Community Solar Project Interconnection
Community Solar Project System Impact Study Report

Completed for
("Applicant")
OCS106

Proposed Point of Interconnection
Circuit 5P15 Kennedy Substation

June 10, 2025

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1.0 DESCRIPTION OF THE COMMUNITY SOLAR PROJECT

("Applicant") proposed interconnecting 1.25 MW of new generation to PacifiCorp's ("Public Utility") circuit 5P15 out of Kennedy substation located in Multnomah County, Oregon. The ("Project") will consist of five (5) CPS SCH275KTL-DO/US-800, 275kVA, String Inverters, for a total requested output of 1.25 MW. The requested commercial operation date is January 6, 2027.

The Public Utility has assigned the Project "OCS106."

2.0 APPROVAL CRITERIA FOR TIER 4 INTERCONNECTION REVIEW

Pursuant to the Section I(1) of the Public Utility's CSP Interconnection Procedures, a Public Utility must use the Tier 4 review procedures for an application to interconnect a Community Solar Project that meets the following requirements:

(a) The Community Solar Project does not qualify for or failed to meet Tier 2 review requirements; and
(b) The Community Solar Project must have a nameplate capacity of three (3) megawatts or less.

3.0 SCOPE OF THE STUDY

Pursuant to Section I(6)(g) of the CPS Interconnection Procedures, the System Impact Study Report shall consist of: (1) the underlying assumptions of the study; (2) a short circuit analysis; (2) a stability analysis; (3) a power flow analysis; (4) voltage drop and flicker studies; (5) protection and set point coordination studies; (6) grounding reviews; (7) the results of the analyses; and (8) any potential impediments to providing the requested Interconnection Service, including a non-binding informational NRIS portion that addresses the additions, modifications, and upgrades to the Public Utility's Transmission System that would be required at or beyond the point at which the Interconnection Facilities connect to the Public Utility's Transmission System to accommodate the interconnection of the CSP Project In addition, the System Impact Study shall provide a list of facilities that are required as a result of the Community Solar Project request and non-binding good faith estimates of cost responsibility and time to construct.

The information contained in this study report is based on preliminary information and not to be used for construction.

4.0 PROPOSED POINT OF INTERCONNECTION

The Applicant's proposed Community Solar Project is to be interconnected to the Public Utility's distribution circuit 5P15 out of Kennedy substation. The proposed Point of Interconnection will be located at approximately 45.591167, -122.635239 located in Multnomah County, Oregon. Figure 1 below is a one line diagram that illustrates the interconnection of the proposed generating facility to the Public Utility's system.

