



# Natural Gas Opportunities

**NAFTANEXT Summit**

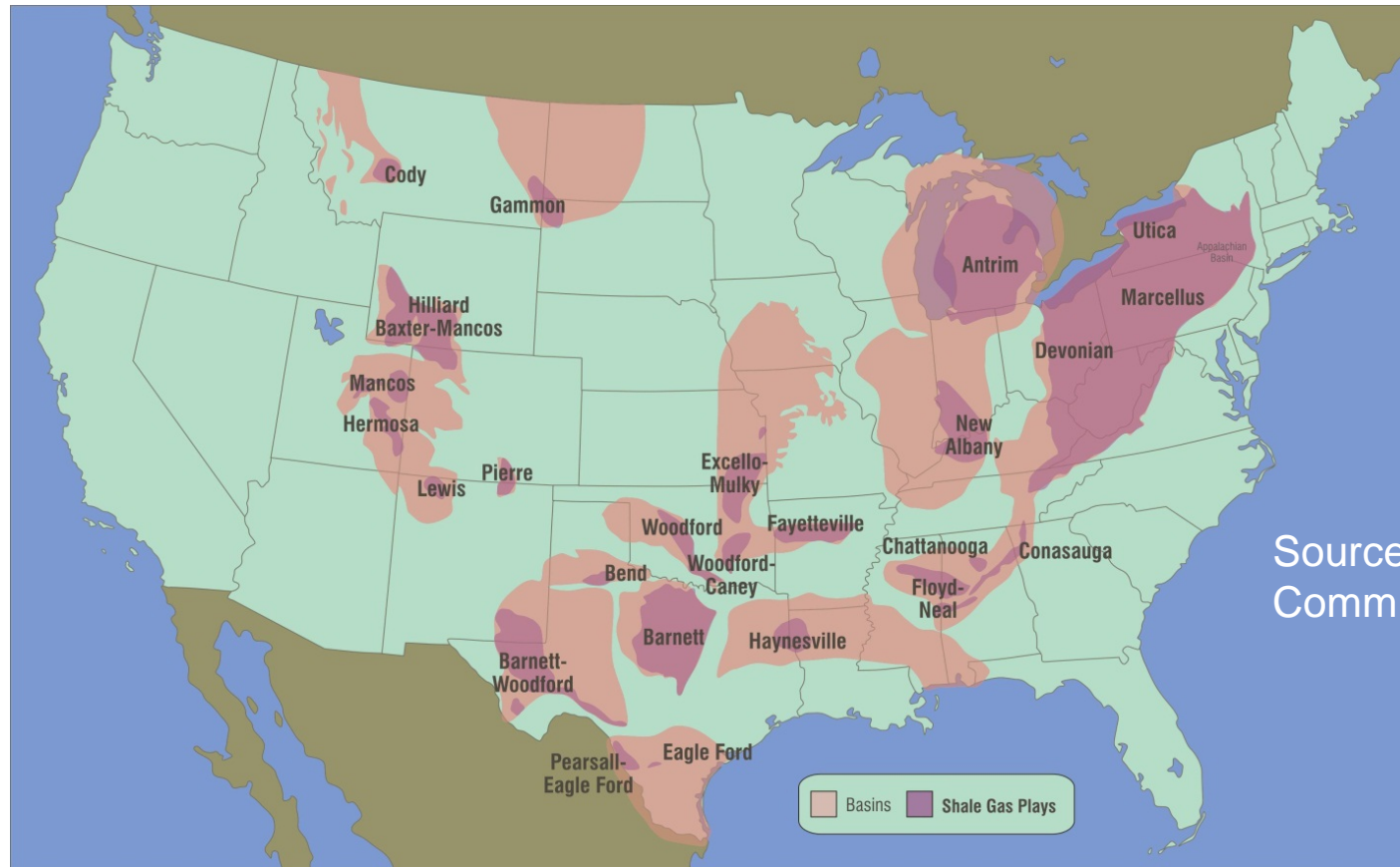
Chicago, IL

Erica Bowman, Chief Economist

April 25, 2014

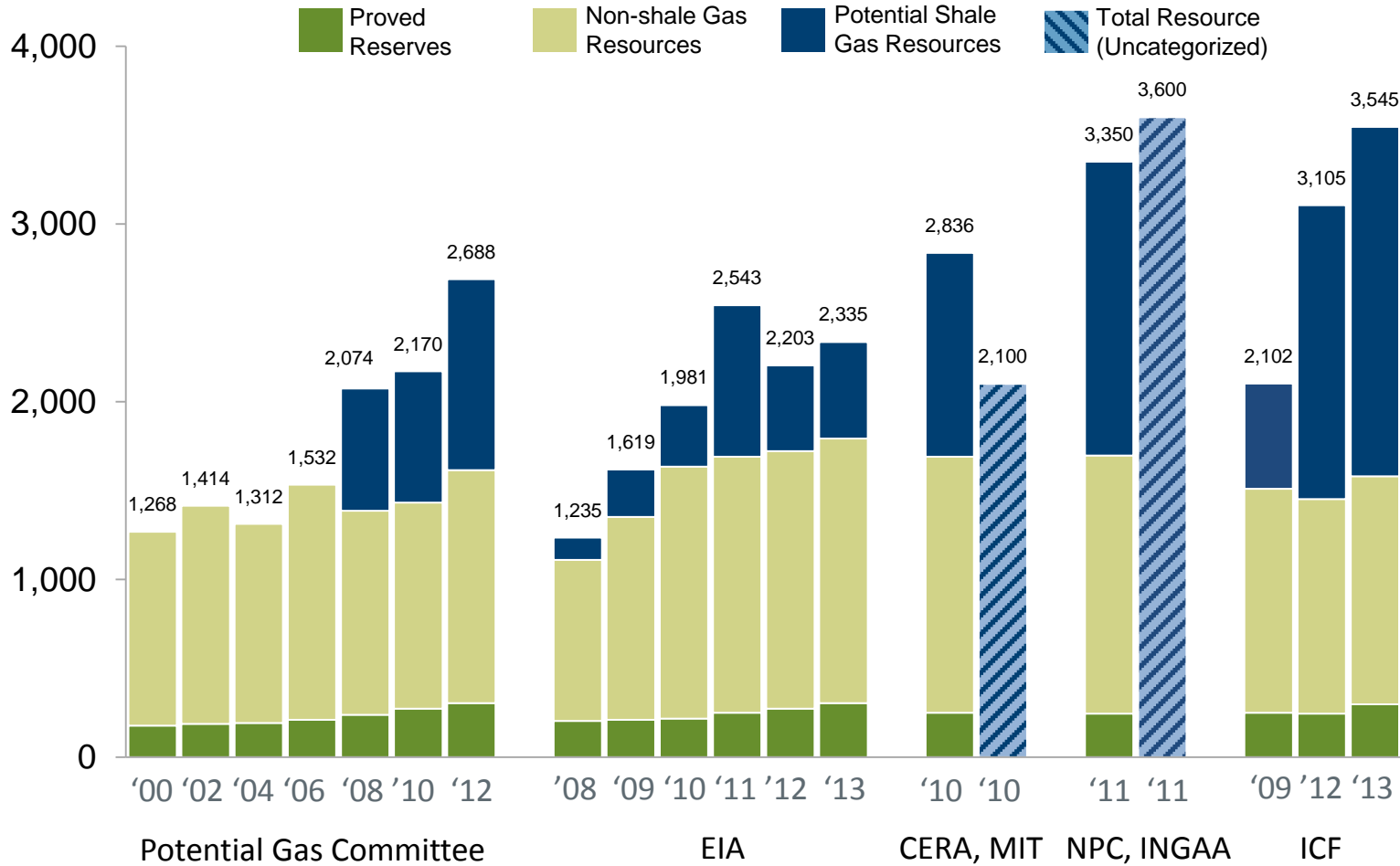


# U.S. Natural Gas Reserves



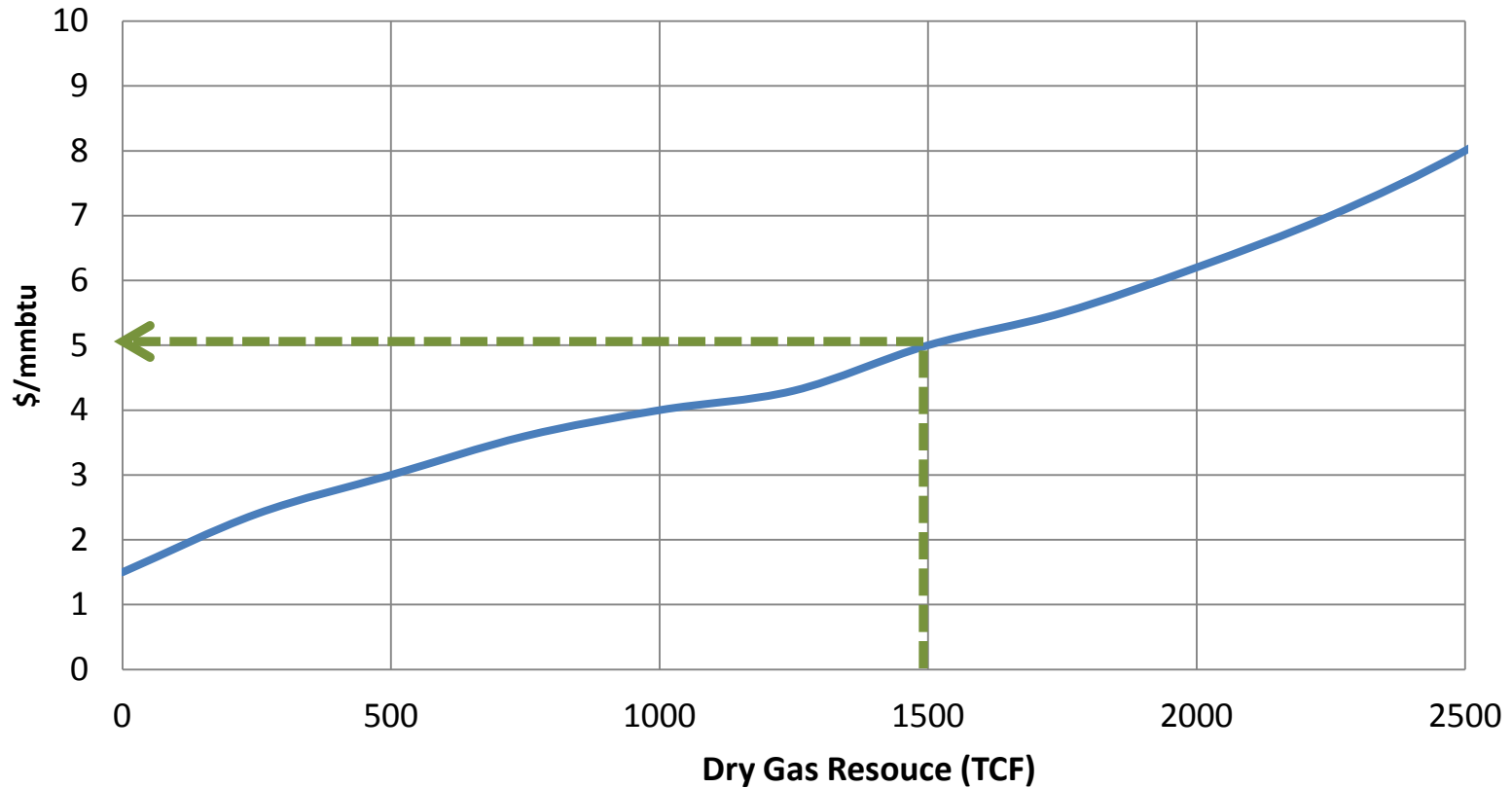
