UPDATE ON THE NORTH AMERICAN PETROLEUM RENAISSANCE

The Outlook for NGLs and Crude Exports

New York Energy Forum
February 24, 2014

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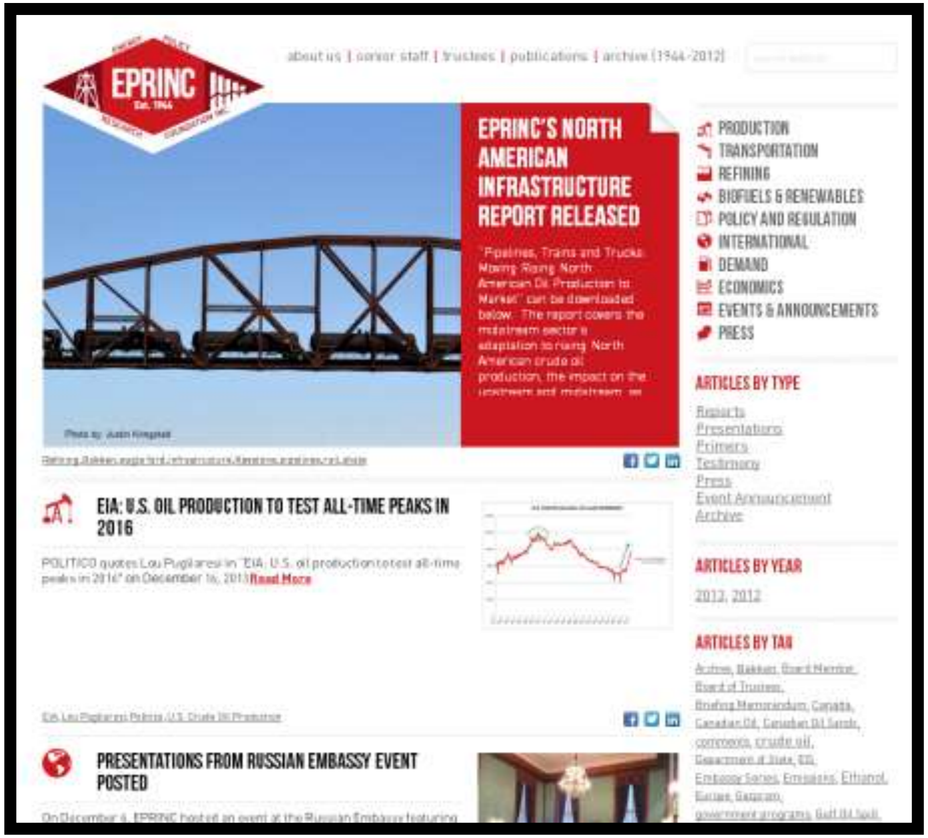
About EPRINC

- Founded in 1944
- Not-for-profit organization that studies intersection of petroleum economics and public policy
- Provides independent and technical analyses for distribution to the public
- Funded largely by the private sector, foundations and U.S. government
- www.eprinc.org



EPRINC Embassy Series

- Engagement with Washington's energy policy community
- Collaboration among the diplomatic community to provide both an interesting venue and constructive policy discussion
- The series offers an opportunity to gain a greater understanding of U.S. energy policy in an era of expanding U.S. supplies of oil and gas

TONIGHT'S DISCUSSION

•SCALE AND SCOPE OF THE NORTH AMERICAN PRODUCTION PLATFORM

•ENERGY SECURITY IN AN ERA OF RISING PETROLEUM OUTPUT

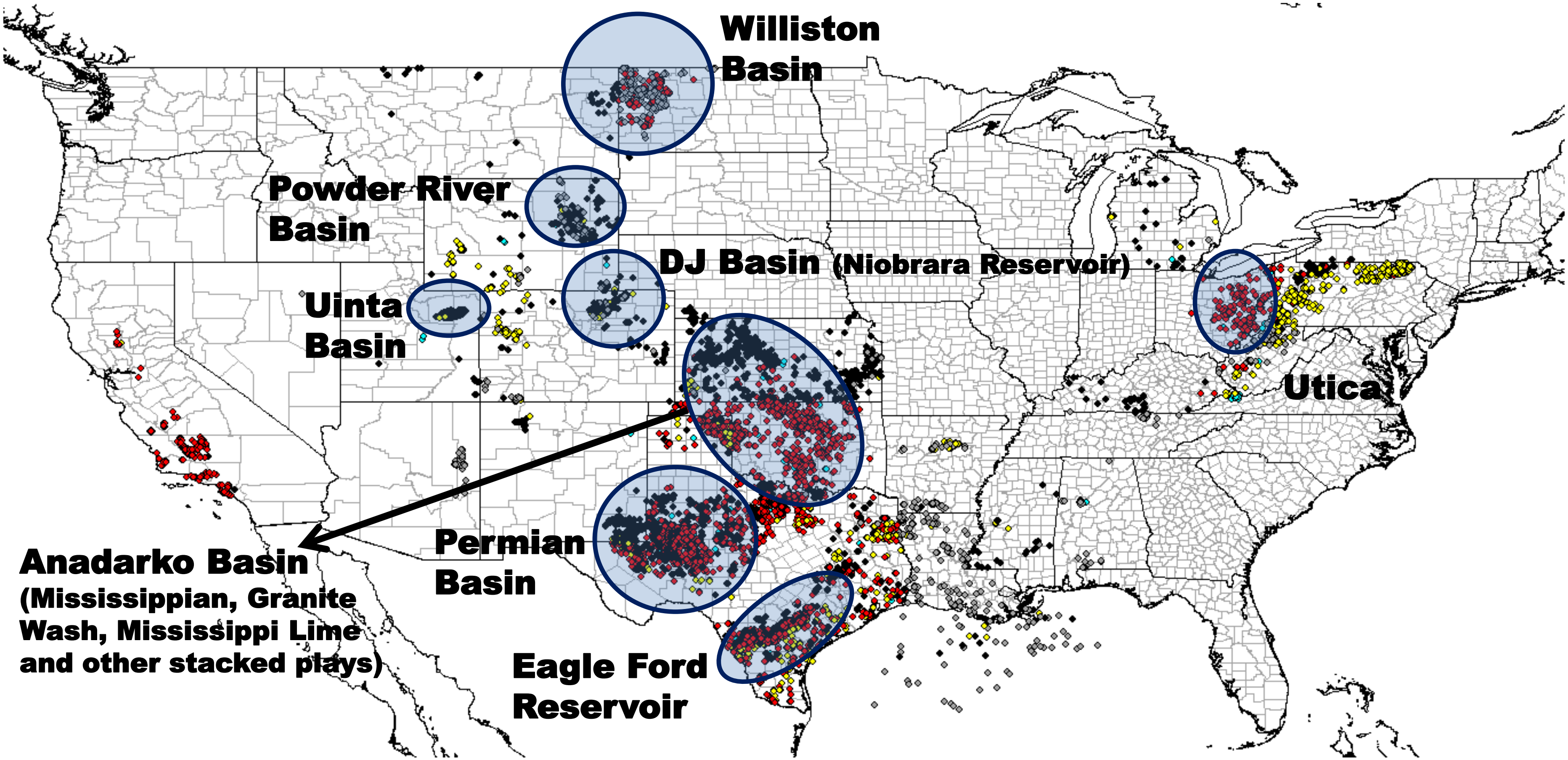
•OUTLOOK for NGL & (POTENTIAL) CRUDE EXPORTS (Will NGLs Lead the way to crude exports?)

