Annual Energy Outlook 2019

Bipartisan Policy Center
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Dr. Linda Capuano, Administrator
U.S. Energy Information Administration

AEO2019 cases examine a range of conditions through 2050

- **Reference case**
  - Assumes current laws and regulations remain unchanged, including sunset dates
  - Assumes 1.9% compound annual growth rates for real U.S. gross domestic product (GDP)
  - Reflects current views in economic and demographic trends, and improvements in known technology
  - Assumes Brent $108 per barrel (b) crude price in 2018 dollars by 2050

- **High and Low Economic Growth cases**
  - 2.4% GDP in high case and 1.4% GDP in low case assumes

- **High and Low Oil Price cases** (Brent crude prices by 2050 in 2018 dollars)
  - $211/b in the High Oil Price case and $50/b in the Low Oil Price case

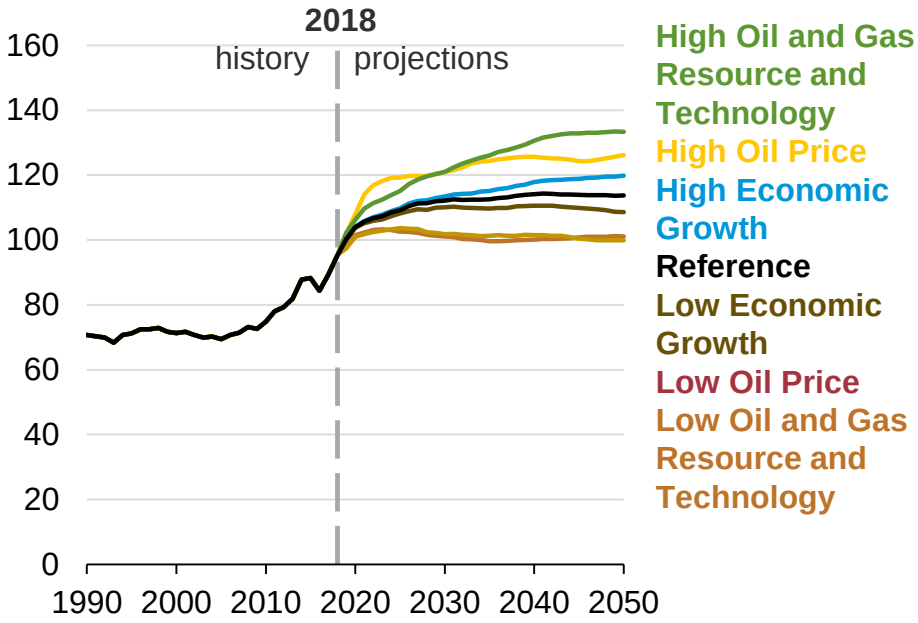
- **High and Low Oil and Gas Resource and Technology cases**
  - High - more accessible resources and lower extraction technology costs than the Reference case
  - Low - fewer accessible resources and higher extraction technology costs than the Reference case

AEO2019 Highlights

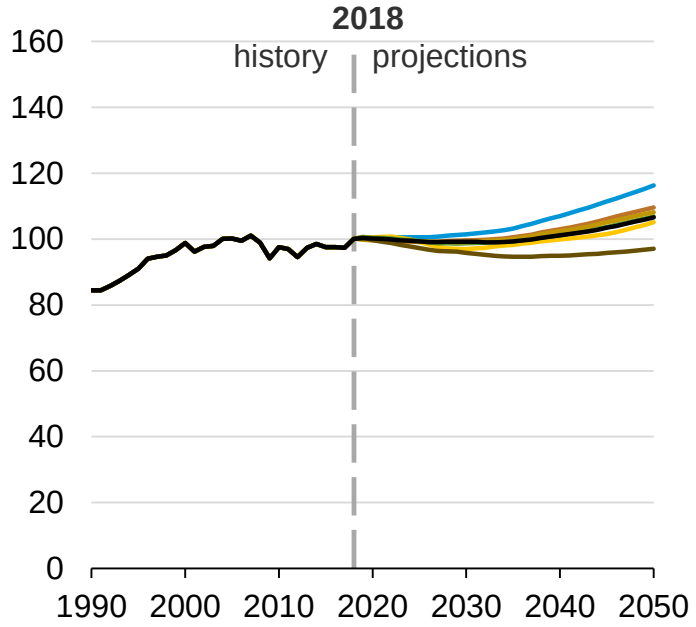
- The United States becomes a net energy exporter in 2020 and remains so through 2050 as production increases in crude oil, natural gas, and natural gas plant liquids (NGPL) coupled with slow growth in U.S. energy consumption.
- Natural gas and NGPLs have the highest production growth of the fossil fuels, and account for almost one-third of cumulative U.S. liquids production through 2050.
- Natural gas prices remain comparatively low to 2050, leading to additional use of this fuel across end-use sectors as well as increasing liquefied natural gas exports (LNG).
- The power sector shows a notable shift in fuel-mix. Significant growth in natural gas-fired electricity generation and intermittent renewables is accompanied by additional retirements of less economic coal and nuclear plants.
- Increasing energy efficiency across end-use sectors keeps U.S. energy consumption relatively flat, even as the U.S. economy continues to expand.

