



**CEE**

CENTER FOR  
ENERGY  
ECONOMICS



# Backward Through the Value Chain

*2016 Annual Meeting and Think Day*

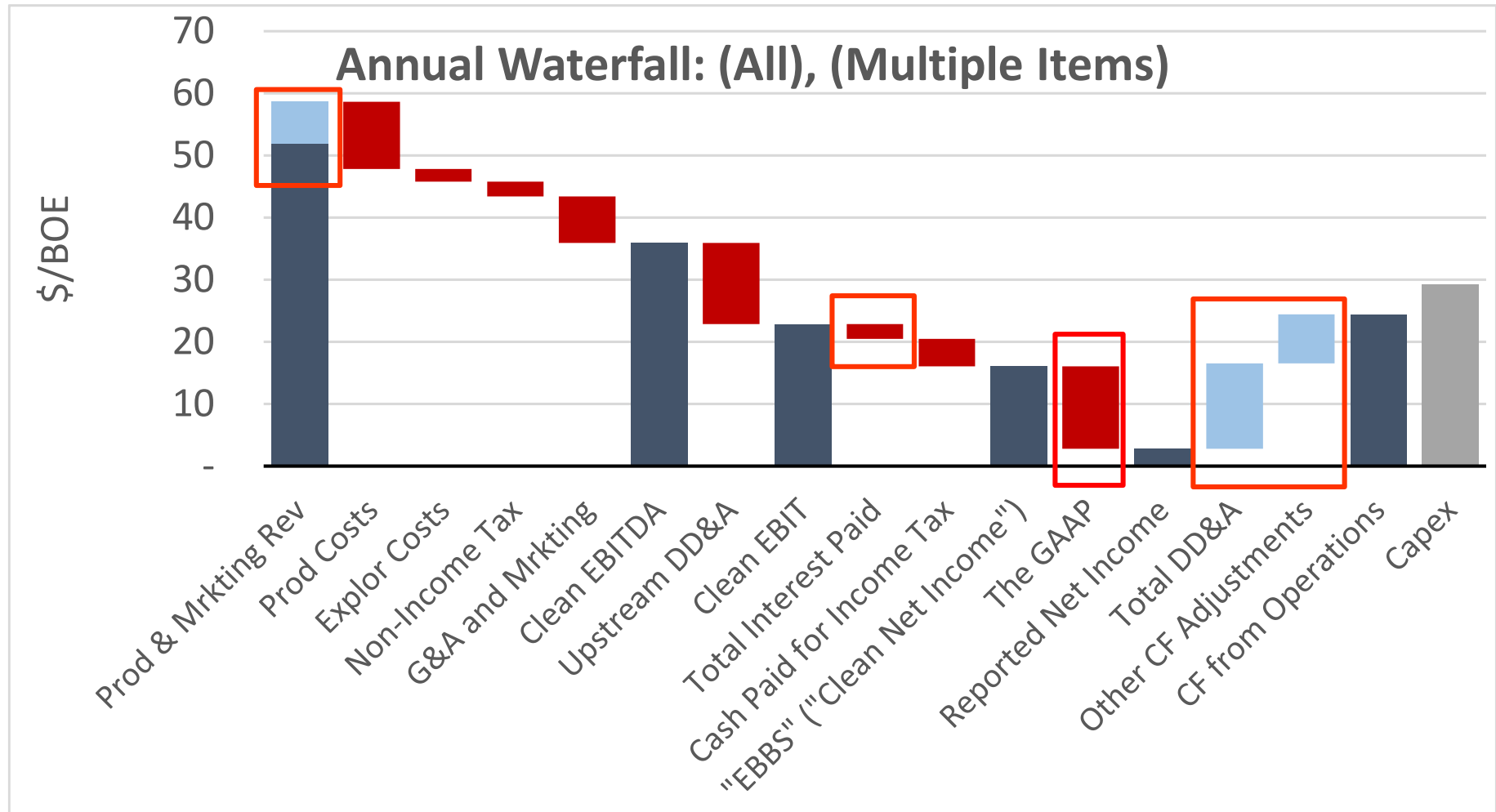
**BACKWARD** ←  
**THROUGH** **VALUE CHAIN**  
**THE**



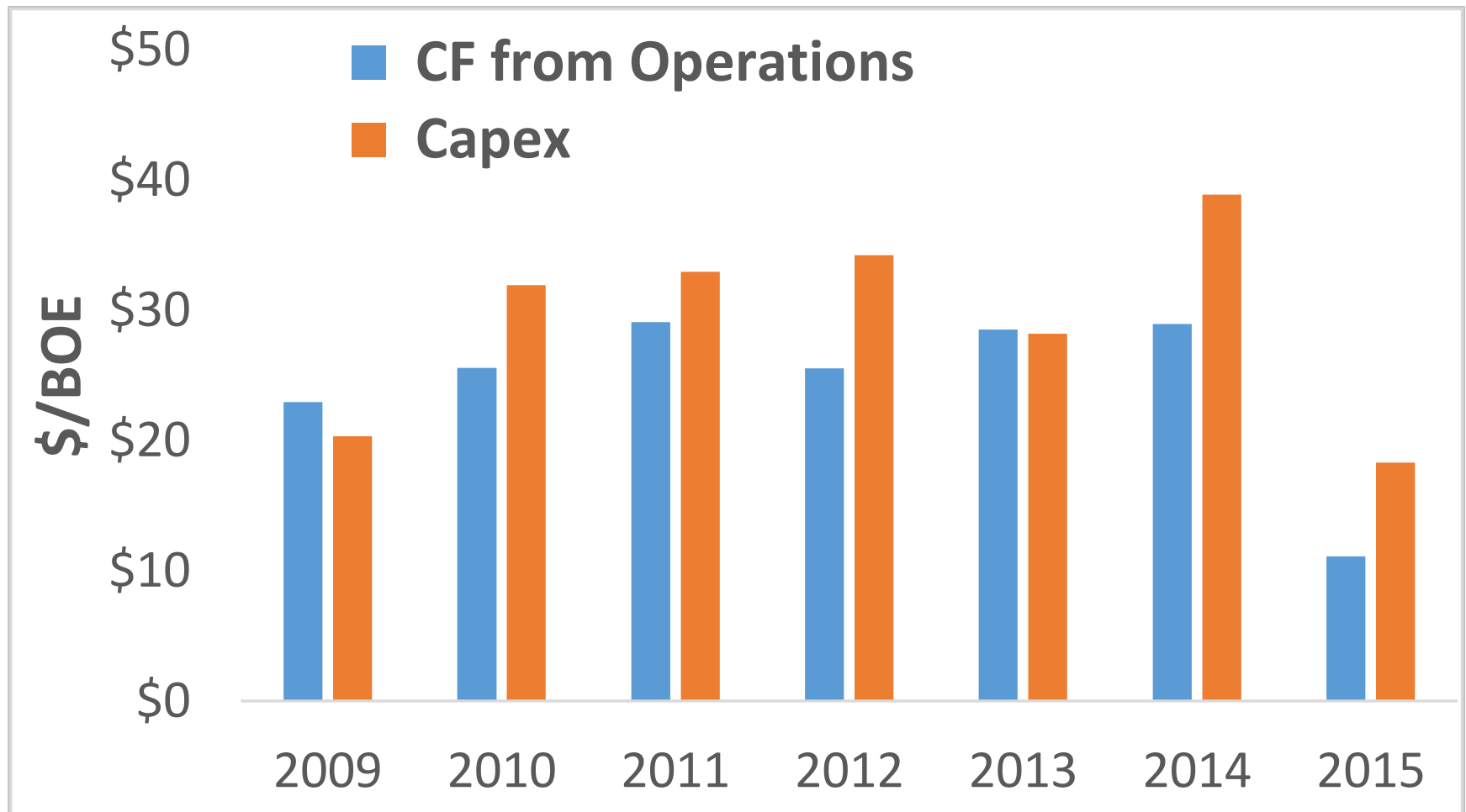
## A CONVERSATION WITH DEB BYERS, PARTNER, EY

# All Companies, 2009-2015:

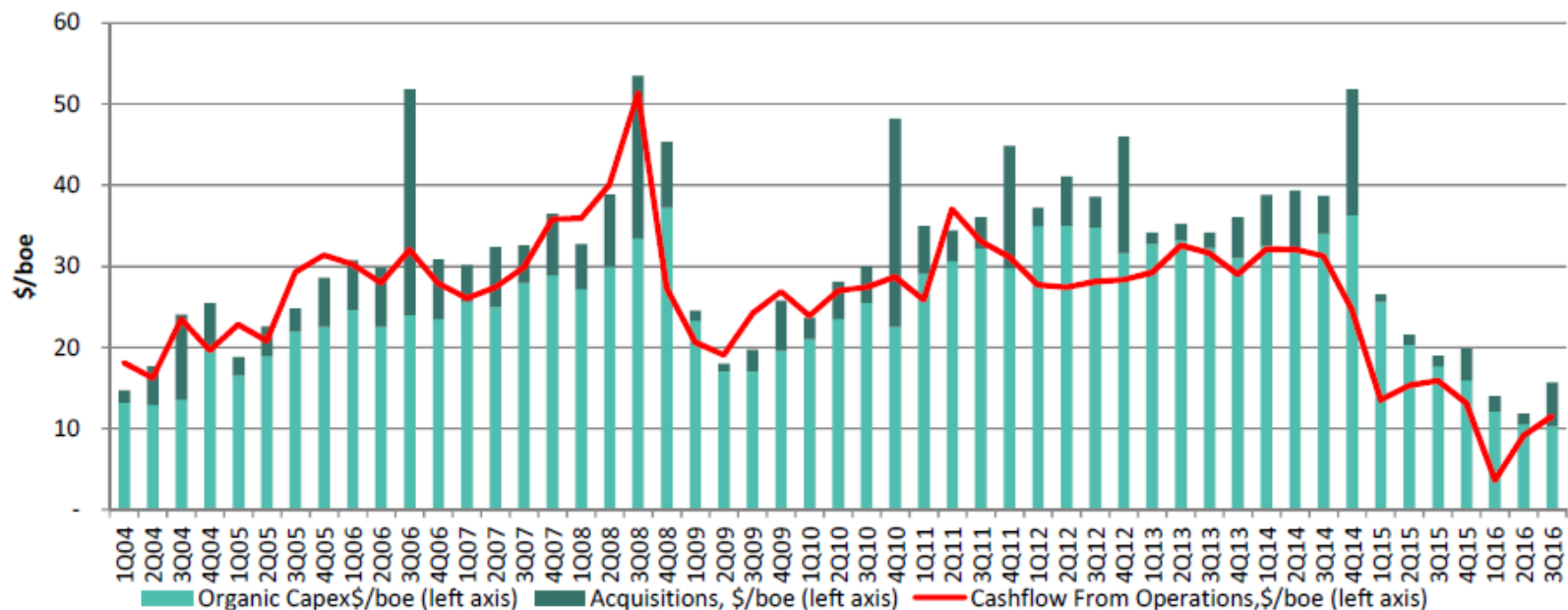
*Overall, companies have outspent cash flow.*