•CRUDE EXPORTS—FOREIGN POLICY & POLITICS

WESTERN INTERIOR SEAWAY

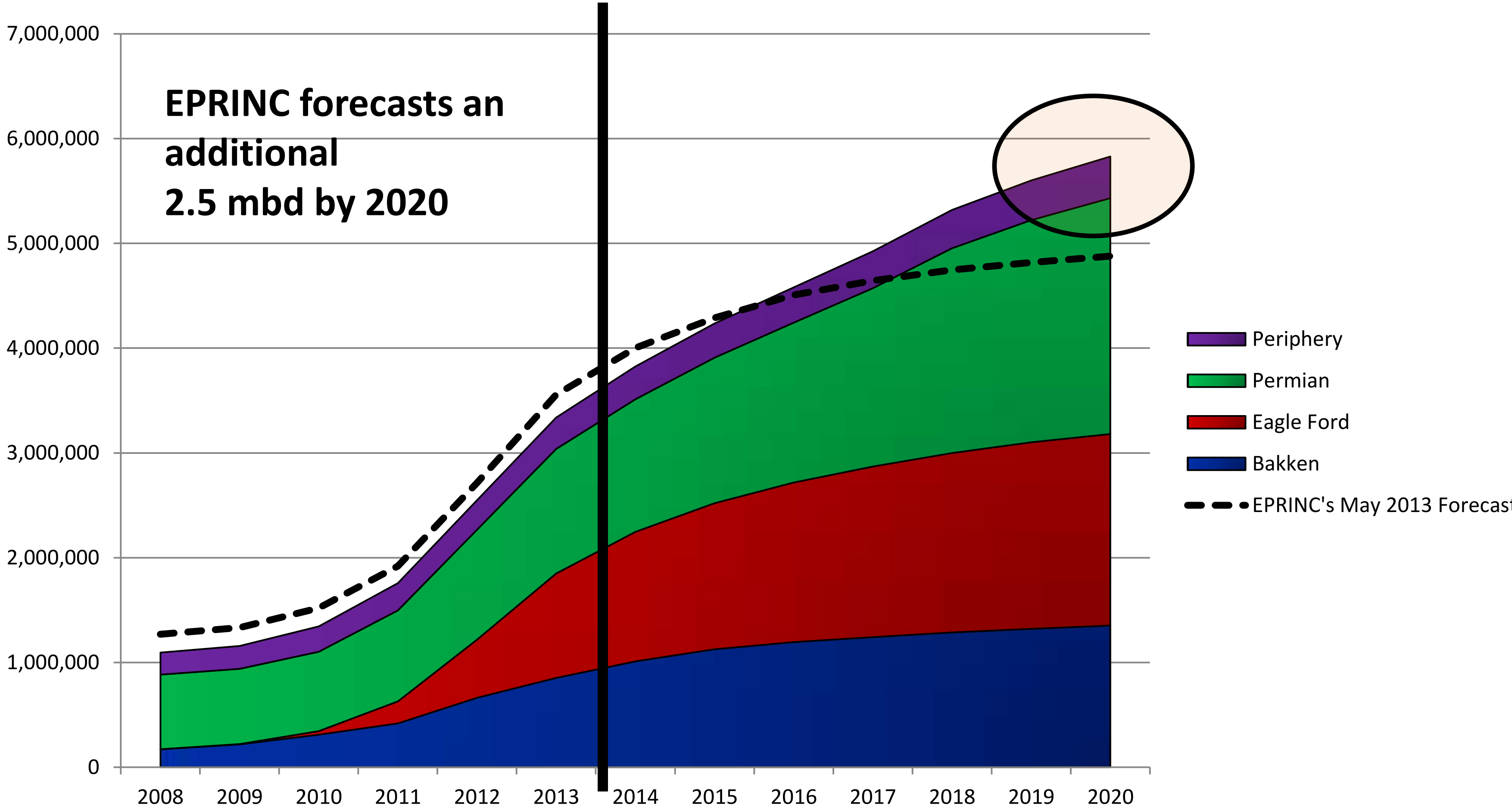
Stanley, Steven M. (1999). *Earth System History*. New York: W.H. Freeman and Company.

Permit Activity



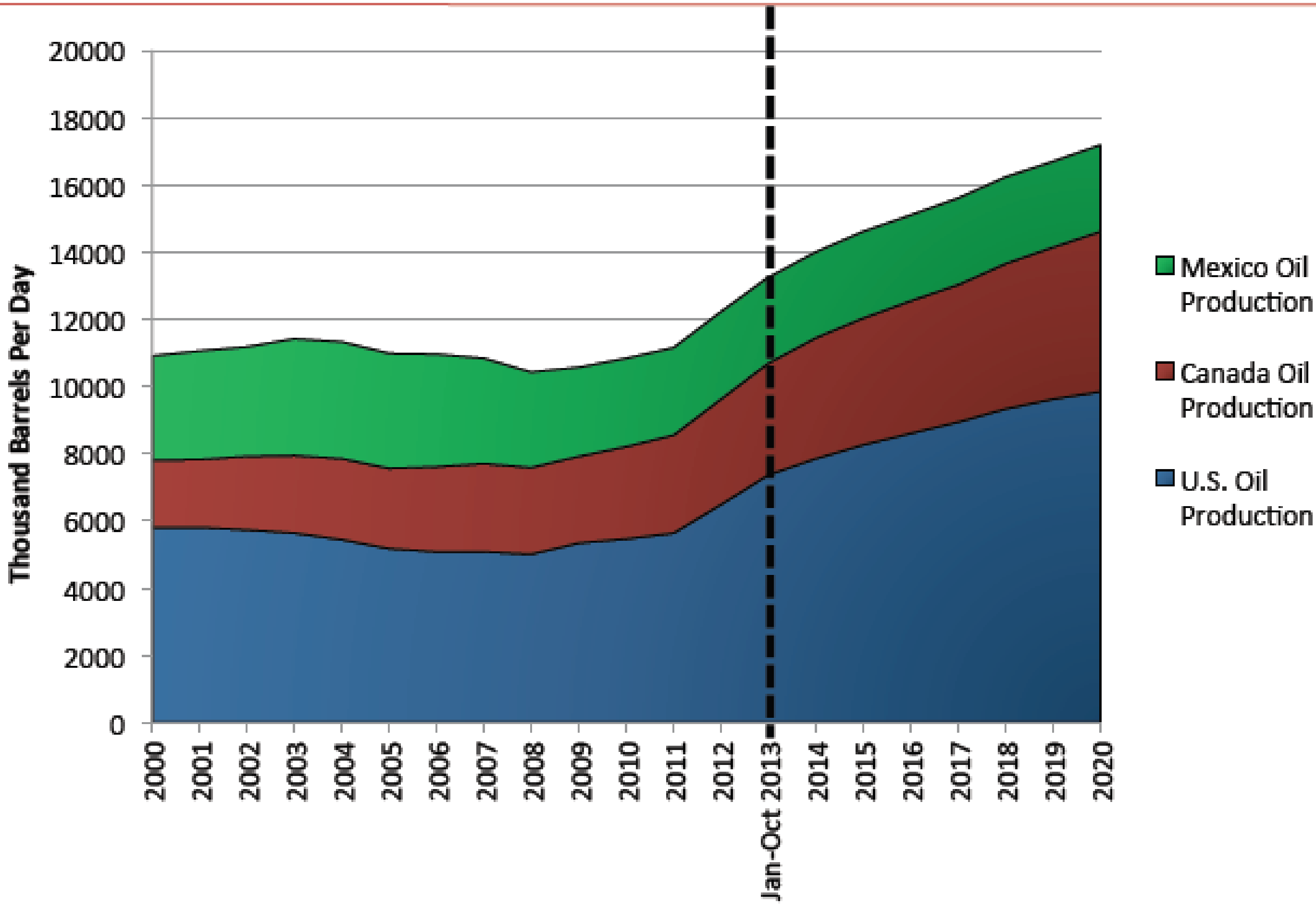
Source: HPDI September 2013, Past 90 Days

