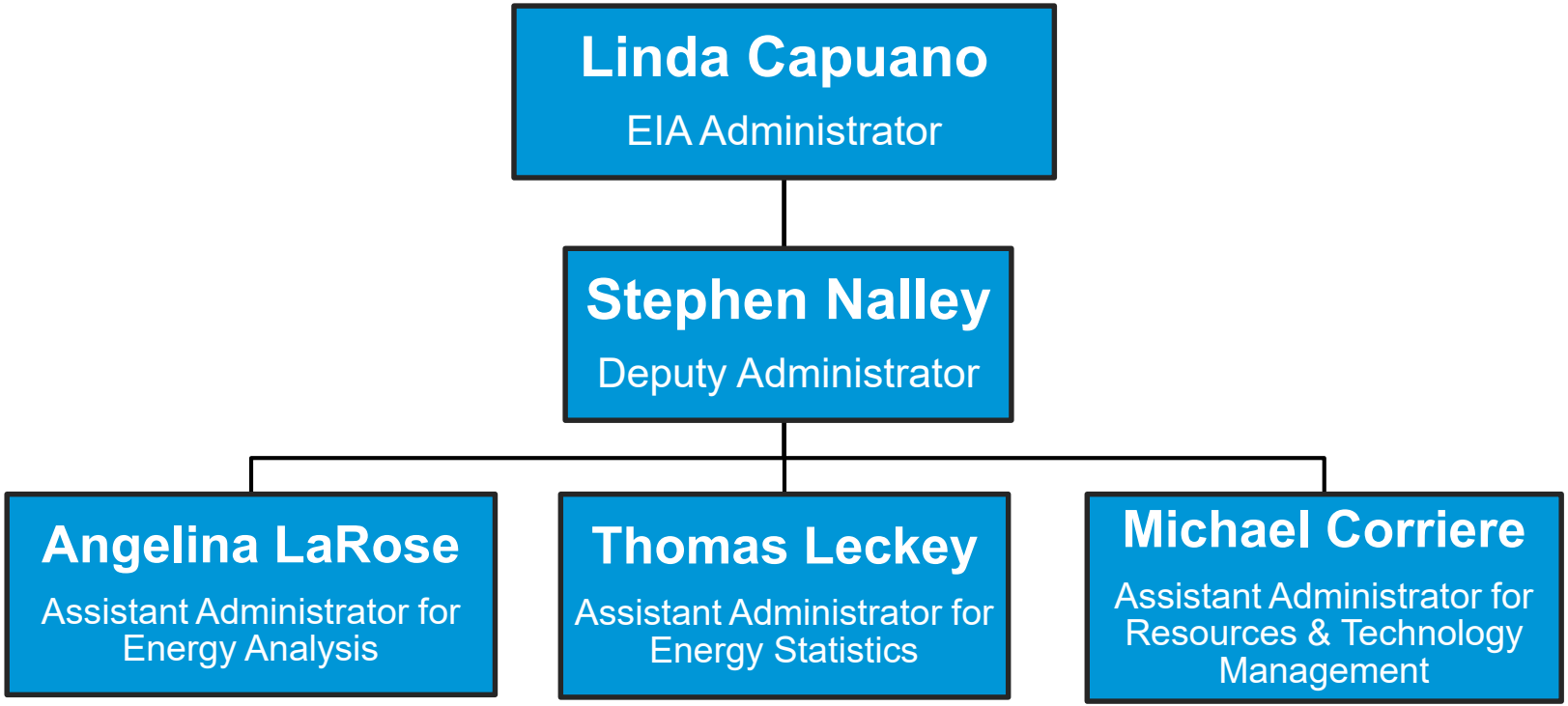
Annual Energy Outlook 2020

Bipartisan Policy Center
January 29, 2020 | Washington, DC

Dr. Linda Capuano, Administrator
U.S. Energy Information Administration

EIA leadership



Independent Statistics & Analysis

U.S. Energy Information Administration

- **One of 13 federal statistical agencies - the nation's source of energy information**
  EIA collects, analyzes, and disseminates independent and impartial energy information to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment.

- **EIA has the legal right to collect data and to protect the collected data**

- **EIA's products are legally independent of approval by any other officer or employee of the United States Government**

Annual Energy Outlook provides long-term U. S. energy projections

- The AEO2020 is available for free download from the EIA AEO website on January 29, 2020.
- The AEO is published to satisfy the Department of Energy Organization Act of 1977, which requires the EIA Administrator to prepare annual reports on trends and projections for energy use and supply.
- EIA staff develops the AEO using the National Energy Modeling System (NEMS), an integrated model that captures interactions of economic changes and energy supply, demand, and prices.
- AEO2020 models projections of what may happen given certain assumptions and methodologies. By varying those assumptions and methodologies, AEO2020 can inform policy makers about the potential impact of current policies, technical investment strategies, and important factors in future energy production and use in the United States.
- Energy market projections are subject to uncertainty because many of the events that shape energy markets—as well as future developments in technologies, demographics, and resources—cannot be foreseen with certainty. To illustrate the importance of key assumptions, AEO2020 includes a Reference case and side cases that systematically vary important underlying assumptions.

