

# U.S. LNG and “Energy Dominance”

New York Energy Forum— February 2018



**Poten & Partners**

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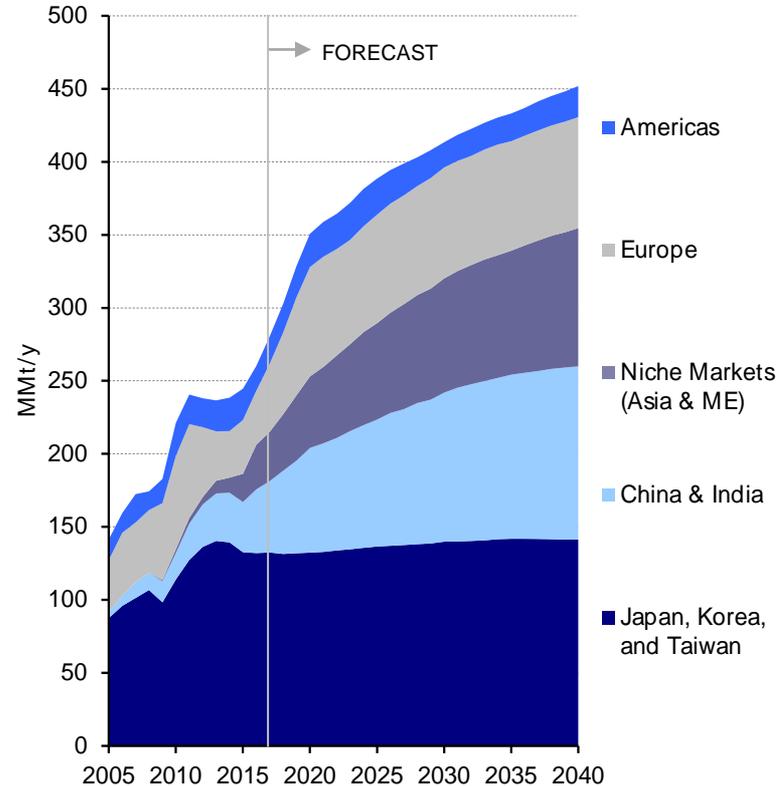
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# Global Growth is Projected to Continue

Despite LNG demand leveling off from 2011 through 2015, long term outlook is positive for growth

- Increase in trade to 2021 is driven by LNG supply already under construction
- Increase in demand post 2021 offers opportunities to new projects

## Global LNG Demand Forecast (2005-2040)

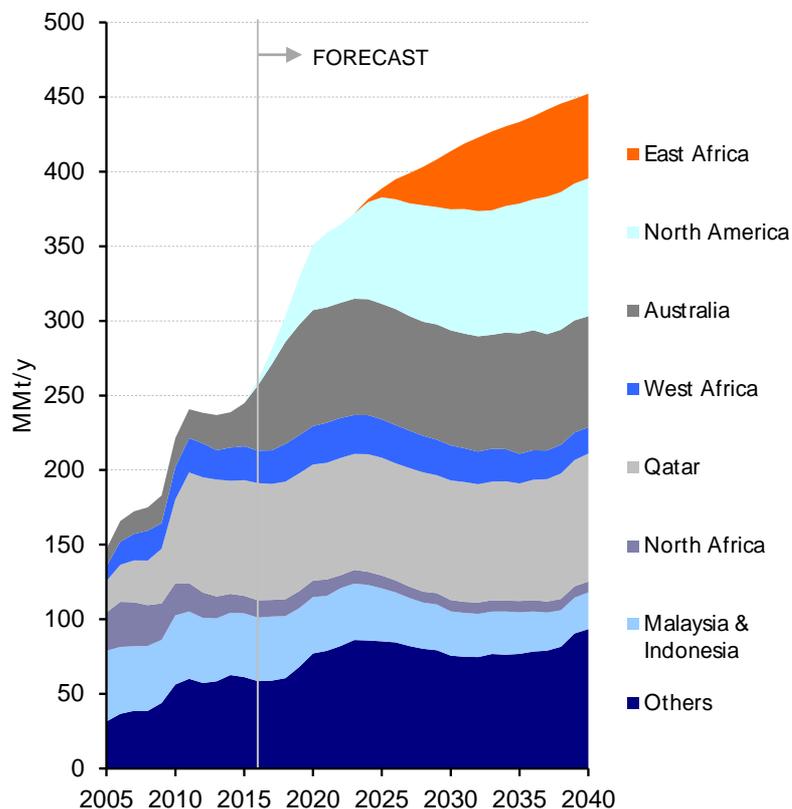


# New long term supply needed post 2022

## New export regions will increase global market share

- Global LNG production reached 260 MMt/y in 2016 after flat production of 240-245 MMt/y in 2011-2015
- Australia and Qatar projected to provide close to 44% of global supply by 2020
  - Limited growth from both countries post 2020. Market share drops to around 35% by 2040
- New supply regions emerge by the end of next decade to satisfy incremental demand
  - East Africa and North America grow to close to 149 MMt/y by 2040 – gaining a 33% global market share.

