

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

For

***PJM Generation Interconnection Request
Queue Position AB2-139***

Raceway Mall 34.5kV

September 2016

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, if any, is included in the System Impact Study.

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 associated with them will be addressed when seeking an Interconnection Agreement as outlined below. . Developer will also be responsible for providing and installing metering equipment in compliance with applicable PJM and Transmission Owner standards.

General

Freemall Associates, LLC, the Interconnection Customer (IC), has proposed a fuel cell facility located Monmouth County, NJ. The installed facilities will have a total capability of 0.42 MW with 0.00 MW of this output being recognized by PJM as capacity. The proposed in-service date for this project is December 2016. **This study does not imply a Jersey Central Power & Light Company (JCPL) commitment to this in-service date.**

Attachment facilities and local upgrades (if required) along with terms and conditions to interconnect AB2-139 will be specified in a separate two party Interconnection Agreement (IA) between JCPL and the Interconnection Customer as this project is considered FERC non-jurisdictional per the PJM Open Access Transmission Tariff (OATT). From the transmission system perspective, no network impacts were identified as detailed below.

Point of Interconnection

AB2-139 will interconnect with the JCPL system at two existing load connections from the Raceway Mall 34.5kV substation

Cost Summary

The AB2-139 project will be responsible for the following costs:

Description	Total Cost
Transmission Owner facilities	\$ 18,108
Transmission System	\$ 0
Total Costs	\$ 18,108

Transmission Owner Scope of Work

The POI has locations, the first is to the 2,000 KVA pad mount transformer # P3763 FRT (12.47/ 7.2KV - 480/277V) , owned by Jersey Central Power & Light (JCPL) and the second to the 2,500 KVA pad mount transformer # P3767 FRT (12.47/ 7.2KV - 480/277V) , owned by JCPL. The secondary cables are owned by the load customer at the site.

The pad mount transformers are served from Raceway Mall Substation circuits 47421 and 47420, fed from Transformers 1 and 2. The proposed 420 KW of rated generation capacity will off-set customer load and will inject excess generated power at the POI. The injected power is estimated at a maximum of 400KW during off peak periods. This power injection will decrease the load on the 47421 and 47420 circuits, but is not expected to cause a reverse power flow condition on Raceway Mall Substation Transformers 1 and 2.

Description	Estimated Costs	Tax (if applicable)	Total Cost
Engineering, planning and commissioning			
Replacement of existing metering with interval metering. Provision of cellular modem interface outputs. JCPL will supply and maintain a cellular connection to the meter interface at the IC's expense.			
Total Estimated Costs	\$ 18,108	\$ 2,912	\$ 21,020

Schedule

JCP& estimates 2 months after execution of construction agreement and construction kick off meeting for design work to be completed. JCPL estimates it will require an additional 1 month to schedule and implement the meter replacement.

Interconnection Customer Requirements

- Distributed Generation must not interfere with the proper detection and clearing of faults on the JCPL distribution or transmission system.
- The connected facility shall comply with harmonic voltage and current limits specified in IEEE Standard 519-1992, “IEEE Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems.” JCPL will require the installation of a Power Quality Meter (SEL-735) to monitor and capture power quality information to permit ongoing assessment of compliance. The unit will be installed at the circuit breaker dedicated to the CoGen system.
- IC must meet all applicable JCPL standards and requirements which are included in the current JCP&L Tariff for Electric Service
- IC’s main breaker shall have a SEL 351 Multi-function relay (or equivalent) which is required for interconnection protection. The relay must have the capability to measure Reverse Power.
- All IC equipment breakers, lighting protection etc. shall meet JCPL’s minimum BL Ratings.
- IC is required to execute a retail service agreement to account for the generation and for time, on an hourly basis, when power is supplied by JCPL.

Anti-Island Protection

The proposed generation facility must be equipped with adequate relay protection to detect an island condition and disconnect from the JCPL distribution system within two seconds of the formation of an island (per IEEE 1547).

Power Factor

The Generation Interconnection Customer shall design its Customer Facility to maintain a composite power delivery at continuous rated power output at a power factor of at least 0.95 leading to 0.90 lagging measured at the Point of Interconnection.

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 JCPL 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>

The revenue metering requirements will be reviewed by JCPL on a case-by-case basis.

In general, JCPL shall continue to own, operate, test and maintain the existing revenue metering equipment per the applicable retail tariff or interconnection service agreement.

The IC must provide JCPL with a facility one line and the estimated bi-directional power flow at the existing JCPL metering point.

The existing JCPL billing meter at the locations will be replaced by JCPL with a bi-directional revenue meter and the JCPL metering current transformers will be replaced with higher capacity units if required. This work will be completed at the IC’s expense.

The bi-directional revenue meter provided and installed by JCPL will record billing data in intervals of typically fifteen or thirty minutes. JCPL will provide, at the IC’s sole cost and expense, the communication link required by the JCPL billing data collection system for access to the meter.

