PerspECCtive

Theme:
Executive Panel Discussion, Thursday Dec 14, 2017

# Executive Panel Discussion

**Moderator**:
Dave Witte - IHS Markit
**Panelists**:
Walter Pinto - Lyondellbasell
Tony Jones - Valero
Ron Corn - CPChem
Mike McAtee - BASF

№ 49

Year: 2017

Date: Dec 12-15

Location: Boca Raton, FL

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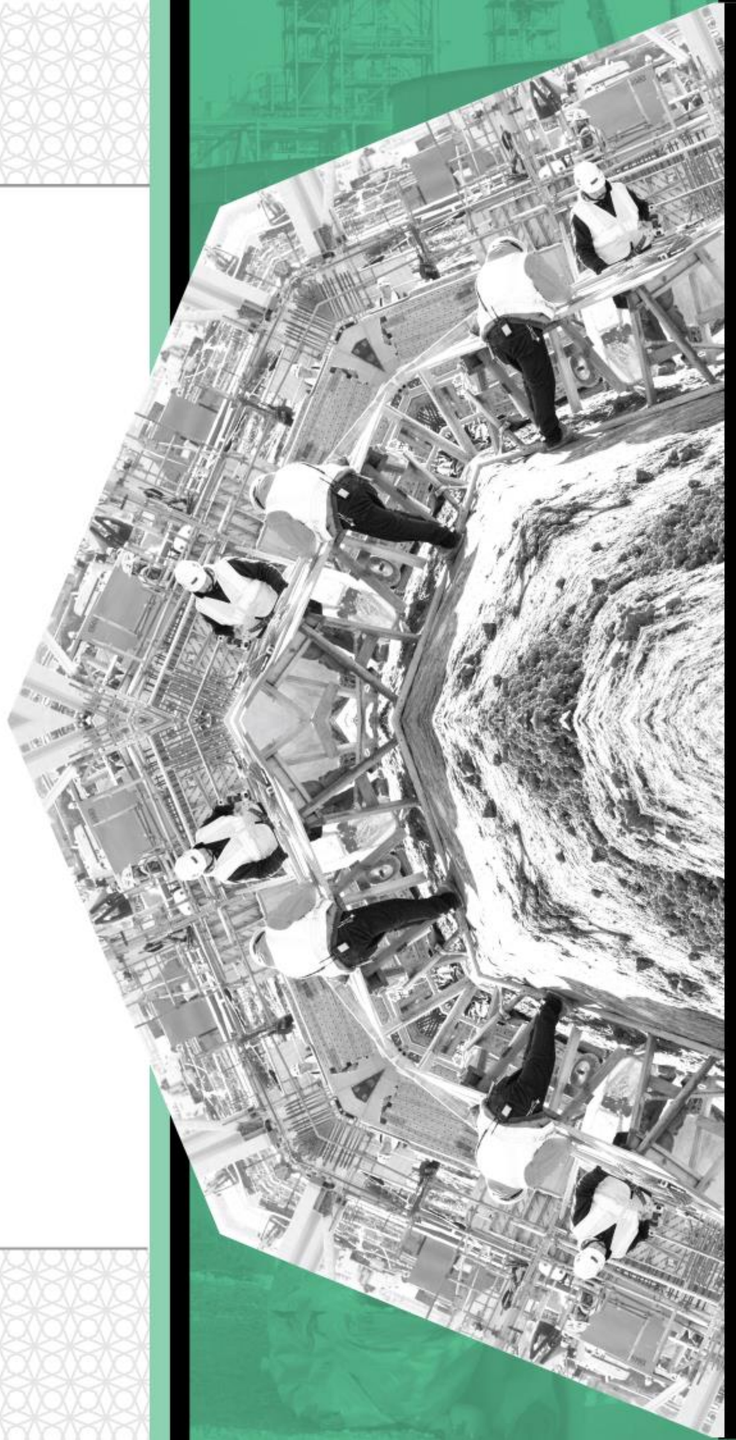


# Addressing strategic challenges with interconnected capabilities

Brought together to form the most Comprehensive sources of data, analytics and insight for the **Energy Upstream, Oil Markets, Midstream, Downstream & Chemical Markets**