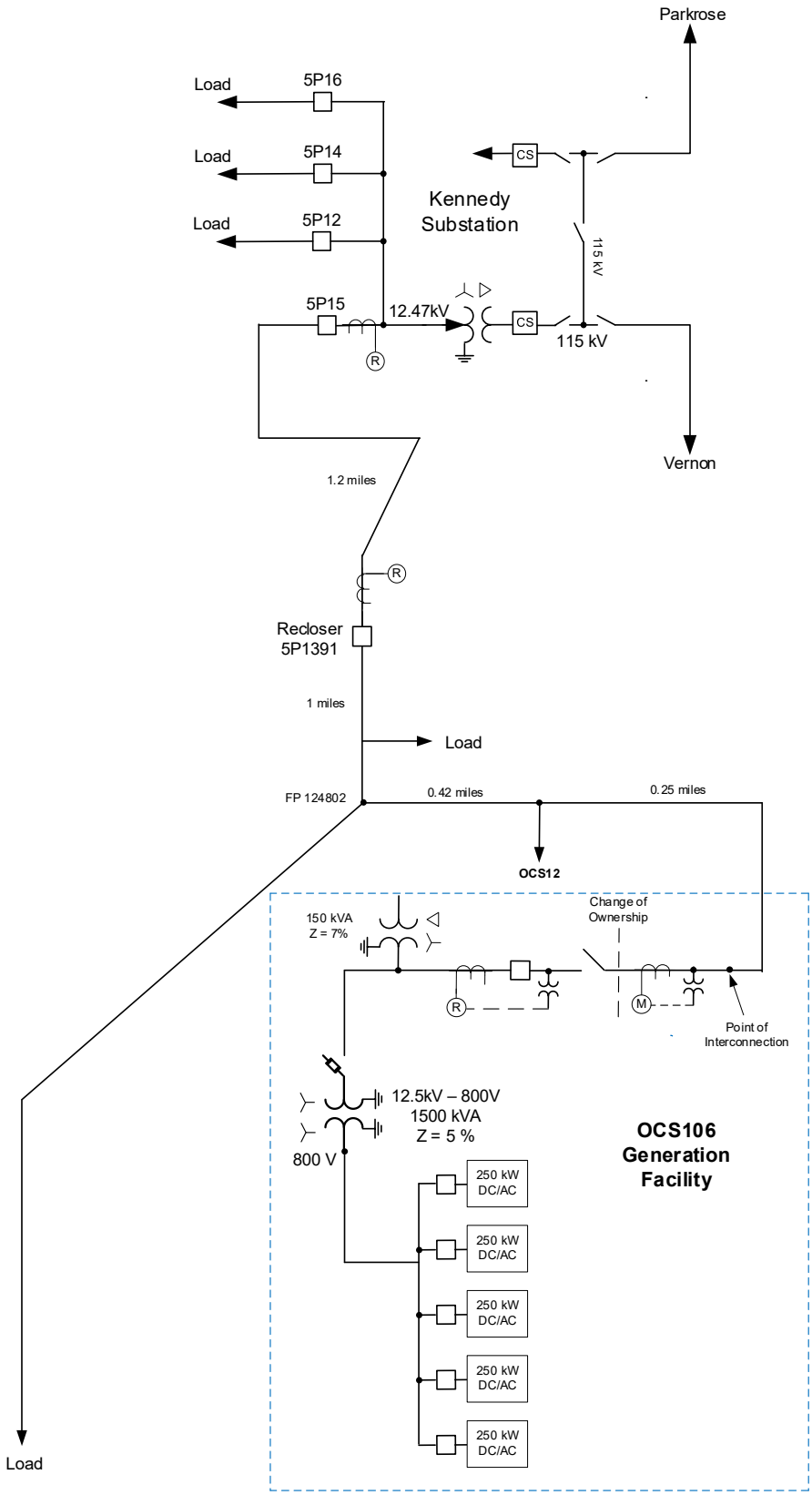


Figure 1: System One Line Diagram

5.0 STUDY ASSUMPTIONS

- All active higher-priority requests for transmission service and/or generator interconnection service (including requests in the traditional interconnection queue and other requests in the Community Solar queue) in the local area of the requested POI 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.
- 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 any facilities required between the Point of Interconnection and the Project unless specifically identified by the Public Utility.
- Line reconductor or fiber underbuild required on existing poles will be assumed to follow the most direct path on the Public Utility's system. If during detailed design the path must be modified it may result in additional cost and timing delays for the Applicant's project.
- Generator tripping may be required for certain outages.
- All facilities will meet or exceed the minimum Western Electricity Coordinating Council ("WECC"), North American Electric Reliability Corporation ("NERC"), and Public Utility performance and design standards.
- There is a planned reconfiguration to move approximately 640kVA of load from 5P476 out of Columbia substation onto 5P15 by closing SW313 and opening SW360, this will be the new standard configuration on 5P15, this has been built into the CYME models. The MDL at the feeder for 5P15 before this reconfiguration is 3.58MW. CYME simulations after switching put the new MDL at 3.98MW, this value will be used in Sections 6.3 and 6.4.
- OCS012 is to be assumed completed and in service prior to OCS106. Their loading must be accounted for in the MDL for this study.
- 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 (https://www.oasis.oati.com/ppw)

6.0 REQUIREMENTS

6.1 COMMUNITY SOLAR PROJECT REQUIREMENTS

The Community Solar Project and interconnection equipment owned by the Applicant are required to operate under constant power factor mode with a unity power factor setting unless specifically requested otherwise by the Public Utility. The Community Solar Project is expressly forbidden from actively participating in voltage regulation of the Public Utilities system without written request or authorization from the Public Utility. The Community Solar Project shall have sufficient reactive capacity to enable the delivery of 100 percent of the plant output to the POI at unity power factor measured at 1.0 per unit voltage under steady state conditions.

Generators shall be capable of operating under Voltage-reactive power mode, Active power-reactive power mode, and Constant reactive power mode as per IEEE Std. 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 Std 1547-2018 needed before or after the Community Solar Project enters service. The Applicant shall be responsible for implementing settings modifications and mode selections as requested by the Public Utility within an acceptable timeframe. The reactive compensation must be designed such that the discreet switching of the reactive device (if required by the Applicant) does not cause step voltage changes greater than +/-3% on the Public Utility's system. In all cases the minimum power quality requirements in PacifiCorp's Engineering Handbook section 1C shall be met and 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.

All generators must meet applicable WECC low voltage ride-through requirements as specified in the interconnection agreement.

