

Generator Interconnection Feasibility Study Report

**Buncombe County, NC
750 MW Winter / 740 MW Summer
2x1 Combined Cycle Unit
Queue #362 and #363**



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Duke Energy Progress
Transmission Department**

Table of Contents

1 PURPOSE..... 3

2 ASSUMPTIONS 3

3 RESULTS..... 4

 3.1 Power-flow Analysis Results 4

 3.2 Short Circuit Analysis Results 4

 3.3 Interconnection of Customer’s Generation 4

 3.4 Estimate of Interconnection Cost 5

4 SUMMARY..... 6

APPENDIX I : FIGURES..... 7

1 PURPOSE

The purpose of this feasibility study is to assess the impacts of the generator interconnection request on the reliability of the Duke Energy Progress (DEP) transmission system with respect to power flow and short circuit analysis only. Estimates of the cost and time required to interconnect the generation as well as to resolve the impacts as determined in this feasibility analysis are also included. The DEP internal system analysis consists of an evaluation of the internal DEP transmission system utilizing documented transmission planning criteria. The requests are described in Table 1 below. The proposed generation is a 2x1 combined cycle unit. The two CTs (totaling 470 MW winter, 460 MW summer) are proposed to connect to the 115 kV buses at Asheville Plant and the steam turbine generator (280 MW summer and winter) is proposed to connect to the 230 kV buses.

Table 1: Interconnection Requests

DEP Generator Interconnection Queue No.	MW	Requested In-Service Date	County	Facility
Queue #362 and #363	750 W 740 S	10/1/2019	Buncombe Co., NC	Asheville Plant 230 kV and 115 kV switchyards

2 ASSUMPTIONS

The following feasibility study results are from the DEP internal power-flow models that reflect specific conditions of the DEP system at points in time consistent with the generator interconnection request being evaluated. The cases include the most recent information for load, generation, transmission, interchange, and other pertinent data necessary for analysis. Future years may include transmission, generation, and interchange modifications that are not budgeted and for which no firm commitments have been made. Further, DEP retains the right to make modifications to modeling cases as needed if additional information becomes available or if specific scenarios necessitate changes. For the systems surrounding DEP, data is based on the SERC LTSG and ERAG MMWG model. The suitability of the model for use by others is the sole responsibility of the user. Prior queued generator interconnection requests and transmission service requests were considered in this analysis. Specifically, the new transmission upgrades associated with the 600 MW network transmission service request (OASIS #81549303) are assumed to be completed and in-service.

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

This study was based on the following assumptions:

- CUSTOMER would construct, own and operate the electrical infrastructure that would connect their generation to DEP's transmission facilities, including any step up

transformers, low-voltage side generator breakers, and lines from the plant to the power island bus. High-voltage side generator breakers at the power island are included in this report as part of the interconnection facilities.

- The Asheville Plant coal units #1 and #2 will be retired after the combined cycle unit is placed in-service.

3 RESULTS

3.1 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 92% and below, for the requested in-service year or the in-service year of a higher queued request. 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 results show that interconnection of the proposed generation facilities created **no thermal issues** on the DEP transmission system. As mentioned above, the transmission upgrades associated with the 600 MW import request were assumed to be in service for the analysis of the proposed generation addition.

3.2 Short Circuit Analysis Results

A short circuit analysis was performed to assess the impact of the proposed generation addition on transmission system equipment capabilities. The analysis found that the short circuit capabilities of some equipment will be exceeded as a result of the proposed generation additions and associated transmission upgrades. Costs of breaker replacements due to short-circuit requirements are included in the total interconnection costs listed below.

The results of the short circuit study are based on Customer provided generation equipment data and location. If the units' technical data or interconnection points to the transmission system changes, the results of this analysis may need to be reevaluated.

3.3 Interconnection of Customer's Generation

The point of interconnection for Queue #362 will be the east and west Asheville Plant 115 kV buses in Buncombe County, near Asheville, NC. The point of interconnection for Queue #363 will be at the proposed double breaker bay between the north and south Asheville Plant 230 kV buses. The Asheville Plant one-line is provided as Figure 1. Changes to transmission facilities resulting from the prior queued and confirmed 600 MW TSR are shown in **Red** and the additional changes to transmission facilities required for the new combined cycle generation plant are indicated in **Green**. The customer should verify that the MVA ratings of

its equipment are sufficient to accommodate delivering the total MW output to the point of interconnection at the required 0.95 or lower power factor.

3.4 Estimate of Interconnection Cost

The estimate includes the assumption that DEP will use a portion of the Asheville Plant property for the addition of the transmission facilities.

Tap Lines

Description:

For Q362, DEP will tap the Asheville Plant 115 kV east and west buses and construct separate 115 kV lines to the Asheville Combined Cycle Power Island site. The 115 kV Power Island buses will be constructed to allow interconnection of the two new CTs.

For Q363, DEP will tap the new double breaker bay between the Asheville Plant 230 kV north and south buses and a 230 kV line will be constructed to the Asheville Combined Cycle Power Island site. The 230 kV Power Island bus will be constructed to allow interconnection of the new steam turbine generator.

The Asheville-Pisgah 230 kV Black & White lines will be relocated to allow space for the addition of a double breaker bay for connection of the steam turbine generator. (See Figure 1)

Substation Additions/Modifications

Description:

Three (3) 230 kV breakers and thirteen (13) 115 kV breakers are being added or replaced solely for this new generation. Other 230 kV and 115 kV breakers that were already being replaced for the TSR are being upgraded to independent pole breakers for operation of the combined cycle plant. The West 115 kV bus will be upgraded to 3000 amps to accommodate operational testing of the new generation plant.

Estimated Cost:

Modifications to transmission planned to accommodate the 600 MW TSR are estimated to cost approximately \$12,000,000

New transmission projects required solely for the new combined cycle Plant are estimated to cost approximately \$28,000,000

Total Interconnection Cost Estimate: \$40,000,000

4 SUMMARY

This Generator Interconnection Feasibility Study assessed the power flow impact of interconnecting a Combined Cycle plant (totaling 750 MW winter / 740 MW summer) to the existing Asheville 230 and 115 kV switchyards, coincident with retirement of the existing Asheville Units 1 and 2. Interconnection upgrades to the DEP Transmission System are necessary to accommodate Q362 and 363.

Current estimates are that the proposed upgrades **can** be completed to meet the Customer's commercial operating date schedule. Asheville 230 kV and 115 kV generation output will be limited before the planned upgrades are completed.

Power-flow	\$0
Stability	N/A
Short Circuit	N/A
<u>Interconnection</u>	<u>\$40,000,000</u>
Total Estimate	\$40,000,000

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APPENDIX I : FIGURES

-Figure 1-