Energy production is more sensitive to assumptions than consumption

Total energy production
quadrillion British thermal units



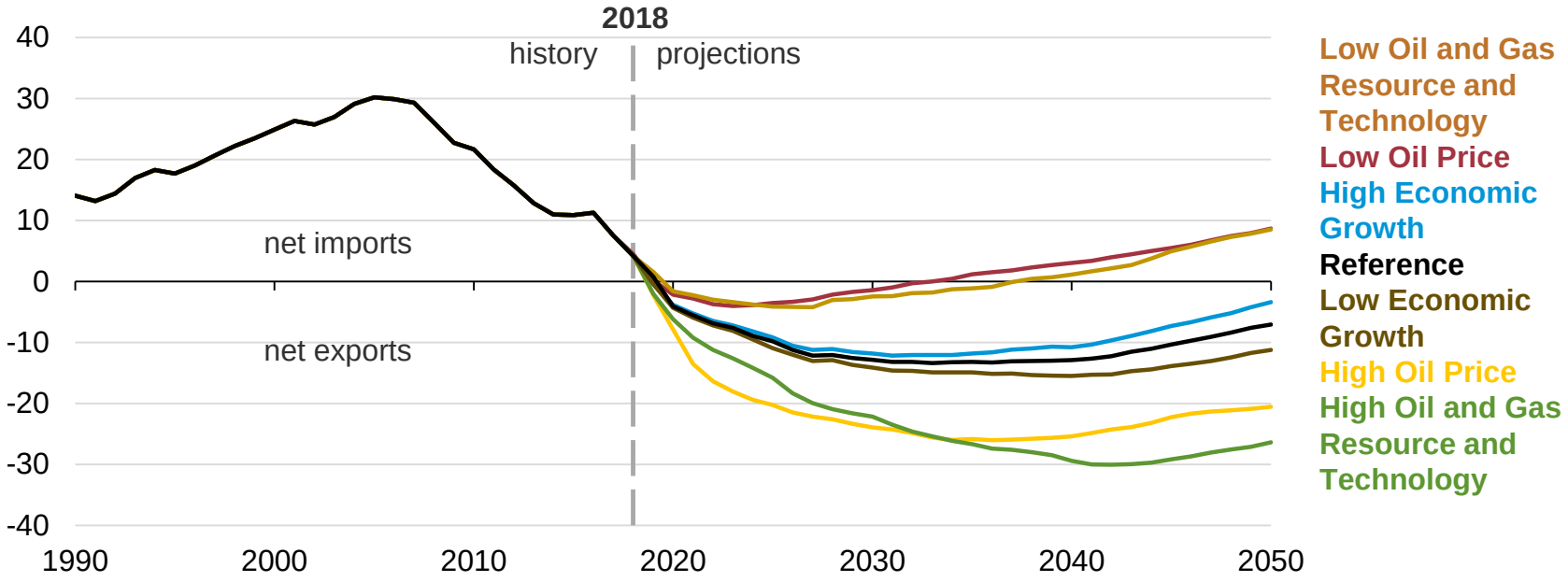
Total energy consumption
quadrillion British thermal units



The United States becomes a net energy exporter after 2020 and remains a net exporter in most cases