# Outspending has been a chronic problem...



# ...not new, not short term

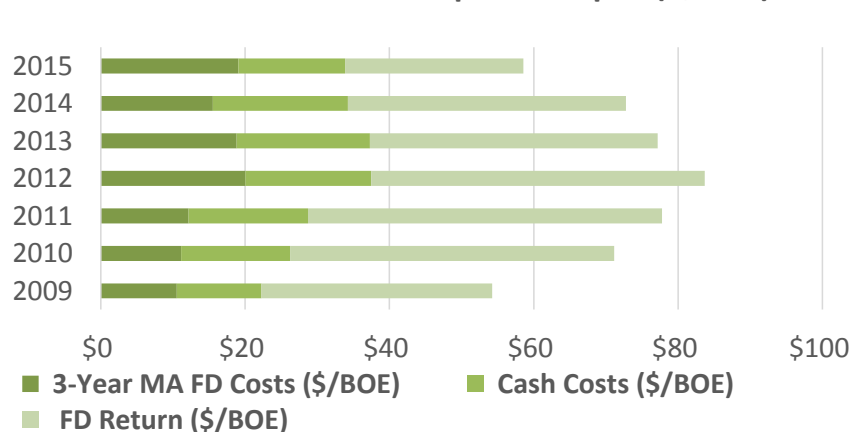


Source: Company reports, Bernstein analysis, Bloomberg

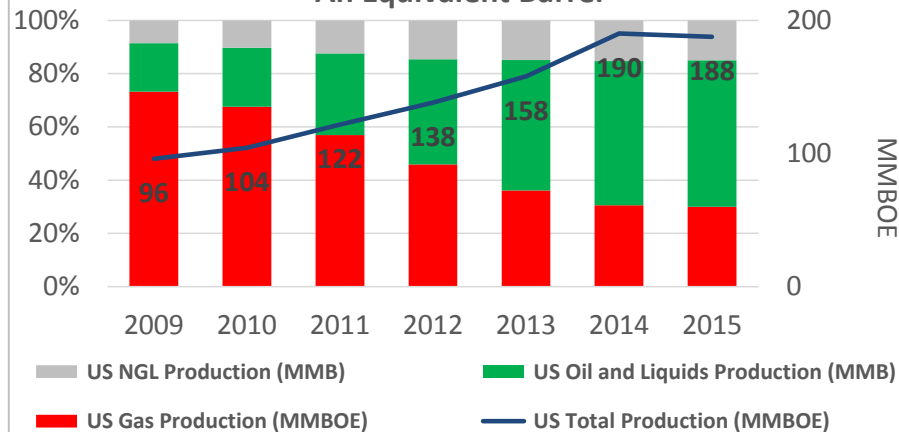
Note: The production volume is an absolute measure and differs from quarter to quarter based on number of companies included in the calculations

# Two Permian Players: (1) Larger, repositioned...

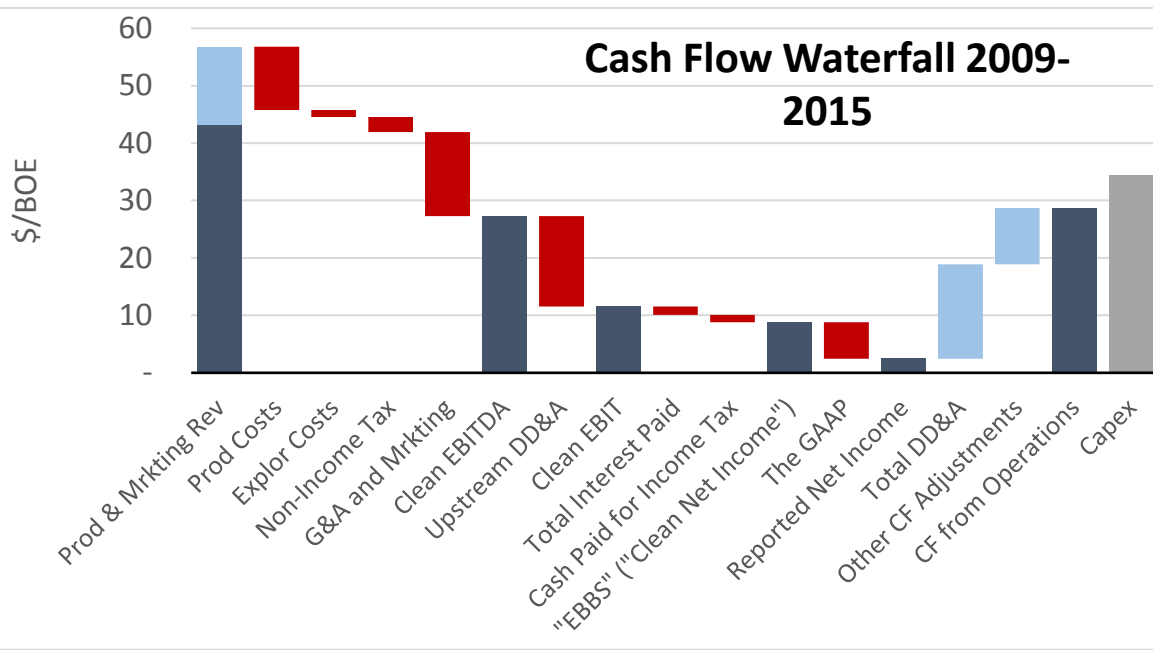
Cost Stack with Return Equal to Capex (\$/BOE)



An Equivalent Barrel



Cash Flow Waterfall 2009-2015

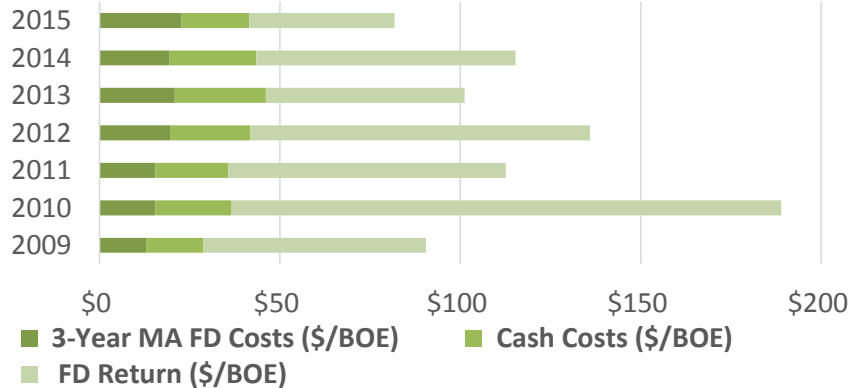


CEE producer benchmarks, 16 companies, SEC filings

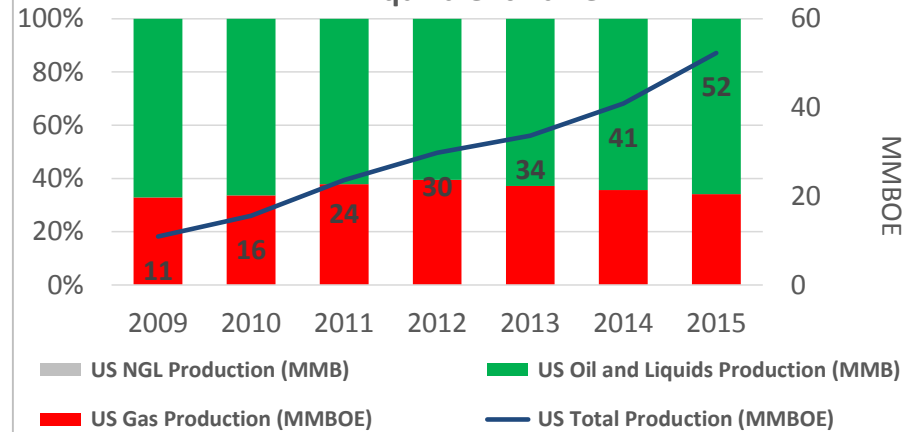
©BEG/CEE-UT, 6

# ...and (2) smaller, historically focused

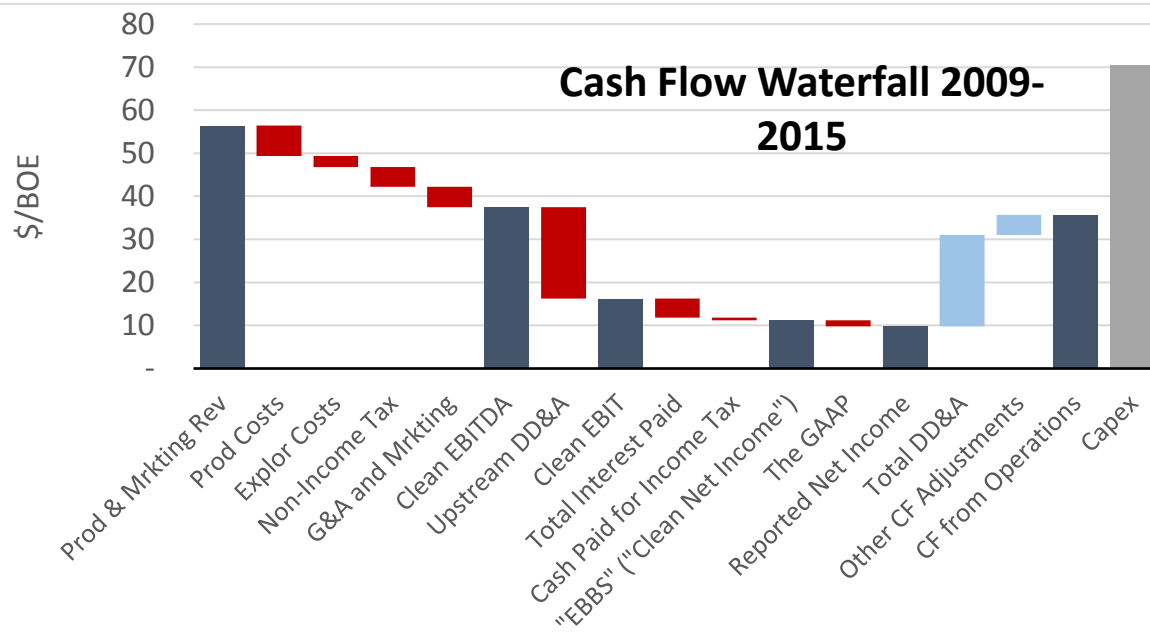
Cost Stack with Return Equal to Capex (\$/BOE)