Jan 2014 EPRINC's Forecast for Major U.S. Shale Plays



Source: HPDI data with EPRINC forecast estimates

North American Oil Production and Forecast

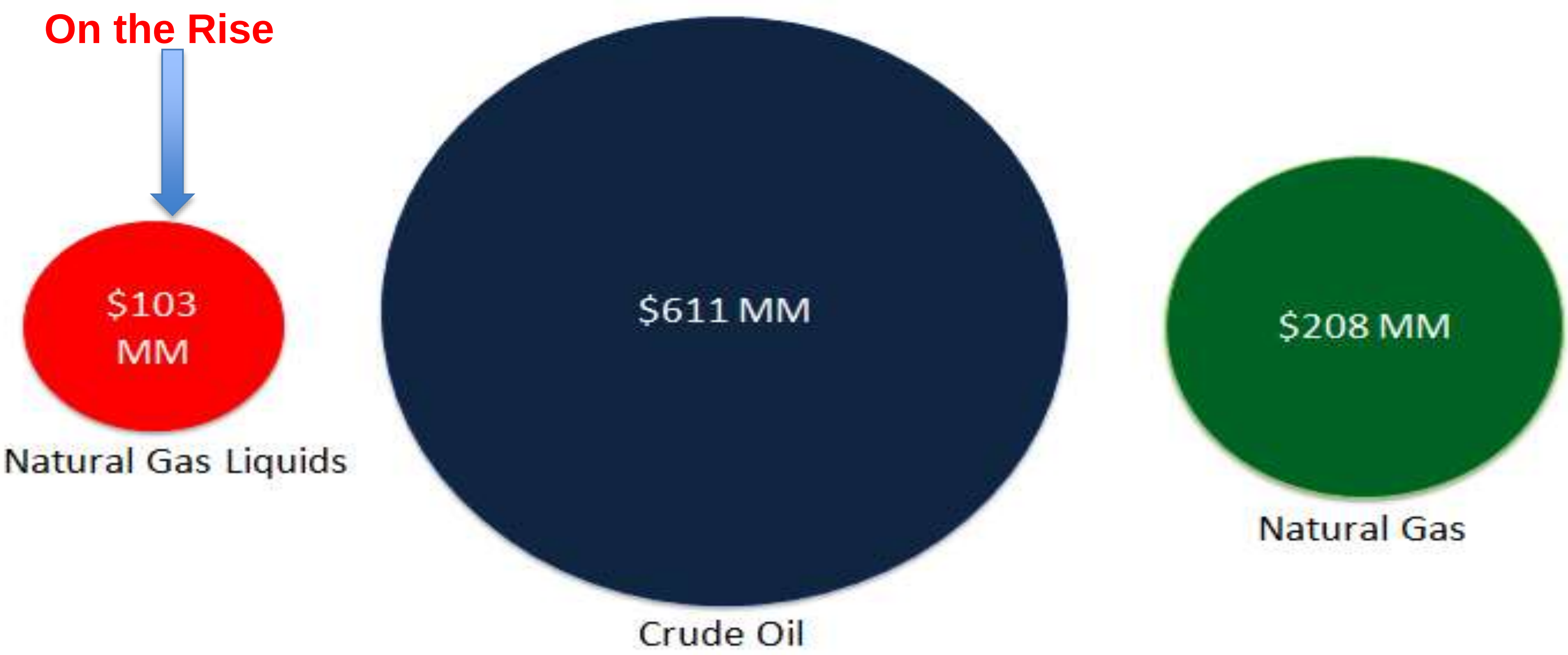


Avg 2013 Oil Production

U.S. 7.4 mbd
Canada 3.3 mbd
Mexico 2.6 mbd

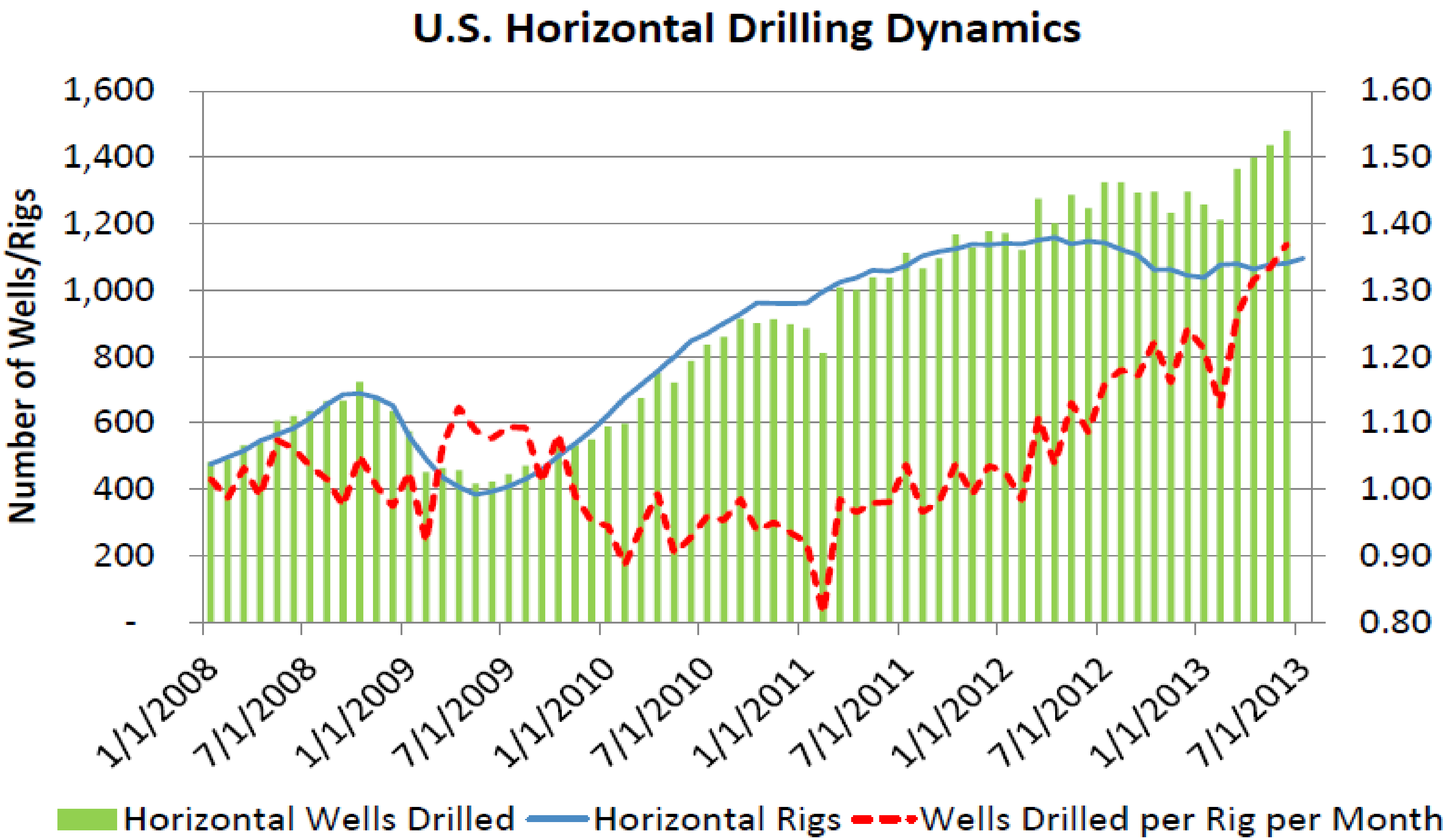
Source :EIA, CAPP, EPRINC Forecasts

Daily Value of U.S. Petroleum Production



Source: EIA, Ponderosa Advisors

Shale Production Begins to Look Like Manufacturing

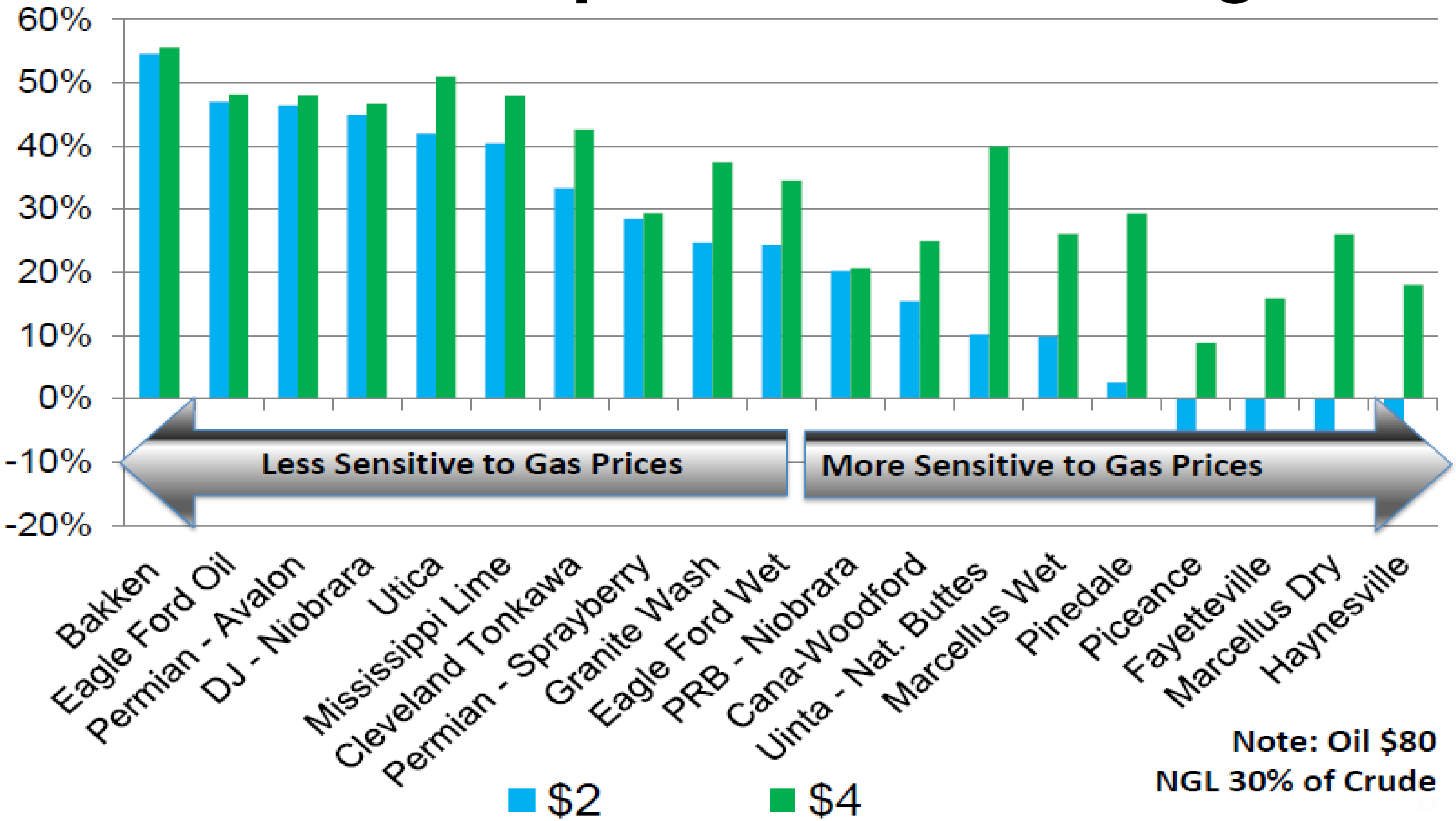


Source: Platts

