Generation Interconnection Feasibility Study Report Web Version

For

PJM Generation Interconnection Request Queue Position Y2-052

South Bend 500 kV Project

June, 2013

Feasibility Study Report

South Bend 500kV Generation Project

Introduction

This Feasibility Study report provides the documentation of an assessment that has been performed by FirstEnergy (FE) in response to a request made by Interconnection Customer (or IC) for an increase in the Capacity output at their existing generating site located in Shelocta, Pennsylvania (shown in Attachment 1) within the service territory of the West Penn Power Transmission System, a subsidiary of FirstEnergy. The IC has proposed a commercial operation date of June, 2013 for the Project. As per the PJM RTEP study process, the South Bend 500kV (Y2-052) Project assessment was accomplished by: 1. Evaluating the reliability impact of the proposed facilities and connection on the interconnected transmission system by the performance of a power flow study; 2. Ensuring compliance with the NERC, ReliabilityFirst, PJM and FE Reliability Standards by identifying the system reinforcements that will need to be installed for an interconnection of the proposed project; 3. Coordinating and cooperating with the PJM staff and the IC by participating in project meetings and issuing this report as a part of the RTEP study process; 4. Performing a Steady State, Short-Circuit and Dynamics Study as necessary; 5. Conducting all studies in accordance with the PJM Manuals, the "FE Requirements for Transmission Connected Facilities", and the "FE Study Guide".

Connection Facilities

In compliance with the Regional Transmission Expansion Planning (RTEP) protocol, IC has submitted a "Form of Generation Interconnection Feasibility Study Agreement" to PJM that identifies its plan to increase capacity by 34.6 MW at its existing natural gas generation plant located in Shelocta, Pennsylvania. For purposes of this report, this project has been designated as the South Bend 500kV (Y2-052) Project to reflect its interconnection voltage and proximity to the South Bend substation. According to the latest interconnection agreement, the existing total generation for the IC's Shelocta generating plant, is 704 MW (623.4 MW capacity). The increase of 34.6 MW capacity would increase the total output to 658.0 MW capacity. This capacity-only uprate is at an existing facility resulting in no Direct Connection Costs associated with this project as shown Attachments 2 and 3. This report contains detailed connection requirements, power flow analysis, short circuit analysis, and a cost and schedule for any associated system reinforcements related to the proposed increase at the existing POI.

PJM Interconnection Study Results

The following is the report describing the results of the analysis performed by PJM engineers with respect to the transmission system impacts.

Network Impacts

The Queue Project #Y2-052 was studied as a 35.0MW (Capacity35.0MW) injection at the South Bend 500 kV substation in the West Penn Power area of FirstEnergy. Project #Y2-052 was evaluated for compliance with reliability criteria for summer peak conditions in 2016. Potential network impacts were as follows:

Generator Deliverability

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

None

Light Load Analysis

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

Multiple Facility Contingency

(Double Circuit Tower Line, Line with Failed Breaker and Bus Fault contingencies for the full energy output)

None

Short Circuit

(Summary form of Cost allocation for breakers will be inserted here if any)

See Transmission Owner's report

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

(Results of the steady-state voltage studies should be inserted here)

None

Stability and Reactive Power Requirement
(Results of the dynamic studies should be inserted here)

Stability analysis will be performed during the System Impact study.

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)
(Summary form of Cost allocation for transmission lines and transformers will be inserted here if any)

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.
Only the most severely overloaded conditions are listed. 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 will study all overload conditions associated with the overloaded element(s) identified.

Not Applicable

Interconnected Transmission Owner's Analysis Results

The following was prepared by FirstEnergy (West Penn Power Company) the Interconnected Transmission Owner, based upon its analysis, as well as that of PJM, for mitigation of the project's impacts on the transmission and lower voltage system as applicable. It includes the costs and schedules for any system upgrades.
Costs for affected Transmission owners other than FirstEnergy are included and reported in the "New System Reinforcements" and "Contribution to Previously Identified System Reinforcements" sections of the "PJM Interconnection Study Results" above.

