

Panel III, Written Remarks
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Good morning Chairman Wellinghoff, Commissioners, staff, and fellow panelists. My name is Mark Lauby and I am the Vice President and Director of Reliability Assessment and Performance Analysis of the North American Electric Reliability Corporation (NERC). I am an Electrical Engineer with more than 30 years experience in the bulk power system industry. I have worked at NERC for 5 years, becoming Vice President in 2011.

In the coming ten years, the North American electric industry will face a number of significant emerging reliability issues. The confluence of these issues will drive a transformational change for the industry, potentially resulting in a dramatically different resource mix, implementation of environmental regulations, a new model for customer interaction with their utility, and a smarter grid built to address growing cyber security concerns. Each of these elements of change is critically interdependent; government and industry action must be closely coordinated to ensure reliability. By assessing and analyzing historic, current and future conditions, as well as emerging issues, NERC develops information vital to being a risk-informed organization and supporting a learning environment for industry to pursue improved reliability performance.

Today, I am here to discuss the key findings of NERC's recent assessment of pending and future environmental regulations and their relationship to bulk power system reliability.

Current State of Processes for Identifying Unit-Specific Local or Regional
Reliability Issues in Response to Final EPA Regulations

1. NERC and Reliability Assessments

In 2007, NERC was designated the Electric Reliability Organization (ERO) by the Federal Energy Regulatory Commission (FERC) in accordance with Section 215 of the Federal Power Act, enacted by the Energy Policy Act of 2005. Following approval by FERC, reliability standards promulgated by NERC became mandatory across the bulk power system. As mentioned before, Section 215(g) of the Federal Power Act requires the ERO to conduct periodic assessments of the reliability and adequacy of the bulk-power system in North America. Section 802 of NERC's *Rules of Procedure* outlines the objectives and scope of the Reliability Assessment Program, which includes the following:

- Review, assess, and report on the overall electric generation and transmission reliability (adequacy and operating reliability) of the interconnected bulk power systems, both existing and as planned

- Assess and report on the key issues, risks, and uncertainties that affect or have the potential to affect the reliability of existing and future electric supply and transmission
- Review, analyze, and report on regional self-assessments of electric supply and bulk power transmission reliability, including reliability issues of specific regional concern
- Identify, analyze, and project trends in electric customer demand, supply, and transmission and their impacts on bulk power system reliability
- Investigate, assess, and report on the potential impacts of new and evolving electricity market practices, new or proposed regulatory procedures, and new or proposed legislation (e.g. environmental requirements) on the adequacy and operating reliability of the bulk power systems

NERC's Rules of Procedure also outline parameters for reliability assessment reports, including periodic and special reliability assessments. The results of these reliability assessments are documented in three types of reports: the long-term assessment, annual seasonal (summer and winter) assessment, and special assessment. NERC's reliability assessments are conducted to provide an independent view of the reliability of the bulk power system and to identify trends, emerging issues, and potential concerns. NERC's projections are based on a bottom-up approach involving the collection of data and perspectives from grid operators, electric utilities, and other users, owners, and operators of the bulk power system. This approach is then supplemented by the independent analysis and reporting by NERC.

NERC assesses industry's plans to preserve bulk power system reliability in a number of ways:

- The **Long Term Reliability Assessment** annually assesses the adequacy of the bulk electric system in the United States and Canada over a ten-year period
- The **Summer and Winter Assessments** assess the adequacy of electricity supplies in the United States and Canada for the upcoming summer and winter peak demand periods. These two reports provide an overall perspective on the adequacy of generation resources and the transmission systems to meet projected summer and winter peak demands
- **Special Assessments** are conducted on a regional, interregional, or interconnection-wide basis as conditions warrant, or as requested by NERC's board or governmental authorities. NERC reliability and technical experts also may initiate special assessments of key reliability issues and their impacts on the reliability of regions, subregions, or an interconnection (or a portion thereof). Such special reliability assessments may include, among other things, operational reliability assessments, evaluations of emergency response preparedness, adequacy of fuel supply, hydro conditions, reliability impacts of new or proposed environmental rules and regulations, and reliability impacts of new or proposed legislation that affects or has the potential to affect the reliability of the interconnected bulk power systems in North America

As part of a special reliability assessment, NERC undertook its study of resource adequacy results from four U.S. Environmental Protection Agency (EPA) environmental regulations. The topic of EPA regulations was seen as a high likelihood-high consequence issue for bulk power system reliability, and NERC, in consultation with its stakeholders undertook their original study in 2010.

