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Coordination Between the Gas and Electric Industries: Understanding the Problem and Assessing the Solutions

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Presentation Overview

Gas-Electric Coordination: Why it Matters and What Can Be Done

- Recent History of Gas-Electric Coordination Concerns
  - NERC Report on Gas/Electric Interdependencies and Recommendations
  - Southwest Cold Weather Event
- Recent FERC Activity in Gas-Electric Coordination
- Problems and Proposed Solutions
  - Standards of Conduct and Communications
  - Scheduling, “No Bump” Rule, and Capacity Release
  - Generator Incentives
  - Other Solutions
  - Recent FERC Action and Next Steps

NERC Report: Interdependencies

- Intended to (1) determine interdependency relationship between gas pipeline operations/planning and electric generation operations/planning and (2) recommend measures to mitigate negative reliability impacts from interdependency

1. Gas pipeline reliability can substantially impact electric generation.
2. Electric system reliability can have an impact on gas pipeline operations.
3. In general, pipeline and electric system operators do not understand each other's business very well.
4. Pipeline planning and expansion are substantially different from the electric equivalent.
5. Communications between pipeline operators and electric reliability coordinators are generally weak.
6. Pipeline tariffs for firm delivery service are not compatible with peaking generation economics in many electric markets.
7. Modern combustion turbines have stringent fuel delivery and fuel quality requirements.

NERC Report: Recommendations

1. NERC Regions should include in their regional assessment program a review of the impact of any fuel transportation infrastructure interruption that could adversely impact electric system reliability.
2. NERC reliability coordinators or their delegates . . . should develop regular, real-time communications with pipeline operators about disturbances that could adversely impact the reliability of either the electric systems or the gas pipeline.
3. For planning purposes, gas pipeline outages that could have an adverse impact on the reliability of the electric systems must be coordinated with the electric industry so that plans to mitigate any impacts to the electric systems may be developed.
4. NERC should develop a reliability standard relating fuel infrastructure reliability to resource adequacy.
5. NERC should include analysis of fuel infrastructure contingencies that could adversely impact the reliability of the electric systems in the NERC planning standards.
6. NERC should establish a monitoring system that tracks fuel infrastructure contingencies that have, or could have, an adverse impact on electric system reliability.
7. NERC should, in concert with other energy industry organizations, formalize communications between the electric industry and the gas transportation industry for the purposes of education, planning, and emergency response.

Southwest Cold Weather Event

- February 1-5, 2011: Extreme cold weather in Texas and the Southwest results in widespread curtailments and rolling blackouts
- Joint FERC/NERC report concluded that gas shortages contributed to electric generator outages and that rolling blackouts led to gas production declines, but were not primary causes of those concerns
  - "Electrical outages contributed to the cold weather problems faced by gas producers, processors, and storage facilities in the Permian and Fort Worth Basins, with producers being more significantly affected by the blackouts"
  - "Gas shortfalls caused problems for some generators in Texas, although not nearly to the extent as did direct weather-related causes such as equipment failure from below-freezing temperatures."

Southwest Cold Weather Event

- Recommendations in report were limited: “[T]he report does not offer specific recommendations in this area, but urges regulatory and industry bodies to explore solutions to the many interdependency problems which are likely to remain of concern in the future.”
  1. Consider fuel switching capabilities for generators.
  2. Consider improvements to coordination between gas and electric industries.
  3. Consider whether gas production and processing facilities should be deemed “human needs” customers and thus exempted or given special consideration for purposes of electric load shedding.

FERC Activity in Gas-Electric Coordination

- February 3, 2012: Request from Commissioner Moeller
  - Outlines nature of gas-electric interdependency and requests comments on identified issues including:
    - Roles of FERC, NERC, and NAESB.
    - How to treat different regions and market structures.
    - Changing flows on gas pipelines.
    - Harmonization of electric and gas markets.
    - The effects from retirements of coal and oil-fired generators.
    - Possible revisions to the Standards of Conduct.
    - Defining the aspects of the problem.
- In response, FERC issued a formal docket and request for comments
- FERC held regional conferences addressing scheduling and market structures/rules; communications, coordination, and information-sharing; and reliability

The Problem: Standards of Conduct and Communications

- Communications to address gas-electric coordination may run afoul of the Commission's Standards of Conduct.
  - Employees with operational knowledge about generator issues are marketing function employees.
    - Prevented from talking to affiliated transmission function personnel.
  - Pipelines and RTOs make a lot of information available, but hesitate to provide more for fear of creating an undue preference.
    - Pipelines unwilling to identify the generators that could be affected by pipeline outage.
  - Market sensitivities related to information about the dispatch of gas-fired generation and expected impacts from forced generation outages.
  - Concerns about informing RTOs/ISOs whether gas-fired units scheduled in day-ahead markets have necessary gas supply and transportation arrangements in place.

