The United States is becoming increasingly reliant on natural gas–fired generation to meet its electricity (power and reliability) needs. Perhaps once unthinkable, due in part to vast coal reserves and comparatively high natural gas prices, natural gas is now fueling more base-load generation resources and is being used to support variable energy resources and meet the reliability needs of the electric system.

The reasons for this growing reliance are widely known in industry circles. To name a few: the United States is experiencing a boom in shale gas production, which has helped produce the lowest natural gas prices in a decade; companies are turning away from once-dominant coal-fired generating resources in response to Environmental Protection Agency mandates; and state-imposed renewable standards and favorable tax considerations have increased development of wind, solar, and other renewable variable energy resources that need quick-response load-following services in order to “firm” the deliveries to the electric grid.

An increasingly gas-fired future is now being factored into electric-industry integrated resource planning and reliability assessments. Accordingly, questions have surfaced regarding the interface between the gas and electric industries. These questions concern whether communications, scheduling, cost...
recovery, contracting, and other practices need to be modified to preserve electric reliability.

Further, a severe February 2011 outage event in the US Southwest prompted a series of investigations into natural gas and electric system reliability. Although initial rumors that gas transmission providers curtailed supplies turned out to be untrue, certain instances in which a failure on one system promulgated a problem on the other were discovered (such as a power outage cutting electricity to gas facilities used to move gas supplies).6 In sum, a fair number of “what if” questions remain, and industry participants, as well as regulators and other stakeholders, are quickly realizing the need to become “bilingual” in gas and electric market terminology, market structures, and the sharply differing models for building new gas transmission infrastructure in order to tackle the tough questions ahead.

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One early lesson learned is that, while changes to gas delivery policies may be warranted, it is not entirely correct to focus solely on the reliability of and scheduling on natural gas pipelines when, in fact, the ultimate goal is to ensure electric system reliability. After all, electric system operators are responsible for organizing dispatch of available resources to meet electricity needs while maintaining reliability of the system, and are tasked with understanding the effects of the change in the composition of its resource mix, following output fluctuations of variable generation resources on a minute-by-minute basis, and managing the increasingly integrated nature of the electric transmission system.

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Perhaps in recognition of this fact, a broad array of natural gas industry participants and trade associations, filing in response to questions posed by several commissioners at the Federal Energy Regulatory Commission (FERC) regarding natural gas and electric market coordination,7 has taken issue with efforts to label electric system reliability as a “gas reliability” problem. These participants emphasize that the pipeline infrastructure and natural gas delivery product model has been historically stable and responded well (at least to this point) to market needs.8 These participants also suggest that any new challenges are posed by the needs spurred by new gas-fired generation and the way the electric industry chooses to procure the fuel and recover the costs necessary for obtaining reliable fuel supply.

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NEED TO WORK TOGETHER GENERALLY RECOGNIZED

Several natural gas industry commenters suggested that FERC should first determine whether new pipeline facilities and/or services are needed to meet the increased needs of electric generators. If such facilities or services are required, FERC should ensure that the gas industry is permitted to recover the associated costs. Certain electric industry participants and trade associations do not agree with the gas industry on these points. However, one thing is clear from the comments submitted in response to the questions posited by FERC commissioners: there is a consensus that the questions are legitimate, and that the industries should work together.

Virtually all commenters welcome FERC’s initiative designed to identify and address potential problems associated with an increasing reliance on natural gas as a fuel for generation. A majority of commenters also believe that FERC should take a direct and leading role in conducting or supervising the inquiry into the adequacy of gas supply and delivery infrastructure. Further, the general sentiment is that the reliability organizations—the North American Energy Standards Board and North American Electric Reliability Corporation—should have input into the process but take action only after FERC has provided industrywide guidance.

Most commenters support a FERC process analyzing these issues on a regional basis, typically
through formation of regional technical conferences (in recognition of the different regulatory schemes that apply in organized versus bilateral markets, as well as the different fuel supply and infrastructure characteristics of each region). However, certain investor-owned utilities and state commissions have differences of opinion on the extent to which FERC should take a leading role within each region (in recognition of the important historic role that state regulators play in integrated resource planning, regulation, and ensuring reliability).\textsuperscript{9} Despite certain differences of opinion, a consensus appears to be forming that a greater reliance on natural gas as a fuel brings with it the need to assess the reliability of the power industry through a FERC-led process. How best to ensure electric reliability is the difficult topic that will continue to be studied and discussed in the coming months and years.

