

Natural gas and electricity generation outlook



For
Council of Industrial Boiler Owners
May 11, 2022

By
Corrina Ricker, Naser Ameen, and Lori Aniti

Natural gas markets

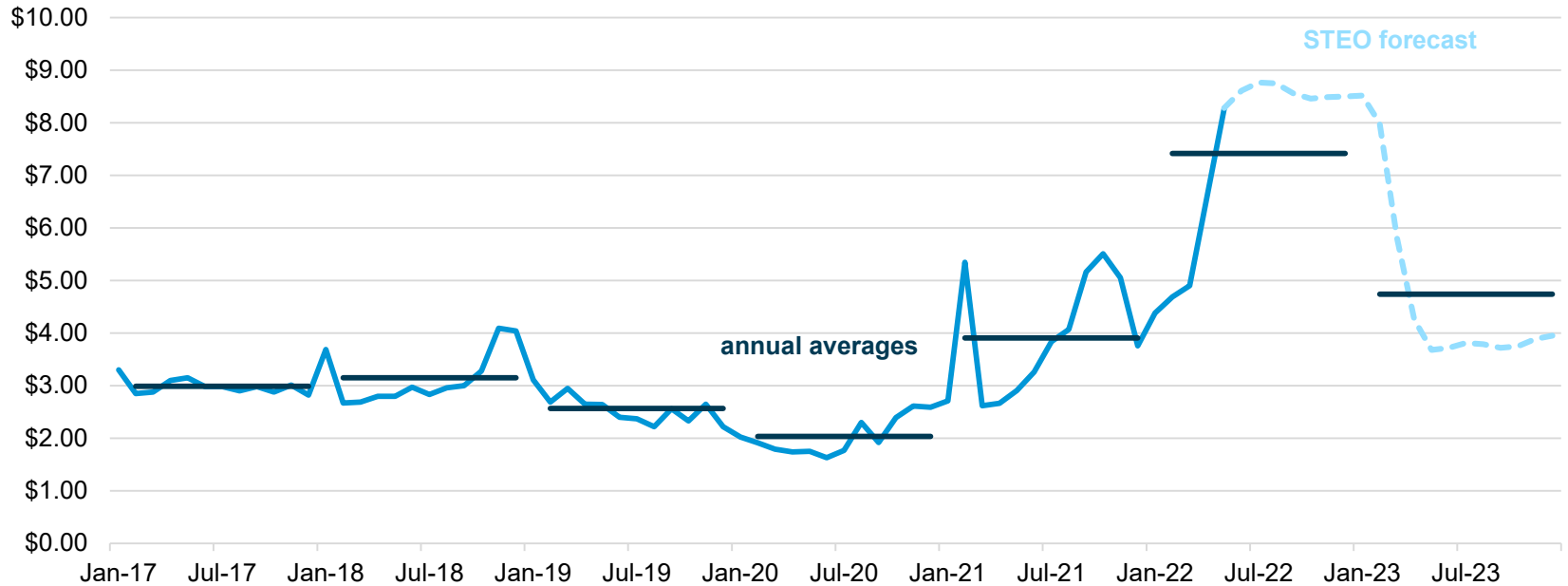
Key takeaways

- According to our *Short-Term Energy Outlook (STEO)*:
 - Natural gas prices will increase in 2022 and then decrease in 2023 as production increases.
 - Consumption of natural gas will increase in 2022 and 2023 from 2021 levels despite higher prices.
 - Net exports of natural gas will increase, led by liquefied natural gas (LNG) exports.
 - Working gas inventories remain below the five-year average until mid-2023.
- According to our *Annual Energy Outlook 2022 (AEO2022)*:
 - Natural gas prices decline from 2021 to 2050 in the Reference and High Oil and Gas Supply cases and increase in the Low Oil and Gas Supply case.
 - Consumption of natural gas in the industrial sector grows the most on a volume basis from 2021 to 2050 in the Reference case, overtaking consumption in the electric power sector.

Henry Hub spot price will average over \$7/MMBtu in 2022 and then decrease to \$4.74/MMBtu in 2023

