

# SOUTHERN COMPANY TRANSMISSION

## Reactive Power Requirements for Generating Facilities Interconnecting to the Southern Companies' Transmission System

### INTRODUCTION

Alabama Power Company, Georgia Power Company, Gulf Power Company, Mississippi Power Company and Savannah Electric and Power Company's ("Southern Companies") general reactive power capability policy for generating facilities interconnecting to the transmission system is that generator owners are required to design the generating facility to maintain a composite power delivery at "Continuous, Rated MW Output"<sup>1</sup> at the interconnection point at a power factor within the minimum range of 0.95 leading to 0.95 lagging. This is the policy as set forth in: (i) the pro forma Large Generator Interconnection Agreement ("LGIA") developed as part of the general Order No. 2003 interconnection standardization proceeding;<sup>2</sup> and (ii) the pro forma Small Generator Interconnection Agreement ("SGIA") developed as part of the general Order No. 2006 interconnection standardization proceeding.<sup>3</sup> The LGIA and the SGIA are attached to Southern Companies' open access transmission tariff.

Consistent with that standard, Southern Companies have developed the following:

- (i) procedures for analyzing the minimum acceptable reactive power capability; and
- (ii) operating requirements for reactive power support;

for interconnecting generating facilities.

### **1. Procedures for Analyzing Minimum Acceptable Reactive Power Capability**

At Continuous, Rated MW Output (for summer peak conditions), calculations performed by Southern Companies must show that the interconnecting generating facility shall have the capability of supplying at least 0.33 MVARs (dynamic vars) into the transmission system for each MW supplied into the interconnection point when the transmission system bus voltage at the interconnection point is at the specified test voltage. The specified test voltages are as follows:

From 44 kV through 161 kV connected units - 1.00 pu

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<sup>1</sup> See **Appendix A** for definitions of "Continuous, Rated MW Output".

<sup>2</sup> Standardization of Generator Interconnection Agreements and Procedures, Order No. 2003, 104 FERC ¶ 61,103 (2003), order on reh'g, Order No. 2003-A, 106 FERC ¶ 61,220 (2004), order on reh'g, Order No. 2003-B, 109 FERC ¶ 61,287 (2004), order on reh'g, Order No. 2003-C, 111 FERC ¶ 61,401 (2005) (collectively referred to as "Order No. 2003").

<sup>3</sup> Standardization of Small Generator Interconnection Agreements and Procedures, Order No. 2006, 111 FERC ¶ 61,220 (2005) ("Order No. 2006").

230 kV connected units	- 1.01 pu
500 kV connected units	- 1.02 pu

The generating facility shall also be capable (at Continuous, Rated MW Output) of absorbing 0.33 MVARs (dynamic vars) from the transmission system for each MW supplied into the transmission system bus when the transmission system bus is at the following specified test voltages:

From 44 kV through 161 kV connected units	- 1.03 pu
230 kV connected units	- 1.04 pu
500 kV connected units	- 1.05 pu

Peaking generation (e.g., simple cycle combustion turbines and other units that would typically be dispatched only during peak load periods) may be exempted from the MVAR absorption requirement on a case-by-case basis.

The calculations made to test the reactive capability requirements set forth above include the allowable range of generator bus voltages considering station service load if it is fed from the generator bus as well as the GSU (generator step up transformer) tap setting. The generating facility must meet both the var production and var absorption requirements on the selected GSU tap setting. For GSU's which do not have a test report available, the manufacturing tolerance for the impedance will be taken into account in the calculations.

## 2. Operating Requirements for Reactive Power Support

When a generating facility is delivering power to Southern Companies' transmission system, the generator owner shall operate its generators to meet its voltage schedule. The voltage will be measured at the interconnection point between the transmission system and the generating facility. If the generating facility does not maintain its scheduled voltage, the generator owner, upon the request of Southern Company Transmission,<sup>4</sup> must explain its inability to comply. Southern Company Transmission will deem the generating facility to have been in compliance with the reactive power requirements if one of the following conditions is met:

- (a) **Maintained voltage was below the required scheduled voltage.** If system conditions occurred that prevented the generating facility from maintaining the voltage schedule and the generator owner demonstrated that the generating facility maximized its MVAR supply.
- (b) **Maintained voltage exceeded the required schedule voltage.** If system conditions occurred that prevented the generator from maintaining voltage schedule and the generator owner demonstrated that the generating facility maximized its MVAR absorption.

