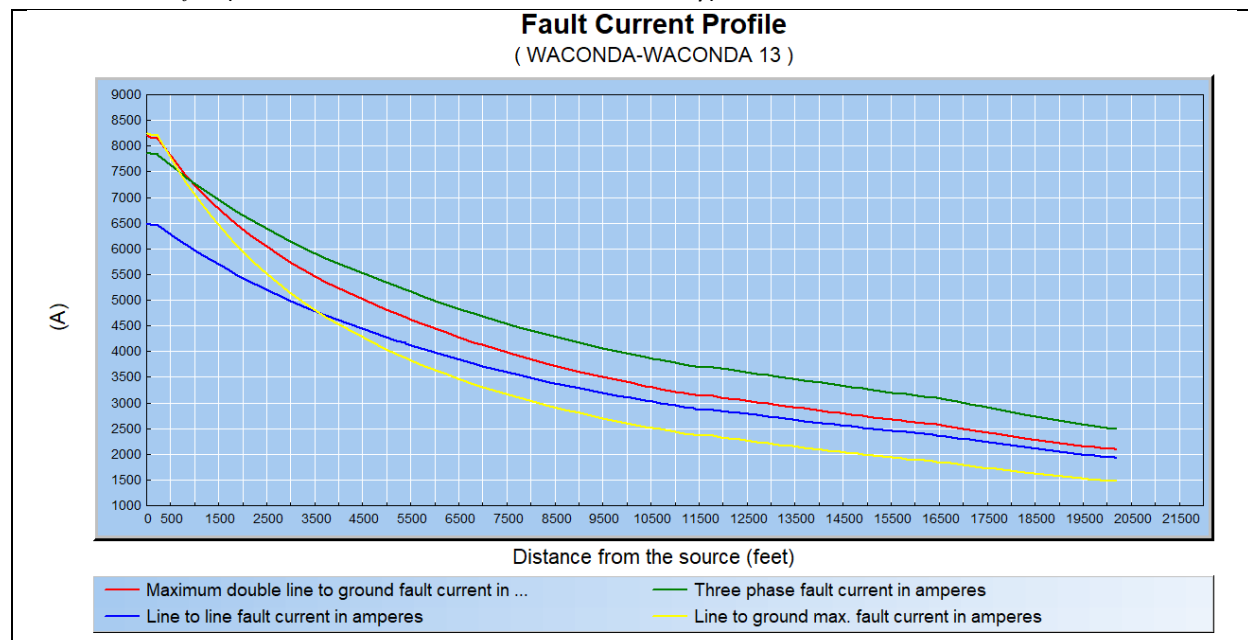
Location	KW	KVAR
Feeder Breaker	<b>-8878</b>	<b>1976</b>
Transformer (115 or 57kV terminals)	<b>-6267</b>	<b>2651</b>
Substation Source Location	<b>-5616</b>	<b>1402</b>

Note: Negative values from CYME indicate backfeed

*Transmission Planning Recommendations (If there is backfeed onto the transmission system)*

**Note:** Provide mitigation strategies and associated costs as proposed by transmission planning engineers. If there is no backfeed onto the transmission system, write “N/A” in the above field.

*Fault Current Profile (DER is connected and in service @ unity)*



Device Type or ID	Distance From Substation (ft)	Bidirectional? (Y/N)	Continuous Rating (Amps)	Momentary Symmetrical, Asymmetrical Interrupting Rating (Amps)	Max Fault Current (Amps)
BREAKER_WACONDA R108, BREAKER_1200A_UNKKV	0	Y	1200	>10000	8245
SW_3153, SW_1200A_UNKKV	228	Y	1200	20000	8206
RCL_3309, RCL_800A	5396	Y	800	12500	5202
SW_8422, SW_600A_UNKKV	11424	Y	600	20000	3711
SW_8423, SW_600A_UNKKV	11763	Y	600	20000	3693
RCL_8425, RCL_140A	16749	N	140	4000	3048

**Note:** List devices between proposed point of interconnection and the feeder breaker. Include feeder regulator(s), feeder breaker, fuses, reclosers, switches, sectionalizers, and line regulators

*Pertinent Violations*

Device Type	General Location	Violation Type	Comments
Recloser, RCL_8425	On Wapato St NE at bypass switch 8425	Reverse Power Flow	140A recloser on Wapato St NE at bypass switch 8425 has reverse power flow and recloser controller needs to be checked for bidirectional capabilities. Upgrade recloser control to mitigate the reverse power flow if bidirectional capabilities do not exist.