AEO2020 reference and side cases examine a range of conditions to 2050

AEO2020 Assumptions

- Current laws and regulations (as of September 2019) remain unchanged
- Current views in economic and demographic trends, and technology improvements
- 1.9% compound annual growth rate for real U.S. gross domestic product (GDP) in Reference Case
  - 2.4% and 1.4% for the High and Low Economic (GDP) Growth Cases
- $105/barrel Brent crude oil price by 2050 in constant 2019 dollars in Reference Case
  - $183/b and $46/b for the High and Low Oil Price Cases
- Oil and Gas Supply 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
- Renewables Cost Cases
  - High: no cost reductions in renewable technologies
  - Low: renewables achieve 40% lower overnight capital costs by 2050 compared to Reference case

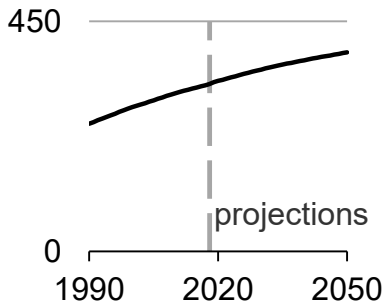
AEO2020 Highlights

- The rate of U.S. energy consumption growth remains slower than GDP growth, so the energy intensity continues its historical decline.
- Electricity generation fuel mix continues to experience a rapid rate of change.
- The United States continues to produce historically high levels of crude oil and natural gas.
- Total U.S. energy-related carbon dioxide emissions fall, then resume modest growth in the 2030s.

AEO2020 Reference case energy intensity continues to fall

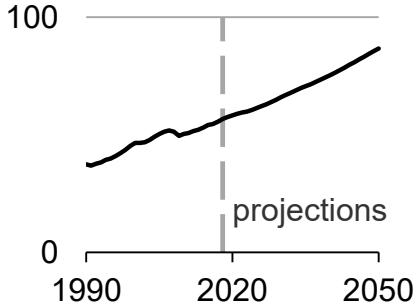
Population grows

U.S. population
million people



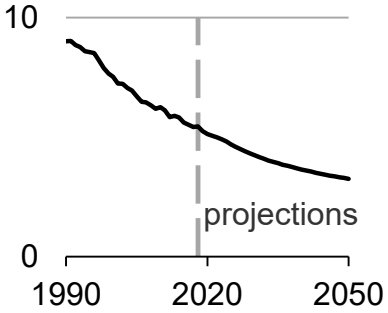
GDP per capita increases

Gross domestic product
per capita
thousand dollars/person



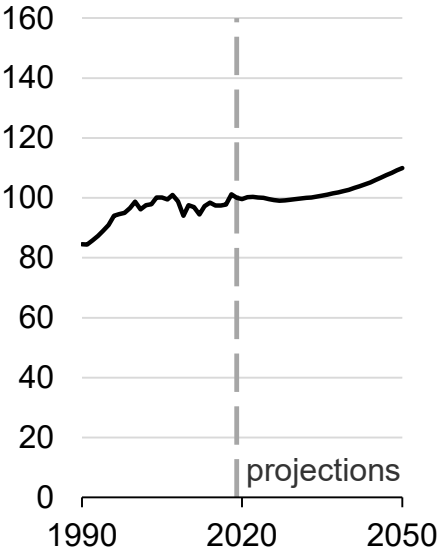
Energy intensity declines

U.S. energy intensity
thousand British thermal units
per dollar



Total energy consumption

quadrillion British thermal units



AEO2020 Highlights

- The rate of U.S. energy consumption growth remains slower than GDP growth, so the energy intensity continues its historical decline.

- **Electricity generation fuel mix continues to experience a rapid rate of change.**
  - **Supported by policy, renewables are the fastest-growing source of electricity generation as cost declines make them economically competitive beyond the expiration of existing federal and state policy support.**
  - **With slow load growth and increasing renewables electricity production, U.S. coal-fired and nuclear electricity generation continue to decline as generating plants are retired through 2050.**