# Agenda

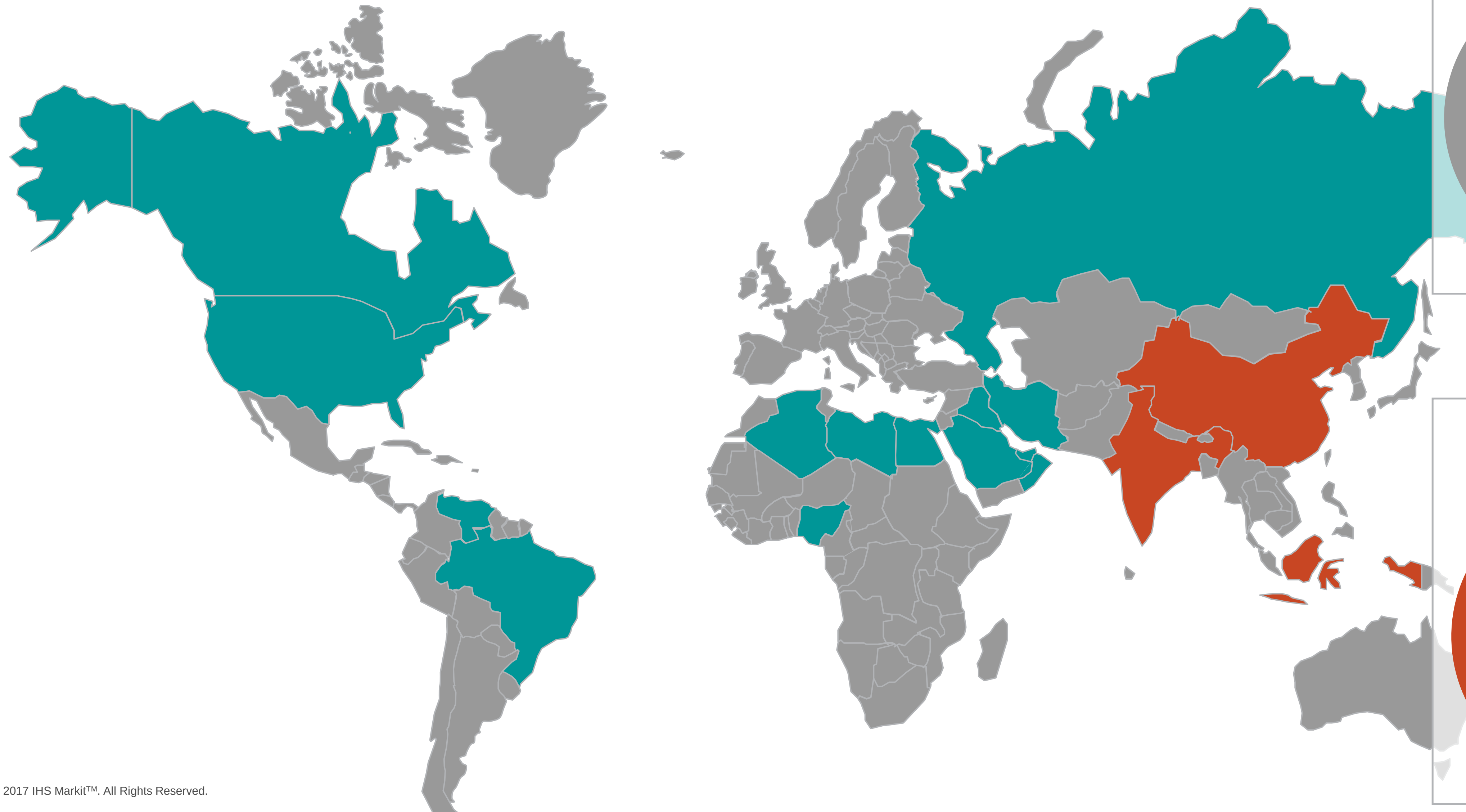
The opportunity - outlook for shale oil, gas and petchems

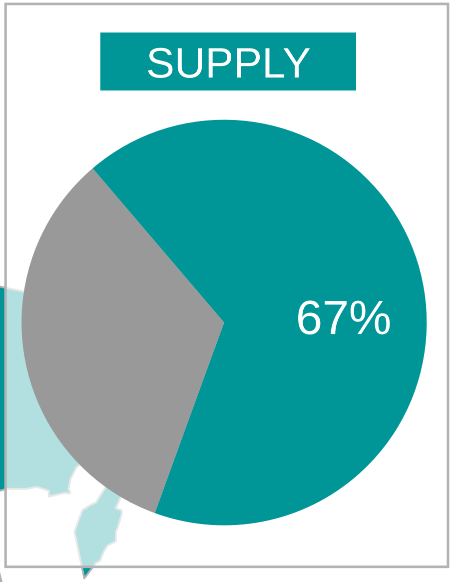
The threat – analyzing capital build options through the supply chain

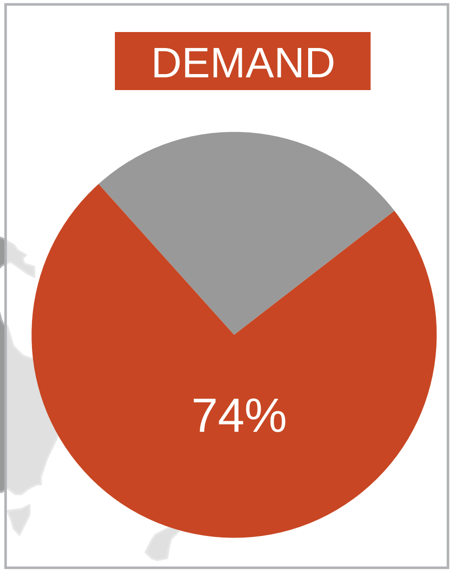
The challenge – panelists ideas to offset threats and capture opportunities

# Chemicals are illustrative of the energy supply chain.  Global chemical demand is concentrated in developing world with more than 50% of demand growth in China…

