

# Industry Advisory

## Generator Governor Frequency Response

Initial Distribution: February 5, 2015

**As a result of the Eastern Interconnection Frequency Initiative, the NERC Resources Subcommittee has determined that a significant portion of the Eastern Interconnection generator deadbands or governor control settings inhibit or prevent frequency response. While this specific work was based on the Eastern Interconnection, in the absence of more stringent regional requirements the following good practice and guidance is applicable to all interconnections. The proper setting of deadbands, droop, and other controls to allow for primary frequency response is essential for reliability of the Bulk Electric System (BES) and critical during system restoration. Further, the accuracy of Transmission Planning models are impacted by incorrect governor data. The purpose of this Advisory is to alert the industry of recommended governor dead band and droop settings that will enable generators to provide better frequency response to support the reliable operation of the Bulk Electric System.**

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### Distribution:

**Initial Distribution:** Balancing Authority, Generator Owner, Generator Operator, Reliability Coordinator, Transmission Operator, Transmission Planner

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**Primary Interest Groups:** Generation Engineering, Generation Operations, System Operators, Transmission Planning

**Advisory:** With exception of nuclear generators, all recipients of this Advisory with generating resources with gross plant / facility aggregate nameplate rating greater than 75 MVA should review generator governor and Distributed Control System (DCS) settings and ensure that, in the absence of technical or operational considerations, dead bands do not exceed +/- 36 mHz, droop setting does not exceed 5%, and that governors are coordinated with the DCS at the generating unit or plant level to provide frequency response.

A growing number of generator governor controls are contained in the associated turbine control system. Typically these functions are referred to as speed control, and reference turbine speed in revolutions per minute (rpm). Entities should review these turbine controls and settings to ensure they are providing the desired governor response with a maximum 36 mHz deadband and a droop characteristic not exceeding 5%. As generator deadband and droop settings are determined or modified, Generator Owners and Operators should communicate those settings and other important governor control system data to their Balancing Authority and Transmission Planning Authority.

**Background:** Accurate dead band and droop information and proper settings are important to the reliable operation of the BES, system restoration and transmission planning models, as explained in NERC's October, 2012 Frequency Response Initiative Report (attached). Building on this work, NERC's Resources Subcommittee authored the Eastern Interconnection Frequency Initiative Whitepaper (attached) in October, 2013, to focus specifically on the importance of appropriate generator governor settings to frequency response.

The NERC Resources Subcommittee has reviewed the generator data submitted in the Eastern Interconnection Frequency Response Survey as well as the survey in the September, 2010, NERC Recommendation Alert "Generator Governor Information and Settings" and determined that many Generator Owners and Operators failed to provide their generator governor dead band or droop settings, possibly because they may lack the resources or knowledge to determine that information. A number of generators owners or operators submitted deadbands in excess of 50 mHz to nearly 300 mHz. Several Generator Owners and Operators have reported an original equipment manufacturer (OEM) governor type with multiple deadband setting configurations including one deadband setting under normal operations at 252 mHz. While this specific information refers to the Eastern Interconnection, in the absence of more stringent regional requirements it is applicable to all interconnections as a matter of good practice and guidance.

NERC encourages Generator Owners and Operators (excluding nuclear generators, which typically have technical considerations precluding their ability to provide frequency response) to work in conjunction with their Balancing Authority to verify generator governor deadband settings, and as appropriate modify deadband settings to be set no greater than +/- 36 mHz with droop settings no greater than 5%, with a continuous, proportional (non-step) implementation of response. Related outer-loop controls within the DCS, as well as other applicable generating unit or plant controls, should be set to avoid early withdrawal of primary frequency response. Generator Owners and Operators should ensure that governors are functional and are capable of providing frequency response.

NERC further encourages Generator Owners and Operators to collaborate with the North American Generator Forum, industry trade associations, and original equipment manufacturers for support in determining and verifying governor deadband and droop settings, and if applicable, how to modify governor settings and frequency response input into generator control logic.

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