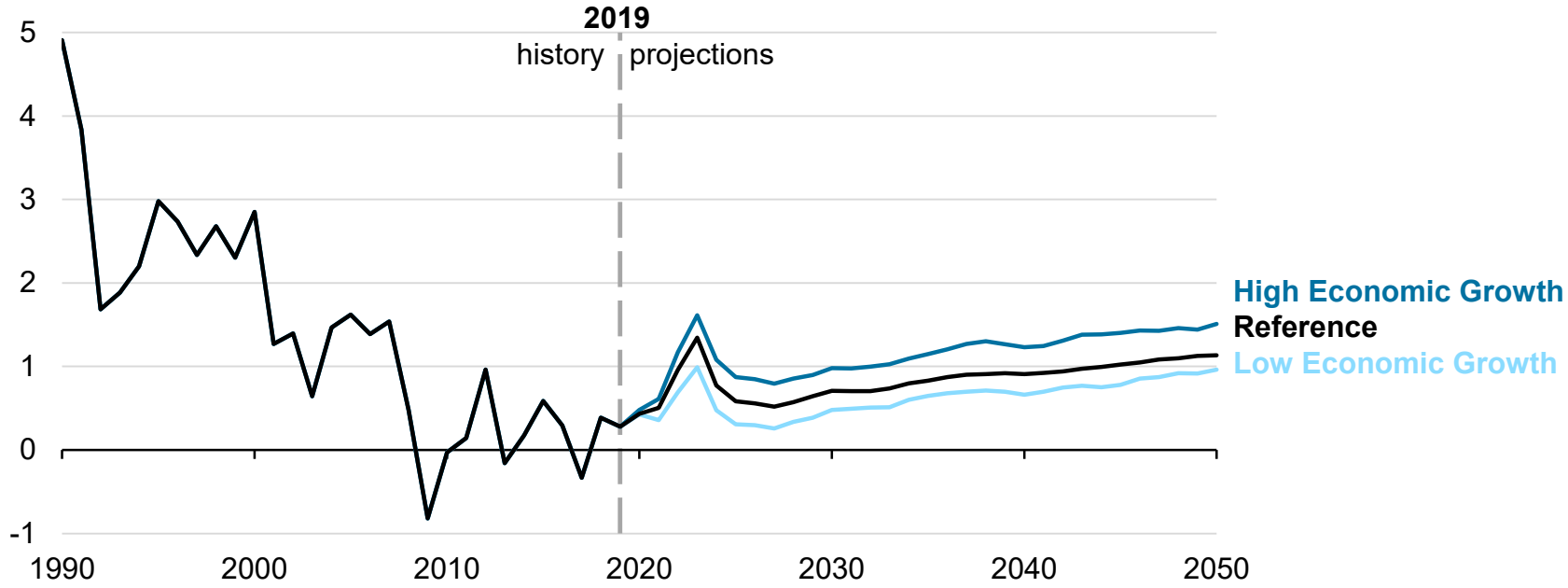
- The United States continues to produce historically high levels of crude oil and natural gas.

- Total U.S. energy-related carbon dioxide emissions fall, then resume modest growth in the 2030s.

Electricity use growth rate remains low and grows slowly to 2050

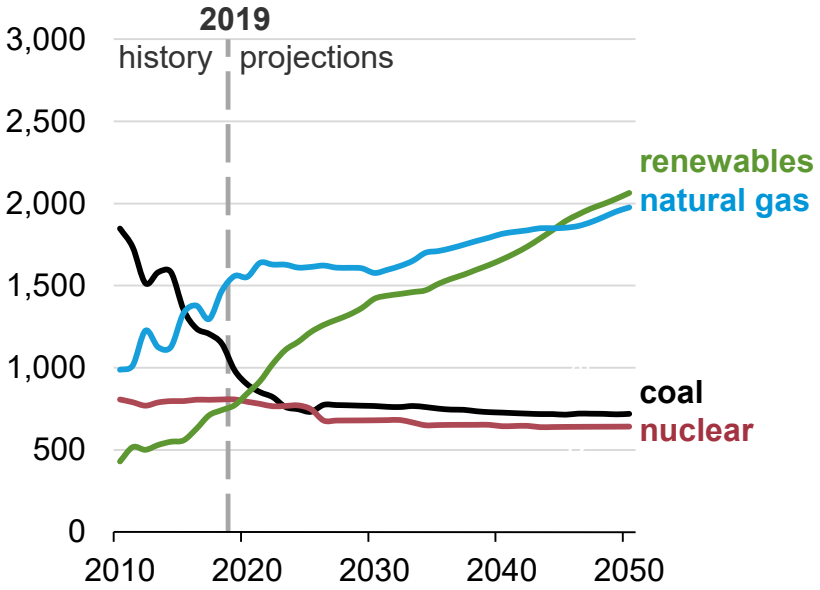
Electricity use growth rate

percentage growth (three-year rolling average)

