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Tectonic Shifts in North American Natural Gas Production Will Result in Market Earthquakes

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Key Points:

- The increasingly economically isolated southern region will act like a closed system at a time when demand growth will likely outpace supply increases.
- More violent price moves can arise during prolonged heat events and periodic cold snaps as increased usage of natural gas for power generation will exacerbate demand spikes.
- A heavier burden will be placed on the market over the coming years to balance the North American natural gas system as it passes through this period of transition.

The tectonic shift in North American natural gas production and consumption over the last decade will precipitate market earthquakes over the coming years. The pricing system for Natural Gas was developed in the 1990s around a single hub (Henry Hub, LA) because of its central location in a system that took gas from a southern production region (OK, LA, TX, Gulf of Mexico) to delivery points in the metropolises of the north. In the last 5 years, and for the next half decade, three factors will result in a material change to this system: the shale revolution, increasingly stringent regulation on coal fired power generation and the exportation of LNG. The changes to where gas is produced and how it is consumed will result in significant changes to how the commodity flows through the North American transportation network. A breakdown of the standard South to North flow pattern will cause further economic isolation of the southern region at a time when increased demand from power generation, greater industrial consumption and LNG exportation will drain supplies in that region. The logistical needs of this transitional market dynamic will mean heightened price volatility both at Henry Hub as well as in the basis differentials to other locations in North America. It is ultimately through significant price moves that the market will balance itself amidst the new seasonal strains that will arise.

In 1991 the Production Region, as it was dubbed by the EIA consisted of Texas, Louisiana, Oklahoma and the Gulf of Mexico, represented over 65% of US Natural Gas Production. Today that proportion stands at 43% as shown in Figure 1 below. The culprit for

this change is the massive increase in production that has occurred in the Marcellus shale formation of the Appalachian Mountains. The increase in the production from the Marcellus,

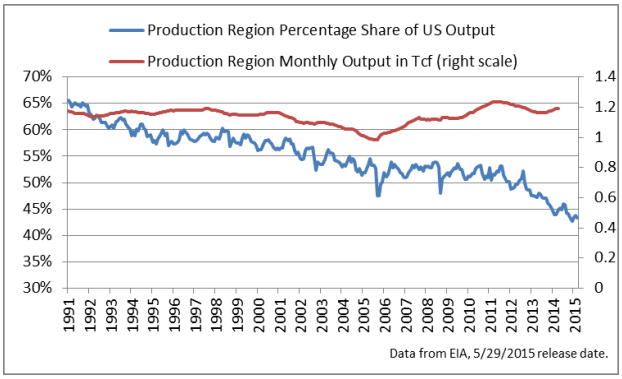

Figure 1

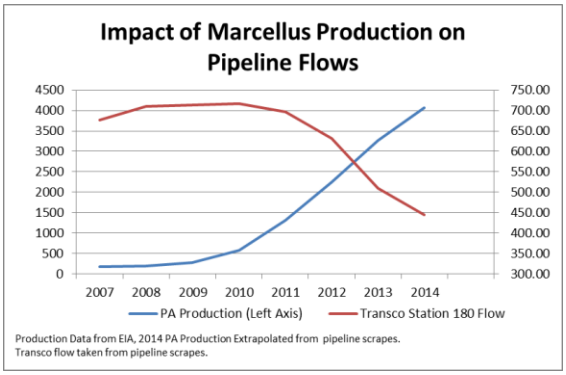

Figure 2

of which a bulk of the increase has occurred in Pennsylvania, has displaced gas that used to be transported north along the Transco[1] pipeline. This displacement can be seen in Figure 2, which shows how the rapid increase of Shale production in Pennsylvania from 2010 has displaced gas that used to flow through southern points like Station 180 in North Central Virginia. This changes the North American natural gas system materially because the demand in the north is satiated from production in Pennsylvania, West Virginia and Ohio rather than from the southern production regions. As a result, output from the Production Region in the South has effectively flat lined over the last two decades (red line in Figure 1) because the new market structure has resulted in low, stable pricing at Henry Hub Louisiana. This is an issue for the increasingly economically isolated southern region because it will act like a closed system at a time when demand growth will likely outpace supply increases.