# Abundant Supply

Estimates of U.S. Recoverable Natural Gas  
(trillion cubic feet)



# Reserves Volume and Cost

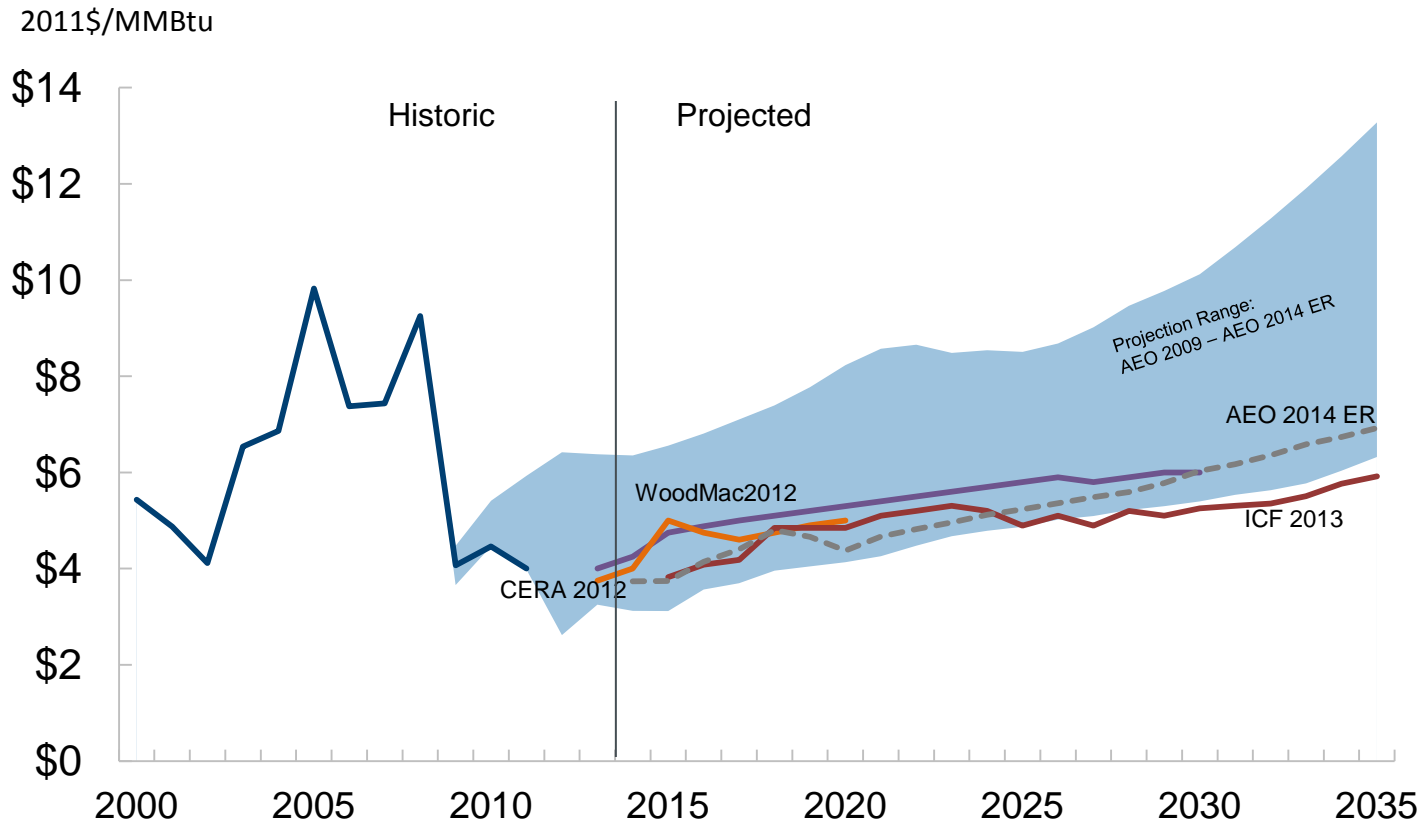
## U.S. & Canada Supply Curve



Source: ICF, "Assessment of NYC Natural Gas Market Fundamentals and Life Cycle Fuel Emissions", June 2012