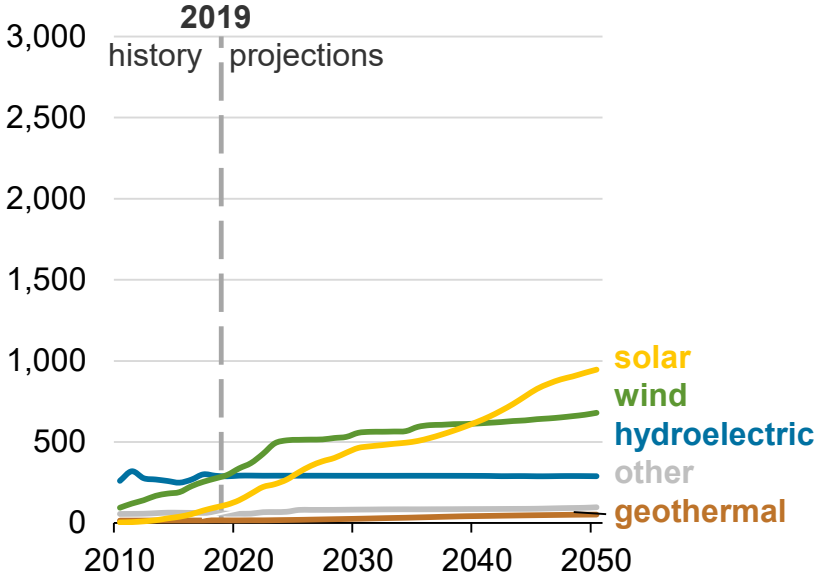


Electricity generation from renewables grows the fastest

Electricity generation from selected fuels (Reference case)
billion kilowatthours



Renewable electricity generation, including end use (Reference case)
billion kilowatthours

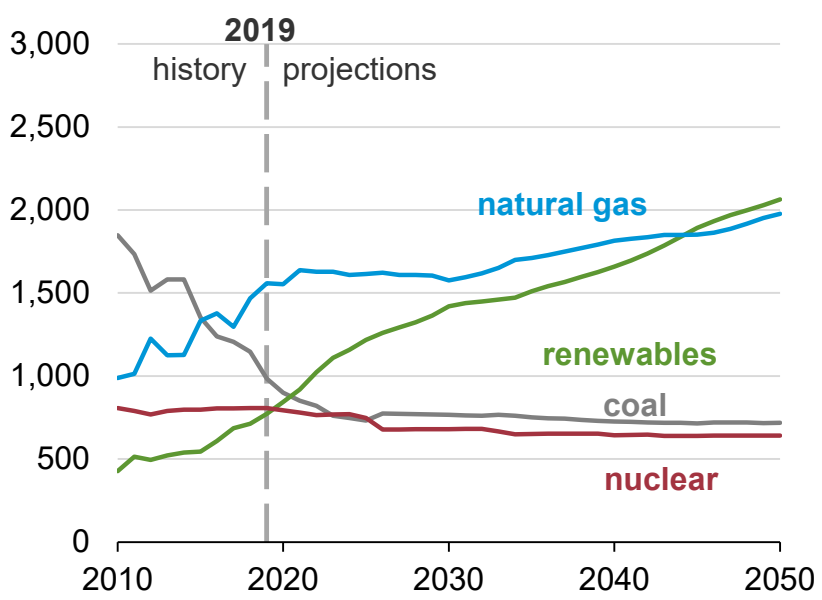


Impact of assuming lower renewable cost on electricity generation

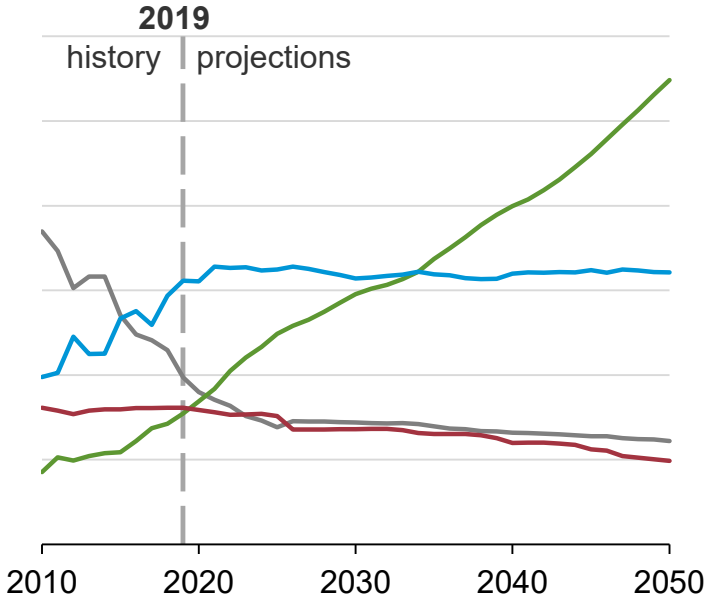
Electricity generation from selected fuels

Reference case

billion kilowatthours



Low Renewables Cost case



AEO2020 Highlights

- The rate of U.S. energy consumption growth remains slower than GDP growth, so the energy intensity continues its historical decline.