## Global LNG Supply Forecast (2005-2040)

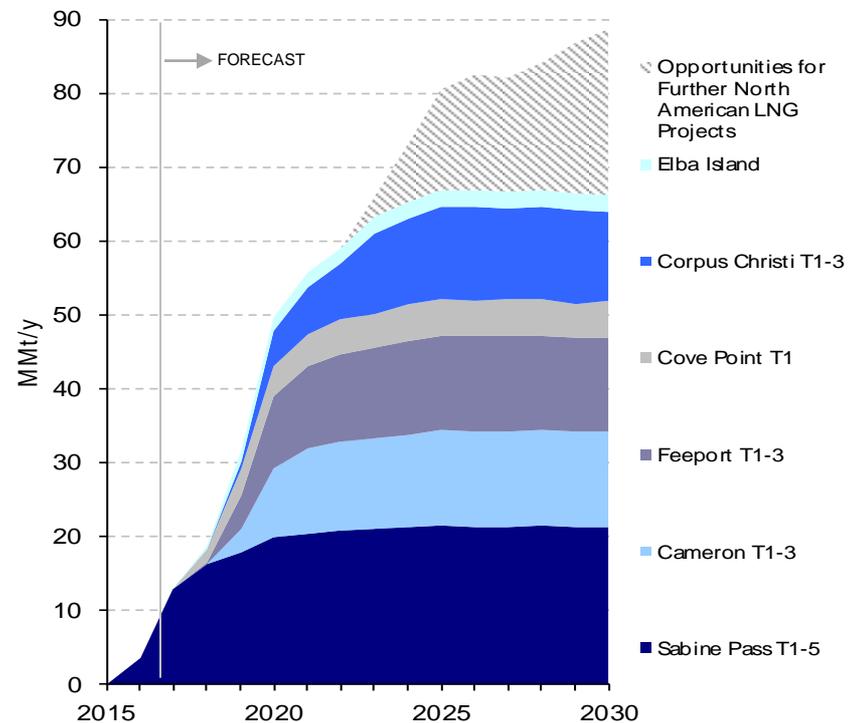


# Around 85 MMt (~12 Bcfd) of LNG exports from North America by 2030

The global market in our view will have appetite for around 85 MMt of North American LNG by 2030

- Around 65 MMt/y of US LNG already taken FID, leaving around 25 MMt/y of additional North American LNG projects by 2030.

North America LNG Supply Forecast (2015-2030)



Source: Poten & Partners

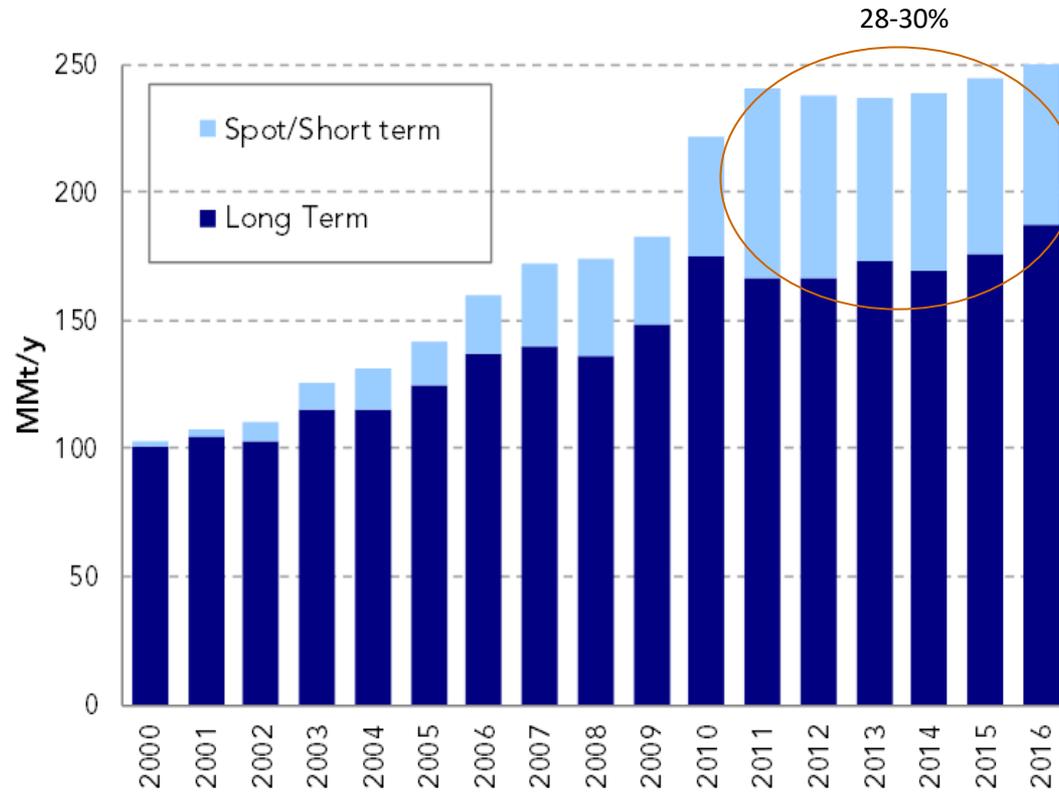
# North American LNG Export Projects are concentrated in the US Gulf Coast



Source: Poten & Partners

# The amount of spot and short-term trade has increased

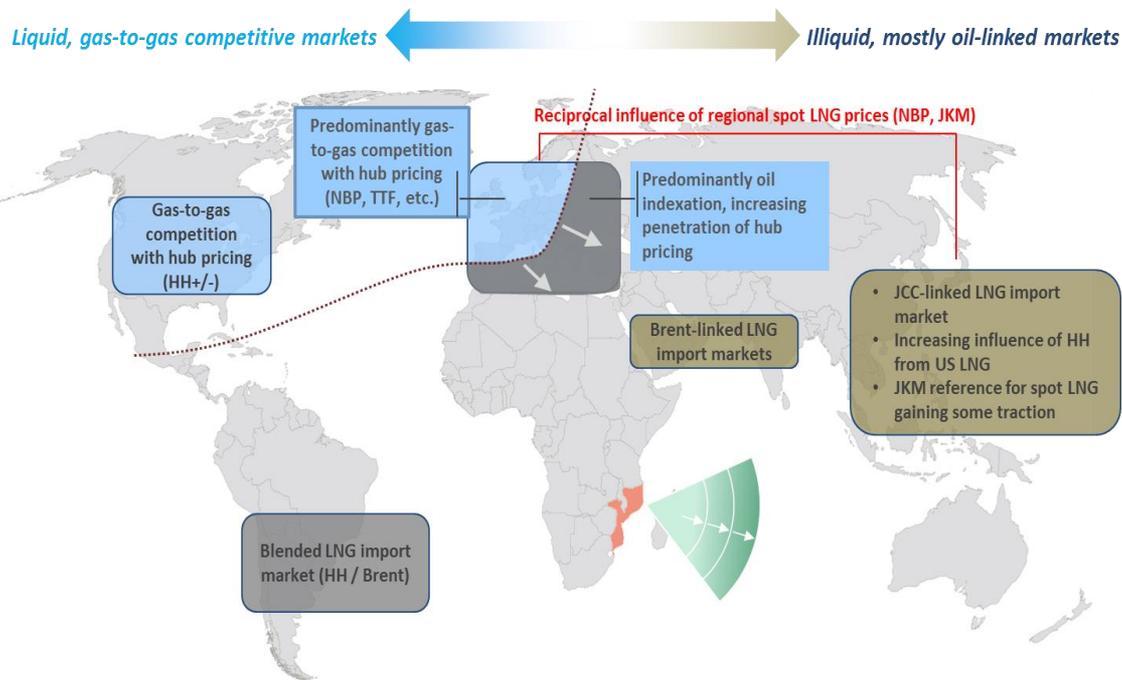
## Development of LNG Spot/Short-Term trades



