

Small Generator Interconnection  
**Tier 4 Facilities Study Report**

Completed for

**(“Applicant”)**  
**TCS-28**

Proposed Interconnection  
**On PacifiCorp’s**  
**Circuit 5R110 out of Vilas Road substation**

**July 6, 2021**

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## **1.0 DESCRIPTION OF THE PROJECT**

(“Applicant”) proposed interconnecting 2.99 MW of new generation to the Public Utility’s distribution circuit 5R110 out of Vilas Road substation located in Jackson County, Oregon. The Interconnection Request is proposed to consist of twenty-four (24) 125 kVA Chint CSP SCA125KTL-DO/US-600-UL solar inverters for a total requested output of 2.99 MW at the POI. The requested commercial operation date is July 15, 2021.

Applicant will operate this generator as a Qualified Facility as defined by the Public Utility Regulatory Policies Act of 1978 (PURPA).

The Public Utility has assigned the project “TCS-28.”

## **2.0 APPROVAL CRITERIA FOR TIER 4 INTERCONNECTION REVIEW**

Pursuant to 860-082-0060(1), a public utility must use the Tier 4 interconnection review procedures for an application to interconnect a small generator facility that meets the following requirements:

- (a) The small generator facility does not qualify for or failed to meet Tier 1, Tier 2, or Tier 3 interconnection review requirements; and
- (b) The small generator facility must have a nameplate capacity of twenty (20) megawatts or less.

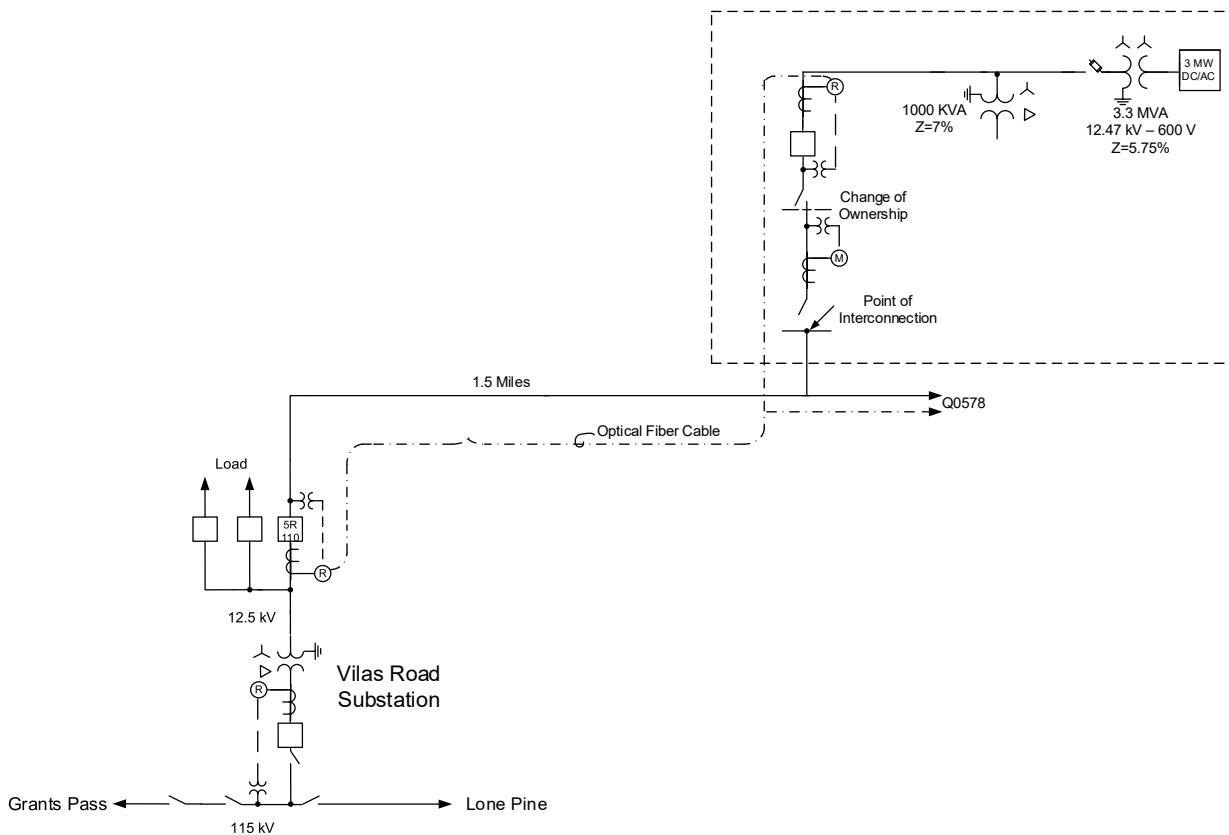
## **3.0 SCOPE OF THE STUDY**

Pursuant to 860-082-0060(8) the Facilities Study Report shall consist of:

- (a) A detailed scope identifying the interconnection facilities and system upgrades required to safely interconnect the small generator facility including the electrical switching configuration of the equipment, including the transformer, switchgear, meters, and other station equipment as applicable;
- (b) A reasonable schedule for completion of the study;
- (c) A good-faith, non-binding estimate of the costs for the facilities and upgrades, including equipment, engineering, procurement, and construction costs, and;
- (d) A detailed estimate of the time required to procure, construct, and install the required interconnection facilities and system upgrades.