Henry Hub spot price

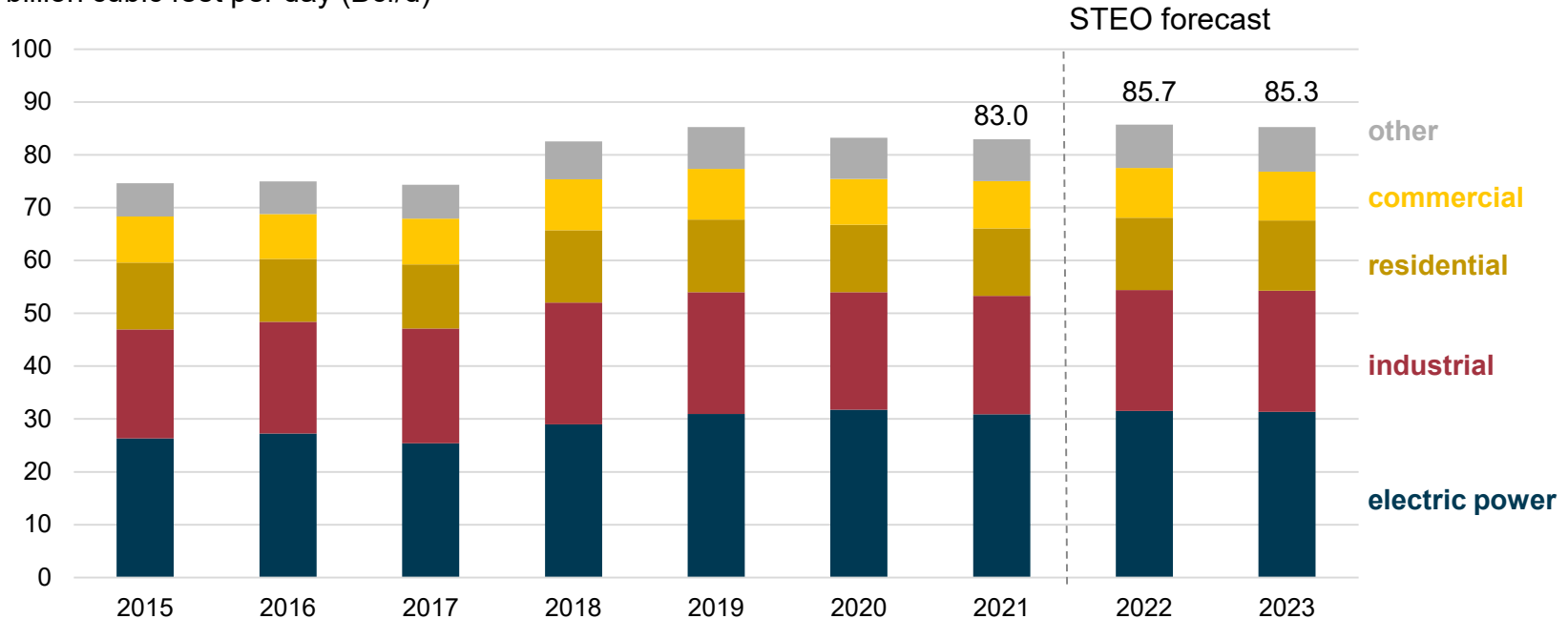
dollars per million British thermal units (\$/MMBtu)



Source: U.S. Energy Information Administration, *Short-Term Energy Outlook (STEO)* May 2022

U.S. consumption of natural gas is expected to increase in 2022 and decrease slightly in 2023

Annual U.S. consumption of natural gas by sector
billion cubic feet per day (Bcf/d)

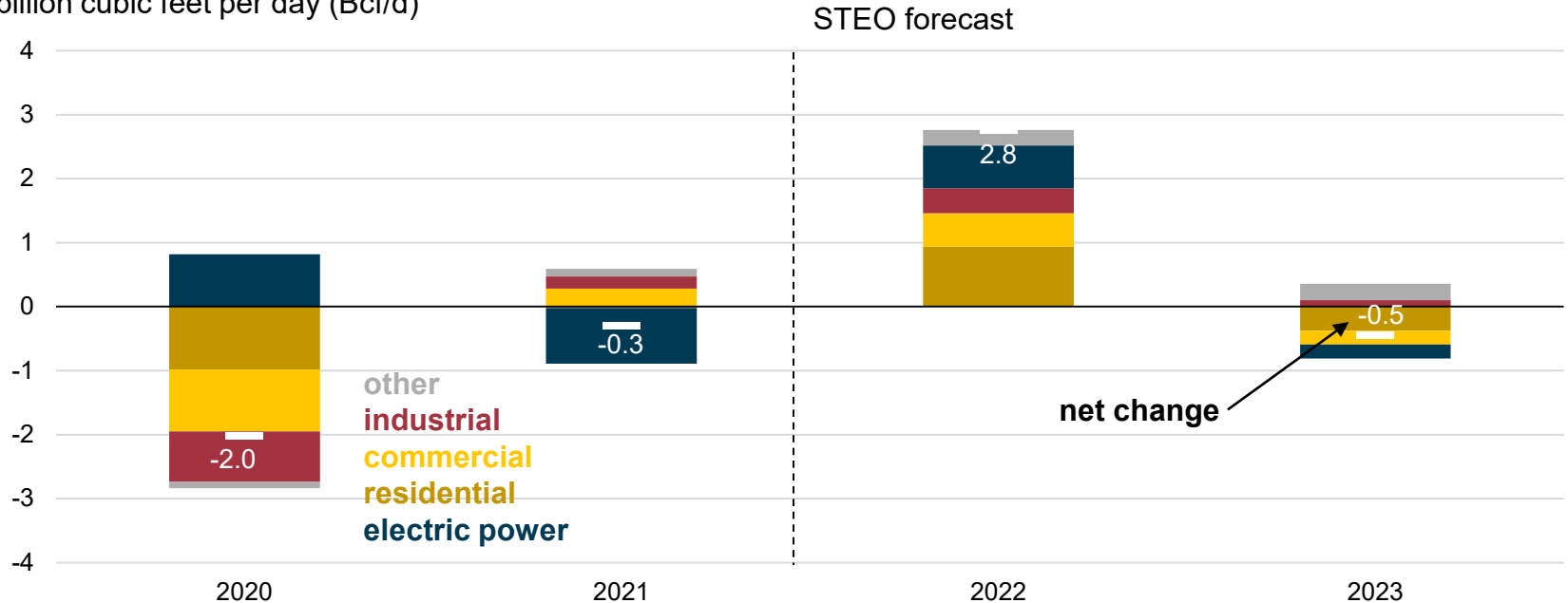


Source: U.S. Energy Information Administration, *Short-Term Energy Outlook (STEEO)* May 2022