An Equivalent Barrel

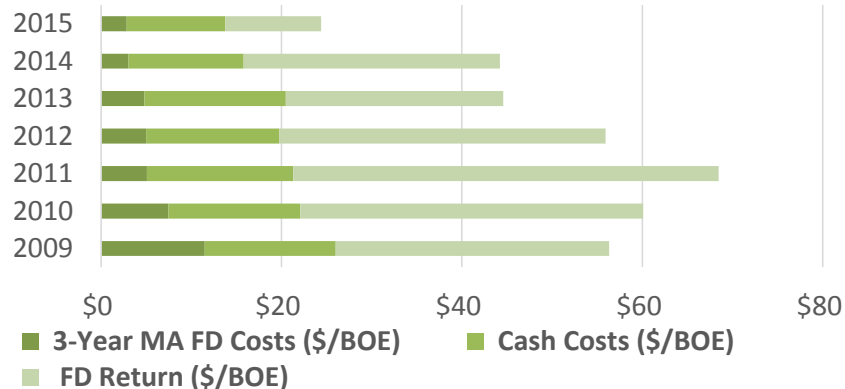


Cash Flow Waterfall 2009-2015

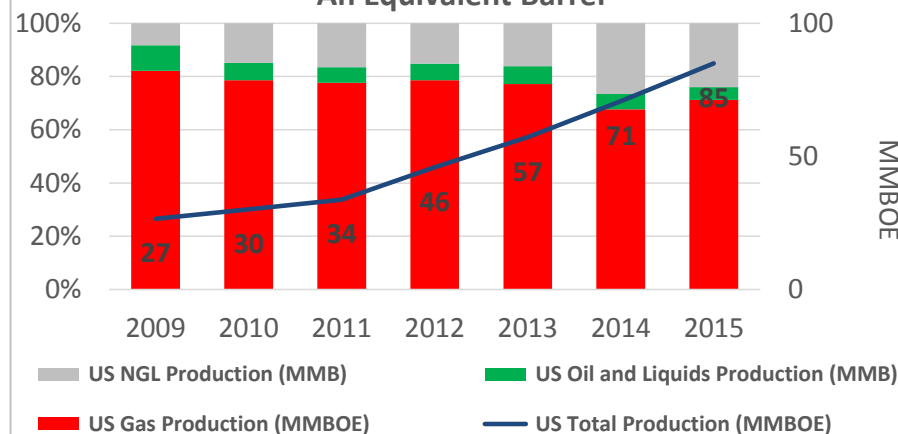


# A Gas Specialist (BOE for comparison)

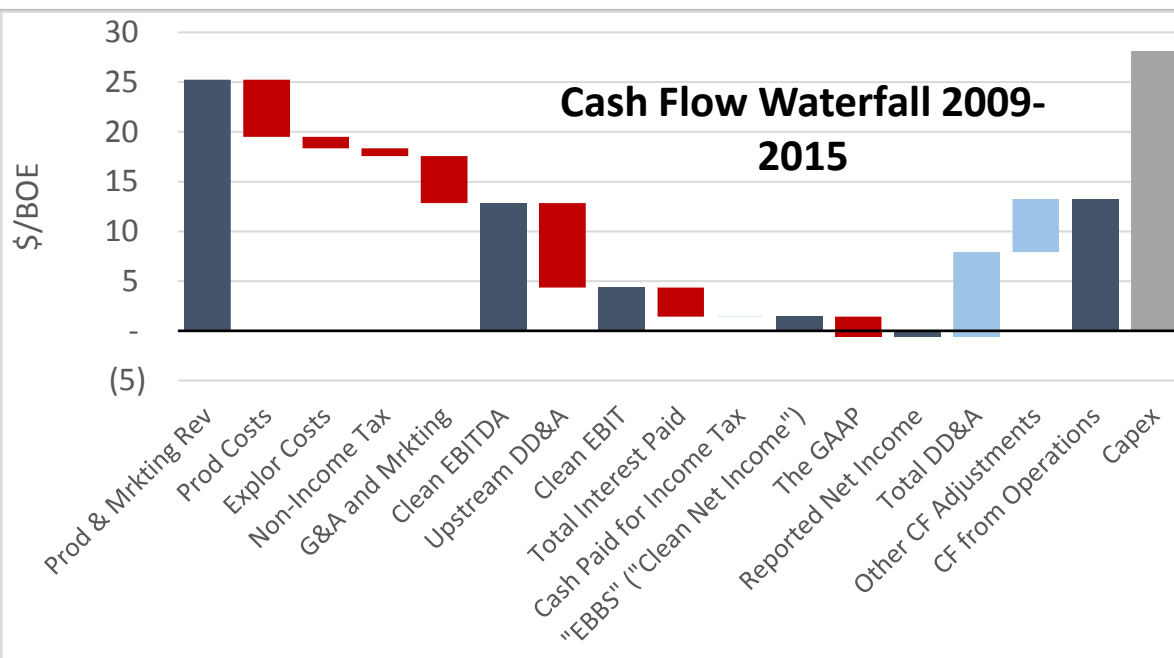
Cost Stack with Return Equal to Capex (\$/BOE)



An Equivalent Barrel



Cash Flow Waterfall 2009-2015



CEE producer benchmarks, 16 companies, SEC filings

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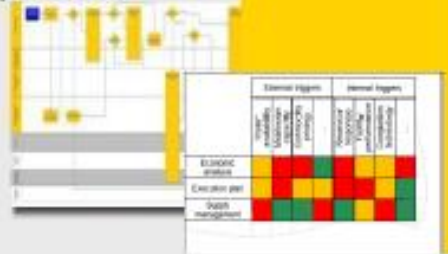
# The Field Development Plan is key to rapidly detect deviations and implement course corrections

## Asset implements changes:

- Rig pace
- Completion crew
- Production plan
- Permit inventory
- Others

## Reservoir to Production

Workflow to support efficient field processes



## Asset / region collects performance / intelligence data

- IP, decline rate, liquid content
- Supplier performance
- NG pricing, NGL pricing
- Midstream capacity
- Progress of midstream project / permitting
- Regulatory events
- others

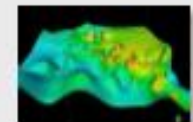
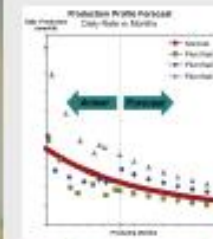
## Plan and schedule adjustment to reflect new learning / business environment



## Typical Adjustment Cycles (examples)

- Monthly: Well sequence, rig moves
- Quarterly: Sub-surface assumptions, land access strategy, infrastructure decisions
- Semiannually: Commodity assumptions, supply contracts

## Control limit monitoring to detect possible variations by "exception"



## Team identifies changes needed:

- Capital deployment
- Drilling & completions
- Land strategy
- Regulatory / permitting strategy
- Others

## Internal review (asset or Corporate) to assess proper course of action

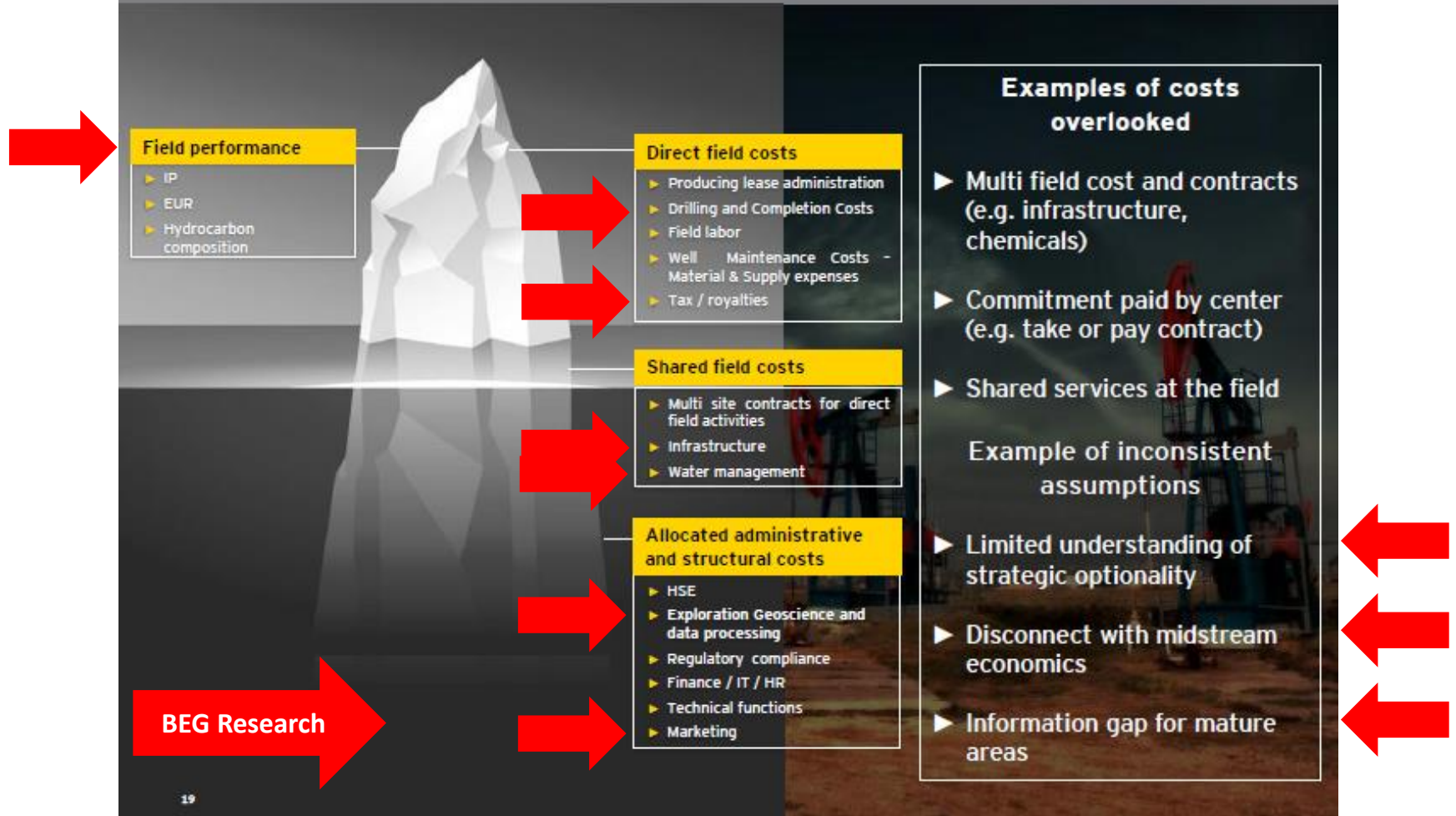


## Cross functional team reviews trends:

- Well performance
- Permitting trends
- Land access
- Tie-in cycle time
- Others

Yellow Detection Green Response

Many companies struggle to understand the true cost of ownership; lower commodity pricing levels have exposed data and system limitations



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# HOCKEY STICKS WE HAVE KNOWN AND LOVED

