

**UNITED STATES OF AMERICA  
BEFORE THE  
FEDERAL ENERGY REGULATORY COMMISSION**

**Standardization of Small Generator  
Interconnection Agreements and Procedures**

**) Docket No. RM02-12-000  
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**COMMENTS OF THE  
NORTH AMERICAN ELECTRIC RELIABILITY COUNCIL**

The North American Electric Reliability Council (“NERC”) is pleased to submit its comments in response to the Advance Notice of Proposed Rulemaking on Standardization of Small Generator Interconnection Agreements issued on August 16, 2002 (“ANOPR”), and to the filings made by various parties thereafter. NERC has monitored the development of draft interconnection agreements and procedures by the parties (the “Coalition”)<sup>1</sup> engaged in the consensus building activity under the Commission’s auspices that were established through the ANOPR. The NERC Board of Trustees has assigned its Planning Committee<sup>2</sup> to provide expert review of the emerging small generator interconnection agreements and procedures, for the purpose of assessing potential impacts to the reliability of North American bulk electric systems.

It is apparent by the numerous annotations to the draft small generator interconnection agreements and procedures filed by the Coalition that significant areas of disagreement remain among the participants. Some of these differing perspectives point to a lack of consensus on the degree to which the reliability of the bulk electric and distribution systems, and the quality of service to other customers, may be affected by the expedited interconnection process and the proposed “no impact” screens. Given the limited time between the filings of agreements and procedures documents on November 12 and 19 and the December 20 deadline for comment, as well as the introduction of subsequent annotations filed by the

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<sup>1</sup> The Transmission/Distribution Coalition (TDC), the Small Generator Coalition (SGC), and the National Association of Regulatory Utility Commissioners (NARUC) are collectively referred to as the “Coalition”.

<sup>2</sup> The Planning Committee has delegated the technical review to its Planning Standards Subcommittee, a group that was instrumental in developing NERC’s planning standards on interconnections and in reviewing the proposed Standardization of Generator Interconnection Agreements and Procedures rulemaking under Docket No. RM02-1-000.

parties as late as December 9 and 10, NERC's initial review has focused on an assessment of potential reliability risks associated with the ANOPR and the November 12 and 19 documents filed by the Coalition parties.

On the basis of the differences among the Coalition parties and NERC's initial identification of several potential reliability concerns listed below, NERC respectfully requests the Commission to:

1. Consider NERC's comments below when working to resolve the differences among the Coalition parties in the course of drafting a proposed rule;
2. Seek further clarifications on the Coalition parties' unresolved issues during the NOPR proceeding to ensure that reliability issues are adequately addressed in the proposed rule;
3. Allow sufficient time (at least 60 days) during the NOPR comment process for more detailed review and analysis of the issues.

NERC will continue to assist the Commission in its rulemaking process by monitoring further development of the proposed small generator interconnection agreements and procedures and providing timely feedback to the Commission should specific reliability concerns arise.

**Reliability Issue 1 – Sufficiency of Screens for Determining No Reliability Impact:** The underlying premise in the draft small generator interconnection agreements and procedures is that small generators have less impact on the system and therefore require less analysis. While this premise may be reasonable for individual generators up to and including 2 MW, there are unique complicating factors that may warrant study for larger generators or for concentrations of smaller generators in a given area. Seldom in industry practice would a generator larger than 10 MW be connected without studying the reliability impacts, feasibility, facilities requirements, protection requirements, etc. Additional requirements can apply on a regional or industry-wide basis. Many Regional Reliability Councils, for example, have established power flow, voltage, stability, short circuit, and protection requirements for generators that have a 10 MW or larger nameplate rating. While the goal of expediting and standardizing the interconnection process is well understood, further inputs should be sought from industry on the

sufficiency of the proposed screens in determining the study requirements of generators that have a 10 MW or larger nameplate rating, and whether such a screening process is beneficial for generators of such size or not.