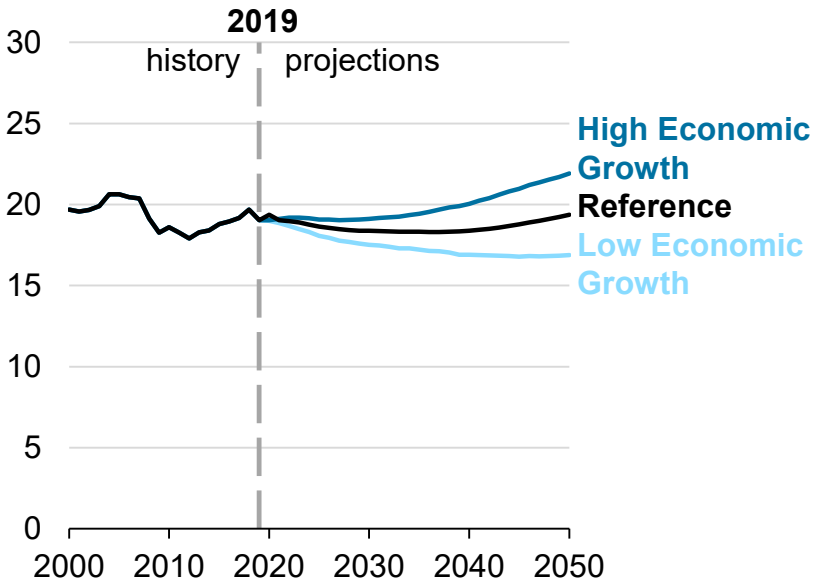
- Electricity generation fuel mix continues to experience a rapid rate of change.

- **The United States continues to produce historically high levels of crude oil and natural gas.**
  - **In 2020, the United States becomes a net energy exporter and remains so through 2050 as production increases in crude oil, natural gas, and natural gas plant liquids coupled with low growth in U.S. energy consumption.**

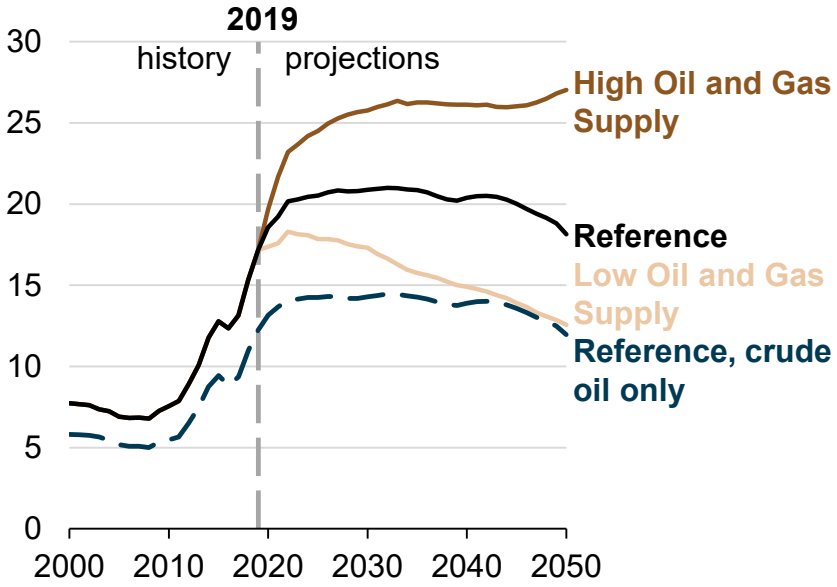
- Total U.S. energy-related carbon dioxide emissions fall, then resume modest growth in the 2030s.

