



## **GROPPE, LONG & LITTELL**

OIL AND GAS ANALYSTS AND FORECASTERS

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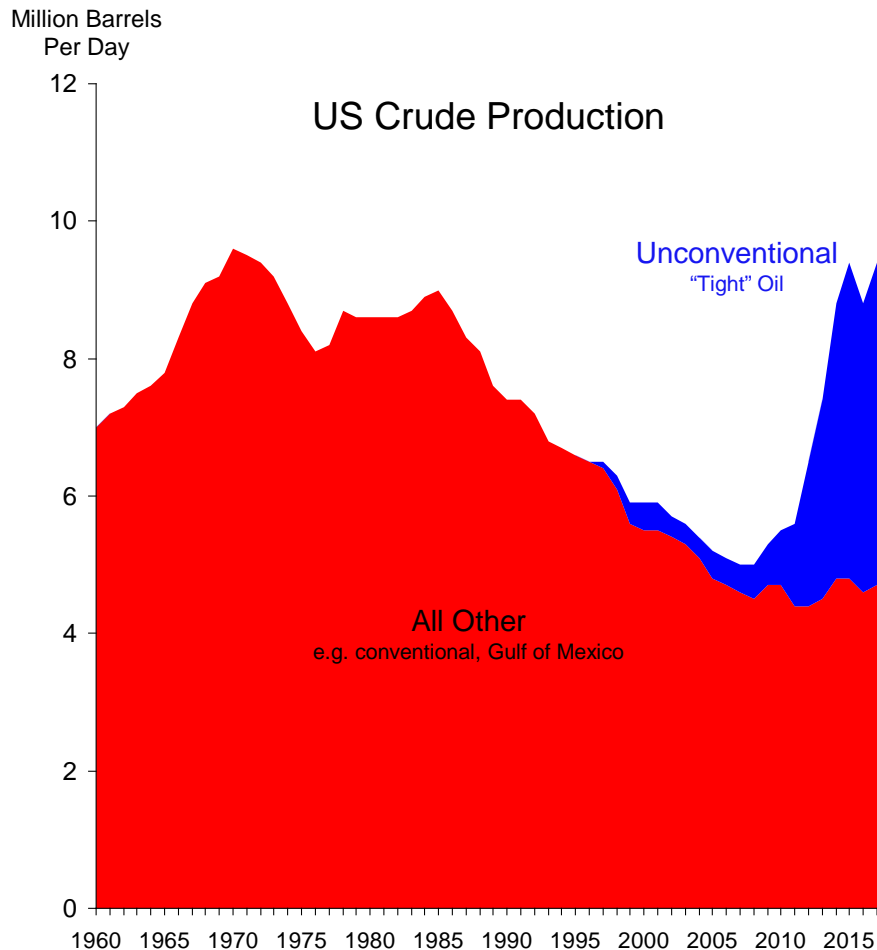
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# **US Unconventional Resource Development A Lesson Learned in Time**

[Roadmap & Policy of Energy & Fuels](#)

ACS National Meeting – ENFL Division

# Surge in US Crude Production

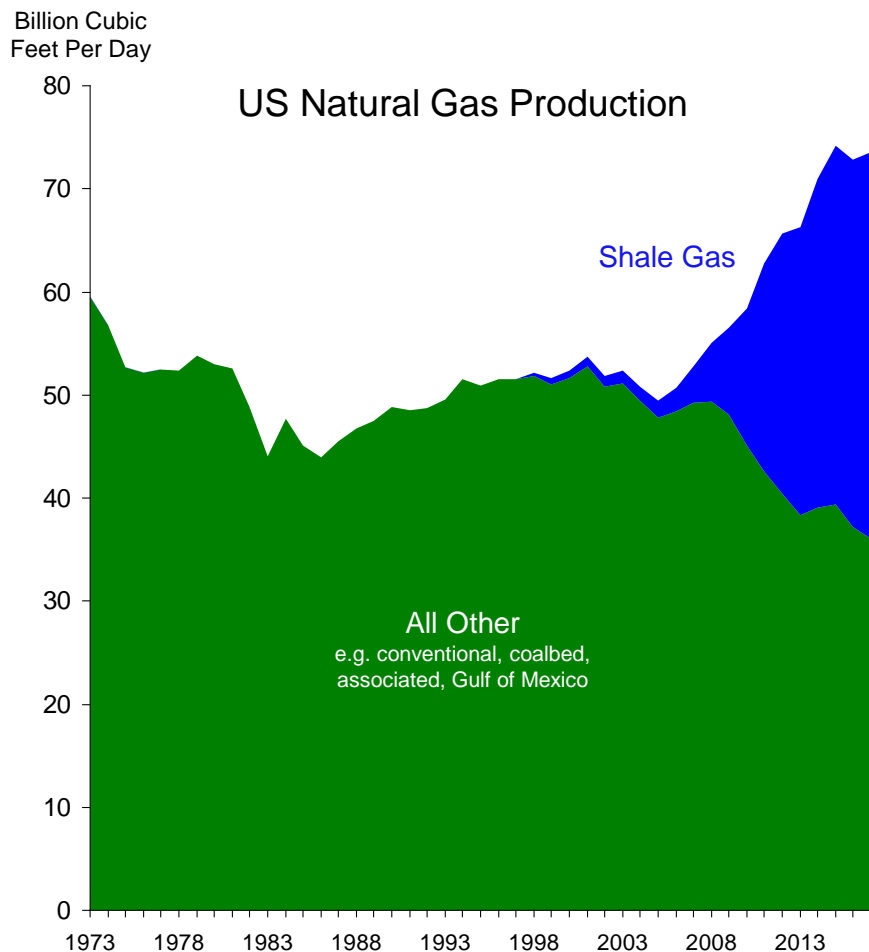


## US tight oil is a game-changer

- New US record in November 2017...
- ...after years of decline
- US now ranks in top 3 producers worldwide
  - Russia 11 MMbd
  - Saudi Arabia 10 MMbd
- Growth contributed to price collapse in 2014

Is it sustainable?