Consumption of natural gas increases in all sectors in 2022—but decreases in the residential, commercial, and electric power sectors in 2023

Year-over-year change in U.S. natural gas consumption

billion cubic feet per day (Bcf/d)

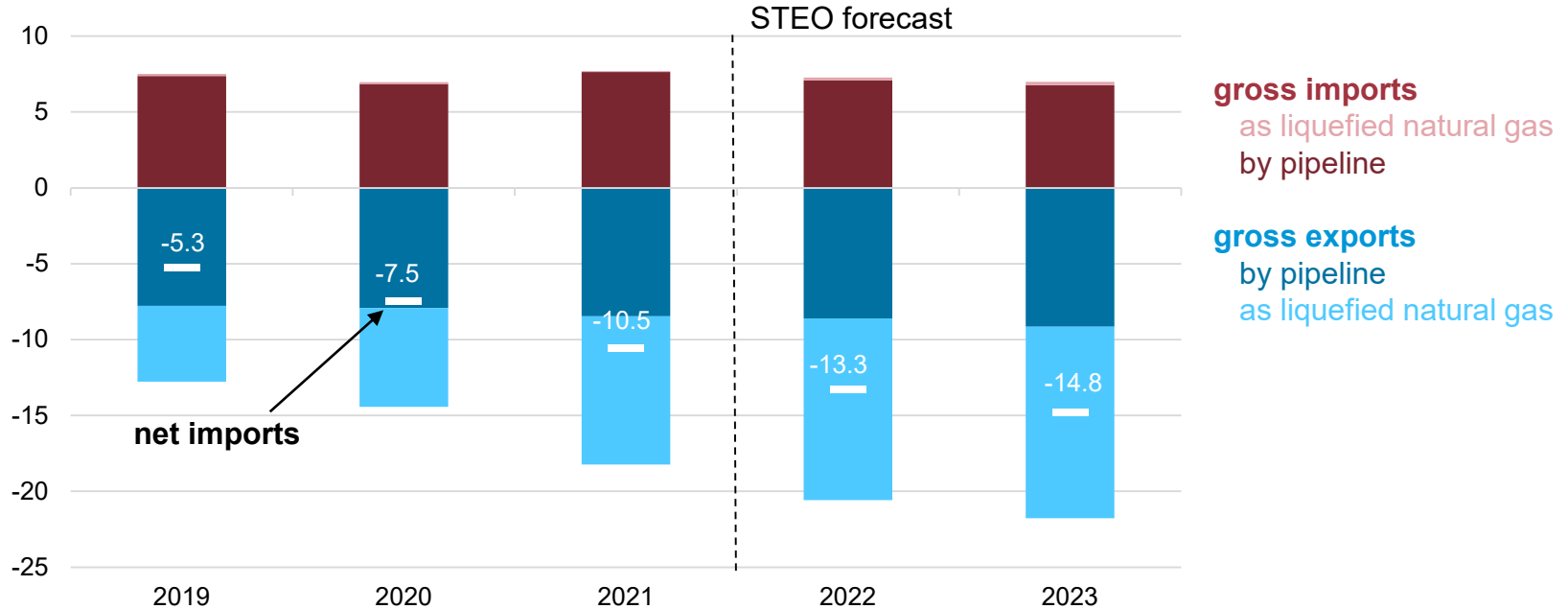


Source: U.S. Energy Information Administration, *Short-Term Energy Outlook (STEO) May 2022*

U.S. natural gas pipeline and liquefied natural gas exports increase in 2022 and 2023

U.S. natural gas trade

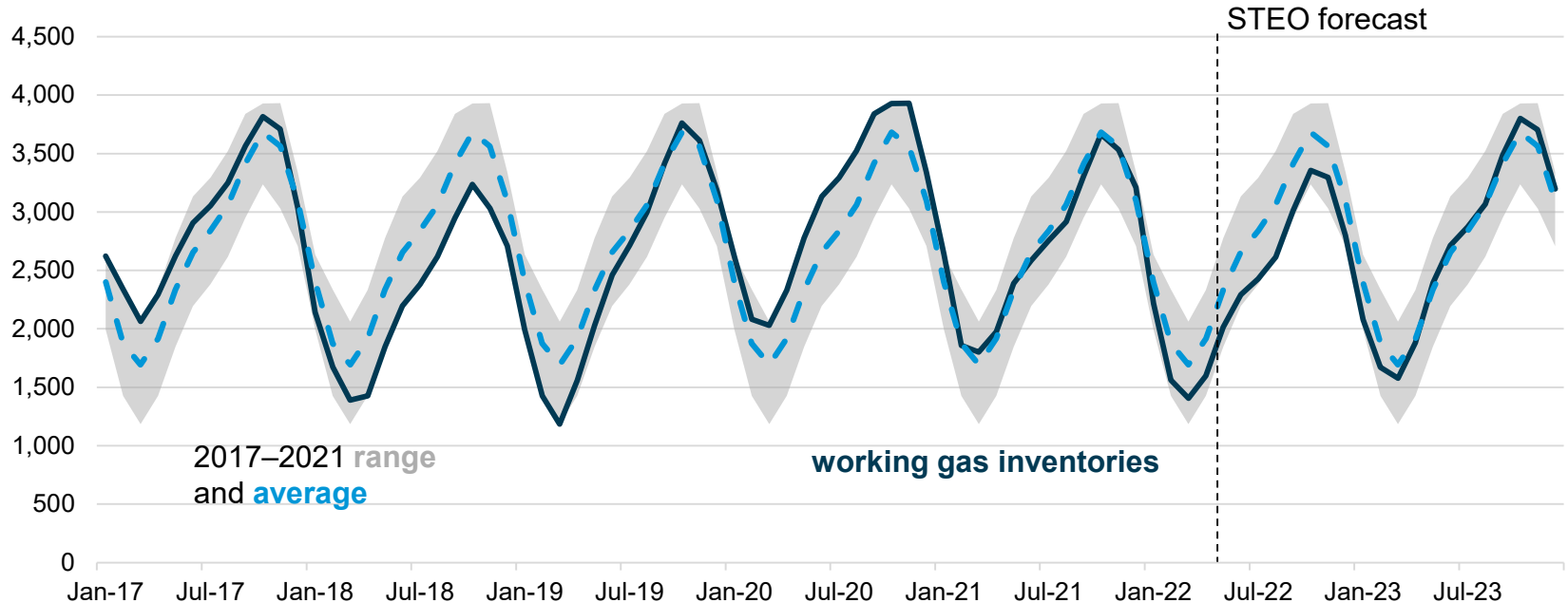
billion cubic feet per day (Bcf/d)