**Note:** Only list new violations for the feeder with the proposed DER. Violations include Overloads, Under-Voltage, Over-Voltage, or Short Circuit Rating. Only list violations for cable, conductors, and equipment on the primary circuit or in the substation.

## BASE CASE INFORMATION FOR HEAVY LOADING CONDITIONS

### Heavy Loading Information

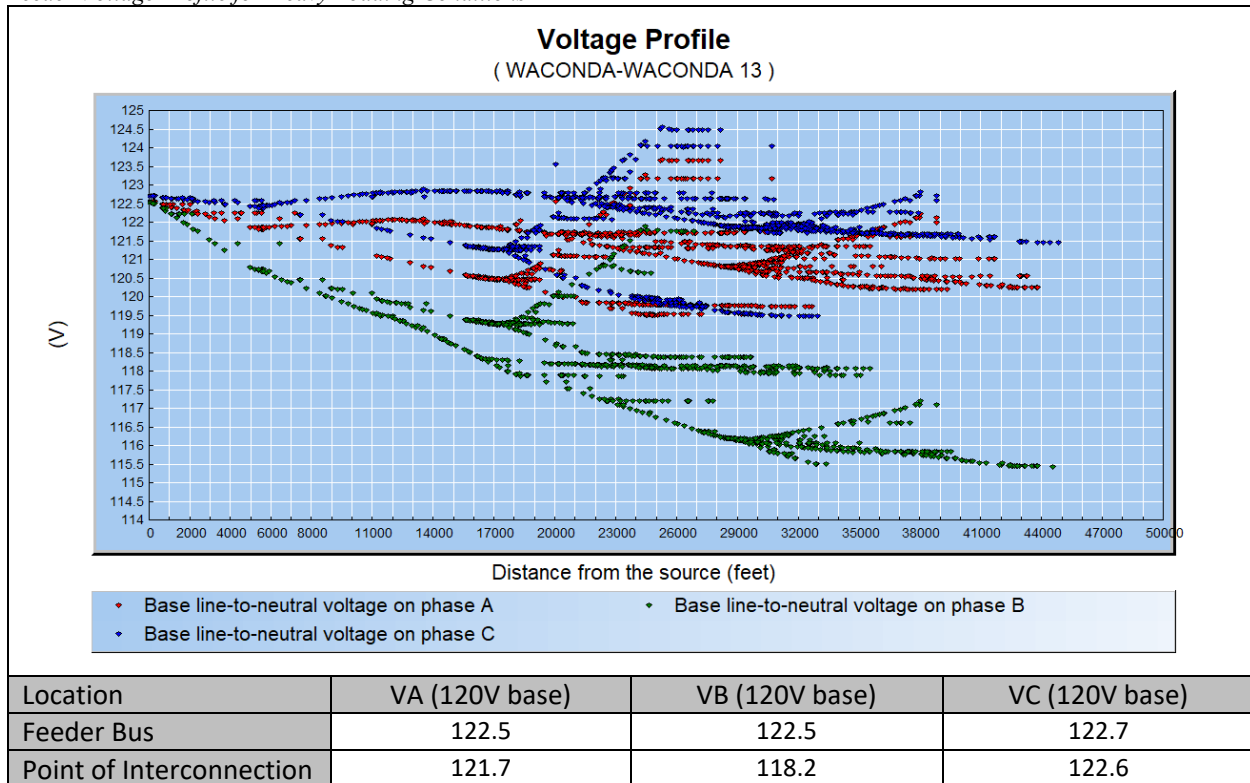
Simulated Date	8/14/2018
Simulated Hour	16:00

### Feeder Loading Information (All feeders served from associated substation transformer)

Feeder Name	Loading (KW)	Loading (KVAR)
Waconda - River	4304	1537
Waconda 13	6689	1742