# Similar Path of US Natural Gas Production



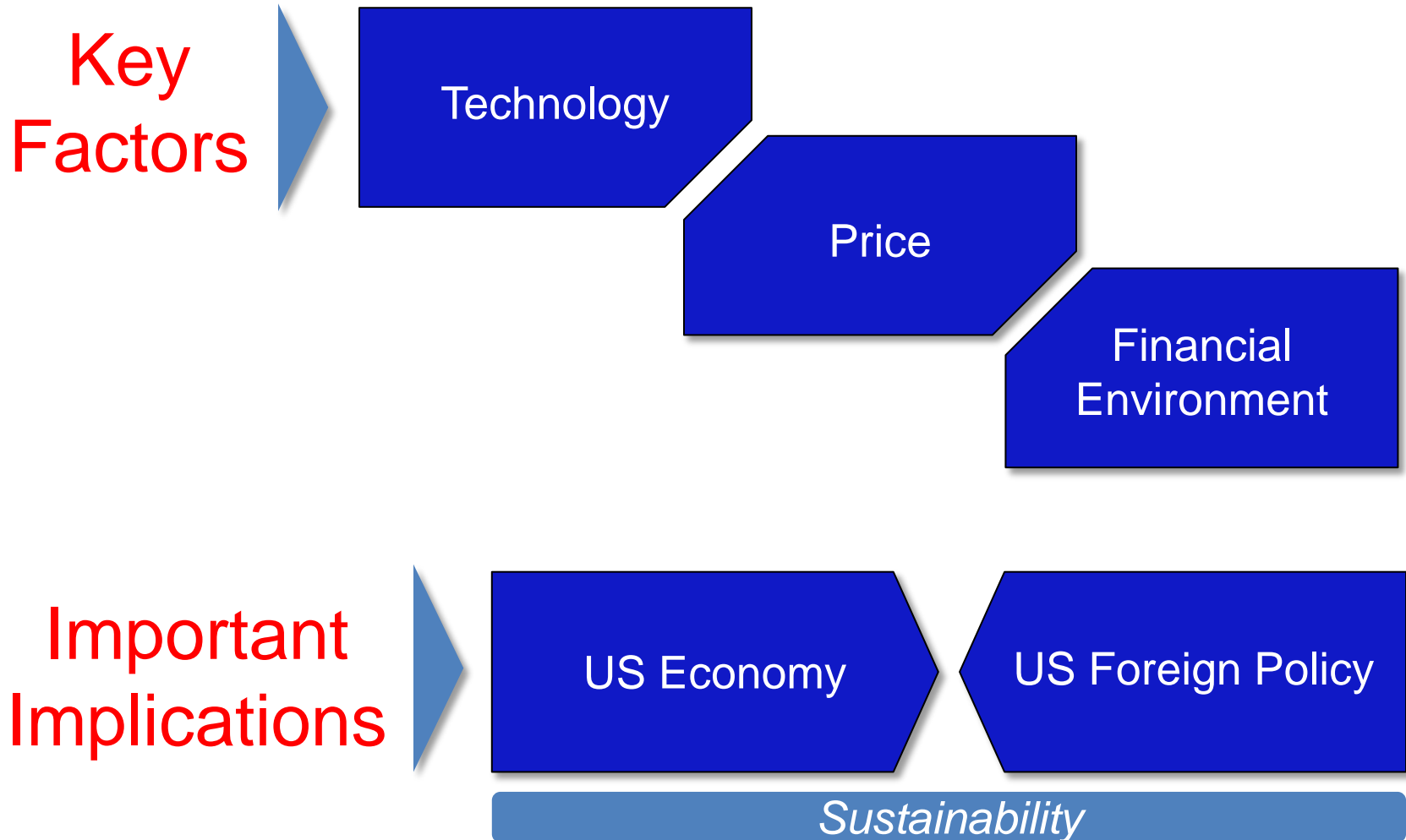
## A similar paradigm shift for shale gas

- Non-shale production steadily declining for years ...
- ...which is why the industry previously built LNG import terminals
- The rapid exploitation of shales has increased total gas production
- US became a net exporter in 2Q17