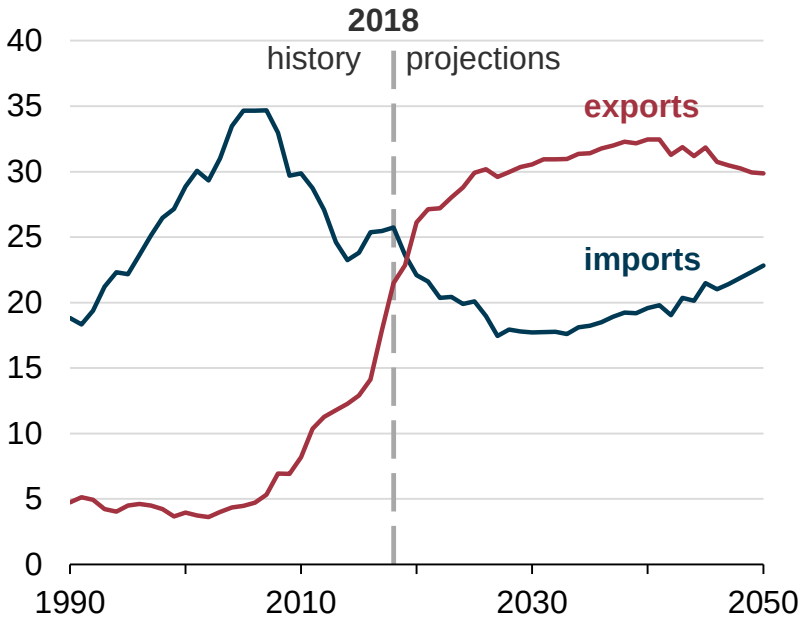
Net energy trade

quadrillion British thermal units

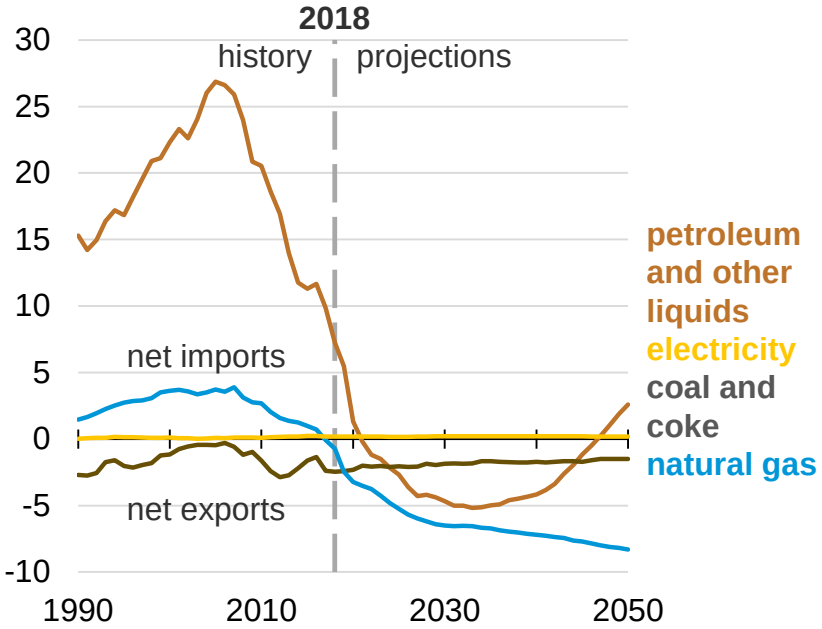


Net energy exports are driven by liquid fuels and natural gas trade flow

Gross energy trade (Reference case)
quadrillion British thermal units

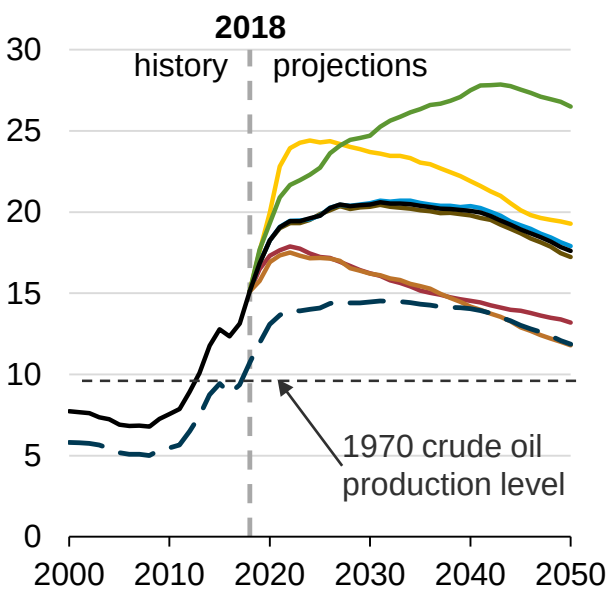


Net energy imports (Reference case)
quadrillion British thermal units



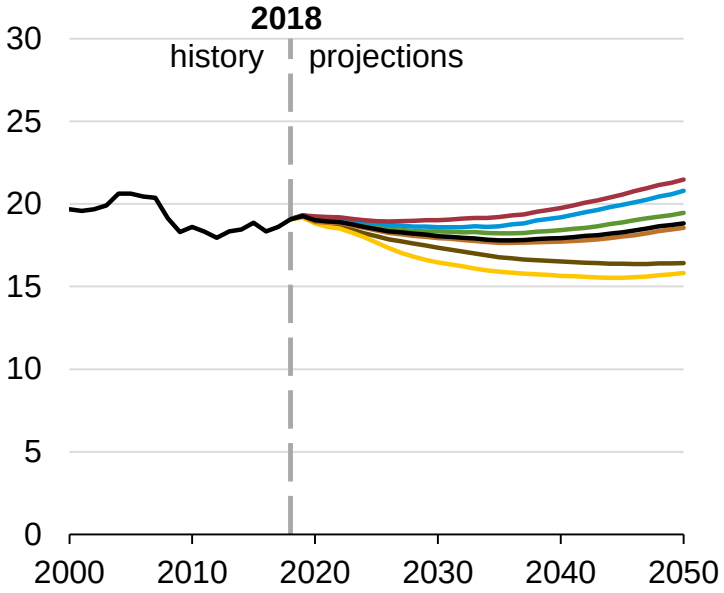
U.S. crude oil and natural gas plant liquids production exceeds its peak 1970 level; consumption declines in most cases

U.S. crude oil and natural gas plant liquids production
million barrels per day



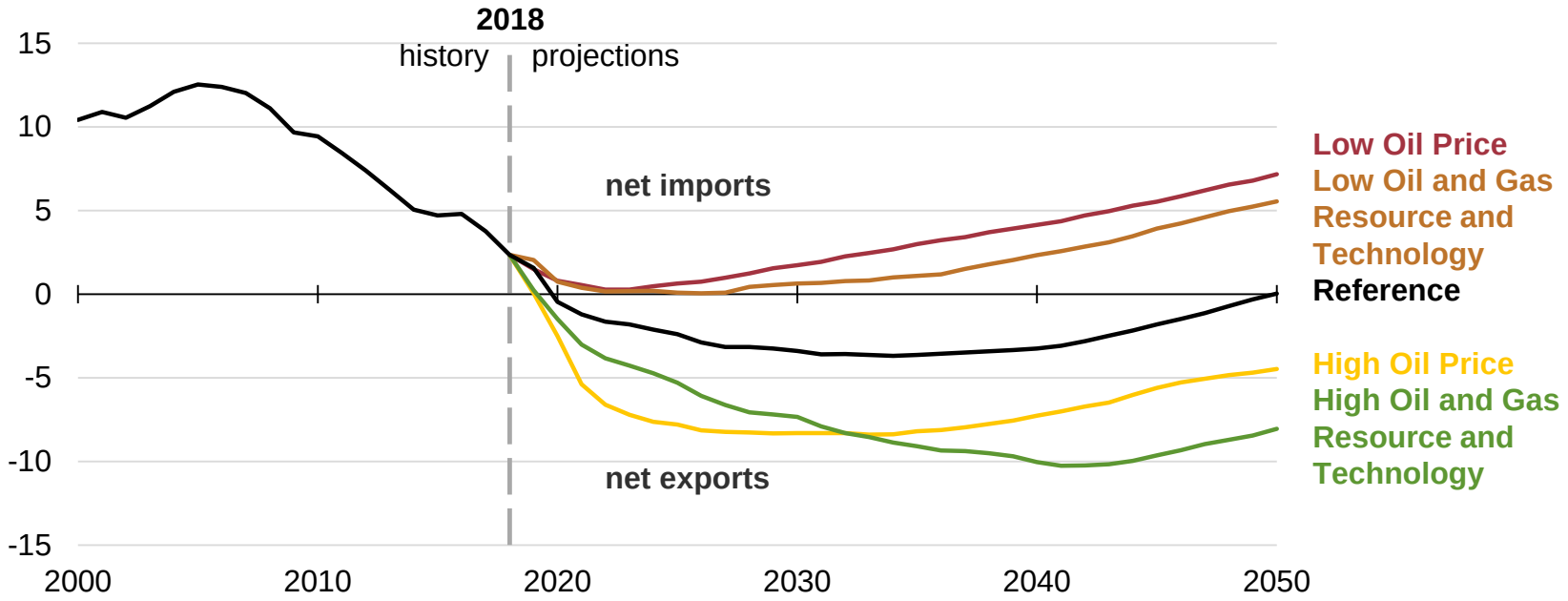
High Oil and Gas Resource and Technology
High Oil Price
High Economic Growth
Reference
Low Economic Growth
Low Oil Price
Low Oil and Gas Resource and Technology
Reference, crude oil only