*A Heart  Healthy Diet of Post-election Energy  
Views*



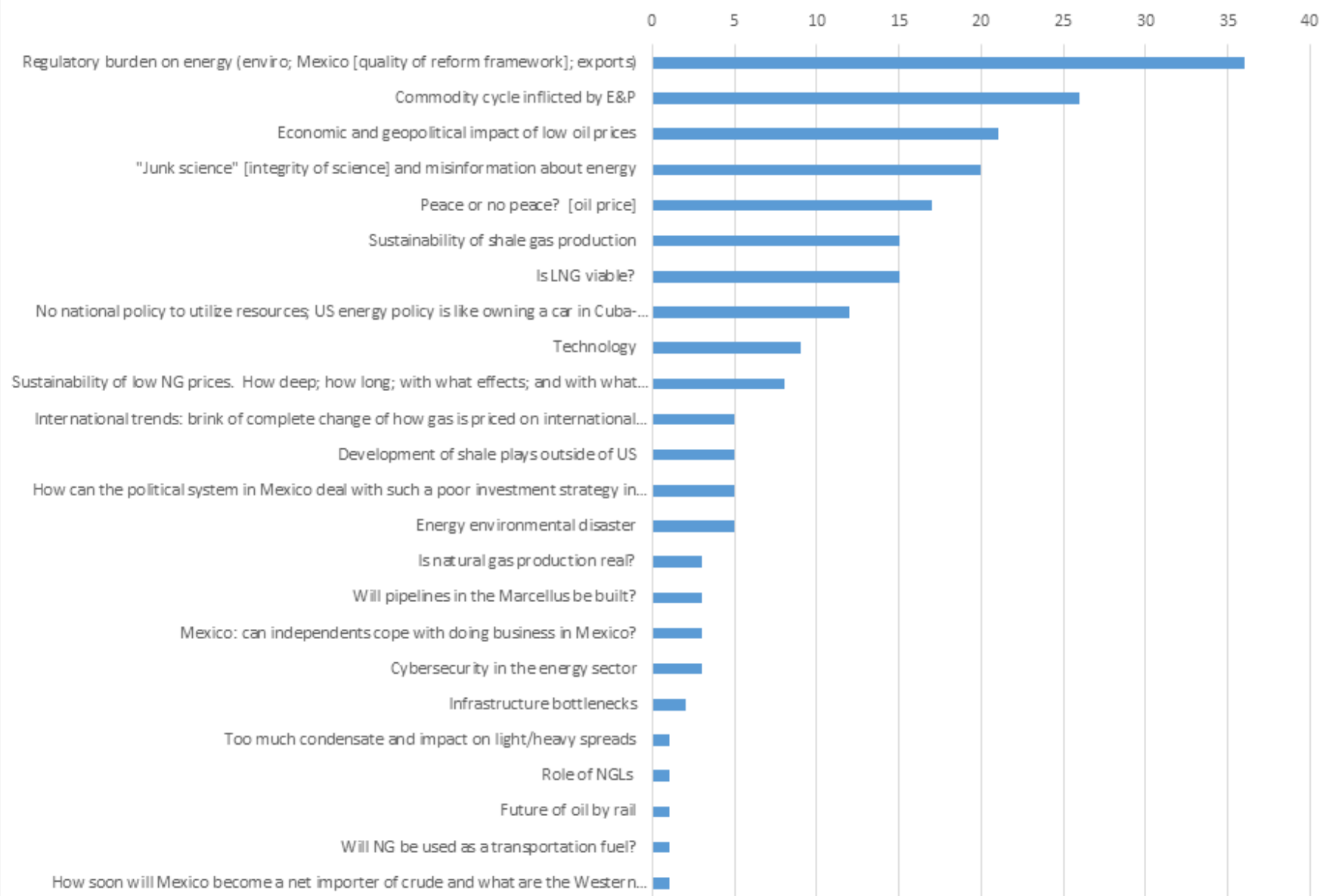
# Getting Traction Around “Up At Night”

*2011-2015 Input*





## Frequency (2011-2015 totals)



# Animal, Vegetable, Mineral?



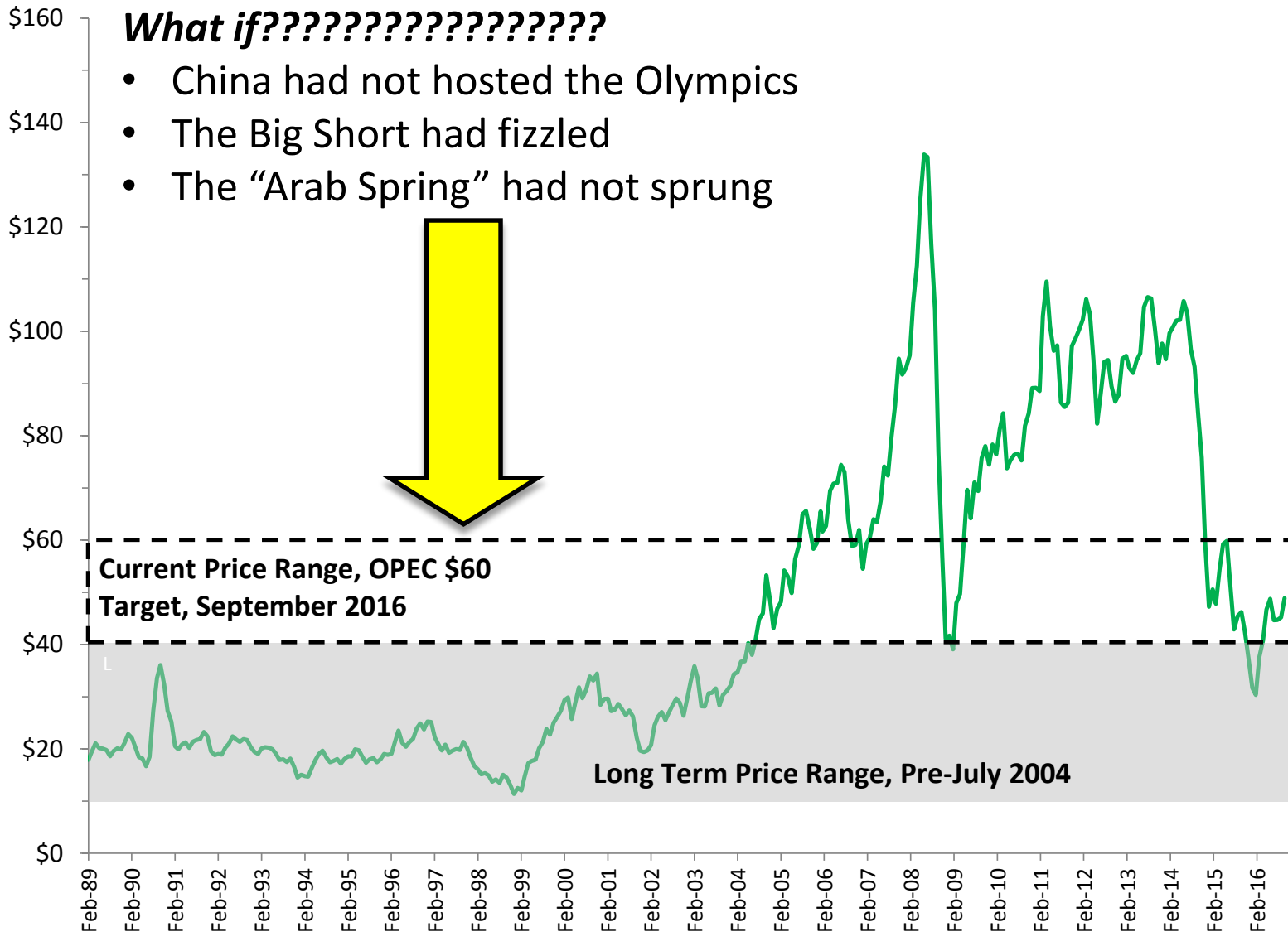
# Animal, Vegetable, Mineral?



# How to get from here to there?

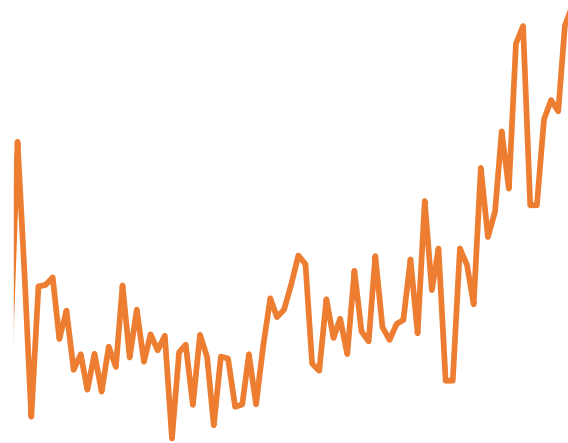
***What if????????????????***

- China had not hosted the Olympics
- The Big Short had fizzled
- The “Arab Spring” had not sprung



