

NCUC DOCKET NO. EMP-108, SUB 0

**SUPPLEMENTAL PRE-FILED DIRECT TESTIMONY OF
WHITNEY RUBIN
ON BEHALF OF AMERICAN BEECH SOLAR LLC**

ATTACHMENT K

Generator Interconnection Affected System Study Report

PJM Interconnection Cluster AC1



**May 6, 2020
Duke Energy Progress
Transmission Department**

PURPOSE

The purpose of this study was to determine under what conditions the DEP transmission system can accommodate PJM's interconnection cluster AC1. Cluster AC1 includes generation throughout the PJM interconnection, but only those with an impact on the DEP system were included in this study. The size and in-service dates of the projects vary. The following PJM queue requests are included in this analysis:

AC1-034
AC1-086
AC1-098/099
AC1-189
AC1-208

ASSUMPTIONS

The following affected system study results are from a PJM power-flow model that reflects specific conditions of the system at points in time consistent with the generator interconnection requests being evaluated. The cases include the most recent information for load, generation additions, transmission additions, interchange, and other pertinent data necessary for analysis. Future years may include transmission, generation, and interchange modifications that are not budgeted for and for which no firm commitments have been made. Further, DEP retains the right to make modifications to power-flow cases as needed if additional information is available or if specific scenarios necessitate changes. For the systems surrounding the study area, data is based on the ERAG MMWG model. The suitability of the model for use by others is the sole responsibility of the user. Prior queued generator interconnection requests were considered in this analysis.

The results of this analysis are based on the Interconnection Customer's queue requests including generation equipment data provided. If the facilities' technical data or interconnection points to the transmission system change, the results of this analysis may need to be reevaluated.

RESULTS

Power Flow Analysis Results

Facilities that may require upgrade within the first three to five years following the in-service date are identified. Based on projected load growth on the DEP transmission system, facilities of concern are those with post-contingency loadings of 95% or greater of their thermal rating and low voltage of 0.92 pu and below, for the requested in-service year. The identification of these facilities is crucial due to the construction lead times necessary for certain system upgrades. This process will ensure that appropriate focus is given to these problem areas to investigate whether construction of upgrade projects is achievable to accommodate the requested interconnection service.

Contingency analysis study results show that interconnection of these generation facilities result in the following thermal issue on the DEP system. Based on study results for 2020 summer, Table 1 shows thermal facility loadings:

Table 1: Power Flow Thermal Results

Transmission Facility	Loading %	Contingency
Rocky Mount – Battleboro (DVP) 115 kV Line	160	Rocky Mount-Hathaway (DVP) Double Circuit 230 kV Lines

Estimate of Resolutions for Power Flow Impacts

The DEP Rocky Mount-Battleboro 115 kV Line will need to be reconducted with 1590 ACSR conductor or equivalent. All ancillary equipment, including any breakers, wave traps, and CT ratios at both ends of the line will need to be updated to 2000A or greater.

Reconductor

Description: Reconductor/rebuild 8.5 miles of the DEP Rocky Mount-Battleboro 115 kV Line to 1590 ACSR conductor or equivalent
Estimated Cost: \$21,980,250 (DEP cost only)

Line Equipment upgrades

Description: Upgrade any ancillary line equipment at both the DEP and DVP ends of the line to 2000A or greater to enable the full conductor rating.
Estimated Cost: \$658,377 (DEP cost only)

NC Utility Tax(2.5%): \$565,966

Total Power-flow Cost Estimate: **\$23,204,593 (DEP cost only)**

Estimated Schedule: 12/31/2022

SUMMARY

This Generator Interconnection Affected System Study assessed the impact on the Duke Energy Progress system of new generation facilities interconnecting to the Dominion transmission system as part of the PJM AC1 cluster. Power flow analysis found an overloading issue that must be mitigated. A full reconductor/rebuild of the Rocky Mount-Battleboro 115 kV Line will be necessary. Estimates are that the Rocky Mount-Battleboro 115 kV Line can be upgraded by December 31, 2022 if a written agreement to proceed is obtained by July 4, 2020.

Power-flow	\$23,204,593
Stability	\$0
Short Circuit	\$0
<u>Interconnection</u>	<u>\$0</u>
Total Estimate	\$23,204,593

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