# Generation Interconnection

# Combined Feasibility / Impact Study Report

# for

# Queue Project AE2-132

# REMINGTON CT 230 KV

# 17.7 MW Capacity / 0 MW Energy

July, 2019

# Table of Contents

## 1 Introduction

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

## 2 Preface

The intent of the combined Feasibility / Impact 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.

## 3 General

The Interconnection Customer (IC), has proposed an uprate to an existing Natural Gas generating facility located in Fauquier County, Virginia. This project requests a Capacity-only increase of 17.7 MW. The installed facilities have a total capability of 190 MW with 170 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is 05/31/2020. This study does not imply a TO commitment to this in-service date.

| | |
|---|---|
| **Queue Number** | **AE2-132** |
| **Project Name** | REMINGTON CT 230 KV |
| **Interconnection Customer** | Virginia Electric and Power Company |
| **State** | Virginia |
| **County** | Fauquier |
| **Transmission Owner** | Dominion |
| **MFO** | 190 |
| **MWE** | 0 |
| **MWC** | 17.7 |
| **Fuel** | Natural Gas |
| **Basecase Study Year** | 2022 |

### 3.1 Point of Interconnection

AE2-132 is a CIR uprate to the Remington Unit 3 at the Remington CT substation.

### 3.2 Cost Summary

The AE2-132 project will be responsible for the following costs:

| Description | Total Cost |
|---|---|
| **Attachment Facilities** | $ N/A |
| **Direct Connection Network Upgrade** | $ N/A |
| **Non Direct Connection Network Upgrades** | $ N/A |
| **Total Costs** | $ N/A |

In addition, the AE2-132 project may be responsible for a contribution to the following costs

| Description | Total Cost |
|---|---|
| **System Upgrades** | $ 0 |

## 4 Transmission Owner Scope of Work

Dominion assessed the impact of the proposed Queue Project AE2-132 was evaluated as a 17.7 MW Capacity (0 MW energy) injection at the existing Remington CT 230 kV substation in the Dominion Transmission System, for compliance with NERC Reliability Criteria on Dominion Transmission System. The system was assessed using the summer 2022 AE2 case provided to Dominion by PJM. When performing a generation analysis, Dominion's main analysis will be load flow study results under single contingency (both normal and stressed system conditions). Dominion Criteria considers a transmission facility overloaded if it exceeds 94% of its emergency rating under normal and stressed system conditions. A full listing of Dominion's Planning Criteria and interconnection requirements can be found in the Company's Facility Connection Requirements which are publicly available at: http://www.dominionenergy.com.

The results of these studies evaluate the system under a limited set of operating conditions and do not guarantee the full delivery of the capacity and associated energy of this proposed generation facility under all operating conditions. NERC Planning and Operating Reliability Criteria allow for the re-dispatch of generating units to resolve projected and actual deficiencies in real time and planning studies. Specifically in Planning Studies NERC Category C Contingency Conditions (Bus Fault, Tower Line, N-1-1, and Stuck Breaker scenarios) allow for re-dispatch of generating units to resolve potential reliability deficiencies. For Dominion Planning Criteria the re-dispatch of generating units for these contingency conditions is allowed as long as the projected loading does not exceed 100% of a facility Load Dump Rating.

Note that the ITO findings were made from a conceptual review of this project. A more detailed review of the connection facilities and their cost will be identified in a future study phases. Further note that the cost estimate data contained in this document should be considered high level estimates since it was produced without a detailed engineering review. The applicant will be responsible for the actual cost of construction. ITO herein 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 systems.

## 5 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 | Total Cost |
|---|---|
| | $ 0 |
| | |
| **Total Non-Direct Connection Facility Costs** | **$ 0** |

## 6 Schedule

Not required

## 7 Transmission Owner Analysis

### 7.1 Power Flow Analysis

PJM performed a power flow analysis of the transmission system using a 2022 summer peak load flow model and the results were verified by Dominion. Additionally, Dominion performed an analysis of its transmission system.

### 7.2 Short Circuit Analysis

PJM performed a short circuit analysis and the results were verified by Dominion. The connection of AE2-132 project to the system does not result in any newly overdutied circuit breakers on the Dominion transmission system and does not have a significant fault current contribution to existing overdutied circuit breakers

### 7.3 Stability Analysis

Not required.

# 8 Interconnection Customer Requirements

## 8.1 System Protection

The IC must design its Customer Facilities in accordance with all applicable standards, including the standards in Dominion's "Dominion Energy Electric Transmission Generator Interconnection Requirements" documented in Dominion's Facility Interconnection Requirements "Exhibit C" located at: https://www.dominionenergy.com/company/moving-energy/electric-transmission-access. Preliminary Protection requirements will be provided as part of the Facilities Study. Detailed Protection Requirements will be provided once the project enters the construction phase.

## 8.2 Compliance Issues and Interconnection Customer Requirements

The proposed Customer Facilities must be designed in accordance with Dominion's "Dominion's Facility Interconnection Requirements" document located at: https://www.dominionenergy.com/company/moving-energy/electric-transmission-access. In particular, the IC is responsible for the following:

1. The purchase and installation of a fully rated protection device (circuit breaker, circuit switcher, fuse) to protect the IC's GSU transformer(s).

2. The purchase and installation of the minimum required Dominion generation interconnection relaying and control facilities as described in the System Protection noted above. This includes over/under voltage protection, over/under frequency protection, and zero sequence voltage protection relays.

3. The purchase and installation of supervisory control and data acquisition ("SCADA") equipment to provide information in a compatible format to the Dominion Transmission System Control Center.

4. Compliance with the Dominion and PJM generator power factor and voltage control requirements.

The GSU(s) associated with the IC queue request shall meet the grounding requirements as noted in Dominion's "Dominion's Facility Interconnection Requirements" document located at: https://www.dominionenergy.com/company/moving-energy/electric-transmission-access.

The IC will also be required to meet all PJM, SERC, and NERC reliability criteria and operating procedures 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 SERC 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 Dominion system.

## 8.3 Power Factor Requirements

The IC shall design its non-synchronous Customer Facility with the ability to maintain a power factor of at least 0.95 leading (absorbing VARs) to 0.95 lagging (supplying VARs) measured at the high-side of the facility substation transformer(s) connected to the Dominion transmission system.

# 9 Revenue Metering and SCADA Requirements

## 9.1 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 Section 8 of Attachment O.

## 9.2 Dominion Requirements

See Section 3.4.6 “Metering and Telecommunications” of Dominion’s “Dominion’s Facility Interconnection Requirements” document located at: https://www.dominionenergy.com/company/moving-energy/electric-transmission-access.

# 10 Network Impacts

The Queue Project AE2-132 was evaluated as a 17.7 MW Summer CIR increase to Remington Unit 3 in the Dominion area. Project AE2-132 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE2-132 was studied with a commercial probability of 100%. Potential network impacts were as follows:

# Summer Peak Load Flow

## 11 Generation Deliverability

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

None

## 12 Multiple Facility Contingency

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

None

## 13 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

## 14 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

## 15 System Reinforcements

None

# Affected Systems

# 16 Affected Systems

## 16.1 LG&E

None

## 16.2 MISO

None

## 16.3 TVA

None

## 16.4 Duke Energy Progress

None

## 16.5 NYISO

None

# Short Circuit

## 17 Short Circuit

The following Breakers are overduty: None

## Attachment 1

System Configuration