



Prospects for LNG Exports from North America

**JOGMEC Petroleum Seminar
February 7, 2013
Tokyo**

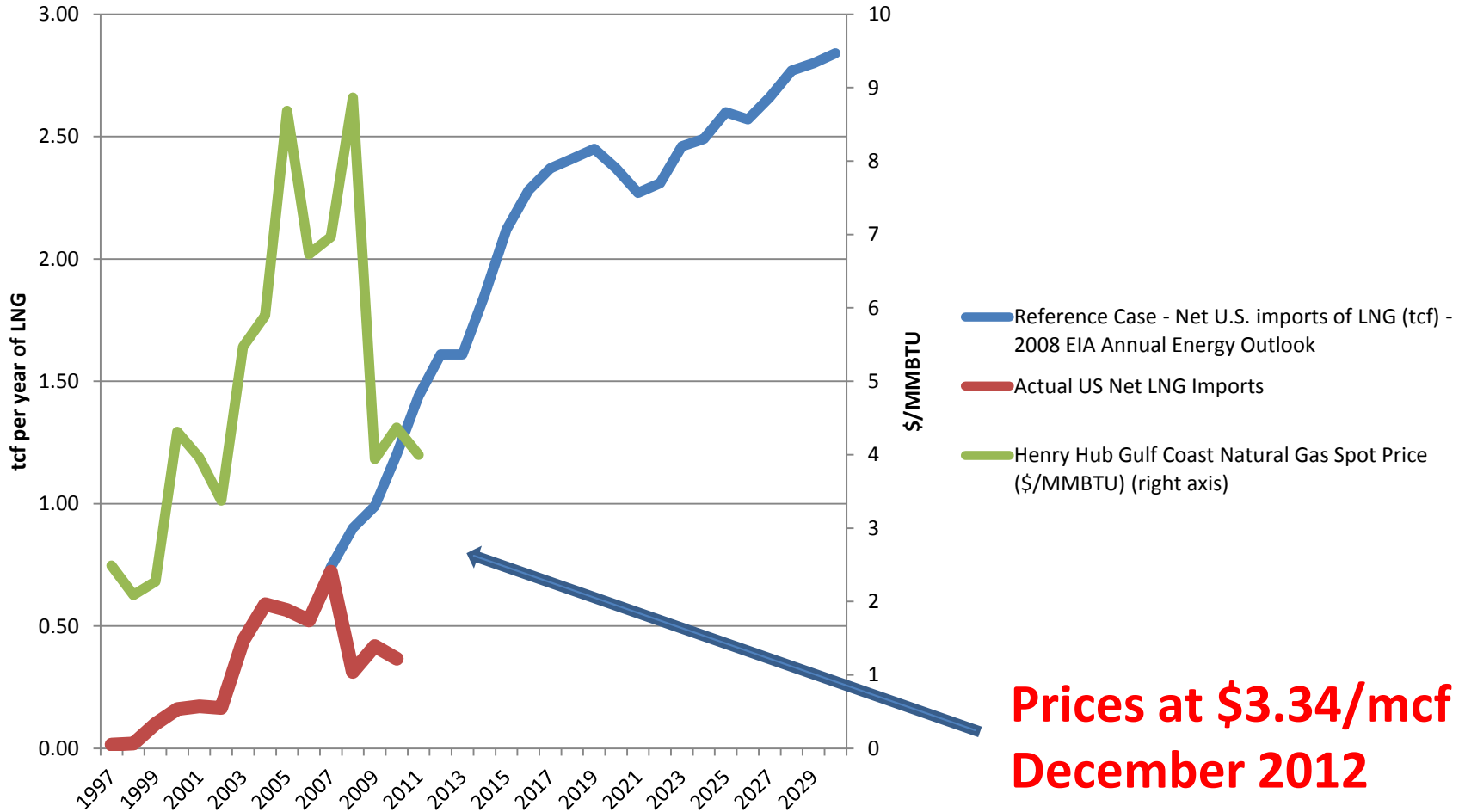
**Lucian Pugliaresi, President
Energy Policy Research Foundation, Inc. (EPRINC)
Washington, DC**

Four Questions

- 1. How big is the U.S. natural gas production opportunity (hint: it's about technology, not reserves).**
- 2. How sensitive is U.S. natural gas production to the price of natural gas i.e., what is the shape of the supply curve?**
- 3. What is the potential for the U.S. to contribute to world LNG supplies (which is not the same as the amount of LNG the U.S. will actually contribute).**
- 4. What role will the U.S. Government play in regulating natural gas production and LNG exports?**

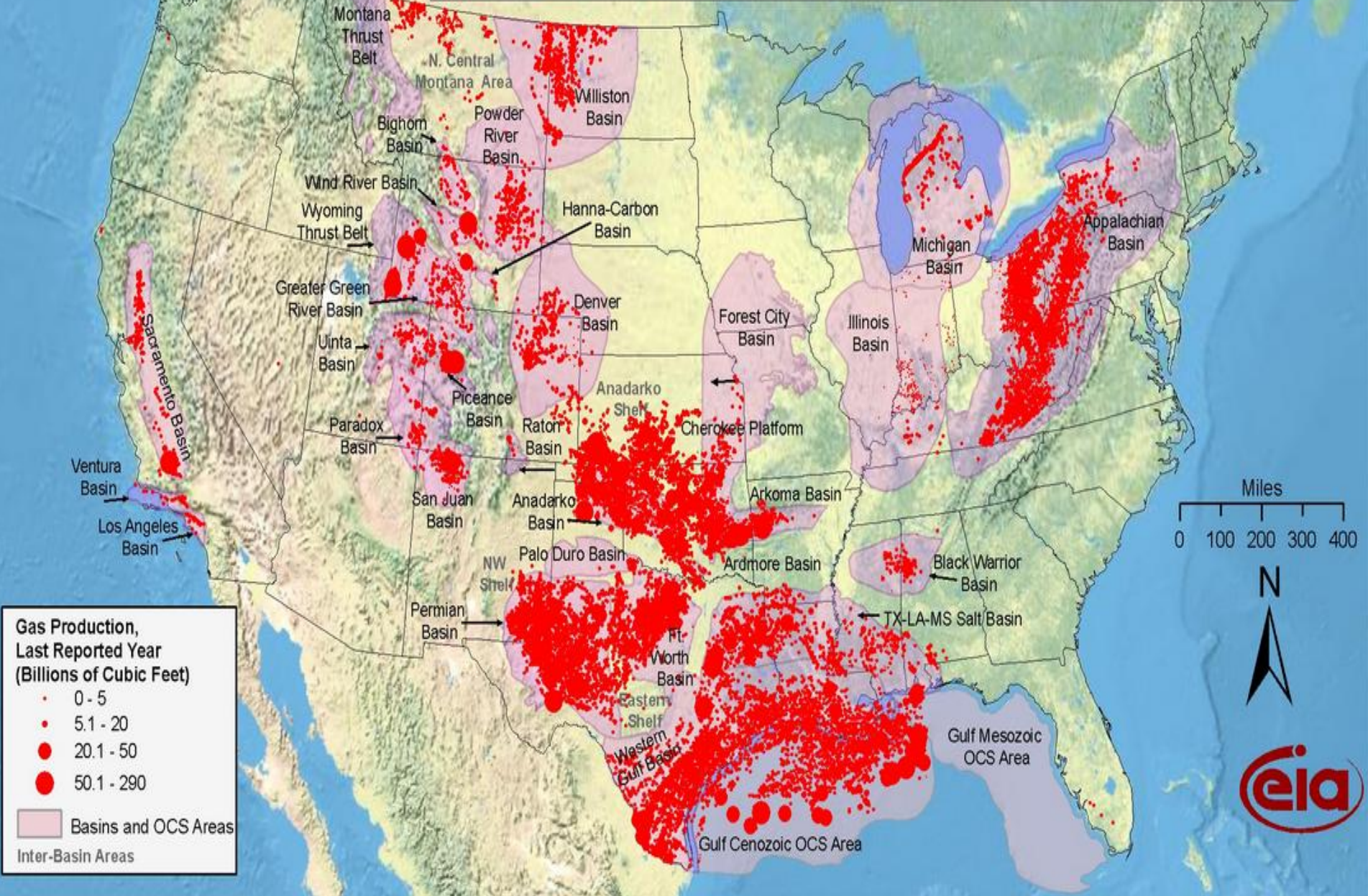
Projected Imports of LNG vs. Actual

(or why forecasters should have humility)

