

Natural Gas and Electric Critical Infrastructure Coordination

Recommendations for the Department of Energy

June 5, 2024

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Statement of Position and Summary of Recommendations

The Electric Advisory Committee (EAC) recognizes the crucial need to enhance the reliability of electric power production through improved coordination between the natural gas and electric industries. Many recommendations have already surfaced in industry reports to address natural gas/electric harmonization^{1 2}. However, limited implementation of new measures indicates the minimal progress to coordinate the two infrastructures. Given the emerging reliability and resiliency risks associated with these two interdependent critical infrastructures, the EAC strongly encourages the DOE to recognize the urgency of this issue, and to prioritize joint natural gas and electricity system efforts by providing leadership to convene appropriate stakeholders, and to support development of new approaches to enhance this coordination as soon as possible.

The EAC recommends that DOE support natural gas and electric infrastructure coordination by convening a variety of stakeholders to identify planning gaps and workforce/organizational needs related to coordination, address policy and framework needs related to coordination, address reliability issues arising from the lack of coordination, support the development of markets that enhance coordination, and advance the development of analytical tools necessary to perform coordinated analysis for informed decision-making.

Background

America's electric grid has long delivered reasonably safe, reliable, and affordable energy. Today, industry and regulators need to incorporate resilience, resource adequacy, decarbonization, and flexibility considerations, while continuing to enable just and reasonable electricity rates. The nation's evolving energy portfolio currently comprises generation and load resources of unprecedented diversity with renewable energy, storage, and demand response being added to the energy mix. New and existing generating capacity increasingly relies on natural gas and renewable resources as other generation resources are phased out. At the same time, long-duration energy storage technologies capable of matching consumer affordability and market energy demands continue to progress. A new approach for coordinated planning between natural gas and electricity is essential and must be resolved in the short-term to maintain grid reliability and resilience in this highly complex environment.

Problem Statement

This multi-variable problem creates significant challenges to preserving energy resource adequacy, especially when both generation, capacity and energy availability are important in any scenario. Managing the evolving energy systems that are increasingly dynamic and intertwined is more complex than ever. Yet, the work processes and frameworks in place today are generally lacking (taking existing resource adequacy practices as given) due to the siloed nature in which the two systems have been historically operated and

¹ <https://www.ferc.gov/media/ferc-nerc-regional-entity-joint-blackstart-and-next-start-resource-availability-study-texas>

² https://ripuc.ri.gov/sites/g/files/xkgbur841/files/eventsactions/AI_Report.pdf



governed. They do not support emerging needs for coordinated infrastructure planning and situational awareness across the respective systems.

Scope of this Proposed Effort

The scope of this proposed effort focuses specifically on near-term recommendations with which the DOE should take immediate action. **The goal of this product is to promote effective coordination between the electricity and natural gas sectors** and increase transparency across the seams of these interdependent and critical infrastructures.

Considerations

From an operational and resource adequacy perspective, variable renewable energy (VRE) resources, electricity storage, and fossil fuel resources have different performance attributes and capabilities. Electricity and natural gas planners, operators and regulators must come together to find common ground in support of a feasible planning model that respects the basic physics that drives operational and governance differences of each energy source. Institutional harmonization must be part of the coordination. DOE should provide leadership to help the sectors align on long-term goals, objectives, and metrics across policies, capabilities, and technologies.

DOE Convening Joint Planning Groups

Impacts on electric reliability and resilience due to natural gas and electricity interdependence and correlated outages must be appropriately and effectively accounted for in risk assessment, planning, and operations. Like electricity, the natural gas value chain consists of different segments – production (including gathering and processing), transmission, and distribution. Access to natural gas can be challenging on multiple fronts ranging from the need for additional natural gas transmission pipelines to the need for near-market underground and liquified natural gas storage. Access to electricity has similar challenges. Natural gas and electric coordination is necessary to address these challenges and can benefit from facilitated, unbiased forums that respect existing statutes and operational limitations, while developing near and long-term solutions.

DOE Convening Federal, State, & Tribal Policy Makers

Natural gas and electric coordination must increase among all policy makers and regulators, given there is no single jurisdiction that regulates or owns all policy directives or implications at the federal, state, and provincial levels for both natural gas and electric. The balkanized policy approach that has evolved over time has been sufficient historically, but it is no longer well suited to an environment that demands increased collaboration across sectors and geographic regions and with a new perspective from all parties for planning and operations. The DOE can be a driving force to convene these entities to identify mechanisms that foster natural gas and electric coordination.

Convening policy makers can help identify technically and financially sound coordinated solutions that provide and maintain reliable energy service. Decisions must take into consideration the costs including but not limited to providing energy reliability, resilience, and resource adequacy.

Shifting the Planning Paradigm from Peak and Low Loads

Electricity planning and forecasting must recognize the current reliance on natural gas supply, storage, and demand response to enable maximum value from renewable energy resources from a reliability and resource adequacy perspective. This should be reflected in hourly resource adequacy metrics and long-range planning. The EAC provided background to this need within its work product “*Urgent Needs to Reliably Facilitate the Energy Transition – Recommendations for the Department of Energy*”³, dated October 18, 2023. Other studies include the *North American Energy Standards Board Gas Electric Harmonization Forum Report*⁴ and the *FERC/NERC Report on Winter Storm Elliott*⁵.