The Applicant will be required to install a transformer that will hold the phase to neutral voltages within limits when the generation facility is isolated with the Transmission Provider's local system until the generation disconnects. The minimum recommended size of this grounding transformer is 150kVA with 7% impedance. The circuit that the project is connecting to is a 12.47kV four wire multi-grounded circuit with line to neutral connected load. Figure 1 shows the addition of a wye – delta grounding transformer of adequate power size and impedance that will meet the requirement.

6.2 TRANSMISSION SYSTEM MODIFICATIONS

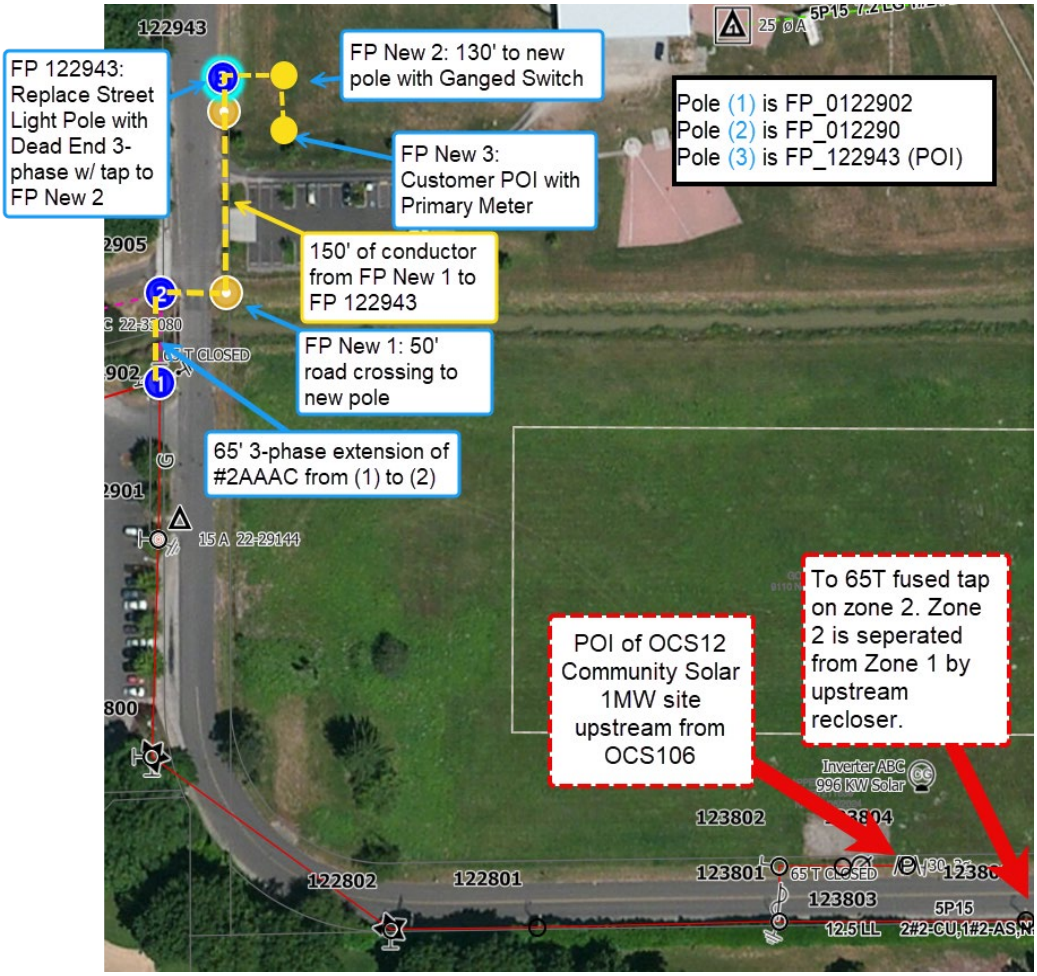
Under the normal and contingency configurations, there are no identified power flow restrictions with OCS106 generation online. No Transmission system modifications are required.