**Note:** List feeders served from the associated transformer or bus of the interconnecting device

### Feeder Voltage Profile for Heavy Loading Conditions



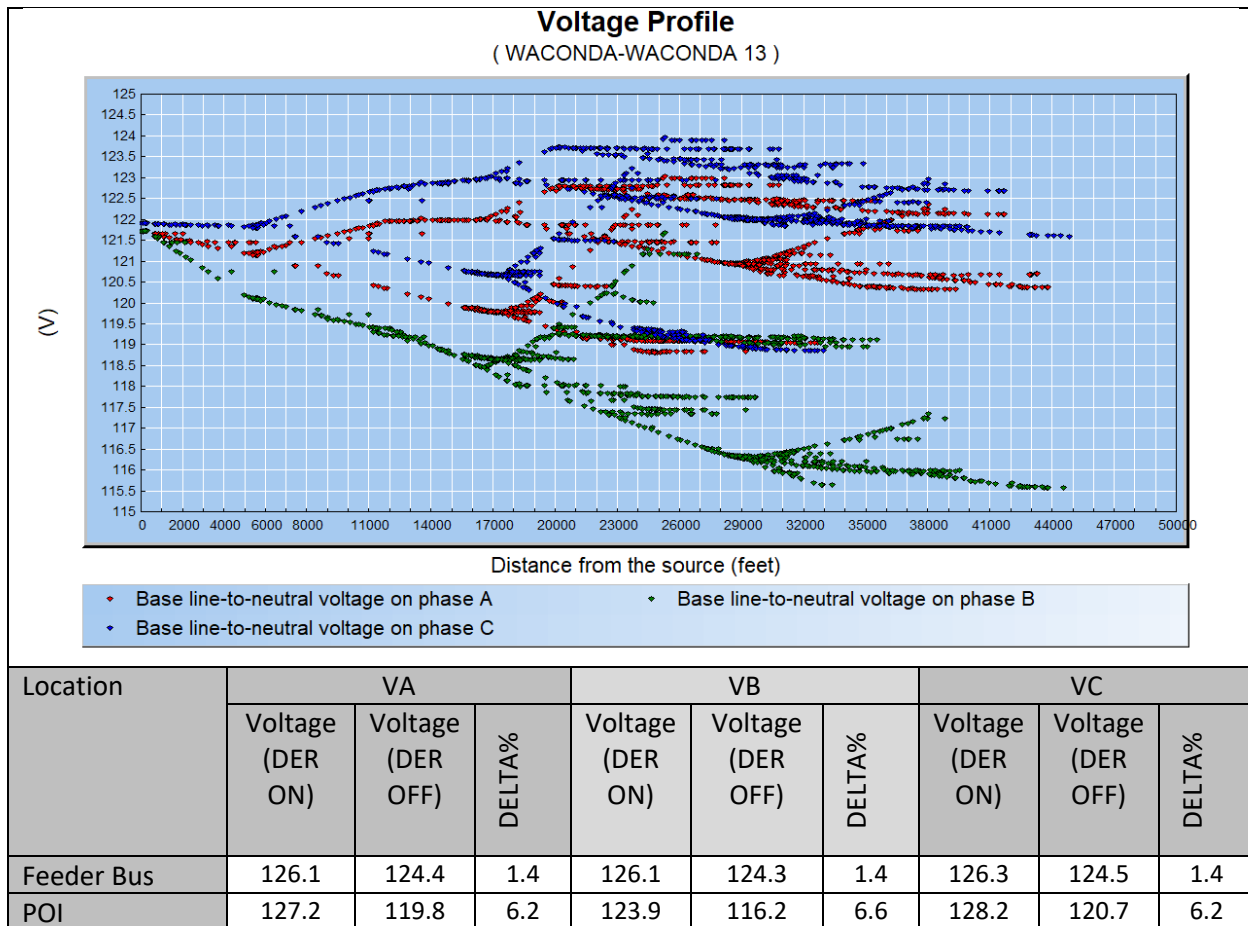
*Pertinent Violations*

Device Type	General Location	Violation Type	Comments
Fuse, FUSE_15136	POI lateral and NE Portland Rd intersection	Overload	40T fuse at the POI lateral and NE Portland Rd intersection is overloaded at 281.2% (112.5A at 40A rated ampacity). Upgrade to mitigate overload fuse not the responsibility of interconnect developer.
Recloser, RCL_3309	On Waconda Rd NE at bypass switch 3309	Reverse Power Flow	800A recloser on Waconda Rd NE at bypass switch 3309 has reverse power flow and recloser controller needs to be checked for bidirectional capabilities. Upgrade of recloser control not the responsibility of interconnect developer.

