

FERC Reliability Technical Conference

Panel II: Emerging Issues – Part II

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Chairman Bay, Commissioners LaFleur, Clark, Honorable, and fellow panelists, thank you for this opportunity to participate in FERC's annual Reliability Technical Conference. This is a very exciting and transformational period for the electric power industry. Unprecedented shifts in the resource mix are occurring. This transformed resource mix must continue to support the reliable operation of the bulk power system (BPS). Therefore, it will be important to understand how the grid will be operated and controlled in the future. These emerging issues include, for example, what resources are being added; what resources are being replaced; what new technologies will be integrated into the system; what are their characteristics; and where are these resource going to be located?

The changing resources include the integration of a large magnitude of renewable variable energy resources, distributed energy resources, distribution-centric resources, micro- and smart-grids, demand response technology, as well as an increasing reliance on just-in-time delivery of natural gas to fuel new generating capacity. The pace at which the industry is adopting these changes is unprecedented. These changes are transforming the energy delivery system.

As the grid changes, new benefits as well as risks will emerge. The benefits will garner most of the attention, but risks must be considered through the lens of assuring continued stable and reliable operations. Once emerging risks are identified and understood, FERC, NERC and the industry can prioritize the risks and work together to mitigate them.

Changing Resource Mix and Single-Fuel Dependency

The resource mix and its delivery is undergoing a metamorphosis from large, remotely-located coal-fired and nuclear power plants, towards gas-fired, renewable, and distribution-centric resources. As this evolution occurs, reserve margin targets are becoming less important, and energy availability is becoming more critical to understanding the risks presented by integrating these new resource technologies. Maintaining reliability requires understanding of the resource composition within an area, the characteristics of the resources, and adequate supply of both the resource and essential reliability services provided by the resource. In addition, operators will need the visibility and control of all resources with the understanding of exactly what is on the system and how those resources will respond in certain situations.

Natural gas is now the predominant fuel for electric generation, and it is the leading fuel type for capacity additions. Renewables continue to grow and become an increasingly larger part of the fuel mix. A diverse fuel mix is the most dependable approach for reliability; overdependence on a fuel can create reliability risks. With public policy and economic factors accelerating the trend, the transition toward natural gas will continue to escalate in the near future. This shift towards a just-in-time fuel delivery underscores the need

to fully understand the impact of natural gas deliverability on reliability, so the risks associated with dependence on a single fuel can be mitigated.

Until recently, challenges with natural gas deliverability were most visible during extreme winter conditions focused almost exclusively on gas supply through pipelines. However, a recent outage of Aliso Canyon – a critical natural gas storage facility – demonstrates the potential risk to BPS reliability due to reduced fuel diversity and over-reliance single-source fuel supply. In this case, the mitigation of the risk may result in controlled load shedding, persisting through the 2016 summer season, and potentially into the 2016-2017 winter and 2017 summer seasons.

NERC recently released a short-term assessment entitled, “Operational Risk Assessment with High Penetration of Natural Gas-Fired Generation.”¹ This report identifies resource and transmission planning protocols as one way to address the type of fuel supply risks exposed by Aliso Canyon. Such protocols could consider the potential for large, common-mode single contingency disruptions including natural gas pipelines and associated facilities, such as compression stations, well-head supply, and gas storage. In order to have effective mitigation, system planners in areas with a high concentration of natural gas generating resources need to thoroughly examine system reliability needs to determine if more firm fuel transportation contracts or units with dual-fuel capability are needed. Further, fuel availability and deliverability should be specifically considered and integrated into resource adequacy and other planning assessments. These considerations should be integrated into larger planning areas, perhaps expanding interconnection-wide planning.

Integration of more distributed energy resources is another critical consideration for BPS reliability. As this trend continues to accelerate, sufficient essential reliability services must be maintained to assure a steady system. In 2015, the Essential Reliability Services Task Force issued “*Essential Reliability Services Task Force Measures Framework Report*,”² highlighting the need for sufficient ramping, frequency support, voltage stability, and inertia as there is increased reliance on more asynchronous distributed energy resources. The industry must ensure these essential services are available to support daily operations as well as during resource constrained episodes. The challenge for operators is the need for continual balancing of generation and demand while providing sufficient amounts of essential reliability services from wind, solar, and other distributed resources. Future systems should be designed to ensure sufficient essential reliability services from all resources.

It is also necessary for regulators and policy makers to recognize the implications of the characteristics presented by the changing resource mix in interconnection requirements or other reliability requirements to provide sufficient means of adapting the system to large amounts of variable and distributed energy resources, located either on the bulk power or distribution systems. These needs will become more significant as retirements of base load fossil-fired units continue. As Roy Thilly discusses in his testimony, changes on the distribution system can potentially impact the BPS. Recognizing differing jurisdictions, this

¹ Published May 24, 2016, following filing of this testimony. Available on NERC’s website.

² [*Essential Reliability Services Task Force Measures Framework Report*](#), NERC, November 2015.

stresses the importance of partnerships between state and federal regulators as they work with industry toward assuring reliability.

Integration of more resources on the distribution system, including micro- and smart-grids, is further changing the characteristics of conventional grid planning and operations. Distribution-centric and distributed energy resources are often interconnected through sub-transmission, or are located behind the meter. As mentioned before, how operators will have the ability to observe, control, and dispatch these resources to ensure the continued reliable operations is a key consideration for the future. Further, as these distributed resources, micro- and smart-grids are added to the system, tens of thousands of control points could be potentially added to the system. Therefore, it is imperative that controls be integrated in a well-planned manner, and this includes addressing the necessary coordination and cyber considerations. Operators will also need to coordinate the output of all devices, working together to maintain frequency, voltage, ramping, and to meet aggregate demand. NERC is closely monitoring the overarching effects of the changing resource mix; the Distributed Energy Resources Task Force was launched to track/monitor activities and develop strategies for maintaining reliability during the transition to this new resource mix.

Resiliency

Resiliency is becoming the yardstick of reliability. Planning and operating a resilient grid will not only include the integration of substantial amounts of distributed energy resources, distribution-centric resources, and increased dependency on gas infrastructure, but it will include more data. NERC is developing analytical methods to identify interdependencies between events and resiliency performance, and remains committed to ensuring resiliency in all aspects of planning and operations. That means monitoring cyber and physical threats to the grid as part of planning and operating the changing resource mix.

Conclusion

NERC is committed to maintaining the reliability of the BPS, and we look forward to working with the Commission to address reliability considerations resulting from current and projected changes to the system. As the Electric Reliability Organization (ERO) for North America, NERC must identify emerging risks and appropriate mitigation strategies to ensure resiliency in: 1) normal system operating conditions; 2) large industry transitions such as the changing resource mix, and; 3) extreme or catastrophic events that can have high impacts but are infrequent. By identifying and quantifying emerging reliability issues through initiatives such as the Essential Reliability Services Task Force, NERC is able to provide risk-informed recommendations that drive NERC's activities and support a learning environment for industry to pursue improved reliability performance. These recommendations, along with the associated technical analysis, provide the basis for actionable enhancements to resource and transmission planning methods, and they shed a light on operational needs, as well as support the development of reliability guidelines and NERC Reliability Standards.

Together, NERC, FERC, and the industry can understand and better mitigate reliability risks in the future. I appreciate the Commission's continued focus on reliability, as this technical conference provides valuable input to the ERO's strategic planning as well as risk mitigation and control activities.