Source: U.S. Energy Information Administration, *Short-Term Energy Outlook (STEO) May 2022*

Working natural gas inventories remain below the five-year average until mid-2023

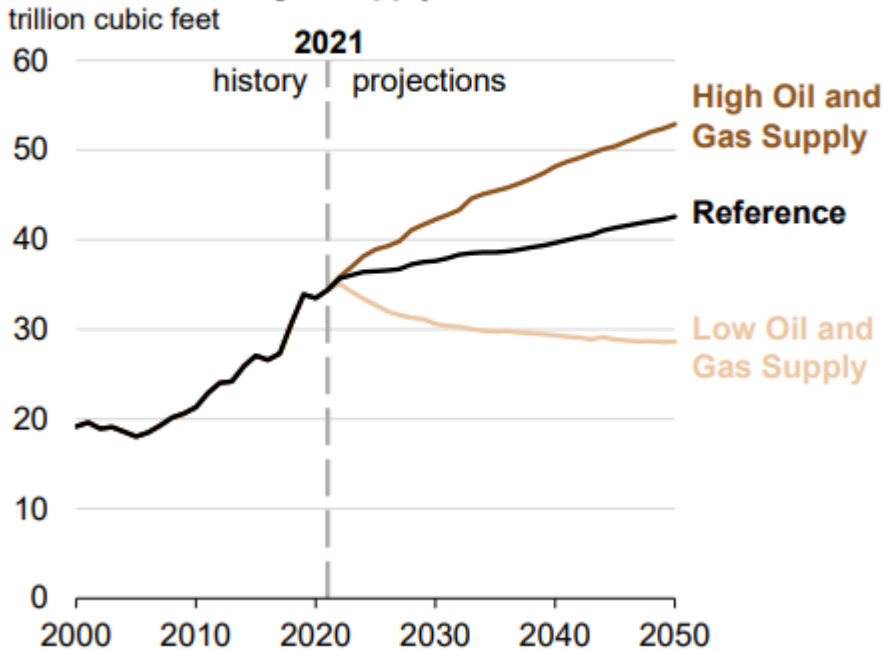
U.S. working natural gas inventories
billion cubic feet



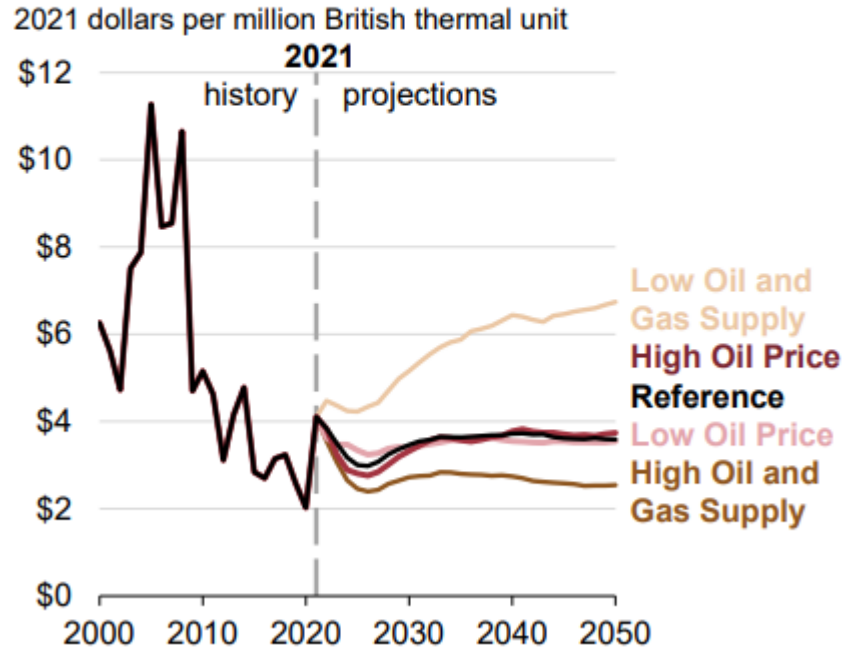
Source: U.S. Energy Information Administration, *Short-Term Energy Outlook (STEO)* May 2022