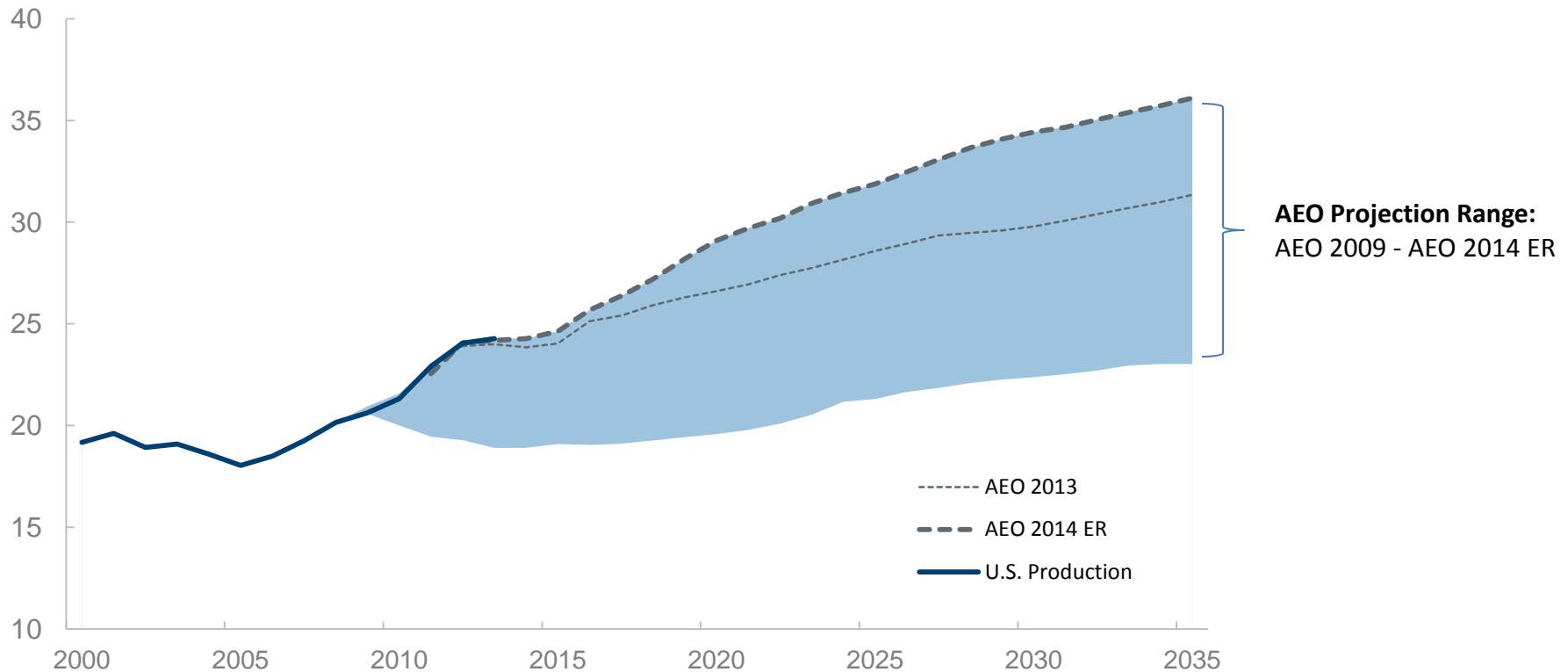
# Price Projections

## Henry Hub Spot Natural Gas Price

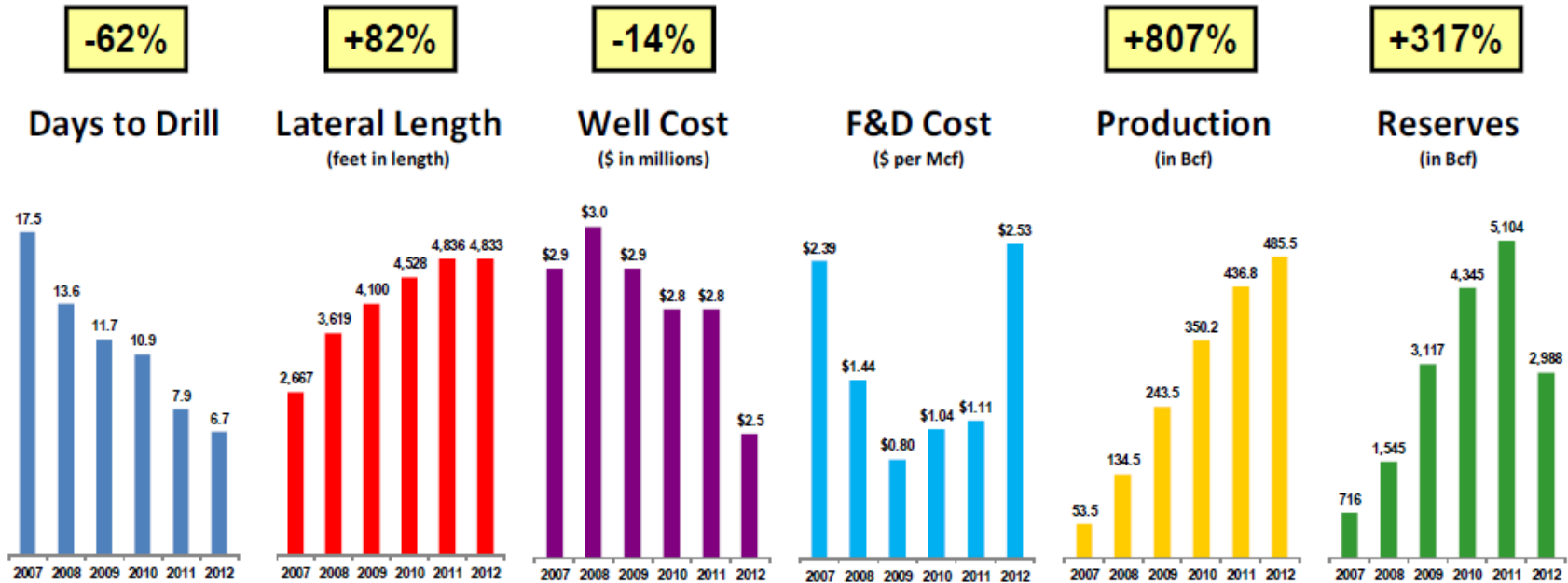


Source: EIA Annual Energy Outlook: 2009, 2010, 2011, 2012, 2013  
Henry Hub Spot prices (Actual prices: 2000 to 2012)