Liquids consumption remains lower than its 2004 peak in most cases

Petroleum and other liquids consumption
million barrels per day



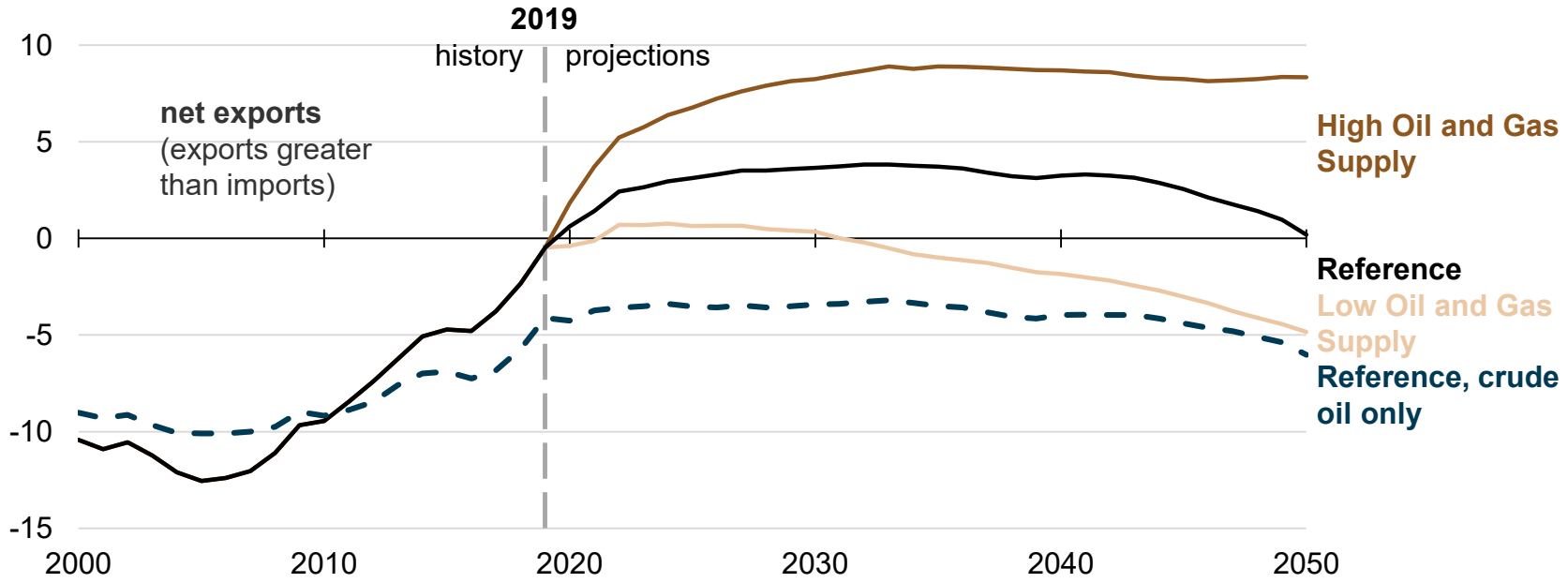
U.S. crude oil and natural gas plant liquids production
million barrels per day



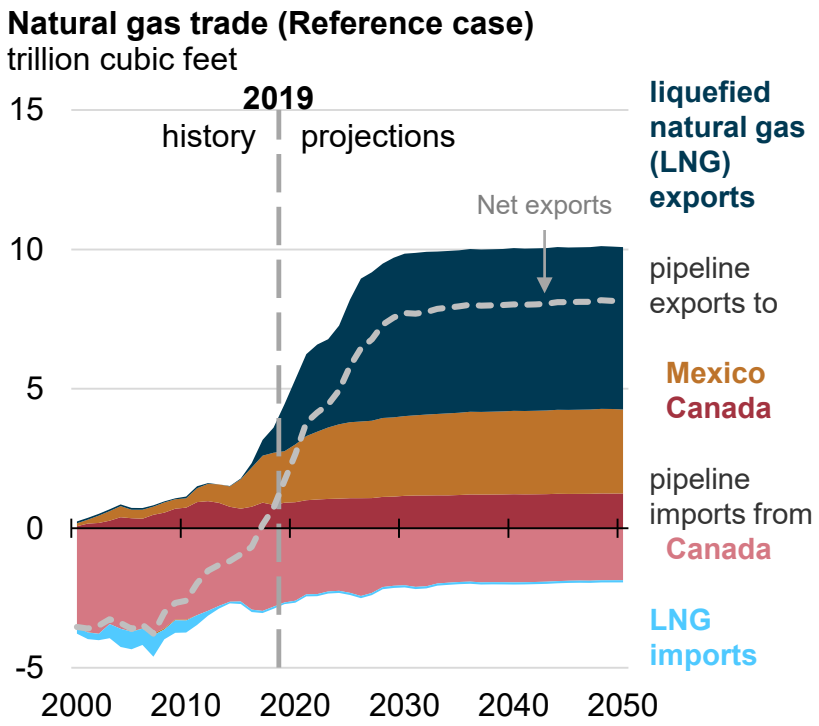
The United States becomes a net exporter of petroleum by volume after 2020