# …But petroleum supply is concentrated elsewhere

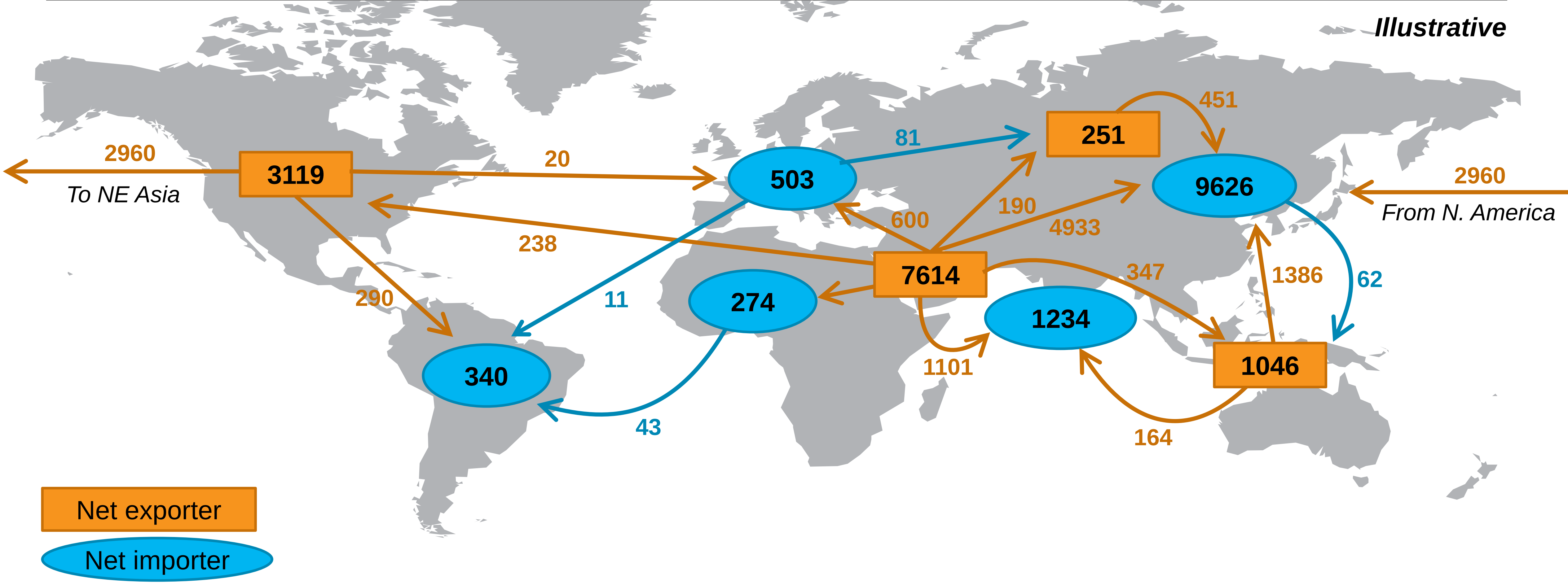




# Trade from advantaged hydrocarbon regions fills the demand gap – typically at the first value chain node with reasonable logistic costs and product market liquidity

**2026 World Monoethylene Glycol Trade Flows, Kilotons**




Volumes greater than 5,000 metric tons noted; intra-regional trade excluded.

# Capital investments seek to maximize returns – preferably with a sustainable competitive advantage

**Braskem-Idesa Ethylene/PE Plant**
**Nanchital, Veracruz, Mexico**
**Start-Up: June 2016**

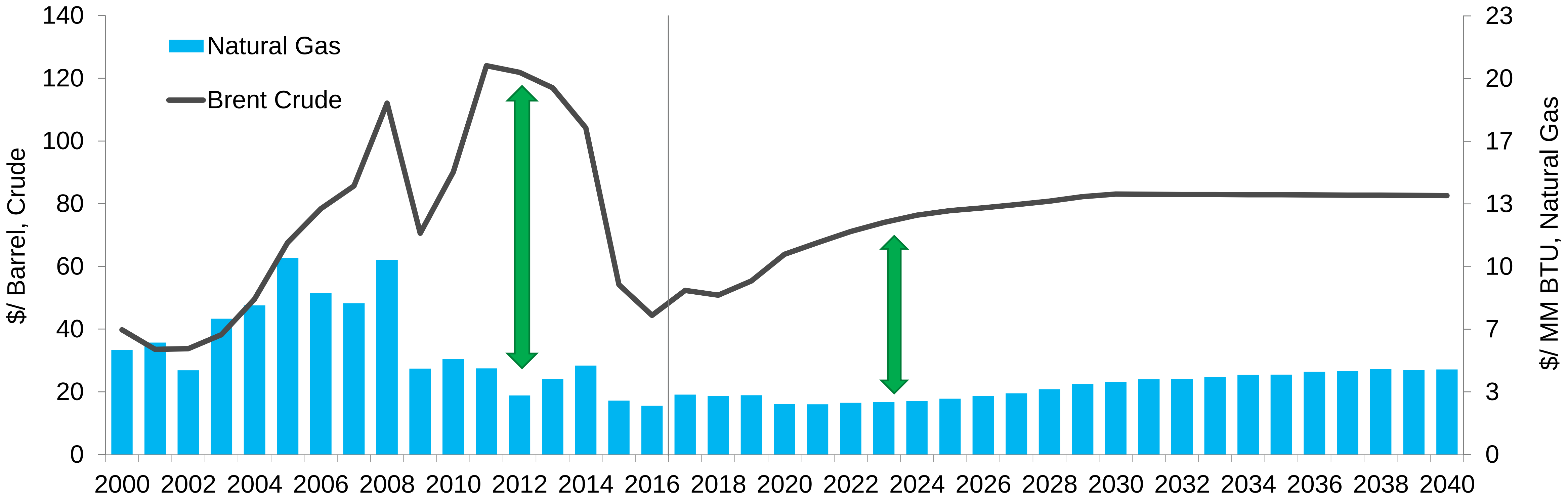
**Investment "Drivers"**

- ✓Secure an energy & feedstock advantage
- ✓Leverage current technology and build world-scale for maximum capital efficiency
- ✓Invest with proximity to local markets and/or access to trade routes
- ✓Build to leverage an upstream and/or downstream integrated position

*Photo courtesy of Braskem IDESA*

# Combination of high crude prices and stable gas is attractive for those North America investments based on natural gas and natural gas liquids

