Natural Gas-Fired Generation--
a National Perspective

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Introduction and Overview

» The Change in Times
  ▪ From “oh yeah, and gas, too,” to gas being the main backdrop for any generation discussion.
  ▪ Reliance on gas has grown, generation has been a major destination for gas abundance.
  ▪ EPA relies on gas for much of 111 (d) performance.

» The Questions
  ▪ What does this all mean?
  ▪ Do we have enough gas?
  ▪ What are the issues?
First—Abundance is Profound and Sudden

US Net LNG Exports (Imports) per EIA

- **9.0 Bcf/d Net Exports**
- **7.8 Bcf/d Net Imports**

**Source:** EIA Annual Energy Outlooks (AEOs), 2008 and 2015

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Meanwhile Gas Has Dominated New Generation Capacity Since 1990

Percent of New Capacity by Source, 1990-2014

Source: EIA
The Power Sector and Carbon

NATURAL GAS COMBINED CYCLE GENERATION (NGCC)

» We already expected 60 GW of coal retirements, 20% of the coal fleet.
» Much (say, half) would be replaced by new NGCCs.
» EPA’s carbon rules would push existing NGCCs from 42% usage to 70%.
» Combined, these factors could add 14 Bcf/d of generation load (over 50 percent, 11 more than EIA shows).

Source: EIA, America’s Natural Gas Alliance, EPA Section 111(d) proposed rule discussion draft
Market Share: When Gas Prices Bottomed Out, Gas Briefly Equalled Coal’s Market Share
But the Market Shares Have Been Converging for 25 Years

- **Coal**
- **Fitted Trend Lines**
- **Natural Gas**

**Possible 111 (d) Impact?**

- **2028 Convergence Business as Usual**
What Does Market Share Convergence Mean?

» In a pure energy balance, convergence of market shares between coal and gas is “in the zone.”
  ▪ It would be a shift of 236,000 Gwh from coal to gas
  ▪ If it’s from the existing NGCC fleet, that’s a 60 percent capacity factor for NGCCs (New capacity would reduce that).
  ▪ If the Coal fleet is reduced by 20 percent, that’s a 62 percent capacity factor for Coal
  ▪ It requires additional gas supply of 4.5 Bcf/day (above today)

» The 111(d) case would take more gas, as much as 8 to 10 Bcf/day more.
  ▪ But that’s well within the industry’s ability to respond.
  ▪ Coal plants would drop to below 50 percent utilization if the remaining plants all stay in service.
  ▪ But still, not outrageous numbers.
Is There Enough Gas? Yes, and More

» EIA included power gen, industrial growth, and LNG exports at generous levels.

» Prices stayed stable in the $4 to $6 range (real) through 2030.

» But there’s more supply, business as usual.

Source: EIA Annual Energy Outlooks 2010 through 2015, OPIS for Actuals
Utilities and reliability managers are nervous about the emerging high degree of reliance on natural gas.

Issues generally fall into three areas:
- Adequacy of pipeline infrastructure
- Finding ways to pay for new pipeline capacity
- Friction between the gas and electric business models

All of these became a big deal in the winter of 2014.

How are they being addressed?
- EIPC, New England Governors’ initiative
- FERC/NAESB efforts on business practices
Meanwhile, What About LNG Exports?

- 38 Bcf/day of applications.
- 10-12 Bcf/day is the most likely level of real US projects,
- That leads to about 9 Bcf/day of exports.
- Why is that?
Who is On Their Way: Big Five

» **Cove Point**: 0.8 Bcf/Day

» **Sabine**: 2.2 Bcf/Day, expanding to 2.8 Bcf/Day *

» **Cameron**: 1.7 Bcf/Day, expanding to 3.5 Bcf/Day *

» **Freeport**: 1.4 Bcf/Day, expanding to 2.8 Bcf/Day *

» **Corpus Christi**: 2.1 Bcf/Day

- All have their FERC approvals, and all are fully contracted.

*Some of the expansion authorizations are still pending
Where Does It Go?

- 5.4 Bcf/Day to Asia
- 3.8 Bcf/Day to Europe
- 9.2 Bcf/Day Total from 11.2 Bcf/Day of Capacity (82 pct Load Factor)
There’s a Natural Market Limit on US LNG

- **World Market Yet to be Filled by 2025: 160 -210 MTPA**
  
  Source: ExxonMobil, BG Group, Wood MacKenzie, Cheniere Energy

- That amounts to 28 to 36 Bcfd of export capacity.

- Applications filed in the US alone add up to 38 Bcfd, or over 100 percent of the high-end estimate.
  
  Source: US DOE

- But there’s competition from Australia, East Africa, Israel, Indonesia, and the Middle East.

- Assuming the US will not get a 100 percent market share, what is reasonable? At 33 percent, that would be 12 Bcfd of capacity, which is pretty much already met by likely projects.
Summary Overview

» First: Natural gas will be critical to the successful operation of clean power.

» Second: We have more than enough supply to meet a very broad range of needs in generation.

» Third: Evolving issues in serving generators are being worked out.

» Fourth: Other uses such as exports don’t get in the way.
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