# Natural Gas Prices vary by region, and Sale Price Structures Have Diversified

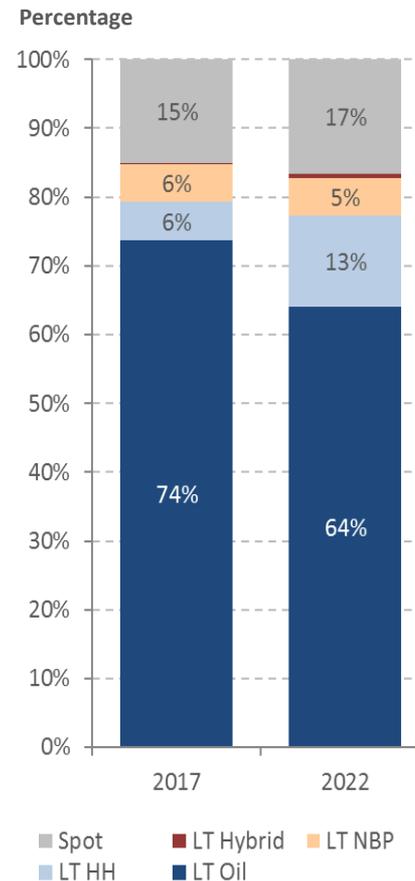
## Global LNG market not yet commoditized

US\$ / mmbtu



JCC: Japanese Crude Cocktail, HH: Henry Hub \* 115% + 3.00 Liq. Fee

## Gas Sales by Price Structure

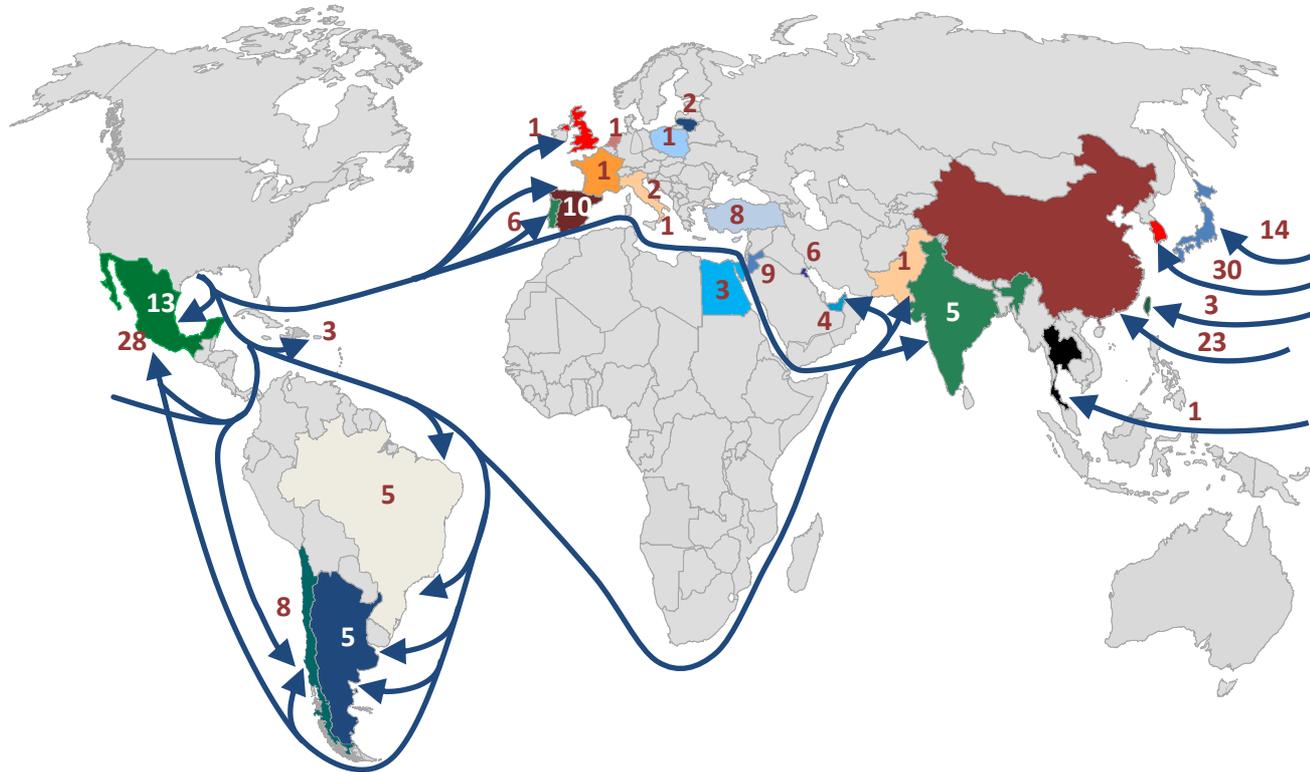


LT: Long-Term LNG Sale and Purchase Agreements

# The Ramp Up of U.S. Exports Will Continue to Complicate Trading Patterns

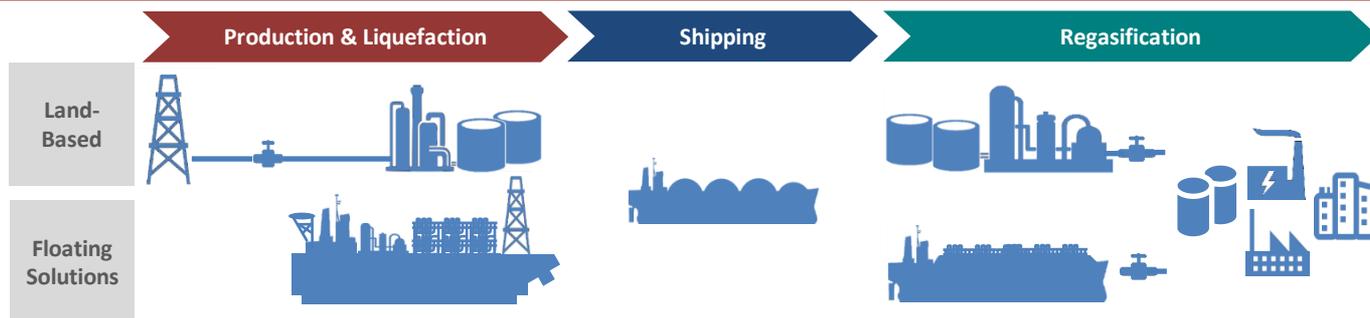
U.S. exports do not have any destination limitations and no minimum offtake obligation (take-or-pay)