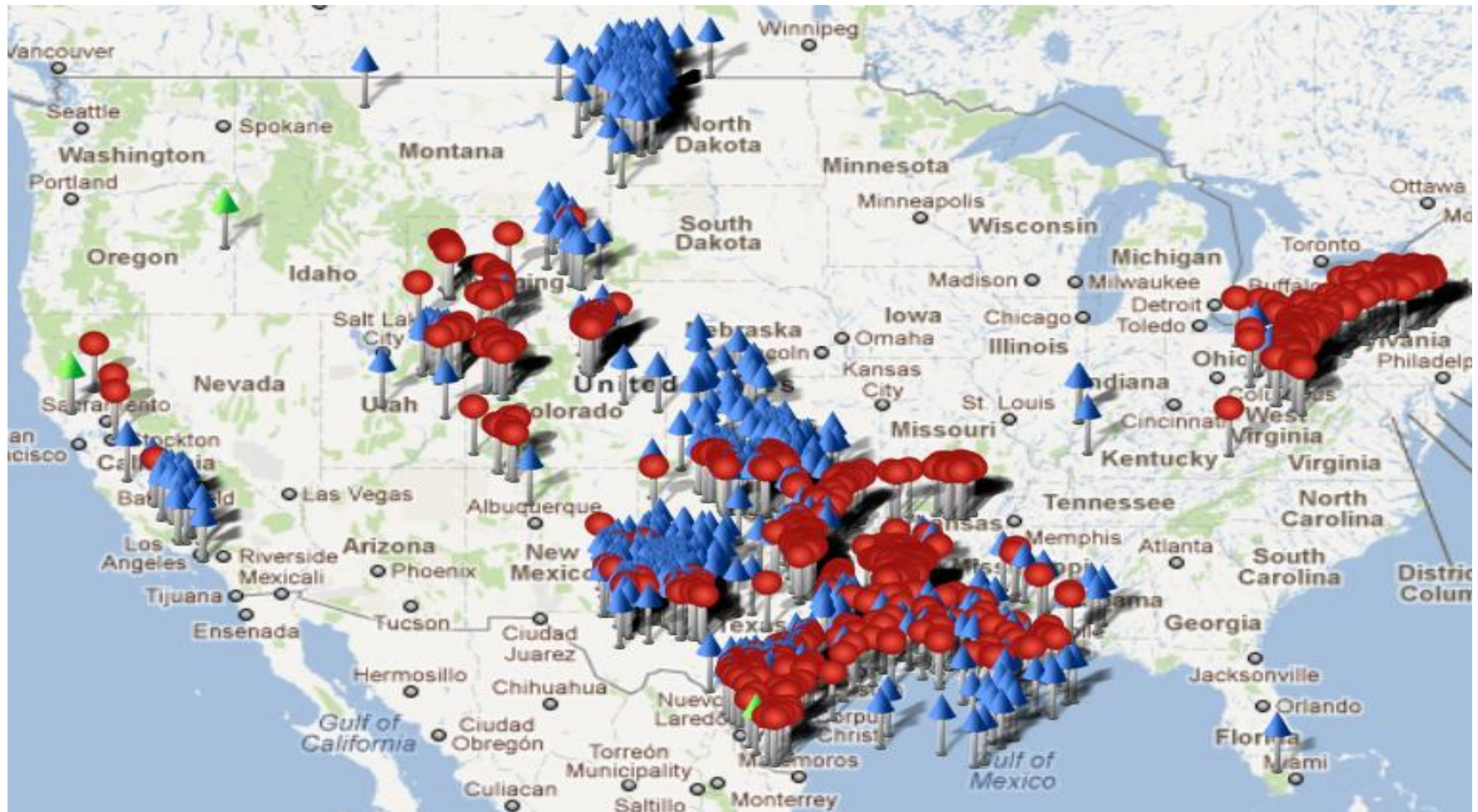


Source : EIA data and forecasts

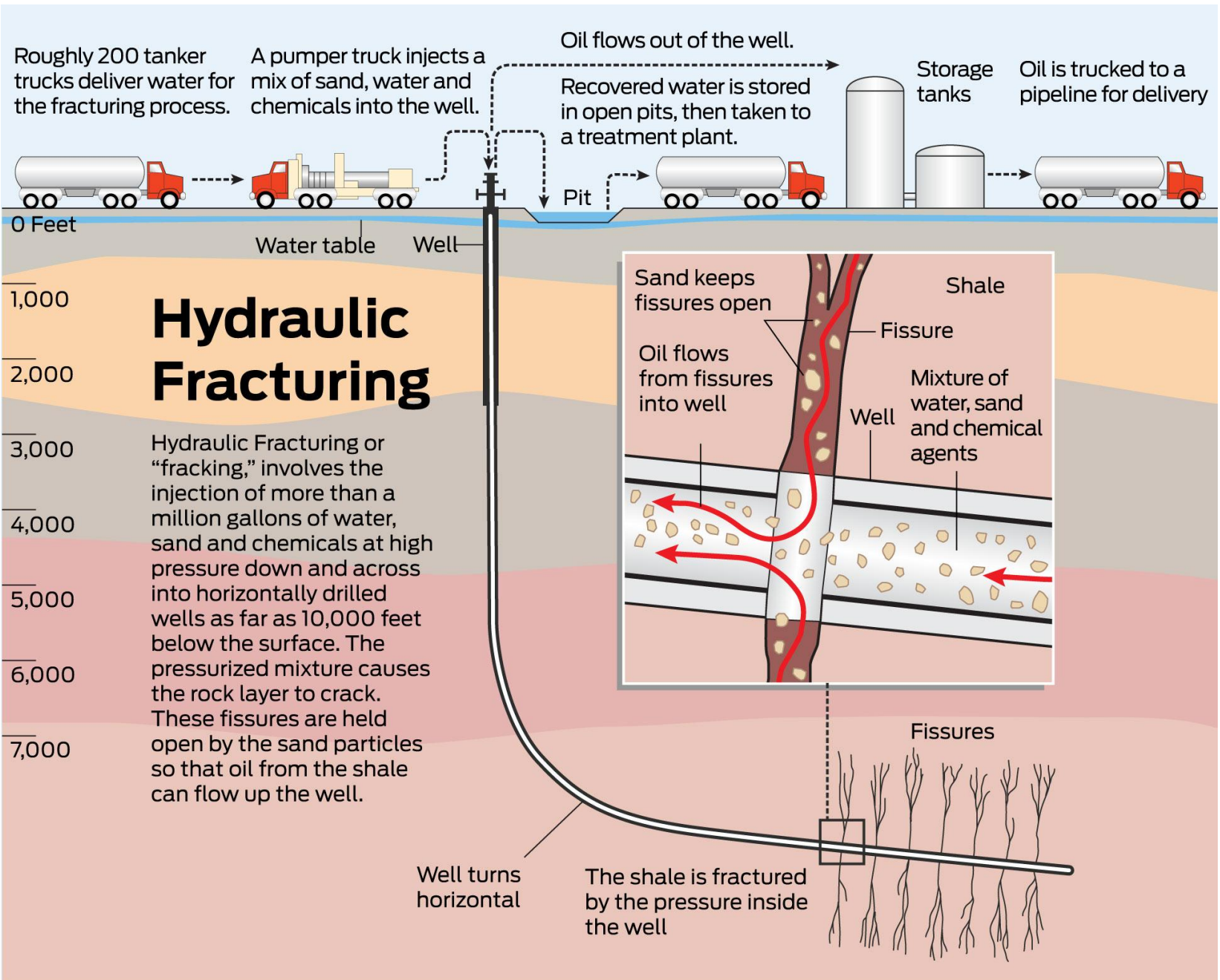
Gas Production in Conventional Fields, Lower 48 States



Rig Count and Permits



Source: Photo Baker Hughes Interactive Rig Count Jan 25, 2012



Shale Gas is Manufactured



Will Public Opposition Stop the Shale Gale?