The IC shall, at its expense, install, own, operate, test, and maintain any metering and telemetry equipment that may be required to provide real-time meter data to JCPL or PJM.

JCPL will provide the IC access to bi-directional KWh and KVARh pulses from the JCPL meter at the IC’s expense, if required.

The IC shall provide JCPL with prior notification of any modifications at the facility that could affect the JCPL revenue meter measurements (substation reconfigurations, generator additions, etc).

Network Impacts

The Queue Project AB2-139 was evaluated as a 0.4 MW (Capacity 0.0 MW) injection at the Raceway 34.5kV substation in the JCPL area. Project AB2-139 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AB2-139 was studied with a commercial probability of 100%. Potential network impacts were as follows:

Base Case Used – 2020 Summer Case

Generator Deliverability

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

None.

Multiple Facility Contingency

(Double Circuit Tower Line contingencies were studied for the full energy output. The contingencies of Line with Failed Breaker and Bus Fault will be performed for the Impact Study.)

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.

Steady-State Voltage Requirements

(Summary of the VAR requirements based upon the results of the steady-state voltage studies)

None.

Short Circuit

(Summary of impacted circuit breakers)

None.

FirstEnergy Analysis

The available fault current on the 12.45/7.2kV distribution system at the primary terminals of the pad mounted transformer, without the proposed generation on circuit 47420, is 3,916 amperes 3 phase and 4,951 amperes line-to-ground and on circuit 47421, is 4,493 amperes 3 phase and 5,100 amperes line-to-ground.

Affected System Analysis & Mitigation

(Summary of impacts on systems external to PJM)

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.

Light Load Analysis

Light Load Studies to be conducted during later study phases (applicable to wind, coal, nuclear, and pumped storage projects).

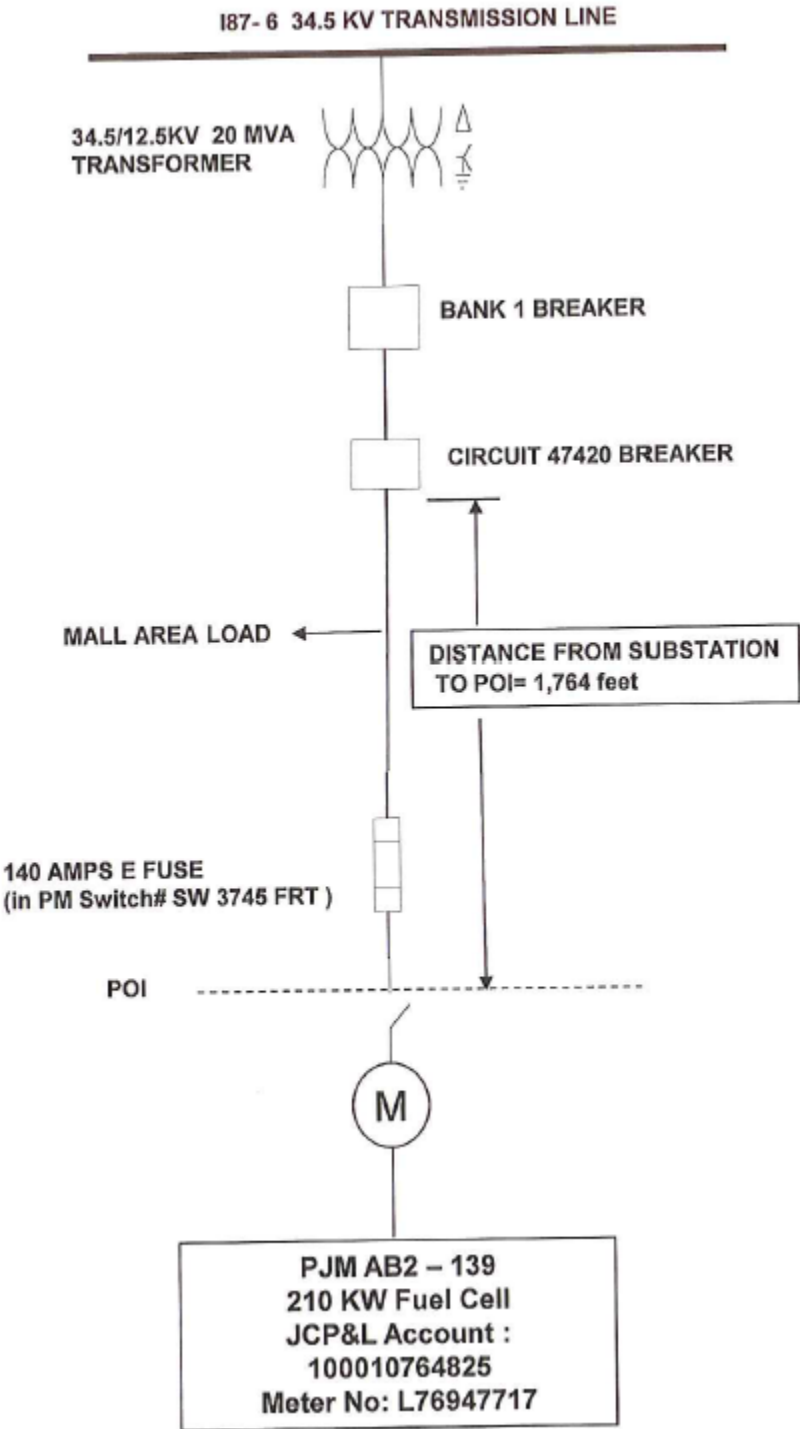
None.