- Destination of U.S. exports during 2017. Approximately 1.8 vessels were required to ship 1 million tons of LNG



The number of cargos imported into each country is highlighted

# LNG is Capital Intensive Industry and Remains Underpinned by Term Agreements



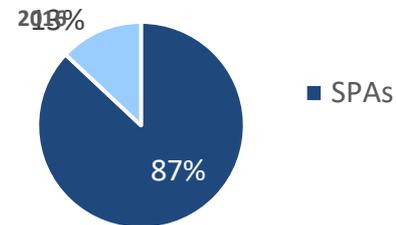
Capital Expenditure for a 10 million ton per annum project (2 Trains)



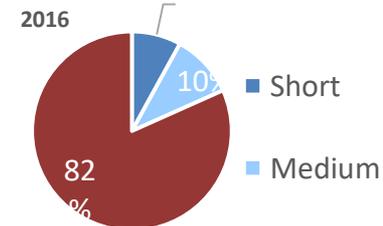
Shipping capital expenditure assumes 13 newbuild vessels acquired to service a 10 mtpa project  
 Regasification capital expenditure for 1 land-based receiving terminal

Trade & Shipping Charter Coverage

% of Global Trade by Dedicated SPAs



Percentage of Fleet by Charter Length

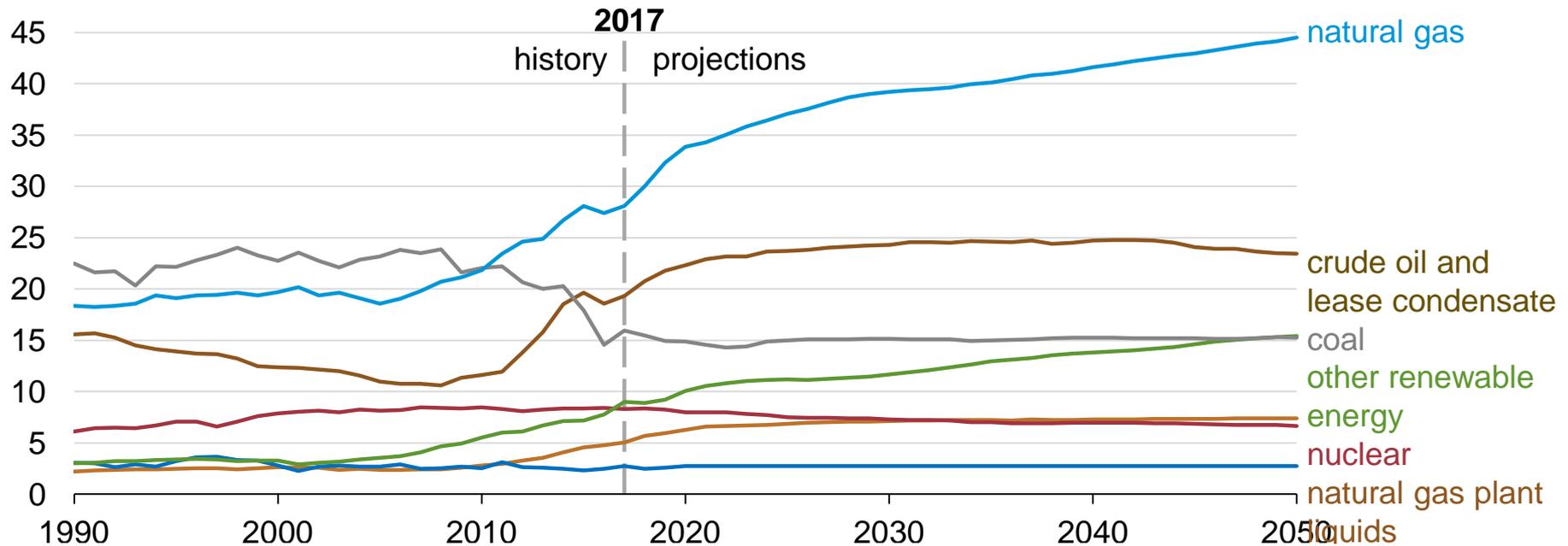