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It is generally recognized that in certain regions of the United States, construction of new pipeline transportation and storage capacity may be necessary.\textsuperscript{10} However, in other regions, it may be more efficient to develop new, tailored natural gas transportation and storage services that use existing infrastructure. Although long-term solutions may vary from region to region (and in some areas, we may find that the existing system is working well), for the most part, commenters urge FERC to avoid a one-size-fits-all approach. For example, the debates over aligning the gas and electric scheduling days and the role of firm versus interruptible pipeline transportation arrangements for fuel used in generation are hot topics that the industries have attempted to tackle once before, with no resolution given a lack of policy guidance from FERC.\textsuperscript{11}

What is different today, perhaps, is that market forces appear to be driving industry participants toward favoring certainty and resolution. The electric industry endeavors to remain reliable, while the natural gas industry fully recognizes that electric generators are the fundamental growth market for the foreseeable future. Yet another difference is that the FERC appears to be open to taking a much stronger role in leading this initiative.

The difficult questions will not be answered overnight—in particular, those involving how to allow generators to recover any transportation costs without pricing themselves out of the market. Phrased differently, how should the gas industry be compensated for the premium services (including the necessary infrastructure) necessary to serve increasing swings in gas load, while at the same time hewing to traditional cost causation principles? However, most participants agree that these issues should be tackled, and a regional stakeholder process provides the best model for answering the daunting “who is going to pay?” questions.

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**QUESTIONS BECOMING INCREASINGLY DIFFICULT**

FERC’s initial salvo of questions is a welcome start, and its leadership is critical to getting the ball rolling on how best to address the fundamental switch from the legacy generation mix to one increasingly reliant on gas-fired generation. With that as background, however, we submit that a next round of more difficult and fundamental questions needs to be a part of the discussion, and we endeavor to list a few here:

1. Should generators sign up for new or more flexible products for delivery of natural gas, or expansion capacity, if those are provided by pipelines? At its simplest, generators using natural gas as a primary fuel source must make an often-difficult decision regarding how best to contract for and schedule deliveries of gas to its facility. A base-load, gas-fired facility, for example, can expect to run a significant number of hours during the year and, to the extent available, can enter into a long-term firm transportation contract with the expectation that its delivered price of energy will recover what ultimately amounts to a fuel cost. For peaking units, however, the question is more complex.

Merchant generators using natural gas as a primary fuel have an incentive to keep their costs low—it is the economic model that makes their projects competitive in the
electric markets in the first place. Thus, traditionally, these generators have relied on interruptible capacity, thereby avoiding the costs associated with having to build new pipeline capacity or holding significant amounts of firm services. But even though it may be known roughly when during the peak that a peaker is expected to generate electricity, firm gas transportation may not be available (as load factors on pipeline increase and particularly if gas and electric system peaks coincide). This historic practice may no longer prove reliable going forward—a point recently recognized by Jeff Wright, director of the Office of Energy Projects at FERC.12

What are the barriers to signing up for firm gas transportation and storage products? Are the new services that have been offered to date, described below, uneconomic or not adequate to cover swings? If new services alone will not satisfy existing needs, is contracting for pipeline expansion capacity an unavoidable consequence of increased reliance on gas-fired generation? Should gas pipeline companies, with their knowledge of their systems, lead the effort in identifying suitable transmission products to alleviate the purported scheduling problems discussed below?

2. Should pipelines develop tailored services or change scheduling rules to better accommodate gas-fired generation needs (and needs of other similarly situated customers)? A significant number of interstate natural gas pipeline companies currently offer a no-notice-type service, and a few others have developed enhanced firm or other short-term firm services geared toward peaking generator needs.13 However, these services do not exist on all pipelines, and on the pipelines that provide these services, they may not be economic or sufficiently flexible to meet the needs of certain gas-fired generators. Further, there may not be enough capacity available to handle increased anticipated swings that will come with growing generator demand and firming of variable energy resources.

Should FERC encourage pipelines to develop new services or expansions in a manner that responds to projected growth? Are changes needed to the FERC natural gas certificate process, such as expanding the scope

of FERC’s blanket certificate regulations, improving interagency coordination to expedite the permitting timeline necessary to incentivize such activity, or allowing incentives for overbuilding to meet potential future demand?