24 HOURS LATER ... SYRACUSE PULLS PLUG

Security concerns zap EPA meeting



Photo illustration by JOHN CATLETT / Graphics Editor

September eyed as earliest date, but site uncertain

By Jon Campbell
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 Staff Writer

It was on. It was moved. Now, it's off — at least until September.

Less than 24 hours after the U.S. Environmental Protection Agency announced it was moving its marathon public meeting from Binghamton University to the Oncenter Complex in Syracuse, the agency Tuesday postponed the event because of security concerns expressed by Onondaga County officials.

Matthew Millea, deputy county executive for physical services for Onondaga, said public safety officials at BU told Onondaga to expect up to 8,000 people to show for the event.

About 1,200 people had pre-registered to attend the hearing, but a large walkup crowd was expected.

"It was just impossible to put together a plan that would ensure public health and safety for a crowd of that size in this period of time," Millea said.

This was the latest in a number of twists and turns for the meeting, which was set for Thursday. On Monday it was moved to Syracuse because of a weeklong contract dispute between the EPA and BU.

The agency now intends to hold the meeting in September," according to

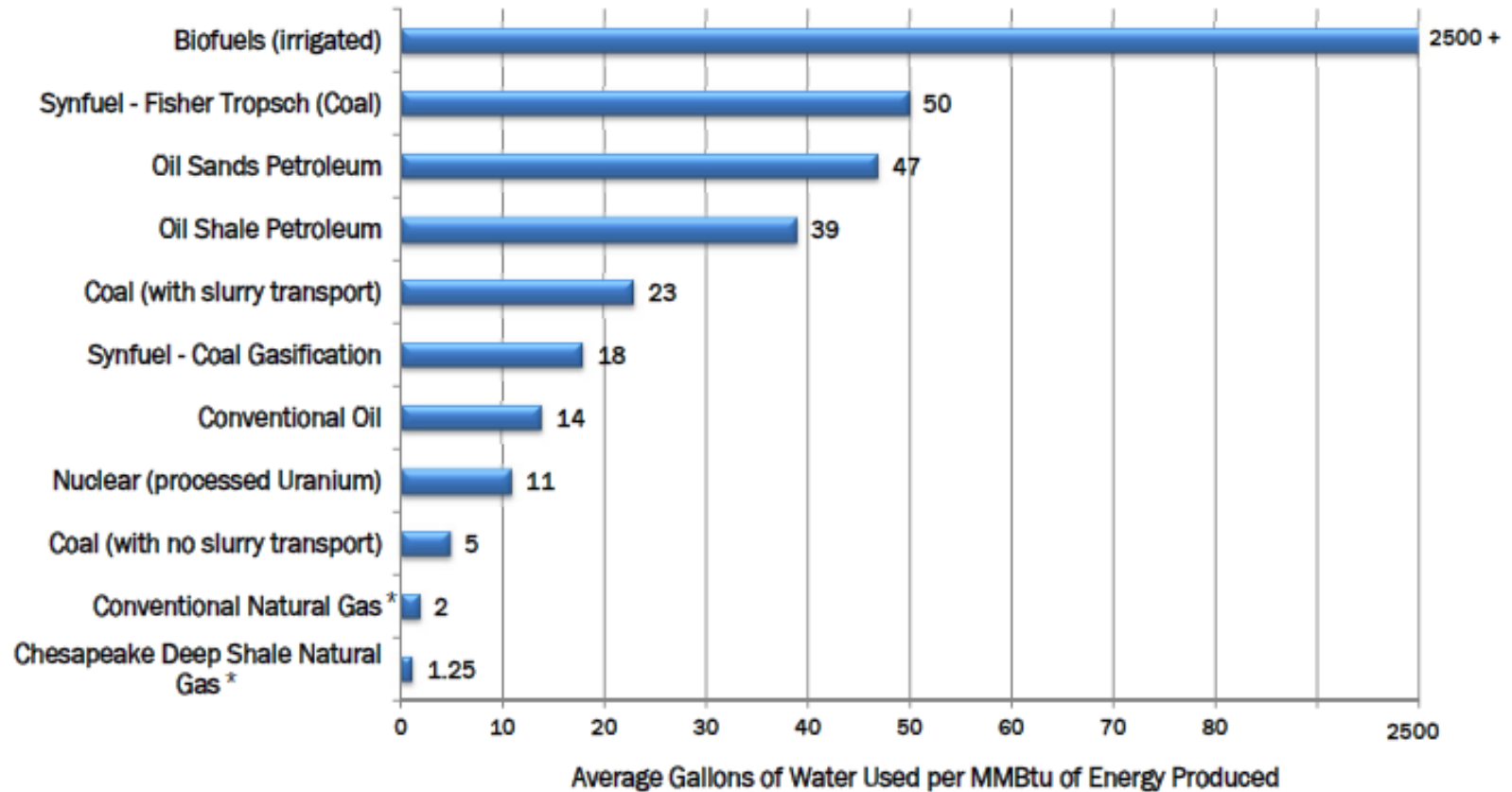
BACK IN BROOME?

If the Environmental Protection Agency's meeting on hydrofracking is rescheduled for September, Broome County might be able to schedule it at one of its venues, said Arena Director Brian Hoffman. Hosting the meeting at a county venue depends on the events already scheduled at the facilities.

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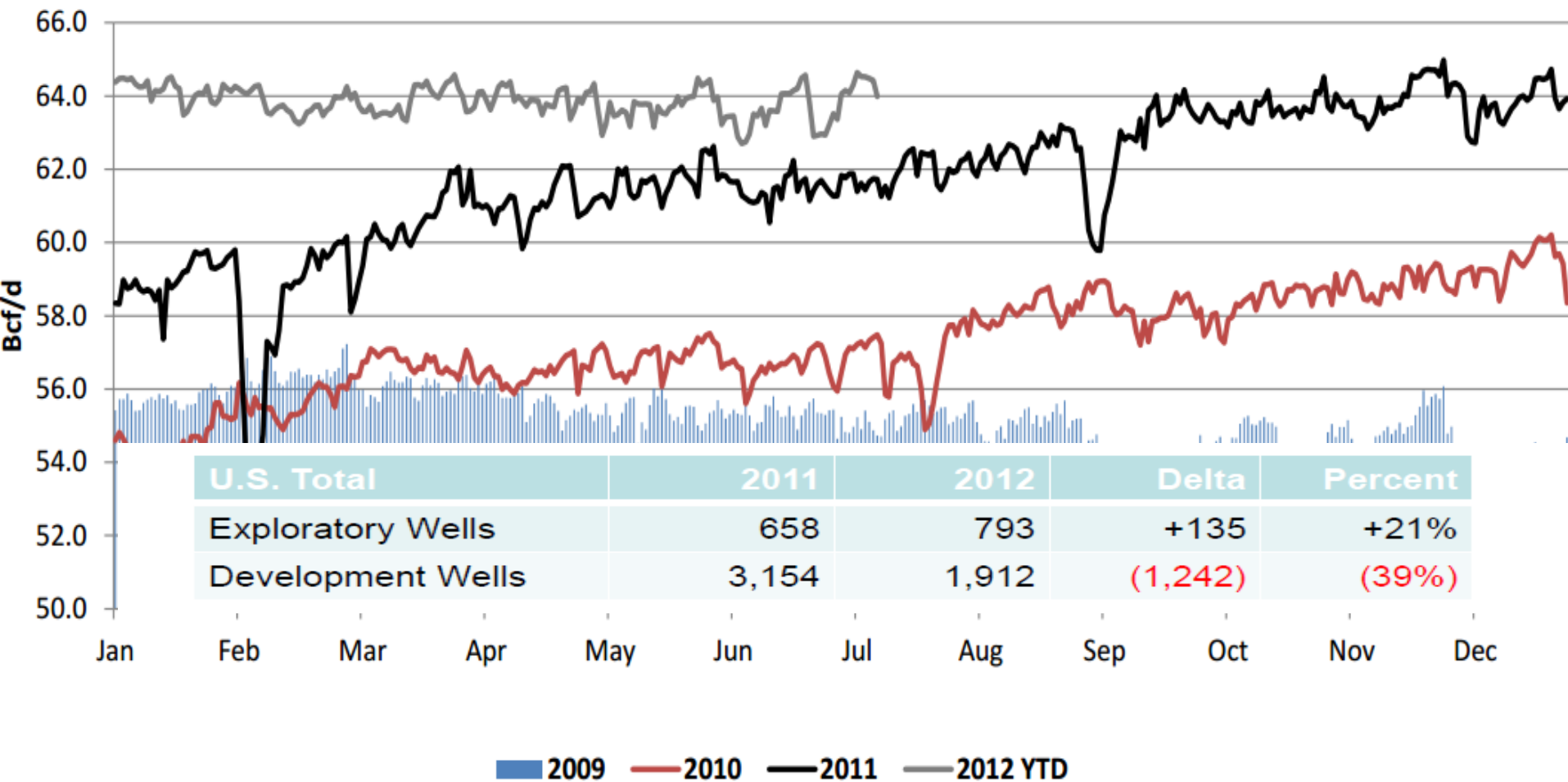
The EPA has conducted three hydrofracking meetings around the country without incident, but none of them attracted the number of people that were expected to be at Thursday's now-postponed meeting. Officials from the City of Syracuse and Onondaga County are developing a security plan to adequately police as many as 8,000 pas-