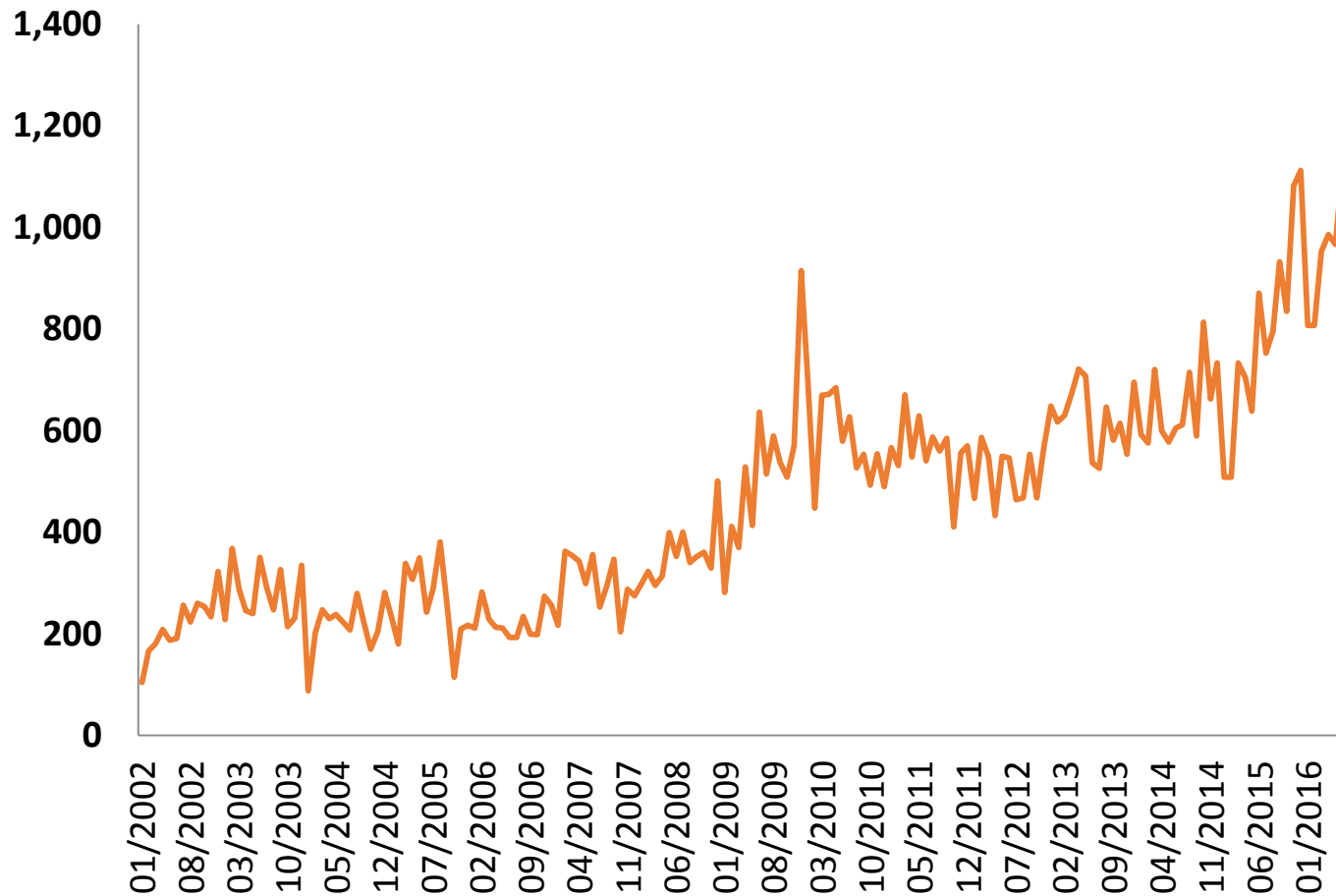


# Animal, Vegetable, Mineral?



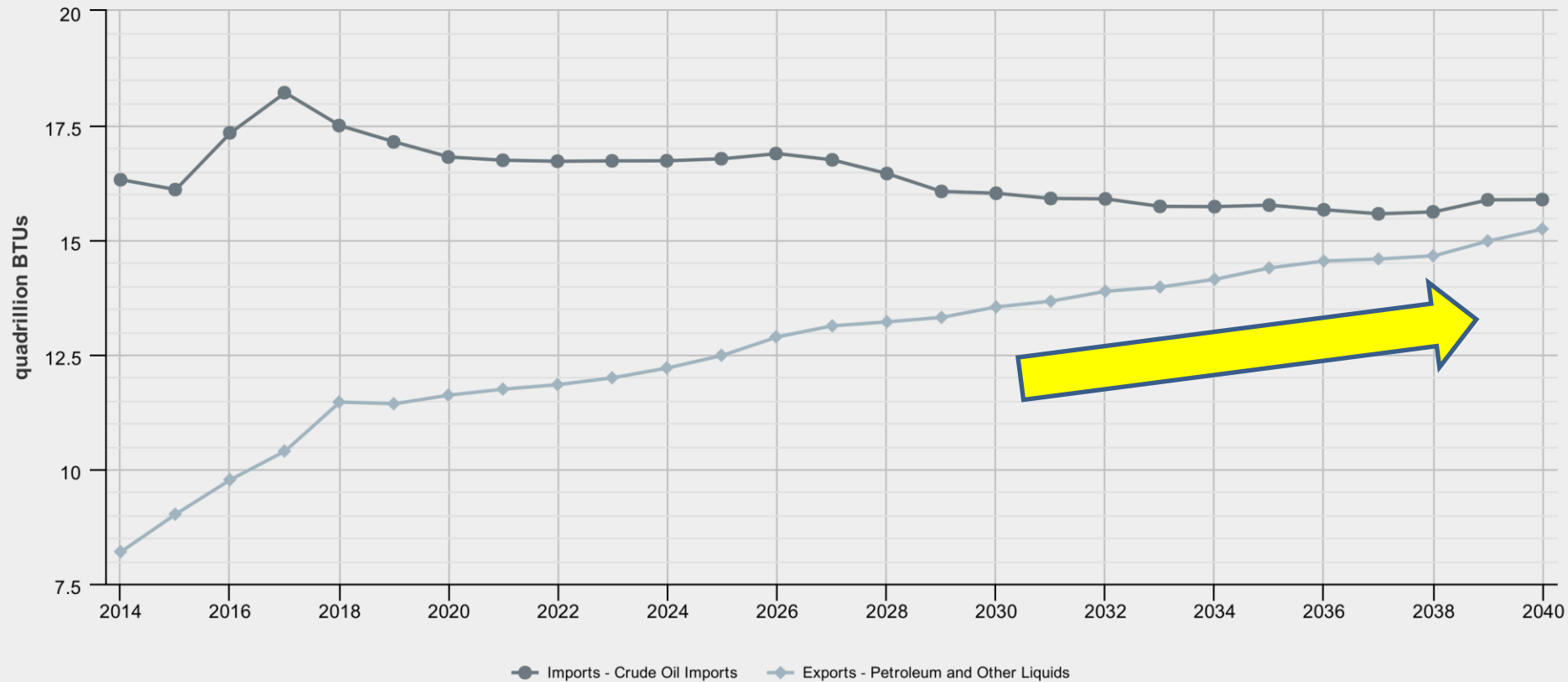
# OPEC, We Hardly Knew Ye

## China Exports - Total Oil Products, KBD



# Our (U.S.) hockey stick?

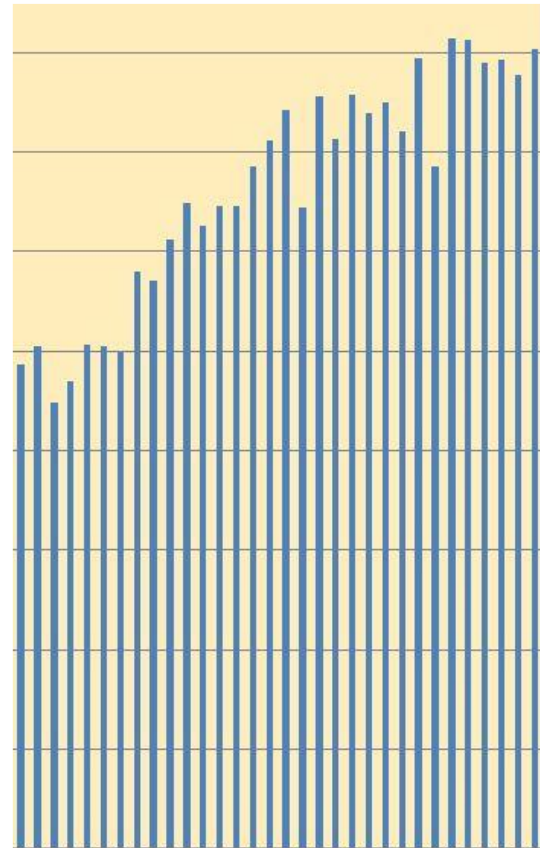
## Exports and Imports



Source: U.S. Energy Information Administration

[www.eia.org](http://www.eia.org)

# Animal, Vegetable, Mineral?



# Congress NEVER Likes to Make Laws



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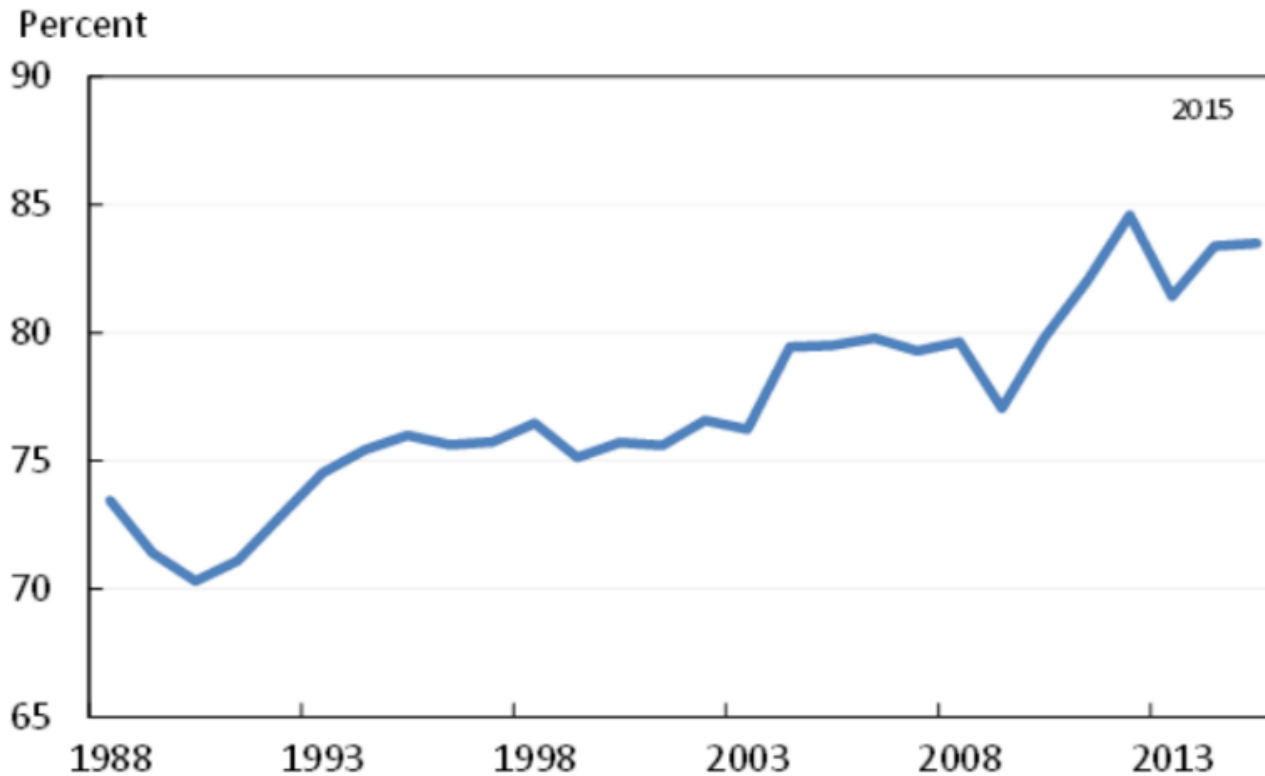
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# Animal, Vegetable, Mineral?



# It's the Economy, Stupid

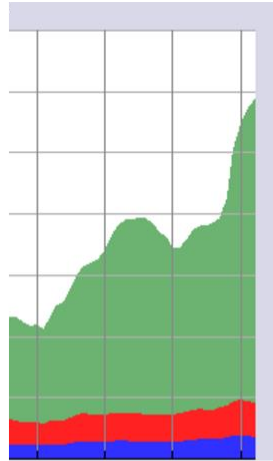
Figure 2: Share of Prime-Age Men Currently Not in the Labor Force Who Did Not Work Last Year



Source: Bureau of Labor Statistics, Current Population Survey (Annual Social and Economic Supplement); CEA calculations.

