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Integrating Renewable Energy Into Interstate Grid

Law360, New York (May 20, 2009) -- On April 16, 2009, the North American Electric Reliability Corporation issued a special report entitled *Accommodating High Levels of Variable Generation*, in which the authority proposed measures for addressing the challenges to grid reliability posed by increasing contribution of renewable generation into the United States' power plant portfolio.

Due in part to increased state and federal policies providing incentives for the construction and operation of renewable power plants, NERC expects a 350 to 700 percent increase in renewable generation — from wind, solar, ocean and certain hydrokinetic sources — compared to 2008 levels.

By their nature, these sources of energy are intermittent in terms of power production and therefore pose reliability challenges to grid operators charged with the task of balancing electricity supply and demand on a second-by-second basis.

NERC's assessment and proposals are timely and carry significant weight, especially since NERC has been delegated the authority by the Federal Energy Regulatory Commission to set and enforce national grid reliability standards.

The report describes at length the unique operational and planning challenges posed by each of the primary intermittent renewable generation resources — namely, wind and solar. The report goes on to present numerous measures for addressing these challenges, with individual tasks for specific industry stakeholders.

For instance, NERC suggests that power system planners do the following:

- Develop standard and nonconfidential power flow and stability models that incorporate increased levels of variable generation
- Prepare consistent and accurate methods for assigning capacity values to variable generation

- Enhance interconnection procedures and standards for all generation to address voltage and frequency ride-through, reactive and real power control, frequency and inertial response
- Update resource adequacy and transmission planning processes to determine the system flexibility needed to accommodate the variable nature of renewable resources
- Consider the effect of large-scale deployment of plug-in hybrid electric vehicles, storage and demand response programs, and variable distributed generation resources (such as rooftop solar panels on commercial buildings)
- Adopt probabilistic planning techniques to ensure that system designs maintain bulk power system reliability
- Reconcile bulk power system voltage ride-through performance requirements and local distribution system anti-islanding voltage drop-out requirements

NERC proposes the following for grid operators:

- Incorporate forecasting techniques into day-to-day operational planning and real-time operations, including unit dispatch
- Ensure that balancing areas have adequate communications for monitoring and transmitting dispatch instructions to variable resources
- Consider securing ancillary services by enlarging balancing areas or participating in wider-area balancing management
- Modify operating practices, procedures and tools to respond to the increased levels of renewable generation

NERC also proposed several industry-wide initiatives, such as the following:

- Industry should support and encourage efforts to develop short circuit and dynamic models.
- Industry participants—generation owners, operators and vendors—should increase their familiarity with the intent and purpose of NERC's Modeling, Data and Analysis Standards.
- Industry should conduct additional research and development on probabilistic planning techniques and the data needed to perform such analysis.
- Industry should develop minimum requirements and/or market mechanisms to ensure that the system features suitable operating characteristics (e.g., ramping requirements,

minimum generation levels, shorter scheduling intervals) and the appropriate resource mix that will maintain reliability.

- Variable generation manufacturers should support the development of detailed three-phase models required for special power system studies.

- Federal, state and provincial regulators and policy makers should consider the impacts of variable generation integration on interstate and provincial bulk power system reliability in their oversight and evaluation activities; collaborate to remove obstacles, accelerate siting and approve permits for transmission line construction; stress the importance of coordinated transmission and resource planning; and consider the issues and opportunities associated with larger balancing areas and the development of shorter resource scheduling intervals or regional dispatch optimization.

- The industry should focus on research and development initiatives, including developing demand response and storage technologies; monitoring the reliability implications of distributed variable generation; improving forecasting methods, especially for severe weather events and next hour(s) ramping events; and developing advanced probabilistic power system planning techniques.

- Industry should reconcile bulk power system voltage ride-through performance requirements and local distribution system anti-islanding voltage drop-out requirements.

NERC also recognizes the need for it to develop a reference manual to educate bulk power and distribution system planners and operators on reliable integration of large amounts of renewable generation. NERC also provides a proposed work plan for 2009 through 2011 for NERC and industry members.

NERC's report comes on the heels of FERC's issuance on March 19, 2009, of a proposed policy statement and action plan on smart grid development.

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