

**GEN-2007-062**

**GEN-2011-019**

**GEN-2011-020**

**Impact Restudy for  
Generator Modification  
(Turbine Change)**

**September 2016  
Generator Interconnection**



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## Revision History

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Date	Author	Change Description
9/29/2016	SPP	Restudy for Generator Modification issued.

## Executive Summary

A Modification Request has been made by the Interconnection Customers for GEN-2007-062, GEN-2011-019, and GEN-2011-020 Interconnection Requests (Combined Generating Facility). The Customers have requested to combine the three Interconnection Requests into a single generator lead and reduce the size of the three Interconnection Requests to be no larger than the original size of GEN-2007-062.

The new generator configuration of the Combined Generating Facility is as shown in the following table.

Interconnection Request Phase	Generators	Aggregate Nameplate Power
GEN-2007-062 (Phase I)	Sixty-three (63) Vestas V100 2.0MW (126.0MW), and Thirty (30) Vestas V117 3.3 MW (99.0MW)	225.0MW
GEN-2007-062 (Phase II)	Eighty-three (83) GE 2.4MW	199.2MW
GEN-2011-019	Eighty-seven (87) Vestas V100 2.0MW	174.0MW
GEN-2011-020	Sixty-nine (69) GE 2.4MW	165.6MW
<b>Project total power</b>		<b>763.8MW</b>

The point of interconnection (POI) is the Oklahoma Gas and Electric (OKGE) Woodward EHV 345kV Substation. S&C Electric Company (S&C) performed the study for this modification request, and S&C’s report on the study follows this summary. The S&C study refers to the entire Combined Generating Facility as GEN-2007-062, but includes the generator configuration as listed above and was studied on the basis that the three Interconnection Requests do not exceed 765MW. If these parameters are not met, this study will be considered invalid and will need be restudied for the correct generator configuration of the Combined Generating Facility.

The study models used were the 2016 winter, the 2017 summer, and the 2025 summer cases and included Interconnection Requests through DISIS-2015-002. The study showed that no stability problems were found with the contingencies studied during the summer and the winter peak conditions as a result of changing to the GE 2.4MW, the Vestas V100 2.0MW and the Vestas V117 3.3MW wind turbines. Additionally, the Combined Generating Facility was found to stay connected during the contingencies that were studied and, therefore, will meet the Low Voltage Ride Through (LVRT) requirements.

A power factor analysis was performed for the study and it was found that the GEN-2007-062, GEN-2011-019, and GEN-2011-020 Interconnection Requests will be required to meet the 0.95 power factor lagging (providing vars) and 0.95 power factor leading (absorbing vars) at the POI. A short circuit analysis was performed and is detailed in the S&C report.

A low wind/no wind condition analysis was performed for this modification request. The analysis showed that the project will inject approximately 57Mvars into the POI during periods of low wind/no wind. The Combined Generating Facility will be required to have approximately 57Mvars of shunt reactors to offset the capacitive injection. The following table shows the approximate reactors necessary for each phase.

<b>Phase</b>	<b>Description (approximate line charging factors)</b>	<b>Approximate reactor</b>
GEN-2007-062 (Phase I)	<ol style="list-style-type: none"> <li>1. Line from Interconnection Customer’s transmission line collection switchyard to POI (5Mvars)</li> <li>2. Line from GEN-2007-062 (Phase I) substation to transmission line collection switchyard (5Mvars)</li> <li>3. Collector subsystem (12Mvars)</li> </ol>	22Mvars
GEN-2011-019	<ol style="list-style-type: none"> <li>1. Line from GEN-2011-019 substation to GEN-2007-062 (Phase I) (6Mvars)</li> <li>2. Collector subsystem (8Mvars)</li> </ol>	14Mvars
GEN-2007-062 (Phase II)	<ol style="list-style-type: none"> <li>1. Line from GEN-2007-062 (Phase II) substation to transmission line collection switchyard (2Mvars)</li> <li>2. Collector subsystem (9Mvars)</li> </ol>	11Mvars
GEN-2011-020	<ol style="list-style-type: none"> <li>1. Line from GEN-2011-020 substation to GEN-2007-062 (Phase II) substation (1Mvar)</li> <li>2. Collector subsystem (9Mvars)</li> </ol>	10Mvars
<b>Total reactors (approximate)</b>		<b>57Mvars</b>

With the assumptions outlined in this report and with all required network upgrades in place, the Combined Generating Facility will be able to reliably interconnect to the SPP transmission grid with the GE 2.4MW, the Vestas V100 2.0MW and the Vestas V117 3.3MW wind turbine generators.

It should be noted that this study analyzed the requested modification to change generator technology, manufacturer, and layout. This study analyzed many of the most probable contingencies, but it is not an all-inclusive list and cannot account for every operational situation. It is likely that the customer may be required to reduce its generation output to 0 MW, also known as curtailment, under certain system conditions to allow system operators to maintain the reliability of the transmission network.

Nothing in this study should be construed as a guarantee of transmission service. If the Customer wishes to obtain deliverability to a specific customer, a separate request for transmission service shall be requested on Southwest Power Pool’s OASIS.