# In the Reference case, natural gas accounts for the largest share of total energy production—

## Energy production (Reference case)

quadrillion British thermal units

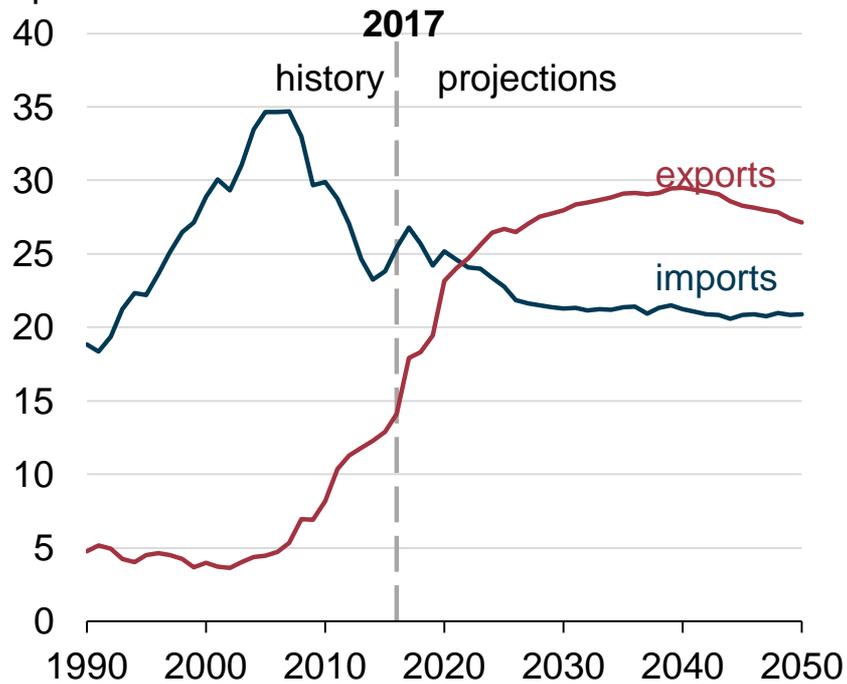




# Even though the United States becomes a net energy exporter in the Reference case—

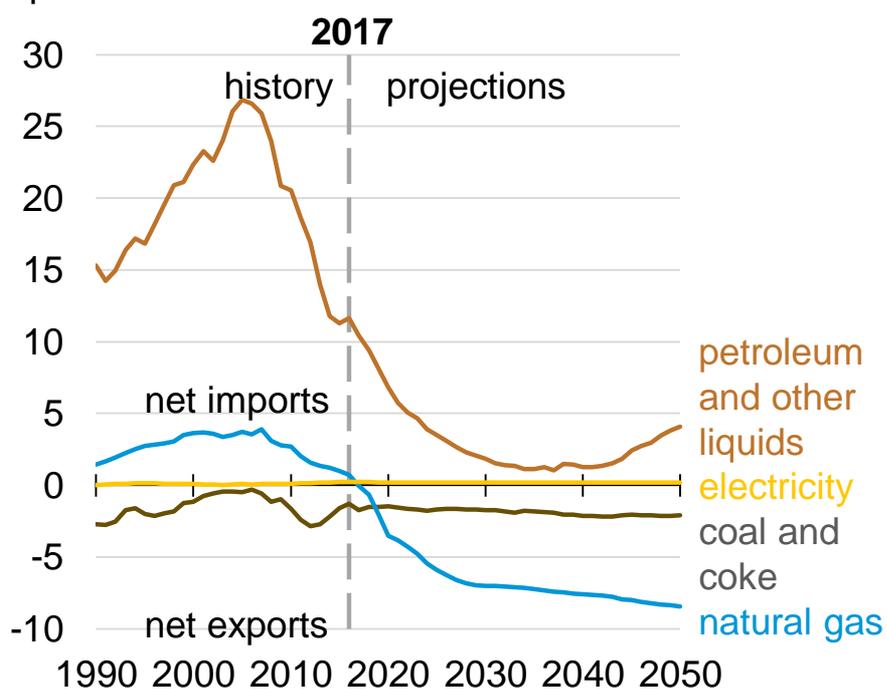
**Energy trade (Reference case)**

quadrillion British thermal units



**Net energy trade (Reference case)**

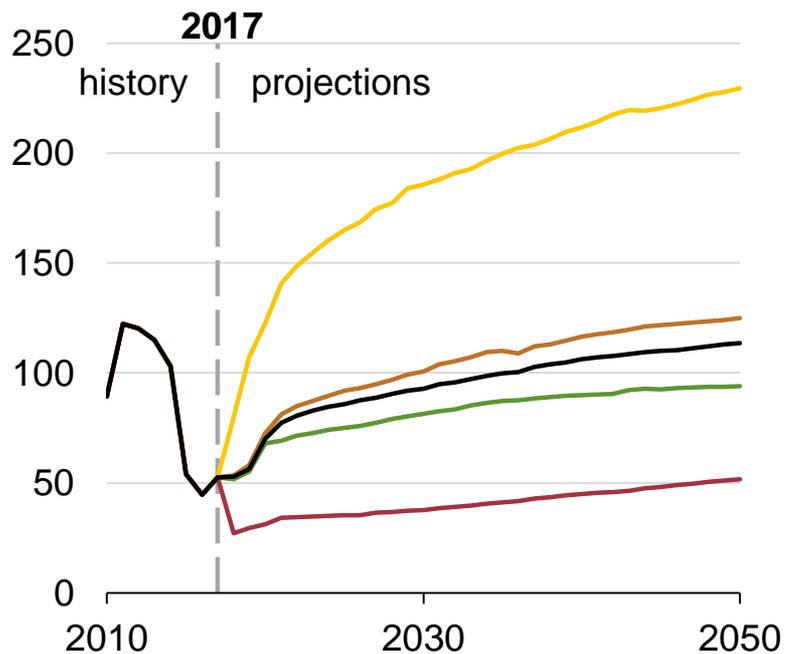
quadrillion British thermal units



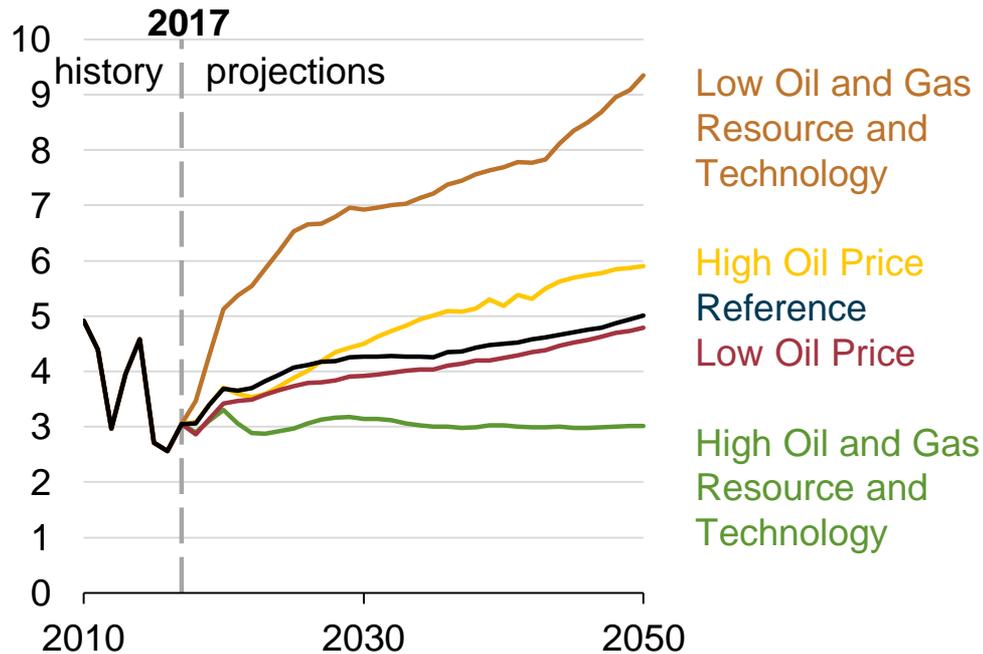


# Assumptions about the size of U.S. resources and the improvement in technology affect domestic oil and natural gas prices—

