Gas and Electric Interdependence
Gas Industry Perspectives on the Coordination of Natural Gas and Electricity Markets

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Utility Operations - Vectren Energy Delivery

- **Vectren Energy Delivery** - Vectren’s utilities deliver gas and/or electricity to more than one million customers in adjoining service territories that cover two-thirds of Indiana and west central Ohio. Vectren is also a low-cost provider of wholesale electricity to other utilities and power marketers in the Midwest.

Non-Utility Operations

- **Infrastructure Services** – Miller Pipeline and Minnesota Limited collectively have over 3,000 employees that provide a comprehensive range of pipeline construction and rehabilitation services for gas, water and sewer utilities, as well as oil and gas pipelines. They also provide specialty products and services for electric utility, industrial and telecommunications customers.

- **Energy Systems Group** – A performance contractor with a national footprint that provides customers with innovative energy efficiency, technology, and long-term financing solutions for modernization of their facilities and energy infrastructure.
Vectren’s Gas Territory Footprint

**Vectren Energy Delivery of Indiana – South**
- 110,000 gas customers

**Vectren Energy Delivery of Indiana – North**
- 570,000 gas customers

**Vectren Energy Delivery of Ohio**
- 315,000 gas customers
Natural Gas and Electric Coordination – Background – Why Now?

Several reasons are contributing to the continuing confluence of the gas and electric industries, including:

- The continued development of shale gas resources and long-term projected “relatively low” natural gas prices make the use of natural gas generation a much easier decision.

- The Environmental Protection Agency (EPA) suite of environmental regulations has hit coal fired generators hard and the replacement has been/is natural gas generation.

- The increasing presence of renewable energy sources, which tend to be intermittent in nature, require quickly dispatched backup generation (and natural gas generators tend to fit the bill)

- It is easier to site and build a natural gas generator than it is to build another kind of base load generator, i.e., coal, nuclear.

- It is easier to site and build a natural gas generator than it is to construct new electric transmission.
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NATURAL GAS OVERVIEW
Shale Gas – Game Changer for the Natural Gas Industry

• Increasing gas supply with natural gas production at record levels.

• Competitive gas prices projected to continue.

• Demands placed on natural gas infrastructure to deliver natural gas from new geographic areas.

• Gross natural gas production reached an all-time high in May 2014 averaging 78.10 BCF per day.
Existing Pipeline Infrastructure and Market Pre-date Shale Gas Boom

- Pipelines are expensive to build.

- Interstate pipelines are funded directly from the contracts signed by customers for firm service on the pipeline.

- Timeline to site and build a new pipeline is about 3 years from start to pipe in the ground.

- Existing pipeline capacity in constrained areas is generally already contracted for and there is limited amounts of interruptible service available.

- Electric generators often rely on interruptible service without firm pipeline contracts.

- Increased demand for natural gas from the low temperatures of the Polar Vortex of 2014 created supply issues and high natural gas prices in constrained areas of the country.
Energy Information Annual Energy Outlook 2014 - Demands on natural gas by electric sector projected to grow through 2040

- Consumption of natural gas for electric power generation grows by about 2 Tcf and makes up about 33% of the increase in total natural gas consumption by 2040.

- Relatively low natural gas prices make natural gas an attractive fuel for serving increased load.

- Natural gas is also the fuel most often used to replace older coal-fired generation as it is retired.
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EPA REGULATION IMPACTS
EPA Mercury and Air Toxics Standards (MATS)

- The need to comply with the EPA's MATS regulations together with low electricity demand growth and competition from natural gas fired generation have recently led several power producers to announce plans to retire coal-fired facilities.

- To comply with MATS, coal-fired plants likely have to install large scale environmental controls for compliance by 2016.

- At the end of 2012 there were 1,308 coal-fired generating units in the United States, totaling 310 GW of capacity. In 2012 alone, 10.2 GW of coal-fired capacity was retired, representing 3.2% of the 2011 total.

- Units that retired in 2010-2012 were small, with an average size of 97 megawatts (MW) and inefficient. By comparison, units scheduled for retirement over the next 10 years are larger and more efficient.

Between 2012 and 2020, over 60 gigawatts of coal-fired capacity is projected to retire. (EIA AEO2014 Reference case)
Regional impacts put increased pressure on both electric and gas infrastructure.
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COORDINATION AND OPERATION ISSUES
**Electric and gas markets and networks fundamentally operate differently**