Power Flow Analysis

A Power Flow study was conducted to determine the reliability impact of the proposed South Bend 500kV (Y2-052) Project on the FE Transmission System. This included the performance of a contingency analysis to identify any facility overload or voltage condition that violates the FE Planning Criteria. Any such violation that is either directly attributable to this project or for which it will have a shared responsibility is included in this report with a least cost plan identified to mitigate them.

The Power Flow Analysis was performed using a 2015 summer peak load base case provided by the PJM staff. This base case included a detailed representation of the West Penn Power transmission system. A simulation of all possible contingencies within the NERC and FE Planning Standards that are impacted by the Project was conducted to test for criteria compliance.

Results from the study Power Flow Analysis showing a comparison of the FE and PJM contingency study results are detailed on Attachment 4. As shown, the conclusion from this analysis is that there are no new upgrades required for the Project.

Short Circuit and Dynamics Analysis

A short circuit analysis has been performed by PJM and the findings were confirmed by FE. The findings show that no circuit breakers are newly over-dutied as a result of the Project connecting to the FE transmission system.

System Protection Analysis

An analysis was conducted to assess the impact of the South Bend 500kV (Y2-052) Project on the system protection requirements in the area. The results of this review have identified the following:

No relay changes are required to allow for the 35 MW increase in generation.

Metering

The IC will be required to comply with all FE Revenue Metering Requirements for Generation Interconnection Customers. These FE requirements are detailed on Attachment 7 of this report.

Compliance Issues

The IC will be responsible for meeting all FE connection requirements as defined in the FE Requirements for Transmission Connected Facilities document:

www.firstenergycorp.com/feconnect
www.pjm.com/planning/design-engineering/to-tech-standards.aspx

While the voltage analysis is not performed for the feasibility study, any voltage criteria violations that would require the plant to provide reactive power, that determination of reactive power requirements will be determined in the system impact study, which will include the low voltage ride through analysis.

The IC will also be responsible for following the requirements of the "FirstEnergy Wholesale Generation Interconnection (WGI) Manual" and the "FE Approved Vendors and Contractors" documents which are also located at the above links.

The IC must also meet all PJM, ReliabilityFirst and NERC reliability criteria and operating procedures required for standards compliance. For example, the IC will need to properly locate and report the over and under-voltage and over and under-frequency system protection elements for its units as well as the submission of the generator model and protection data required to satisfy the PJM and ReliabilityFirst audits. Failure to comply with these requirements may result in a disconnection of service if the violation is found to compromise the reliability of the FE system.

FE Facility Upgrades and Costs

Results from the PJM and FE Power Flow Analysis (Attachment 4) show that there are no FE criteria violations that are directly attributable to the capacity of the Project at the POI. Therefore in accordance with the RTEP procedures defined in the PJM Open Access Transmission Tariff and PJM Manuals, the IC is not responsible for network upgrades. The PJM findings show that there are no criteria violations which may have an impact on network congestion and local energy deliverability for the POI. Note that the FE and PJM study results differ due to the differences in the study process and power flow programs utilized.

The direct connection for the South Bend 500kV (Y2-052) Project is already in place at the South Bend substation and as a result no associated direct connection costs are included within this report. The total estimated costs without taxes associated with FE protection verification, inspection and oversight is $10,000. FE reserves the right to return to any issues in this document and, upon appropriate justification, request additional monies to complete any reinforcements to the transmission system.