Petroleum and other liquids consumption
million barrels per day



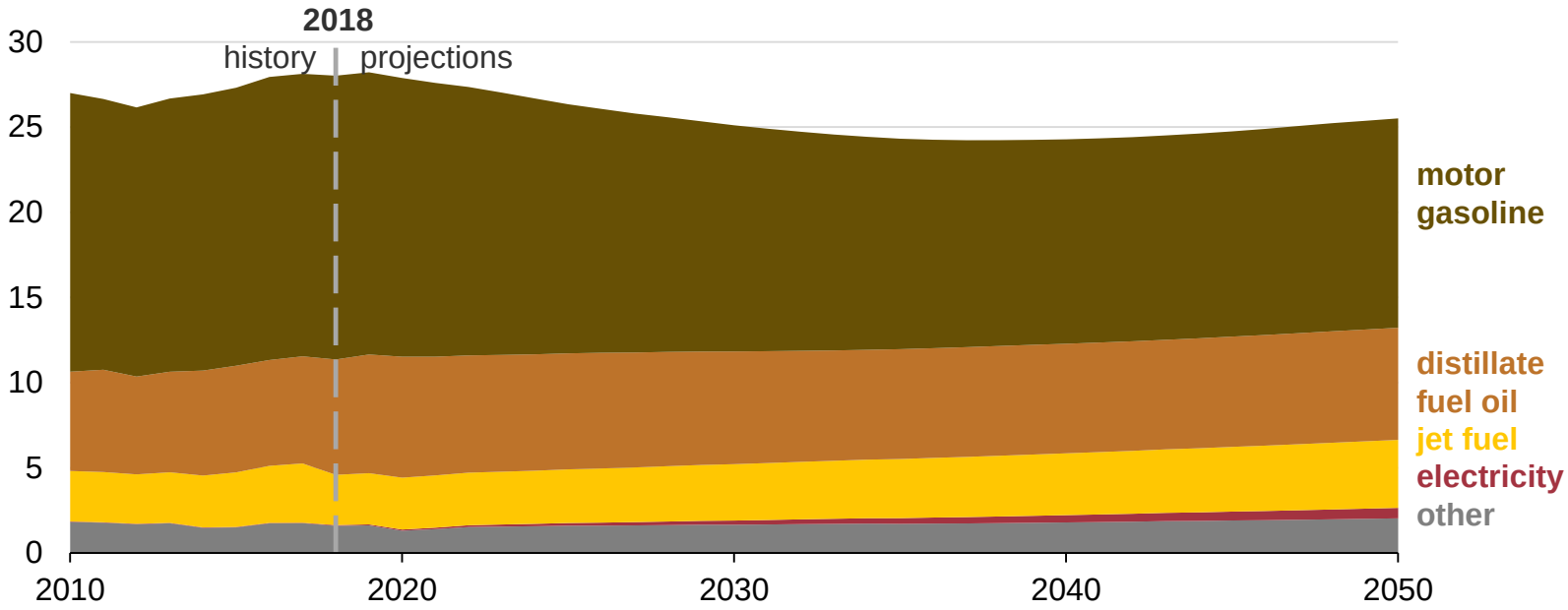
The United States becomes a net exporter of petroleum on a volume basis after 2020 in the Reference case

U.S. petroleum and other liquids net imports
AEO2019 Reference Case
million barrels per day

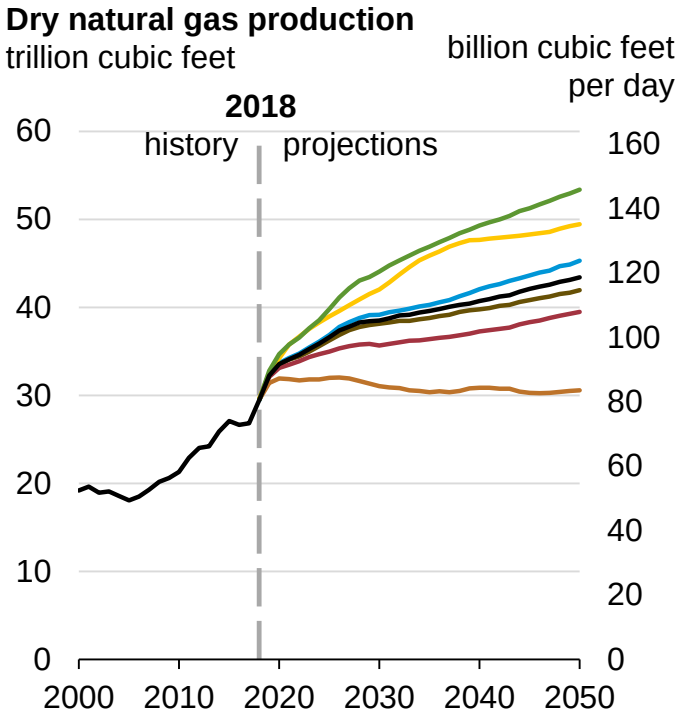


Transportation energy consumption declines through the mid-2030's as fuel economy increases offset growth in vehicle miles traveled

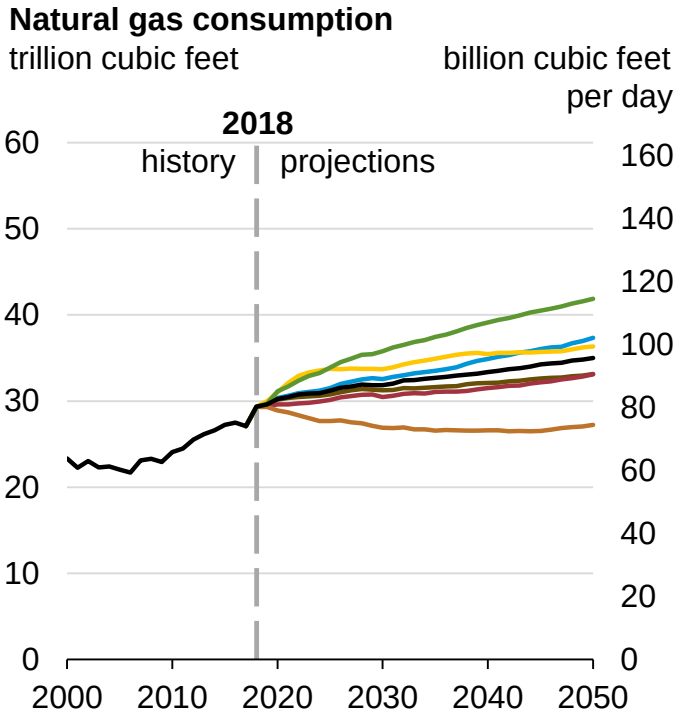
Transportation sector consumption (by fuel)
quadrillion British thermal units



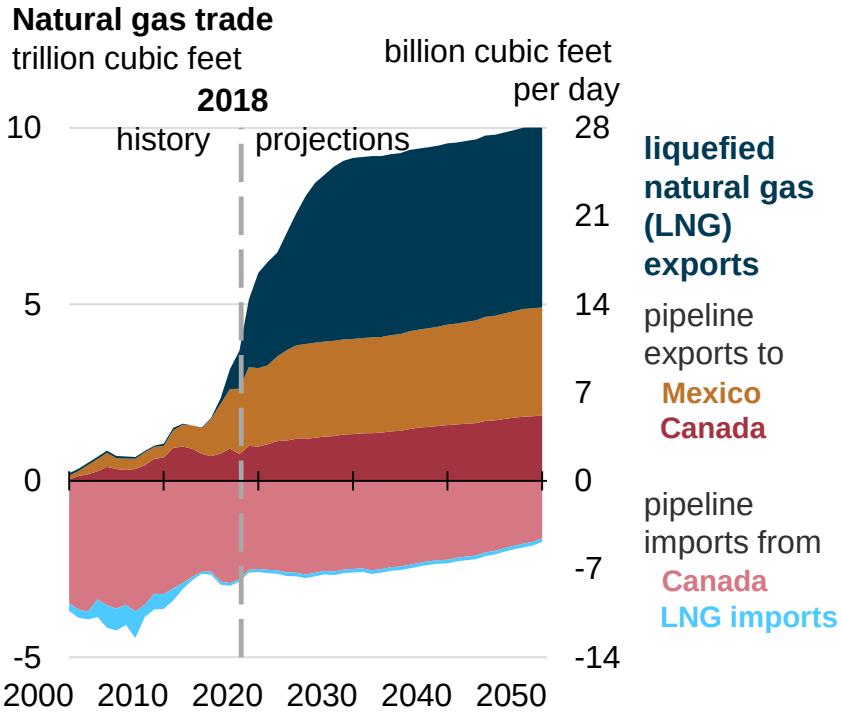
U.S. natural gas production growth outpaces natural gas consumption in all cases