# Natural Gas Production (TCF): Reference



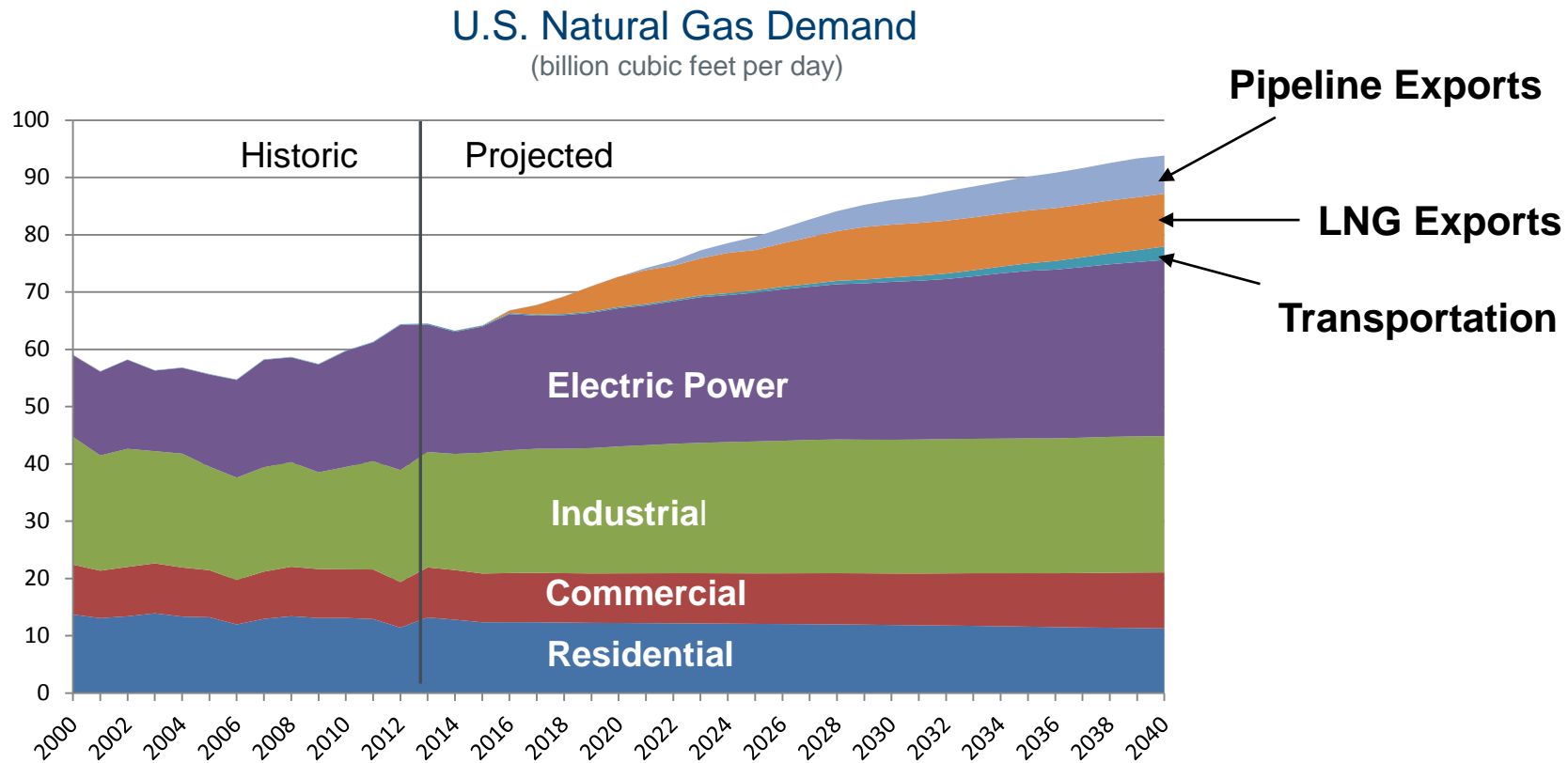
# Technology Advancement



- Continuous improvement in our Fayetteville Shale operations – completed lateral length has increased 82% over the last four years while total well costs have decreased 14%.
- Vertical integration and contiguous acreage position allow us significant economies of scale and operating flexibility.

Source: Fayetteville Play, Southwestern Energy

# Natural Gas Consumption

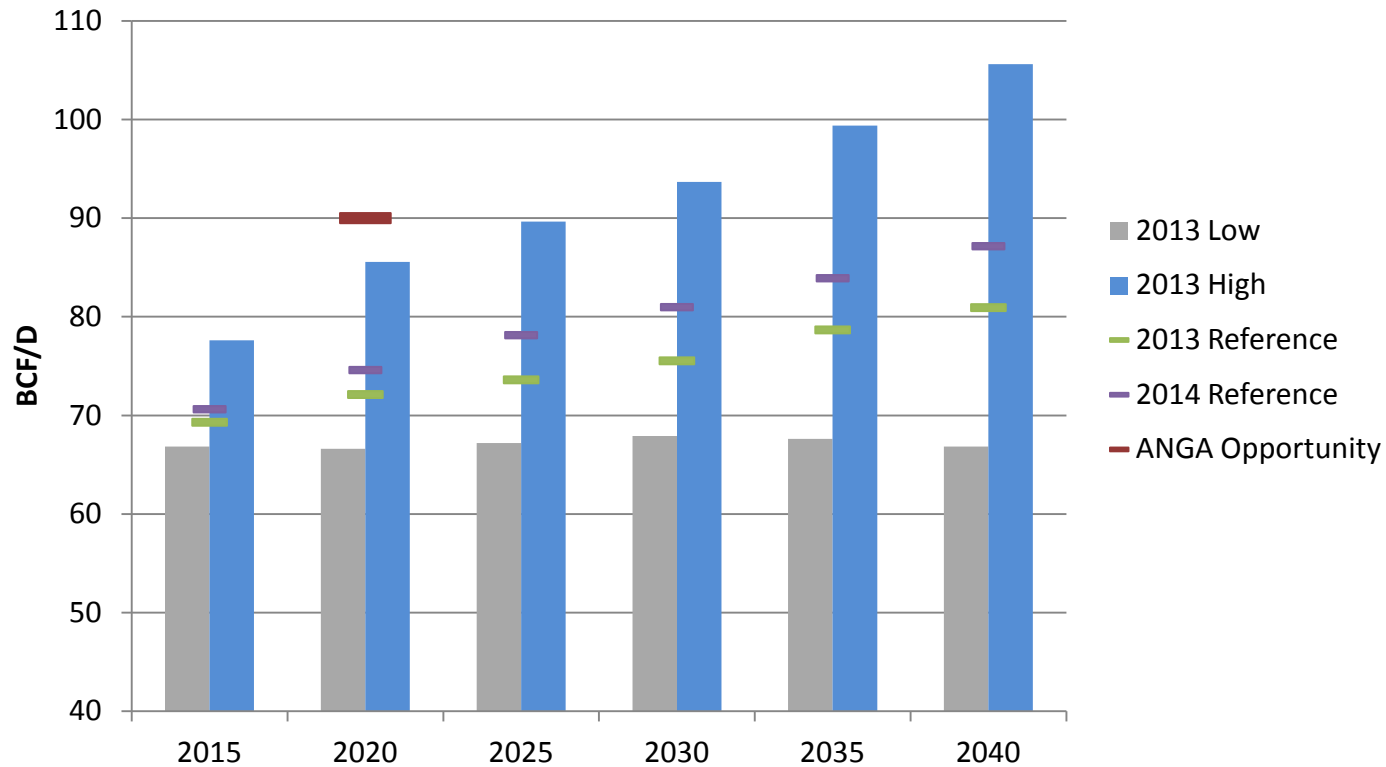


Projected Data Source: EIA Annual Energy Outlook: 2014 ER  
Historic Data Source: EIA Natural Gas Monthly, February 2013