The Problem: Standards of Conduct and Communications

- Information exchanged between pipelines and RTOs about a generator could result in unilateral pipeline or RTO actions competitively harming that generator, or could allow third party competitors access to sensitive information.
- Pipelines and RTOs have expressed an interest in receiving more information about:
  1. Pipeline capacity that generators have scheduled.
  2. Generator burn rates for specific generators.
  3. Immediate notice of significant generator changes.
  4. Improved coordination of maintenance planning and scheduling.
- Gas control has limited information about expected generator dispatch (which affects them directly).

Possible Solutions: Standards of Conduct and Communications

- Implement a “One Call” system an RTO could use to inform gas industry participants supplying specific generation of changes in electric system operations.
- Rely on existing practices for information exchange:
  - NAESB WGQ Standards that (1) require generators and pipelines to “establish procedures to communicate material changes in circumstances that may impact hourly flow rates,” and (2) require pipelines to provide BAs and RCs notice of operational flow orders and other critical notices.
- CAISO modified its tariff to permit CAISO to provide outage information to pipelines for their use in coordinating outages, repairs, and curtailments on their systems. These disclosures are subject to NDAs and the Standards of Conduct.

Possible Solutions: Standards of Conduct and Communications

- Develop communication protocols for the exchange of information regarding planned outages of generators and pipelines.
- Implement procedures allowing RTOs and ISOs to share real-time operational information with pipelines.
- Exchange pipeline and electric transmission system operators for cross-training.
- Use tabletop exercises within regions to address loss of supply scenarios.

The Problem: Scheduling

- The misaligned scheduling practices of the gas and electric industries contribute to coordination deficiencies.
  - Operating days for gas and electric industries are not aligned.
  - Disconnect between the timeframe for pipeline nominations (including for capacity release) and the timeframe during which generators receive bid confirmations in day-ahead markets.
    - Pipelines have one day-ahead nomination opportunity, which can be revised once in the day-ahead and twice within the gas day at specified times
    - Over-nominations are then allocated through the pipeline's nomination priorities.
    - Generators are dispatched hour-by-hour, and may not operate at many hours of the day. Gas-fired resources are often considered flexible with dispatch changing regularly. Intermittent resources magnify this issue.
    - The best time for them to obtain gas prices is prior to the first nomination period.
    - Generators bid in the electric day-ahead market, and their bids are not confirmed until after their daily pipeline nominations are due.

The Problem: Scheduling

- Scheduling disconnect has practical implications, including:
  - Significant price and supply risk because the best gas price is only available if the generator nominates for pipeline transportation before their electric bid is confirmed.
  - Pipeline nominations for a single day cover parts of two electric days. Alternatively a generator could seek gas for two daily cycles to accommodate a single electric day's needs.
  - Pipeline nomination schedule does not provide flexibility needed to match actual dispatch of generators.

Possible Solutions: Scheduling

- Pipeline options (all historically offered at higher rates)
  - Allow more nomination cycles.
  - Offer a firm no-notice service allowing firm shippers to receive gas deliveries on demand up to firm entitlements without scheduling and balancing penalties.
  - Offer more service that is more flexible in the rate at which gas must flow.
- RTO/ISO options:
  - Change scheduling of day-ahead unit commitment to match gas nomination cycle. The trade-off is that this moves unit commitment further away from real time, making load forecasts less accurate.

The Problem: “No Bump” Gas Rules

- The “no bump” rule and the pipeline capacity release rules contribute to the lack of coordination.
  - Primary and secondary pipeline nominations, which normally have a higher priority, cannot bump already scheduled interruptible service during the last intra-day nomination cycle.
  - While generators with firm pipeline service favor elimination of the “no bump” rule, other firm shippers, particularly industrial users, favor its retention on the grounds that without it fewer shippers would use interruptible transportation, leading to lower utilization rates for pipeline capacity, resulting in higher fixed costs allocated to firm shippers.