**Note:** Only list violations for the feeder with the proposed DER. Violations include Overloads, Under-Voltage, Over-Voltage, or Short Circuit Rating. Only list violations for cable, conductors, and equipment on the primary circuit or in the substation.

## DER INTERCONNECTION – HEAVY LOADING

*Feeder Voltage Profile for Heavy Loading Conditions (DER is connected and in service @ unity)*



**Note:** POI = Point of Interconnection. Will need to turn on/turn off DER and run load flow to determine voltage fluctuation.

*System Backfeed* (Record loading at the source side of the proposed DER facilities' feeder breaker, and at the distribution power transformer).

Location	KW	KVAR
Feeder Breaker	-3833	2736
Transformer (115 or 57kV terminals)	291	-1450
Substation Source Location	8146	1918

**Note:** Negative values from CYME indicate backfeed

*Pertinent Violations*

Device Type	General Location	Violation Type	Comments
Recloser, RCL_8425	Wapato St NE at bypass switch 8425	Reverse Power Flow	140A recloser on Wapato St NE at bypass switch 8425 has reverse power flow and recloser controller needs to be checked for bidirectional capabilities. Upgrade recloser control to mitigate the reverse power flow if bidirectional capabilities do not exist.

**Note:** Only list new violations for the feeder with the DER. Violations include Overloads, Under-Voltage, Over-Voltage, Reverse Power Flow, or Short Circuit Rating. Only list violations for cable, conductors, and equipment on the primary circuit or in the substation.

## SYSTEM IMPROVEMENTS – LIGHT LOADING

### *System Improvement Summary*

The improvements needed pertaining to this interconnection:

- Add Dynamic VAR support for flicker
- Install one (1) 300-amp Solid-Blade cutouts and service metering at DER lateral

There are two overloaded fuse banks, one hydraulic recloser that has reverse power flow. These devices did not become a violation due to the addition of the interconnection, SPQ0172, therefore the upgrades pertaining to these violations are not the responsibility of the developer.

**Note:** If no system improvements are needed, write “No additional upgrades are required on the distribution system pertaining to this interconnection request” in the above field.

### *Feeder Voltage Profile for Light Loading Conditions (DER is off)*

Upgrades to support the interconnect will not have system wide impacts on voltage profile.

Location	VA (120V base)	VB (120V base)	VC (120V base)
Feeder Bus			
Point of Interconnection			



*Fault Current Profile*

Upgrades to support the interconnect will not have system wide impacts on fault current profile.

Device Type or ID	Distance From Substation (ft)	Bidirectional? (Y/N)	Continuous Rating (Amps)	Momentary Symmetrical, Asymmetrical Interrupting Rating (Amps)	Max Fault Current (Amps)

**Note:** List devices between proposed point of interconnection and the feeder breaker. Include feeder regulator(s), feeder breaker, fuses, reclosers, switches, sectionalizers, and line regulators

*Pertinent Violations*

Device Type	General Location	Violation Type	Comments

**Note:** None of these violations should supersede base case violations.

*DER Interconnection – Light Loading* (DER is connected and in service @ unity)

*Feeder Voltage Profile for Light Loading Conditions* (DER is connected and in service @ unity)

Upgrades to support the interconnect will not have system wide impacts on voltage profile.									
Location	VA			VB			VC		
	Voltage (DER ON)	Voltage (DER OFF)	DELTA%	Voltage (DER ON)	Voltage (DER OFF)	DELTA%	Voltage (DER ON)	Voltage (DER OFF)	DELTA%
Feeder Bus									
POI									

**Note:** POI = Point of Interconnection. Will need to turn on/turn off DER and run load flow to determine voltage fluctuation

*DER Power Factor*

Range	KW	KVAR	Power Factor (%)
Positive (Lagging)			
Negative (Leading)			

**Note:** Interconnecting device will have an acceptable power factor range in which voltage delta will be acceptable. Determine acceptable positive and negative power factor of the DER.

*System Backfeed* (Record loading at the source side of the proposed DER facilities' feeder breaker, and at the distribution power transformer).