Water Used to Produce Energy



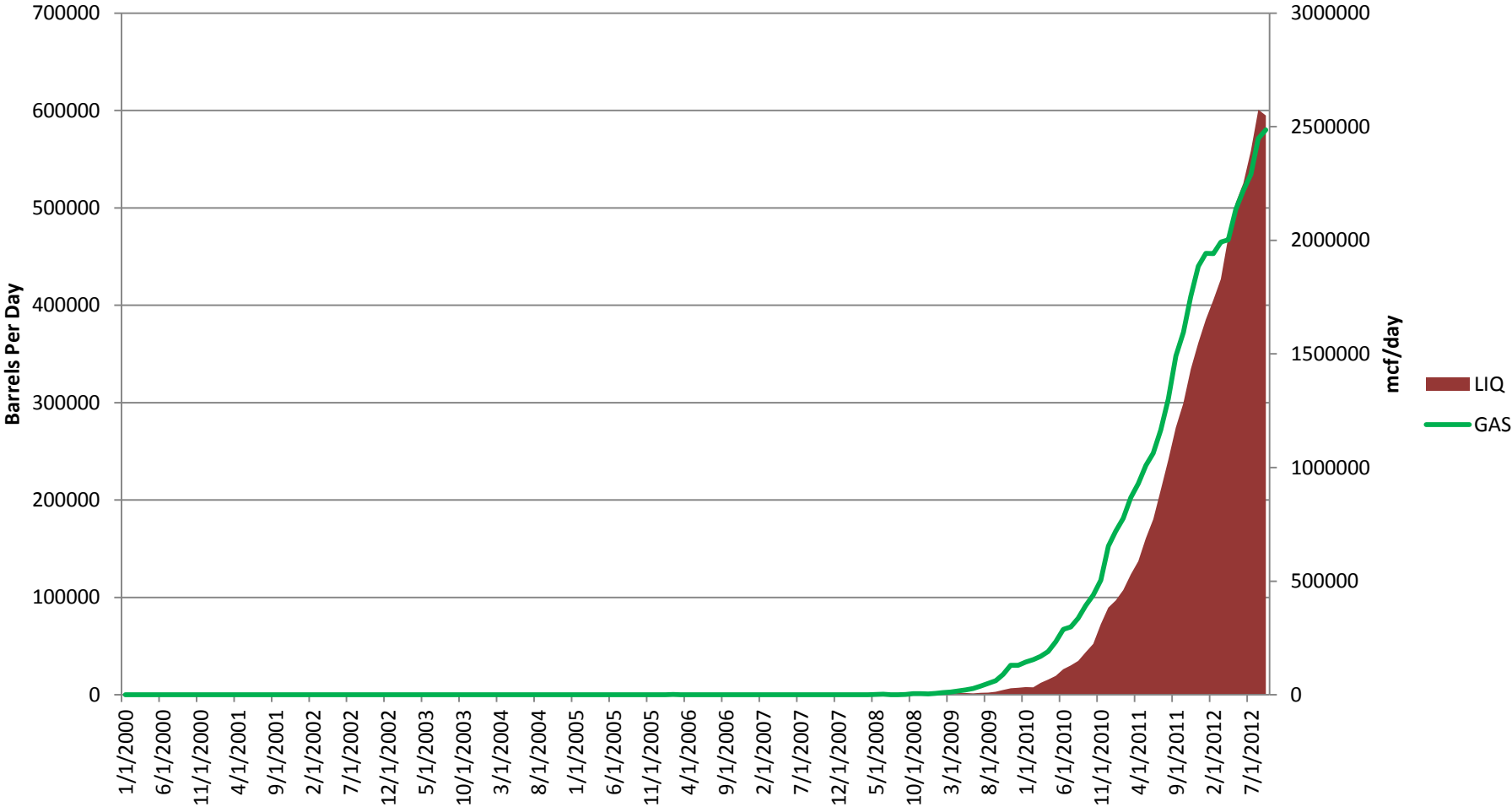
Source: U.S. DOE, Chesapeake

Historical US Gas Production



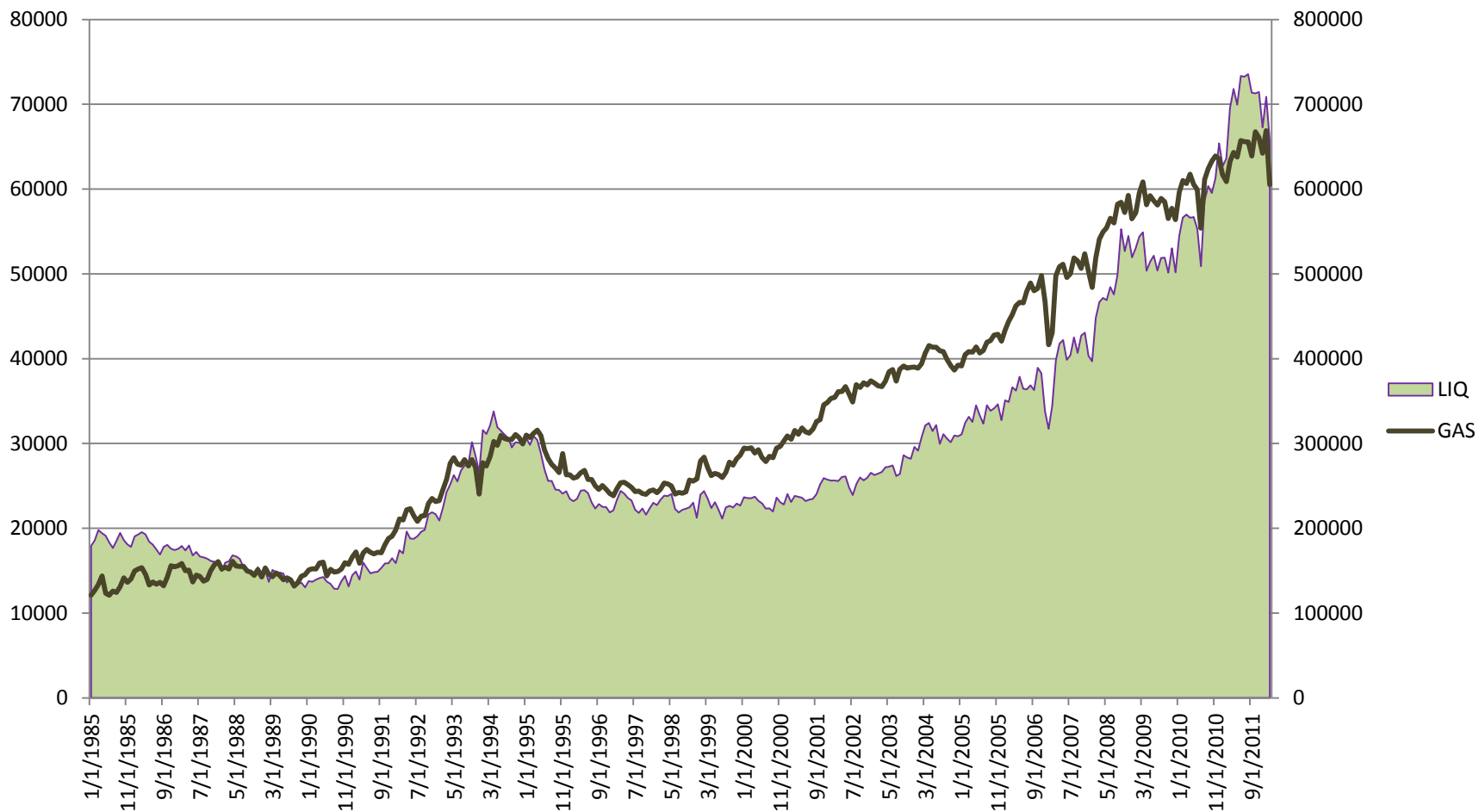
Source: Bentek, NDPA Williston Basin natural gas study, "The Williston Basin: Greasing the Gears for Growth in North Dakota"