U.S. natural gas production and prices

U.S. dry natural gas production
AEO2022 oil and gas supply cases



Natural gas spot price at Henry Hub
AEO2022 side cases



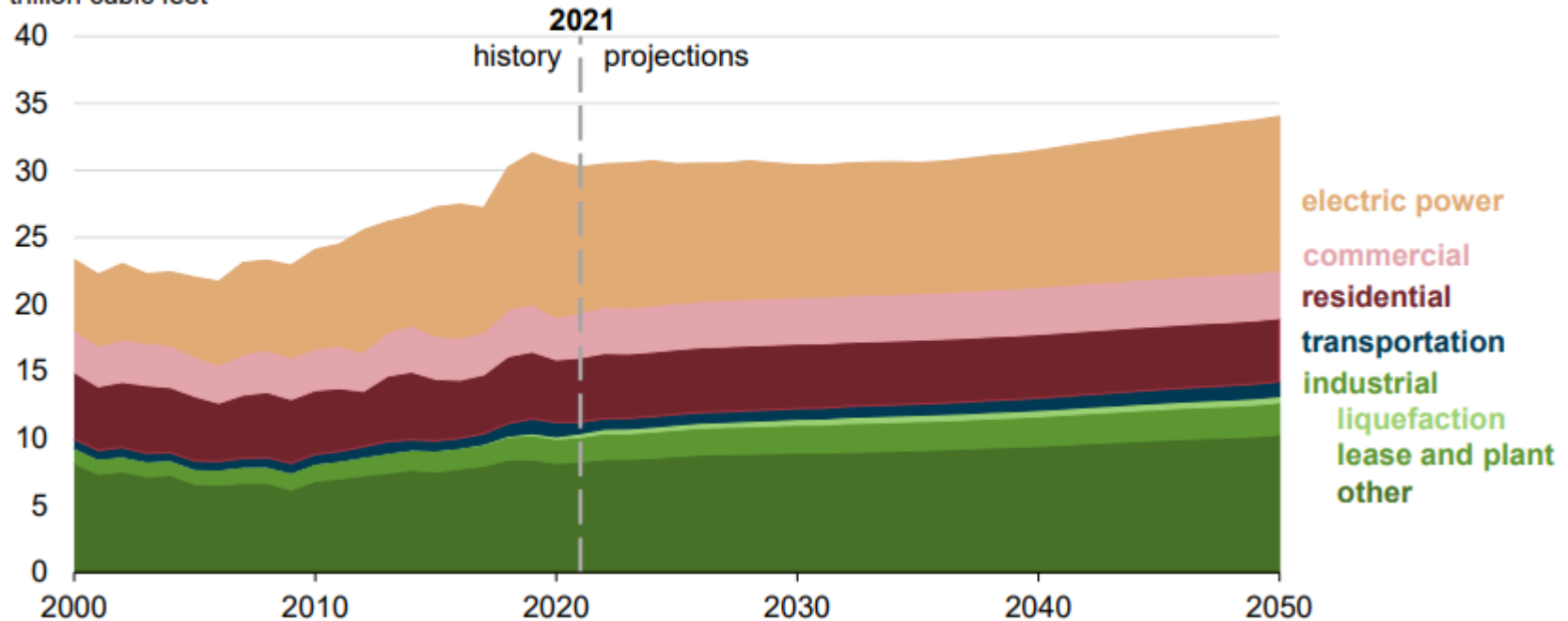
Source: U.S. Energy Information Administration, *Annual Energy Outlook 2022* (AEO2022)

U.S. natural gas consumption by sector

Natural gas consumption

AEO2022 Reference case

trillion cubic feet



Source: U.S. Energy Information Administration, *Annual Energy Outlook 2022* (AEO2022)

Links and contact information

- Email: corrina.ricker@eia.gov
- *Short Term Energy Outlook* | eia.gov/outlooks/steo/
- *Annual Energy Outlook* | eia.gov/outlooks/aeo/
- Relevant *Today in Energy* and *In the News* articles:
 - [Calcasieu Pass, the seventh U.S. liquefied natural gas export terminal, begins production](#)
 - [The United States ended the winter with the least natural gas in storage in three years](#)
 - [Net withdrawals from working gas stocks exceeded the five-year average during the 2020–21 heating season](#)
 - [Natural gas consumption in the U.S. industrial sector grows through 2050, driven by the bulk chemicals industry](#)