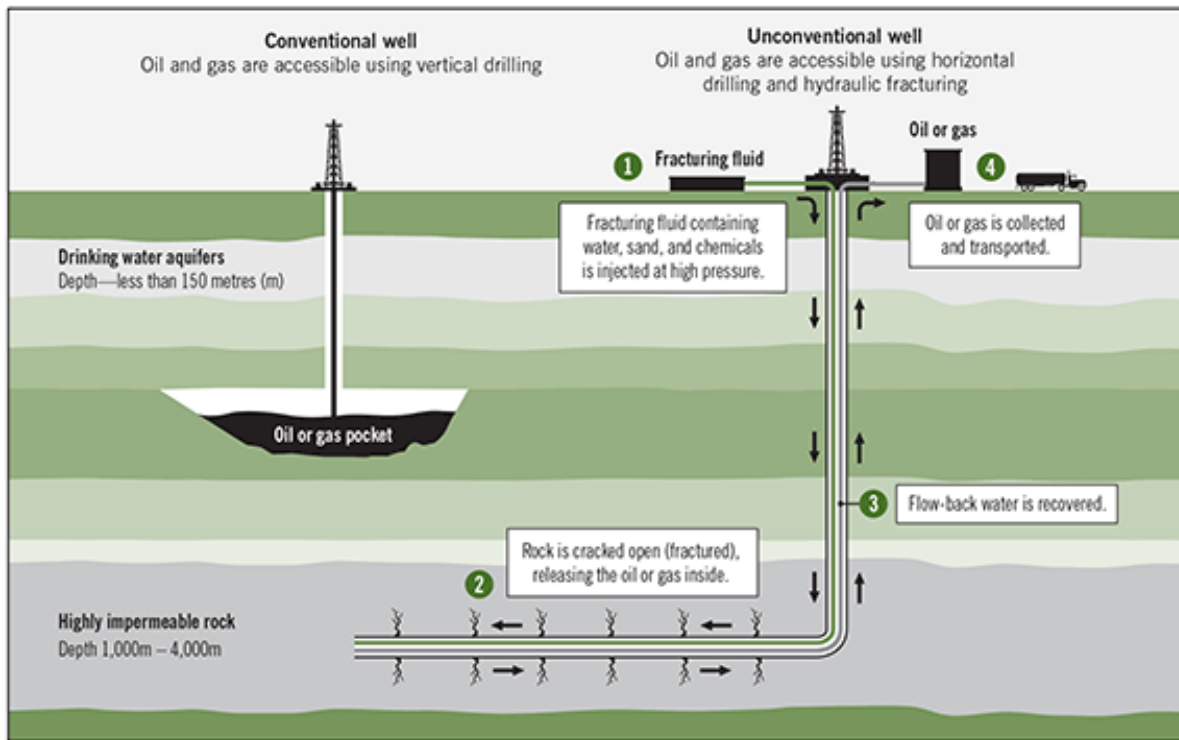
Any lessons learned?

# Key Factors and Implications

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# Technology Application



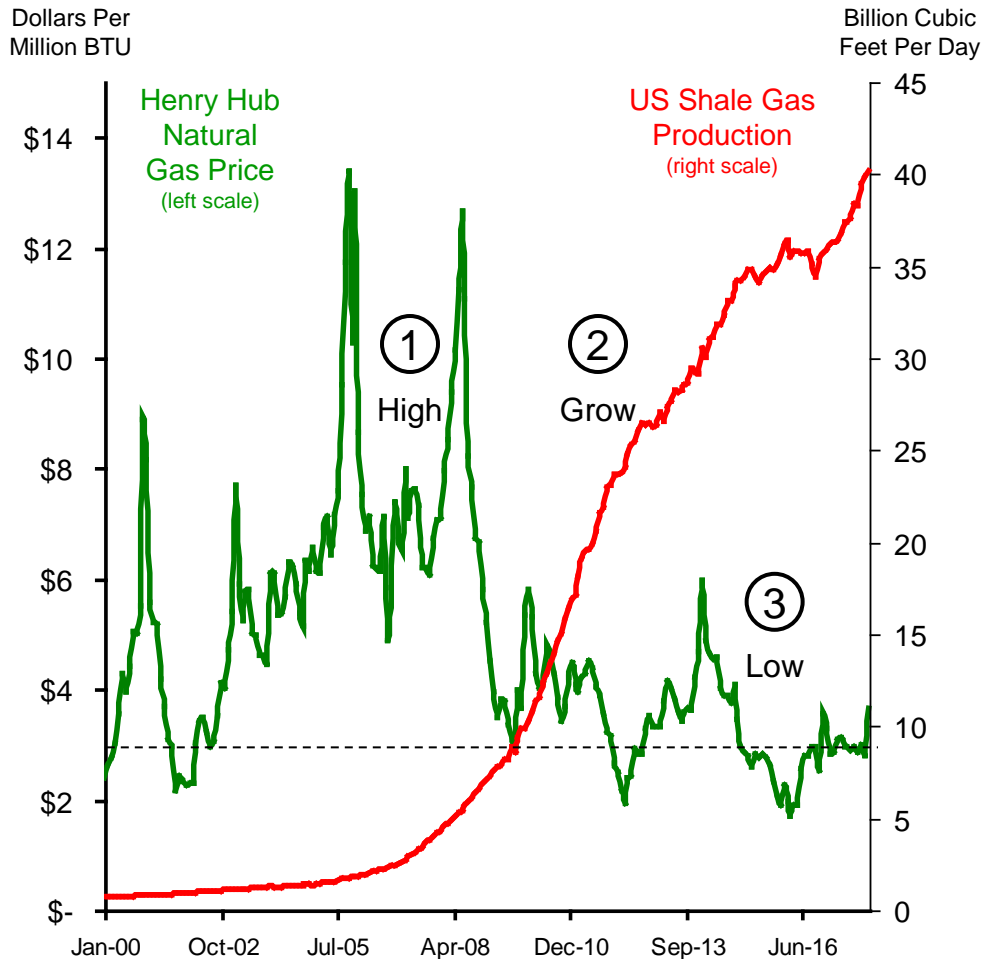
- Hydraulic fracturing
  - Unlocks untapped resource
  - High initial production rates...
  - ...but steep declines
- Horizontal drilling
  - Economies of scale offset higher costs
  - Accelerates “in-fill” drilling compared to conventional