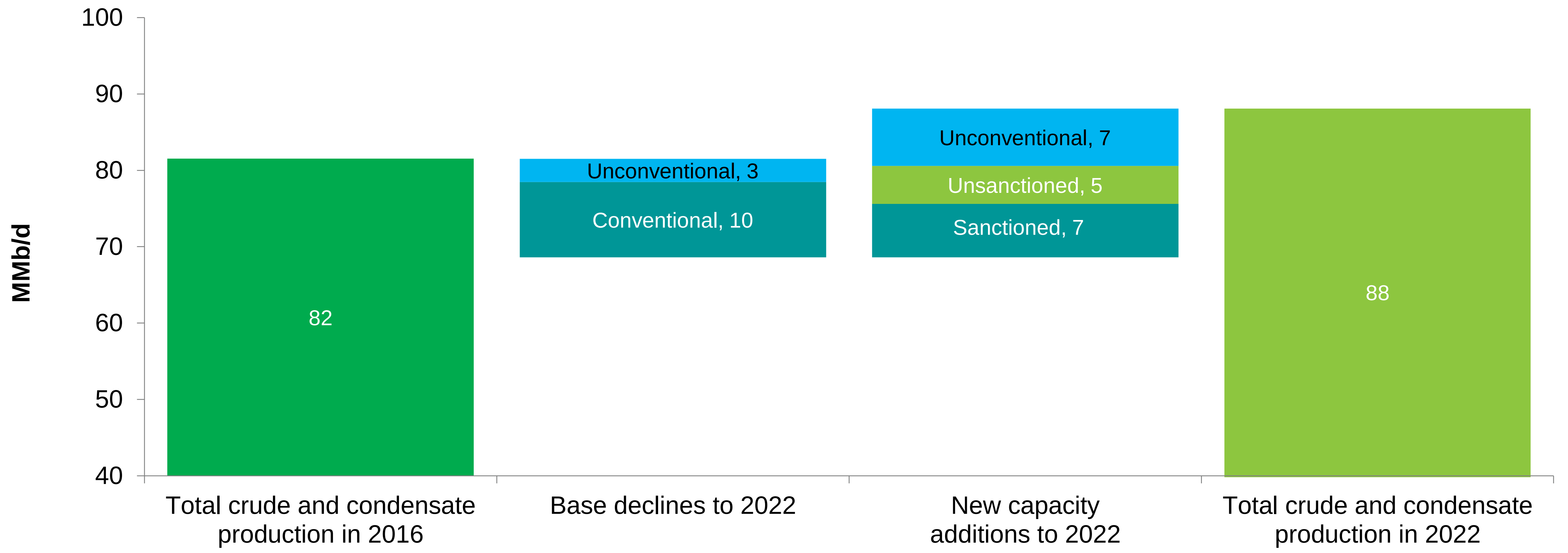
**Global crude oil vs. USGC natural gas (2017 Constant $)**




Source: IHS Markit

# Global crude and condensate production requires ~20 MMb/d new supply by 2022

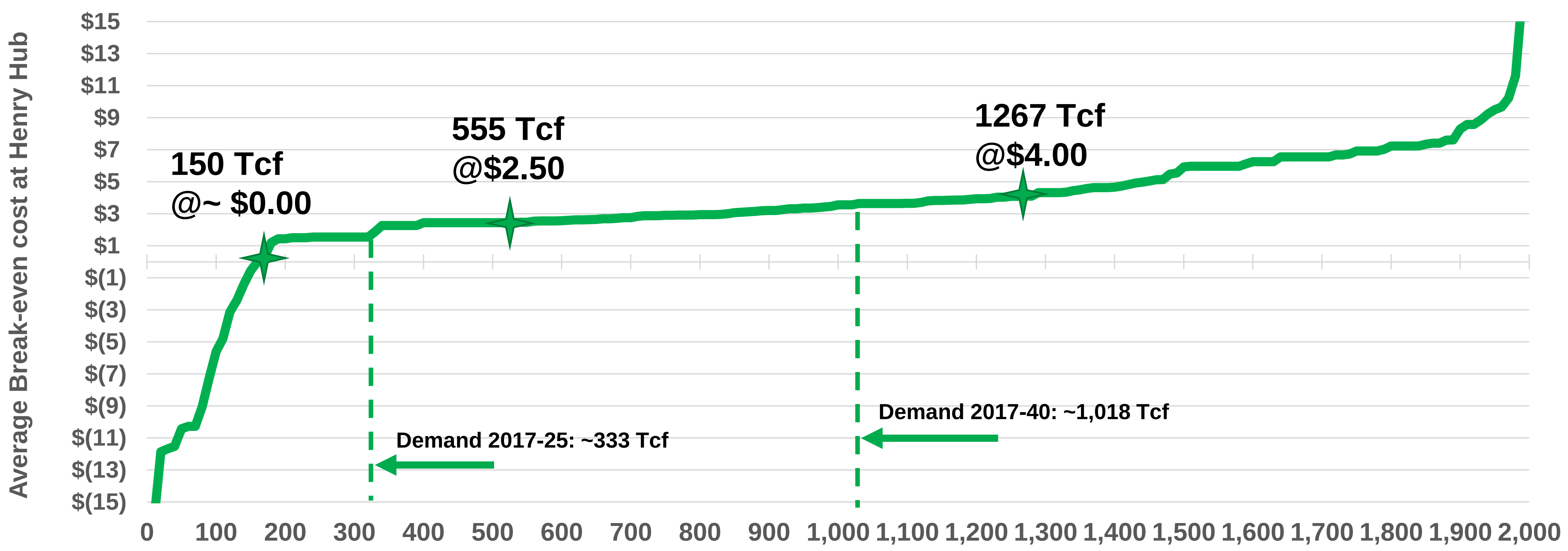
## Global crude and condensate supply in 2022