6.3 DISTRIBUTION/TRANSMISSION LINE MODIFICATIONS

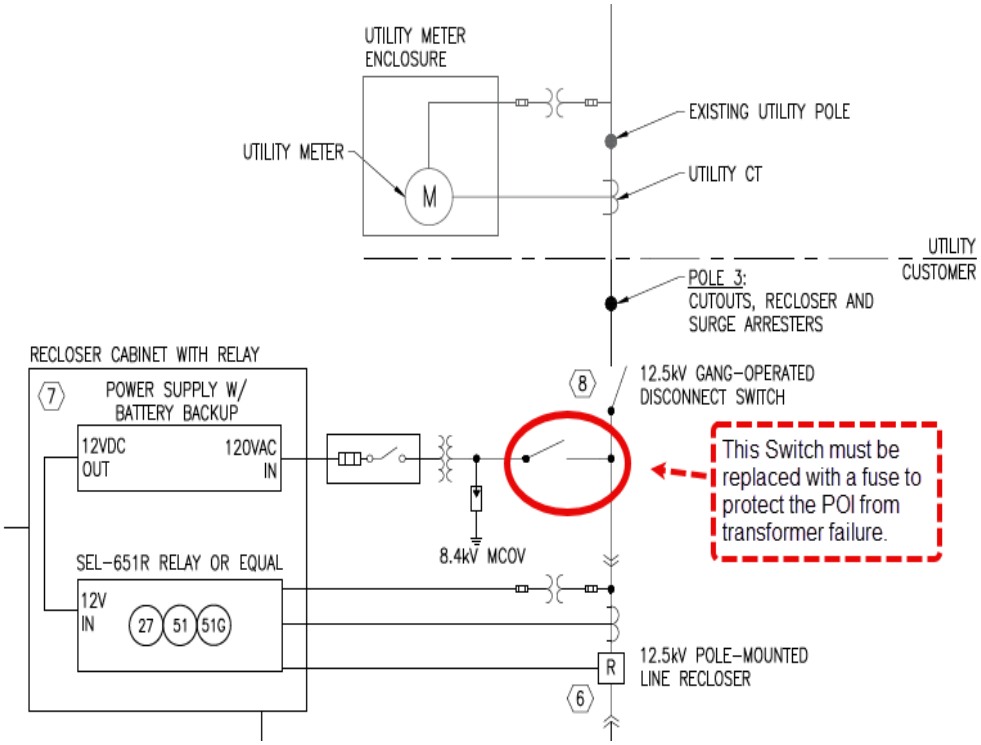
Distribution system feeder 5P15 minimum daytime load (MDL) is 3.0 MW. The Applicant's proposed generating facility is located 15,086 ft. from the Kennedy substation. The site is downstream from a recloser tap from the mainline with an MDL of 2.2 MW. The Kennedy 5P15 system is 12.47kV$_{L-L}$ operated in a grounded wye - grounded wye configuration.

The Applicant's planned Point of Interconnection ("POI") is at a streetlight pole facility point ("FP") 01101001.0122943, the nearest 3-phase is 230ft south and across the road at FP 01101001.0122943. The following distribution system modifications will be required to provide a POI at the Applicant's requested location:

- **FP_0122902 to FP_0122905:** Extend 3-phase for 65ft. New conductors should be 2# AAAC. This span has an existing single phase #2 ACSR conductor. Both Poles will need replacing.
- **FP_0122905 to FP New 1:** Install new pole East required for parallel road crossing of NE Sunderland for 50ft.
- **FP New 1 to FP_122943:** Extend 3-phase north by 150 ft to a new pole replacing an existing streetlight.
- **FP_122943 to FP New 2:** New pole east with Ganged Switch on Applicant's lot.
- **FP New 2 to FP New 3(POI):** New adjacent pole on the Applicant's lot to install primary metering.



- The Applicant must add fusing between their recloser cabinet's PT and the source side of the line recloser.



Before OCS12 Online:

Load Flow Box

Breaker - CB5P15/KDY_CB5P15

5P15	V_LL	kV_LL	V_LL (pu)	i (A)	Loading Unblance %	Summer Rating	Winter Rating	% Loading	kVA	kW	kVAR	PF
A	120.0	12.47	1.00	205.9	2.35	300.0	300.0	68.6	1481.9	1352.8	605.0	91.3
B	120.0	12.47	1.00	208.5	3.69	300.0	300.0	69.5	1501.2	1367.2	620.2	91.1
C	120.0	12.47	1.00	189.0	-6.04	300.0	300.0	63.0	1360.4	1259.1	515.4	92.5
N				19.5				Total:	4343	3979	1740	

Downstream				V_Base_AN	120.0	V_Base_AB	120.0
Gen kW	436			V_Base_BN	120.0	V_Base_BC	120.0
Conn kVA	26602			V_Base_CN	120.0	V_Base_CA	120.0
_Distance	0.0	kV LL Base:	12.470				
Customers Downstream	1368	kV LN:	7.2				
			DISCONNECT_UNKA				

