NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

FERC Technical Conference on EPA's Clean Power Plan – Panel I

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Thank you Chairman LaFleur, Commissioners, and fellow panelists. NERC appreciates the opportunity to participate in today's technical conference concerning the Environmental Protection Agency's (EPA) proposed Clean Power Plan (CPP).

As part of the first panel we have been asked to be prepared to discuss the following questions:

1. What operational issues could arise under different compliance approaches? Are there operational issues that could arise if neighboring states adopt different methods of compliance?
2. What tools are available to address these potential issues and ensure that electric reliability is maintained as states and regions comply with the proposed rule?
3. How will entities responsible for electric system planning (e.g., reliability entities, state public utility commissions, grid operators) coordinate with entities responsible for developing state and regional plans to comply with the proposed rule?
4. Are additional tools or processes needed to address any potential operational issues or ensure coordination between relevant entities?

As the Electric Reliability Organization for North America, NERC is considering these questions and others through the lens of our reliability assessments of the proposed CPP rulemaking. These will help inform policymakers and stakeholders concerning reliability considerations raised by the plan.

The CPP is a broad proposal. As currently written, it has the potential to significantly affect the nation's electric generation resource mix, infrastructure needs, markets, and regulatory regimes. Individually and collectively, these impacts raise important considerations for reliability of the bulk power system. We must be assured the bulk power system will remain reliable during and after the transformation from the current state to the envisioned end-state. Based on the information we have from the draft CPP rule, and our initial review, deeper assessment is needed to determine the time requirements and potential risks to reliability resulting from this transformation. Our assessments are focused on this determination, and are vital to assuring that the bulk power system can be reliably operated.

Recognizing that reliability is NERC's singular focus, it is important to emphasize that this report and additional later assessments are *not* intended to: (1) advocate a policy position in regard to the environmental objectives of the proposed CPP; (2) promote any specific compliance approach; (3) advocate any policy position for a utility, generation facility owner, or other organization to adopt as part of compliance, reliability, or planning responsibilities; (4) support the policy goals of any particular stakeholder or interests of any particular organization; or (5) represent a final reliability assessment.

Consistent with this approach, NERC has established a plan to complete a series of reliability assessments of the CPP. An initial review of the CPP was published on November 5th, 2014, and a second, "Phase I" assessment is underway, targeted for completion in the early spring timeframe. NERC's reports will become increasingly granular as the CPP process evolves from the proposal stage, to final rule, and to state implementation.

NERC's INITIAL RELIABILITY REVIEW OF THE CLEAN POWER PLAN

NERC's initial review report – "Potential Reliability Impacts of EPA's Proposed Clean Power Plan"[1] – evaluated the plan's potential risks to reliability and focused on the assumptions contained in the proposed CPP.

NERC's initial reliability review was developed to inform regulators, state officials, public utility commissioners, utilities, and other impacted stakeholders of the potential risks to reliability from EPA's proposed CPP. The key goals included:

- Provide an evaluation and comparison of the assumptions supporting the CO_2 reduction objectives in the proposed CPP to other projections available within NERC assessment reports.
- Provide insight into planned generation retirements, load growth, renewable resource development, and energy efficiency measures that might impact CO_2 emissions and the EPA's target-driven assumptions.
- Assess the potential reliability consequences if the EPA assumptions cannot be realized.
- Identify potential reliability impacts resulting from changes in the resource mix. Some of these include: (1) resource displacement or retirements; (2) the impacts on regional planning reserve margins, the implication from shifts in resource mix and on the availability of Essential Reliability Services characteristics; (3) the increase in variable resources; (4) over-reliance on any particular fuel, especially natural gas; (5) the need for transmission to support large power transfers, and; (6) other reliability considerations, including regional differences.

[1] Potential Reliability Impacts of EPA's Proposed Clean Power Plan
http://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/Potential_Reliability_Impacts_of_EPA_Proposed_CPP_Final.pdf

- Support the electric power industry and NERC stakeholders by providing an independent assessment of reliability while serving as a platform to inform policy discussions on bulk power system (BPS) reliability and emerging issues.

Key Findings
NERC's report examines the assumptions underlying each of the four building blocks in the CPP, recognizing that the assumptions are highly inter-dependent. The report identified the following factors which require additional reliability consideration:

Implementation of the CPP reduces fossil-fired generation: The proposed CPP aims to cut CO_2 emissions from existing power plants to 30 percent below 2005 levels by 2030 with substantial CO_2 reductions required under the State Implementation Plans (SIPs) as early as 2020. According to the EPA's *Regulatory Impact Assessment*, generation capacity would be reduced by between 108 and 134 GW by 2020 (depending on state or regional implementation options). The number of estimated retirements identified in the EPA's proposed rule may be conservative if one or another of the assumptions prove to be unachievable. Developing suitable replacement generation resources to maintain adequate reserve margin levels may represent a significant reliability challenge, given the constrained time period for implementation.