Source: IHS Markit

# Nearly 1,300 Tcf North American gas supply at Henry Hub <$4/MMBtu

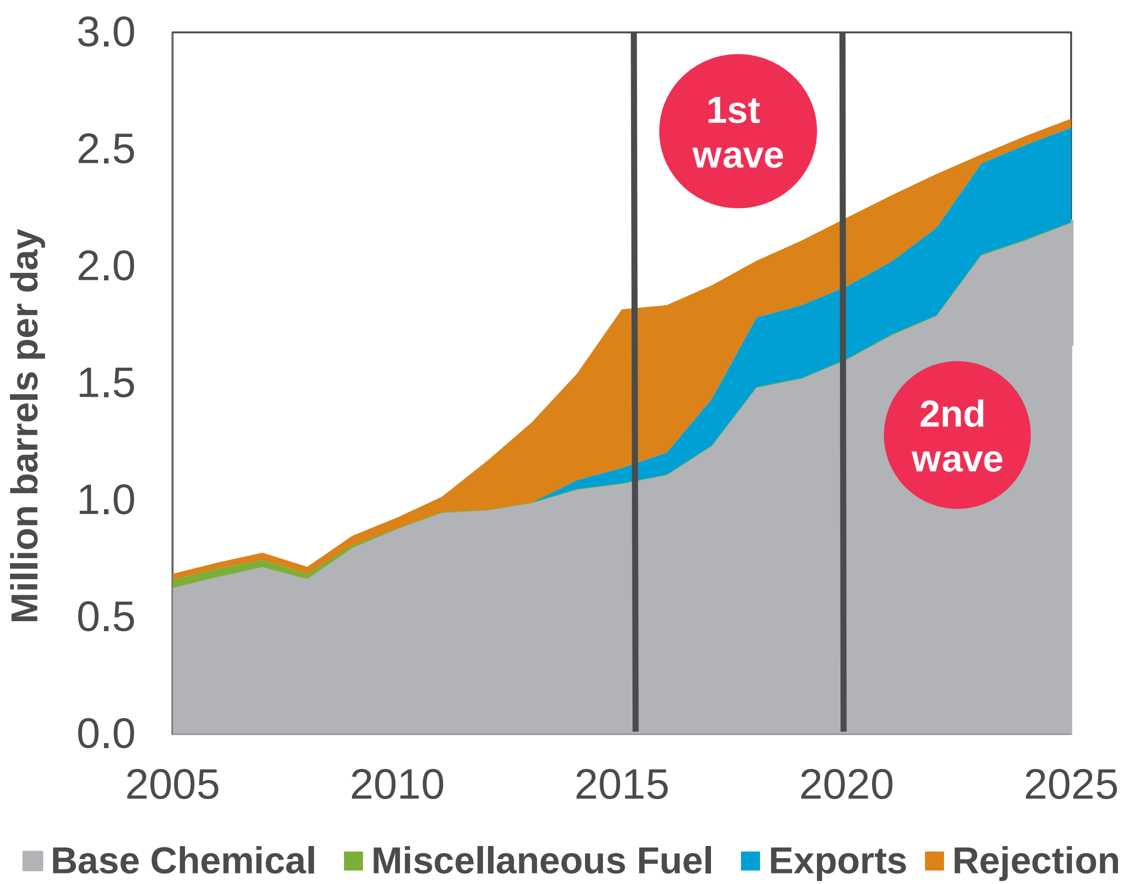
**Breakeven price at Henry Hub ($/MMBtu) for natural gas resources (Tcf)**




Source: IHS Markit

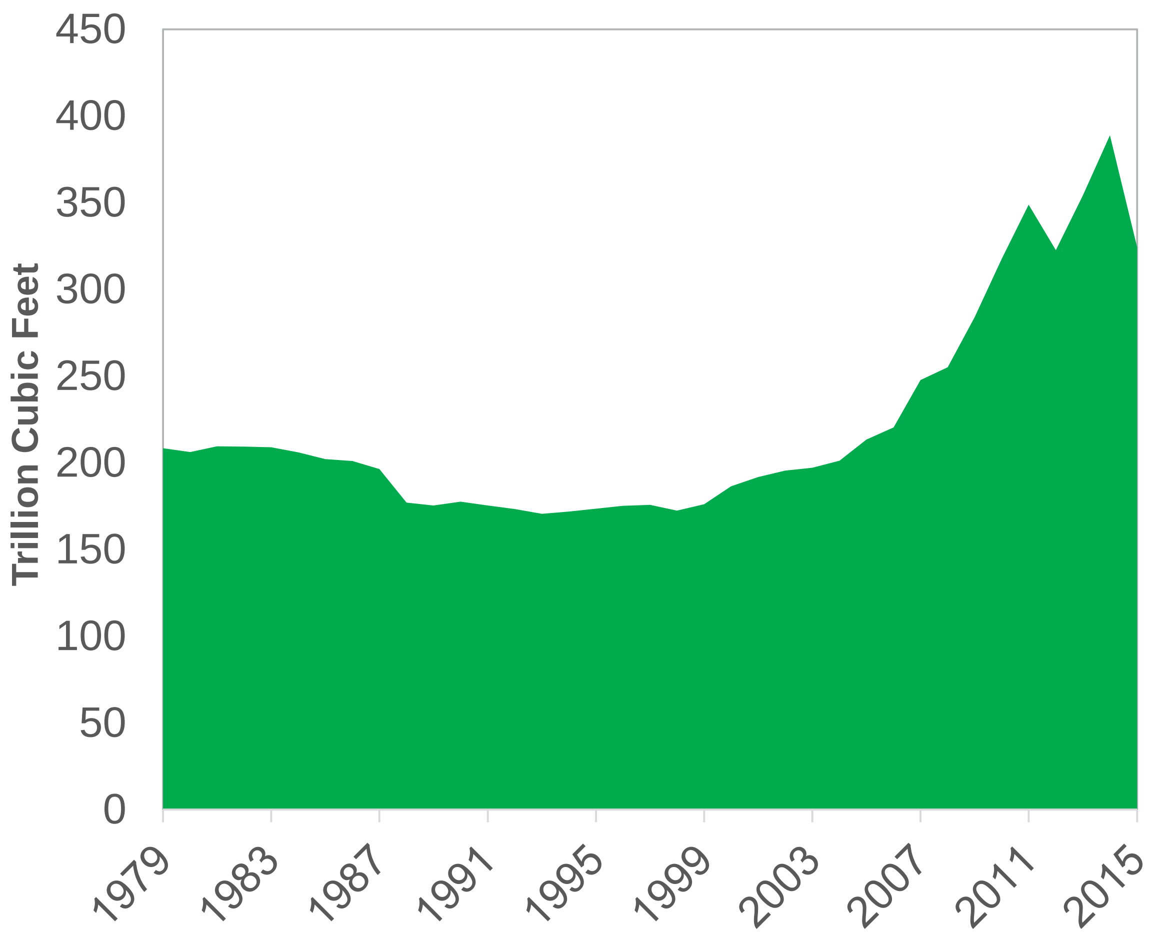
# Lots of feedstock unlocked by shale suggest another wave of US-based investment – but where?