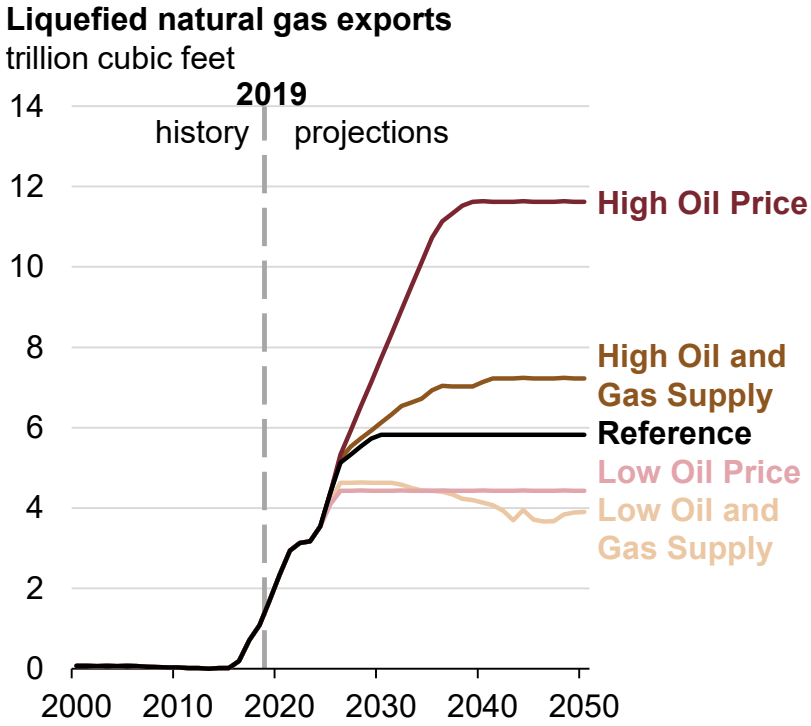
Net exports of U.S. petroleum and other liquids

million barrels per day



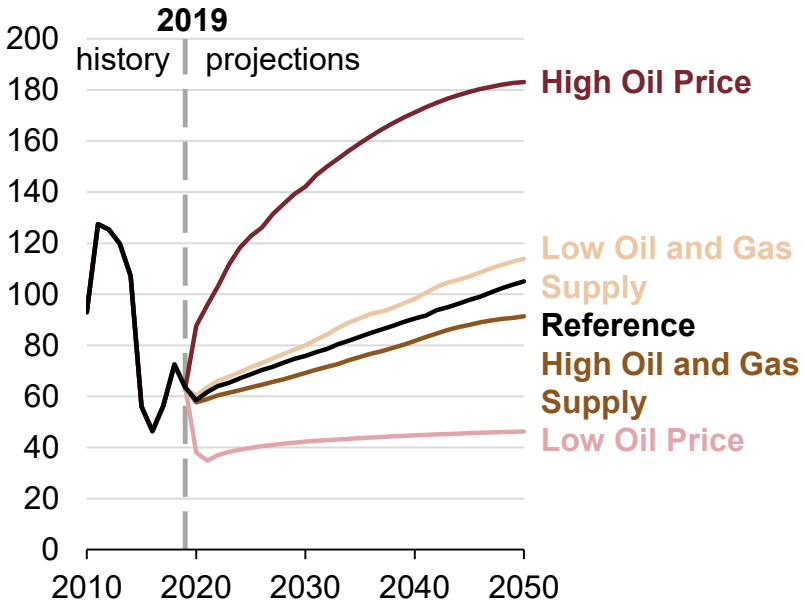
Net exports of natural gas from the United States continue to grow