Multi Pad Drilling Adds Efficiency

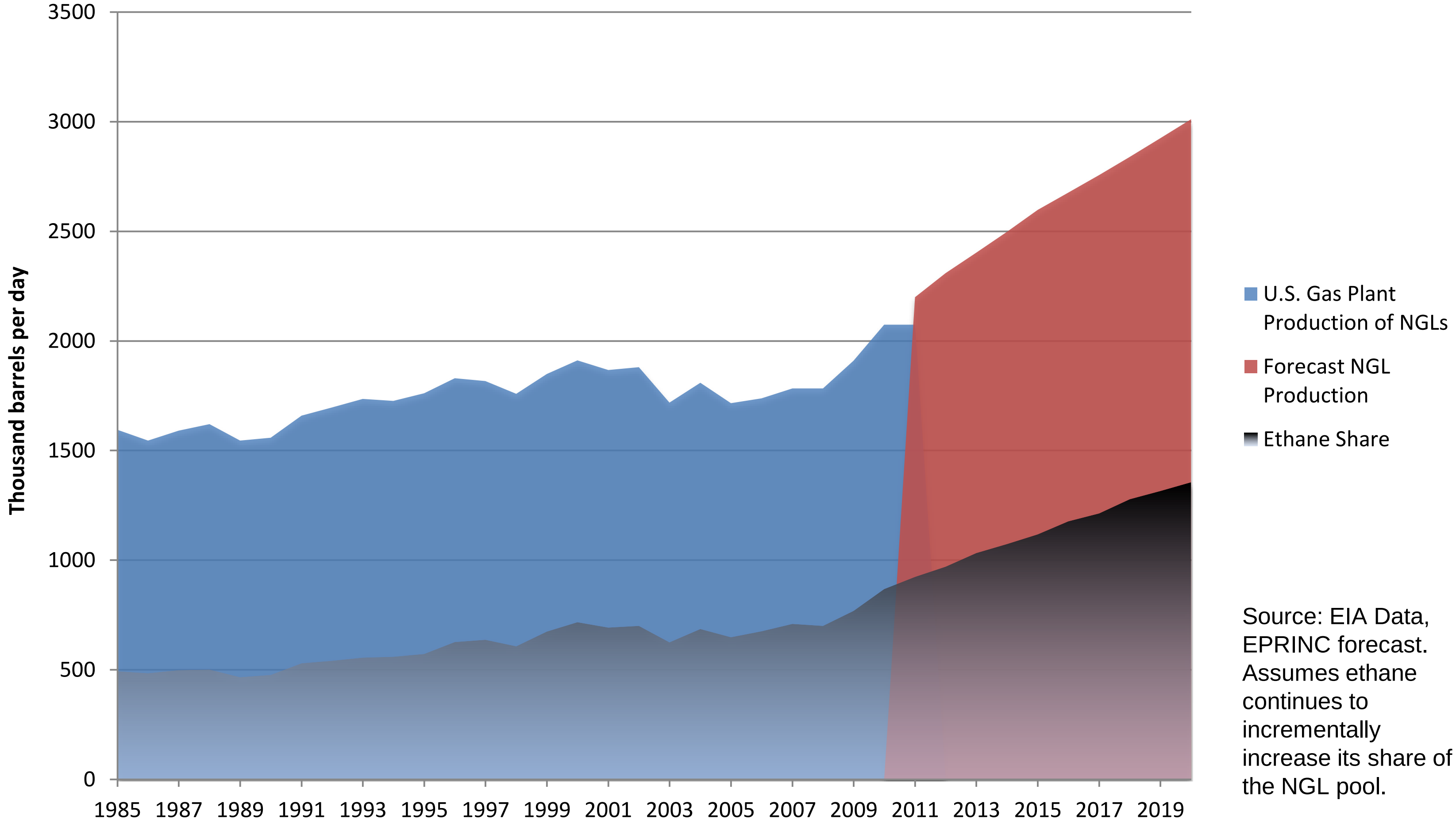
Source: Nabors

NGLs Keep the Gas Flowing



Source: Bentek

NGL PRODUCTION OUTLOOK



Source: EIA Data, EPRINC forecast. Assumes ethane continues to incrementally increase its share of the NGL pool.

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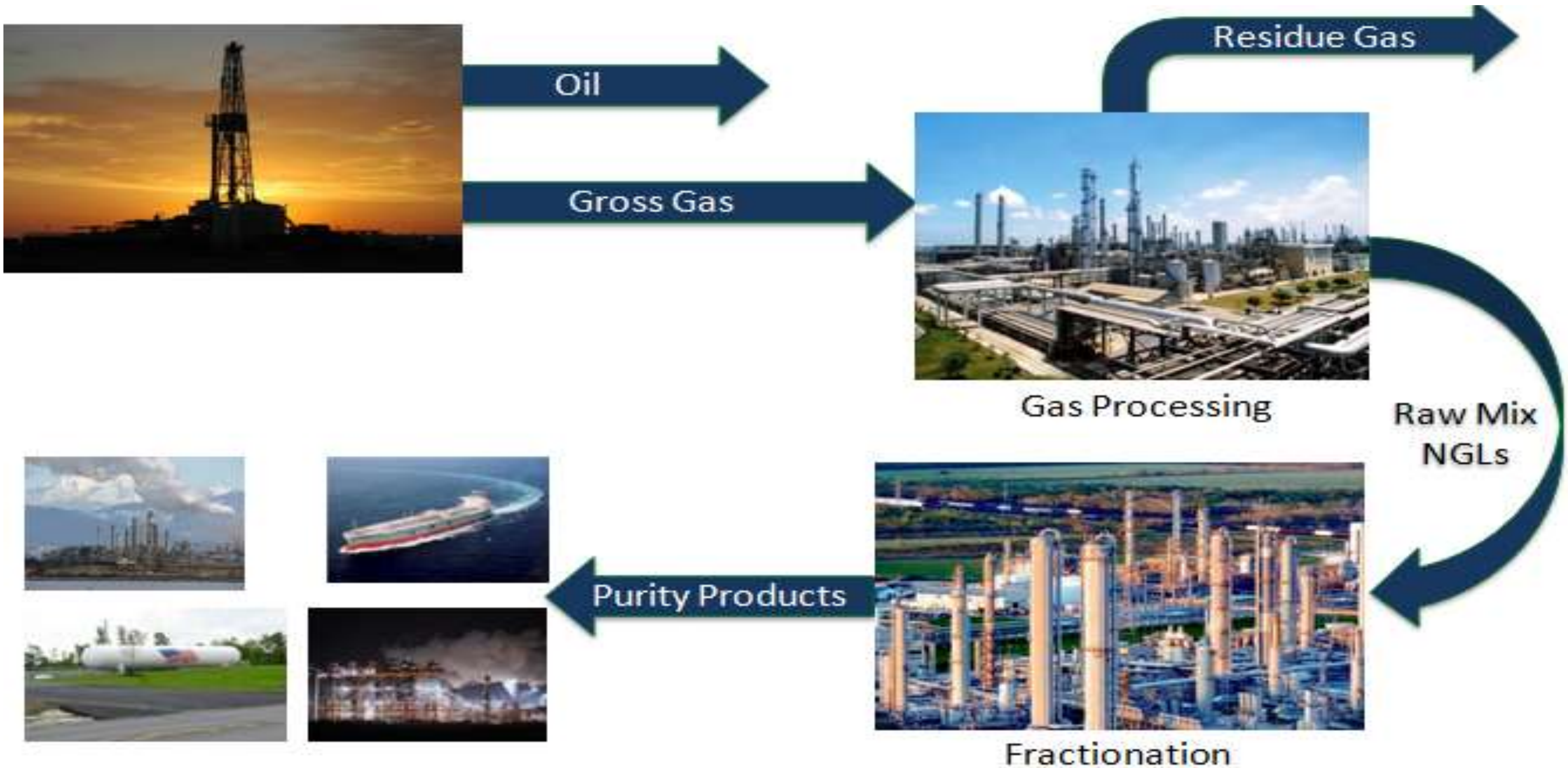
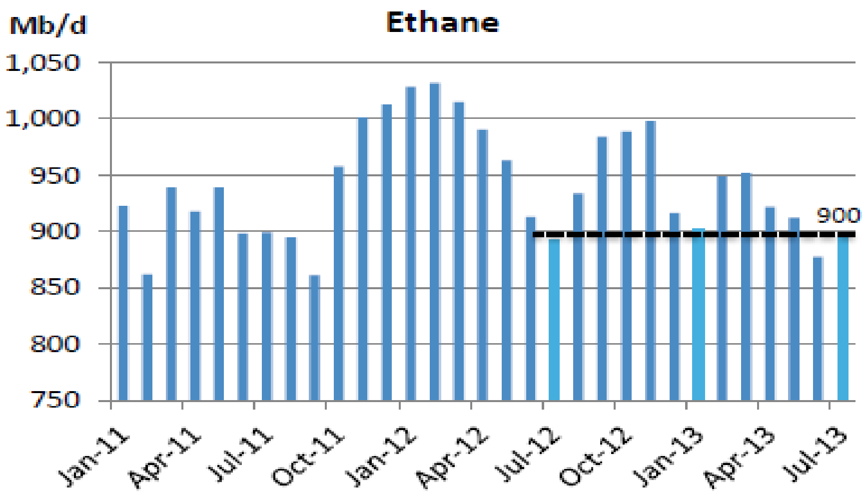
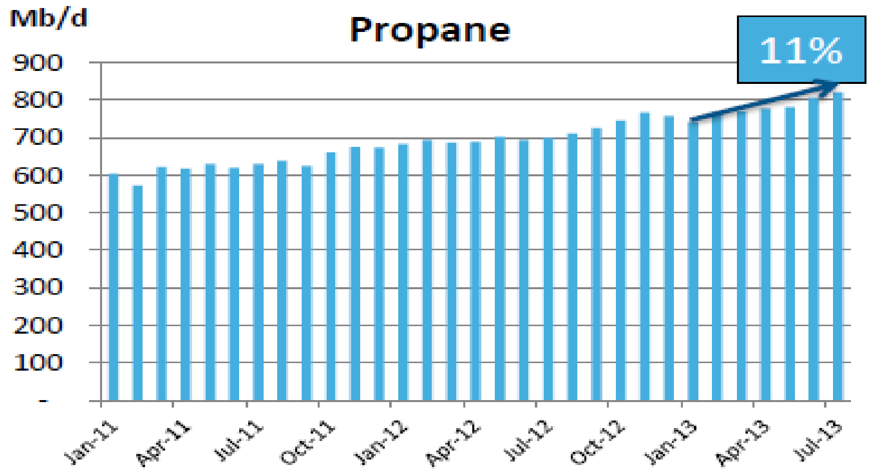
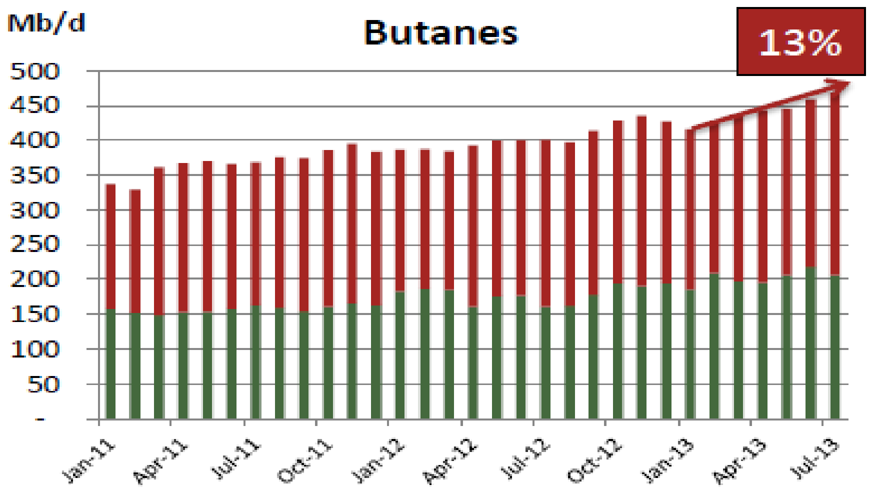
Process Flow Diagram for NGLs

