

Generator Interconnection Affected System Study Report

PJM Interconnection Cluster AE1

Revision 3 – based on PJM cluster as of 10/2023



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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 AE1. Cluster AE1 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
AE1-056	60	Red House-South Creek 115 kV
AE1-072	150	Shawboro – Sligo 230 kV
AE1-148	90	Kerr Dam-Ridge Rd 115 kV

This Revision 1 is based on the PJM retooling work and reports through 10/2023.

The PJM retooling and this DEP report assume that reconductoring of the Rocky Mount – Battleboro 115 kV line is the next upgrade to address overloading of this line. The completion of the reconductor project is expected May 2025.

The PJM 115 kV reconfiguration project at Hathaway and Battleboro is confirmed as the next upgrade after the reconductor to address loading on the Rocky Mount – Battleboro 115 kV line.

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 2021 summer, Table 1 shows thermal facility loadings:

Table 1: Power Flow Results

Transmission Facility	Loading %	Contingency
Greenville – Everetts (DVP) 230 kV line, 478 MVA (DEP: 485 MVA)	131.2 (129.3)	DVP_P7-1: LN 2058-2181: Rocky Mount-Hathaway (DVP) 230 kV East and West lines Common Tower Outage

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

Table 2: Upgrades and Contributing Requests

Overloaded Transmission Facility	Contributing Requests	Upgrade Description	Upgrade Cost	Time to Complete (months)
Greenville – Everetts (DVP) 230kV line	AE1-072	Rebuild 1.87 miles of aging double circuit 230kV towers, ISD 6/1/2027	\$20.11 M	36 *
Greenville – Everetts (DVP) 230kV line	AE1-072	Reconductor 1.87 miles of one side of double circuit 230kV line plus terminal equipment	\$0.15 M	36 *

* Transmission Planning or Class 5 estimates

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 AE1 cluster. Power flow analysis found overloading issues that must be mitigated. Some of the projects to mitigate the overloads are Contingent Upgrades assigned to earlier queued requests. Required upgrades and assigned costs are listed below.

AE1-056 Assigned and Contingent Upgrades	Assigned Cost
None.	\$0
Total for AE1-056	\$0

AE1-072 Assigned and Contingent Upgrades	Assigned Cost
Reconductor Greenville-Everetts 230 kV line (currently assigned to AD1-022)	\$0
Total for AE1-072	\$0

AE1-148 Assigned and Contingent Upgrades	Assigned Cost
None.	\$0
Total for AE1-148	\$0

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

Reviewed by: Kyle Hord
Kyle Hord, PE, Duke Energy Progress