South Texas' Eagle Ford Reservoir Liquid and Gas Production



Source: HPDI Dec 23 2012, liquid volumes includes condensate, estimated condensate volumes are up to 40% of liquids production

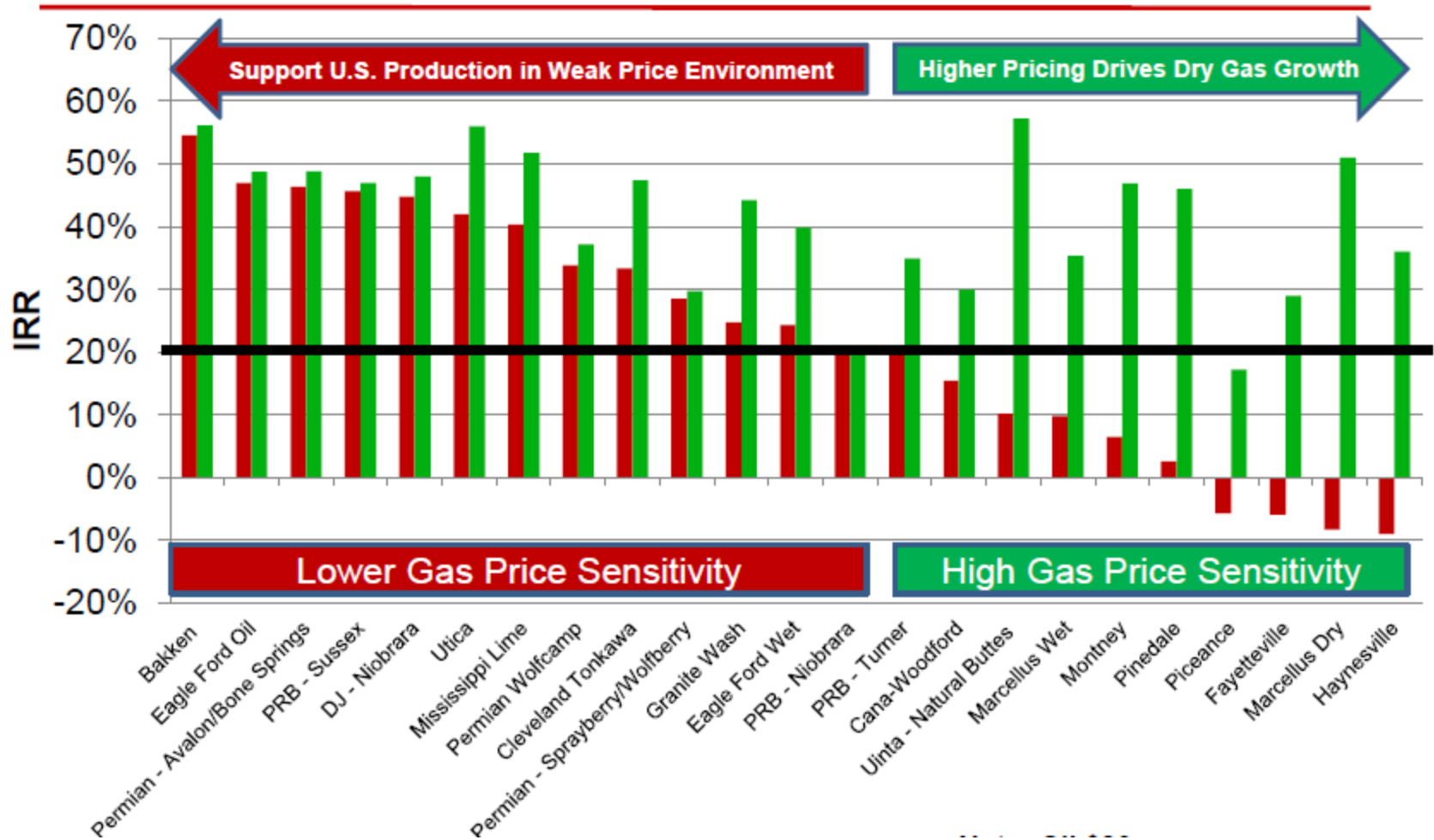
Niobrara Production



Source : EIA data and forecasts

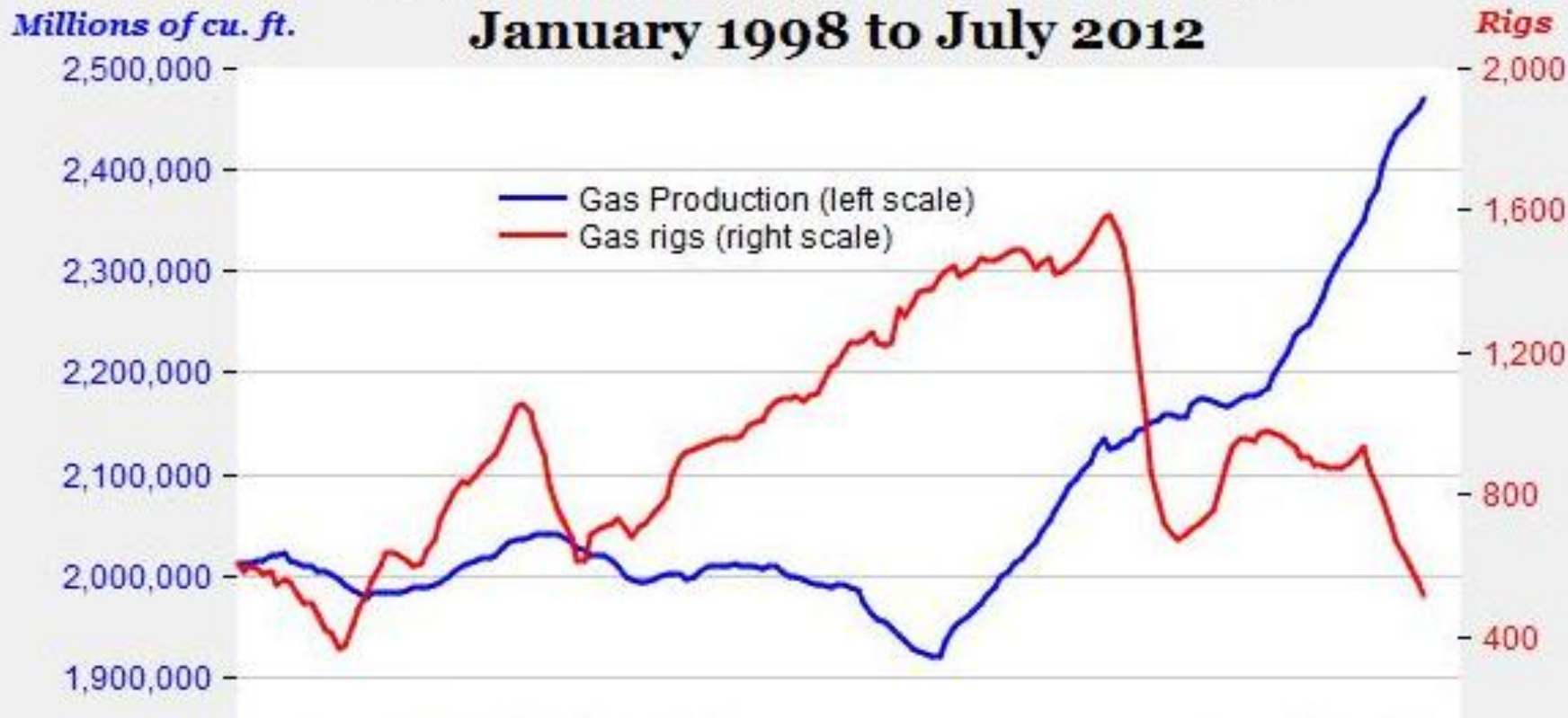
High Volumes of Associated Gas and Wet Plays Sustain U.S. Output