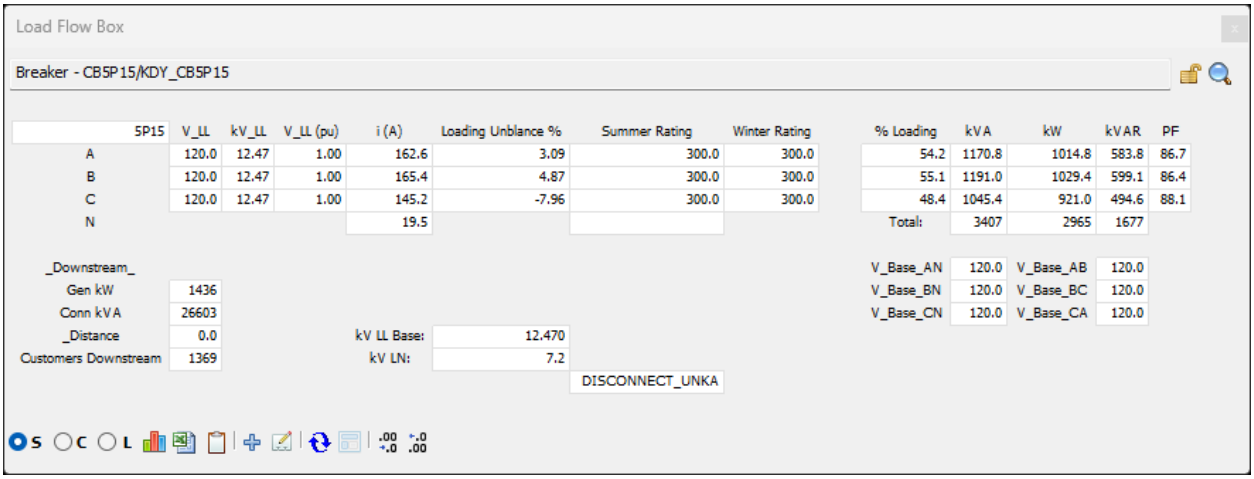
Load Flow Box

Recloser - RC_1391_5P15/RC_134505__6044144

5P15	V_LL	kV_LL	V_LL (pu)	i (A)	Loading Unblance %	Summer Rating	Winter Rating	% Loading	kVA	kW	kVAR	PF
A	118.4	12.32	0.99	163.7	4.41	200.0	200.0	81.9	1163.5	1107.7	355.9	95.2
B	118.7	12.33	0.99	151.7	-3.23	200.0	200.0	75.9	1080.3	1042.2	284.5	96.5
C	118.8	12.33	0.99	155.0	-1.18	200.0	200.0	77.5	1104.1	1064.6	292.5	96.4
N				11.1				Total:	3347	3215	933	

Downstream				V_Base_AN	118.4	V_Base_AB	118.6
Gen kW	255			V_Base_BN	118.7	V_Base_BC	118.6
Conn kVA	21384			V_Base_CN	118.8	V_Base_CA	118.6
_Distance	6278.1	kV LL Base:	12.470				
Customers Downstream	338	kV LN:	7.1				
			ELECTRONIC_200A				

After OCS12 Online:

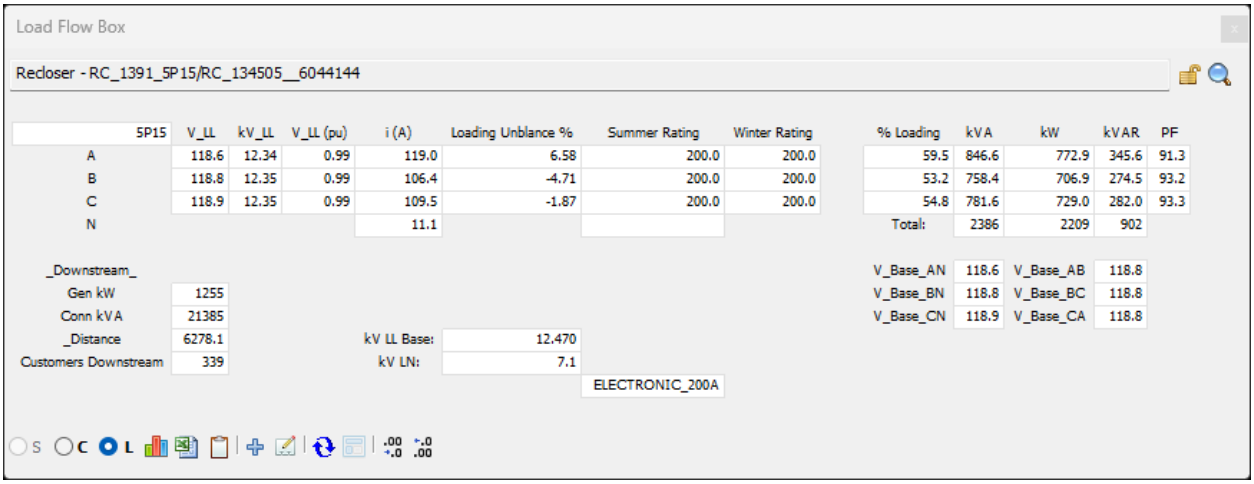


Load Flow Box

Breaker - CB5P15/KDY_CB5P15

5P15	V_LL	kV_LL	V_LL (pu)	i (A)	Loading Unblance %	Summer Rating	Winter Rating	% Loading	kVA	kW	kVAR	PF
A	120.0	12.47	1.00	162.6	3.09	300.0	300.0	54.2	1170.8	1014.8	583.8	86.7
B	120.0	12.47	1.00	165.4	4.87	300.0	300.0	55.1	1191.0	1029.4	599.1	86.4
C	120.0	12.47	1.00	145.2	-7.96	300.0	300.0	48.4	1045.4	921.0	494.6	88.1
N				19.5				Total:	3407	2965	1677	

Downstream				V_Base_AN	120.0	V_Base_AB	120.0
Gen kW	1436			V_Base_BN	120.0	V_Base_BC	120.0
Conn kVA	26603			V_Base_CN	120.0	V_Base_CA	120.0
_Distance	0.0	kV LL Base:	12.470				
Customers Downstream	1369	kV LN:	7.2				
			DISCONNECT_UNKA				



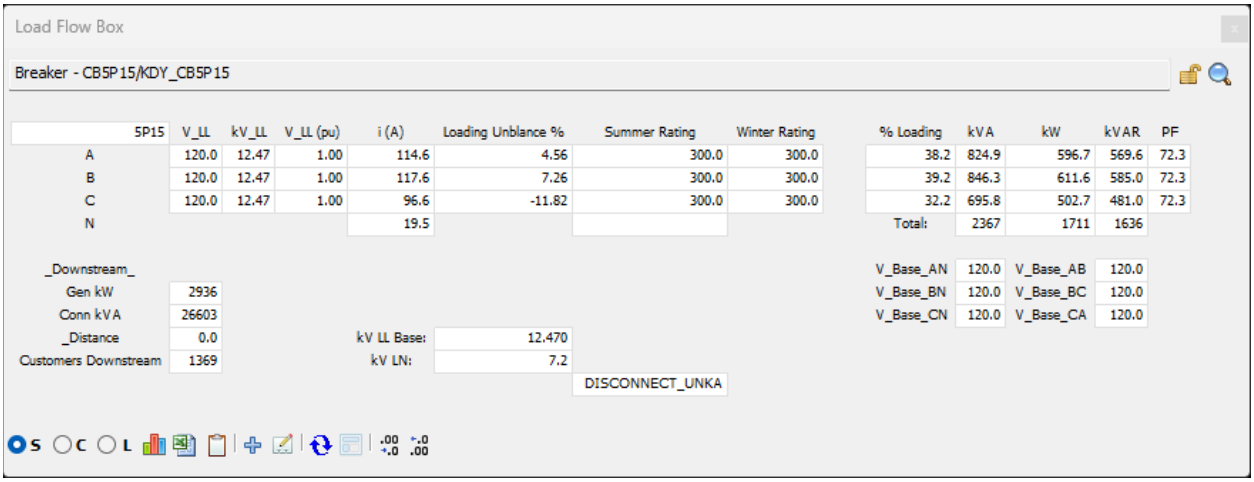
Load Flow Box

Recloser - RC_1391_5P15/RC_134505__6044144

5P15	V_LL	kV_LL	V_LL (pu)	i (A)	Loading Unblance %	Summer Rating	Winter Rating	% Loading	kVA	kW	kVAR	PF
A	118.6	12.34	0.99	119.0	6.58	200.0	200.0	59.5	846.6	772.9	345.6	91.3
B	118.8	12.35	0.99	106.4	-4.71	200.0	200.0	53.2	758.4	706.9	274.5	93.2
C	118.9	12.35	0.99	109.5	-1.87	200.0	200.0	54.8	781.6	729.0	282.0	93.3
N				11.1				Total:	2386	2209	902	

Downstream				V_Base_AN	118.6	V_Base_AB	118.8
Gen kW	1255			V_Base_BN	118.8	V_Base_BC	118.8
Conn kVA	21385			V_Base_CN	118.9	V_Base_CA	118.8
_Distance	6278.1	kV LL Base:	12.470				
Customers Downstream	339	kV LN:	7.1				
			ELECTRONIC_200A				

