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On FERC's Role in Electric Security

Background. To understand the role of FERC in electric security, it helps to start by looking back to 1965. In that year, New York City had a major blackout. In response to that blackout, the utility industry formed the North American Electric Reliability Corporation, or NERC. NERC's role was to develop rules for utilities to plan and operate the grid reliably. The rules were voluntary, not mandatory. At that time, the grid was already integrated to some extent across the US-Canada border, so NERC was formed as an international organization.

Almost 40 years later, in 2003, we had an even larger blackout, affecting about 50 million people in the US and Canada. Afterward, the US and Canada issued a joint report on the causes of the blackout and possible remedies to prevent such problems in the future. The report summarized the causes as primarily related to "trees, tools and training." That is, tree trimming was inadequate and led to arcing that initiated the blackout; system operators lacked good tools for situational awareness; and they also lacked adequate training. The report recommended making reliability rules mandatory, instead of voluntary. The report also recommended establishment of an Electric Reliability Organization, or ERO, to develop and enforce the rules.

FERC regulation of reliability. In 2005, the US Congress enacted a law implementing these recommendations, and giving FERC its current authority over electric reliability. Under this law, FERC approves and oversees enforcement of reliability standards. This includes standards on cyber security. Our authority generally applies to facilities 100 kv or higher, and does not include "local distribution." The law gives us no authority to require construction of generation or transmission.

This law also created our role in regulating NERC. In 2006, we certified NERC as the ERO. NERC develops reliability standards through an open stakeholder process. After standards are approved by NERC's stakeholders and then its Board, NERC files the standards with FERC and the Canadian provinces. FERC can approve or remand the standards. We also can direct NERC to address a particular subject. Since 2006, remands have been rare, but directives have not. Significantly, FERC cannot write the standards. Most enforcement is done by NERC, with FERC oversight. FERC also has authority to enforce directly, but those cases have been infrequent. Penalties for violations are authorized up to $1 million per day.

The key reliability standards include those for: balancing resources and demand in real-time; transmission planning; interconnection operations (involving real-time oversight by about 15 utilities monitoring the operations of multiple utilities in a region); and transmission operations. A key principle of these standards is to plan and operate the grid so that it will remain stable even after a "contingency," such as the sudden loss of a generating facility.

Canadian regulation of reliability. In contrast to US regulation of reliability at the federal level, reliability in Canada is generally regulated by the provinces instead of the federal government. NERC standards are mandatory in most provinces, and some provinces have authority to modify the standards. Most provinces monitor and enforce the standards. Penalties vary, but some provinces have authorized penalties up to $1 million per day. Twice a year, FERC and Canadian regulators meet to

discuss issues, and Mexico often participates too. A 2015 Canadian report described this as a "harmonized continental approach to mandatory reliability standards."

Cross-border power sales. There is no centralized market operating across the US-Canadian border. However, there are significant power sales. Canada is a net exporter to the US. Canada has extensive hydropower resources, about 60 percent of its 2014 generation. Over 30 power lines cross this border. In 2015, Canada sold over 65 TWh to the US, about ten percent of Canadian generation. NERC has projected Canadian sales to the US will triple by 2030, although this was based on implementation of the Clean Power Plan.

US exports to Mexico are small. Imports from Mexico exceeded exports in 2014. Mexico has been implementing a major restructuring of its electricity policies in the past two years. US generators are beginning to express more interest in selling power into Mexico. Earlier this year, Mexico approved reliability regulations under a new "Grid Code." This Code includes ten of NERC's reliability standards.

Resource adequacy. Our 2005 legislation does not authorize FERC to impose mandatory resource adequacy standards. Resource adequacy traditionally has been regulated by the States. However, NERC is authorized to issue reports on resource adequacy, and does so annually or periodically, with FERC oversight. Also, FERC has exclusive jurisdiction over the rates, terms and conditions of wholesale power sales in interstate commerce. Our authority also includes "practices" significantly affecting these rates.

RTO/ISO market designs. There are seven regional markets operating in the US. Six are regulated by FERC; the other is in Texas. The designs for these markets differ in many ways. About 15 years ago, FERC proposed a "standard market design" for the FERC-regulated markets. This SMD drew substantial opposition, and FERC did not go forward with the proposal.

Three of these markets have a centralized capacity market. These are the eastern markets: PJM, NYISO and ISO New England. PJM and ISO New England procure capacity three years ahead. NYISO's capacity market is not so far ahead, less than a year. All three have locational prices. They also have a downward sloping, administratively-determined demand curve. The revenues from these markets can help address any shortfall between revenues expected in the energy market and the cost of new entry, to provide a price signal for construction.

Three other markets use a different approach, requiring each utility to meet a specified planning reserve margin. These are the California ISO (CAISO), the Midcontinent ISO (MISO), and the Southwest Power Pool (SPP). Utilities in CAISO must meet a State-determined reserve margin of 15 percent, plus adders for other components such as ramping flexibility. Utilities in MISO must meet a reserve margin set by their State or, absent such a requirement, a default margin set by MISO. Utilities in SPP must meet a 12 percent margin.

Texas has an energy-only market. There has been debate in Texas about establishing a capacity market, but so far Texas has decided to continue with its energy-only approach. Recently, the price cap in Texas was raised to $9,000 per MWh. An operating reserve demand curve is used and, for example, sets prices at $9,000 if operating reserves fall below 2,000 MW.

Issues have come up about the seams between FERC-regulated markets. For example, the different approaches used in PJM and MISO have led to claims that resources in MISO are selling capacity in PJM in order to gain revenues from PJM's capacity market. In a different way, during the California energy

crisis of 2000-01, there were concerns about the seam between CAISO and neighboring States, and the need to sustain sales across this seam. Currently, this seam raises a new issue, of utilities outside of California seeking to participate in an energy imbalance market with CAISO.

Transformation of US grid. The US grid is changing rapidly. Approximately 80 percent of capacity retired in 2015 was coal-fired. That is almost five percent of our coal fleet. These retirements were due to low natural gas prices, environmental restrictions and other factors. Traditionally, coal-fired units have been the primary source of generation, but in recent months gas-fired units have produced more than coal-fired units.

We are also seeing a significant increase in renewable generation. Sixty percent of capacity additions in 2015 were renewables. Output from utility-scale renewables is expected to grow by nine percent in 2016. Renewables are expected to produce 14 percent of US generation in 2016.

Increased reliance on natural gas for electricity generation may present issues. For example, during the extreme cold weather of the "polar vortex" in 2014, many gas-fired units were unavailable due to lack of fuel or other issues. PJM and ISO New England have both proposed changes to their capacity markets to provide stronger incentives for performance and/or penalties for non-performance. As another example, the shutdown of the natural gas storage field at Aliso Canyon in the Los Angeles area is raising concerns this year about possible curtailments of fuel to gas-fired generators in the area.