\$2/mcf vs. \$5/mcf



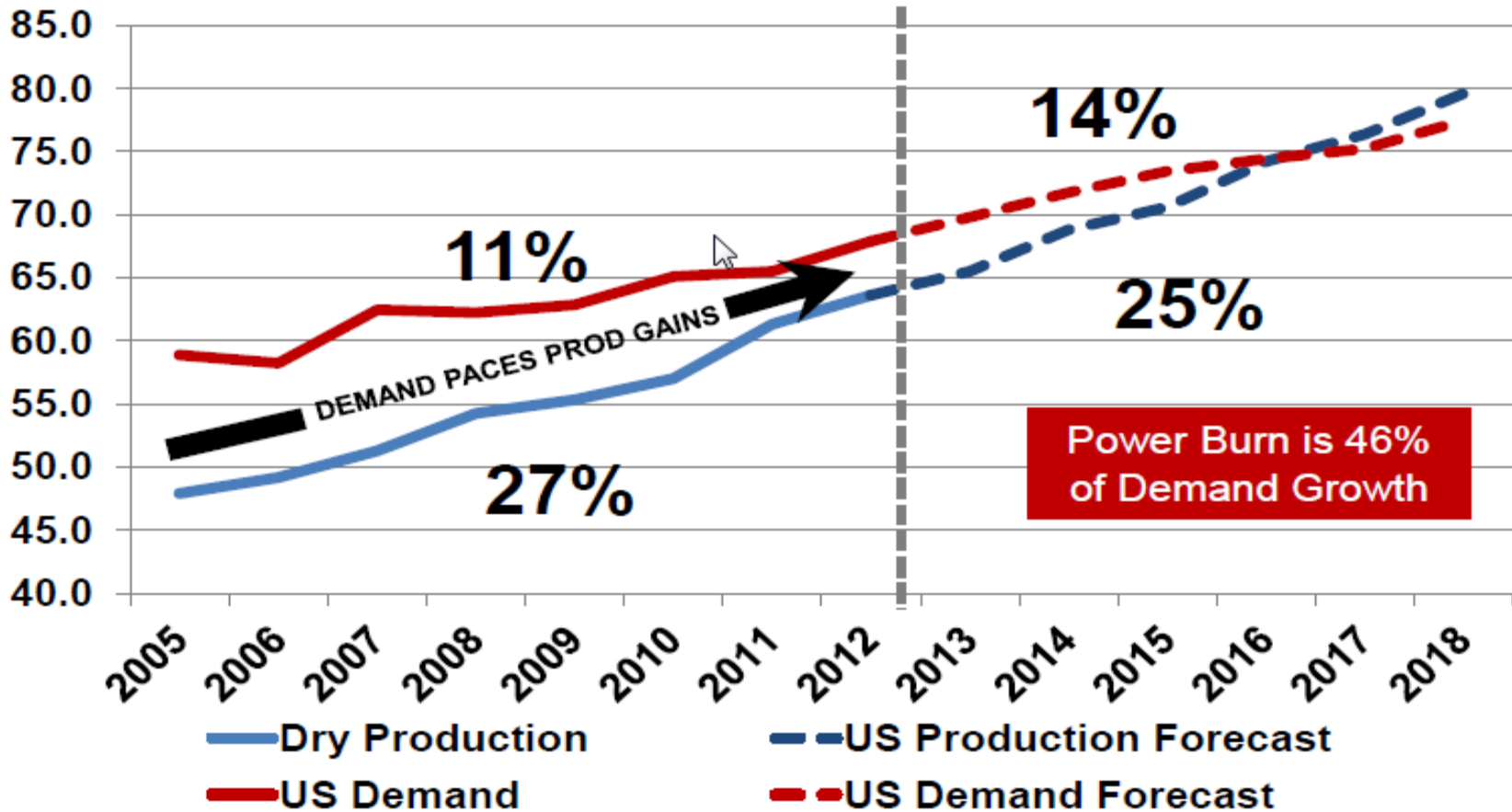
Source: Bentek

Natural Gas: Production vs. Rigs January 1998 to July 2012



Source: Baker Hughes

U.S. Natural Gas Capacity Likely to Continue Growing



Source: Bentek

Petrochemical Cost Curve By Country -- 2012

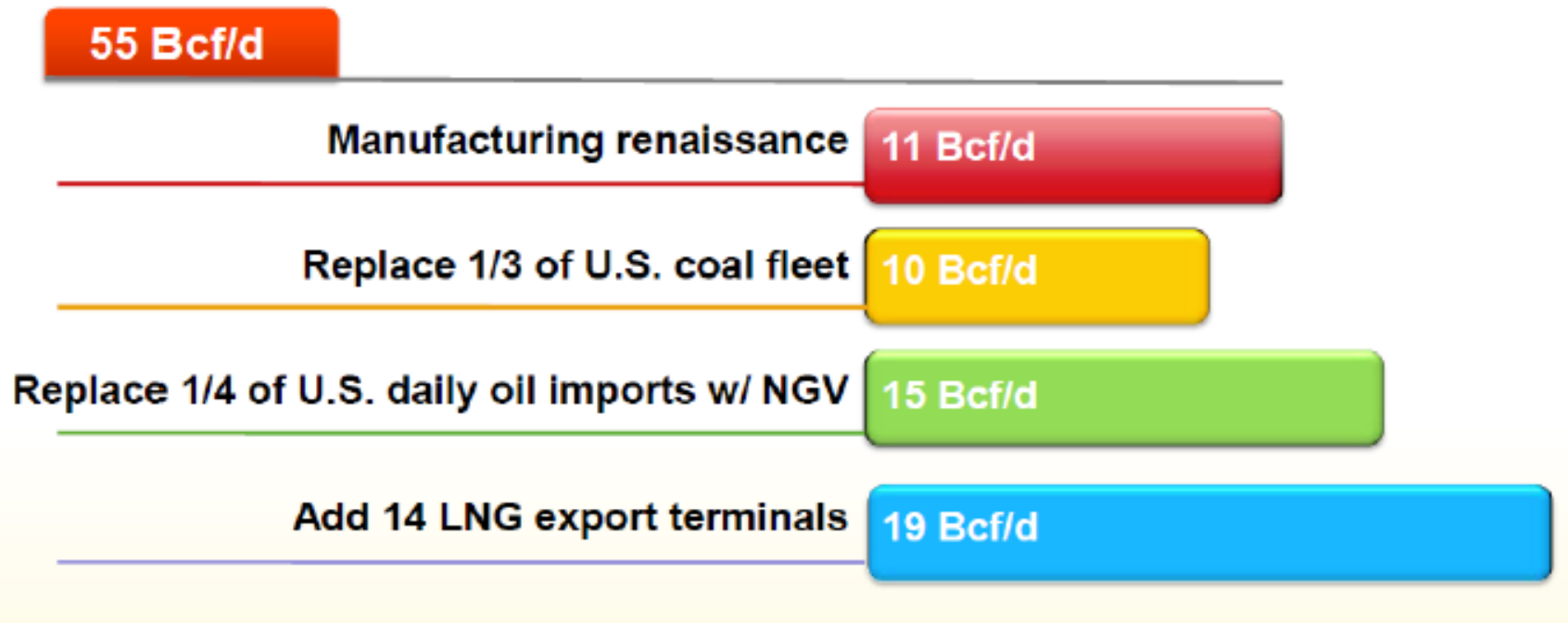
Cash Costs
(\$/Pound)