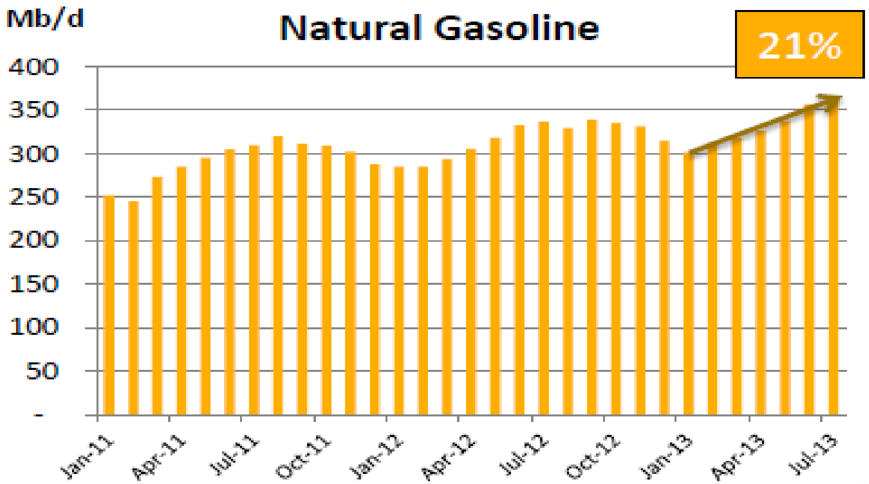


U.S. NGL OUTPUT UP 8% YTD for 2013









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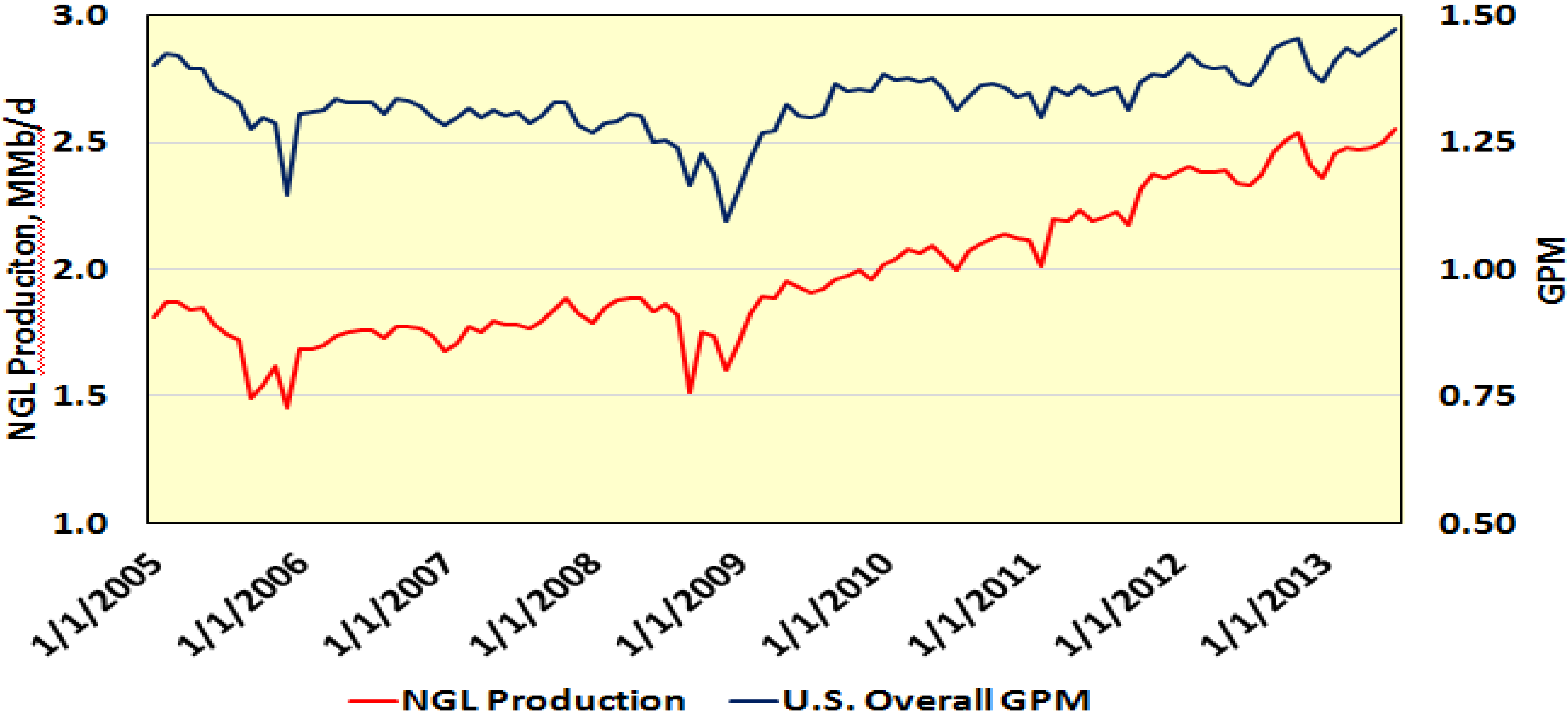
Source: EIA