**North Sea Brent oil price**  
2017 dollars per barrel



**Henry Hub natural gas price**  
2017 dollars per million Btu

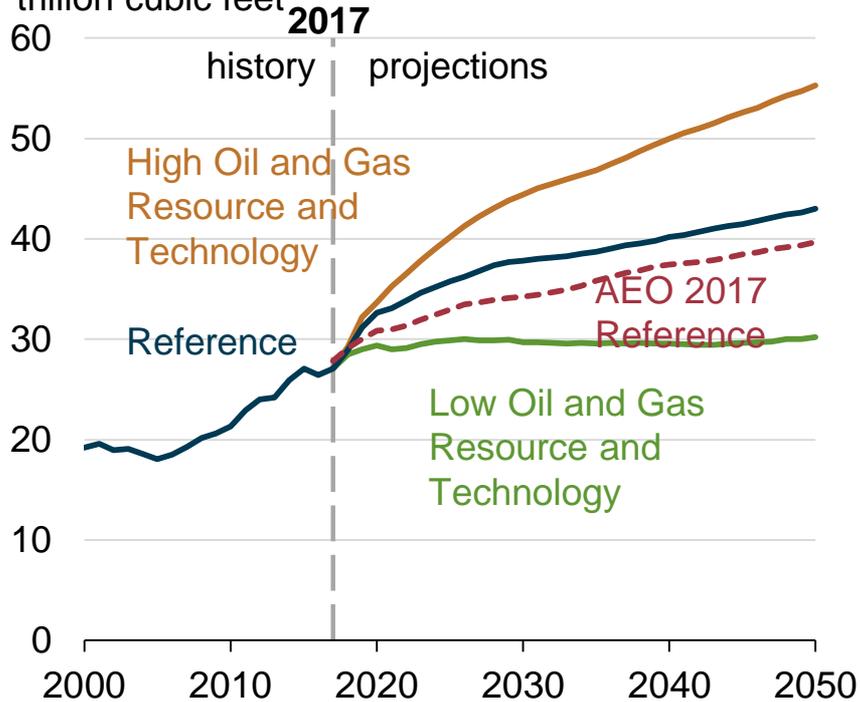




# Natural gas prices across cases are dependent on resource and technology assumptions—

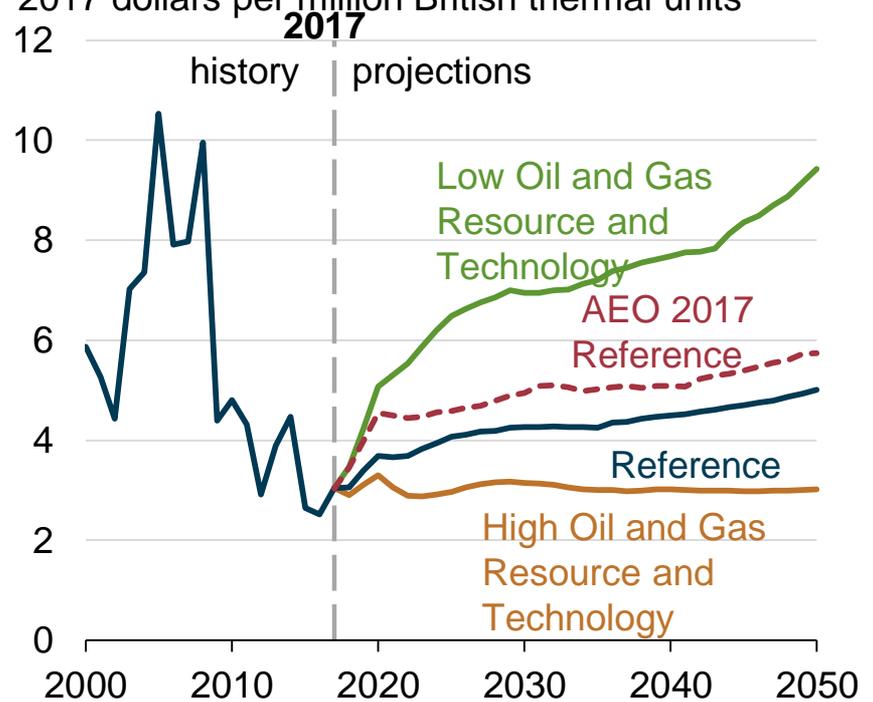
## Dry natural gas production

trillion cubic feet



## Natural gas spot price at Henry Hub

2017 dollars per million British thermal units

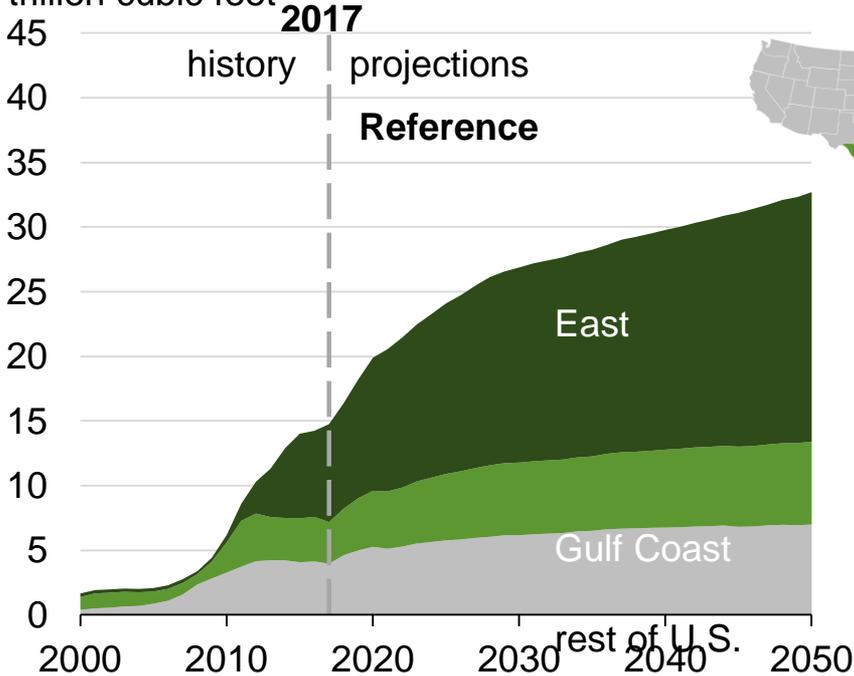




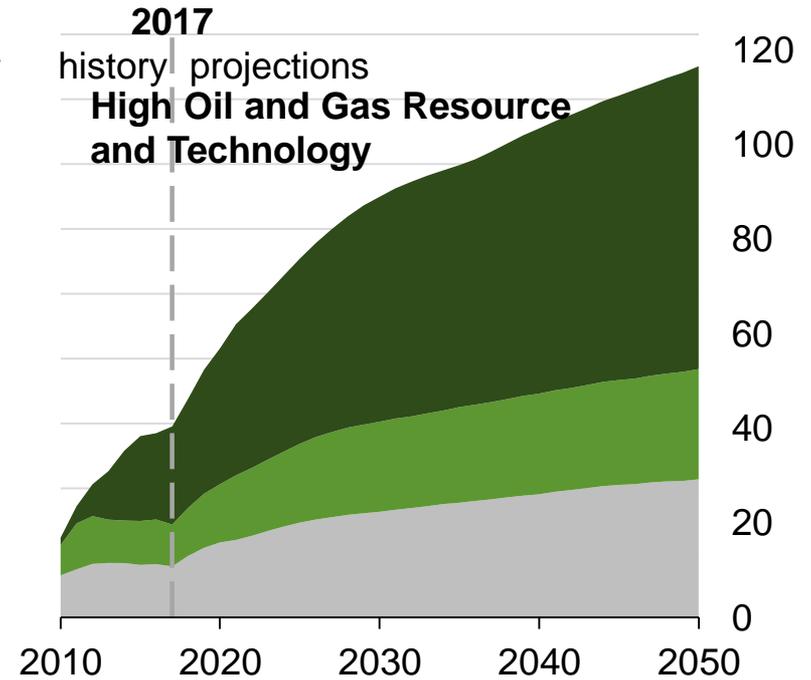
# Plays in the East lead production of U.S. natural gas from shale resources in the Reference case—