# Demand Opportunity

## EIA Annual Energy Outlook



Source: EIA AEO 2013, 2014 ER; ANGA analysis

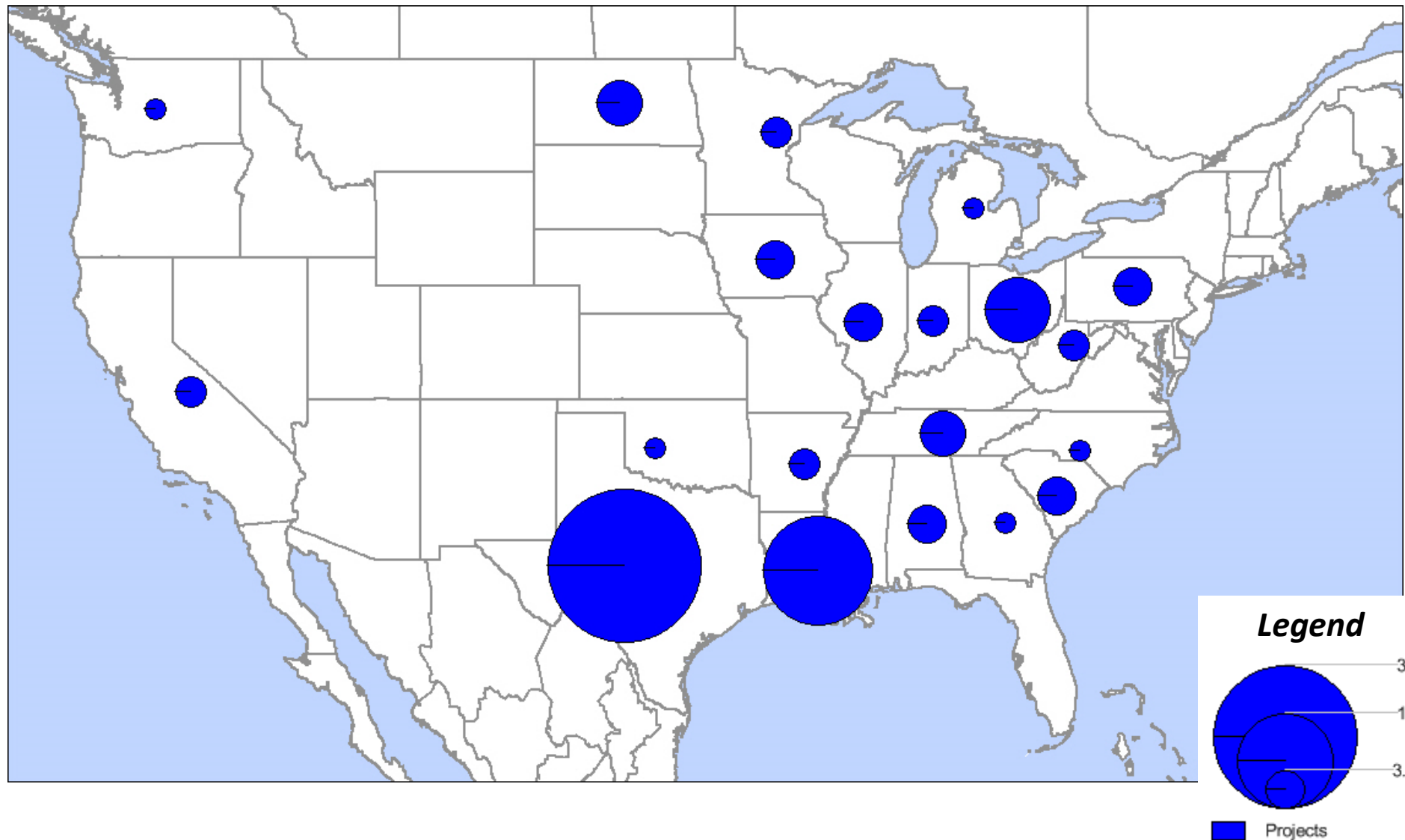
# Employment Impacts from Additional Natural Gas Consumption

## Domestic Jobs Impacts of Alternative Uses of Natural Gas per 1 additional BCF/d Production

	Upstream & Midstream Jobs	Construction Jobs	Operations Jobs	Total
Gas to Liquids Plants	13,000	4,000	900	18,000
Liquefied Natural Gas Plants		1,700	200	15,000
Methanol Plants		3,000	1,800	18,000
Ammonia Plants		4,200	3,400	21,000

Source: ICF, "Tech Effect: How Innovation in Oil and Gas Exploration is Spurring the US Economy", October 2012