There is a recognized disconnect between gas and electric scheduling days. FERC policy has traditionally allowed interruptible shippers to “bump” firm transportation customers on pipelines during the last scheduling cycle. Has the time now come for FERC to take up the tall task of evaluating whether bumping rules should be changed? For example, should an additional intraday nomination cycle with bumping rights be added to give more flexibility to generators holding firm services to schedule gas in a manner that aligns with market clearing times? Alternatively, could FERC allow bumping rights to a predefined set of generating assets critical to maintain reliability on the electric system? Although some interstate pipelines have added additional scheduling cycles to increase intraday flexibility in nominations and scheduling of gas, is the lack of consistency across pipelines a barrier to using the flexibility offered?

3. Should generators be required to have guaranteed fuel delivery to their plants before bidding into an organized day-ahead market or to interconnect to systems in areas without an organized market? Ignoring for a minute the discrepancies between the “electric market day” and the “gas market day,” what level of natural gas transportation firmness, if any, should be required for any generator to bid into the organized day-ahead electricity market? If a gas-fired generator is relying on an interruptible transportation product, that generator may not be available to meet energy/reliability system needs when called upon during periods when firm gas transportation customers on that pipeline are fully using their services.

In areas without an organized market, should generators similarly be required to have firm natural gas transportation arrangements so that the facility could provide some reliability functionality if needed? With the increase in renewable generation projects being developed in the Pacific Northwest and Southwest regions, in particular, daily
fluctuations in energy production from variable energy resources, such as wind and solar resources, require following services that can be expected to be increasingly provided by gas-fired generation.

A requirement for firm delivery of the fuel would seemingly solve the availability issue, but at what cost? Would such a requirement increase energy costs to an uneconomic level? Should only specific, predetermined gas-fired units necessary to maintain reliability on the system be required to hold (and be compensated for) firm transportation for their fuel requirements and should recovery of the costs associated with that commitment be guaranteed?

4. Is better communication between market administrators and gas pipelines necessary? This question was raised by FERC, but it bears repeating: should there be better communication between system operators and gas pipeline companies to ensure gas delivery to units that are needed to maintain reliability of the system?

System operators and gas pipelines could coordinate expected outages so a gas pipeline component is not offline at a time when the gas unit connected to the pipeline is expected to be needed. But is it enough to coordinate outages? Should market and system administrators provide comprehensive dispatch information to gas pipeline companies, and should the delivery service provided to reliability gas units be given a priority over other firm gas delivery pipeline customers?

5. Should market bids reflect the true cost of the gas plant? If generators are required to hold contracts that guarantee the delivery of fuel to their plants, it goes without saying that the firm transportation requests to gas pipelines in certain areas may exceed the capacity of the existing pipeline infrastructure. Further, generators may not necessarily have a mechanism to recover the costs expended for firm pipeline transportation (which includes the capital costs associated with construction of new pipelines). As a result, new or expanded pipeline capacity may be needed and may come at a significant cost to generators using natural gas as a primary fuel.

Would this added cost price new gas-fired generation out of the market? Should markets be required to accept gas bids if the clearing price would otherwise be below a bid that includes the cost the generator incurs to build the pipeline? Guaranteed cost recovery for the gas generator is seemingly the surest way to address the firm/interruptible delivery dilemma. Perhaps it is also the most controversial, as well.

6. Should gas pipeline companies build new pipeline capacity in advance of any specific need or anchor shipper commitment? All signs point to an increase in development of new gas-fired generation resources. Industrial customers are also projected in certain regions to demand additional gas supplies. Further, the need for new natural gas transmission and storage capacity in certain regions has been demonstrated. Gas pipelines are generally constructed or expanded using an “anchor shipper” model, in which customers commit to sign firm contracts for transportation and storage services in advance of construction of the facilities. In other words, gas pipeline companies do not build to meet anticipated demand; they build based on committed firm contract needs—a practice consistently and historically endorsed by FERC. However, will a growing reliance on natural gas–fired generation change this paradigm? Should natural gas pipeline and storage developers be encouraged to build with future capacity needs in mind? If the answer to this question is yes, cost-allocation questions inherently follow.

7. Should the cost of new pipeline capacity be socialized across a region? As noted earlier, certain natural gas–fired generators may not have a mechanism to recover the costs expended for firm pipeline transportation and storage products (which includes the capital costs associated with construction of new pipelines and storage facilities). Although it could be argued that firm transportation costs should be reflected as a “fuel cost” for purposes of recovery, pricing gas transportation costs into a market bid price may ultimately significantly increase the market clearing price for energy. Whether or not this is a good thing is beyond the scope of this article, but should different pricing mechanisms be explored?