2. 2010 Special Reliability Scenario Assessment: Resource Adequacy Impacts of Potential U.S. Environmental Regulations

The NERC Planning Committee directed the Reliability Assessment Subcommittee to complete a special reliability assessment of the *2009 Long-Term Reliability Assessment* that noted environmental legislation and regulation as an emerging issue. In July 2010, NERC completed an assessment of the status and bulk power system reliability effects from integrating technologies to address potential climate change initiatives.¹ In October 2010, NERC released a report titled, *2010 Special Reliability Scenario Assessment: Potential Resource Adequacy Impacts of U.S. Environmental Regulations*.

The NERC Planning Committee and Reliability Assessment Subcommittee are made up of U.S. and Canadian industry experts, engineers, and technical advisors with expertise in resource planning and environment regulations representing all sectors of the electric power industry. The focus of this special reliability assessment is to identify potential outcomes of future EPA regulations and quantify potential effects on future resource adequacy (i.e., reductions in Planning Reserve Margins).

Additionally, the report was intended to inform NERC's stakeholders, industry leaders, policymakers, regulators, and the public so that sound and informed decisions can be made regarding resource requirements. It is NERC's responsibility, as the ERO, in the United States to assess and highlight bulk power system reliability considerations resulting from emerging system conditions or external events to ensure that suitable plans are put in place to ensure reliability.

The scope of this special assessment included study of the potential implications of four pending EPA regulations on resource adequacy, based on expectations as of the end of October 2010. The four regulations studied individually and in aggregate were:

- i. ***Clean Water Act – Section 316(b), Cooling Water Intake Structures***
Assumed the retrofit of open-loop cooling systems to closed-loop cooling (addition of cooling towers was assumed in our modeling analysis) and all nuclear plants made the upgrades
- ii. ***Clean Air Act – Section 112, Utility Air Toxics***
Title I of the *Clean Air Act – National Emission Standards for Hazardous Air Pollutants* (NESHAP), or *Maximum Achievable Control Technology (MACT) Standards*; (the proposed *Utility Air Toxics Rule* was issued on March 16, 2011). Requires coal-fired plants to reduce their emissions of air toxics, including mercury and acid gases
- iii. ***Clean Air Transport Rule (CATR)***
Regulates SO₂ and NO_x to reduce long-range transport of pollutants contributing to ground-level ozone and fine particle non-attainment issues in downwind states
- iv. ***Coal Combustion Residuals (CCR)***
Would regulate coal-fired power plants currently disposing of more than 130 million tons per year of coal-ash and solid byproducts

¹ NERC Report, *Reliability Assessment of Climate Change Initiatives: Technology Assessment and Scenario Development*, http://www.nerc.com/files/RICCI_2010.pdf, July 2010

Planning bulk power system resources requires an integrated view, one that addresses the cumulative effects of multiple factors that drive decisions. It is for this reason that NERC assessed the impacts resulting from water, air and hazardous waste regulations.

3. Conduct of the Study

Through an integrated impact analysis, NERC was able to assess the cumulative effects of multiple regulations on electric power generation. Because more than one regulation pertains to any given power plant, the integrated analysis enabled NERC to perform an economic assessment, using industry-vetted assumptions, to measure the effects of complying with these regulations. This integrated impact analysis process is comparable to the way in which industry does planning—industry must deal with all regulations rather than each regulation in isolation.

