Natural Gas Infrastructure

The Capacity to Fuel the Future

Introduction

Natural gas is a critical fuel in New York State's energy portfolio, providing 27% of the primary energy consumed by New Yorkers, fueling 35% of the State's electric generation capacity, and heating more than half of all residences. There are over 4.7 million natural gas customers in New York, consuming more than 1,100 billion cubic feet (BCF) of natural gas annually.[1] The role of natural gas in the energy markets is expected to grow significantly in the future, due to its combination of affordable pricing, desirable emissions characteristics, and the secure and abundant domestic nature of natural gas. Indeed, half of all the future electric capacity in the New York Independent System Operator's (NYISO) interconnection queue is natural gas fired.

New York is served by a safe, robust natural gas infrastructure, including 11 natural gas pipelines with 4,726 miles of interstate pipe installed, 226 BCF of underground natural gas storage, and 10 local distribution companies (LDCs) providing the final link between the sources of natural gas and the customers. More than 80% of the nation's natural gas is supplied from domestic sources, and 98% of the nation's natural gas is supplied from North America,[2] enhancing our energy security.

Concerns about global climate change have highlighted natural gas's ability to serve as a bridge to a future where energy production is less carbon-intensive. As the hydrocarbon with the lowest proportion of carbon, most observers anticipate that addressing climate change will likely increase our reliance on natural gas.

The forecasted growth in reliance on natural gas raises issues to be managed regarding the status of the natural gas infrastructure in New York State, and what needs to change in the future to ensure the sufficiency and reliability of our robust natural gas infrastructure system. This white paper will address these questions, and recommend policy modifications that will allow the creation of the needed infrastructure.

Discussion

Natural Gas Infrastructure Reliability Planning

Substantial new gas pipeline infrastructure has been constructed in New York State, including new pipelines such as Iroquois and Millennium, as well as expansions of existing pipelines. Much of this is due to LDC peak-day planning mandates that have made it possible for LDCs to sign up for new pipeline capacity needed to maintain reliable service to firm customers on the coldest days of the winter. These long term

[1] http://www.northeastgas.org/pdf/mkt_snapshot_0209.pdf
[2] "Natural Gas Monthly 2009," US Department of Energy, Energy Information Administration.

commitments from LDCs have made pipelines willing and able to build new capacity when a sufficient proportion of a project is subscribed to by customers.

In the natural gas pipeline industry, the function of ensuring reliability and sufficiency of resources is performed by a combination of market forces and LDCs working with utility commissions, and implemented by the LDCs and natural gas pipeline companies. While there is no central planning authority such as in the electric industry in the State, where the job of ensuring bulk power system reliability is performed primarily by the NYISO, implementing reliability rules that are set by the North American Electric Reliability Corporation and the Northeast Power Coordinating Council, as evidenced by the growth in pipeline capacity, this "light-handed regulation" scheme has been working well.

Commodity Impacts of Natural Gas Infrastructure

LDCs sign up only for the capacity needed to supply their firm customers (typically winter heating customers). Natural gas commodity price spikes in certain areas signal that there may be a benefit from constructing new gas infrastructure beyond what is required to maintain reliability of the natural gas systems of LDCs. The price spikes have been occurring in certain New York City markets, and FERC among others has taken note. Most notable were price spikes that occurred in February 2007 and January 2008 when the NYC daily spot price was more than $25 per dekatherm higher than other areas of the country. While LDC commodity purchasing practices typically avoid exposure to spot market commodity pricing, electric generators are often exposed to the price volatility seen in the spot markets.

Price spikes due to local gas transmission constraints can be reduced by encouraging construction of additional gas infrastructure, including pipelines, LDC transmission and storage. Another way to address cost issues in the natural gas market is to attract new supplies, for example by approving LNG import terminals which have been faced with challenging regulatory requirements in New York. Smoothing these spikes in natural gas commodity prices can have significant benefit for electric utility customers. Reduced commodity volatility benefits electric customers directly through reduced electric supply costs since natural gas is often the marginal electric production fuel and therefore sets the price for all electric power.

Electric System Reliability Impacts

Natural gas infrastructure capacity supports the fuel needs of electric generators, which are greatest on the hottest days in the summer. However, there are no requirements that electric generators subscribe to firm pipeline capacity, and generators typically choose to procure most or all of their supply using interruptible pipeline services, giving them lower priority than heating customers who subscribe to firm pipeline services. In addition, many generating units are permitted to burn alternate fuels for relatively limited periods due to emissions restrictions. As a result, some electric generators risk shut down on the coldest days.