8. Should markets be required to dispatch a set resource mix during the operating day? This question may be perceived as coming out of left
field, and, admittedly, it does. But would future heavy reliance on gas-fired generation be a good thing? With coal piles stacking up, is it necessary to ensure that certain units will run so that our reliance on gas-fired generation is not taken to an extreme? This is just a thought.

CONCLUSION

Seemingly all industry (gas and electric) participants acknowledge that there are issues with the growing reliance on gas-fired generation. Regional needs will be key in exploring solutions to these issues. As regional groups work through the issues, general market forces should be allowed to develop any regional solutions.

NOTES


3. See, e.g., US Energy Information Administration. (2012, April 10). Short term energy and summer fuels outlook, at p. 9 (“Total marketed production of natural gas grew by an estimated 4.8 Bcf/d (7.9 percent) in 2011, the largest year over year volumetric increase in history. This strong growth was driven in large part by increases in shale gas production.”).

4. Kahn, C. (2012, April 11). Natural gas prices dip below $2. Retrieved from http://www.google.com/hostednews/ap/article/ALeqM5h4zsZre3_A1HQmg02JKmh4evPHQdolc d=b6f6cf5c6289401fac492446cd5792ab (“price of natural gas has dropped below $2 for the first time in more than a decade”: supplies high in part because “improved drilling techniques have allowed companies to produce more from vast, gas-rich layers of underground rock.”)


7. Coordination between Natural Gas and Electricity Markets, Docket No. AD12-12-000 (February 15, 2012). FERC is the agency tasked with, among other things, maintaining reliability of the nation’s electric system and regulating the interstate natural gas pipeline industry.


9. On a broader scale, several parties also caution against creating significant differences in regulation between regions, thereby potentially creating an uneven playing field.


The electric industry has largely lived on excess capacity on pipelines, notably in New England, Wright said. Generators would sign up for firm transmission on the lateral from the main pipeline to the plant, but would sign up for interruptible transportation on the main pipeline. “Well, you kind of think those days are coming to an end,” he said.

The electric industry needs to understand that interruptible transportation can and will be bumped if customers with firm capacity need the space on the pipeline. “Now if you come screaming foul, I don’t see you really having a venue,” he said.

On the gas side, there are several gas companies that have variable hour rate structures to accommodate electric customers. “That’s a step in that direction, so we will see how that goes,” Wright told the roundtable. “I can’t purport to give you a solution to this right now,” but the differences between the industries are going to have to be resolved, he said.

13. See, e.g., Texas Gas Transmission LLC, FERC NGA Gas Tariff, Fourth Revised. Volume No. 1, Section 5.10, Version 2.1.0 (ENS Service offers 11 new nomination cycles each day); Transwestern Pipeline Co., LLC, FERC Gas Tariff, Fourth Revised Volume No. 1, Part V, Version 0.0.0 (FTS-5 Service provides for flows in 16 hours as part of its Phoenix expansion); Rockies Express Pipeline LLC, FERC Gas Tariff, Third Revised Volume No. 1, Rate Schedule - IBS, Version 0.0.0 (IBS Service offers an imbalance management service designed to allow shippers transporting volumes to a specific delivery point to elect for a range of swing-up and/or swing-down from nominated quantities under the linked transportation agreement); Natural Gas Pipeline Company of America LLC, FERC Gas Tariff, Eighth Revised Volume No. 1, Part 5.8, Version 0.0.0 (FRSS Service provides a shipper with firm reverse storage service designed to meet the needs of the electric generation market during the summer peak periods); CenterPoint Energy Gas Transmission Co., LLC, FERC Gas Tariff, Eighth Revised Volume No. 1, Sheet Nos. 225 and 84 (RSS Service offers a No-Notice service aimed at power plant/swing-type markets and designed to meet a shipper’s unscheduled peak or swing demands, and EFT Service allows shippers to take service at accelerated levels above 24-hour ratable takes); and El Paso Natural Gas Co., FERC Gas Tariff, Third Revised Volume No. 1A, Part III, Section 3, Version 6.0.0 (FT-H Service offers hourly firm services that allow shippers to take gas at non-ratable flows within the day).