Natural gas production

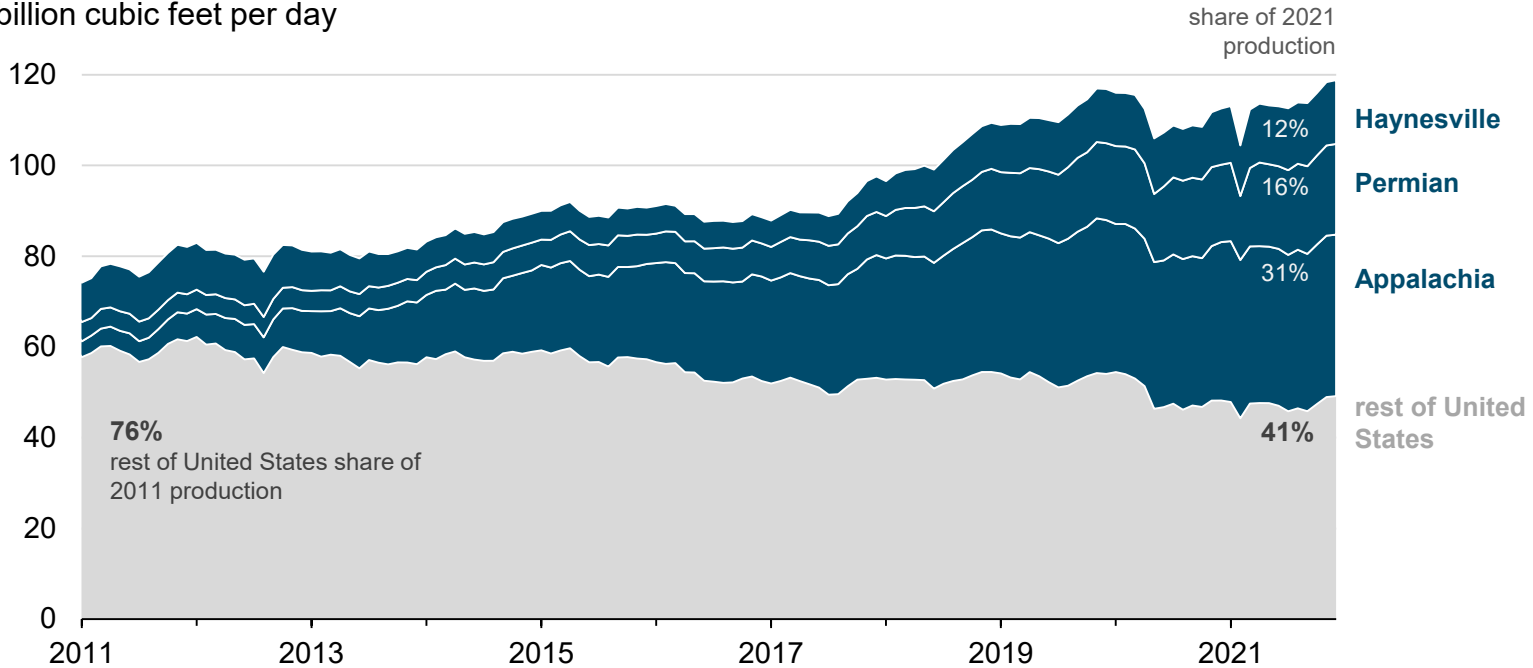
U.S. marketed natural gas production will rise in 2022 and 2023

- Marketed natural gas production has been generally rising during the past decade. In 2020, production fell slightly by 0.34 billion cubic feet per day (Bcf/d) from 96.25 Bcf/d in 2019.
- In 2021 production rose by 2.5 Bcf/d to 98.4 Bcf/d. We estimate 2022 and 2023 production will rise by 3.4 and 5.7 Bcf/d respectively.
- Appalachia, Permian, and Haynesville regions accounted for most of the production and growth in the past, and will account for future growth as well.
- Downside risks to forecast – labor shortage, input costs, operator restraints, price volatility, and uncertainty.

Haynesville, Permian, and Appalachia were the main growth regions in 2021

Monthly U.S. natural gas gross withdrawals (Jan 2011–Dec 2021)