High



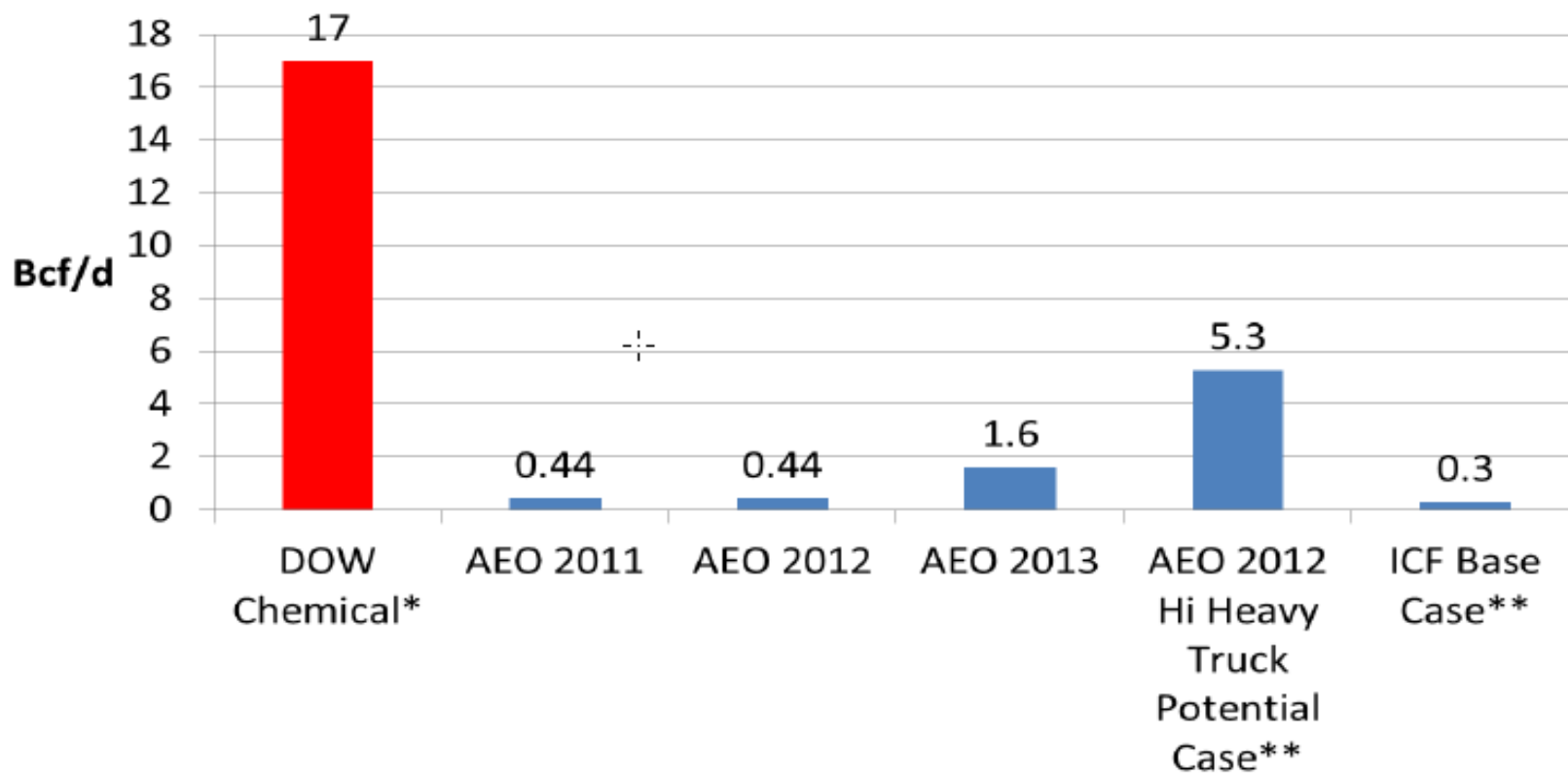
Source: American Chemistry Council

Opposition to U.S. LNG Exports----- How Realistic is a 55 bcf/d growth in natural gas demand From 2012 to 2035?