Assumed heat rate improvements for existing generation may be difficult to achieve: NERC is concerned that the assumed improvements may not be realized across the entire generation fleet since many plant efficiencies have already been realized and economic heat rate improvements have been achieved. Multiple incentives are in place to operate units at peak efficiency, and periodic turbine overhauls are already a best practice. Site-specific engineering analyses would be required to determine any remaining opportunities for economic heat rate improvement measures.

Greater reliance on variable resources and gas-fired generation is expected: The CPP will accelerate the ongoing shift toward greater use of natural-gas-fired generation and variable energy resources (VERs). Increased dependence on renewable energy generation will require additional transmission to access areas that have higher-grade wind and solar resources (generally located in remote areas). As NERC states in its Initial Reliability Review of the CPP proposal, long lead times for transmission development and construction require long-term system planning – typically a 10-15 year outlook. In addition to designing, engineering, and contracting transmission lines, siting, permitting, and various federal, state, and municipal approvals often take much longer than five years to complete.

Increased natural gas use will require pipeline expansion to maintain a reliable source of fuel, particularly during the peak winter heating season. Extreme weather events impose further system challenges. For example, as NERC describes in a review of the January 2014 polar vortex, the stressed conditions led to

much higher forced outage rates for generators and limitations on availability of natural gas to supply electric power in affected regions competing with residential and commercial/industrial uses.[2]

Pipeline constraints and growing gas and electric interdependency challenges impede the electric industry's ability to obtain needed natural gas services, especially during high-use periods. Increased natural gas use will require pipeline expansion to maintain a reliable source of fuel. Sufficient time will be needed to plan, site, and build new gas pipelines. As with electric transmission infrastructure, this process takes many years to complete.

Rapid expansion of energy efficiency displaces electricity demand growth through 2030: In its rate calculation for best practices by state, the EPA assumes up to a 1.5 percent annual retail goal for incremental growth in efficiency savings. The EPA assumes that the states and industry would rapidly expand energy efficiency savings programs from 22 TWh/year in 2012, to 108 TWh/year in 2020, and reach 380 TWh/year by 2029. With such aggressive energy efficiency expansion, the EPA assumes that energy efficiency will grow faster than electricity demand, with total electricity demand shrinking after 2020. The implications of this assumption are complex. If the EPA-assumed energy efficiency growth rates cannot be attained, additional carbon reduction measures would be required, primarily through reduced fossil-fired generation.

Essential Reliability Services may be strained by the proposed CPP: Essential Reliability Services (ERSs) are the key services and characteristics that comprise the following basic reliability services needed to maintain BPS reliability: (1) load and resource balance; (2) voltage support; and (3) frequency support. The anticipated changes in the generation resource mix and new dispatching protocols will require comprehensive reliability assessments to identify changes in power flows, resource changes and resulting changes in the availability of ERSs. New reliability challenges may arise with the integration of generation resources that have different ERS characteristics than the units that are projected to retire. The changing resource mix introduces changes to operations and expected behaviors of the system. To address these changes, more transmission and new operating procedures may be needed to address risks to reliability.

More time for CPP implementation may be needed to accommodate reliability enhancements: State and regional plans must be approved by the EPA. This approval is anticipated to require up to one year, leaving as little as six months to two years to implement the approved plan. Areas that experience a large shift in their resource mix are expected to require transmission enhancements and gas pipeline infrastructure to maintain reliability. Constructing the resource additions, as well as the expected transmission enhancements, may represent a significant reliability challenge given the constrained time period for implementation. While the draft rule provides flexibility for meeting compliance requirements

[2] NERC Polar Vortex Review, September 2014, http://www.nerc.com/pa/rrm/January%202014%20Polar%20Vortex%20Review/Polar_Vortex_Review_29_Sept_2014_Final.pdf

within the proposed time frame, there appears to be less flexibility in providing reliability assurance beyond the compliance period.

Recommendations

CPP Compliance Timeline – In general, compliance levels and timelines in the final plan should be harmonized with the timeline necessary to develop and implement the resources and infrastructure changes called for in the respective state and regional plans. We identify several areas below that warrant consideration.