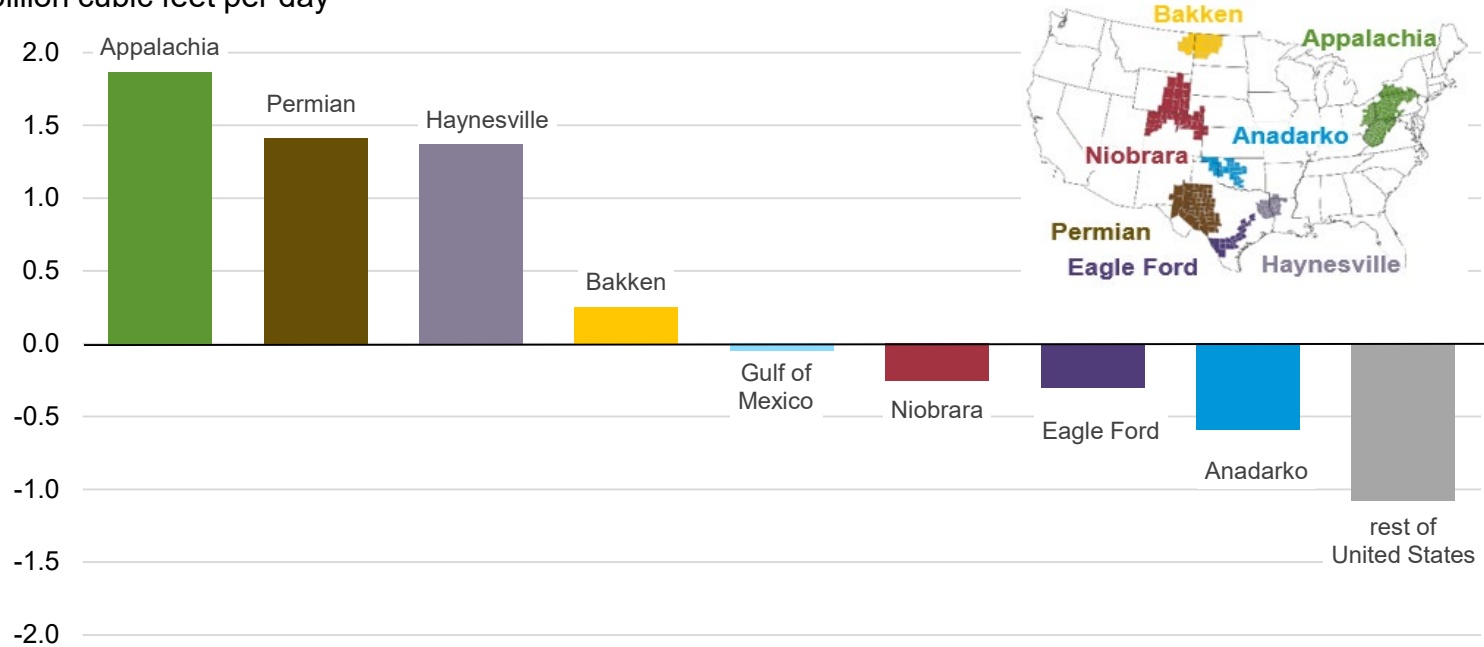
billion cubic feet per day



Source: U.S. Energy Information Administration, *Short Term Energy Outlook (STEO) May 2022*

Growth in other regions was marginal in 2021

Annual change in U.S. natural gas production by region (2020–2021)
billion cubic feet per day



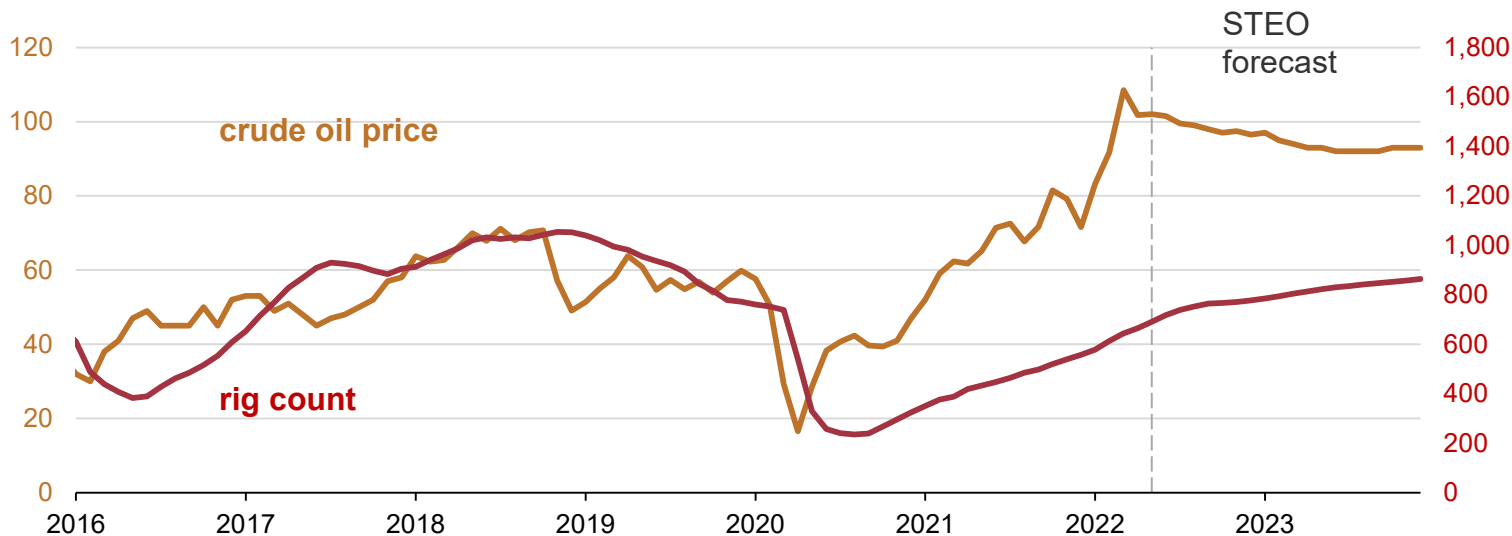
Source: U.S. Energy Information Administration, *Short Term Energy Outlook (STEO)* May 2022

Rig count remains low even as the WTI price rises close to \$100 per barrel

West Texas Intermediate crude oil price and L48 rig count (2015-2022)