Traditional analytical methods of grid performance based on peak electric and natural gas demands are no longer sufficient. Many areas are no longer planning based on peak electric and natural gas demands but are turning to planning for critical resource adequacy days. More dynamic, multi-sector tools and technologies are needed for accurate system forecasts of energy demand for alleviating electric and natural gas system individual operational constraints, while addressing co-dependencies across the two systems. Further, with the changing generation portfolio and increased demand response, storage, electrification of demand, occurrences of temperature extremes, and occurrences of correlated electricity and natural gas outages, the capability to perform hourly⁶ or shorter timeframe assessments is necessary to identify the most vulnerable and most probable conditions for both energy sectors. This granular assessment capability is most crucial during periods of extreme weather that simultaneously affects energy demand in both sectors.

Convening all appropriate stakeholders should be a leading priority for DOE to address these issues including the need for long term coordinated critical infrastructure. Planning horizons may need to be longer as buying new long-haul capacity on transmission pipelines, replacing coal with natural gas-fired generation, securing emerging long-duration storage, recognizing dramatic increases in electric transmission development, and improved demand response programs will drive significant energy market changes. Risk profiles, their impact on operating reserves, and resource adequacy need to be expanded to evaluate multi-sector threats. Recommended risk profiles should include telecommunications, water systems, electricity-dependent natural gas production/processing systems, natural gas delivery systems, and some customer sited distributed energy resources (DERs).

Recommendations for specific DOE actions to support Gas and Electric Coordination

1. Convene the following key stakeholders within the natural gas and electricity sectors:
 - a. Joint planning groups of natural gas and electric stakeholders
 - i. Define gaps and risks of current planning processes.
 - ii. Discuss best practices for the evolving energy system, where the value of a better coordinated multi-sector planning and investments ensuring reliability and resilience are maintained.

³ https://www.energy.gov/sites/default/files/2023-10/EAC%20Recommendations%20-%20Urgent%20Needs%20to%20Reliably%20Facilitate%20the%20Energy%20Transition%20October%202023_0.pdf

⁴ NAESB Gas Electric Harmonization Forum Report https://www.naesb.org/pdf4/geh_final_report_072823.pdf

⁵ [Winter Storm Elliott Report: Inquiry into Bulk-Power System Operations During December 2022 | Federal Energy Regulatory Commission \(ferc.gov\)](https://www.ferc.gov/energy/winter-storm-elliott-report)

⁶ Hourly planning, or 8760 hourly planning throughout a year, accounts for dynamic generation, electric and gas demands, and weather conditions that may occur at any time.

- iii. Define and align long term goals, objectives, metrics, policies, capabilities, and technologies that are needed to improve electricity and natural gas coordination.
 - iv. Discuss coordination of a planning approach that addresses every hour of the year, including considering weatherization, ensuring availability to black start, and redefining reserve margins for both demand side and resource side assets for both sectors.
 - v. Identify potential workforce and organizational needs to ensure proper execution of more integrated system planning and coordination.
 - vi. Conduct exercises that test identified solutions that improve coordination, such as:
 1. Evaluate the direct and indirect impacts of curtailment prioritizations of contracted natural gas deliveries.
 2. Apply the curtailment priorities, especially for natural gas resources over which the DOE has oversight or specific visibility as well as weatherization standards to benchmark and test the performance of those standards and communicate resulting best practices.
 3. Evaluate risks of increasing electrification of critical natural gas infrastructure as it relates to system reliability and restoration.
 - b. Market design and wholesale energy market stakeholders that impact natural gas and electricity coordination, such as:
 - i. Risks arising from impaired coordinated between the interstate electricity trade and natural gas trade, and what needs to be improved, including relative risk.
 - ii. Develop a plan on how markets can mitigate those risks, such as taking into consideration fuel supply from intrastate vs. interstate pipelines and potential investment in local gas storage.
 - c. Federal, state, and tribal officials, regulators, and natural gas and electric industry leaders to address hourly coordination for the year to maintain infrastructure reliability.
 - i. Discuss modification of policies or regulations that interfere with natural gas and electric coordination.
 - ii. Identify and seek coordination solutions to any policy and regulatory inconsistencies and conflicts that could negatively affect reliable natural gas and electric operations.
 - iii. Identify emerging reliability risk factors and implement protocols for harmonization across all sectors.
 - d. Seek solutions in the near-term to address the most significant Bulk Electric System (BES) transmission constraints which result in large generation resource curtailments of multiple days on average each year.
- 2.** Support development of new tariffs, market mechanisms, and/or other frameworks that promote coordination and address cost allocation.
- 3.** Support the development of tools, models, standards, and training needed to plan and operate increasing interdependent natural gas and electric infrastructures informing coordination decisions on an hourly basis throughout the year, including developing a proof-of-concept protocol to integrate utility natural gas and electric planning jointly avoiding industry silos.

The EAC requests that DOE provide an update on their progress on how they are addressing the recommendations in this document, by the first EAC meeting in 2025.