## **4.0 PROPOSED POINT OF INTERCONNECTION**

The Applicant’s proposed Small Generator Facility is to be interconnected to the Public Utility’s distribution circuit 5R110 out of Vilas Road substation via a 12.5 kV primary meter point. Figure 1 below is a one line diagram that that illustrates the interconnection of the proposed generating facility to the Public Utility’s system.



*Figure 1: System One Line Diagram*

## 5.0 STUDY ASSUMPTIONS

- All active higher priority transmission service and/or generator interconnection requests will be considered in this study and are listed in Appendix 1. If any of these requests are withdrawn, the Public Utility reserves the right to restudy this request, as the results and conclusions contained within this study could significantly change.
- For study purposes there are two separate queues:
  - Transmission Service Queue: to the extent practical, all network upgrades that are required to accommodate active transmission service requests and are expected to be in-service on or after the Applicant's requested in-service date for the Project will be modeled in this study.
  - Generation Interconnection Queue: when relevant, interconnection facilities associated with higher queue interconnection requests will be modeled in this study. However, no generation will be simulated from any higher queued project unless a commitment has been made to obtain transmission service.
- The Applicant's request for interconnection service in and of itself does not convey transmission service.
- This study assumes the Project will be integrated into Public Utility's system at the agreed upon and/or proposed point of interconnection.

- The Applicant will construct and own the facilities required between the point of interconnection and the Project.
- Generator tripping may be required for certain outages.
- All facilities will meet or exceed the minimum WECC, NERC, and Public Utility performance and design standards.
- This report is based on information available at the time of the study. It is the Applicant's responsibility to check the Public Utility's web site regularly for transmission system updates (<http://www.pacifiCorp.com/tran.html>)

## **6.0 REQUIREMENTS**

### **6.1 SMALL GENERATOR FACILITY REQUIREMENTS**

The following outlines the design, procurement, construction, installation, and ownership of equipment at the Applicant's Small Generation Facility.

#### **6.1.1 APPLICANT TO BE RESPONSIBLE FOR**

- Design, construct, own and maintain the Applicant's generating facility and associated collector system.
- Design the Small Generating Facility with reactive power capabilities necessary to operate within the full power factor range of 0.95 leading to 0.95 lagging as measured at the POI. The reactive compensation must be designed such that the discreet switching of all reactive devices (if required by the Applicant) does not cause step voltage changes greater than +/-3% on the Public Utility's system.
- Equip the Small Generating Facility generators capable of operating under voltage reactive power mode, active power reactive power mode, and constant reactive power mode as per IEEE standard 1547-2018. This project shall be capable of activating each of these modes one at a time. The Public Utility reserves the right to specify any mode and settings within the limits of IEEE standard 1547-2018 needed before or after the Small Generating Facility enters service. The Applicant shall be responsible for implementing settings modifications and mode selections as requested by the Public Utility within an acceptable timeframe.
- Operate the Small Generating Facility under constant power factor mode with a unity power factor setting unless specifically requested otherwise by the Public Utility. The Small Generating Facility is expressly forbidden from actively participating in voltage regulation of the Public Utility's system without written request or authorization from the Public Utility.
- Operate the Small Generating Facility so minimum power quality requirements in PacifiCorp's Engineering Handbook section 1C are met, the standards are available at <https://www.pacificpower.net/about/power-quality-standards.html>. Requirements specified in the System Impact Study that exceed requirements in the Engineering Handbook section 1C power quality standards shall apply.