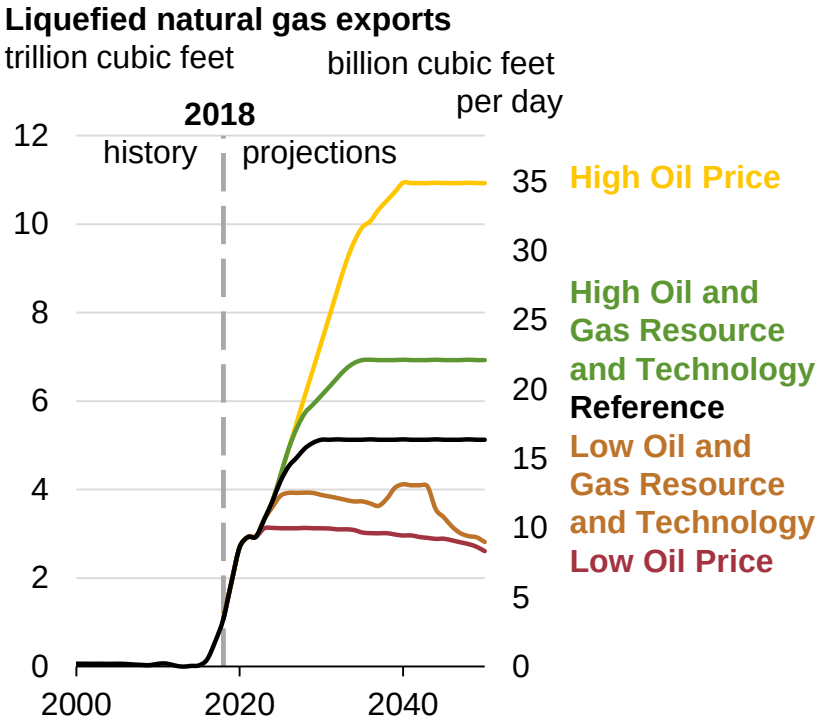


High Oil and Gas Resource and Technology
High Oil Price
High Economic Growth
Reference
Low Economic Growth
Low Oil Price
Low Oil and Gas Resource and Technology



Net exports of natural gas from the United States continue to grow in the Reference case, led by waterborne trade

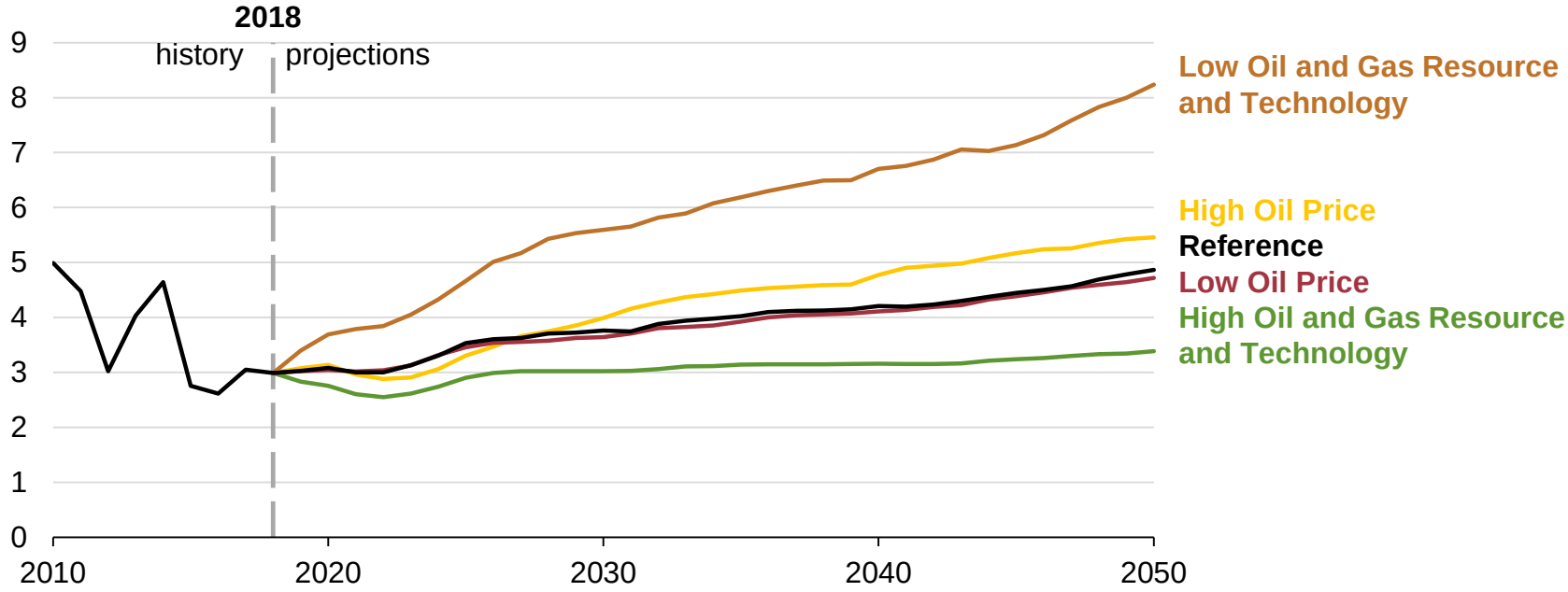




Natural gas prices are influenced more by resource and technology assumptions than global market conditions