## Shale gas production by region

trillion cubic feet



billion cubic feet per day

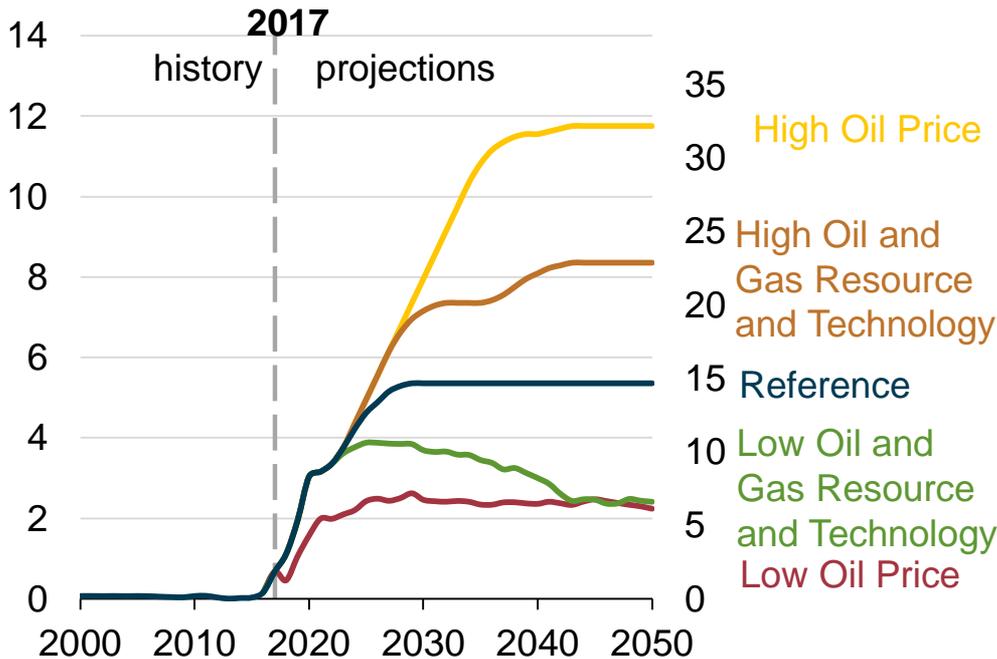




# U.S. liquefied natural gas exports are sensitive to both oil and natural gas prices—

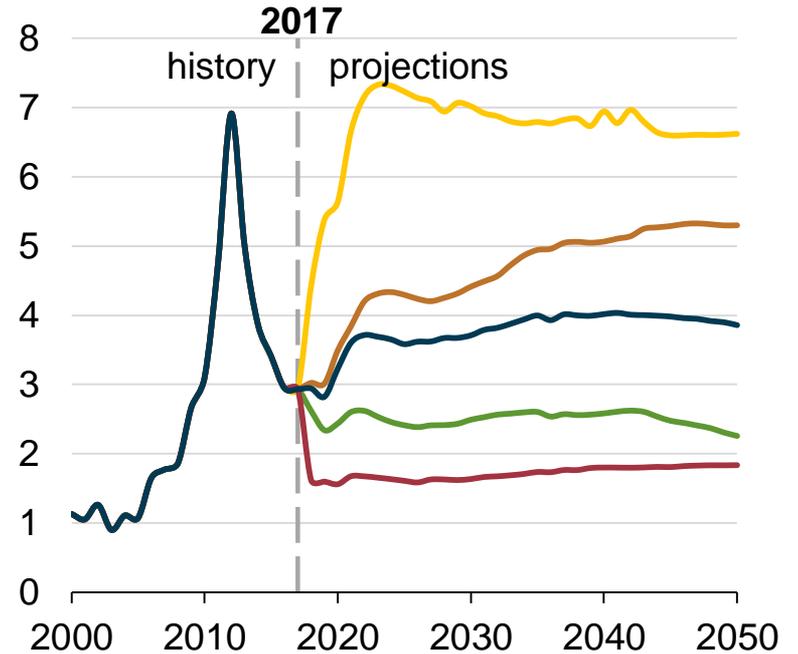
## Liquefied natural gas exports

trillion cubic feet    billion cubic feet per day



## Oil-to-natural gas price ratio

energy-equivalent terms



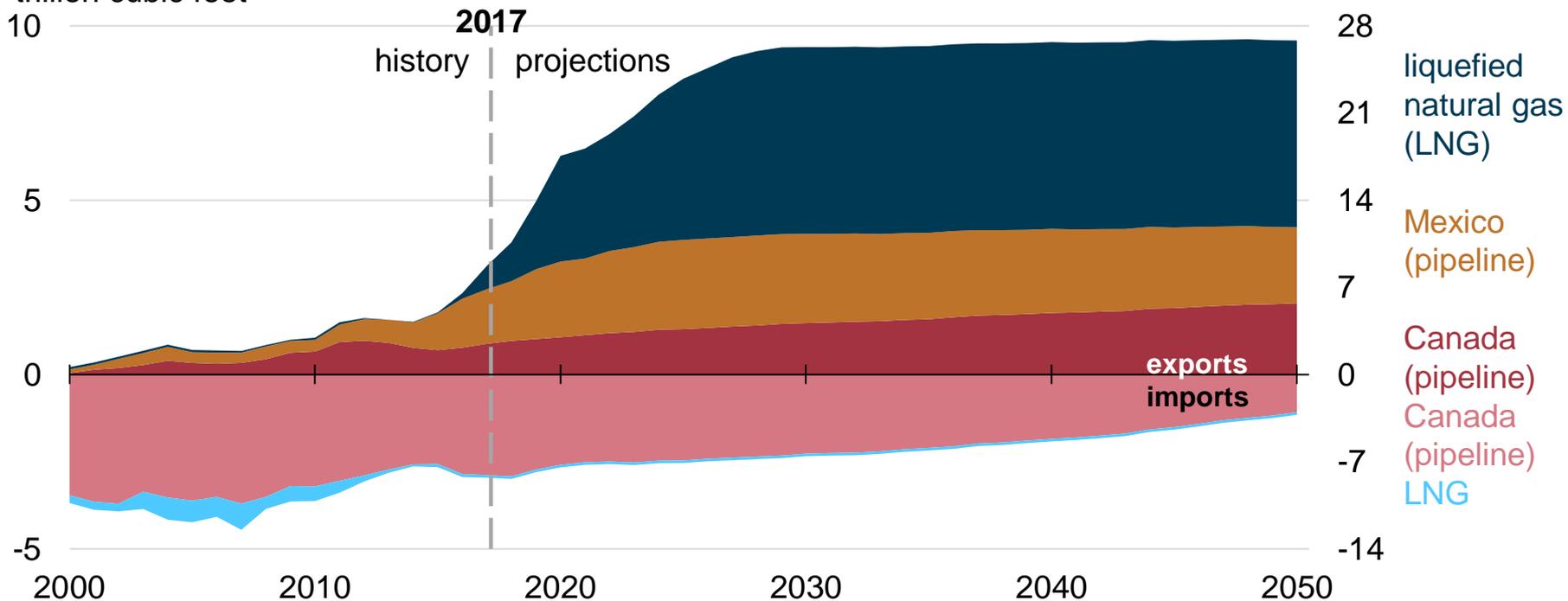