- Technology continues to advance...
  - Faster drilling times
  - Longer laterals
  - More proppant



- ...but advancement is finite
- Resource is finite and heterogeneous
  - “Sweet spots” are limited
  - All wells are not identical and not all “home runs”

# Price Dynamics: Gas

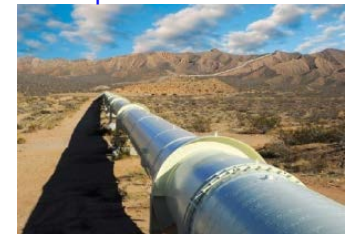


- Technology boom spurred by rising prices
- For many US gas companies shale is a technical success but a commercial failure – due to collapse in prices
- Low prices a benefit to gas consumers...
- ...prompting a demand response
  - Electricity generation
  - Petrochemicals
  - Exports

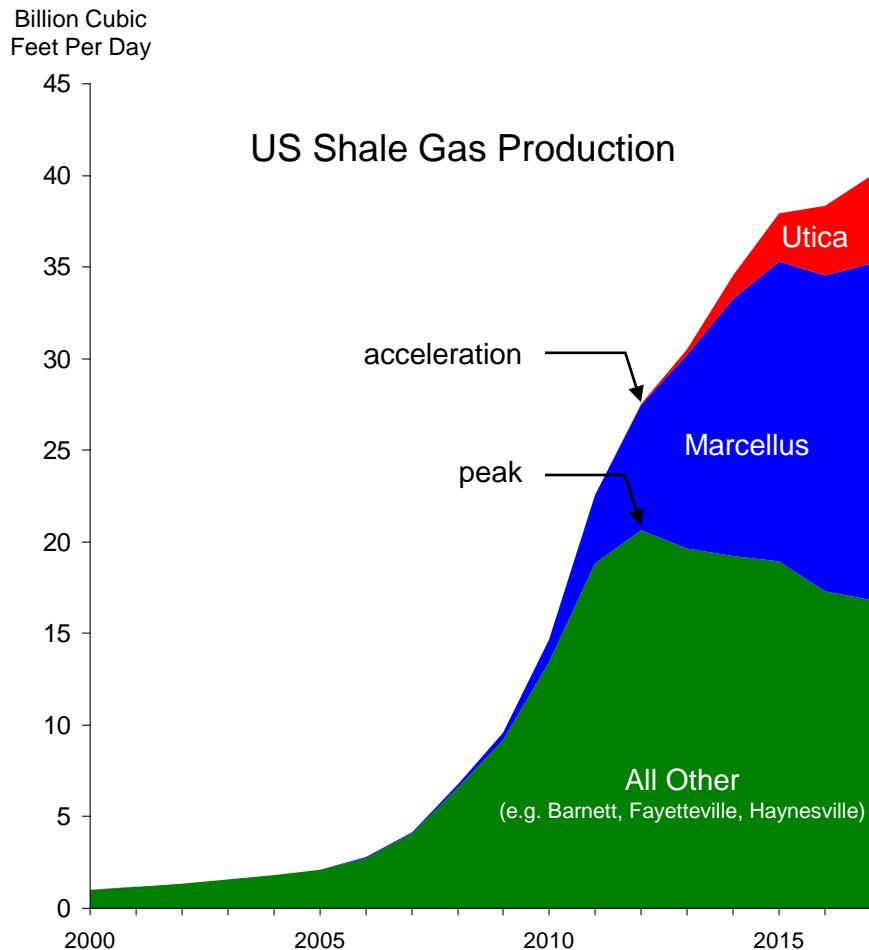
LNG Export Projects



Pipeline to Mexico



# Price Impact on Source of Gas Supply

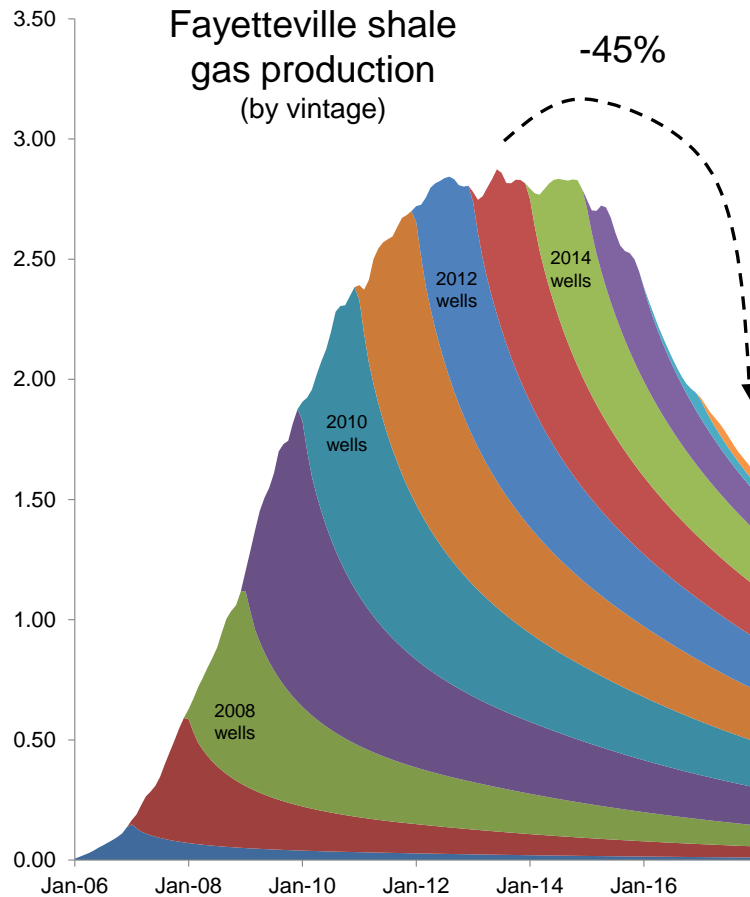


