PJM Generator Interconnection
W1-057 Earleys 34.5 kV
7.6 MW Capacity / 20 MW Energy
Feasibility Study Report

July 2010
DMS #600297v1

Introduction

This Feasibility Study has been prepared in accordance with the PJM Open Access Transmission Tariff, §36.2, as well as the Feasibility Study Agreement between Interconnection Customer (IC), and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is Virginia Electric and Power Company.

Preface

The intent of this Feasibility Study is to determine a plan, with preliminary cost and construction time estimates, to connect the subject generation interconnection project to the PJM network at a location specified by IC. As a requirement for interconnection, IC 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 and the underlying system. All facilities required for interconnection of a generation interconnection project must be designed to meet ITO technical specifications.

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. IC is responsible for its right of way, real estate, and construction permit issues.

General

Queue W1-057 is an IC 7.6 MW Capacity resource interconnection consisting of a 20 MW solar farm. W1-057 generation will be located near Earleys, North Carolina. Output from the generation will be connected to the 34.5 kV line from Earleys substation.

Potential PJM Network Impacts

Queue project W1-057 was studied as a(n) 20.0 MW (7.6 MW of which was Capacity) injection into ITO system at the Earleys substation. Project W1-057 was evaluated for compliance with reliability criteria for summer peak conditions in 2014.

Potential network impacts were as follows:

Generator Deliverability

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

No problems identified.

Multiple Facility Contingency

(Double Circuit Tower Line contingencies only for the full energy output. Stuck breaker and bus fault contingencies will be performed for the Impact Study)

No problems identified.

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

No problems identified on the transmission system.

System Stability Analysis

Dynamic studies are part of the System Impact Study.

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[1]. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Transmission Interconnection request. As a result of the aggregate energy resources in the area, the following violations were identified.

None.

[1] 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.

Dominion Virginia Power's Assessment Results

IC requested a Feasibility Study of a 20 MW interconnection for its proposed Aulander, NC facility onto ITO's 34.5 kV Distribution System. IC requested that any modifications to existing facilities and any facilities built new to accommodate the 20 MW interconnection requests be constructed for a potential final build out capacity of 20 MW. The requested site has ITO's existing 34.5 kV Earleys Substation Circuit (to be determined) source.

Earleys Substation, located on NC-11/NC-42 between Joe Holloman Rd and NC-11 Business/NC-350 in Aulander, NC, is a 115/34.5 kV substation. It currently houses two 34.5 kV circuits and has room to expand. ITO proposes installing a new breaker to accommodate IC's 20 MW interconnection. Even though the solar capacity factor reduces the capacity amount, the full 20 MW was used for this study onto the distribution network. IC's interconnection is to be located approximately 4000 ft away from the substation. The smallest conductor in the main line to the interconnection is proposed to be 477 AAC which is capable of handling 36 MVA of load.

Non-Direct Connection Local Upgrades

Modifications are required to existing Earleys Substation to accommodate proposed interconnection. Modifications inside the substation will include:

1. relocation of capacitor banks to make room for a new breaker and getaway ($80,000); and
2. distribution bay work to accommodate new breaker ($60,000).

The total estimated cost of substation rearrangement work and new 34.5kV breaker bus work is $140,000.

Direct Connection Local Upgrades (items 1-5) & Attachment Facilities (items 6-7)

The new facilities required to provide the interconnection will include:

1. Installation of transfer trip protection on the new circuit breaker, substation transformer and transmission line terminals in Earleys Substation.
2. Installation of transfer trip protection on IC generator breaker.
3. Installation of approximately 4000 feet of a three phase overhead line and sixteen poles depending on the location of interconnection.
4. Installation of approximately 400 feet of 1000 MCM Bulk Feeder.
5. Installation of new Breaker.
6. Installation of three phase overhead line tension disconnects at two separate pole locations.
7. Installation of pole mounted bi-directional metering.

The Feasibility Study estimated cost for the installation of Direct Connection Local Upgrades and Attachment Facilities is $552,000. The total for Non-Direct Connection Local Upgrades and Direct Connection Local Upgrades is $692,000.

In addition to the ITO facilities indicated above, to provide a transfer trip circuit protection scheme, the IC will be responsible for providing and maintaining communication lines between the IC's main generator breaker and the ITO's Earleys Substation. The IC will also be responsible for providing and maintaining telephone lines to the ITO's metering equipment at the Point of Interconnection. IC provided 34.5 kV 3-phase circuit will interconnect overhead at the Point of Interconnection which will be the load side terminals of the ITO provided pole mounted bi-directional meter. It will be the IC's responsibility to obtain any required right-of-way between the ITO's existing facilities and the Point of Interconnection. IC is responsible for design, purchase,

installation and maintaining all Attachment Facilities on the IC side of the Point of Interconnection.

The estimated time for engineering, material acquisition and construction of this interconnection is approximately 8 months. Detailed engineering, costs, material lead times and construction time requirements will be determined as part of the System Impact Study.