# The United States is a net natural gas exporter in the Reference case because of near-term export growth and continued import decline —

## Natural gas trade

trillion cubic feet

billion cubic feet per day



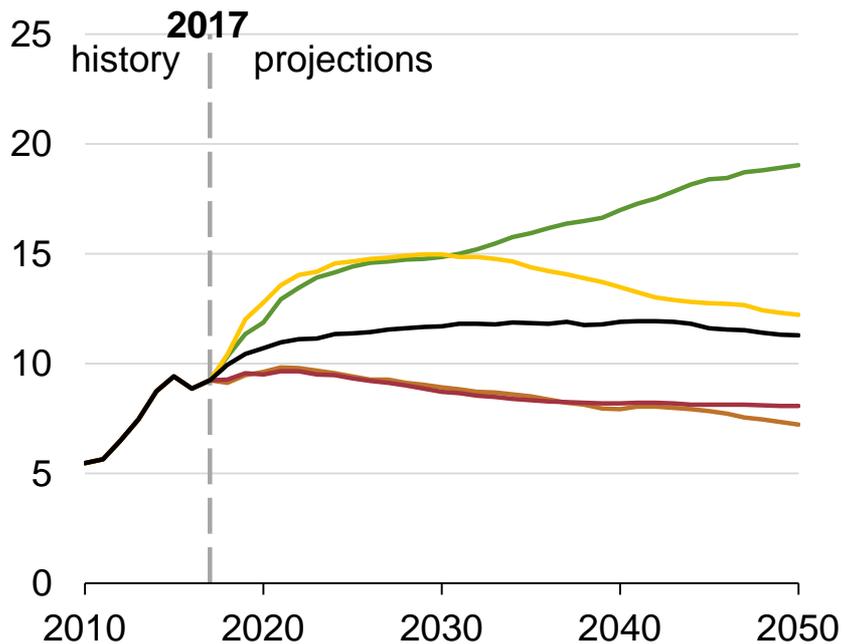


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# Although world oil prices play a role in U.S. crude oil and natural gas production—

**Crude oil production**  
million barrels per day



**Dry natural gas production**  
trillion cubic feet