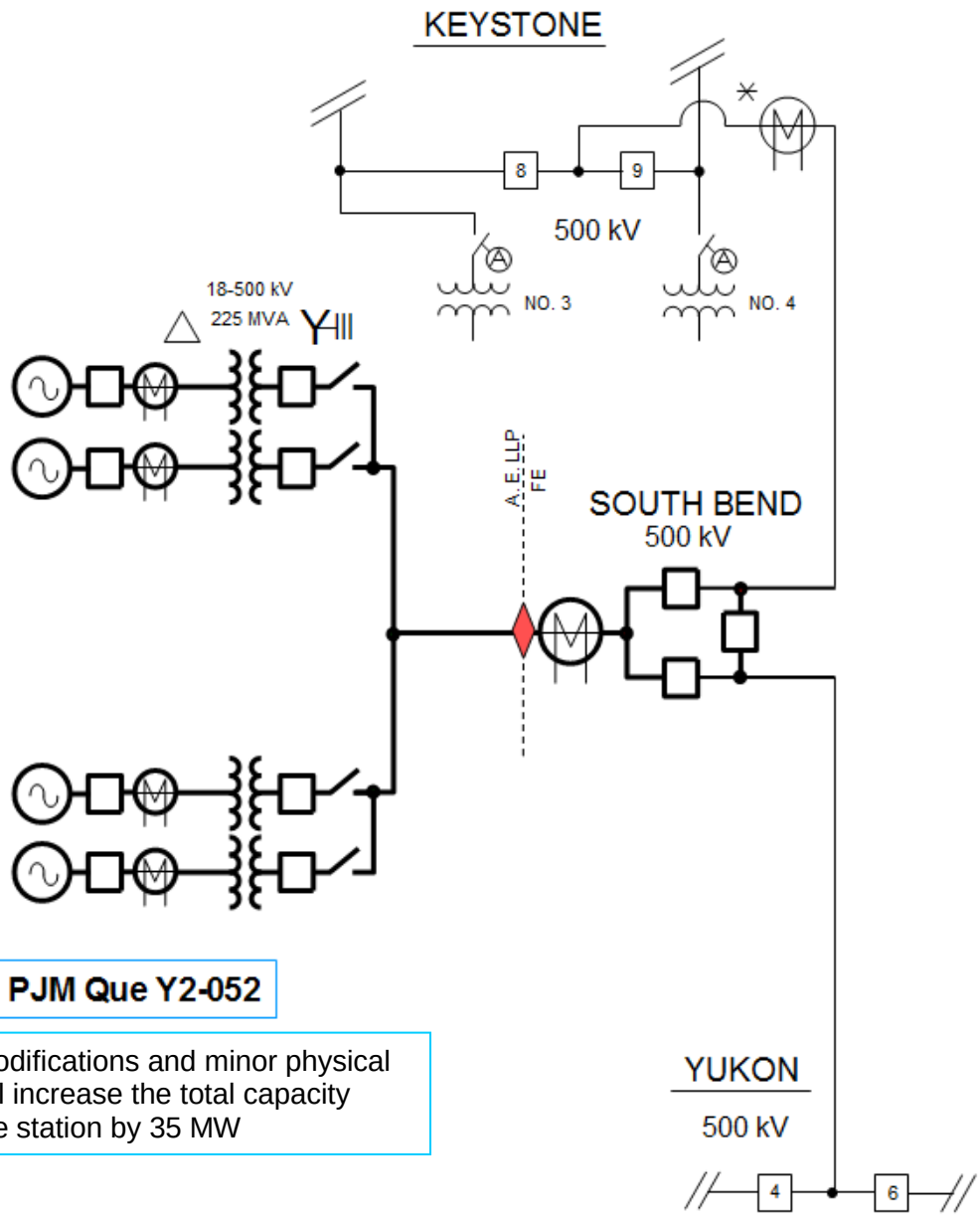
Summary

The South Bend 500kV (Y2-052) Project did not cause any FirstEnergy transmission planning violations and no direct connection facilities are required. As such, no direct connection or network upgrade costs are provided in this assessment.

Attachment 1
Project Location

Attachment 2
Primary POI Substation Configuration

POI (Point of Interconnection) located at red diamond in drawing below



PJM Que Y2-052

Software Modifications and minor physical changes will increase the total capacity output of the station by 35 MW

Attachment 3
Direct Connection Requirements

Not required

Attachment 4
FE Contingency Analysis Results

Not required

Attachment 5
FE Network Facility Reinforcement Conceptual Cost Estimates

Not required

Attachment 6
FE Network Facility Reinforcement Conceptual One Line Diagrams

Not Required

Attachment 7
FE Revenue Metering Requirements

The FirstEnergy Revenue Metering Requirements may be found in the FirstEnergy Requirements for Transmission Connected Facilities document located at the following links:

www.firstenergycorp.com/feconnect
www.pjm.com/planning/design-engineering/to-tech-standards.aspx