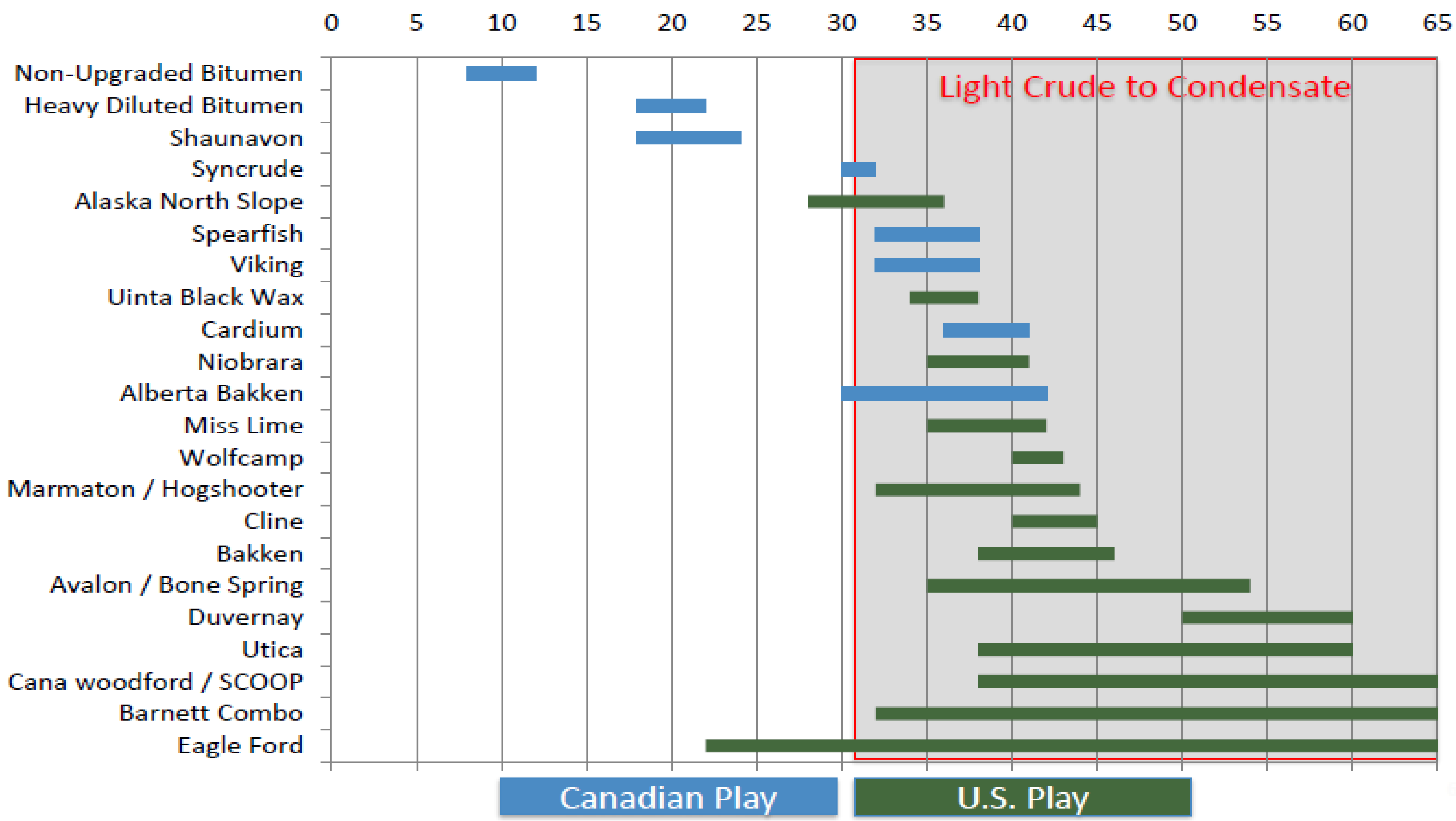
NGL Output Up 50% Since 2009, GPM* Up 5%