Location	KW	KVAR	Direction (Yes or No)	
			Toward Source?	Toward Load?
Feeder Breaker				
Transformer (115 or 57kV terminals)				

*Fault Current Profile (DER is connected and in service @ unity)*

Upgrades to support the interconnect will not have system wide impacts on fault current profile.					
Device Type or ID	Distance From Substation (ft)	Bidirectional? (Y/N)	Continuous Rating (Amps)	Momentary Symmetrical, Asymmetrical Interrupting Rating (Amps)	Max Fault Current (Amps)

**Note:** List devices between proposed point of interconnection and the feeder breaker. Include feeder regulator(s), feeder breaker, fuses, reclosers, switches, sectionalizers, and line regulators

*Pertinent Violations*

Device Type	General Location	Violation Type	Comments

**Note:** None of these violations should supersede base case violations.

## SYSTEM IMPROVEMENTS – HEAVY LOADING

*Feeder Voltage Profile for Heavy Loading Conditions (DER is off)*

Upgrades to support the interconnect will not have system wide impacts on voltage profile.			
Location	VA (120V base)	VB (120V base)	VC (120V base)
Feeder Bus			
Point of Interconnection			

*Pertinent Violations*

Device Type	General Location	Violation Type	Comments

**Note:** None of these violations should supersede base case violations.

*DER Interconnection – Heavy Loading (DER is connected and in service @ unity)*

*Feeder Voltage Profile for Heavy Loading Conditions (DER is connected and in service @ unity)*

Upgrades to support the interconnect will not have system wide impacts on voltage profile.									
Location	VA			VB			VC		
	Voltage (DER ON)	Voltage (DER OFF)	DELTA%	Voltage (DER ON)	Voltage (DER OFF)	DELTA%	Voltage (DER ON)	Voltage (DER OFF)	DELTA%
Feeder Bus									
POI									

**Note:** POI = Point of Interconnection. Will need to turn on/turn off DER and run load flow to determine voltage fluctuation

*System Backfeed (Record loading at the source side of the proposed DER facilities' feeder breaker, and at the distribution power transformer).*

Location	KW	KVAR	Direction (Yes or No)	
			Toward Source?	Toward Load?
Feeder Breaker				
Transformer (115 or 57kV terminals)				

*Pertinent Violations*

Device Type	General Location	Violation Type	Comments

**Note:** None of these violations should supersede base case violations.

## **APPENDIX A: LINKS TO SUPPORTING DOCUMENTATION**

[IEEE](#) – (Reference IEEE 1547-2003)

[Job Aid 1](#) – Minimum Daylight Load

[Job Aid 2](#) – Setting up CYME for an Interconnection Study

[Job Aid 3](#) – Finding Proposed Interconnection Locations

[Job Aid 4](#) – Conducting a CYME Interconnection SI Study

[Power Quality Guidelines](#) – LD19100

[Regulator and LTC Settings](#) – Substation

[Regulator Settings](#) – Feeder

[Small Power \(QF\) Interconnection Queue](#)

[Substation Highside Source Impedances](#)

[System Impact Schedule](#)

## APPENDIX B: EQUIPMENT RATINGS AND STANDARDS

### *Cutouts*

Polymeric Cutout Specifications					
Cutout Usage	PGE Part Number	Cutout Type	kV Rating	Amp Rating	
				Continuous	Asymmetrical Interrupting
General	40102	Open dropout	15	100	16,000
Special application	39478			200	12,000
	90006289	Solid blade		300	—

15-kV Solid Blade Cutout Ratings				
PGE Part Number	Voltage Rating (kV)		Current Rating (amps)	
	Nominal	Maximum	Continuous	Momentary (asymmetrical)
90006289	14.4	15.0	300	12,000

**Table 10: 15-kV Solid Blade Cutout Ratings**

### *Gang Operated Switches*

15-kV Gang-Operated Switch Fault Ratings				
PGE Part Number	Manufacturer	Peak Withstand (amps, rms, 10 cycles)	Momentary, Symmetrical (amps, rms, three seconds)	Fault Closing (peak amps) <sup>1</sup>
03586	S&C Electric Company Omni-Rupter <sup>2</sup>	65,000	20,000	42,000
	Inertia Engineering LineBOSS	51,000	32,000	30,000
03587	Unassembled S&C Electric Company Alduti-Rupter	40,000	25,000	20,000

### *Switches*

15-kV Disconnect Switch Ratings				
PGE Part Number	Voltage Rating (kV)		Current Rating (amps)	
	Nominal	Maximum	Continuous	Momentary
03582	15	15.5	1200	61,000