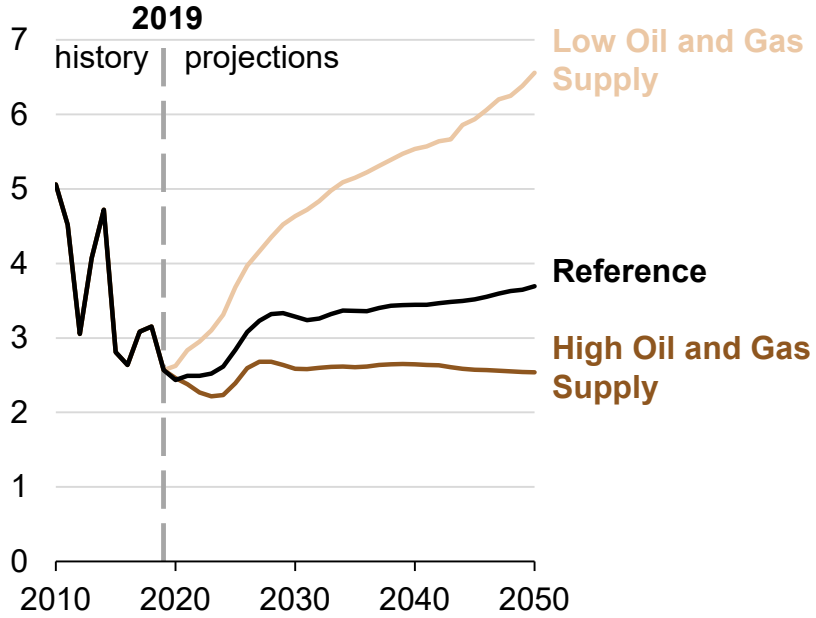


Crude oil and natural gas price assumptions to 2050

North Sea Brent crude oil price
2019 dollars per barrel



Natural gas price at Henry Hub
2019 dollars per MMBtu



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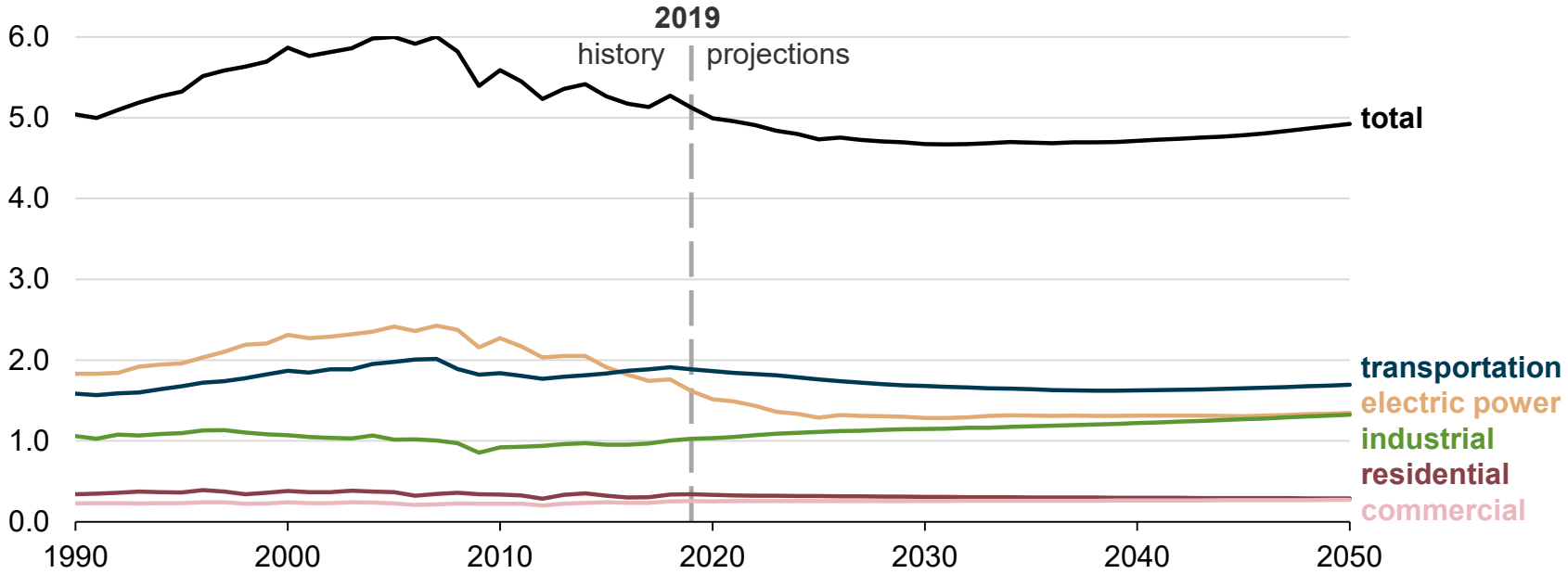
- **Total U.S. energy-related carbon dioxide emissions fall, then resume modest growth in the 2030s, driven largely by increases in energy demand in the transportation and industrial sectors, but remain 4% below 2019 levels in 2050.**

Emissions decline with changing electricity generation fuel mix, then increase with growing consumption in industrial and transportation sectors

U.S. energy-related carbon dioxide emissions by end-use sector (Reference case)
billion metric tons



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Three AEO2020 Issues in Focus articles

- **High and Low Renewables Cost case Issues in Focus – January 29, 2020**
  - Considers the impact of renewable power generation costs on U.S. electricity markets

- **Alternate Policies cases Issues in Focus – March 2020**
  - No Affordable Clean Energy (ACE) Rule case: assumes the existing rule is not implemented
  - Carbon-free Generation Standard case: assumes 50 states achieve a minimum of 50% no net carbon dioxide emission generation
  - Utility Rate Structure cases: assume net distributed photovoltaic generation will be compensated at the wholesale or marginal price of electricity
  - Carbon fee cases: assume carbon allowance fee starts in 2021 and increases 5% per year

Three AEO2020 Issues in Focus articles (Continued)

- **Global Liquefied Natural Gas (LNG) Demand cases Issues in Focus – 3Q2020**
  - Considers the effects different levels of U.S. LNG exports have on domestic natural gas markets

AEO2020 Panel Discussion

Discuss uncertainties that could impact electric power sector production and consumption projections

- Competition between renewables, natural gas, coal and nuclear fuels for electricity generation
- Implications of intermittent renewables capacity additions on grid reliability

Thank you

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