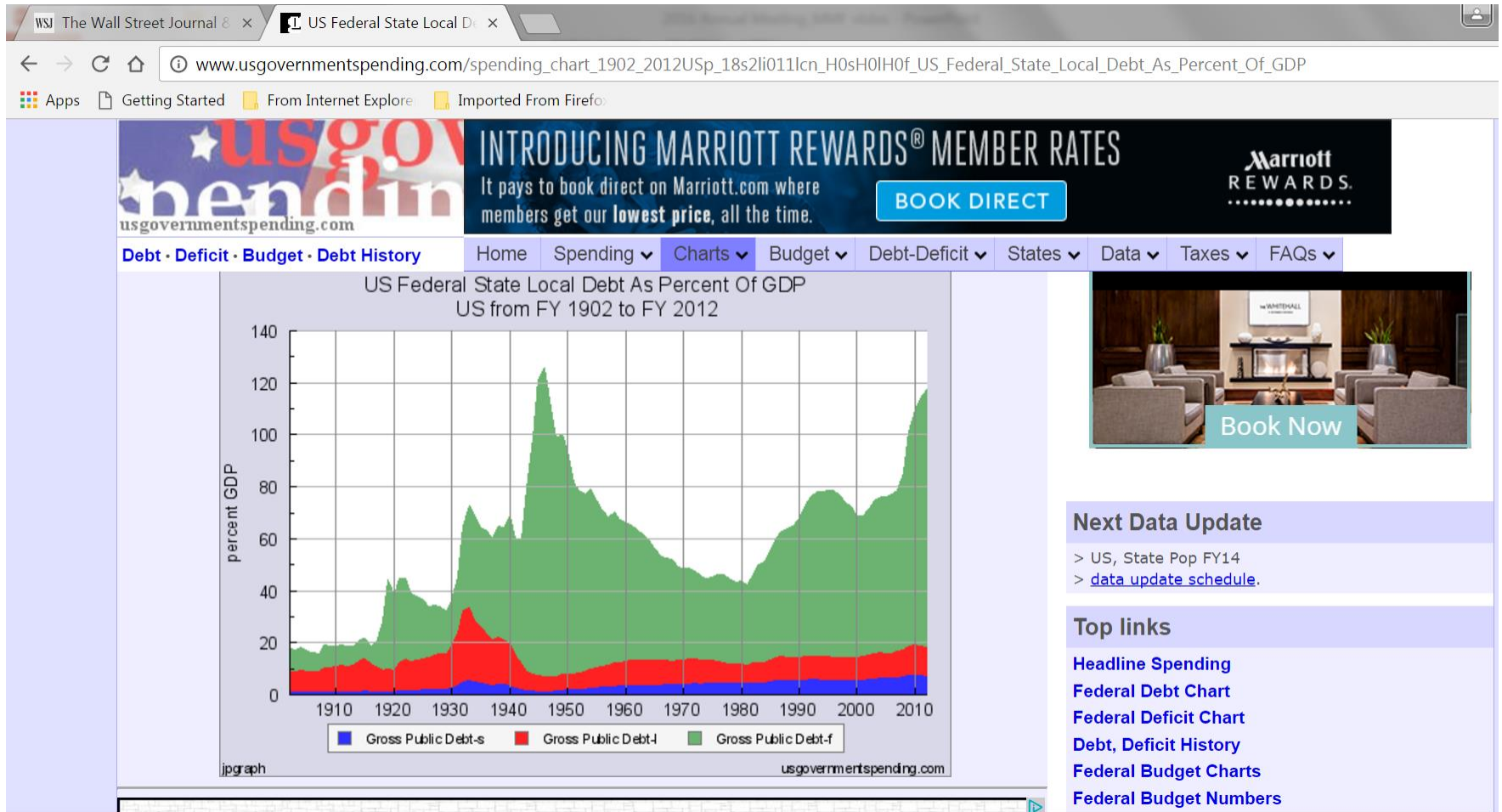
[https://www.whitehouse.gov/sites/default/files/page/files/20160620\\_cea\\_primeage\\_male\\_lfp.pdf](https://www.whitehouse.gov/sites/default/files/page/files/20160620_cea_primeage_male_lfp.pdf)

# Animal, Vegetable, Mineral?





# Future Generations

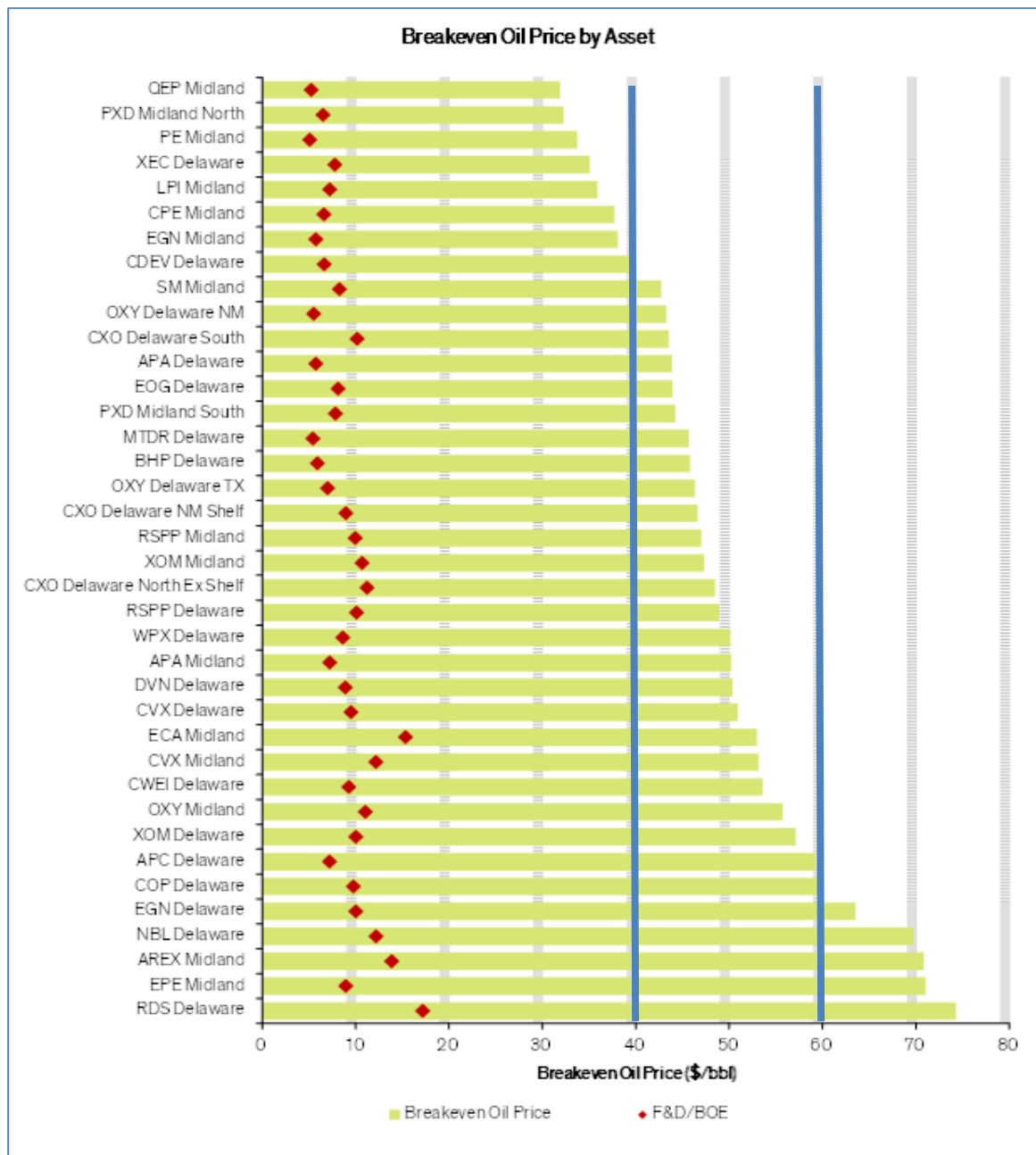


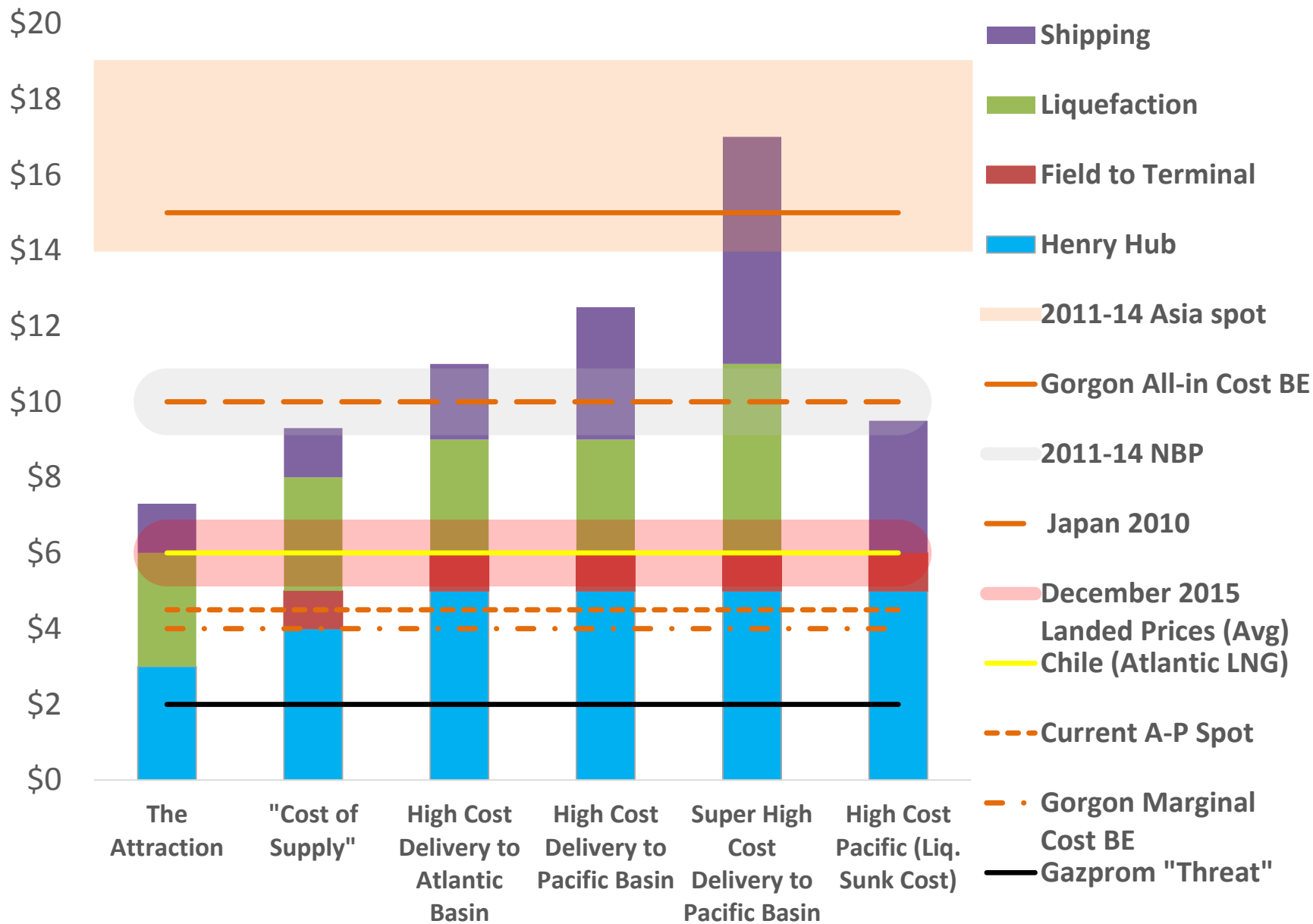
# The End



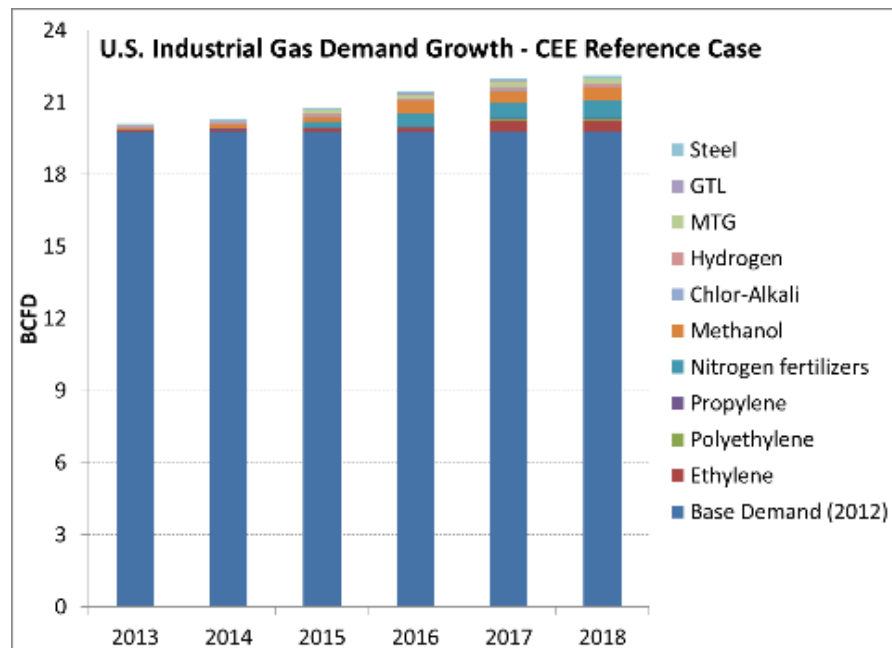
<http://bruins.ice.nhl.com/club/microhome.htm?location=/winterclassic2016>

