

***Generation Interconnection  
Feasibility Study Report***

***For***

***PJM Generation Interconnection Request  
Queue Position AC1-001***

***Delano 138 kV***

**February 2017**

## Preface

The intent of the feasibility study is to determine a plan, with ballpark cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the Interconnection Customer. The Interconnection Customer may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

In some instances a generator interconnection may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection, 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 impact study is performed.

The Feasibility 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

The Interconnection Customer proposes to increase the generation of its previously proposed PJM queue position AB2-083 by 80.0 MW (54.4 MW Capacity) connecting to the Delano 138kV substation in Ross County, Ohio (see Figure 2).

The requested Backfeed date is September 30, 2017.

The requested in service date is October 31, 2017.

## Attachment Facilities

### Primary Point of Interconnection (Delano 138 kV Substation)

PJM Project AB2-083 will pay for the necessary direct connection work required.

Note: An additional 138 kV circuit breaker is recommended to allow for breaker maintenance and inspections. Implicit in acceptance of a single breaker connection is an understanding that the project will be required to be out of service during periodic inspection or maintenance of the circuit breaker.

It is understood that the IC is responsible for all costs associated with this interconnection. The costs above are reimbursable to AEP. The cost of The IC's generating plant and the costs for the line connecting the generating plant to The IC's switching station are not included in this report; these are assumed to be The IC's responsibility.

The Generation Interconnection Agreement does not in or by itself establish a requirement for American Electric Power to provide power for consumption at the developer's facilities. A separate agreement may be reached with the local utility that provides service in the area to ensure that infrastructure is in place to meet this demand and proper metering equipment is installed. It is the responsibility of the developer to contact the local service provider to determine if a local service agreement is required.

## Interconnection Customer Requirements

Requirement from the PJM Open Access Transmission Tariff:

1. An Interconnection Customer entering the New Services Queue on or after October 1, 2012 with a proposed new Customer Facility that has a Maximum Facility Output equal to or greater than 100 MW shall install and maintain, at its expense, phasor measurement units (PMUs). See Section 8.5.3 of Appendix 2 to the Interconnection Service Agreement as well as section 4.3 of PJM Manual 14D for additional information.
2. The Interconnection Customer may be required to install and/or pay for metering as necessary to properly track real time output of the facility as well as installing metering which shall be used for billing purposes. See Section 8 of Appendix 2 to the Interconnection Service Agreement as well as Section 4 of PJM Manual 14D for additional information.

# **Revenue Metering and SCADA Requirements**

## **PJM Requirements**

The Interconnection Customer will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Sections 24.1 and 24.2.

## **AEP Requirements**

The Interconnection Customer will be required to comply with all AEP Revenue Metering Requirements for Generation Interconnection Customers. The Revenue Metering Requirements may be found within the "Requirements for Connection of New Facilities or Changes to Existing Facilities Connected to the AEP Transmission System" document located at the following link:

<http://www.pjm.com/~media/planning/plan-standards/private-aep/aep-interconnection-requirements.ashx>

## **Network Impacts**

The Queue Project AC1-001 was evaluated as an 80.0 MW (Capacity 54.4 MW) injection at the Delano 138kV substation in the AEP area. Project AC1-001 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AC1-001 was studied with a commercial probability of 53%. Potential network impacts were as follows:

## **Base Case Used**

Summer Peak Analysis – 2020 Case

## **Contingency Descriptions**

The following contingencies resulted in overloads:

None

## **Generator Deliverability**

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

None

## **Multiple Facility Contingency**

*(Double Circuit Tower Line, Fault with a Stuck 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)*

*Note: Please see Appendices for projects providing impacts to flowgate violations. The values in the Reference column correspond to the proper table in the Appendix.*

None

## **Steady-State Voltage Requirements**

None

## **Short Circuit**

*(Summary of impacted circuit breakers)*

New circuit breakers found to be over-duty:

None

## **Delivery of Energy Portion of Interconnection Request**

*PJM also studied the delivery of the energy portion of this interconnection request. Any 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 Merchant Transmission Interconnection request.*

*Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which shall study all overload conditions associated with the overloaded element(s) identified.*

None

## **New System Reinforcements**

None

## **Schedule**

It is anticipated that the time between receipt of executed agreements and Commercial Operation may range from 12 to 18 months if no line work is required. If line work is required, construction time would be between 24 to 36 months after signing an interconnection agreement.

**Note:** The time provided between anticipated normal completion of System Impact, Facilities Studies, subsequent execution of ISA and ICSA documents, and the proposed Backfeed Date is shorter than usual and may be difficult to achieve.

## **Conclusion**

Based upon the results of this Feasibility Study, the increase of 80.0 MW (PJM Project #AC1-001) to the previous 40.0 MW solar generating request (PJM Project #AB2-083) will not require additional interconnection charges to connect to the Delano station. PJM project AB2-083 will pay for the necessary direct connection work required. This plan of service will interconnect the proposed solar generating facility in a manner that will provide operational reliability and flexibility to both the AEP system and the The IC generating facility.