- As per NERC standard VAR-001-1, the Public Utility is required to specify voltage or reactive power schedule at the POI. Under normal conditions, the Public Utility's system should not supply reactive power to the Small Generating Facility.
- Install a transformer that will hold the phase to neutral voltages within limits when the generation facility is isolated with the Public Utility's local system until the generation disconnects.
- Design, procure, install, and own a Public Utility approved 12.5 kV recloser containing a Schweitzer Engineering Laboratories ("SEL") 351R/651R relay/controller to perform the following functions:
  - Receive transfer trip from Vilas Road substation
  - Detect faults on the 12.5 kV at the generation facility
  - Detect faults on the 12.5 kV line to Vilas Road substation
  - Monitor the voltage and react to under or over frequency, and / or magnitude of the voltage
- Procure and install instrument transformers on the Public Utility side of the recloser.
- Input the settings provided by the Public Utility into the recloser relay.
- Provide the Public Utility Level 2 password control of the recloser relay.
- Terminate the control cable provided by the Public Utility in the recloser relay.
- Provide the Public Utility the necessary easement to allow the Public Utility to construct its line extension between its existing facilities and the Point of Change of Ownership.
- Provide Public Utility unfettered and maintained access to its interconnection facilities.
- Construct the Applicant's last pole at the Point of Change of Ownership to Public Utility's standard.
- Provide any construction or backup retail service necessary for the Project.
- Arrange for and provide permanent retail service for power that will flow from the Public Utility's system when the Project is not generating. Applicant shall coordinate with the Public Utility's customer service group establish a request number and account number.
- Provide the Public Utility a Professional Engineer ("PE") stamped maintenance plan for all Applicant facilities.

#### **6.1.2 PUBLIC UTILITY TO BE RESPONSIBLE FOR**

- Coordinate with the Applicant to establish request and account numbers.
- Develop and provide the settings for Applicant's recloser relay.
- Observe and provide acceptance of the relay settings in the Applicant recloser relay.
- Observe and provide acceptance of the installation of the Applicant's final pole at the point of change of ownership.
- Terminate the final span of conductor onto the Applicant's final pole.

- Provide the Applicant control cable for Applicant to terminate to its recloser relay. Observe the installation and confirm connectivity and functionality of the transfer trip communications path.

## **6.2 POINT OF INTERCONNECTION**

The following outlines the design, procurement, construction, installation, and ownership of equipment at the Point of Interconnection.

### **6.2.1 PUBLIC UTILITY TO BE RESPONSIBLE FOR**

- Design, procure, install, own and maintain the required extension of the 12.5 kV facilities from Public Utility's existing facilities near facility point 01336001.0330341 to the point of change of ownership including a minimum of two poles, conductor, cutouts, fuses, jumpers and a gang operated switch.
- Procure and install a pole mounted enclosure to house the Public Utility's communications equipment for fiber termination.
- Design, procure and install 12.5 kV revenue metering equipment for the Project including a revenue quality meter and instrument transformers. The transformers will be installed on a pole. The meter will be installed in an enclosure at the base of the pole.
- Provide and install a cellular connection for retail sales and generation accounting via the MV-90 translation system.

## **6.3 OTHER**

The following outlines the design, procurement, construction, installation, and ownership of equipment beyond the Point of Interconnection.

### **6.3.1 PUBLIC UTILITY TO BE RESPONSIBLE FOR**

- Distribution Circuit
  - Extend approximately 1.5 miles of fiber optic cable to the Point of Interconnection.
- Vilas Road Substation
  - Develop and implement a transfer trip scheme for faults between Vilas Road substation and the Applicant's generating facility recloser.
  - Modify the LTC settings of the substation transformer.

## **7.0 COST ESTIMATE**

The following estimate represents only scopes of work that will be performed by the Public Utility. Costs for any work being performed by the Applicant are not included.

<b>TCS-28 Collector Substation</b>	<b>\$59,000</b>
<i>Metering, relay settings</i>	
<b>Distribution</b>	<b>\$49,000</b>
<i>Line extension</i>	

**Communications**

\$167,000

*Install 1.5 miles of fiber and communications equipment***Total: \$275,000**

\*Any distribution line modifications identified in this report will require a field visit analysis in order to obtain a more thorough understanding of the specific requirements. The estimate provided above for this work could change substantially based on the results of this analysis. Until this field analysis is performed the Public Utility must develop the project schedule using conservative assumptions. The Applicant may request that the Public Utility perform this field analysis, at the Applicant's expense, prior to the execution of an Interconnection Agreement in order to obtain more cost and schedule certainty.

Note: Costs for any excavation, duct installation and easements shall be borne by the Applicant and are not included in this estimate. This estimate approximates the costs incurred by the Public Utility to interconnect this Small Generator Facility to the Public Utility's electrical distribution or transmission system based upon the level of study completed to-date. The Applicant will be responsible for all actual costs, regardless of the estimated costs communicated to or approved by the Applicant.