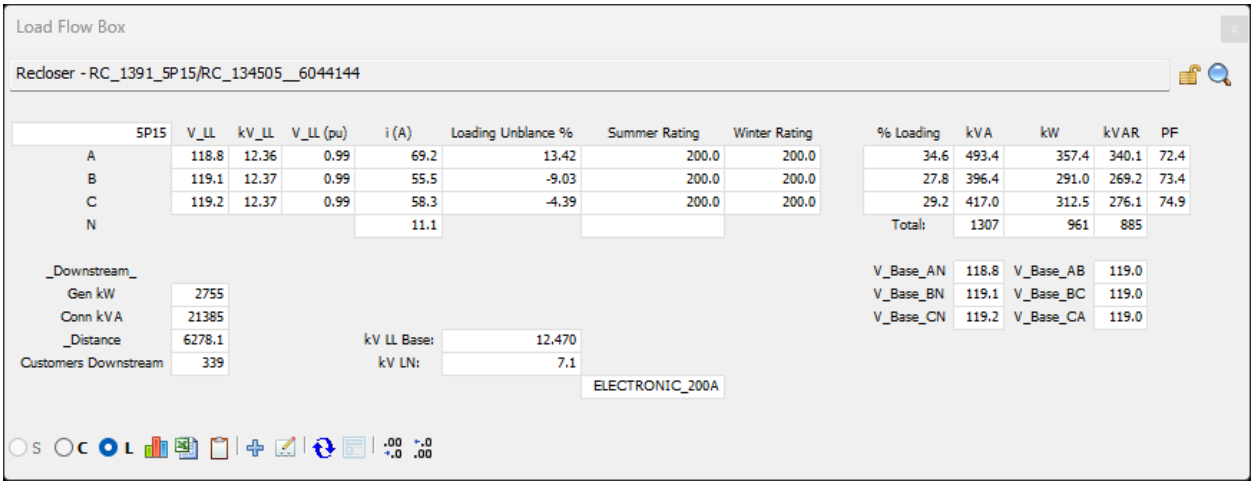
After OCS106 Online:


Load Flow Box

Breaker - CB5P15/KDY_CB5P15

5P15	V_LL	kV_LL	V_LL (pu)	i (A)	Loading Unblance %	Summer Rating	Winter Rating	% Loading	kVA	kW	kVAR	PF
A	120.0	12.47	1.00	114.6	4.56	300.0	300.0	38.2	824.9	596.7	569.6	72.3
B	120.0	12.47	1.00	117.6	7.26	300.0	300.0	39.2	846.3	611.6	585.0	72.3
C	120.0	12.47	1.00	96.6	-11.82	300.0	300.0	32.2	695.8	502.7	481.0	72.3
N				19.5				Total:	2367	1711	1636	

Downstream				V_Base_AN	120.0	V_Base_AB	120.0
Gen kW	2936			V_Base_BN	120.0	V_Base_BC	120.0
Conn kVA	26603			V_Base_CN	120.0	V_Base_CA	120.0
_Distance	0.0	kV LL Base:	12.470				
Customers Downstream	1369	kV LN:	7.2				
			DISCONNECT_UNKA				


Load Flow Box

Recloser - RC_1391_5P15/RC_134505__6044144

5P15	V_LL	kV_LL	V_LL (pu)	i (A)	Loading Unblance %	Summer Rating	Winter Rating	% Loading	kVA	kW	kVAR	PF
A	118.8	12.36	0.99	69.2	13.42	200.0	200.0	34.6	493.4	357.4	340.1	72.4
B	119.1	12.37	0.99	55.5	-9.03	200.0	200.0	27.8	396.4	291.0	269.2	73.4
C	119.2	12.37	0.99	58.3	-4.39	200.0	200.0	29.2	417.0	312.5	276.1	74.9
N				11.1				Total:	1307	961	885	

Downstream				V_Base_AN	118.8	V_Base_AB	119.0
Gen kW	2755			V_Base_BN	119.1	V_Base_BC	119.0
Conn kVA	21385			V_Base_CN	119.2	V_Base_CA	119.0
_Distance	6278.1	kV LL Base:	12.470				
Customers Downstream	339	kV LN:	7.1				
			ELECTRONIC_200A				

6.4 EXISTING BREAKER MODIFICATIONS – SHORT-CIRCUIT

The increase in the fault duty on the system as the result of the addition of the generation facility with photovoltaic arrays fed through 5 – 275kVA CPS inverters connected to a 1.5 MVA 12.5 kV – 800 V transformer with 5 % impedance will not push the fault duty above the interrupting rating of any of the existing fault interrupting equipment.