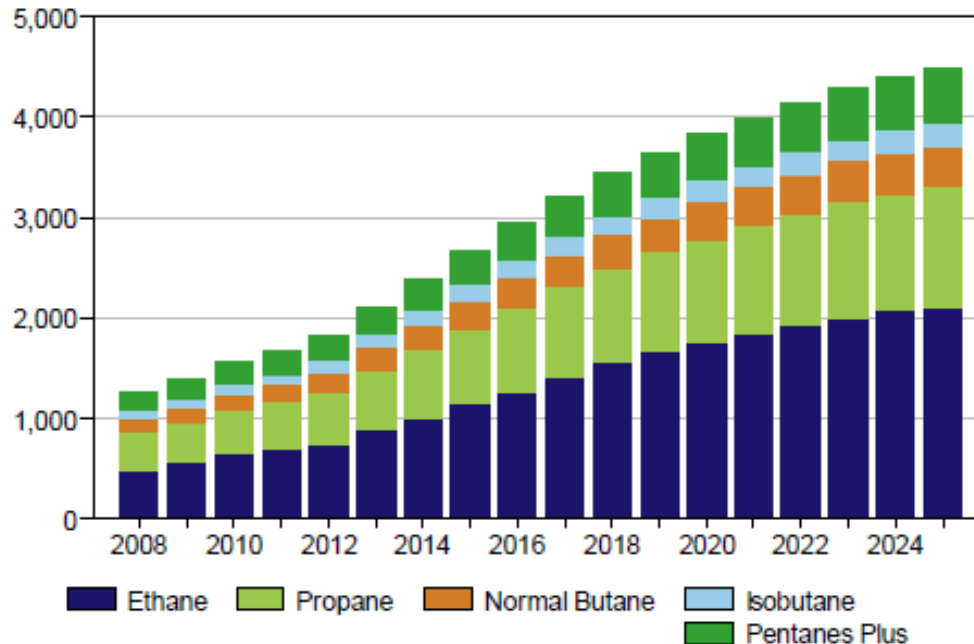
# U.S. Industrial Project Announcements



# Natural Gas Liquids

**US NGL Contained Production from Gas Processing**

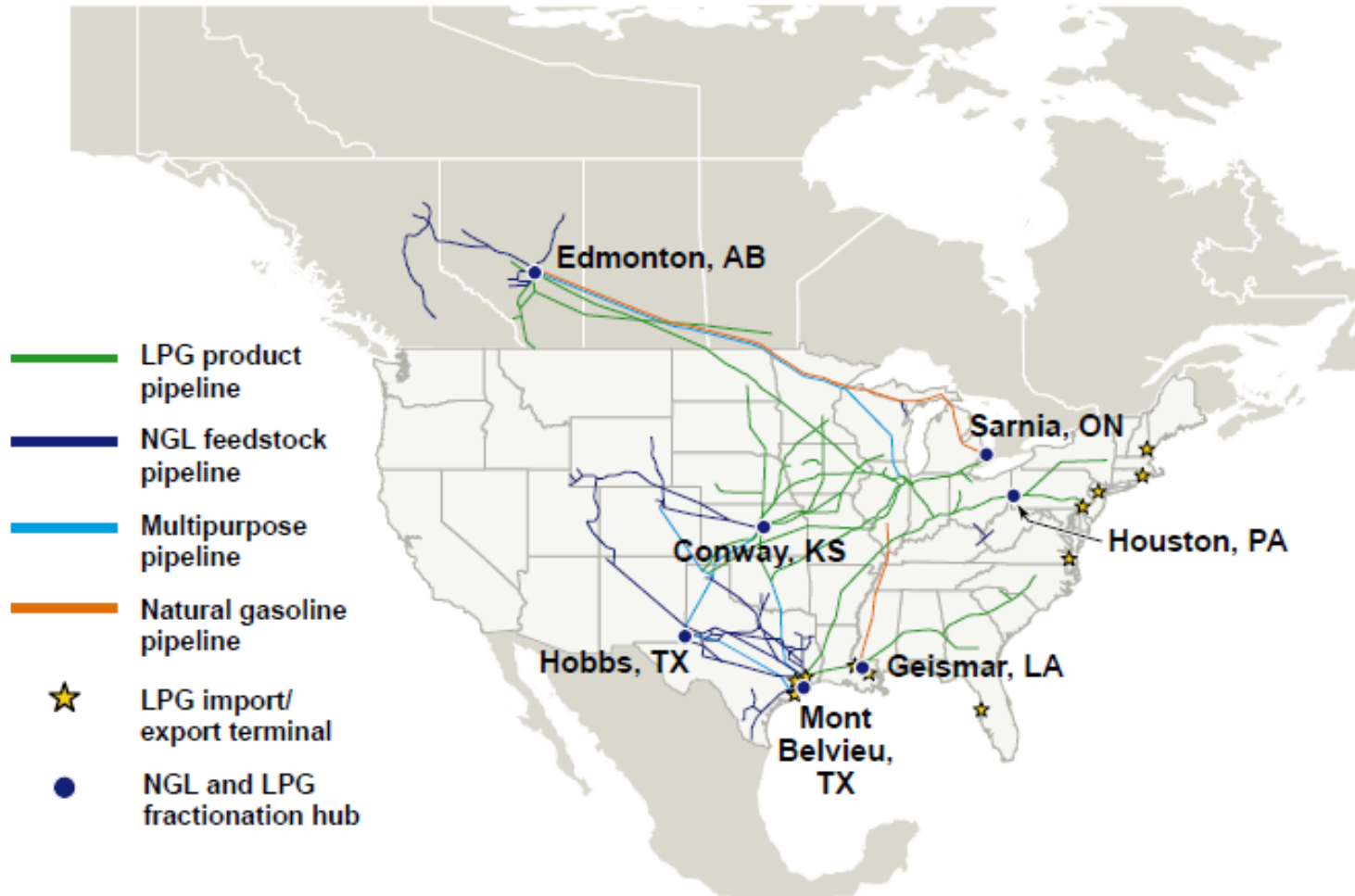
Thousand barrels per day



Source: IHS Chemical

Since 2008, US NGL production has increased by 500,000 barrels/day. By 2020, NGL production is expected to reach 3.8 million barrels/day. This is an increase of 100% over current levels.

# NGL and LPG Pipelines

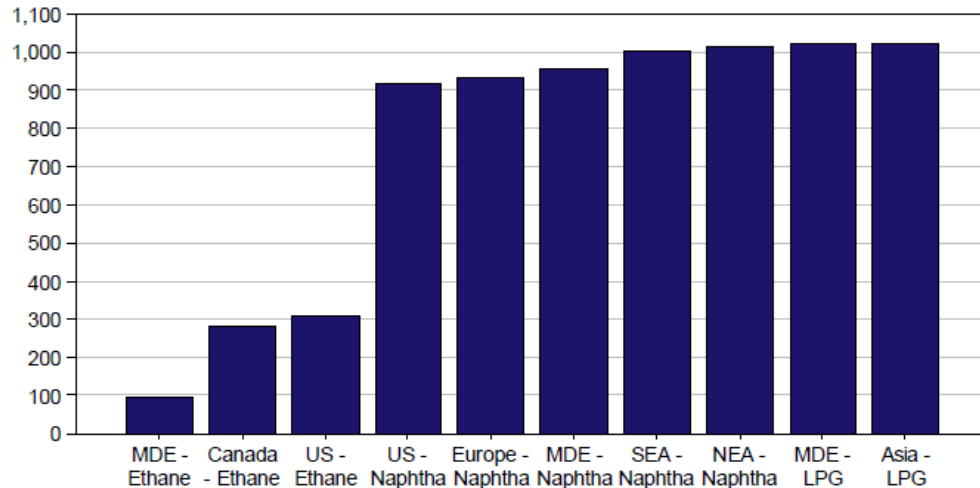


Source: IHS Energy  
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# Ethylene Production

Cost to Produce One Metric Ton of Ethylene: 2013

\$US per metric ton



MDE = Middle East, NEA = Northeast Asia, SEA = Southeast Asia

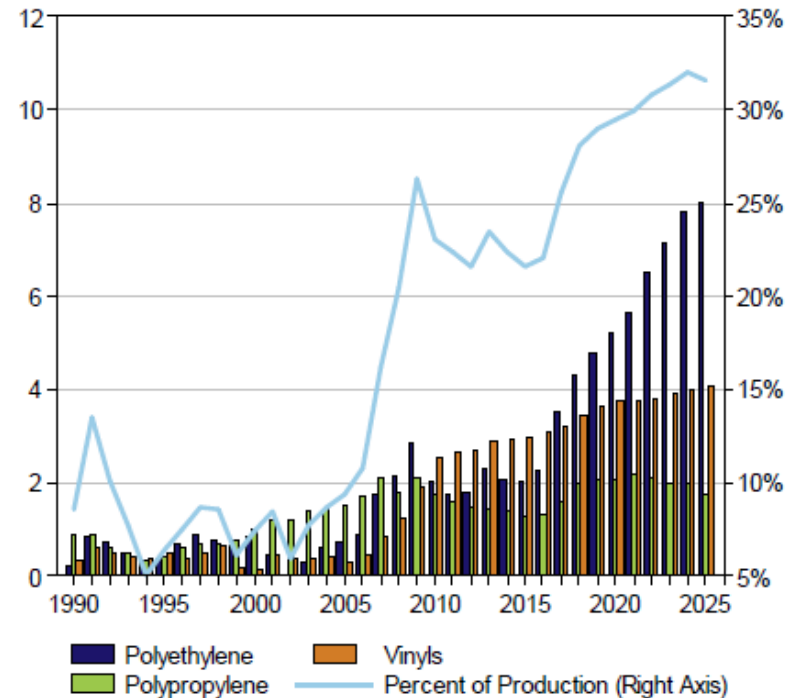
Source: IHS Chemical

Low natural gas prices are creating an advantage for the U.S. and Canadian ethylene production.