## Economics matter...eventually

- Major shift in 2012 as drilling activity became concentrated on Appalachia basins
  - Marcellus (PA, WV)
  - Utica (OH)
- Only area where production is marginally economic at low gas prices
- Higher prices needed to reverse decline in “all other”

# Case Study: Fayetteville Shale

Billion Cubic Feet Per Day



Approximately 5,000 square miles

- At peak, more than 30 active drilling rigs
- Current rig count of zero (since Sep 2017)



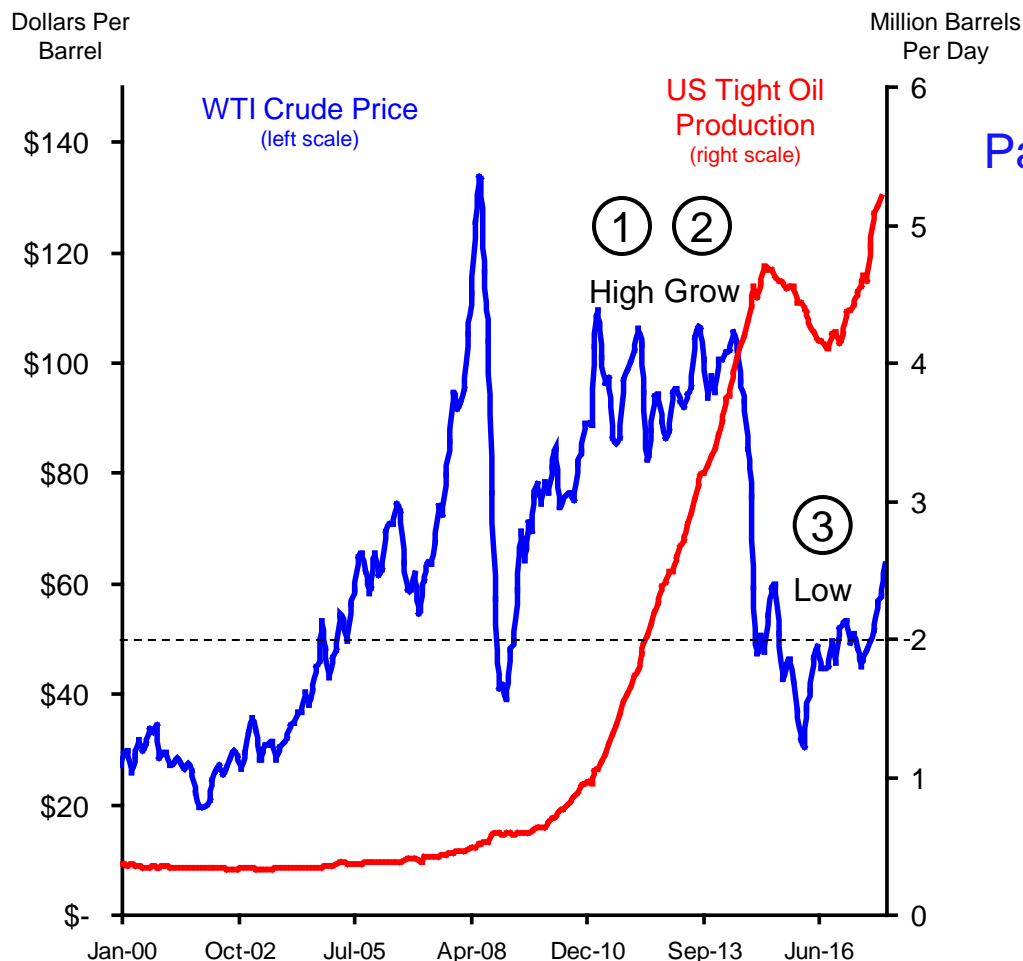
- 2011: acquired Fayetteville assets for \$4.75 billion
- 2012: write-down of asset value by \$2.8 billion



- Dominant producer
- Currently seeking sale of all Fayetteville assets – to pursue activities in Appalachia



