

Generator Interconnection Affected System Study Report

PJM Interconnection Cluster AD1

Revision 1



September 9, 2021
Duke Energy Progress
Transmission Department

Generator Interconnection Affected System Study Report:
PJM Interconnection Cluster AD1

PURPOSE

The purpose of this study was to determine under what conditions the DEP transmission system can accommodate PJM's interconnection cluster AD1. Cluster AD1 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:

Queue #	MW	Interconnection Substation or Transmission Line
AD1-022/023	120	Cashie-Trowbridge 230 kV
AD1-056/057	94	Hornertown-Hathaway 230 kV
AD1-074/075/076	484	Trowbridge 230 kV

This Revision 1 removes the upgrade of the Rocky Mount – Hathaway 230kV lines, based on information from PJM impact study reports.

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 issues on the DEP system. Based on study results for 2021 summer, Table 1 shows thermal facility loadings:

Table 1: Power Flow Results

Overloaded Transmission Facility	Loading %	Contingency
Rocky Mount – Battleboro (DVP) 115kV line	235.0	DVP_P7-1: LN 2058-2181: Rocky Mount-Hathaway (DVP) 230kV East and West lines Common Tower Outage
Greenville – Everetts (DVP) 230kV line	124.08	DVP_P7-1: LN 2058-2181: Rocky Mount-Hathaway (DVP) 230kV East and West lines Common Tower Outage

Generator Interconnection Affected System Study Report:
PJM Interconnection Cluster AD1

Interconnection requests contributing to the overloaded facilities care shown in Table 2.

Table 2: Upgrades and Contributing Requests

Overloaded Transmission Facility	Contributing Requests	Upgrade Description	Upgrade Cost	Time to Complete
Rocky Mount – Battleboro (DVP) 115kV line	AD1-022/023 AD1-056/057	Reconductor 8.54 miles	\$31.3 M	30 months
Rocky Mount – Battleboro (DVP) 115kV line	AD1-022/023 AD1-056/057	Build new 115kV Phase Shifter Station	\$25 M*	36 months*
Rocky Mount – Battleboro (DVP) 115kV line	AD1-022/023 AD1-056/057	PJM potential project to reconfigure 115kV lines	-	-
Greenville – Everetts (DVP) 230kV line	AD1-022/023 AD1-056/057 AD1-074/075/076	Reconductor 1.87 miles of one side of double circuit 230kV line plus terminal equipment	\$10 M*	24 months*

* Transmission Planning level estimates

Generator Interconnection Affected System Study Report:
PJM Interconnection Cluster AD1

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 AD1 cluster. Some of the identified upgrades are Contingent Upgrades assigned to earlier queued requests. Power flow analysis found overloading issues that must be mitigated. Required upgrades and assigned costs are listed below.

AD1-022/023 Assigned and Contingent Upgrades	Assigned Cost
Reconductor Rocky Mount-Battleboro 115kV line	\$0
Construct Phase Shifter Station in Rocky Mount-Battleboro 115kV line, or PJM potential project to reconfigure 115kV lines	\$25,000,000 or \$0
Reconductor Greenville-Everetts 230kV line	\$10,000,000
Total for AD1-022/023	-

AD1-056/057 Assigned and Contingent Upgrades	Assigned Cost
Reconductor Rocky Mount-Battleboro 115kV line	\$0
Construct Phase Shifter Station in Rocky Mount-Battleboro 115kV line	\$0
Reconductor Greenville-Everetts 230kV line	\$0
Total for AD1-056/057	\$0

AD1-074/075/076 Assigned and Contingent Upgrades	Assigned Cost
Reconductor Greenville-Everetts 230kV line	\$0
Total for AD1-074/075/076	\$0

Study Completed by: William Quaintance
Bill Quaintance, PE, Duke Energy Progress

Reviewed by: Mark Byrd
Mark Byrd, PE, Duke Energy Progress