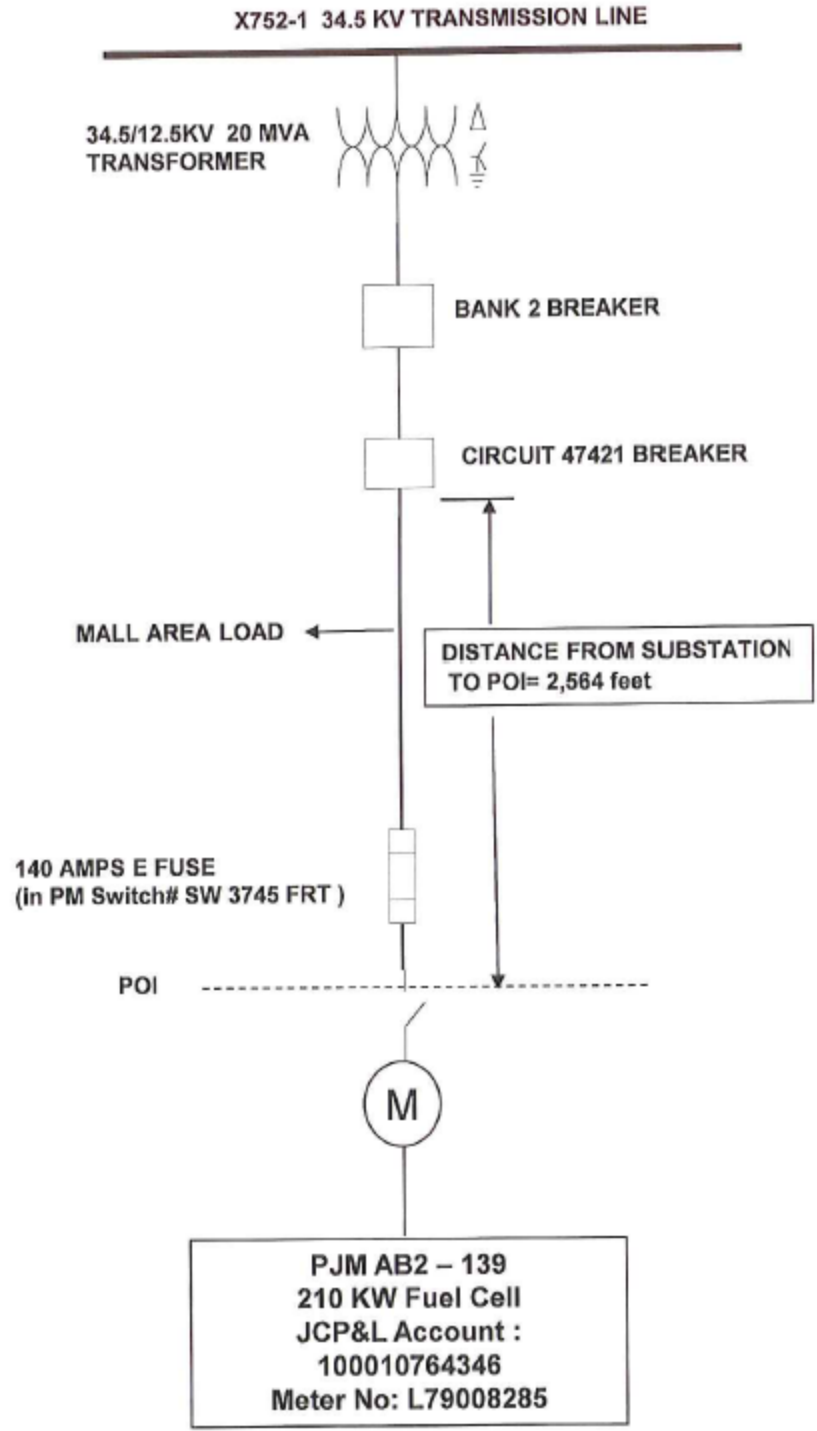
Stability and Reactive Power Requirement for Low Voltage Ride Through

(Summary of the VAR requirements based upon the results of the dynamic studies)

None.

Attachment 1. Single Line Diagrams





Attachment 2. Site Location