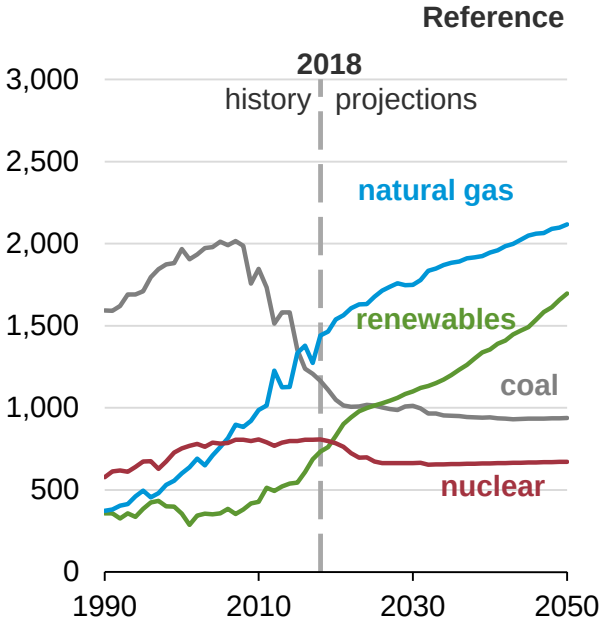
Natural gas spot price at Henry Hub

2018 dollars per million Btu

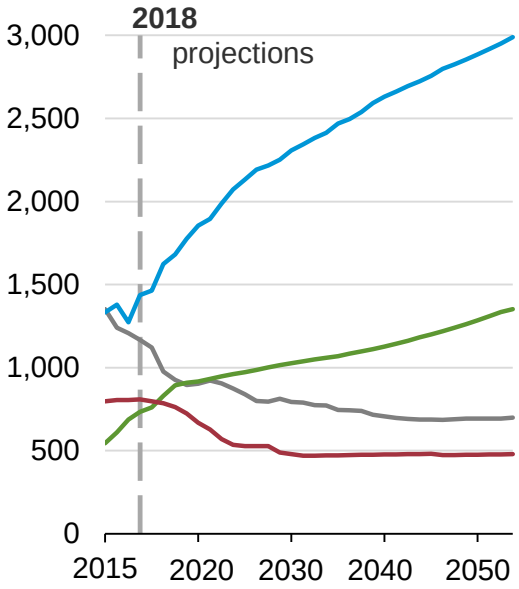


Natural gas prices drive growth in electricity generation fuel mix

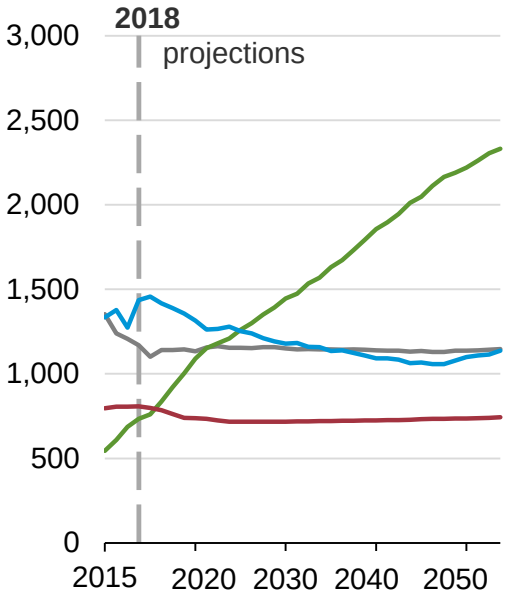
Electricity generation from selected fuels
billion kilowatthours