**Table 9: 15-kV Disconnect Switch Ratings**



*Reclosers*

Types of Reclosers and Corresponding PGE Part Numbers					
PGE Part Number	Phase	Setting	Continuous Rating	Type	Symmetrical Amps
03398	Single	1A3C	50	L <sup>1</sup>	3000
03399		2A2D			
03401			70		
03405			100		
03406			140		
39135		50	V4L	3000	
03402		70		4200	
39130		1A3C		6000	
03403		2A2D			
39131		1A3C			
03408		2A2D			
39132		1A3C			
03410		2A2D			
39133		1A3C			
03411		2A2D			
39134		1A3C			
—		Three			Electronic allows a variety of curves
03414	800 maximum		VWE	12,000	
39756			NOVA	12,500	
40242					

1. The L-type recloser is no longer purchased by PGE; it is here for reference only.

*Switchgear*

Switchgear Design Ratings	
Design	Rating
Maximum voltage	15.5 kV
Power frequency	60 Hz
Lightning impulse withstand voltage	95 kV
Power frequency withstand voltage	35 kV
Continuous current	1200 A
Momentary asymmetrical current	40 kA
Fault-closing asymmetrical current	40 kA

**Table 1: Switchgear Design Ratings**

600-A, Pad-Mounted Switchgear Configurations				
PGE Part Number	Number of Switch Ways	Number of Fused Ways	Switchgear Momentary Fault Rating (kA, asymmetrical)	Unit Momentary Fault Rating (kA, symmetrical)
39686	3	1	40	14
39687	2	2		

**Table 5: 600-A, Pad-Mounted Switchgear Configurations**

900-A, Pad-Mounted Switchgear Configurations					
PGE Part Number	Number of Switch Ways	Number of Fault Interrupter Ways	Switch Way Continuous Rating (amp)	Fault Interrupter Way Continuous Rating (amp)	Unit Fault Rating (kA, symmetrical)
90008072	2	2	900	600	25
90008073	3	1			
90008074	4	—		—	

**Table 7: 900-A, Pad-Mounted Switchgear Configurations**

1200-A, Pad-Mounted Switchgear Configurations				
PGE Part Number	Number of Switch Ways	Number of Fused Ways	Switchgear Momentary Fault Rating (kA, asymmetrical)	Unit Momentary Fault Rating (kA, symmetrical)
01433	4	—	40	35
01434	2	2		14
01435	3	1		
40050 <sup>1</sup>	4	—	61	35
40051 <sup>1</sup>	3	1		

1. This style is currently only used for Intel sites that require a higher fault rating.

**Table 3: 1200-A, Pad-Mounted Switchgear Configurations**

600-A, Submersible Switchgear Ratings						
PGE Part Number	Number of Switch Ways	Number of Fault Interrupter Ways	Unit Continuous Rating (amp)	Switchgear Continuous Rating (amp)	Fault Interrupter Continuous Rating (amp)	Unit Fault Rating (kA, symmetrical)
01425	2	2	600	600	200	12.5
01427	3					
01428						

**Table 10: 600-A, Submersible Switchgear Ratings**

900-A, Submersible Switchgear Dimensions					
Unit Fault Rating (kA, symmetrical)	Total Number of Ways	Tank Width <sup>1</sup> (inch)	Tank Depth <sup>2</sup> (inch)	Bushing Height (inch)	Total Height (inch)
12.5	4	65.4375	40.0625	17.5	26.625
25			40.25	28.75	33
12.5	5	80.4375	40.0625	17.5	26.625
25			40.25	28.75	33
12.5	6	95.4375	40.0625	17.5	26.625
25			40.25	28.75	33

1. Termination side of tank.

2. Depth includes controller enclosure but not bushings.

**Table 12: 900-A, Submersible Switchgear Dimensions**

*IEEE Voltage Range/Clearing Times Table*

Voltage range (% of base voltage <sup>a</sup> )	Clearing time(s) <sup>b</sup>
V < 50	0.16
50 ≤ V < 88	2.00
110 < V < 120	1.00
V ≥ 120	0.16

<sup>a</sup>Base voltages are the nominal system voltages stated in ANSI C84.1-1995, Table 1.

<sup>b</sup>DR ≤ 30 kW, maximum clearing times; DR > 30kW, default clearing times.

The voltage deviation when the DER is off line or in service must be within Voltage Guideline limits from 88% to 110% of the nominal voltage at the point of interconnection and the substation bus. The voltage guideline set by IEEE-1547 requires DER to disconnect from the grid or clear at the set time shown.