Framing the Issues: Growing Tensions at the Interface of the Natural Gas and Electricity Industries

Sue Tierney
Analysis Group, Boston, MA

MITEI Symposium – Growing Concerns, Possible Solutions: Gas/Electric Interdependency
April 16, 2013 – Cambridge, MA
The context for today’s Symposium:

Our focus:

- The inter-relationships among the natural gas and the electric power markets and systems in the U.S.

The conventional wisdom about the U.S. systems:

- The electric industry: will become even more dependent upon natural gas than it has in recent years
- The natural gas industry: different outlooks tied to different assumptions about demand in power sector

My paper:

- Sets the context for more granular discussions
Observations:

1. REGIONAL DIFFERENCES ARE ACUTE
2. STAKEHOLDERS’ PERSPECTIVES (ON PROBLEMS AND SOLUTIONS) VARY A LOT
3. THE REGULATORY ISSUES ARE COMPLEX
4. CHANGE IS NEEDED – IN BOTH INDUSTRIES
5. CHANGE SHOULD BE BUILT ON TOMORROW’S NEEDS, NOT YESTERDAY’S
Natural gas

Many players – now highly differentiated business segments and interests

- Commodity – highly competitive
- Delivery – regulated interstate transportation and distribution

Geographic footprint of infrastructure

- Reflects historical relationships between production and consumption centers

Many product/service offerings for different types of customers

- Firm: LDCS and some vertically integrated electric companies
- Interruptible: industrial and power generation

Natural gas – power sector market

Post-1999 investment in power plants: gas-fired capacity

Natural gas prices and consumption: pre 2008

U.S. Natural Gas Wellhead Price (Dollars per Thousand Cubic Feet)

U.S. Natural Gas Use by Sector

Electric
Residential
Industrial
Commercial

U.S. Energy Information Administration: http://tonto.eia.gov/dnav/ng/hist/n9190us3m.htm
Outlook for natural gas prices (2008 versus 2013)

NYMEX Natural Gas Futures Prices - for May 2013 to December 2020
(Henry Hub $/Mcf, with prices as of 4-2008 and 4-2013)

SNL Energy (NYMEX).
Natural gas prices – pre- and post- 2008

U.S. Natural Gas Wellhead Price
(Dollars per Thousand Cubic Feet)

U.S. Energy Information Administration: [http://tonto.eia.gov/dnav/ng/hist/n9190us3m.htm](http://tonto.eia.gov/dnav/ng/hist/n9190us3m.htm)
U.S. natural gas consumption by end use (1997-2012)

EIA: [http://www.eia.gov/dnav/ng/ng_cons_sum_dcu_nus_a.htm](http://www.eia.gov/dnav/ng/ng_cons_sum_dcu_nus_a.htm)
Electric power industry

Changes in the past decade:

- Restructuring to introduce competition into generation side of the industry
- Significant gas-fired generation investment post-1999, with underutilized capacity as prices rose before 2008/2009
- State policies (and high gas prices) pushing forward renewable capacity development
- “Fuel-limited resources” – not just renewables (intermittent) but also “just-in-time deliveries of natural gas” to projects without firm gas transportation
U.S. power system: changes in fuel mix pre-2008/2009

Natural gas use growing

But coal use still half of the generation
Electric generation by fuel type and by region (2012)

EIA, Annual Energy Outlook 2012, Supplemental Tables. In this figure, “Renewables” includes conventional hydro, wind, other.
Planned coal plant announcements (2012-2022)
Natural gas pipeline additions (US versus Northeast)

Electric generation by fuel type (2005-2011; 2012-2030)

EIA, Annual Energy Outlook, 2013.
Emerging strains: gas/electric interdependency

Market timing and coordination issues, reliability risks, and operational challenges on both the electric and gas systems:

Examples:

- In some regions – chicken and egg timing problems
  - generators need to commit to move gas volumes before knowing whether their offers into organized daily power markets have been accepted;
  - generators need to offer prices into such energy markets without fully knowing the price of their natural gas.

- Instances where gas customers that have contracted for firm gas supply and transportation service face potential (or real) curtailments as operational conditions change upstream and downstream.

Tensions are visible across the business models of different players in the two industries, and in the market rules in different regions.
Various spotlights on the issue:

Recent attention by:

- National Petroleum Council (9-2011) (“Prudent Development”)
- North American Electric Reliability Corporation (12-2011) (“A Primer of the Natural Gas and Electric Power Interdependency in the U.S.”)
- National Association of Regulatory Utility Commissioners (2012/2013)
Various spotlights on the issue:

Issues of note:

- mismatched operating schedules;
- coordination and information sharing, including near-term or real-time power generation forecasts;
- business-model and planning issues in each of the industries that create chicken-and-egg problems for gas and electric resources and infrastructure.
Some take-aways:

1. The degree to which these issues raise serious challenges for efficient and reliable energy supply varies considerably by region and by type of issue.
   
   There are places, such as New England, where the issues are more urgent than in others.

2. There are lots of players with very different points of view, not only across business segments, industries and roles, but also within them.

3. Third, the regulatory issues are complicated;
   
   FERC may have responsibility for a broad set of policy issues on electric/gas integration issues
   
   But the states not only have strong interests but also in some cases regulatory responsibilities that can affect market participants’ behaviors.
Some take-aways:

4. Fourth, there is pressure building, and something needs to change.

   It’s hard enough to introduce change into a single industry
   It’s harder to introduce meaningful changes in two.
   Both industries need to change how they’re doing things
   Among those who may need to change the ways they look at these issues are regulators themselves.
Some take-aways:

5. In parallel with the changes in structure, operations, markets for natural gas and electricity, there have been transformational changes in information systems and communications networks in last 15 years

Examples:

- Proliferation of broad user access to high-speed computing capability
- Commercialization of the internet, with options for real-time info sharing
- Explosion of information exchanged through online systems, social media
- Development and deployment of advanced electronic-metering systems and other aspects of “smart” devices and software

Even so, there are: variations and gaps in use of such capabilities, which exacerbate some of the gas/electric tensions, but also create large opportunities

Changes should take presume such changes, and allow for further innovations
The rest of the day

Today’s panels will cover:

- Competing claims: Gas and electric scheduling mismatches and capacity release issues;
- Ensuring natural gas availability in the future;
- Coordination and information sharing; and
- Dual modeling of the electric and gas markets and systems.
Susan F. Tierney, Ph.D.
Managing Principal
Analysis Group
111 Huntington Avenue, 10th Floor
Boston, Massachusetts 02199
617-425-8114
stierney@analysisgroup.com