## **Option 2**

### **Network Impacts**

The Queue Project AC1-001 was evaluated as an 80.0 MW (Capacity 54.4 MW) injection tapping the Delano - Nevil Switch 138 kV line in the AEP area. Project AC1-001 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AC1-001 was studied with a commercial probability of 53%. Potential network impacts were as follows:

#### **Base Case Used**

Summer Peak Analysis – 2020 Case

#### **Contingency Descriptions**

The following contingencies resulted in overloads:

None

#### **Generator Deliverability**

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

None

#### **Multiple Facility Contingency**

*(Double Circuit Tower Line, Fault with a Stuck 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**

*(Summary of impacted circuit breakers)*

New circuit breakers found to be over-duty:

None

## **Delivery of Energy Portion of Interconnection Request**

*PJM also studied the delivery of the energy portion of this interconnection request. Any 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 Merchant Transmission Interconnection request.*

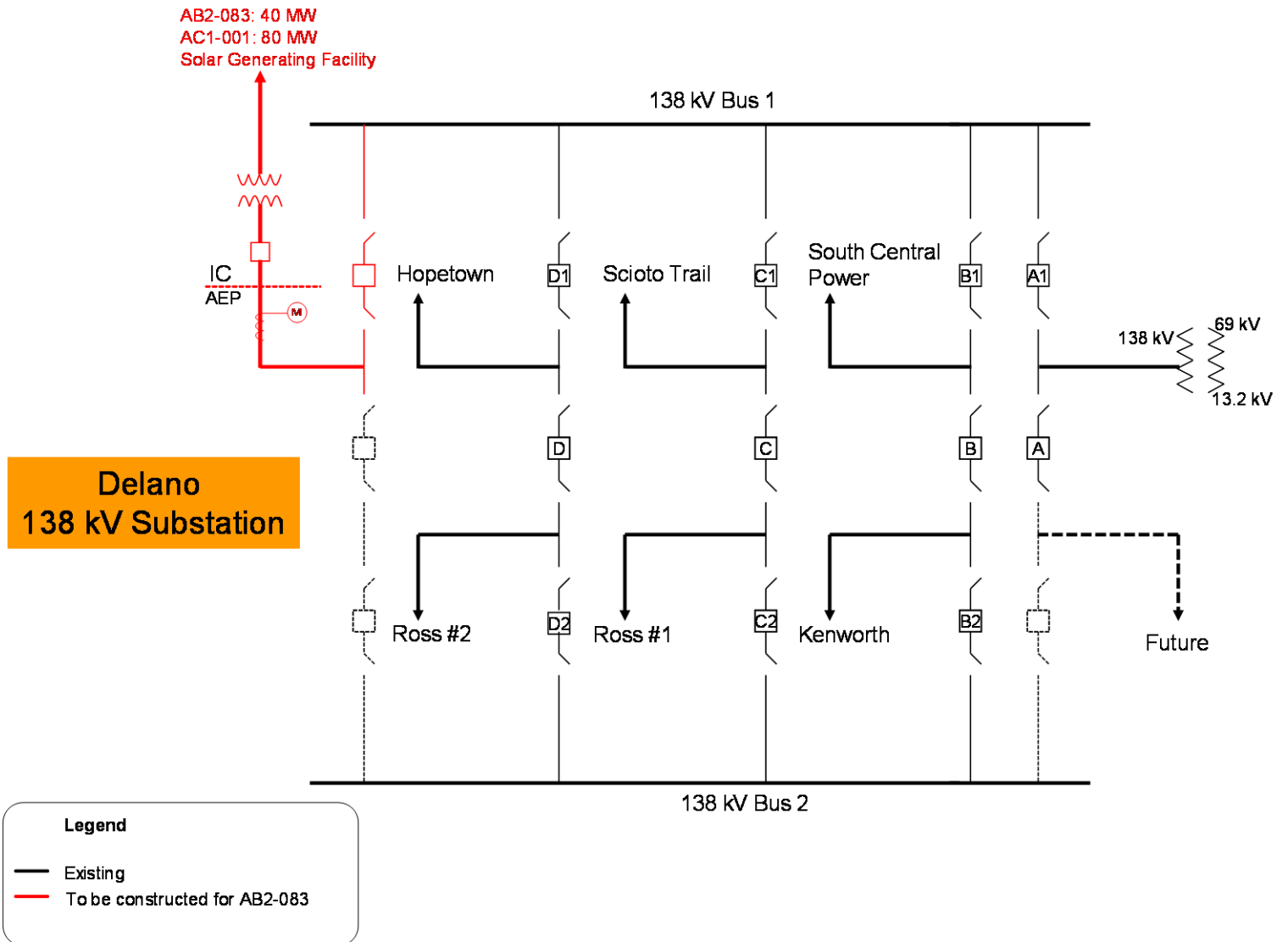
*Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which shall study all overload conditions associated with the overloaded element(s) identified.*

None



**Figure 1: Point of Interconnection (Delano 138 kV Substation)**

**Single-Line Diagram**



**Figure 2: Point of Interconnection (Delano 138 kV Substation)**

