

***Generation Interconnection
Combined Feasibility/System Impact
Study Report
(Revised)***

For

***PJM Generation Interconnection Request
Queue Position V2-047
(Energy only)***

Maurice River Township 12kV

March 2010

Preface

The intent of the Combined Feasibility/System Impact Study is to determine a plan, with approximate cost and construction time estimates, to connect the subject generation interconnection project to the PJM network at a location specified by the Interconnection Customer. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system. All facilities required for interconnection of a generation interconnection project must be designed to meet the technical specifications (on PJM web site) for the appropriate transmission owner.

In some instances an Interconnection Customer may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection or merchant transmission upgrade, may also contribute to the need for the same network reinforcement. The possibility of sharing the reinforcement costs with other projects may be identified in the Feasibility Study, but the actual allocation will be deferred until the System Impact Study is performed.

The Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The project developer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study.

General

Simple Solar Systems, LLC, the Interconnection Customer (IC), has proposed a 1.35 MW (energy only) solar powered generating facility consisting of ground mounted solar arrays. The generating facility will be located in Maurice River Township, Cumberland County, New Jersey. V2-047 was studied as a 1.35 MW injection into the Atlantic City Electric's system at the Union 12kV substation and evaluated for compliance with reliability criteria for summer peak conditions in 2013.

Point of Interconnection

V2-047 will interconnect with the Atlantic City Electric (ACE) distribution system at the South Delsea 12kV circuit (NJ1842) which is a Union 138/12kV substation feeder (see Attachment 1).

Distribution System Impacts

Feeder Operation Analysis

A study of high voltage at low load, flicker, and the automatic line equipment operation was performed. The results indicate that under normal operations this installation should not cause any of the above mentioned problems.

System Protection Analysis

For V2-047 type of distributed generation installations, the need for transfer trip is evaluated based on the load downstream of the different sectionalizing devices (i.e. fuses, reclosers, etc) on the circuit between the Point of Interconnection and the source substation. The guidelines included in IEEE 1547 were applied during the evaluation. IEEE 1547 recommends at least a three to one minimum load to generation ratio is used to ensure that a given unit will trip off quickly enough if islanded with power delivery load. This mismatch between generation and load ensures a rapid decay of frequency and voltage. This standard does not make an exception for solar type installations which can be certified to be non-islanding and are preferred on our system. The ACE documents for interconnection requirements follow the recommendations of IEEE 1547.

For the V2-047 project, a 1.35 MW installation is proposed to be fed from the tail end of the Union, South Delsea (NJ1842) circuit. As identified in the single line drawing in Attachment 1, the circuit traces through three reclosers (P/N B6313, P/N B6892, and P/N 16933) before ending at the Union substation. The latest load forecast for this feeder is 13.4MVA. ACE normally assumes 40% of the forecast peak value as the minimum load on the circuit, which is equal to 5.36MVA. Part of the South Delsea feeder does not meet the three to one load to generation criteria. As a result, ACE will require a transfer trip signal to be sent for operation of two downstream reclosers (P/N B6313 & P/N B6892) between the Point of Interconnection and the Union substation.

Transmission Owner Scope of Work

The scope of work is as follows:

Attachment Facilities

- Replace the recloser control on the reclosers at: P/N B6313, P/N 6892 with SEL-351R controls to provide the ability to initiate a transfer trip signal to the generator.
- Establish a fiber optic path between each recloser to the generator location.
- Review Interconnection Customer's design to validate equipment is available to receive the ACE transfer trip signal to remove his unit from service.
- Add a recloser near the Point of Interconnection to be used for monitoring & isolation.

System Planning

Scope: Review initial plans and coordinate the activities identified in the Feasibility/System Impact and Facilities Study. Incorporate the resource into overall system plans.

Project Management and Special Billing

Scope: Provide overall coordination of all ACE Engineering and Operating groups involved with the design, construction and final testing of newly installed equipment. Provide billing to the Interconnection Customer for services rendered during the project.

