NERC Calls for New Approach to Power System Reliability Planning Due to Gas Supply Distribution Risks

December 2017

On November 14, 2017 NERC released a report concluding that the growth in natural gas fired generation resources and the increasing interdependence of the power system and the natural gas delivery system has resulted in new electric reliability risks.

NERC’s Special Assessment: Potential Bulk Power System Impacts Due to Severe Disruptions on the Natural Gas System notes that as reliance on natural gas to meet electric generation requirements increases, additional planning and operational measures must be considered to better mitigate power system reliability risks.

Recommended Actions

Utilities should consider the loss of key natural gas infrastructure in their planning studies.
Utilities should develop criteria to evaluate large-scale power delivery system reliability impacts due to loss of natural gas pipelines, LNG, compressor stations, or natural gas storage facilities in the extreme event list as detailed in the Transmission Planning NERC Reliability Standard (TPL-001-4). The criteria should also consider capacity and energy limitations, including seasonal replenishment requirements of gas storage facilities. Pipeline systems should be planned with the equivalent of N-1 contingency planning to assure deliverability of natural gas in the event of a pipeline, LNG terminal, or gas storage facility outage.1

Owners and operators of dual fuel capable generators must ensure operability on their secondary fuel.
Generator Owners and Operators of units with dual fuel capability should maintain and regularly test fuel switching operational capabilities and back up fuel inventories at units to ensure that dual fuel capable units provide adequate resilience in the event of a natural gas outage.

NERC Reliability Guideline on Gas and Electrical Operational Coordination
The NERC Operating Committee is drafting a Reliability Guideline on Gas and Electrical Operational Coordination that identifies operational practices to increase power system resilience and adaptability during extreme conditions impacting gas supply. The guideline will provide insights on establishing gas and electric industry coordination mechanisms; training, and testing; establishing and maintaining open communication channels; and best practices for maintaining situational awareness. It will also provide examples of proactive measures that should be taken to prepare for the potential of adverse conditions on the pipeline system. It is expected to be available on the NERC website in the near future.

Summary of Key Findings

The NERC report highlights that North America is experiencing a large shift in the electric generating resources it uses due to the ongoing retirement of coal fired and nuclear generation capacity coupled with growth in natural gas, wind, and solar generation resources. Regulatory rulings and state renewable portfolio standards are identified as significant drivers for the development of more renewable energy resources, while historically low natural gas prices and other factors are contributing to a large increase in the development of natural gas fired resources. Some areas within North America now meet their peak electric demand with greater than 60 percent of that demand sourced from natural gas fired electric generation.

Natural gas facility disruptions can have varying impacts depending on geographical location and overall infrastructure dynamics.
NERC reports that transmission system disruptions due to natural gas facility outages are possible and are dependent on a variety of area specific circumstances, including the distance from natural gas supply sources, and the amount of natural gas fired generation connected to the pipeline system. NERC identifies the New England region and Southwest California–Arizona area as examples where areas were identified in this assessment of needing more granular analysis, planners should be tasked with performing more detailed studies. Where appropriate planners should develop contingency plans to mitigate potential natural gas interruptions, and report back to NERC on what has been done.

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an outage of nearly any major natural gas facility during summer or winter electric peak load peak periods would likely lead to reliability risks.

NERC’s power flow simulation demonstrated that certain groups of gas-dependent generators studied experience transmission challenges during an extreme gas system event.

NERC conducted a power flow simulation screening assessment that evaluated the electric transmission system under extreme conditions for loss of significant electric generation due to failures of natural gas facilities. The analysis identified approximately 40 “clusters” of natural gas dependent generation representing at least 2,000 MW. A power flow simulation was conducted for each of these clusters.

![Figure 5.1: Natural Gas Generation Clusters](image)

From the originally identified 40 clusters, 14 clusters met the NERC risk criteria with 2 GW or more of generation being at risk of loss, excluding alternative fuel generation capacity, for power flow screening. Within the clusters there were some situations where multiple pipelines fed the generation fleet within the identified geographical area. In some instances there were more than one set of generating stations identified within a cluster that met the screening criteria of 2GW or greater and were supplied by only one gas pipeline. In aggregate, 19 groups of generation were selected within the 14 clusters in addition to the 5 groups of natural-gas-fired generation from the loss of a large natural gas underground natural gas storage facility, for further power system analysis.

Many mitigation strategies have been and can be employed to reduce potential impacts of a natural gas disruption. NERC identified that electric transmission upgrades, dual fuel capability, electric power imports; the addition of incremental and diverse generating resources, firm fuel agreements, and battery storage can serve as potential strategies to mitigate the risks from the disruption of natural gas infrastructure.

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Comprehensive planning by Planning Coordinators can significantly increase system resilience.
NERC reports that Planning Coordinator studies show that comprehensive planning and evaluation of contingencies on the natural gas system can result in identifying effective resilience measures to maintain reliability. Planning Coordinators that have conducted these studies have found success in working with state regulators when requesting regulatory support for additional resilience measures (e.g., oil inventory, new natural gas generation that is dual fuel capable, etc.).

TRC can help

TRC has experts in both gas delivery and electric transmission system planning who can jointly provide oversight, independent review and help your company stay ahead of the curve in this area of reliability risk mitigation. Risk assessments of both the electric transmission and gas delivery systems can be undertaken holistically.

Resources:

- NERC Report: Potential Bulk Power System Impacts Due to Severe Disruptions on the Natural Gas System
- TRC Pipeline Facilities Services
- TRC Pipelines, Storage and Terminals Services
- TRC System Studies & Planning Services
- TRC Power Delivery Support Services

About TRC

TRC is a leading provider of environmental and engineering solutions for oil and gas facilities and the infrastructure that links them. Our specialists take on a wide range of pipeline and facilities projects providing full lifecycle services including engineering, integrity, regulatory expertise, air permitting, biological and cultural resources management, remediation and stakeholder outreach guidance.

TRC’s Power Delivery Engineers provide full service power system planning, reliability risk review and design services for utilities, municipalities and industry. Comprised of over 1,000 personnel, many of whom are experienced utility planners our project teams know how to plan, design, and install facilities that meet a client’s financial, technical, and scheduling goals including compliance with changing NERC standards and guidelines.

Together, TRC’s gas and electric technical experts can help your company review the implications of the recent NERC Assessment, its recommendations for action and to identify the steps to take to foster coordination between the gas and electric sectors as it intersects with your company’s situation.

This regulatory update is a service to our utility clients, helping keep you informed of issues that impact your company’s electric system reliability risks and to help you achieve your business goals.

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