Source: EIA, BENTEK Energy, Ponderosa Advisors

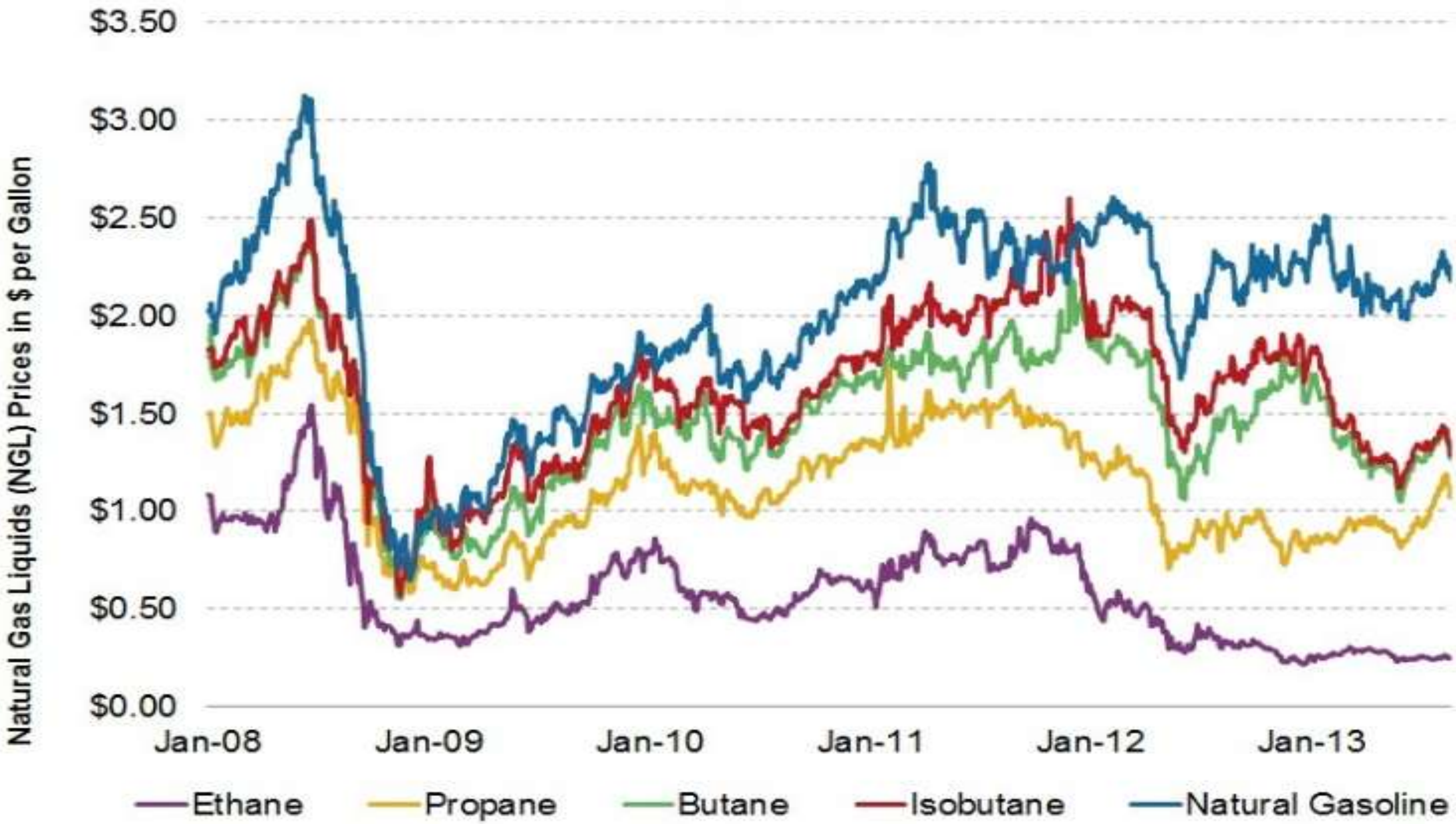
***GPM: gallons of NGLs per MCF**

RISING US and Some Canadian Production is Very Light



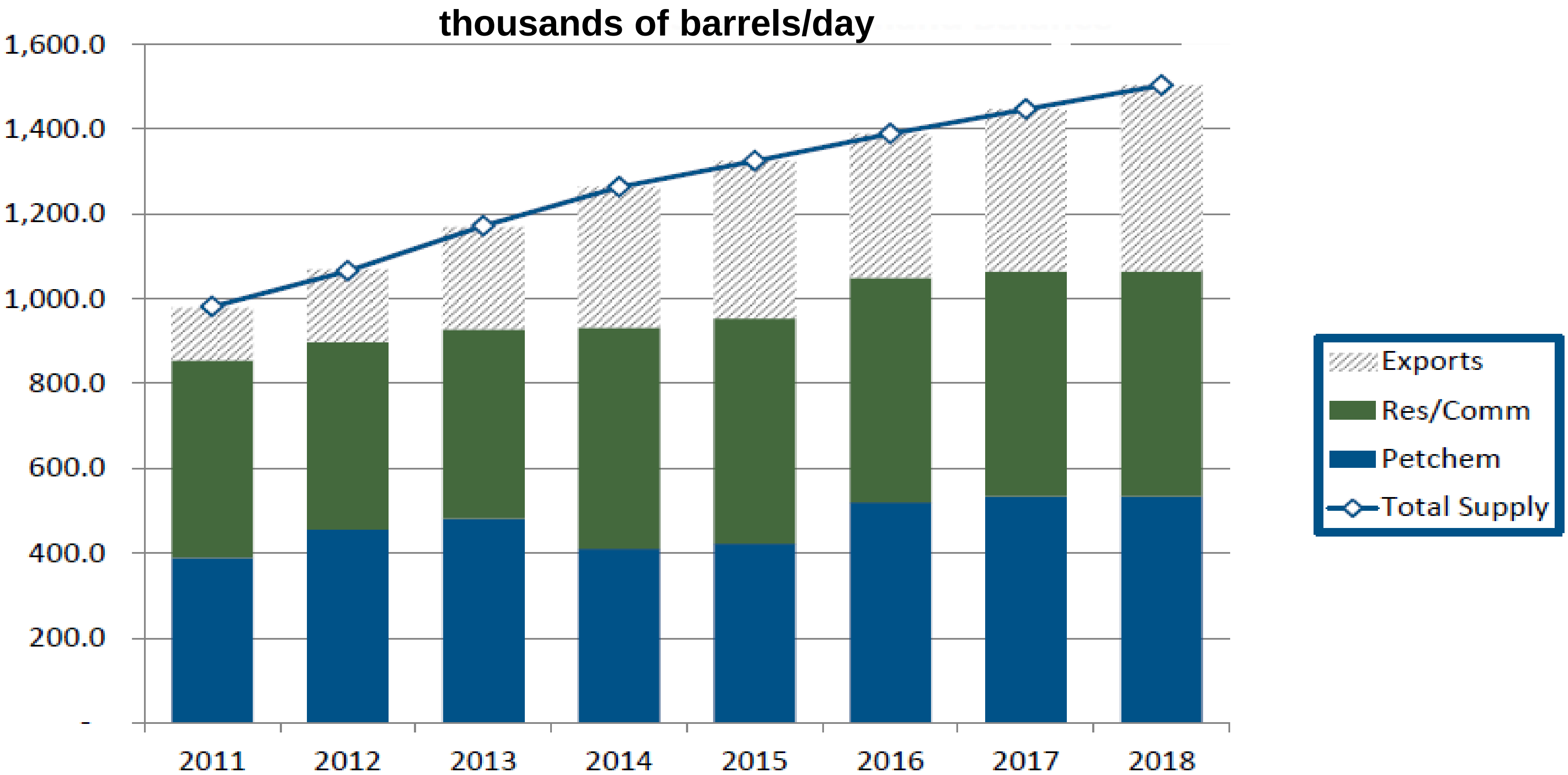
Source: Platts

RECENT TRENDS IN US NGL PRICES



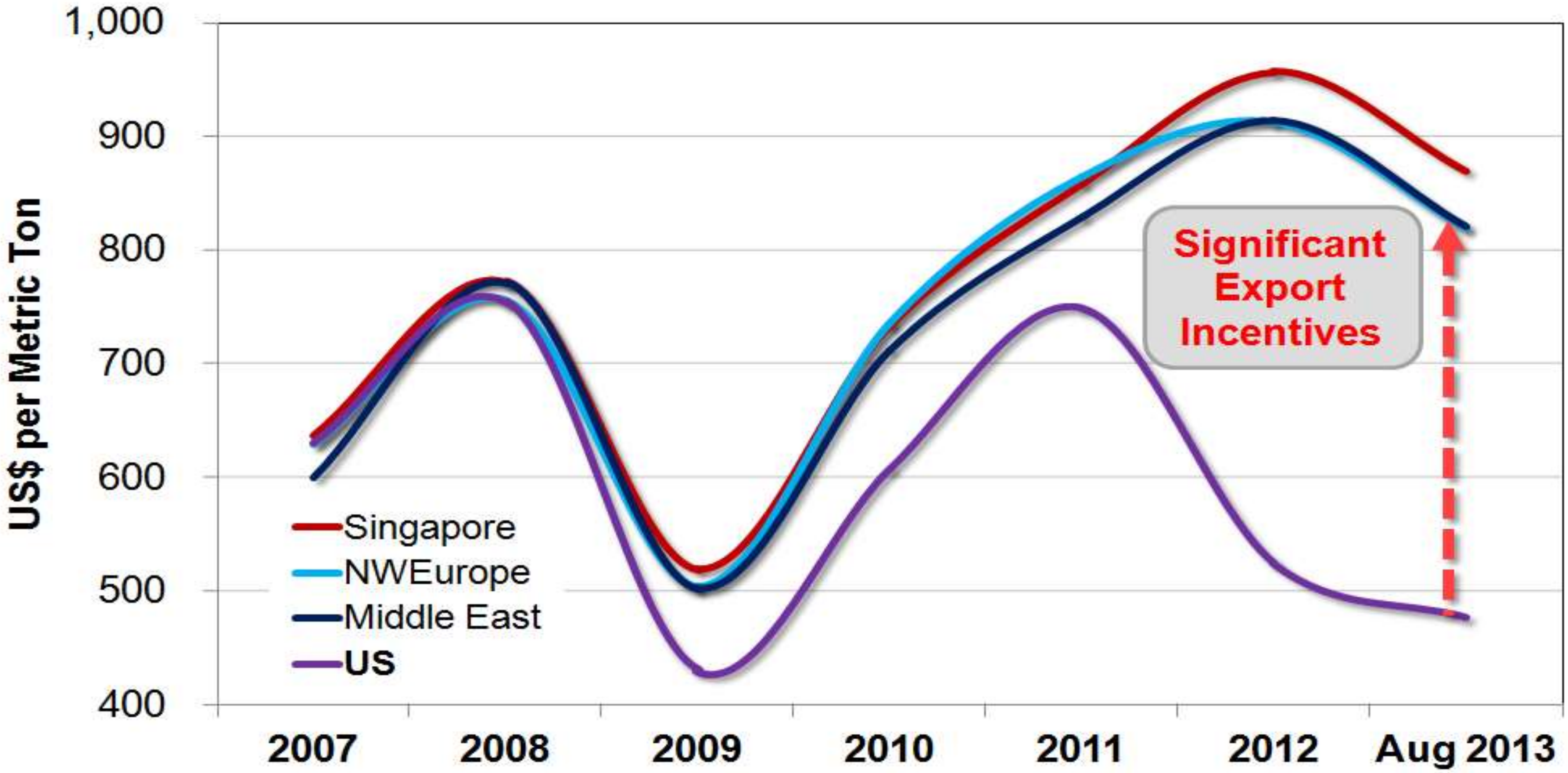
Source: Liquid Commodity Partners

Required Growth in LPG Exports



Source: Platts

Regional Propane Prices



Source: KBC Advanced Technologies

Existing and Proposed LPG Export Terminals

Company	LPG Export Capacity ('000 b/d)	Location	Start-up Year
Existing Terminals			
Enterprise	135	Houston Ship Channel, TX	Existing
Targa	49	Galena Park, TX	Existing
Other	2	Miami, Norfolk, NY, Seattle, LA	Existing
Existing Capacity	**186**		
Proposed Projects			
Enterprise	114	Houston Ship Channel, TX	2013 Q1
Targa	121	Galena Park, TX	2013 Q3
Vitol	98	Beaumont, TX	2014 Q4
Sunoco Logistics	39	Marcus Hook, PA	2014 Q3
Pembina Pipeline Co.	39	Prince Rupert, BC (Canada)	2015 Q3
Occidental	75	Corpus Christi, TX	2017
Capacity Expansions	**486**		

+300K in 2-4 yrs

Source: ESAI Energy, LLC, EIA, FERC

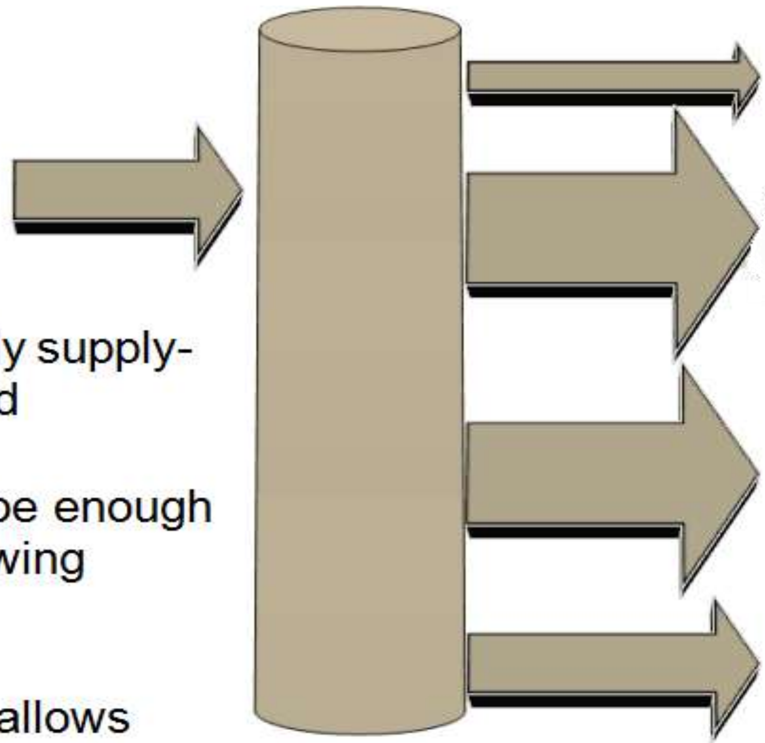
Getting North American LPG to Asia

- Price Differential is Enormous Incentive for LPG Exports
- For 2019, 235,000 bbl/d of US LPG Already Contracted for Japanese, Chinese, and Korean companies
- By 2018, US LPG Export Potential Likely to Reach 350,000 bbl/d
- European Prices Will Come Under Pressure, Saudi CP Also Under Pressure
- Hybrid Pricing Coming? (merge Mt. Belview w/ Saudi CP)

What's the Politically Correct Name for this Stuff?