High Oil and Gas Resource and Technology



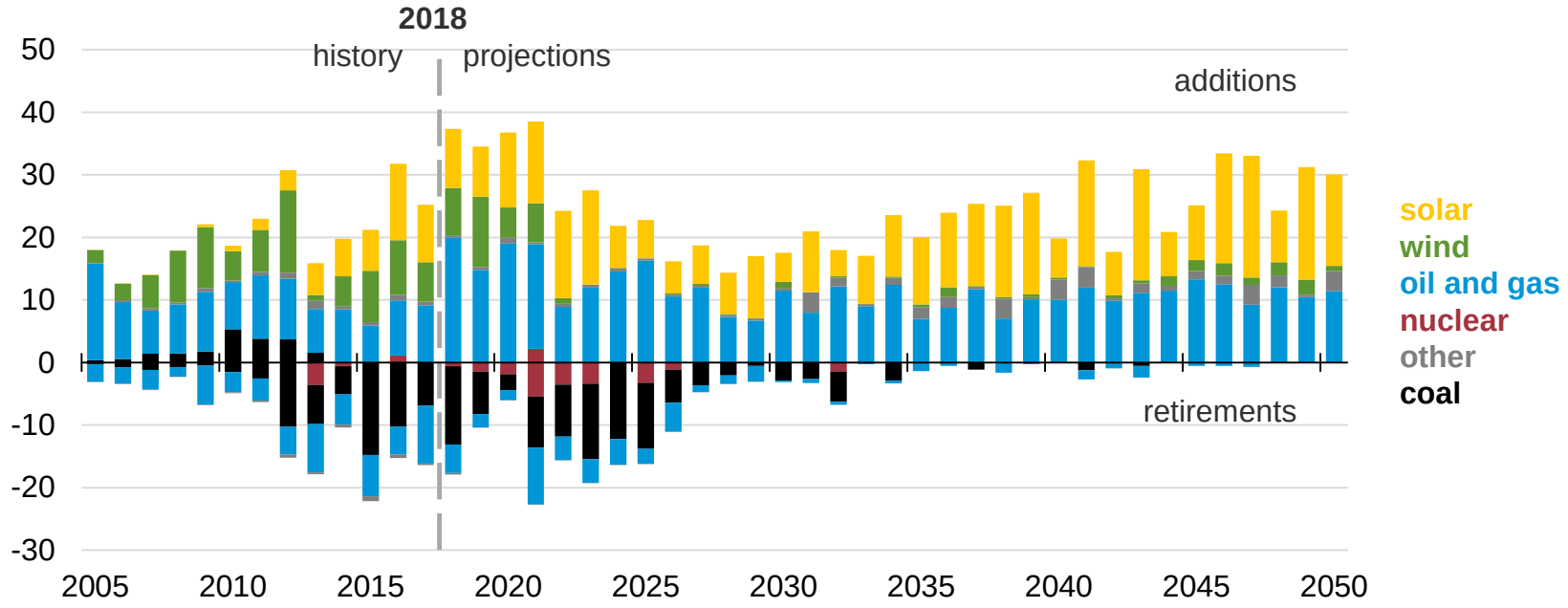
Low Oil and Gas Resource and Technology



Renewables and natural gas are projected to meet new generating capacity

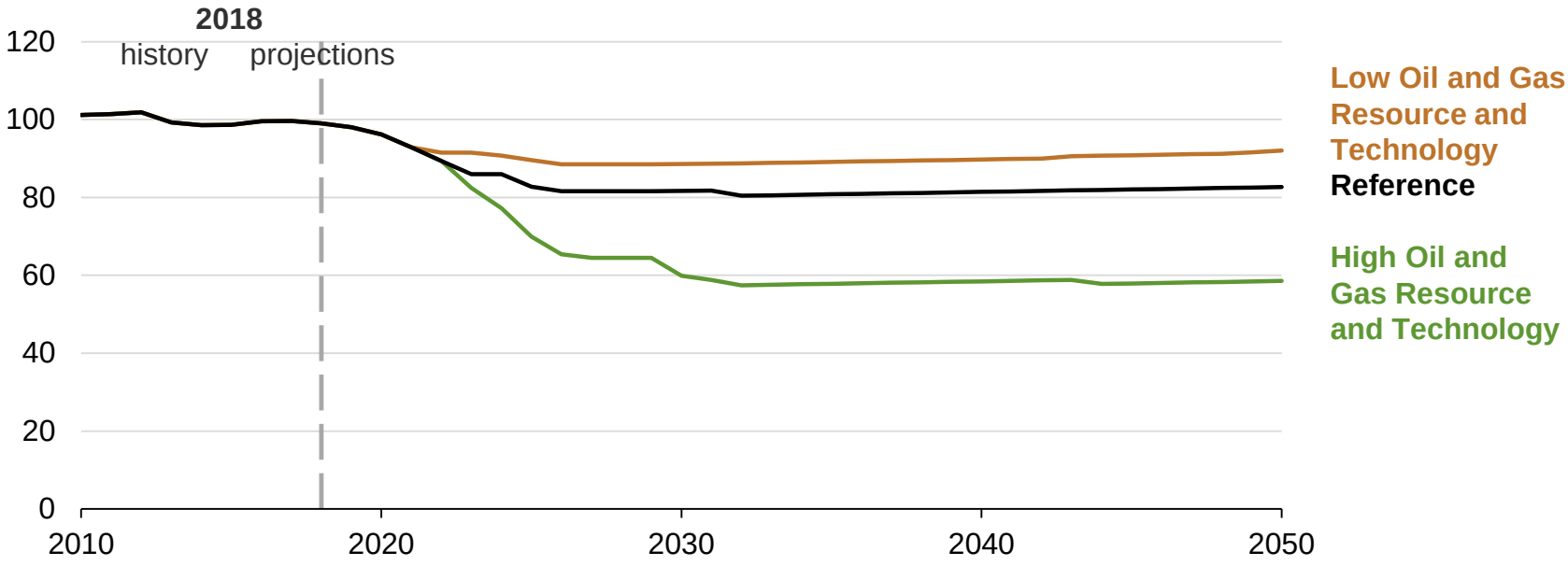
Annual electricity generating capacity additions and retirements (Reference case)

gigawatts



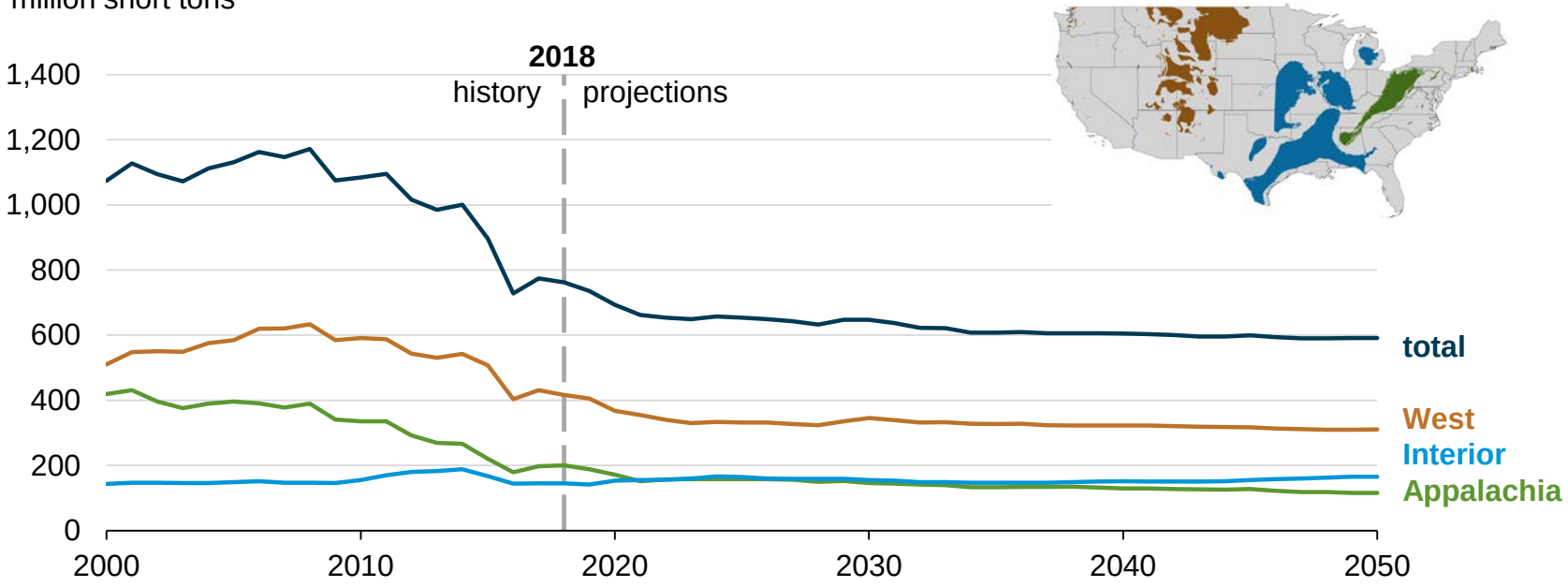
Nuclear capacity retirements continue with lower natural gas prices

Nuclear electricity generating capacity
gigawatts



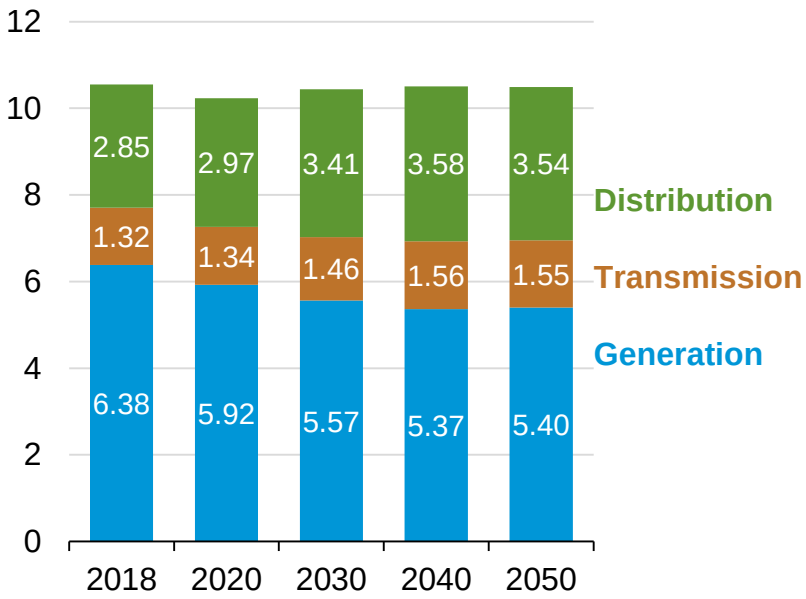
Coal production decreases through 2035 because of retirements of coal-fired electric generating capacity