Outside Plant Communications

Scope: Fiber Optics Construction. Provide for the installation of approx 2.5 miles of aerial FO cable connecting the IC's facility to two Automatic Circuit Reclosers on pole B6313 and B6892 on the Union Sub South Delsea Feeder.

System Protection

Scope: Model the Delsea 12kV feeder circuit and photovoltaic generator in the ASPEN Short Circuit Study. Provide logic settings for the two SEL-351R recloser controllers at P/N B-6890 and B-6314. (Local District Engineering will determine the time-current settings). Provide technical support and guidance to Electric Maintenance (Relay & Communications Groups) on the transfer trip schemes and the testing of the schemes. Review the customer site prints particularly those associated with the transfer trip interface.

Interconnection Arrangements

Scope: Perform interconnection technical issue review and resolution. Review installation approach and insure compliance with interconnection agreements.

System Operations

Scope: Interface with GE EMS

Distribution Construction

Scope: Replace two (2) Reclosers (B6313 & B6892) with NOVA electronic reclosers with SEL-351R controllers. Install a recloser near the customer interconnection.

Metering

Scope: The Mays Landing Meter Department will construct a 12kV three phase primary metering cluster mount, and deliver the mount to the site for installation. A contractor or ACE overhead line crew will be required to put the cluster mount assembly into service, and Meter Department technicians will complete the secondary wiring and related meter work at the base of the metering pole. A meter technician will assist the contractor or ACE overhead line crew in energizing this equipment.

Interconnection Customer Scope of Work

The Interconnection Customer (IC) assumes full responsibility for design and construction of all facilities associated with the V2-047 generating facility on the IC side of the POI. Site preparation including grading and an access road, if necessary, is assumed to be by the IC.

The IC will be required to install metering and telemetry equipment to provide revenue metering and real-time telemetry data to PJM. The requirements for this equipment are listed in Appendix 2, Section 8 of Attachment O to the PJM Tariff, as well as PJM Manuals 01 and 14D. Protective relaying and metering design and installation must comply with Atlantic City Electric Applicable

Standards.

Transmission Network Impacts

Potential transmission network impacts were as follows:

Generator Deliverability

*(Single or N-1 contingencies for the **Capacity** portion only of the interconnection)*

Not applicable.

Multiple Facility Contingency

*(Double Circuit Tower Line, Line with Failed Breaker and, Bus Fault contingencies for the **Full** energy output.*

None

Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. “Network Impacts”, identified for earlier generation or transmission interconnection projects in the PJM Queue)

None

Short Circuit

Not required.

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. “Network Impacts,” initially caused by the addition of this project’s generation)

None

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project.

None

Cost and Timing Summary

While the information in this transmittal is reasonable for the scope of work defined, it should however be noted that the cost figures are conceptual in nature at this stage, as an engineering team has not been assigned to the project. Obviously, any change to the scope of work will require that the

estimates be revisited. The costs are a best estimate, but the developer will be charged for actual costs. Any under or over-runs will be reconciled at the conclusion of the project.

The estimated time to construct the necessary upgrades is **6-12 months** following receipt of a fully executed Interconnection Service Agreement and Interconnection Construction Service Agreement. The schedule will be refined during the Facilities Study phase of the project.

Cost Summary

Department	Direct or Indirect	Labor or Material	Cost
<i>System Planning</i>	Direct	Labor	\$10,000
<i>Project Management & Special Billing</i>	Direct	Labor	\$1,000
	Indirect	Labor	\$1,000
<i>Outside Plant Communications</i>	Direct	Labor	\$35,121
	Direct	Material	\$19,784
	Indirect	Labor	\$52,450
<i>System Protection</i>	Direct	Labor	\$4,800
<i>Interconnection Arrangements</i>	Direct	Labor	\$1,150
<i>System Operations</i>	Direct	Labor	\$1,200
<i>Distribution Construction</i>	Direct	Labor	\$100,000
	Direct	Material	\$50,000
<i>Metering</i>	Direct	Labor	\$2,848.00
	Direct	Material	\$13,485.49

Project Subtotal:

Direct (Internal or ACE)

-Labor - \$156,119

-Material - \$83,269.49

Indirect (External or Contractor)