# Price Dynamics: Crude

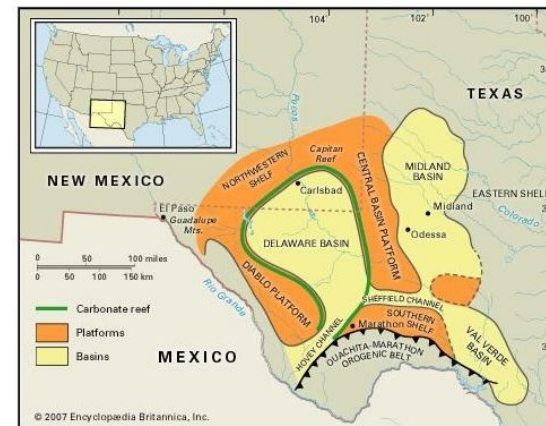
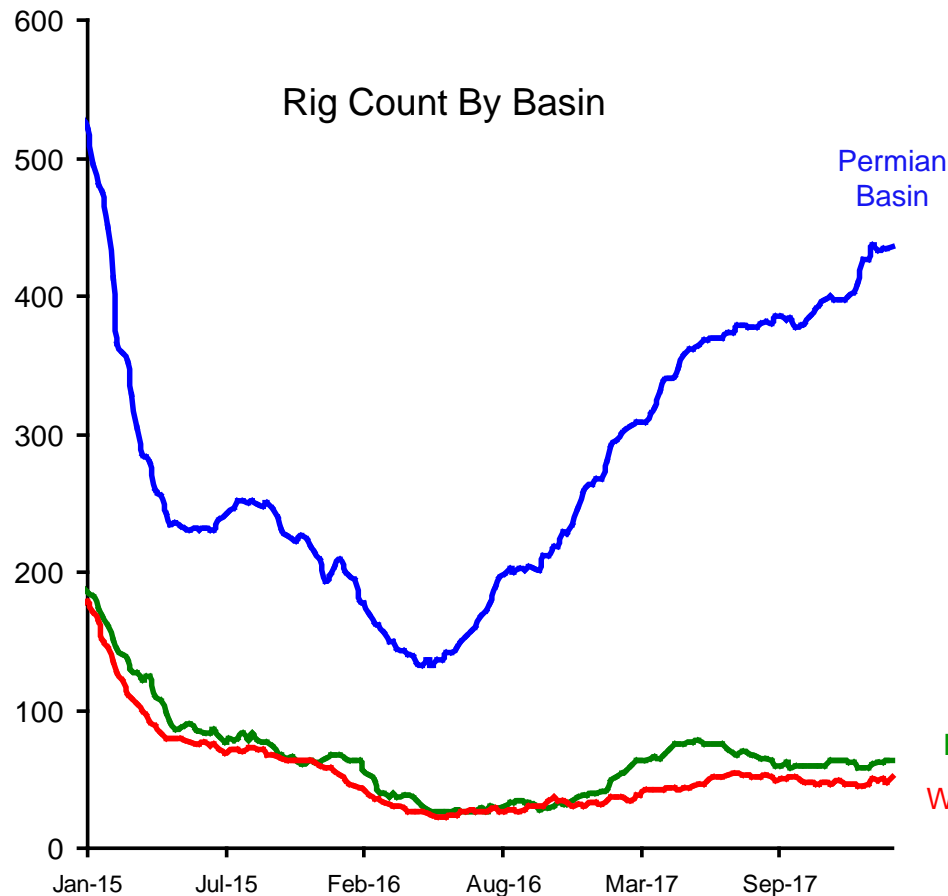


## Pattern for tight oil similar to shale gas

- Oil a global market
  - More factors to consider
  - Natural gas market is regional (for now)
- Same pattern as gas (high price, rapid production growth, price collapse)
- Over 130 E&P bankruptcy filings since the start of 2015 (\$80 billion in aggregate debt)
- Low prices benefit US economy
  - Lower gasoline prices
  - Exports (balance of trade)
- Production growing again
  - Shift to areas where drilling is marginally economic at low prices (e.g. Permian Basin)
  - Financial environment rewards growth