CONDENSATE SPLITTING

Condensate



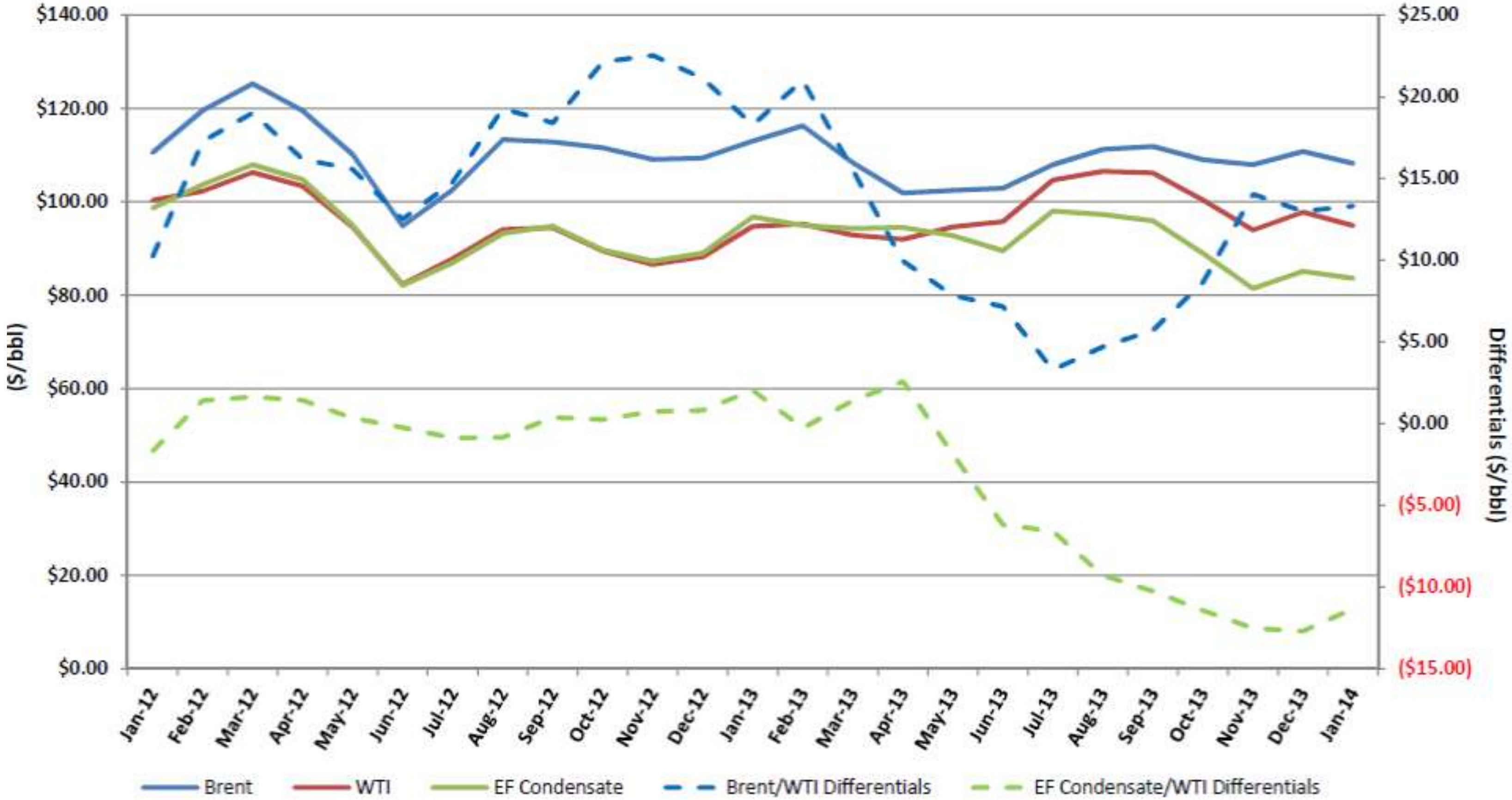
- The market is typically supply-driven, <u>not</u> demand led

- Key issue; will there be enough <u>demand</u> to match growing supply?

- Splitting condensate allows products to be exported

Eagle Ford Condensate Discounts Accelerate

Differential to WTI



Source: Company communications to EPRINC

North American Condensate Exports and Unconventional Wisdom

•Lease Condensate (vs. Plant Condensates) Cannot be Exported, except for Canada)

•Canadian Diluent Demand Will Soak Up Excess US Supply, but……

HOPE AND CHANGE IS COMING

•Growing Evidence Lease Condensate Output is Under Reported—Eagle Ford is Leading Edge of Price Pressure

•Have we Overestimated the Degree of Difficulty in Obtaining Export Licenses? (Korean diplomatic initiatives already underway) and Canadian production is rising adding to pricing pressure.

•150,000 to 300,000 bbls/d of Condensate Exports (Lease and Plant) no longer Impossible – high percentage to Asian markets

FOREIGN POLICY & POLITICS

•Asian Consumers Seeking to Constrain Middle East Pricing Dominance

•US Exports as an Instrument to Support Iranian Sanctions

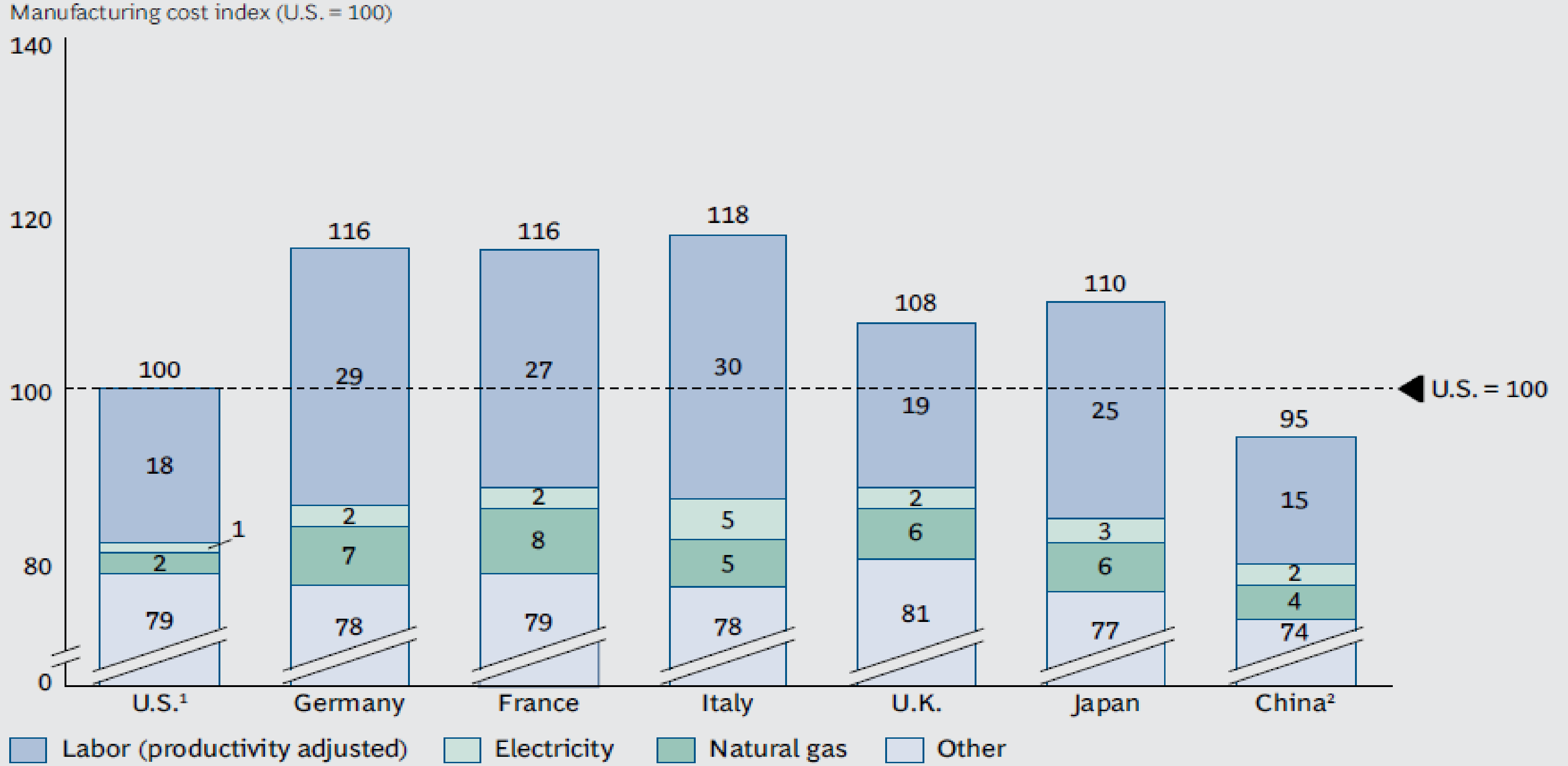
•Are Gasoline Prices a Non-Issue?

•The New Chair of the Senate Energy Committee and the Difficulty of a Political Trifecta

•Using the Existing Export Control Process to Move Forward (condensate will lead the way)

•What is Energy Security in the new production paradigm?

Average Projected Relative Manufacturing Costs for 2015



Sources: U.S. Economic Census; U.S. Bureau of Labor Statistics; U.S. Bureau of Economic Analysis; International Labour Organization.
Note: Cost structures were calculated as a weighted average across all industries. No difference was assumed in "other" costs (e.g., raw materials inputs and machine and tool depreciation). Differences in values are a function of the industry mix of each exporting country.
[1]U.S. figures represent costs in a set of select lower-cost states specified in previous publications.
[2]Chinese figures represent the Yangtze River Delta region.