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<sup>4</sup> For purposes of this document, the term "Southern Company Transmission" shall mean Southern Companies' transmission operator, transmission owner and transmission planner, as appropriate.

- (c) **Southern Company Transmission had requested a modified GSU tap setting.** Southern Company Transmission requested the generating facility to operate on a GSU tap which made the reactive requirement of the generating facility different from a production value of 0.33 times rated MW and an absorption value of 0.33 times rated MW. The generator owner must have demonstrated that the generating facility provided its maximum MVAR production or absorption in an effort to meet the required voltage schedule. When a modified GSU tap setting is requested, Southern Company Transmission will determine the adjusted minimum requirements and provide them to the generator owner.

If Southern Company Transmission determines that the generating facility did not comply with these requirements, appropriate actions, in accordance with Order No. 2003 or Order No. 2006 (as appropriate), may be taken.

When a generating facility is on-line, the full reactive capacity of the generator(s) is expected to be available to the transmission system whether it is generating at reduced MW or at its Continuous, Rated MW Output. If the generating facility is temporarily operating above Continuous, Rated MW Output, it must reduce to the Continuous, Rated MW Output when requested by Southern Company Transmission if that is necessary for the generator(s) to produce the amount of MVARs required to meet the required voltage schedule. Generator owners which have their generating facility's reactive capability limited by an equipment failure or operating problem should advise Southern Company Transmission and correct the situation as soon as possible.

An exception to the requirement of holding a scheduled voltage on the transmission grid may be given to co-generation facilities that have significant customer load served from the generator bus. These types of facilities will be evaluated on a case-by-case basis.

### 3. **CONSEQUENCES OF NOT FULFILLING ABOVE REQUIREMENTS**

In the event a generating facility subject to these procedures and requirements does not comply with the supply of reactive power support in accordance with the aforementioned requirements, such action will be considered a material breach of the interconnection agreement and appropriate action will be taken.

### 4. **APPLICABILITY**

All interconnection requests for new generators submitted on or after January 20, 2004 are subject to the terms and conditions of these reactive power procedures and requirements. Generators interconnected to Southern Companies' transmission system prior to January 20, 2004 remain subject to applicable reactive power procedures and requirements.

### Definition of Generator Continuous, Rated MW Output

The purpose of this appendix is to define the term "Continuous, Rated MW Output" for the various generator types. All resources connected to the Southern Control Area are required to comply with NERC and SERC schedules and criteria for demonstrating generator MW capability.

1. **Coal, nuclear, oil and gas facilities:** These electric generator types are turbine generators which have steam power as their prime mover. For these facilities the term "Continuous, Rated MW Output" shall mean the generating facility's full load MW capability expected to be available continuously on a daily basis under normal operating conditions during June - August, when all generators of this type residing at the plant are demonstrating concurrently.
2. **Combustion turbine and combined cycle facilities:** These electric generator types are turbine generators which have fuel/air mixtures expanded through combustion as the prime mover for the combustion turbine and, in the case of combined cycle facilities, exhaust heat recovery steam generation as a prime mover for the steam turbine. For these facilities the term "Continuous, Rated MW Output" shall mean the generating facility's full MW capability expected to be available continuously on a daily basis under normal operating conditions during June - August, when all generators of this type residing at the plant are demonstrating concurrently.
3. **Conventional and pumped storage hydro facilities:** These electric generator types are turbine generators which have water as their prime mover. For these facilities the term "Continuous, Rated MW Output" shall mean the generating facility's full load efficient gate MW capability expected to be available continuously for eight hours during five continuous weekdays of the June - August peak season, when all generators of this type residing at the plant are demonstrating concurrently. Simulated operation using an acceptable hydro production modeling program which utilizes at least thirty years of hydro flow data may be used in the demonstrated rating process.