# Price Impact on Source of Crude Supply

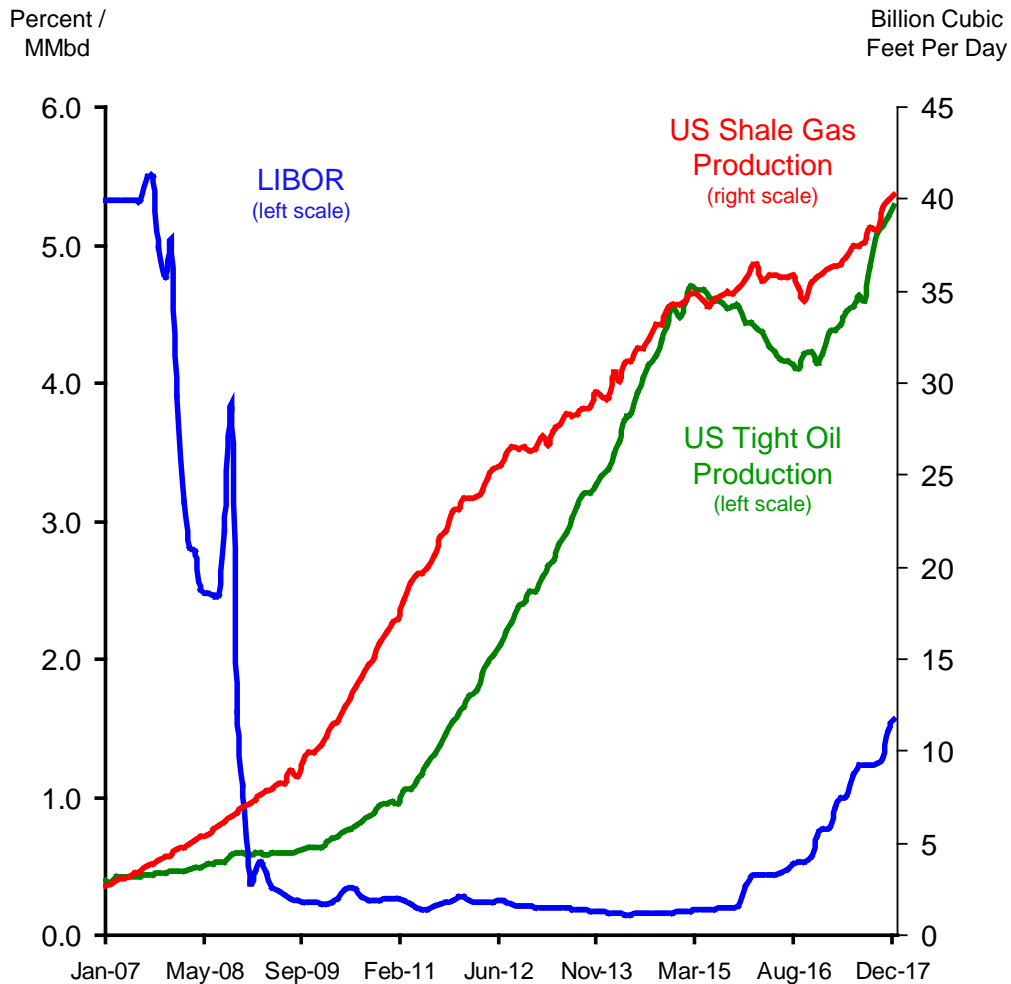
Drilling Rigs



- Regional shift to the Permian Basin
- Acquisition costs skyrocketing
- Major oil companies focus

Eagle Ford  
Williston Basin  
(Bakken)

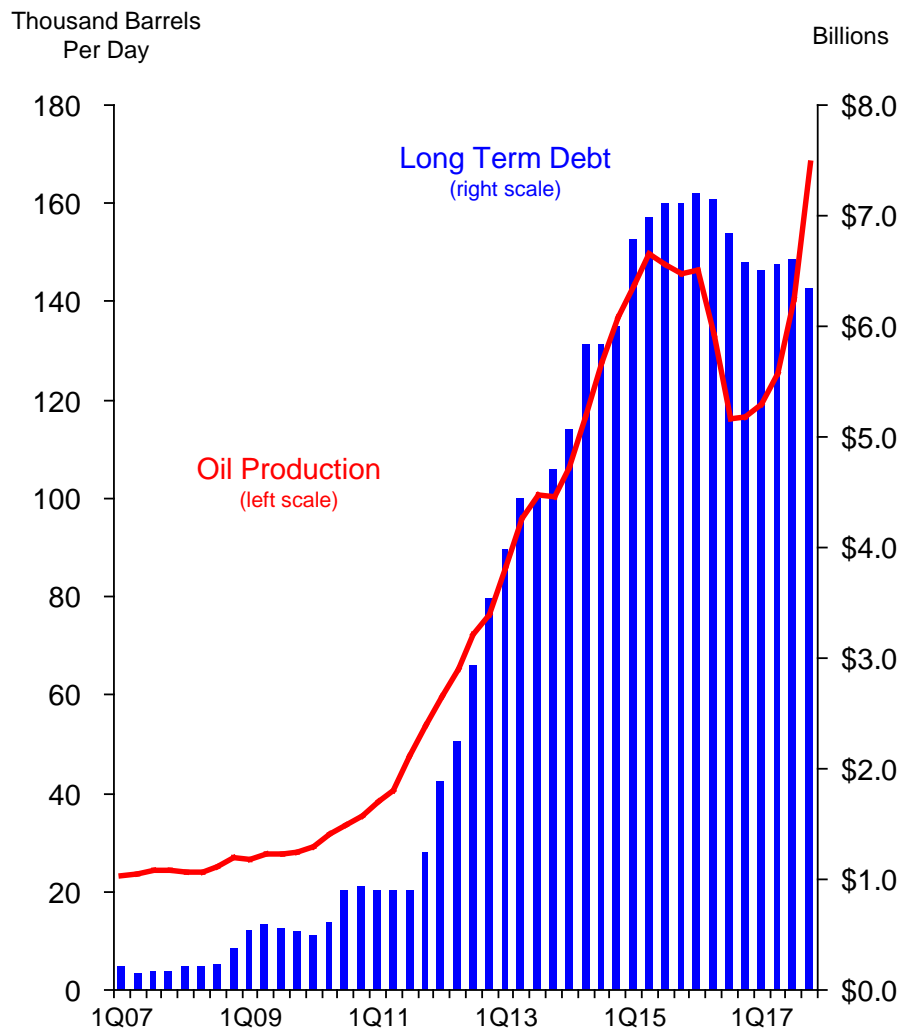
# Financial Environment: A New Era



## Unprecedented financial environment

- US production growth has occurred at a time of historically low interest rates...
- ...creating a surplus of investable capital
  - Debt
  - Public equity (e.g. stocks, IPO's)
  - Private equity
- Market rewards growth not profitability
  - Not sustainable
  - Perceptions slowly starting to shift...
  - ...leading to improved discipline