By determining the aggregate impact of the multiple applicable regulations, industry can identify economically vulnerable units, make decisions on potential retirements and retrofits, and acquire additional capacity resources to maintain reliability for both demand and supply, as appropriate. To complete this decision process, industry must be given enough time to effectively coordinate both retirement and retrofit decisions for existing generation. Each power plant in the United States will have its own unique characteristics. Different areas of the country will be affected more than others; therefore, from a power system planning and wide-area reliability perspective, the geographic location of the most affected units must be well understood.

The assessment design is particularly important to understand—the assessment results are a snap-shot of the future based on sound engineering assumptions where uncertainty exists. The assessment relies on two separate scenario cases (moderate and strict) for each rule to provide sensitivities to the assumptions used. The strict case scenarios reflect the coupled effects of higher compliance costs with more stringent requirements for the proposed rules (i.e., stricter emission standards and exclusion of government extensions).

As the EPA proposed rules were not final, the moderate case and the strict case provided sensitivities based on expert judgment and there were reasonable assumptions as to the difference in possible outcomes from the potential EPA rules. Further, NERC assessed each regulation individually and in combination to determine the cumulative effects on resource plans. NERC then calculated the amount of capacity reductions due to accelerated unit retirements and increased station load needed to power additional environmental controls for the years 2013, 2015, and 2018, based on demand and generation projections from NERC's 2009 Long Term Reliability Assessment.

4. 2010 Study Results

The results of the 2009 special assessment can be summarized in three key considerations:

- i. Timing: The timing of industry's obligations for compliance with environmental

regulations is the most important consideration. The pace and stringency of these environmental regulations should take into consideration the overall cumulative risk to the bulk power system. Reliability will be a function of the timing associated with regulatory compliance deadlines. The industry needs both time and certainty to act and make informed decisions

- ii. Tools: NERC identified a number of tools the industry and regulators have for mitigating potential reliability impacts from complying with the environmental regulations assessed in this report. Advancing in-service dates of future generation and implementing more demand response and energy efficiency, as examples, could help alleviate projected capacity losses in severely affected areas. Where organized energy markets exist, price signaling for new resources requirements will be especially important to replace potentially lost capacity in a timely manner. EPA, FERC, the U.S. Department of Energy (DOE) and state utility regulators, both together and separately, should employ the array of tools at their disposal to moderate reliability impacts, including, granting extensions to install emission controls where warranted
- iii. Coordination: Industry coordination will be vital to ensure retrofits are completed in a way that does not diminish reliability. Statutory and regulatory safeguards also allow the EPA, the President of the United States, and DOE to extend or waive compliance under certain circumstances. Increased coordination with state regulators will be required to ensure rules can be implemented effectively in order to maintain reliability. Coordinating an industry-wide environmental control retrofit effort creates considerable operational challenges to manage the maintenance schedules of what may be hundreds of retrofits in a short period of time. It will require careful coordinated planning, carried out by the operators throughout the interconnections

The results and key findings of the 2010 report were:

- **EPA Regulations May Have Significant Impacts on Planning Reserve Margins**
 - For the Strict Case, up to a 78 GW reduction of coal, oil, and gas-fired generation capacity is identified as economically vulnerable during the ten-year period of this scenario. For the Moderate Case, this reduction occurs in 2018; while in the Strict Case, similar reductions occur in 2015
 - Due to increased demand growth, this reduction in capacity significantly affects projected Planning Reserve Margins for a majority of the NERC Regions and subregions. Potentially significant reductions in capacity within a five-year period require heightened need for the addition of resources in a short time-period
 - Overall, impacts on Planning Reserve Margins and the need for more resources is a function of the pace of the proposed EPA rules.
- **Regional Capacity Impacts Varies**

Capacity reductions are concentrated in six NERC regions: Texas Reliability Entity (TRE), Midwest Reliability Organization (MRO), Northeast Power Coordinating Council

(NPCC), ReliabilityFirst Corporation (RFC), SERC Reliability Corporation (SERC), and the southern portion of the Western Electricity Coordinating Council (WECC). I have attached a map showing the boundaries of the NERC regions to my testimony