6.5 PROTECTION REQUIREMENTS

The OCS106 Community Solar Project will need to disconnect from the network in a high-speed manner for faults on the 12.47 kV line on circuit 5P15 out of Kennedy substation. The minimum daytime load on circuit 5P15 is 3.0 MW which is above the maximum potential power output of the proposed OCS106 Community Solar Project. For this reason, the imbalance condition of the load and generation can be relied upon to cause the high-speed disconnection of the generating facilities for faults on the distribution system.

The Community Solar Project is planned to be connected beyond an existing line recloser RC 5P1391 at facility point 01101001.0134505. During some daytime periods the load beyond the recloser can be as low as 2.2 MW which is more than the potential generation from the proposed Community Solar Project. For this reason, the imbalance condition of the load and generation can be relied upon to cause the high-speed disconnection of the generating facilities for faults on the distribution system.

With the addition of the OCS106 Community Solar Project there will be a potential for the Community Solar Project to contribute more fault current for phase to ground faults between line recloser 5P1391 and Kennedy substation to be above the pickup value for the ground overcurrent element in the recloser. With the current recloser configuration this will cause it to trip for these type faults. This will down grade the service to the existing customers and will not be acceptable. The relay at the recloser has the capability to have the overcurrent elements to be set directional. Settings will be applied to the line recloser so that it will only be tripped for faults beyond the line recloser.

There will also be potential for the Community Solar Project to contribute more fault current for phase to ground faults on the other 12.47 kV feeders out of Kennedy substation. The relay is currently set to be non-directional but has the capability to be set directional so that the breaker will only be tripped for faults on the feeder it is there to protect. This relay setting change will be needed for this project.

The 12.47 kV circuit recloser planned to be installed at the OCS106 project will need to be equipped with Schweitzer Engineering Laboratories (SEL) 651R relay/controller and voltage instrument transformers mounted on the utility side of the circuit recloser. The 651R will perform the following protection functions:

1. Detect faults on the 12.47 kV equipment at the solar-electric Community Solar Project
2. Detect faults on the 12.47 kV line to Kennedy Substation
3. Monitor the voltage and react to under or over frequency, and/or magnitude of the voltage

6.6 Data Requirements (RTU)

There are no SCADA requirements for this.

6.7 Communication Requirements

No communications work is required for this project.

6.8 Substation Requirements

No substation requirements have been identified.

6.9 Metering Requirements

Interchange Metering

The metering will be located on the high side of the Applicant's generator step up transformer at the Point of Interconnection. The metering will be installed overhead on a pole per distribution DM construction standards. The Public Utility will procure, install, test, and own all revenue metering equipment. The metering will be bi-directional to measure KWH and KVARH quantities for both generation received, and back feed retail load delivered. There will be no additional station service metering for supplying generation load. The metering generation and billing data will be remotely interrogated via the Public Utility's MV90 data acquisition system.

Station Service/Construction Power

Prior to construction, Applicant must arrange construction power with the Public Utility as holding the certificated service territory rights for the area in which the load is physically located. Station service and temporary construction power metering shall conform to the Six State Electric Service Requirements manual.

Please note, prior to back feed, Applicant must arrange distribution voltage retail meter service for electricity consumed by the Project and arrange back up station service for power that will be drawn from the distribution line when the Project is not generating. Applicant must call the PCCC Solution Center 1-800-640-2212 to arrange this service. Approval for back feed is contingent upon obtaining station service.

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.

Distribution System *Line extension and poles*	$123,000
Protection and Control *Engineering and relay settings review*	$69,000
Substation *VT installation and SEL 651R*	$130,000
Metering *Metering package and engineering*	$13,000
Project Management *Project manager, project control specialist*	$18,000
Other *Capital surcharge, contingency, administrative support*	$77,000
Total	**$430,000**

*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 is as accurate as possibly given the level of detailed study that has been completed to date and approximates the costs incurred by Public Utility to interconnect this Community Solar Project to Public Utility's electrical distribution or transmission system. An estimate, based on finer detail, will be calculated during the Facilities Study. The Applicant will be responsible for all actual costs, regardless of the estimated costs communicated to or approved by the Applicant.

8.0 SCHEDULE

The Public Utility 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 Facilities Study.

Please note, the time required to perform the scope of work identified in this report appears to result in a timeframe that does support the Applicant's requested commercial operation date of January 6, 2027.

9.0 PARTICIPATION BY AFFECTED SYSTEMS

Public Utility has identified the following Affected Systems: None

10.0 APPENDICES

Appendix 1: Higher Priority Requests
Appendix 3: Property Requirements

10.1 APPENDIX 1: HIGHER PRIORITY REQUESTS

All active higher priority transmission service and/or generator interconnection and Community Solar Project 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/Community Solar Queue Requests considered:
OCS012

10.2 APPENDIX 3: 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 able to be permitted 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.