U.S. net exports of products created from ethylene are expected to rise significantly by 2025.

US Net Exports for Selected Products

Million metric tons

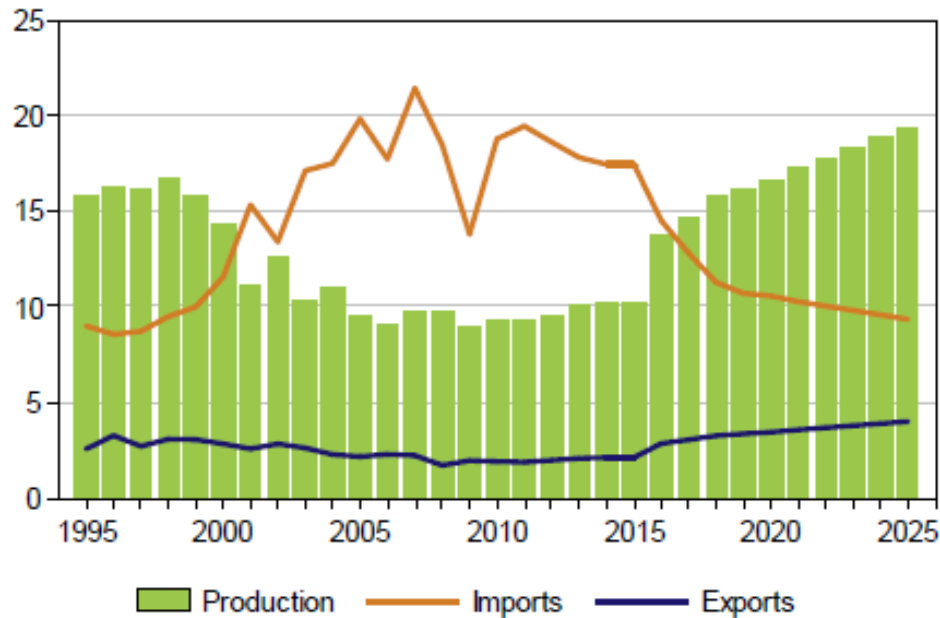


Source: IHS Chemical

# U.S. Fertilizer Production

## US Fertilizer Industry: Nitrogen

Million product tons

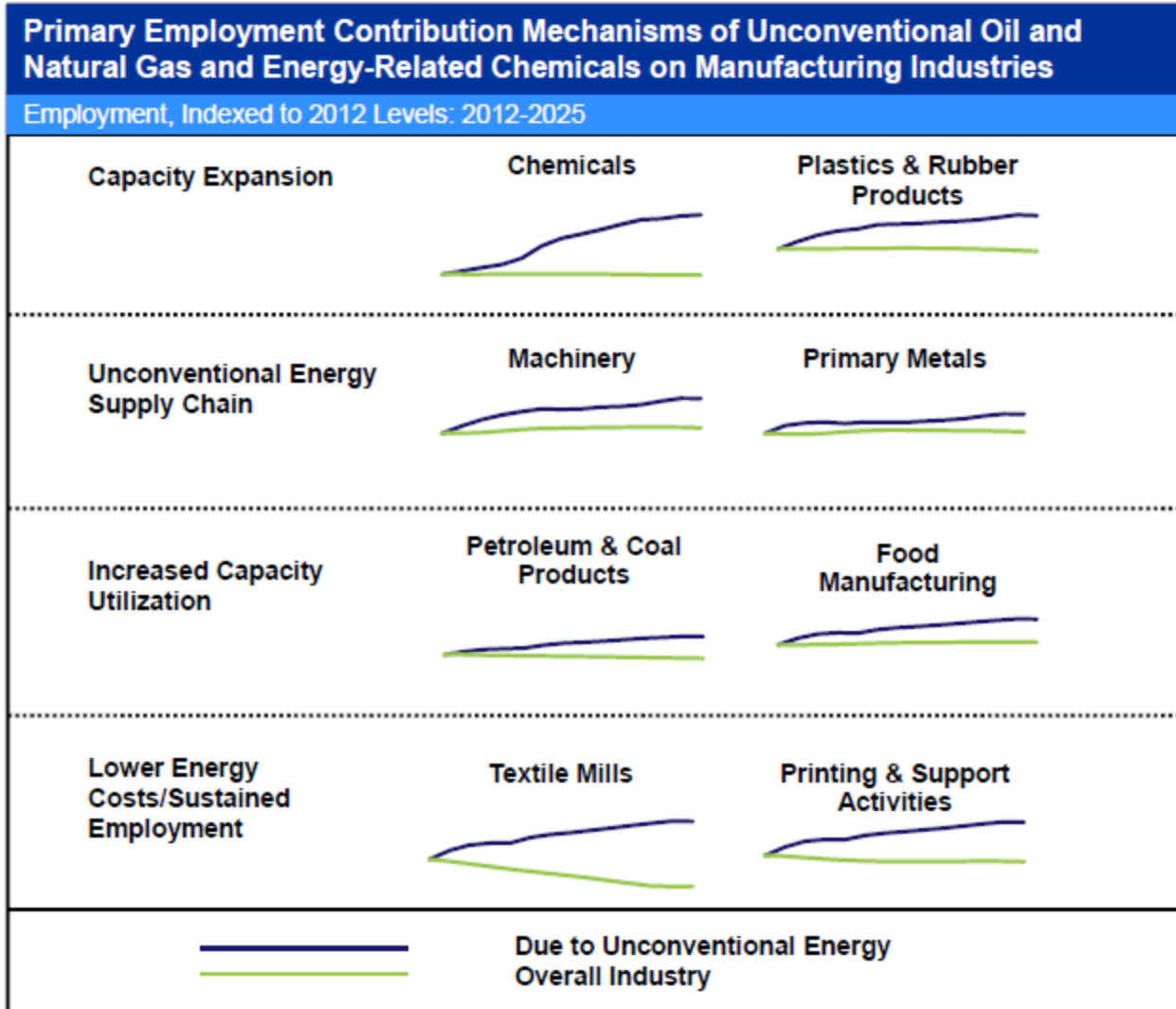


Source: IHS Energy

Operating rates in 2013 for US ammonia producers are estimated to have reached about 90% of capacity.

Many new projects have been announced and will be starting up between 2016 and 2018.