> *Planning & Analysis* – NERC's initial reliability review recommended continued assessment of the reliability implications of the proposed CPP, and encouraged regional and multi-regional industry planning and analysis groups to begin detailed system evaluations and work in partnership with policy makers to ensure there is clear understanding of the complex interdependencies resulting from the rule's implementation.
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> *Resource & Transmission Adequacy* – Additional recommendations addressed impacts to resource adequacy and electric infrastructure as well as impacts on reliability from the changing resource mix. The states, Regions, and ISO/RTOs should perform further analysis to examine potential resource and transmission adequacy concerns associated with unit retirements, potential declines in reserve margins and impacts on ERS. EPA and the states, along with industry, should consider the time required to integrate potential transmission enhancements and additions necessary to address impacts to reliability from the proposed CPP.
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> *Natural Gas Transmission Infrastructure* – Due to accelerated unit retirements and increased reliance on natural gas for electric power, further coordinated planning between the electric and gas sectors will be needed to ensure a strong and integrated system of fuel delivery and generation adequacy. Such planning should include considerations for pipeline expansion to meet the increased reliance on natural gas.

Essential Reliability Services – Given the changing resource mix, ISO/RTOs, utilities, and Regions should assess the impacts to ERSs in order to maintain reliability. To address this challenge, NERC has established an Essential Reliability Services Task Force and will continue to work with stakeholders to address these issues. Additionally, system operators and ISO/RTOs need to develop appropriate processes, tools, and operating practices to adequately address operational changes on the system.

New Technologies – The development of technologies (such as electricity storage) could help support the reliability objectives of the BPS. Deployment of these technologies should be expedited to support the additional variability of resources on the BPS.

Reliability Safety Valve – Finally, EPA, FERC, DOE, and state utility regulators should employ the array of tools and their regulatory authority to develop a reliability assurance mechanism. This should include a "reliability safety valve." Policymakers should consider approaches to the implementation of the CPP rule that provides demonstrated assurances that reliability can be sustained during the implementation period. To the extent that plans require greater infrastructure development of gas, transmission, supply resources, or other assets than feasible under the proposed CPP timelines, a reliability safety valve mechanism will help the states or the EPA manage the transition while maintaining reliability.

NERC's PHASE I SPECIAL ASSESSMENT

NERC is currently conducting a more detailed reliability assessment of the draft rule. This report will be published in the early spring timeframe. This "Phase I" assessment will be comprised of three elements.

- **Part 1** will consist of a sensitivity analysis using a series of scenarios evaluating the implementation of the draft rule to identify resource adequacy needs as well as the timeline associated with reliability reinforcement required to meet CPP requirements. NERC will also assess the need for new natural gas infrastructure.

- **Part 2** will consist of a transmission adequacy assessment as well as identification of infrastructure upgrades needed to support the scenario analysis of part 1.

- **Part 3** will be NERC's independent evaluation of existing studies completed by industry stakeholders. NERC will review these studies and assess cumulative impacts on a region-wide basis.

This analysis will focus particularly on the timing available to address the rule's implementation, the anticipated significant shifts in resources (i.e., both fuel and geography), and consequent changes in the network's ability to manage reliable operations (e.g., much larger transfers and power swings).

Additional Planned Reliability Assessments

As the rulemaking process continues, NERC plans two additional assessments. After the rule is finalized, NERC's "Phase II" report will be a conventional reliability assessment based on known requirements. We anticipate this report will be available in December 2015. As elements of state implementation plans (SIPs) and a potential model Federal EPA state implementation plan will be emerging at that time, our assessment will incorporate examples of those elements. This assessment may be helpful to the states and regions as they develop their respective SIPs.

Finally, NERC is planning a "Phase III" report after many of the SIPs have been filed with EPA. This assessment will include a more granular reliability focused cross-section of regional and single-state SIPs. December 2016 is the target date for this report. The target dates for these assessments are based on EPA's current schedule; however, they are subject to change if EPA's schedule shifts.

CONCLUSION

Over the past several years, NERC has closely tracked the grid's changing resource mix used to supply electricity to the nation. The CPP proposal will accelerate and significantly transform this ongoing shift in resources. As these rules are implemented through various State Implementation Plans, reliability of the bulk power system must be among the highest priorities.

NERC Reliability Standards and Regional Entity criteria must be met at all times to ensure reliable operation and planning of the BPS. Given the magnitude of the proposed CPP, it will be critical to navigate uncertainty during the highly complex implementation period. Accordingly, NERC strongly recommends a reliability safety valve to manage emerging and impending risks to the BPS.

NERC's assessments of the CPP rule are intended to help inform all policymakers and stakeholders on key reliability issues. As EPA's rulemaking continues to develop, NERC will continue to evaluate the final rule, state and regional plans, and refine our reliability assessments as significant milestones are reached.

We appreciate our partnership with FERC to assure reliability of the bulk power system, and we look forward to working with FERC on this important rule as its consideration proceeds.