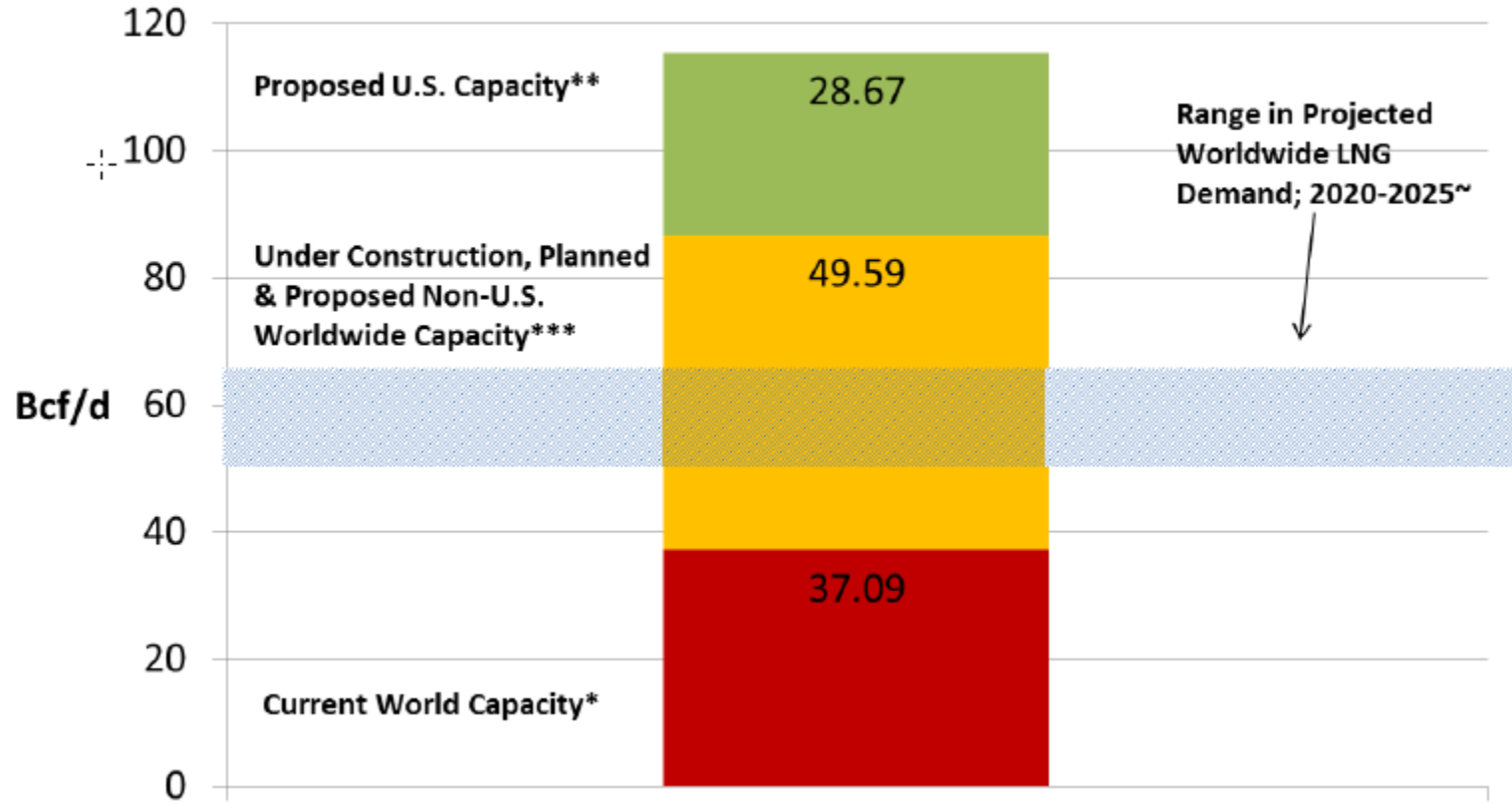


Source: Dow Chemical Corporation

PROJECTED NATURAL GAS DEMAND Transportation Sector



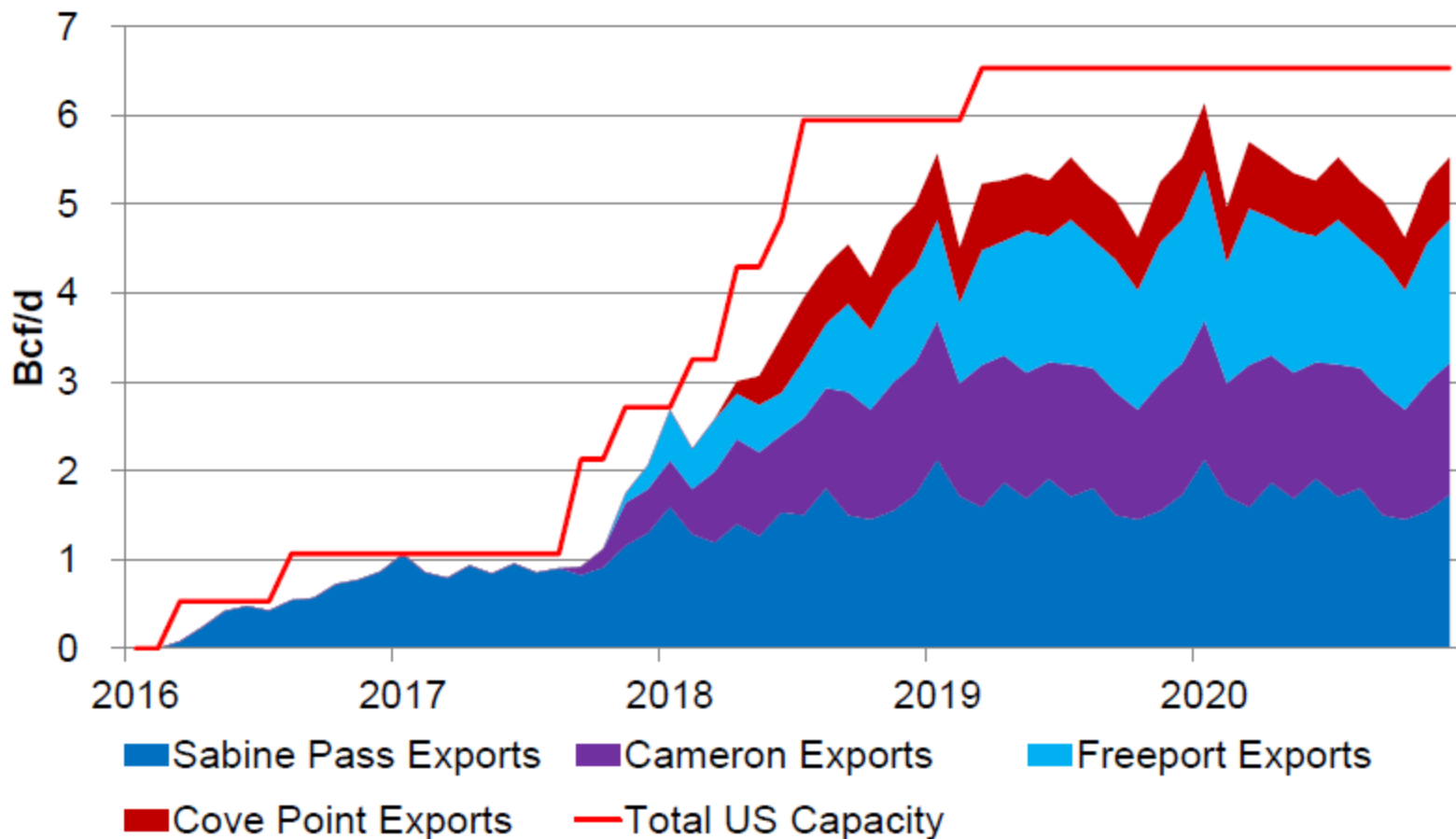
Proposed U.S. Projects Far Exceed Demand – Many Will Not Reach FID



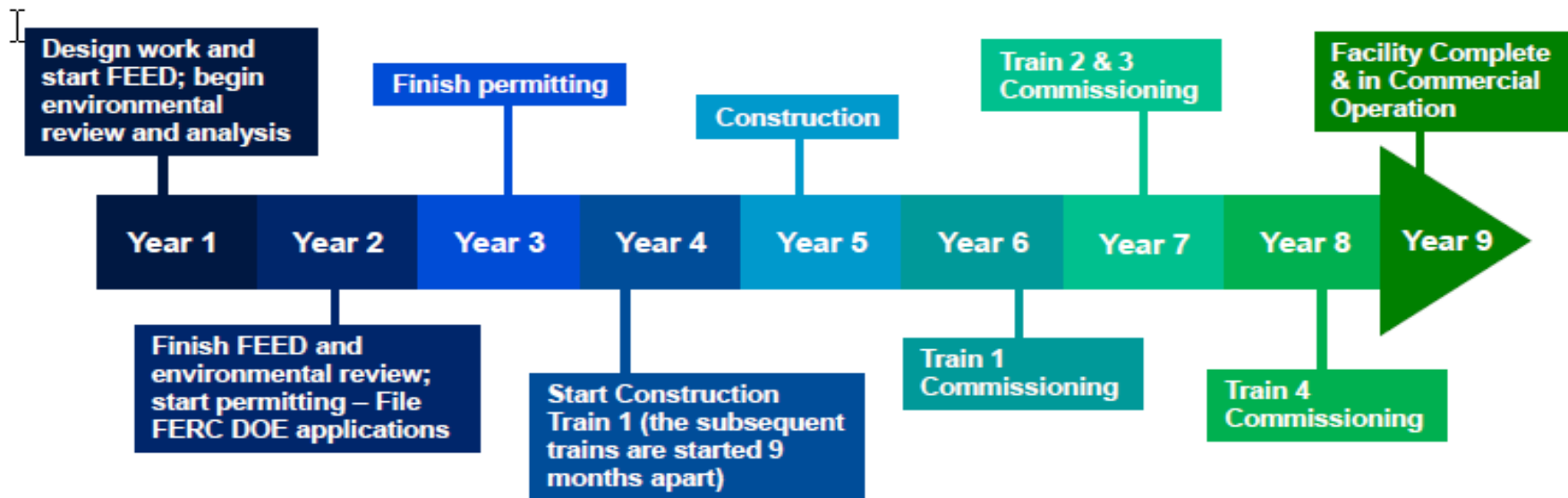
***Does not include recently added 3bcf/d of FTA applications and 24.8 of Non FTA Applications.**

Sources: Poten Group, ICF, U.S. DOE, Facts, BG Group, Credit Suisse

Possible Timing of Four LNG Export Projects



Permitting and Construction Timelines for FERC Approval



Sources: Poten Group, ICF, U.S. DOE, Facts, BG Group, Credit Suisse

Conclusions

- Aside from **Sabine Pass Trains 1-4**, which has completed FERC permitting, there are only three projects that have exited the pre-Filing process: **Corpus Christi Liquefaction (Cheniere)**, **Freeport LNG** and **Cameron LNG (Sempra)**.
- Maximum of five to six projects, with a maximum of 12 bcf/d, but given world LNG competition, U.S. exports likely to be limited to 6-8 bcf/d over next 20 years.
- U.S. LNG exports highly unlikely to harm U.S. manufacturing advantage, supply curve will remain flat due to technology advances and continued access to natural gas on private lands. U.S. has massive natural gas expansion capacity.
- Only pay attention to those projects that exit the pre-filing process at FERC as this is where a major commitment is made, engineering and environmental assessment with an approximate cost of \$100 million.
- DOE will permit several export licenses for Japan in the next 2-6 months.