# U.S. Employment Contributions

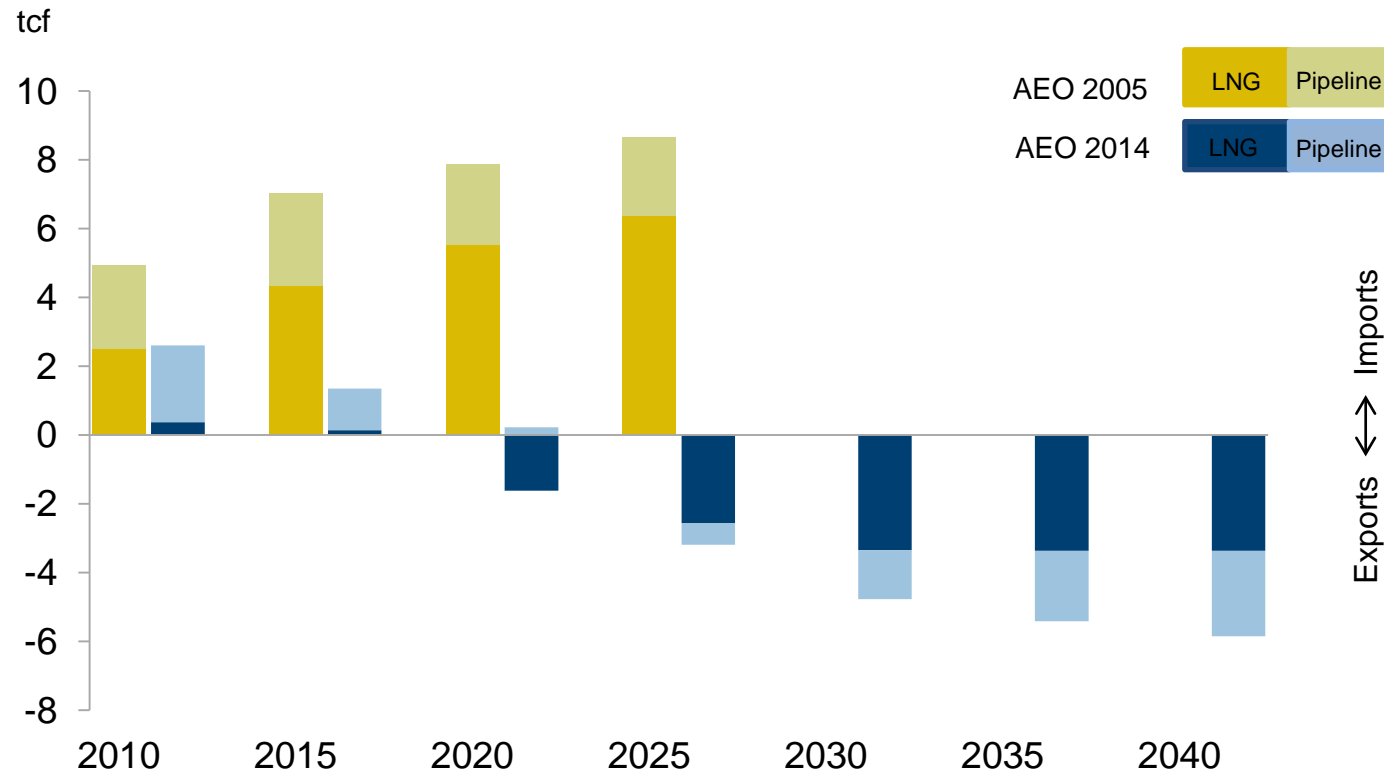


Source: IHS Economics



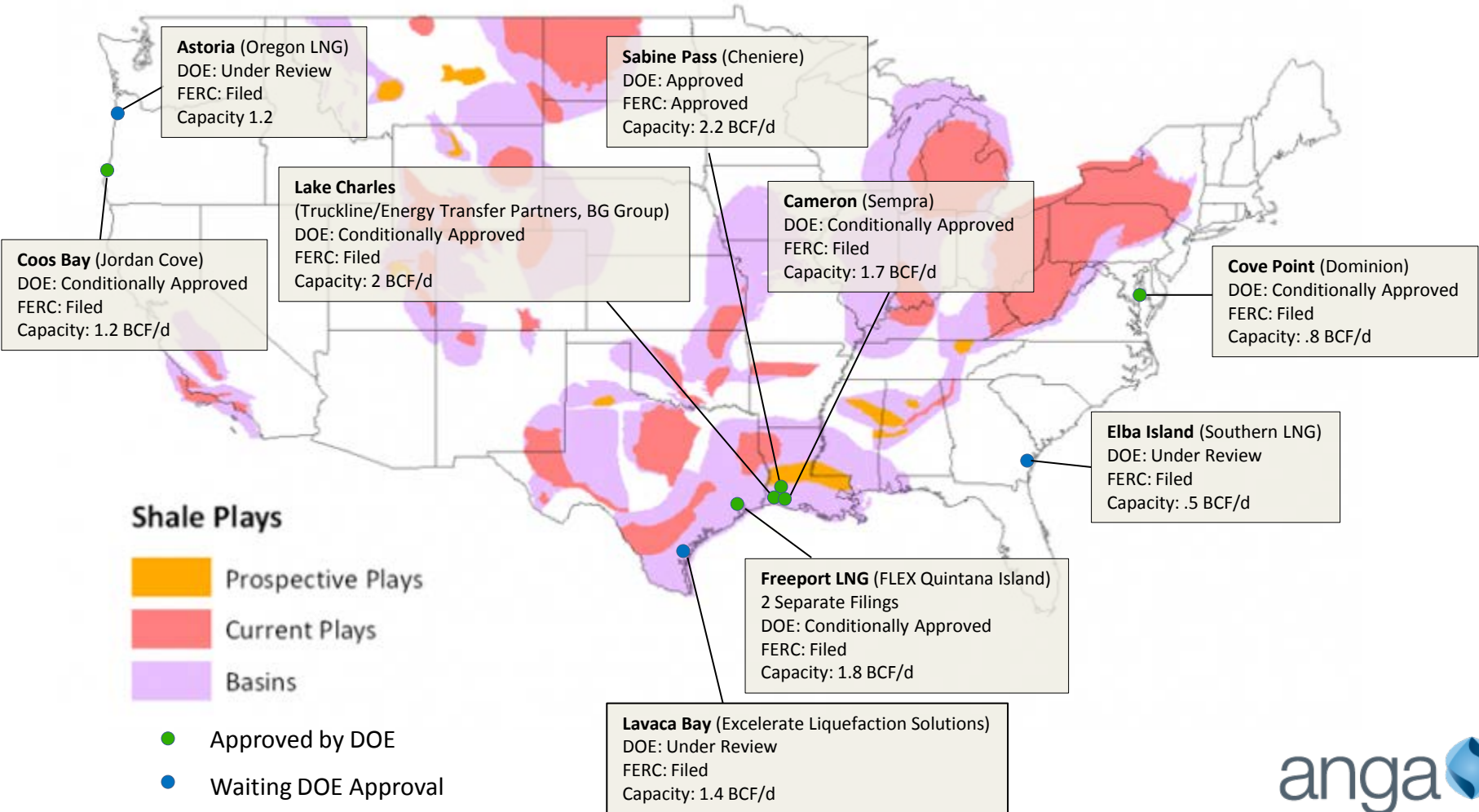
# Fundamental Shift in Outlook

## Forecast of Natural Gas Imports (trillion cubic feet)



Source: EIA Annual Energy Outlook 2005 & 2014

# LNG Exports



# Infrastructure Requirements Through 2035

	2014-2035	Average Annual
Gas Well Completions (1000s)	307	14
Oil Well Completions (1000s)	914	42
Total Well Completions (1000s)	1,221	56
Miles of Transmission Mainline (1000s)	18.6	0.8
Miles of Laterals to/from Power Plants, Storage Fields and Processing Plants (1000s)	17.1	0.8
Miles of Gas Gathering Line (1000s)	303.1	13.8
Inch-Miles of Transmission Mainline (1000s)	568	26
Inch-Miles of Laterals to/from Power Plants, Storage Fields and Processing Plants (1000s)	279	13
Inch-Miles of Gathering Line (1000s)	1,095	50
Compression for Pipelines (1000 HP)	4,388	199
Compression for Gathering Line (1000 HP)	8,402	382
Gas Storage (Bcf Working Gas)	823	37
Processing Capacity (Bcfd)	34.2	1.6
LNG Export Facilities (Bcfd)	9.3	0.4

Source: INGAA Foundation Report (March 2014)



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