# MIDSTREAM, LNG, DOWNSTREAM





# Cheap NGLs Aiding an Industrial Renaissance



## U.S. Reference Case:

83 Projects worth \$65 billion;  
2.3 BCFD demand add

## U.S. High Case:

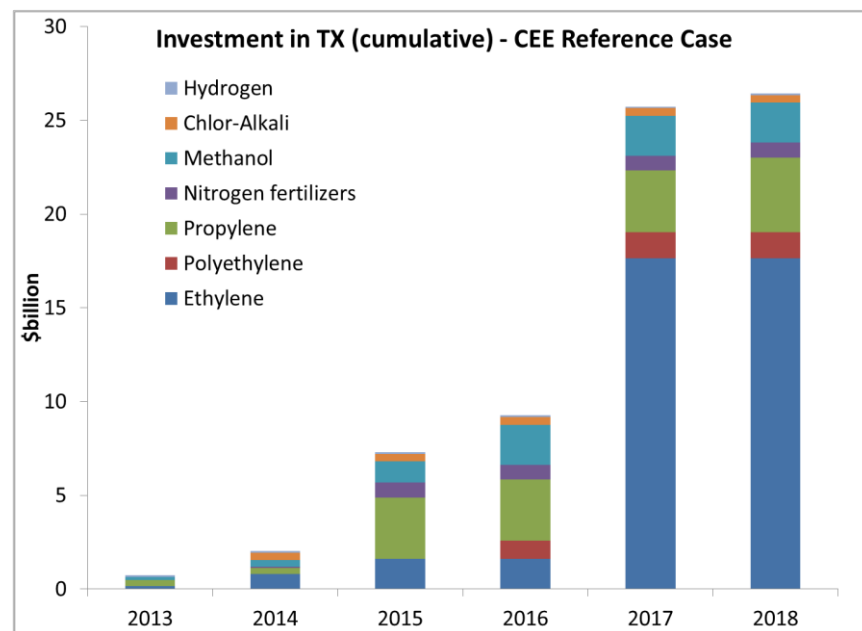
112 Projects worth \$98 billion;  
3.5 BCFD demand add

## Texas Reference Case:

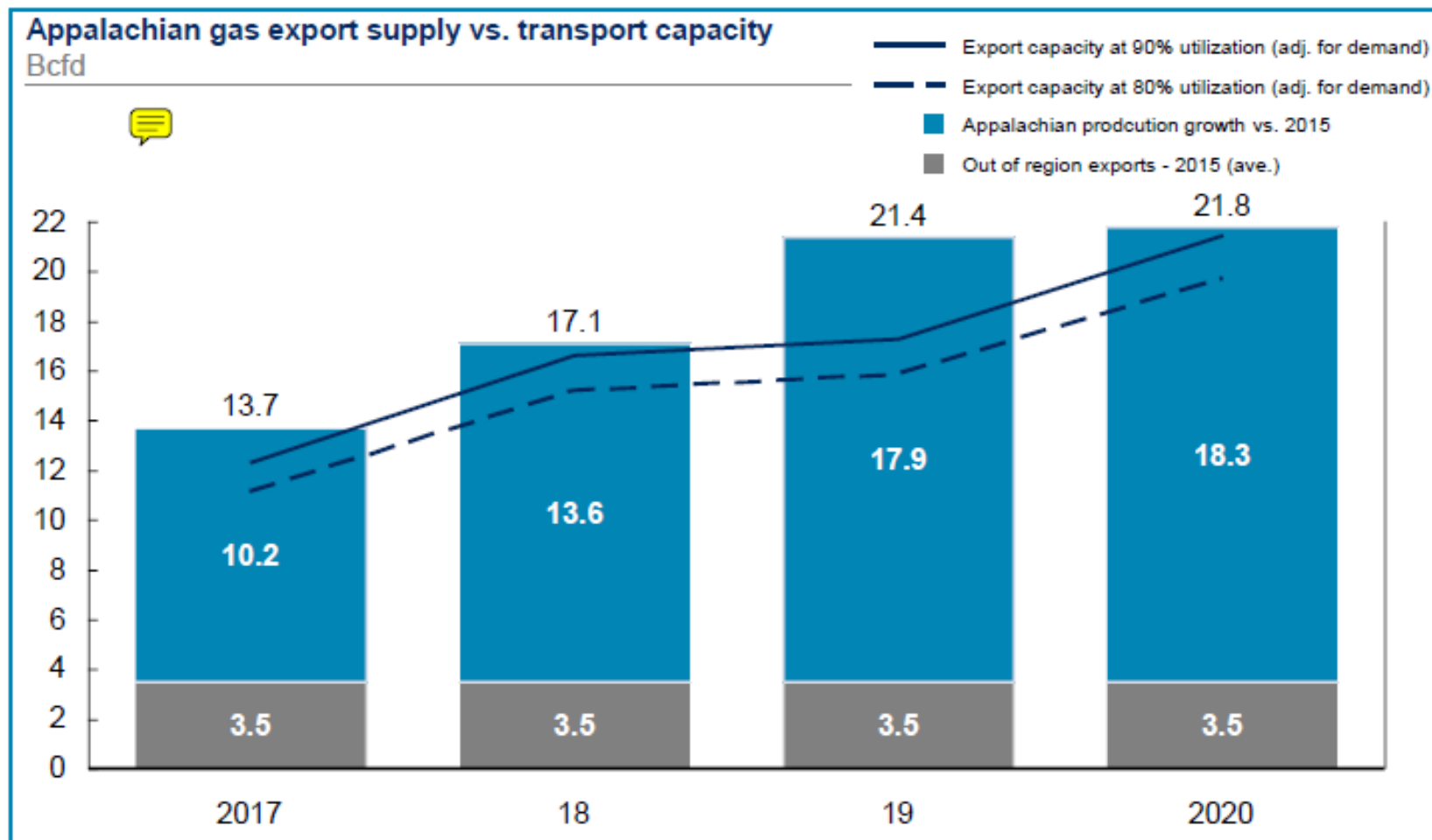
\$26.5 billion; 0.8 BCFD demand add

## Texas High Case:

\$33 billion; 0.9 BCFD demand add



# Appalachian production set to outstrip export capacity, after taking into account regional demand increases, including Cove Point LNG exports



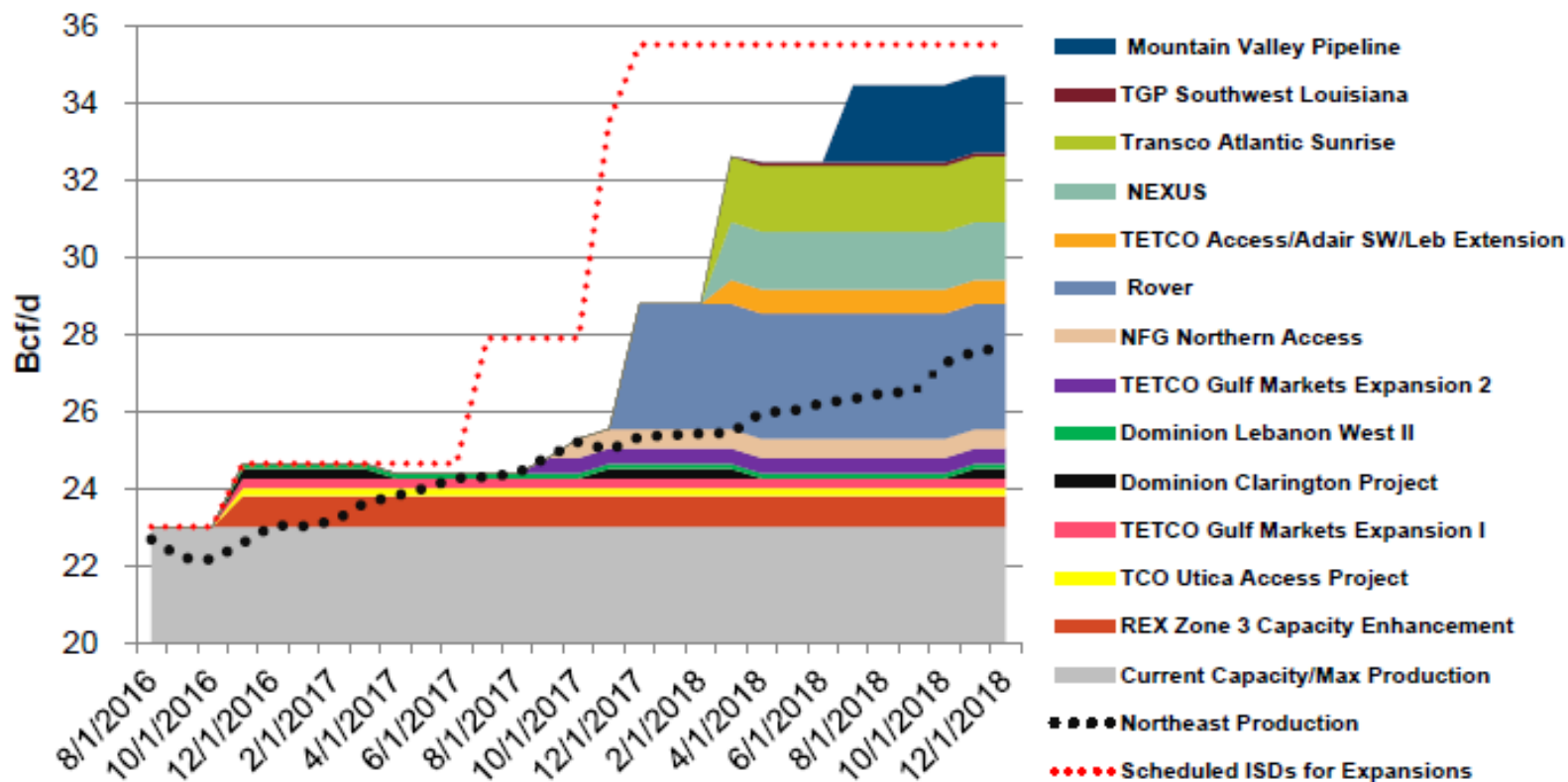
Note: Export capacity based interstate pipeline capacity and incremental demand growth within the Appalachian/Northeast region.