# Case Study: Continental Resources



Strong correlation between debt and production growth



- US company focused on Bakken (North Dakota) and SCOOP/STACK (Oklahoma)
- Unlikely to be replicated if interest rates keep rising

# Conclusions

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CAUTION  
CURVES  AHEAD

Technology

Advancing...  
...but finite

Price

Always uncertain

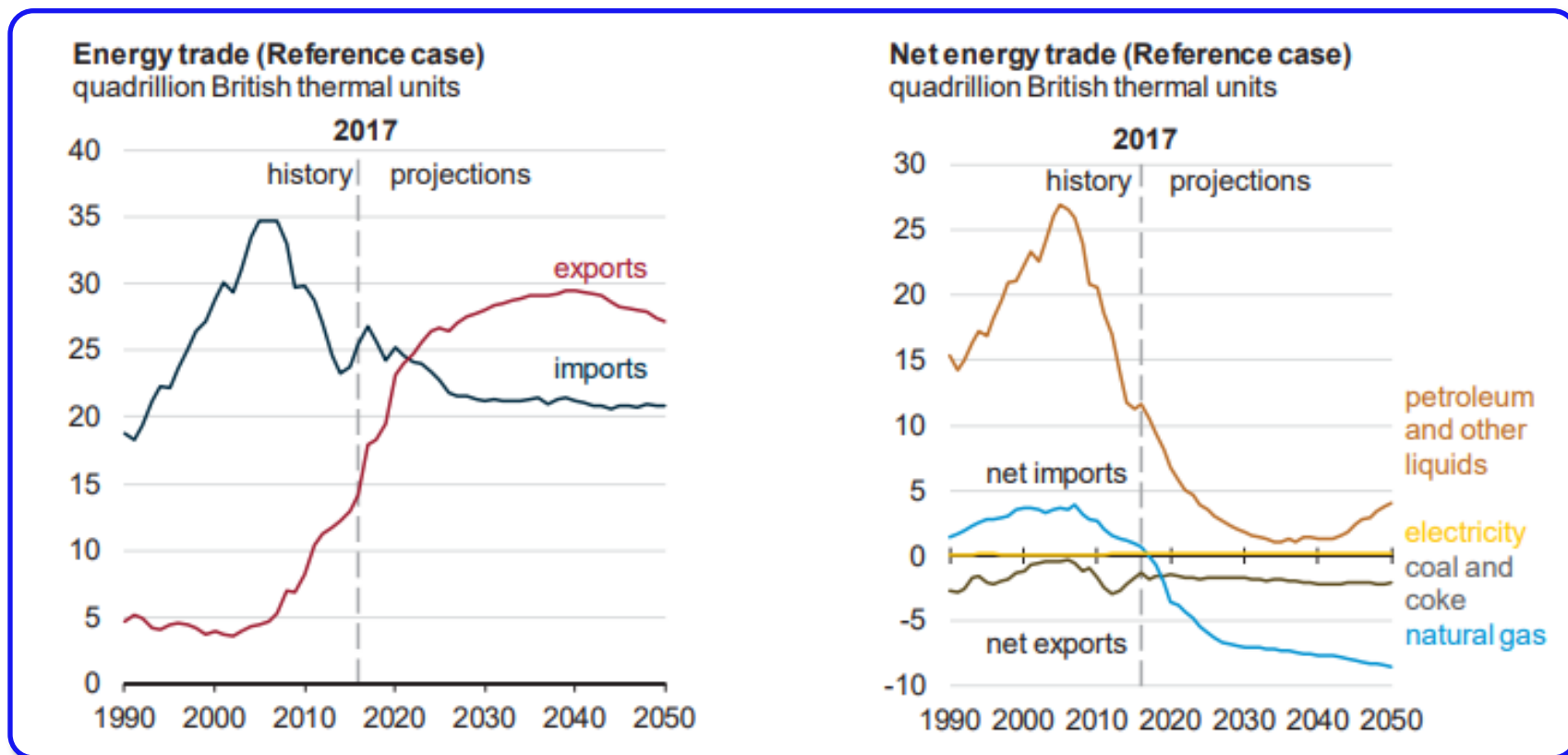
Financial  
Environment

Evolving...  
...likely more restrictive

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Q & A

# EIA Outlook: US Becomes a Net Energy Exporter



- US a net energy importer since 1953
- Declining imports and growing exports could make the US a net energy exporter by the early 2020s
- “Energy independence”, if achieved, has major implications for the US economy and foreign policy

# Abstract

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## **US Unconventional Resource Development – A Lesson Learned in Time**

US production of crude oil and natural gas has increased substantially over the last decade through drilling and development of unconventional resources, first shale gas and now tight oil. The process is capital intensive and requires large upfront investments – for which the true economics become evident only after considerable time has passed. In broad terms development of shale gas did not live up to early expectations when considering high acreage costs, lower ultimate recoveries and the resulting asset write-downs. With development of tight oil still in the early stages it will be important to examine the parallels, apply any lessons learned and determine realistic expectations for the domestic oil industry.

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