The Problem: Capacity Release Rules

- The pipeline capacity release rules contribute to the lack of coordination.
  - Traditionally, LDCs often contract for long-term firm pipeline capacity based on their winter peak demand.
    - Gas-fired generators in those regions rely on obtaining capacity through capacity release in the summer during their peak load times when LDC gas needs are much lower.
  - This is no longer always true due to the increased reliance on gas-fired generation, which has led generators to compete for firm pipeline capacity.
  - Commission regulations on capacity release are intended to be flexible, and would permit an LDC to arrange a short-term release to a generator at a market rate at any point in the nomination cycle.
  - BUT, this is subject to the scheduling opportunities that are available, which feeds into the same scheduling concerns.

Possible Solutions: “No Bump” and Capacity Release Rules

- Any changes to the “no bump” rule would need to be addressed with the interrelated scheduling rules.
- Enhanced scheduling remains an option for pipelines, which can charge higher prices for services with additional flexibility.
  - Could offer an additional nomination opportunity after the last standard intra-day opportunity.
- Enhanced scheduling could also provide better opportunities to arrange short-term capacity releases.

The Problem: Generator Incentives

- The lack of appropriate incentives for firm gas supply.
  - Generators in RTOs and ISOs have little incentive to obtain long-term primary firm pipeline service, reducing the incentives for constructing additional pipeline capacity.
    - Generators receive, at best, a one-year or seasonal price for power, but firm gas delivery are arranged on a long-term basis.
    - When evaluating bids from generators in regions with capacity markets, the firmness of a generator's fuel supply is not considered, creating less incentive for firm fuel or dual-fuel supplies.
      - There is dispute regarding whether the penalties for nonperformance are sufficient to indirectly ensure firmness of fuel supply.

Possible Solutions: Generator Incentives

- RTOs could make a capacity resource's revenue dependent on its performance in scarcity conditions.
- RTOs could increase the nonperformance penalties for capacity resources.
- Because this is fundamentally a resource adequacy issue, FERC has indicated a preference to leave this issue to states and market participants.

Other Solutions

- New Reliability Standards could be developed to address gas supply issues for generators, who are subject to NERC-developed mandatory Reliability Standards.
  - Pipelines are not subject to these Standards.
  - Could impose fuel availability requirements.
- Splitting between regional and national Issues
  - On a regional level: differences between organized and bilateral markets, which require different approaches, potentially allow markets to resolve.
  - National level: (1) Standards of Conduct and communications issues and (2) gas and electric scheduling and capacity release issues.

Other Solutions

- Gas-sharing pools similar to electric reserve pooling arrangements.
- 24-hour service and balancing services from gas storage providers.
- Broadening Standards of Conduct exception to include non-emergency situations to prevent an emergency and also to permit communications to alleviate emergencies on a nearby/regional transmission provider's system.
- Setting a minimum level of dependability in fuel-supply

Recent FERC Action

- FERC provides guidance on Standards of Conduct
  - Intended to address concern that Standards of Conduct could limit the coordination between electric and gas industries, but acknowledged that this must be balanced against harm from the disclosure of sensitive information
  - Guidance:
    - Standards of Conduct apply only to communications between affiliated entities, and not between unaffiliated gas pipelines and electric system operators; do not apply to RTOs or ISOs at all
    - An exception for communications in emergencies when information needs to be shared to ensure system reliability
    - Regions should clearly define the information to be shared across industries and place appropriate restrictions on its use to ensure that undue discrimination or preference does not occur when gas-electric coordination is needed. "By clearly defining the information to be shared and placing appropriate restrictions on its use, regions can address coordination needs consistent with statutory prohibitions against undue discrimination or preference."

What's Next?

- *Coordination Between Natural Gas & Electricity Markets*, 141 FERC 61,125 (Nov. 15, 2012)
  - FERC directs Staff to hold technical conferences on: (1) possible changes to rules governing communications; (2) how natural gas and electric industry schedules could be harmonized in order to achieve the most efficient scheduling systems
  - FERC directed conferences with RTOs and ISOs on May 16, 2013, and October 17, 2013
    - Progress made to refine existing practices for coordination and ensuring adequate fuel supplies
    - Gas transportation concerns that arose during the winter heating season and any fuel-related generator outages
  - FERC Staff quarterly reports for 2013 and 2014 on gas-electric coordination activities

Questions?

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