## US Ethane Demand and Rejection



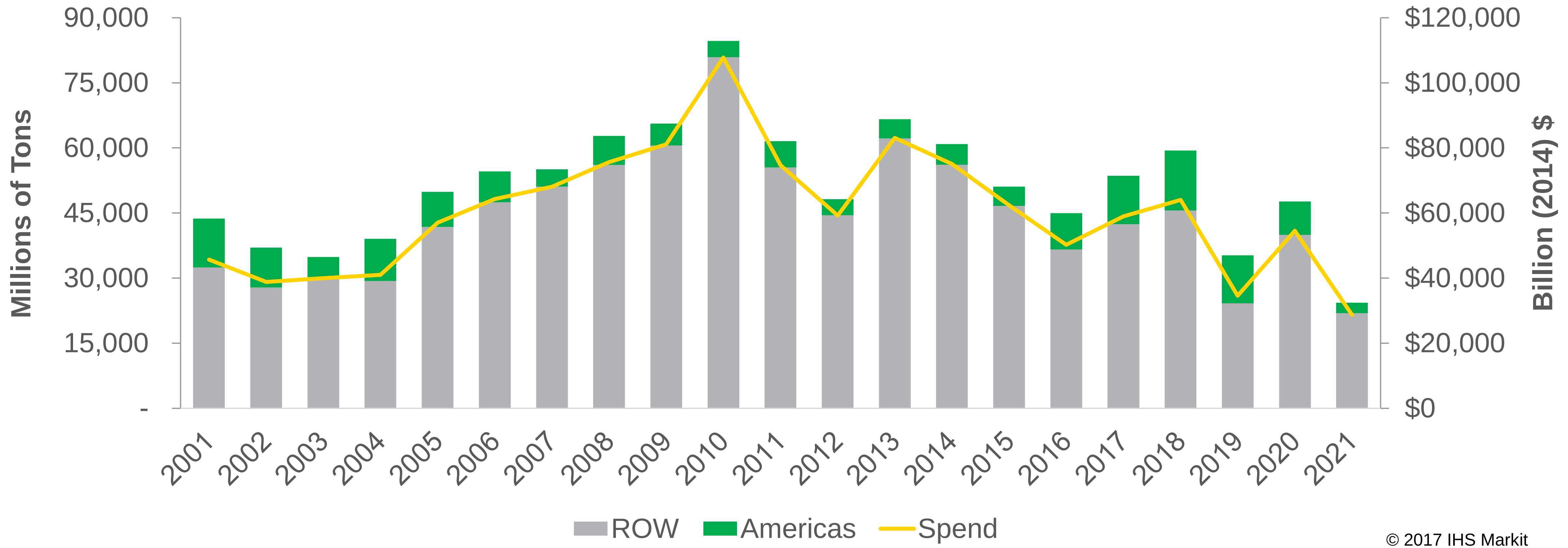

Source: IHS Markit

## US Proven Gas Reserves



# For chemicals, plant builds either aligned with demand or hydrocarbon supply; lately total capital investment has trended down - except in the US. Will it continue?