Source: McKinsey team analysis

McKinsey & Company | 10

# Infrastructure Remains Bottleneck Long-Term

## Bentek Estimated ISD's For Northeast Pipeline Expansions



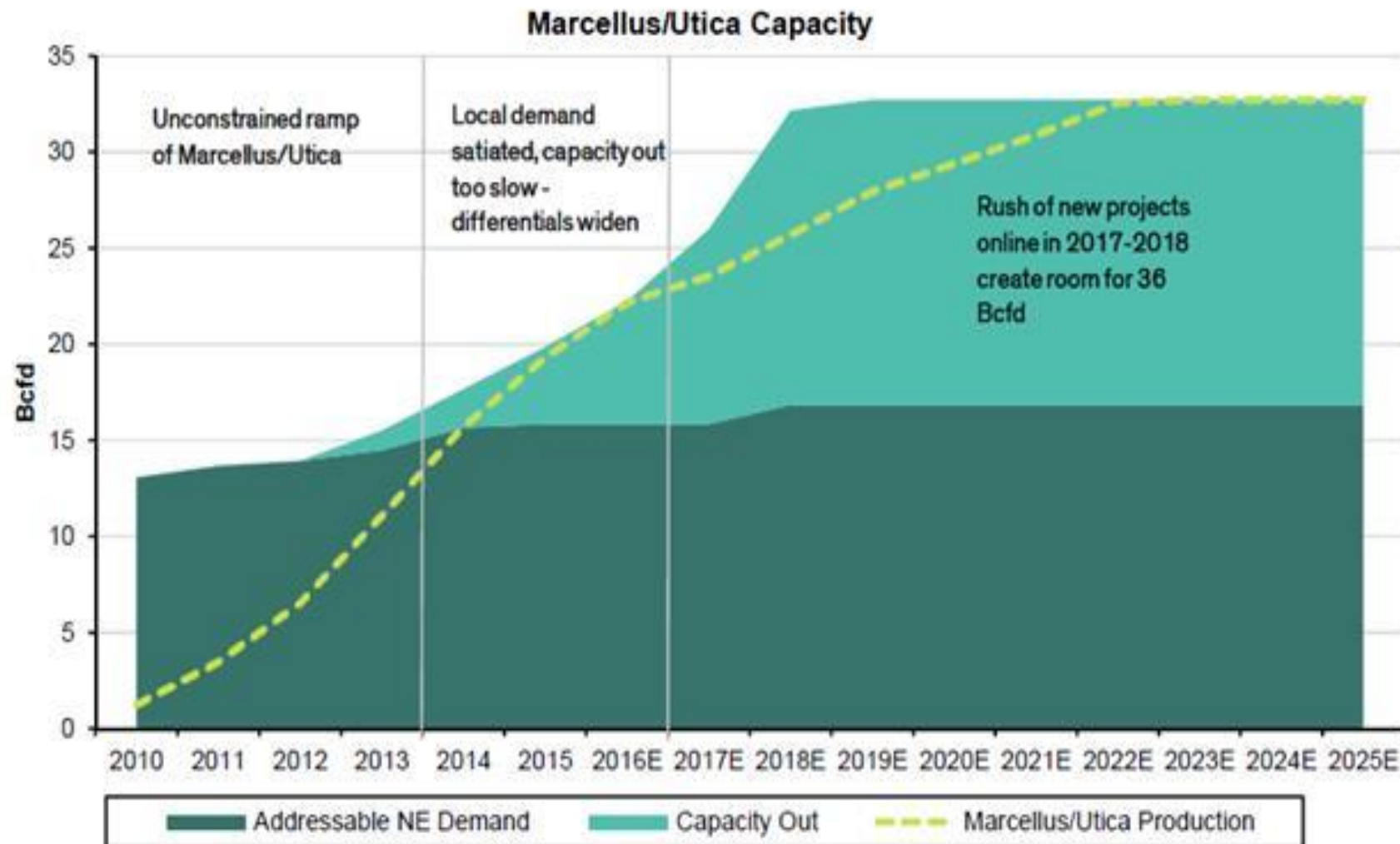
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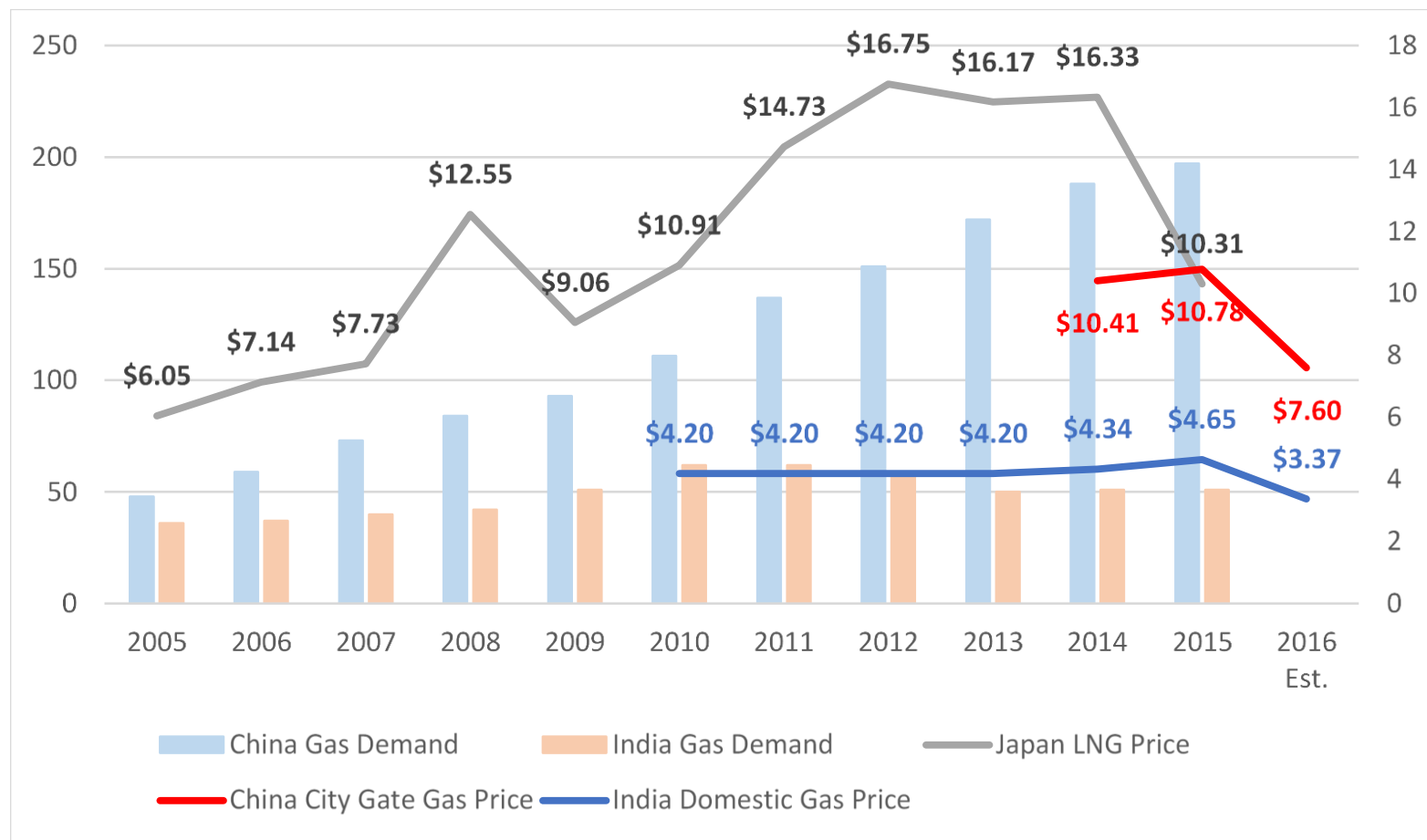


**EXHIBIT 5: After years of takeaway constraints, the basin will be overbuilt until the early 2020s...during this time in the Southwest/Utica there will be more takeaway than there is production, allowing the differential to close**



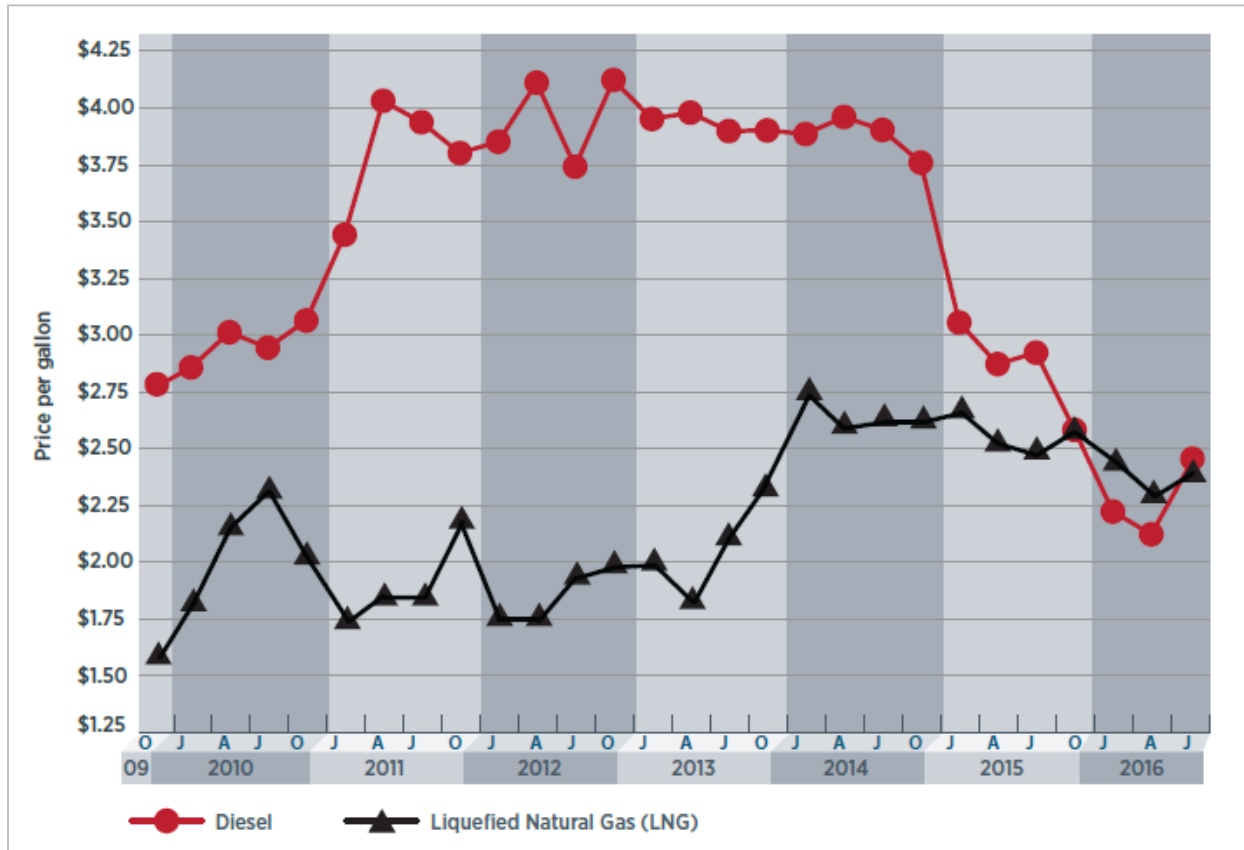
Source: EIA, DI Desktop, Corporate reports, Bernstein analysis and estimates

# China and India Gas Demand (BCM), Domestic Gas Prices (MMBtu) and Japan LNG Prices (MMBtu)



Sources: BP SR 16; Sen, A. April 2015; Paltsev, S., et.al., July 2015

# LNG (DGE) and Diesel Prices



[http://www.afdc.energy.gov/fuels/fuel\\_comparison\\_chart.pdf](http://www.afdc.energy.gov/fuels/fuel_comparison_chart.pdf)