Coal production by region
million short tons

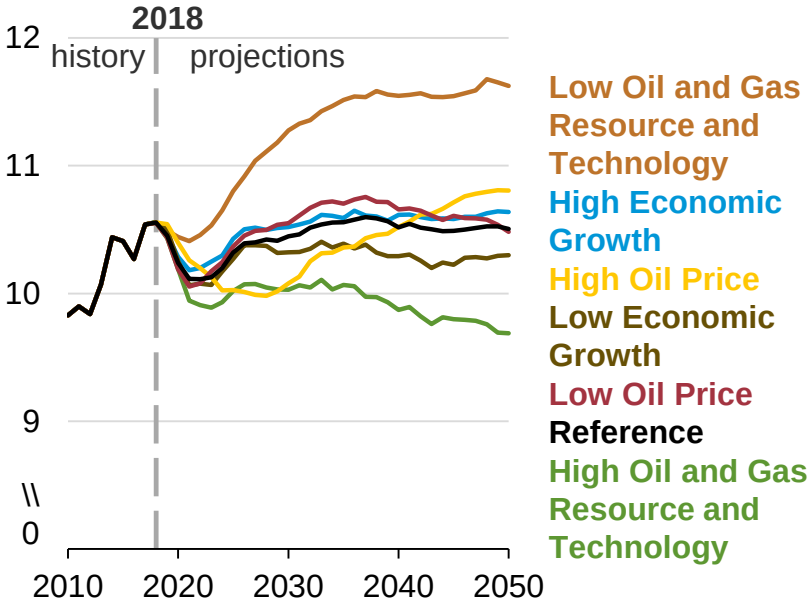


Electricity prices decline slightly as falling generation costs offset increasing transmission and distribution costs

Electricity prices by service category: Reference case
2018 cents per kilowatthours

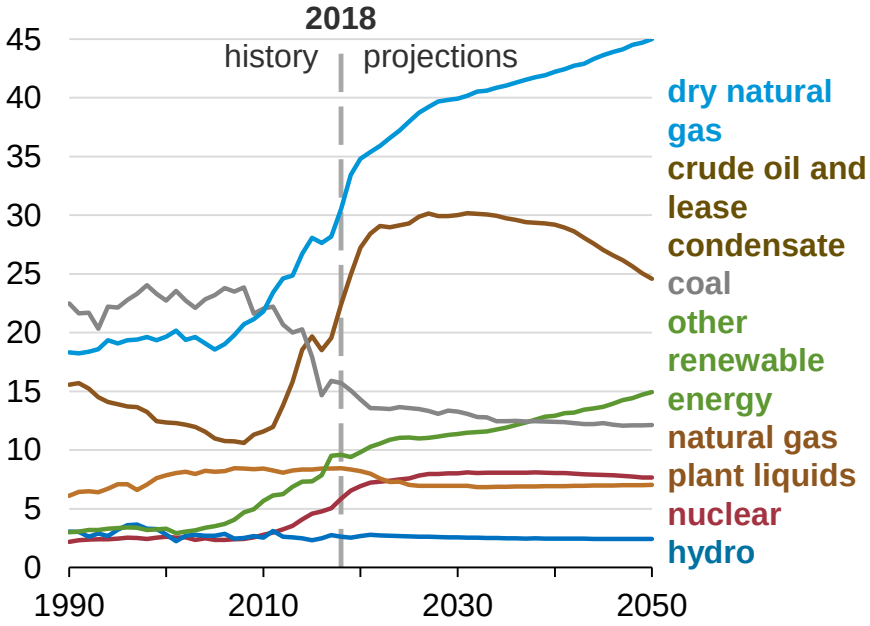


Average electricity price
2018 cents per kilowatthour

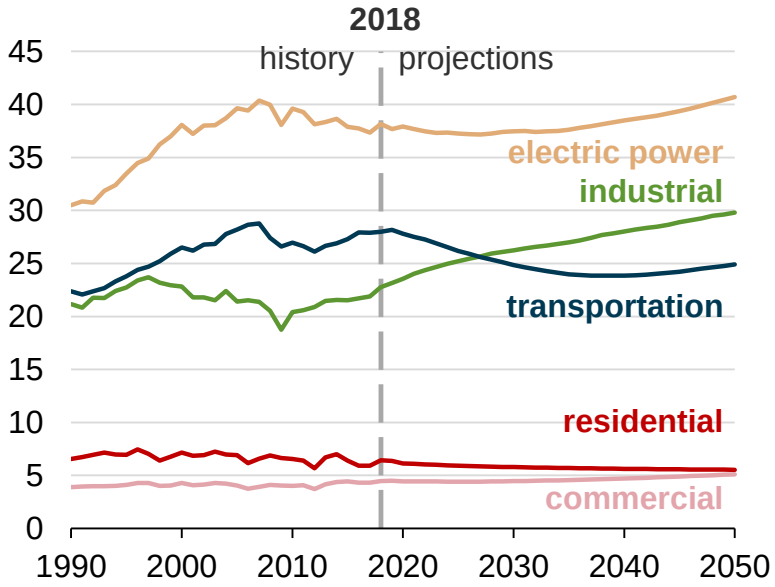


U.S. energy production and consumption change significantly under current laws and regulations

Energy production (Reference case)
quadrillion British thermal units



Energy consumption by sector (Reference case)
quadrillion British thermal units



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AEO 2019 Panel Discussion

- Market, policy, and technological forces driving AEO projections of U.S. fuel consumption and generation.
  - Development of tight and shale resources
  - Impact of sustained low natural gas prices and falling renewable energy costs.
- Uncertainties that could impact projections.
  - Electricity sector trends
  - consumption trends of oil and petroleum product consumption trends
  - Impact of emerging technologies across sectors.