## Capital Spending in the Chemical Industry

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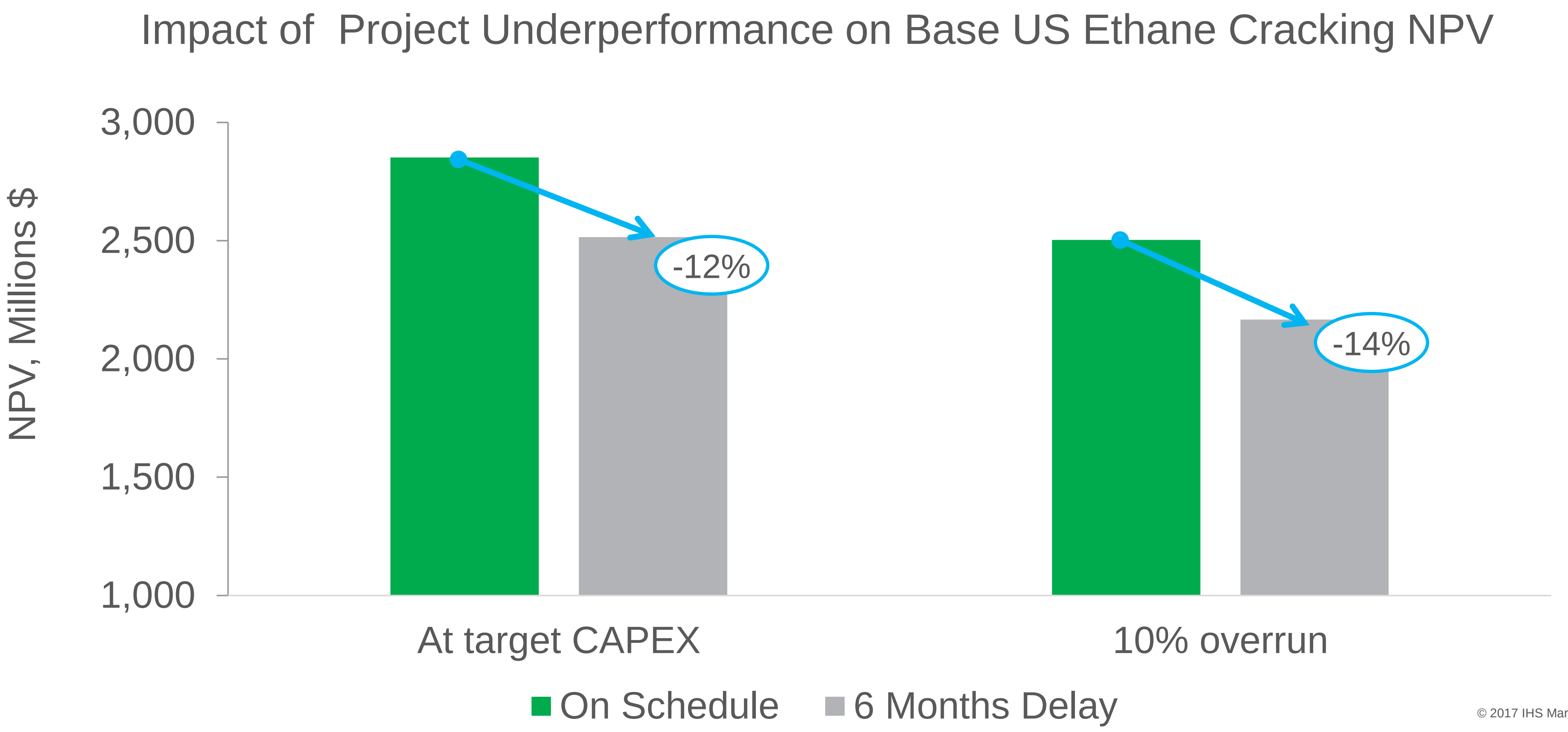
# Plenty of value creation available for US investment, but high execution risk as delays and overruns destroy value