**8.0 SCHEDULE**

Execute Interconnection Agreement	August 20, 2021
Provision of First Progress Payment	August 20, 2021
Applicant and Public Utility Establish Retail Service Request	October 1, 2021
*Applicant Initial Design Package Provided	October 1, 2021
Public Utility Engineering & Procurement Commences	October 18, 2021
Applicant Property/Permits/ROW Procured	January 10, 2021
Public Utility Property/Permits/ROW Procured	March 18, 2022
*Applicant Final Design Package Provided	May 20, 2022
Public Utility Engineering Design Complete	September 16, 2022
Construction Begins	October 31, 2022
Applicant Maintenance and Commissioning Plans Provided	January 6, 2023
Applicant and Public Utility Construction Complete	March 3, 2023



Public Utility Commissioning Activities Complete	April 3, 2023
Public Utility Commissioning Document Review Complete	April 10, 2023
Applicant's Facilities Receive Backfeed Power	April 11, 2023
Initial Synchronization/Generation Testing	April 14, 2023
Commercial Operation	April 25, 2023

\*Applicant initial design package shall include final generating facility location, inverter/turbine selection, basic protection package, tie line route and collector system locations and data as applicable. Applicant final design package shall include PE stamped issued for construction ("IFC") drawings for generating facility, collector substation, tie line as well as an updated PSS/e model and updated WECC approved model, electromagnetic transient ("EMT") model and a detailed short circuit model of its generation system using the ASPEN OneLine short circuit simulation program as applicable. The WECC model parameters must be adjusted to reflect the plant's actual anticipated performance. The plant controller must be included in the model. If there is to be coordination between facilities or a master VAR controller, this must be included in the detailed WECC dynamic model, as well as in the PSS/e user-written model.

Please note, the time required to perform the scope of work identified in this report does not support the Applicant's requested commercial operation date of July 15, 2021.

## **9.0 PARTICIPATION BY AFFECTED SYSTEMS**

Public Utility has identified the following Affected Systems: None

## **10.0 APPENDICES**

Appendix 1: Higher Priority Requests

Appendix 2: Property Requirements

**10.1 APPENDIX A: HIGHER PRIORITY REQUESTS**

All active higher priority transmission service and/or generator interconnection requests will be considered in this study and are identified below. If any of these requests are withdrawn, the Public Utility reserves the right to restudy this request, as the results and conclusions contained within this study could significantly change.

Transmission/Generation Interconnection Queue Requests considered:

GI Queue	Size (MW)
687	415.8
721	55
741	40
757	20
806	20
825	10
826	10
827	10
828	13
829	10
830	10
849	100
905	50
906	80
907	80

**10.2 APPENDIX B: PROPERTY REQUIREMENTS****Requirements for rights of way easements**

Rights of way easements will be acquired by the Applicant in the Public Utility's name for the construction, reconstruction, operation, maintenance, repair, replacement and removal of Public Utility's Interconnection Facilities that will be owned and operated by PacifiCorp. Applicant will acquire all necessary permits for the project and will obtain rights of way easements for the project on Public Utility's easement form.

**Real Property Requirements for Point of Interconnection Substation**

Real property for a point of interconnection substation will be acquired by an Applicant to accommodate the Applicant's project. The real property must be acceptable to Public Utility. Applicant will acquire fee ownership for interconnection substation unless Public Utility determines that other than fee ownership is acceptable; however, the form and instrument of such rights will be at Public Utility's sole discretion. Any land rights that Applicant is planning to retain as part of a fee property conveyance will be identified in advance to Public Utility and are subject to the Public Utility's approval.

The Applicant must obtain all permits required by all relevant jurisdictions for the planned use including but not limited to conditional use permits, Certificates of Public Convenience and Necessity, California Environmental Quality Act, as well as all construction permits for the project.

Applicant will not be reimbursed through network upgrades for more than the market value of the property.

As a minimum, real property must be environmentally, physically, and operationally acceptable to Public Utility. The real property shall be a permitted or permittable use in all zoning districts. The Applicant shall provide Public Utility with a title report and shall transfer property without any material defects of title or other encumbrances that are not acceptable to Public Utility. Property lines shall be surveyed and show all encumbrances, encroachments, and roads.

Examples of potentially unacceptable environmental, physical, or operational conditions could include but are not limited to:

- Environmental: known contamination of site; evidence of environmental contamination by any dangerous, hazardous or toxic materials as defined by any governmental agency; violation of building, health, safety, environmental, fire, land use, zoning or other such regulation; violation of ordinances or statutes of any governmental entities having jurisdiction over the property; underground or above ground storage tanks in area; known remediation sites on property; ongoing mitigation activities or monitoring activities; asbestos; lead-based paint, etc. A phase I environmental study is required for land being acquired in fee by the Public Utility unless waived by Public Utility.

- Physical: inadequate site drainage; proximity to flood zone; erosion issues; wetland overlays; threatened and endangered species; archeological or culturally sensitive areas; inadequate sub-surface elements, etc. Public Utility may require Applicant to procure various studies and surveys as determined necessary by Public Utility.
- Operational: inadequate access for Public Utility's equipment and vehicles; existing structures on land that require removal prior to building of substation; ongoing maintenance for landscaping or extensive landscape requirements; ongoing homeowner's or other requirements or restrictions (e.g., Covenants, Codes and Restrictions, deed restrictions, etc.) on property which are not acceptable to the Public Utility.