- **Individually, as modeled, the Section 316(b) Cooling Water Intake Structures Rule Would Have the Greatest Potential Impact on Planning Reserve Margins**

This rule will apply to 252 GW (1,201 units) of coal, oil steam, and gas steam generating units across the United States, as well as approximately 60 GW of nuclear capacity (approximately a third of all resources in the U.S.). We assumed all nuclear plants would remain on line in this assessment, though the Oyster Creek nuclear power plant has since announced retirement in 2019

- **As modeled the Maximum Achievable Control Technology Standards (MACT), Clean Air Transport Rule (CATR), and the Coal Combustion Rule CCR Rules Also Contributed to Reductions in Capacity**

- The “hard-stop” 2015 compliance deadline applicable to the EPA Utility MACT² Rule makes retrofit timing a significant issue and potentially problematic. The increased demand for contractors, materials, and engineering expertise needed to install environmental controls could potentially impede the industry’s ability to comply with the rules within the given timeframe
- The CATR could have impacts as soon as 2013 with more significant impacts by 2015
- Individually, the CCR Rule is projected to drive the least amount of economically vulnerable units. However, the associated compliance costs of CCR contribute to the cumulative effects shown in the Combined EPA Regulation Scenario

5. 2011 Study Update Results

As part of the 2011 *Long-Term Reliability Assessment*, NERC undertook an action item from the 2010 study to further assess the implications of the EPA regulations as greater certainty or finalization emerges around industry obligations, technologies, timelines, and targets. With more clarity in the EPA regulations, along with data and industry information relatively fresh, it was appropriate to measure ongoing industry action and identifies the relative resource adequacy uncertainty. The study results from this update are before NERC’s Board of Trustees.

Conclusion

NERC issued the *2010 Special Reliability Scenario Assessment: Potential Resource Adequacy Impacts of U.S. Environmental Regulations* in October of 2010. EPA since has issued proposed rules for Utility MACT and 316(b) (cooling). NERC reviewed these proposed rules and included an updated study in the *2011 Long-Term Reliability Assessment*, expected to be released

² If EPA finalizes the utility MACT rule in November 2011 as currently planned, compliance would be required by November 2014 under Section 112 of the CAA.

at the end of November, to assess the impacts of these rules as proposed on conclusions made in NERC's 2010 report.

NERC will continue to assess the implications of the EPA regulations as greater certainty emerges around industry obligations, technologies, timelines, and targets through its annual assessment process. Further, NERC will lead industry's effort and response to identify resource adequacy implications along with impacts to operating reliability and second tier impacts (e.g., deliverability, stability, localized issues, outage scheduling, operating procedures, and industry coordination) resulting from proposed and pending EPA regulations. As part of this leadership, NERC will leverage the expertise of the Planning Authorities to identify and assess the local system conditions that could impact reliability, review industry's plans to maintain bulk power system reliability, while meeting environmental regulations.

Thank you for your interest in NERC's findings. I sincerely appreciate your attention to bulk power system reliability and look forward to the panel's discussions.

Background

NERC assesses and reports on the reliability and adequacy of the North American bulk power system divided into the eight Regional Areas shown on the map below. The users, owners, and operators of the bulk power system within these areas account for virtually all the electricity supplied in the U.S., Canada, and a portion of Baja California Norte, Mexico. NERC is currently headquartered in Atlanta, Georgia with additional offices in Washington, DC.



NERC Regional Entities			
TRE	FRCC	MRO	NPCC
Texas Reliability Entity	Florida Reliability Coordinating Council	Midwest Reliability Organization	Northeast Power Coordinating Council, Inc.
RFC	SERC	SPP	WECC
ReliabilityFirst Corporation	SERC Reliability Corporation	Southwest Power Pool, Incorporated	Western Electricity Coordinating Council
Note: The highlighted area between SPP and SERC denotes overlapping regional area boundaries. For example, some load-serving entities participate in one region and their associated transmission owner/operators in another.			