Years of low natural gas pricing have incented the development of LNG export

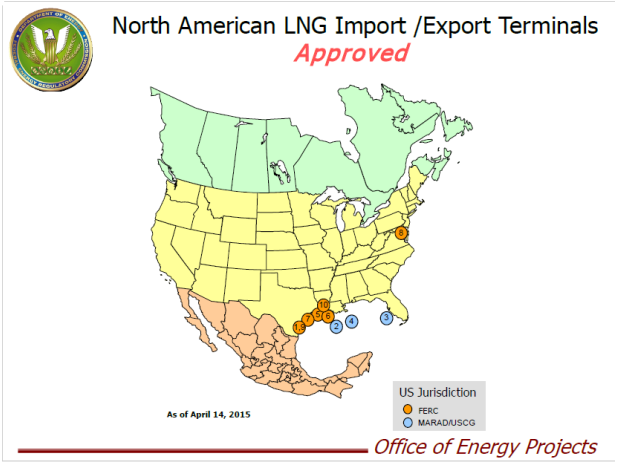

Figure 3

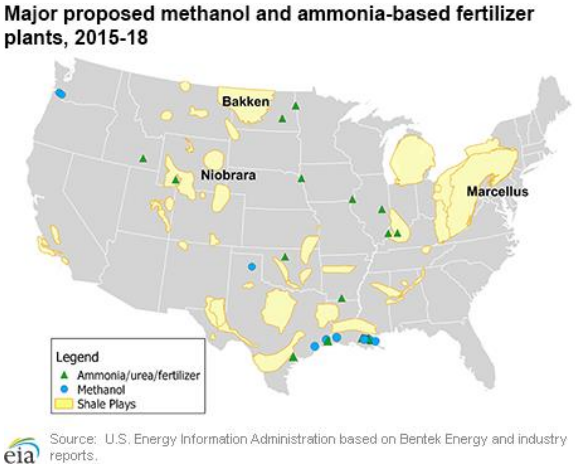

Figure 4

[1] The Transco Pipeline is one of the main transportation legs in the North American system that brings gas from production gathering systems in Southern Texas and Louisiana to demand centers in Atlanta before heading up through the Carolinas, Washington DC and onto New York City.

facilities in the Gulf of Mexico as well as increased usage of natural gas as a fuel for power generation, industrial process and transportation. The majority of these developments have occurred in the southern production region (as shown in Figure 3), which will disproportionately increase in demand for that region. The low, stable price environment in the Gulf of Mexico has afforded industrial firms and fertilizer producers the ability to build out capacity in that region (Figure 4). The long duration LNG export contracts and consistent draw from industrial consumers will result in a significant increase to base gas demand over the coming years.

A combination of more stringent EPA regulations on coal fired generation and the economic impacts of years of low natural gas pricing have resulted in a greater percentage of US electricity coming from Natural Gas fired power plants. Data shows this shift when we plot power burn in the southern Production Region against degree days in that part of the country; we find that power demand per a given degree day[2] is significantly higher than it has been in the past 3 years (shown in Figure 5). The increased demand for gas is caused by the lower utilization of coal fired power plants as natural gas fired generation facilities pick up the slack.

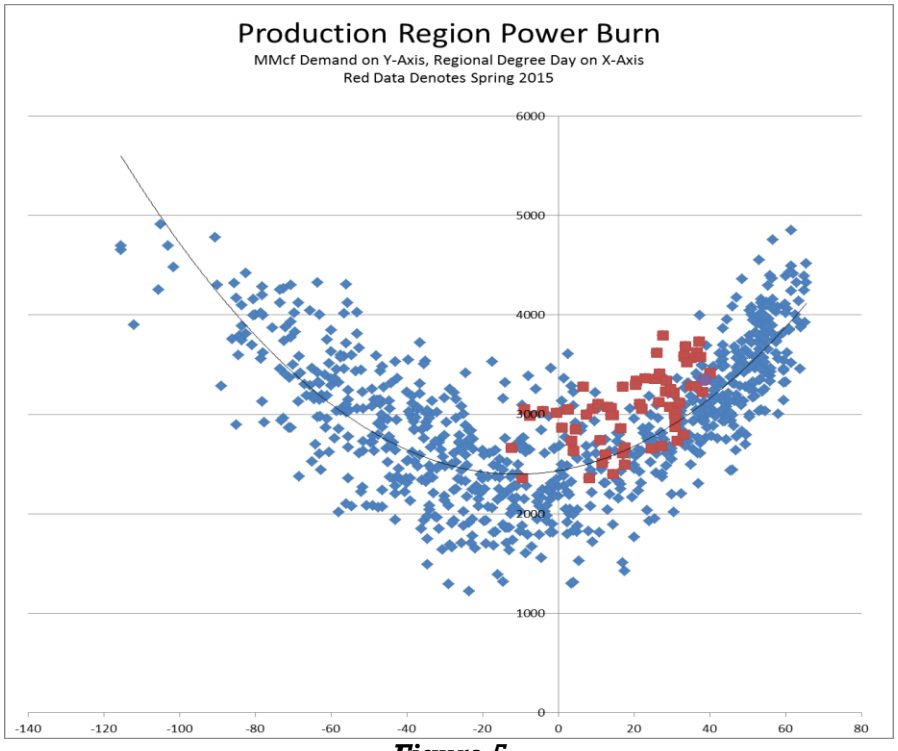

Figure 5

[2] A degree day is a unit used to determine the heating/cooling requirements of buildings, representing a fall of one degree below a 65°F for one day. The heating/cooling requirements for a given structure at a specific location are considered to be directly proportional to the number of Degree Days at that location.

The effects of this shift in power generation have been noticeable in the spring shoulder season; however much more violent price moves can arise during prolonged heat events and periodic cold snaps as increased usage of natural gas for power generation will exacerbate demand spikes. Storage, which was previously used to store gas in summer to burn in winter when North America demanded far more than it could supply; will increasingly need to be used to balance the system over intra-seasonal periods when exogenous weather events stress it. Since it is calendar spreads that dictate storage economics, these spreads will have to move significantly in order to send the proper logistical signals to the market. Similarly, we can anticipate significant volatility in locational basis pricing as the market will have to incent the movement of gas from the Marcellus to southern demand areas in Atlanta and even Texas if needed. While continued production increases will certainly weigh on prices, the loss of significant amounts of coal fired generation has increased the price at which demand from gas to coal switching will occur. The absolute high end of the price spectrum will require the curtailment of LNG exports by sending Henry Hub over international prices in Europe and Asia. Ultimately, a heavier burden will be placed on the market over the coming years to balance the North American natural gas system as it passes through this period of transition. This provides a significant opportunity for traders that understand these implications as the tectonic plates of supply and demand shift underneath the market's feet.

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