

***Generation Interconnection  
Feasibility Study Report***

***For***

***PJM Generation Interconnection Request  
Queue Position AB1-138***

***Navy 34.5kV***

**February 2016**

## 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 (IC), has proposed a solar generating facility located in Ocean County, New Jersey. The installed facilities will have a total capability of 9.6 MW with 3.6 MW of this output being recognized by PJM as capacity. The proposed in-service date for this project is April 2016. **This study does not imply a Jersey Central Power & Light Company (JCPL) commitment to this in-service date.**

### Point of Interconnection

AB1-138 will interconnect with the JCPL system along a 34.5kV circuit from the Navy substation.

### Cost Summary

The AB1-138 project will be responsible for the following costs:

Description	Cost	Tax (if applicable)	Total Cost
Attachment Facilities	\$ 0	\$ 0	\$ 0
Direct Connection Network Upgrades	\$ 456,700	\$ 150,900	\$ 607,600
Non Direct Connection Network Upgrades	\$ 24,400	\$ 5,300	\$ 29,700
<b>Total Costs</b>	<b>\$ 481,100</b>	<b>\$ 156,200</b>	<b>\$ 637,300</b>

## Attachment Facilities

No Attachment Facilities are required to support this interconnection request.

## Direct Connection Cost Estimate

The total preliminary cost estimate for the Direct Connection work is given in the table below. These costs do not include CIAC Tax Gross-up.

Description	Activity Cost	Tax (if applicable)	Total Cost
Lakehurst – Navy (N140) 34.5 kV Line: Tap the Lakehurst – Navy (N140) 34.5 kV line and install 3 SCADA controlled load break switches, 34.5 kV Meter Package and associated facilities.	\$ 456,700	\$ 150,900	\$ 607,600
<b>Total Direct Connection Facility Costs</b>	<b>\$ 456,700</b>	<b>\$ 150,900</b>	<b>\$ 607,600</b>

## Non-Direct Connection Cost Estimate

The total preliminary cost estimate for the Non-Direct Connection work is given in the table below. These costs do not include CIAC Tax Gross-up.

Description	Activity Cost	Tax (if applicable)	Total Cost
Lakehurst Substation: Revise relay settings on the Navy 34.5 kV line for AB1-138 Interconnection.	\$ 24,400	\$ 5,300	\$ 29,700
<b>Total Attachment Facility Costs</b>	<b>\$ 24,400</b>	<b>\$ 5,300</b>	<b>\$ 29,700</b>

## Interconnection Customer Requirements

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.

3. The purchase and installation of fully rated 34.5 kV circuit breaker on the high side of the (AB1-138) step-up transformer.
4. The purchase and installation of the minimum required FE generation interconnection relaying and control facilities. This includes over/under voltage protection, over/under frequency protection, and zero sequence voltage protection relays.
5. The purchase and installation of supervisory control and data acquisition (“SCADA”) equipment to provide information in a compatible format to the FE Transmission System Control Center.
6. The establishment of dedicated communication circuits for SCADA to the FE Transmission System Control Center.
7. A compliance with the FE and PJM generator power factor and voltage control requirements.
8. The execution of a back-up service agreement to serve the customer load supplied from the (AB1-138) generation project interconnection point when the units are out-of-service. This assumes the intent of the Interconnection Customer is to net the generation with the load.

## **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.

### **JCPL Requirements**

The Interconnection Customer will be required to comply with all FE Revenue Metering Requirements for Generation Interconnection Customers. The Revenue Metering Requirements may be found within the “FirstEnergy Requirements for Transmission Connected Facilities” document located at the following links:

<http://www.firstenergycorp.com/feconnect>

<http://www.pjm.com/planning/design-engineering/to-tech-standards.aspx>

## **Network Impacts**

The Queue Project AB1-138 was evaluated as a 9.6 MW (Capacity 3.6 MW) injection at the Lakehurst 34.5kV substation in the JCPL area. Project AB1-138 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AB1-138 was studied with a commercial probability of 53% using a 2019 Summer Peak case. Potential network impacts were as follows:

### **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)*

None.

### **Potential Congestion due to Local Energy Deliverability**

*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**

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

None.

### **Contribution to Previously Identified System Reinforcements**

*(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)*

None.