-Labor - \$53,450

-Material – N/A

Total: \$292,838.49

With 18% Overheads (ESAG) and 15% Contingency

Direct (Internal or ACE)

-Labor - \$207,638.27

-Material - \$110,748.42

Indirect (External or Contractor)

-Labor - \$71,088.50

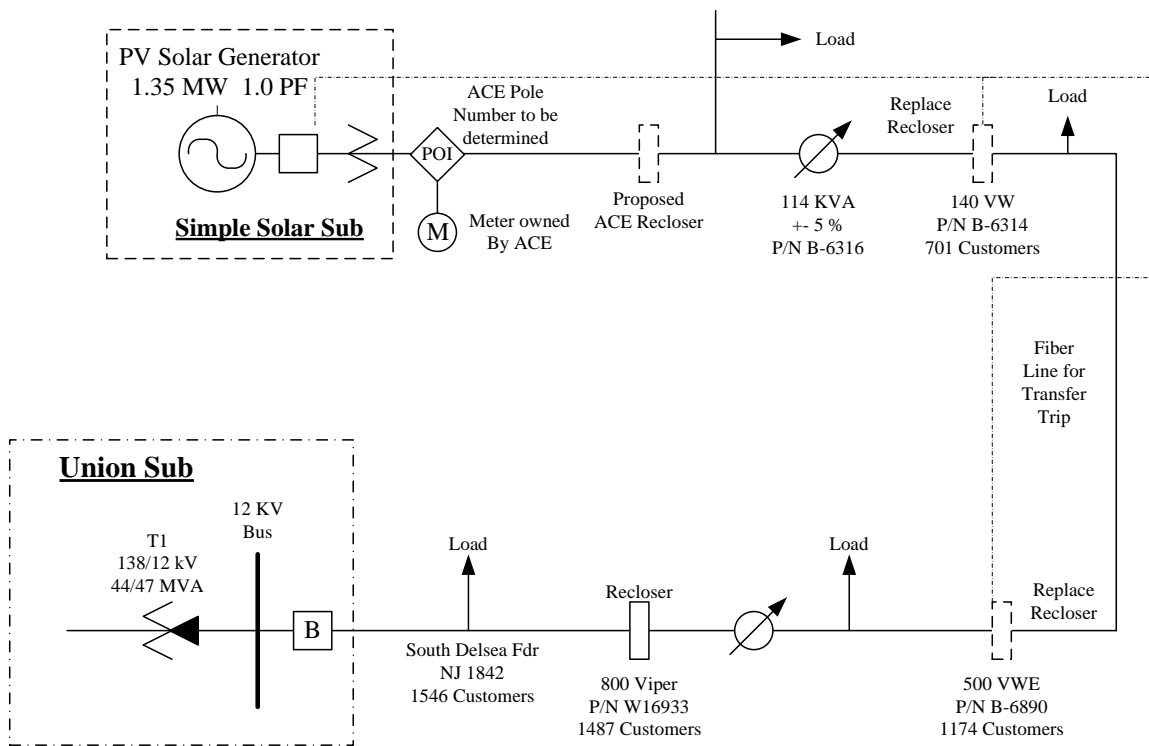
-Material – N/A

Estimated Project Total: \$389,475.19

Attachment 1

V2-047

Union 138/12 kV Sub



***Generation Interconnection
Combined Feasibility/System Impact
Study Report***

For

***PJM Generation Interconnection Request
Queue Position V2-047
(Energy only)***

Maurice River Township 12kV

January 2010

Preface

The intent of the Combined Feasibility/System Impact Study is to determine a plan, with approximate cost and construction time estimates, to connect the subject generation interconnection project to the PJM network at a location specified by the Interconnection Customer. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system. All facilities required for interconnection of a generation interconnection project must be designed to meet the technical specifications (on PJM web site) for the appropriate transmission owner.

In some instances an Interconnection Customer may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection or merchant transmission upgrade, may also contribute to the need for the same network reinforcement. The possibility of sharing the reinforcement costs with other projects may be identified in the Feasibility Study, but the actual allocation will be deferred until the System Impact Study is performed.

The Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The project developer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study.

General

Simple Solar Systems, LLC, the Interconnection Customer (IC), has proposed a 2 MW (energy only) solar powered generating facility consisting of four (4) ground mounted 500kW solar arrays. The generating facility will be located in Maurice River Township, Cumberland County, New Jersey. V2-047 was studied as a 2 MW injection into the Atlantic City Electric's system at the Union 12kV substation and evaluated for compliance with reliability criteria for summer peak conditions in 2013. The planned in-service date is December 2009.

Point of Interconnection

V2-047 will interconnect with the Atlantic City Electric distribution system at the Union 138/12kV substation (see Attachment 1).

Direct Connection Requirements

Transmission Owner Scope of Direct Connection Work

The scope of work and estimated costs for the direct connection facilities is as follows:

1. The construction of a new approximate 8 mile 12kV dedicated feeder with aerial cable to be built between the IC's generating site and the Union 138/12kV substation. The estimated cost to perform this work is **\$3,200,000.**

2. A feeder terminal will be created at the Union 138/12kV substation for the new dedicated 12kV feeder. The estimated cost to perform this work is **\$525,000**.
3. A utility operated recloser will be required on the IC tap that will have proper relaying and communication. The estimated cost to perform this work is **\$50,000**.
4. Utility grade primary metering will be required. The estimated cost to perform this work is **\$20,000**.
5. A SCADA point addition to Control Center will be required. The estimated cost to perform this work is **\$10,000**.
6. System protection planning. The estimated cost to perform this work is **\$15,000**.

The total estimated cost to perform the above work is **\$3,820,000**. The estimated time to complete the work is **6 to 12 months** following receipt of a fully executed Interconnection Services Agreement and Interconnection Construction Service Agreement. Schedule and costs to be refined during the Facilities Study phase of the project.

Note: the above cost does not include the Contribution in Aid of Construction (CIAC) tax.

Interconnection Customer Scope of Direct Connection Work

The Interconnection Customer assumes full responsibility for design and construction of all facilities associated with the V2-047 generating station on their side of the POI. Site preparation including grading and an access road, if necessary, is assumed to be by the IC.

The IC will be required to install metering and telemetry equipment to provide revenue metering and real-time telemetry data to PJM. The requirements for this equipment are listed in Appendix 2, Section 8 of Attachment O to the PJM Tariff, as well as PJM Manuals 01 and 14D. Protective relaying and metering design and installation must comply with Atlantic City Electric Applicable Standards.

Cost and Timing Summary

While the information in this transmittal is reasonable for the scope of work defined, it should however be noted that the cost figures are conceptual in nature at this stage, as an engineering team has not been assigned to the project. Obviously, any change to the scope of work will require that the estimates be revisited. The costs are a best estimate, but the developer will be charged for actual costs. Any under or over-runs will be reconciled at the conclusion of the project.

Network Impacts

Potential network impacts were as follows:

Generator Deliverability

*(Single or N-1 contingencies for the **Capacity** portion only of the interconnection)*

Not applicable.

Multiple Facility Contingency

*(Double Circuit Tower Line, Line with Failed Breaker and, Bus Fault contingencies for the **Full** energy output.*

None

Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. “Network Impacts”, identified for earlier generation or transmission interconnection projects in the PJM Queue)

None

Short Circuit

Not required.

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. “Network Impacts,” initially caused by the addition of this project’s generation)

None

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project.