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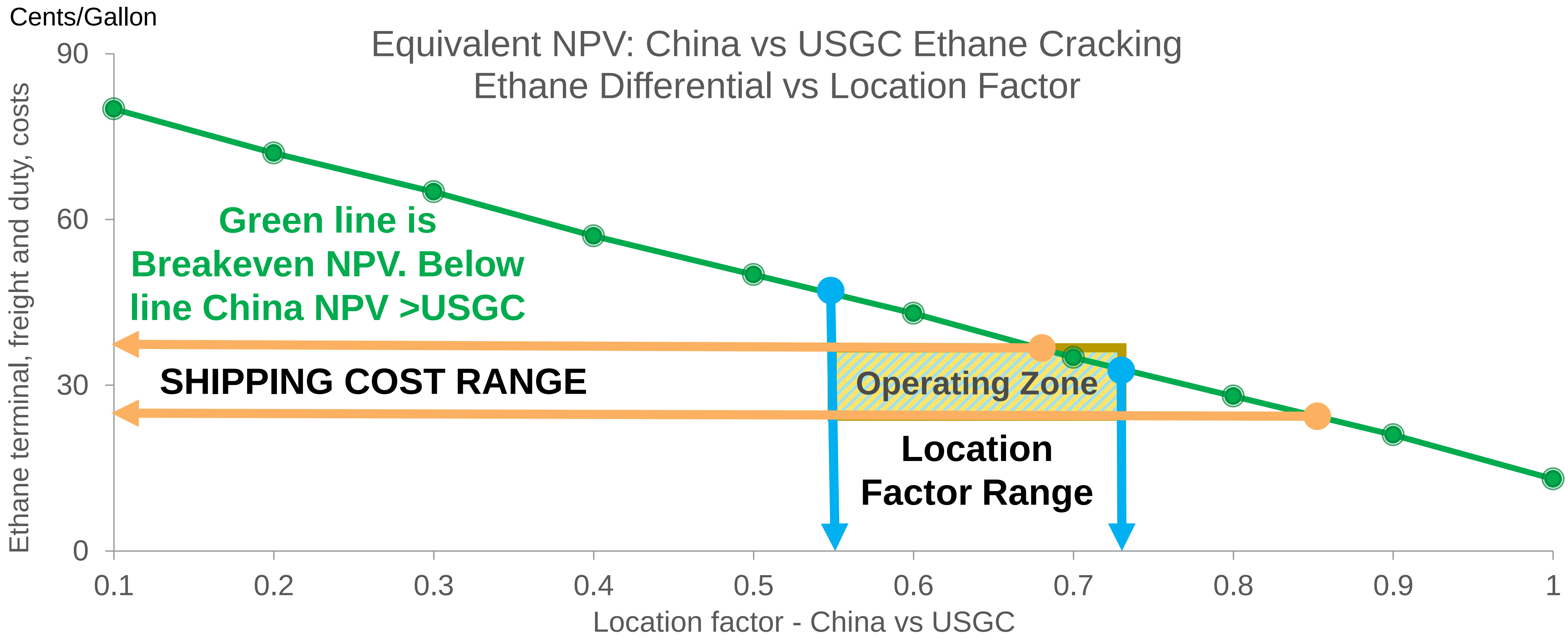
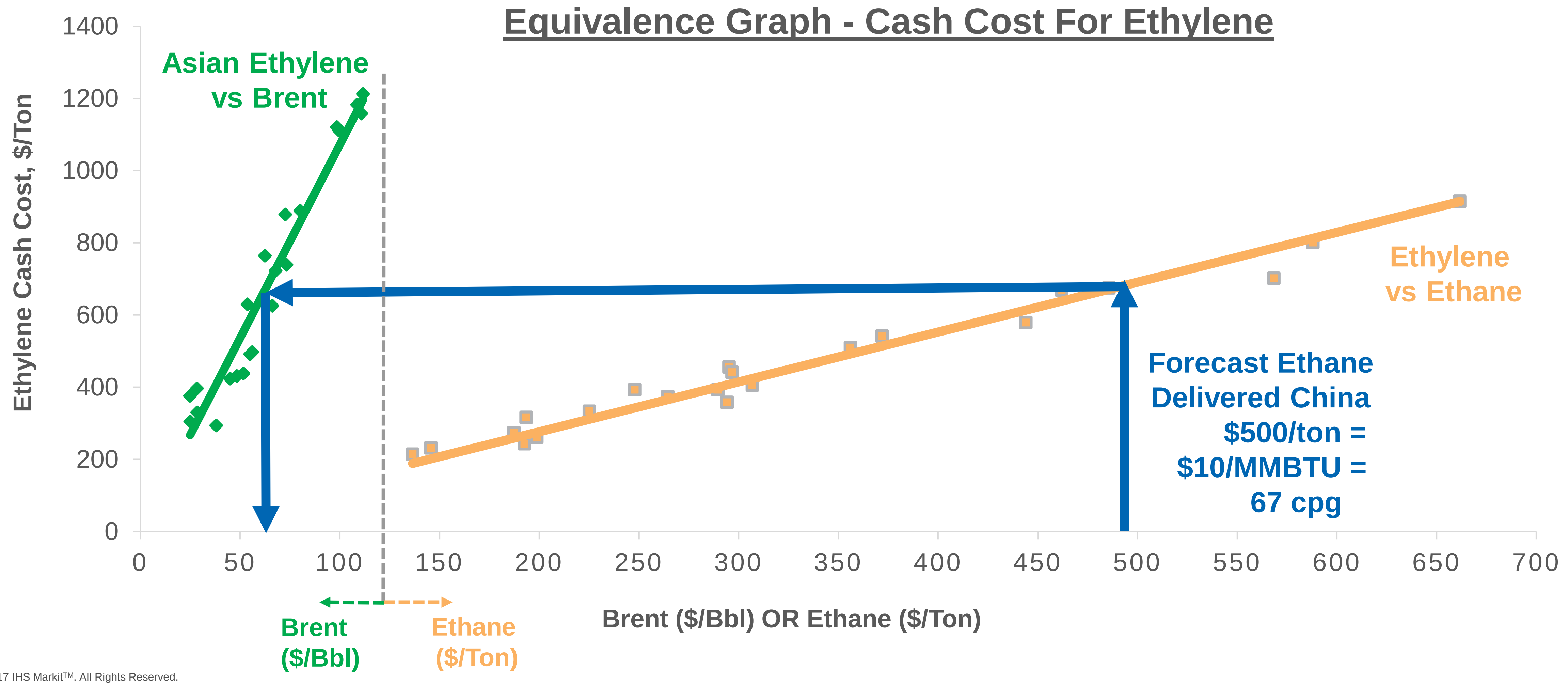
# Case study - Multiple models for investment exist to satisfy Chinese demand growth

| Option | Cash Cost | Capital | Market Risk |
|---|---|---|---|
| Export ethane, build cracking in China | Highest | Lowest | Lowest |
| Build US methanol, export to MTO in China | Lowest | Moderate | Medium |
| Build ethane cracker in US, export product | Moderate | Highest | Highest |

# Low-cost Chinese and high US capital costs means Chinese investment beats US returns even after accounting for high feedstock shipping costs



# At expected ethane prices, cash costs favor naphtha at crude prices below $60/Bbl. Will crude to ethane spreads be low enough for Chinese ethane to beat naphtha?



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## Conclusions

- **Demand growth concentrated** in developing world **and dislocated** from hydrocarbon supply
- **Shale has unlocked huge amounts of competitive supply** supporting investment growth in Energy and Chemicals
- Poor (relative) EPC performance **eroding feedstock advantages**
- New approaches to improve US EPC productivity are needed, **or risk a shift of building to overseas**

# Our distinguished panel

lyondellbasell

## Walter Pinto

**Senior Director, Global Projects and Engineering**

BASF
We create chemistry

## Mike McAtee

**Senior Vice President, Strategic Projects**

Chevron Phillips Chemical Company LP

## Ron Corn

**Senior Vice President, Petrochemicals**

VALERO ENERGY CORPORATION

## Tony Jones

**Senior Vice President, Project Execution**