**Reliability Issue 2 – Effects of Aggregating Small Generators:** Although one generator project may pass the proposed screens for expedited handling, the cumulative impact of multiple new generators may affect reliability. Although there is a brief reference to the aggregated effects of small generators, the issue is more complex than is acknowledged in the current draft documents. Additional complexity arises when multiple requests to interconnect generators are received at different times, yet there is uncertainty as to which projects may actually become interconnected and which will not. There must be some orderly method for sequencing the study of proposed generator additions. Because these impact studies would generally be conducted on a regular cycle and include all proposed projects submitted within the cycle, it may be appropriate to reference a fixed study cycle rather than study time limits for each individual project.

**Reliability Issue 3 – Generator Data Models:** There are multiple references to IEEE models as the basis for generator data requirements. However, the IEEE models are not generally used in industry practice for studying the impact of generators. The most commonly used data models are the power flow and associated stability models of PSS/E (PTI, Inc.) and PSLF (General Electric Corporation). Data requirements for small generators should be based on the type of data required by today's power flow and dynamics programs that are used for the analysis of system impacts.

**Reliability Issue 4 – Reference to NERC and Regional Reliability Council Standards:** There are no references in the draft documents to small generators meeting NERC and Regional Reliability Council standards for voltage regulators on synchronous generators, speed governing equipment, relay protection, power quality, and data reporting. For small generators, such criteria are important for assuring the reliability of the distribution system and avoiding adverse impacts on other distribution customers or the bulk electric system. Small generators should not be allowed to create power quality

issues for neighboring or parallel loads. Voltage and frequency variation limits or requirements need to be clearly defined. All references to criteria in the documents must clearly delineate what criteria are to be met or addressed.

**Reliability Issue 5 – Safety of Non-Dispatched Resources:** Safety becomes an issue when a small generator is operated outside the dispatch of the system operator. While such operation can be generally accepted, if a line is out for repair or maintenance and a small generator remains in service, a safety hazard may be caused by the generator back-feeding into an isolated feeder. This concern points to the need for small generators to have a contact person to receive operational communications and to be available for daily communications with the operator of the distribution system or the bulk electric transmission system.

**Reliability Issue 6 – Additional Screen Needed for Overvoltage:** The islanding of synchronous or induction generators with utility equipment that contains an amount of capacitive MVARs greater than 25% of the generator rating can cause a near instantaneous escalation of voltage to levels greater than 2.5 per unit (e.g., 34.5 kV on a 13.8 kV system). Such an excessively high voltage would likely lead to arcing and failure of the generator, utility equipment, and/or customer load devices that are in the islanded area, as well as creating a safety hazard for maintenance personnel. The response of distribution systems with connected small generators to islanding situations has been extensively studied through field tests and transient simulations, as reported by Ferro and Gish.<sup>3</sup> The conclusion of these papers is that an overvoltage condition can occur when a synchronous or induction generator is isolated with (1) capacitive vars that are greater than 25% of the generator rating and (2) the total generation exceeds 33% of the load connected to it. The first three of the Primary Screening Criteria address some but not all of the possible interconnection scenarios that could lead to damaging and potentially hazardous

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<sup>3</sup> W.E. Ferro, W.B. Gish, "Overvoltages caused by DSG operation: Synchronous and Induction Generators," IEEE Vol. PWRD-1 Jan. 1986; and  
W.E. Ferro, W.B. Gish, "Ferroresonance and Loading Relationships for DSG Installations," IEEE Vol. PWRD-2 July 1987

overvoltage conditions. NERC recommends that an additional criterion be considered in the Primary Screening Criteria to cover interconnection scenarios that could lead to overvoltages:

“Proposed generators not using an inverter based equipment package must not be connected to the power system at a location where the operation of protective devices (e.g., circuit breakers, circuit switchers, fuses, etc.) can isolate an aggregate amount of generation that exceeds 30% of the minimum load in the isolated area.”

**Reliability Issue 7 – Spot Networks Are Not Common:** “Spot networks” are referenced in the small generator screening criteria. This type of primary (high voltage, e.g., 4 kV) distribution network is unique to a few electric systems, notably in the New York City area, and is not common to the rest of North America. NERC requests that the Commission consider the uniqueness of these networks and not adopt *pro forma* small generator screening criteria based on these networks. These criteria may rather be offered on an exception basis as unique connection requirements by distribution operators that operate such systems.

Respectfully submitted,

NORTH AMERICAN ELECTRIC  
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