None

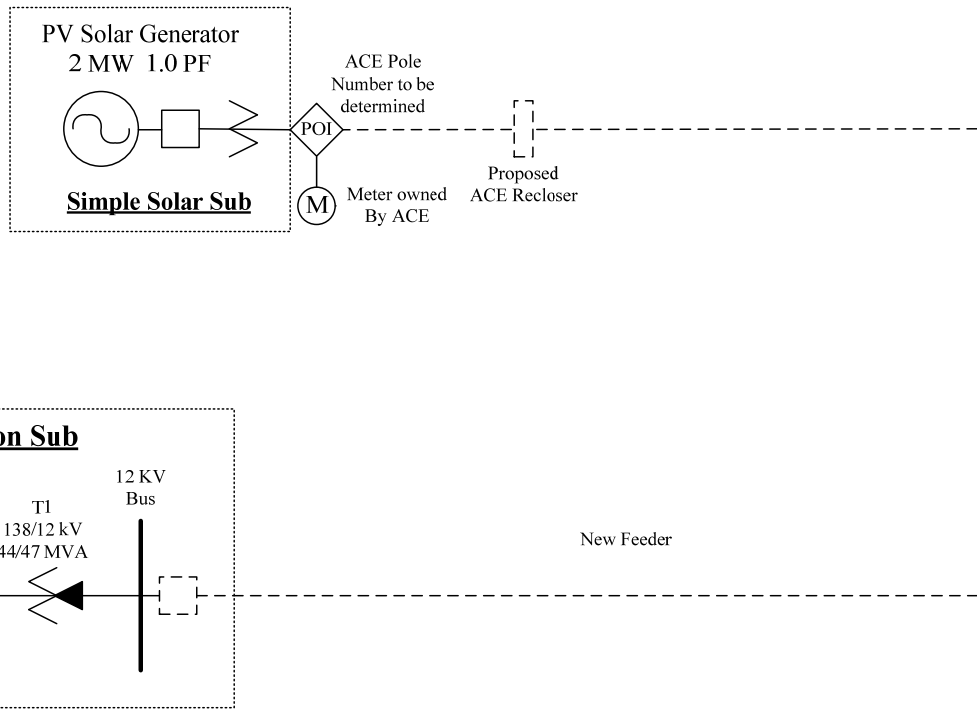
Dynamic Analysis

The dynamic study is in progress and will be completed during the Facilities Study phase of V2-047. The IC may be required to provide dynamic VAR compensation as a result of the study. The study may identify the need for additional system equipment, settings, distribution system reinforcements, and possibly Point of Interconnection alternatives.

V2-047

Union 138/12 kV Sub

Proposed



***Generation Interconnection
Combined Feasibility/System Impact
Study Report
(PJM Portion)***

For

***PJM Generation Interconnection Request
Queue Position V2-047***

Maurice River Township 12 kV

October 2009

Preface

The intent of a Combined Feasibility/System Impact Study is to determine a plan, with approximate cost and construction time estimates, to connect the subject generation interconnection project to the PJM network at a location specified by the Interconnection Customer. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system. All facilities required for interconnection of a generation interconnection project must be designed to meet the technical specifications (on PJM web site) for the appropriate transmission owner.

The following report documents the PJM results of the Combined Feasibility/System Impact Study for V2-047, Maurice River Township 12 kV. It does not include the Transmission Owner's (TO) results which will be provided under separate cover. No transmission network impacts were identified.

General

Simple Solar Systems, LLC, the Interconnection Customer (IC), has proposed a 2 MW energy only (0 MWC) solar powered generating facility consisting of four (4) 500 kW output inverters. The facility will be located in Maurice River Township, New Jersey. PJM studied V2-047 as a 2 MW injection into the Atlantic City Electric's distribution system at the Union 12.9 kV substation and was evaluated for compliance with reliability criteria for summer peak conditions in 2013. The planned in-service date is December 2009.

Point of Interconnection

V2-047 will interconnect with the Atlantic City Electric distribution system via a tap of the 12.5 kV South Delsea feeder circuit (see Attachment 1 for simple single line).

Direct Connection Requirements

Transmission Owner Scope of Direct Connection Work

To be provided with TO's results.

Interconnection Customer Scope of Direct Connection Work

The Interconnection Customer assumes full responsibility for design and construction of all facilities associated with the V2-047 generating station and the 12 kV direct connection line on the IC side of the POI. Site preparation including grading and an access road, as necessary, is assumed to be by the developer. Route selection, line design, right-of-way acquisition and construction of lines will be entirely the responsibility of the IC.