The issue of natural gas delivery capacity sufficiency is a critical one for electric customers, and there is no single entity testing the natural gas infrastructure system on a

State-wide basis for capacity sufficiency to support generators. LDCs engaged in supply and pipeline capacity planning for the needs of their customers as well as when designing and constructing their gas infrastructure focus on those customers with reliability needs that can only be supplied by firm pipeline capacity, many of whom are heating customers. Many LDCs, however, also serve electric generation units "behind the city gate" that are not supplied directly by the gas pipelines. The economic benefits to electric generators and electric customers of relying on non-firm gas service are substantial. The reliability benefits that accrue to LDC-supplied generators by being able to access multiple pipelines are also considerable.

Fuel Diversity

Fuel diversity has gotten some attention as a result of reliability concerns in the New England electricity markets in 2001, and the related cost impact of high natural gas prices on electric prices. Additional gas transmission capacity to serve electric generators would mitigate the risk of gas capacity insufficiency, as well as increase the ability to meet carbon emissions targets set under cap and trade programs such as the Regional Greenhouse Gas Initiative (RGGI), and would reduce the impact of local reliability rules like the Minimum Oil Burn rules in New York City.

Any reliability risk caused by increased reliance on natural gas by electric generators is mitigated in several ways. New York is "pipeline rich", receiving gas from many different sources (Gulf of Mexico, Canada, Midwest, imported LNG, as well as a growing quantity of local production) transported on 11 different pipelines, mitigating the contingency risk on the electric generation fleet as a whole from the temporary loss of any single pipeline. Generators connected to the Con Edison transmission system are further protected from this risk because the Con Edison system is directly fed by four independent pipelines, as well as transmission interconnections with neighboring LDCs. Finally, many generators located in the Con Edison electric service territory have backup fuel that can be used either when reliability of the gas system is a concern (during cold winter periods) or when price makes liquid fuels more economic than natural gas.

Environmental Benefits

By modifying the gas transmission infrastructure to allow generators that can currently burn both natural gas and liquid fuels to burn more natural gas and less liquid fuels, local air pollution can be reduced. Natural gas fired generators typically emit 25% less CO_2, one-quarter of the NO_x, one-tenth of the SO_x and one-thousandth of the particulates compared to an electric plant fueled with oil.[3]

Natural gas also may be able to support a smooth transition to a low- or no-carbon future. Renewable resources such as wind and solar have become substantially more attractive due to advances in technology and reductions in cost, but both wind and solar are intermittent resources that depend entirely on a factor outside anyone's control: the weather. Dispatchable electric resources such as natural-gas-fired traditional and quick start generators, can offset the reliability challenge posed by renewable resources. The reliability and proven technology of dispatchable gas fired turbines may make an ideal

[3] http://www.naturalgas.org/environment/naturalgas.asp

pairing with the growing intermittent renewable resources currently planned for the New York State. By instituting rules and markets that allow additional gas fired generators to be paired with new intermittent renewable resources, a safe, reliable and significantly less carbon-intensive electric generation portfolio will start to emerge in New York.

A renewed emphasis on greening our transportation infrastructure should also examine the opportunity to increase the numbers of natural gas vehicles (NGVs) and the need for more compressed natural gas fueling infrastructure to support those vehicles. Growth in NGVs will place additional demands on the state's natural gas infrastructure, but will help the State achieve environmental goals. For more information on this issue, see our companion white paper on this topic, "Alternative Fuel Vehicles: The Road Ahead."

Proposal

1. Consider endorsing changes to LDC peak-day planning mandates to allow LDCs to plan their own system or subscribe to new pipeline capacity to reduce gas commodity price spikes. There may be instances where new gas transmission capacity can be justified on the basis of the economic benefits provided to gas customers, and LDCs should be able to explore these options.

2. Be mindful of the intermittent nature of many of these resources, and make it economically feasible for the pairing of renewable resources with reliable, dispatchable gas generation resources. NYISO studies on the impact of renewables on electric system reliability are crucial and should guide policy makers to adopt changes needed to integrate substantially higher volumes of renewable resources without reducing system reliability.

3. Support electric reliability by establishing a cross-functional team to monitor the peak summer gas use of electric generators so that it does not overwhelm the available gas transmission capacity, as well as the ability of the electric generators to forecast hourly gas consumptions in order to ensure that daily pipeline capacity can meet short term load durations. Examine other aspects of electric/gas reliability relationships to ensure that new generation resources are sited in areas where they do not worsen the risk of a gas outage causing electric reliability problems.

4. Consider how new gas transmission capacity (either on an LDC's gas transmission network or on the interstate gas pipeline system) can be funded in cases when that new gas transmission capacity also benefits electric customers in a region. The benefits examined would include the elimination or reduction of electric market costs, including uplift charges, made possible by reducing the cost of natural gas supplies, and potentially reducing the hours that oil is needed as a back-up fuel.

Questions or comments?

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