<table>
<thead>
<tr>
<th>Different Market Structure</th>
<th>Natural Gas Pipeline</th>
<th>Electric Generation</th>
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</thead>
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<tr>
<td></td>
<td>• Free market driven entity • Unbundled</td>
<td>• Regulated states vs. deregulated states • Organized wholesale power markets lowest-cost dispatch model vs. operating a bi-lateral electric power market</td>
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<tr>
<td>Commodity Dependency</td>
<td>Based on natural gas</td>
<td>Dependent on various commodities - coal, natural gas, oil, solar, wind, etc.</td>
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<tr>
<td>Operational Response</td>
<td>• Gas moves through a transmission pipeline at roughly 30 miles per hour. • Operational changes take time and are often manual.</td>
<td>• Electricity in transmission moves close to the speed of light. • Operational changes can be almost instantaneous.</td>
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<tr>
<td>Market Operations</td>
<td>• Standard national gas day and schedule with 2 standard same-day and day-ahead nomination cycles. • Gas day begins at 9 AM CST</td>
<td>• Electric schedules vary by RTO and can be as frequent as every 15 minutes. • Electric day varies by midnight in each zone. RTO schedules</td>
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Issues with the Gas Day Raised by the Electric Industry

- The gas day timely nomination cycle deadline occurs before electric dispatch is confirmed. There is a need for tighter alignment in capacity-constrained markets.

- Electric load can unexpectedly change during the day. There are limited scheduling opportunities to manage intraday changes in electric load.

- From the electric industry perspective, there are too many hours between the last opportunity to schedule their natural gas needs and the end of the gas day.
Natural Gas Considerations

- Changes to the gas day will not solve the lack of available capacity. New pipeline infrastructure is needed.

- When considering changes, FERC must consider how changes would impact all pipeline customers and not just power generators. Pipelines serve, gas utilities, industrials, gas marketers, and producers.

- Regional differences in the markets must be considered. There is unlikely a single solution that works nationwide. A solution for one region could be to the detriment of another region.

- The gas industry is unbundled. Producers, gathering systems, processors, intrastate pipelines, interstate pipelines, and LDCs currently need to coordinate.

- Physical operations remain a prevalent part of the structure of the gas industry.
  - Much of the natural gas infrastructure to support producers is in remote locations.
  - The natural gas network does not have the ability to make instantaneous changes like that electric network.
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FERC ACTIONS
Natural Gas and Electric Coordination – FERC Background

- For the past two years, the Federal Energy Regulatory Commission (FERC) has made the increased interdependency of the natural gas and electricity systems a top priority.

- During 2012 & 2013, a series of regional and issue specific technical conferences were held by FERC to further define how to improve coordination.

- A technical conference was held on April 25, 2013 focused on natural gas and electric scheduling, and whether and how natural gas and electric industry schedules could be harmonized in order to achieve the most efficient scheduling systems for both industries.
FERC Actions to Synchronize Gas and Electric Days

- Notice of Proposed Rulemaking (Docket No. RM14-2) – Proposes changes to the nomination and scheduling timelines used in the natural gas industry.
  - Move Gas Day to **4 a.m. CCT** – explanation given is to accommodate early morning ramp up time of electric generators in the east.
  - Moves first Timely Nomination Deadline from 11:30 a.m. to 1:00 p.m. - reasoning is to provide electric generators sufficient time to make a timely nomination for pipeline capacity after they have received their electric dispatch orders.
  - Adds a third and fourth intra-day nomination cycle to the Gas Day – to provide generators an additional chance to modify their gas supply arrangements to meet actual electric demand.

- FERC issued an order to determine if the day ahead scheduling practices of RTOs and ISOs should be changed to better coordinate with the changes being imposed on the natural gas industry. (Docket No. EL 14-22) – Would align electric markets to gas day changes.

- FERC issued an order requiring all pipelines to file revised tariff sections providing for the posting of offers to purchase released pipeline capacity.
North American Energy Standards Board (NAESB) Alternative Proposal to FERC Gas Day Changes

- FERC provided the natural gas and electric power industry until September 28\textsuperscript{th} to develop an alternate industry consensus proposal/standard through the NAESB process.

- NAESB worked with industry, but was unable to reach a consensus on the start of the gas day.

- The NAESB Board of Directors did approve to have NAESB redline the standards for the items that they were able to get general agreement on outside of the gas day.
  - 1:00 PM timely nomination cycle
  - No more than three intra-day cycles and the last cycle being no bump.
  - Changes made independent of the gas day. Standards referencing the 9 am gas day removed.

- Ultimately though, FERC could choose to go with their original proposal, fill in the blanks on the NAESB standard or make an attempt at another hybrid day proposal based on comments received.

- NAESB voting showed that the industry is very split on the gas day.
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STATE ACTIONS –
Gas & Electric Coordination

The “issue” with many issues.

• No easy solution

• Constantly changing environment

• Impacts vary and are regional in nature.

• Complex issue crossing multiple regulatory areas

• Federal, Regional, State and Local authorities involved in different levels of oversight, regulation and permitting

• Interstate versus Intrastate issues

• Regulated versus de-regulated markets

What can state legislators do to ensure supportive regulatory frameworks for gas and electric industries to have the tools to ensure reliability?