The IC will be required to install metering and telemetry equipment to provide revenue metering and real-time telemetry data to PJM. The requirements for this equipment are listed in Appendix 2, Section 8 of Attachment O to the PJM Tariff, as well as PJM Manuals 01 and 14D. Protective relaying and metering design and installation must comply with Atlantic City Electric Applicable

Standards.

Network Impacts

Potential network impacts are as follows:

Generator Deliverability

*(Single or N-1 contingencies for the **Capacity** portion only of the interconnection)*

Not applicable.

Multiple Facility Contingency

*(Double Circuit Tower Line, Line with Failed Breaker and, Bus Fault contingencies for the **Full** energy output.*

None

Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. “Network Impacts”, identified for earlier generation or transmission interconnection projects in the PJM Queue)

None

Short Circuit

Not required.

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. “Network Impacts,” initially caused by the addition of this project’s generation)

None

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project.

None

Stability Analysis

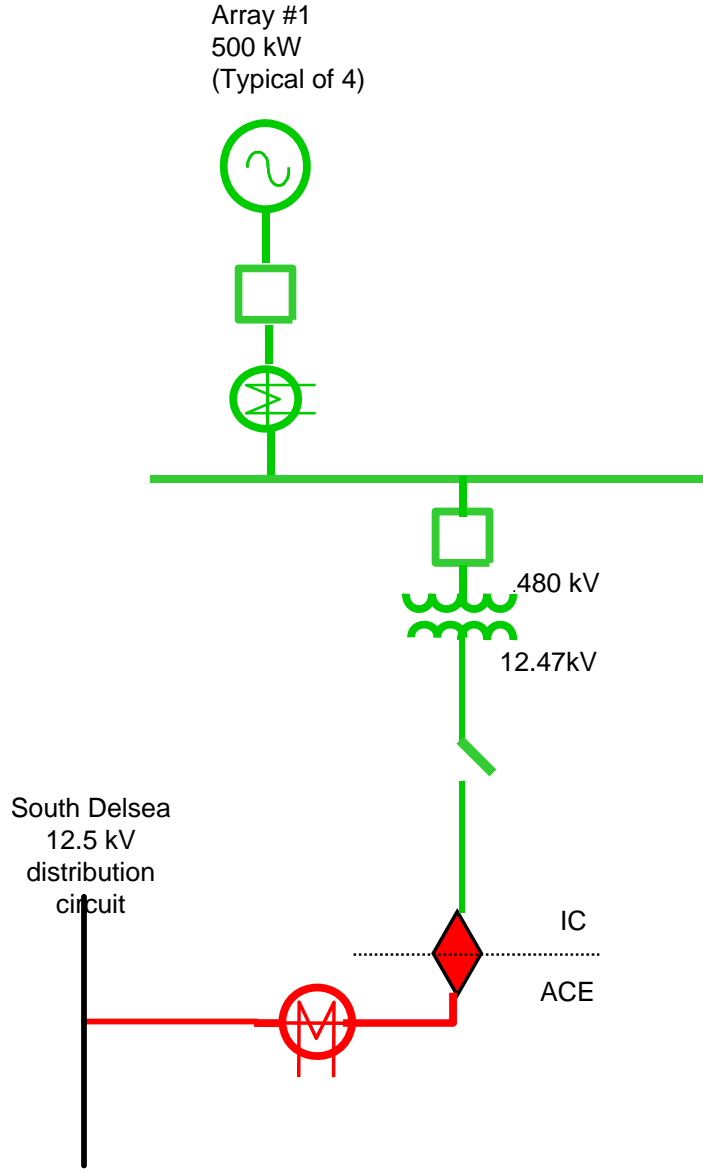
Not required.


Potential Congestion due to Local Energy Deliverability

(PJM also studied the delivery of the energy portion of the surrounding generation. Any potential problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with Network Upgrades to eliminate the operational restriction at their discretion by submitting a Transmission Interconnection Request. Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full deliverability for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which analyzes all overload conditions associated with the identified overloaded element(s). As a result of the aggregate energy resources in the area, the following violations were identified:

None.

Attachment 1
V2-047



 Point of Interconnection