West Texas Intermediate crude oil price
dollars per barrel

rig count
number of rigs

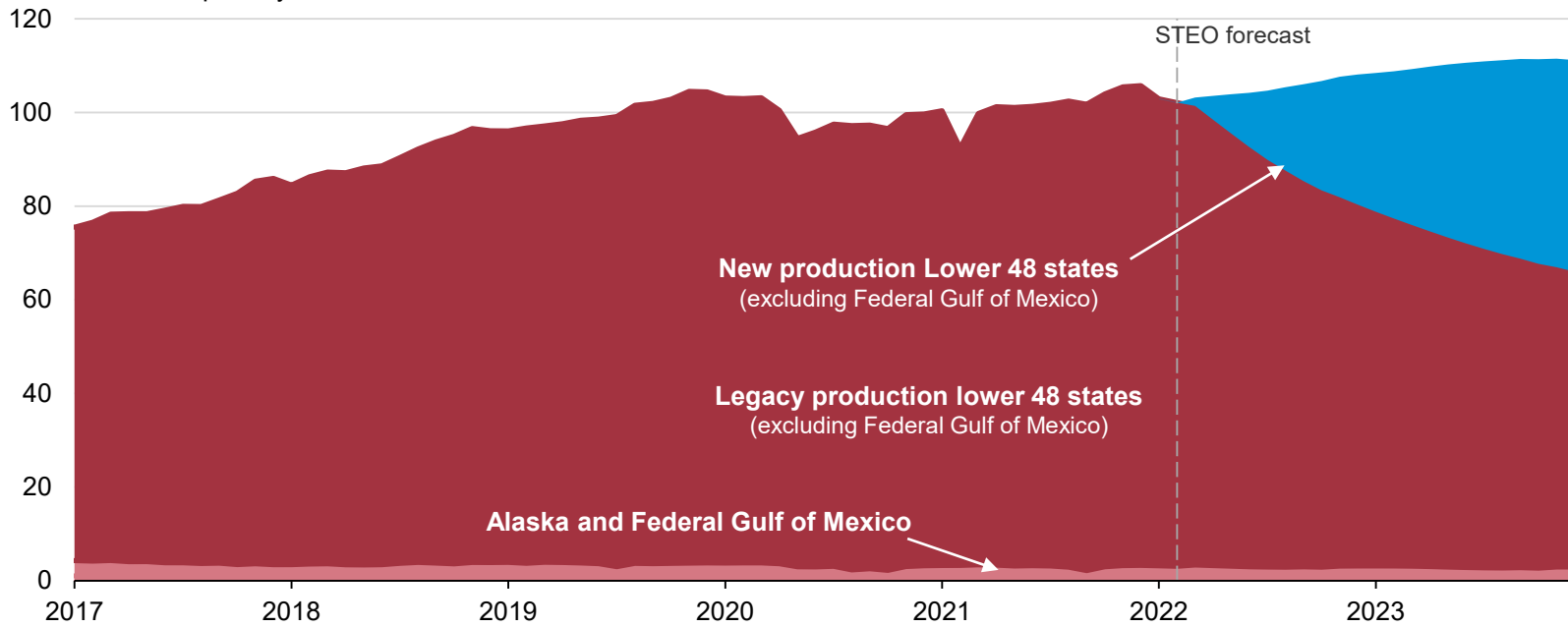


Source: U.S. Energy Information Administration, *Short Term Energy Outlook (STEO)* May 2022

U.S. marketed natural gas production expected to rise in 2022 and 2023

U.S. monthly marketed natural gas production (2017-2023)

billion cubic feet per day



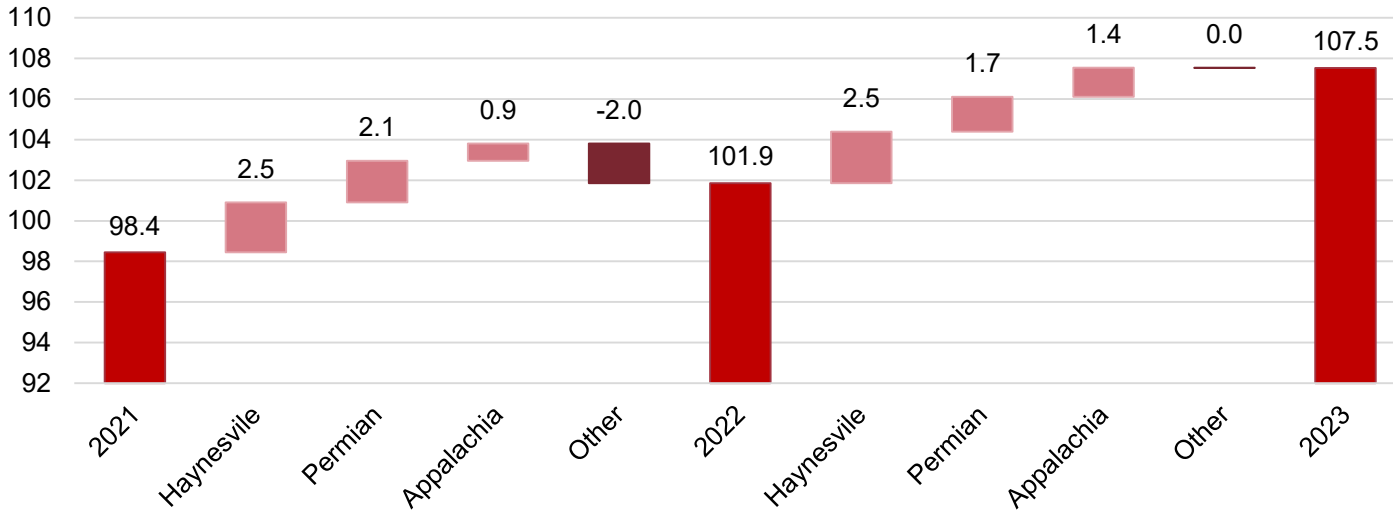
Source: U.S. Energy Information Administration, *Short-Term Energy Outlook (STEO)* May 2022

Haynesville, Permian, and Appalachia will account for 60% of the production in the next two years

Lower 48 change in marketed gas production by select STEO regions



billion cubic feet per day



Source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, May 2022

Some downside risks to watch for

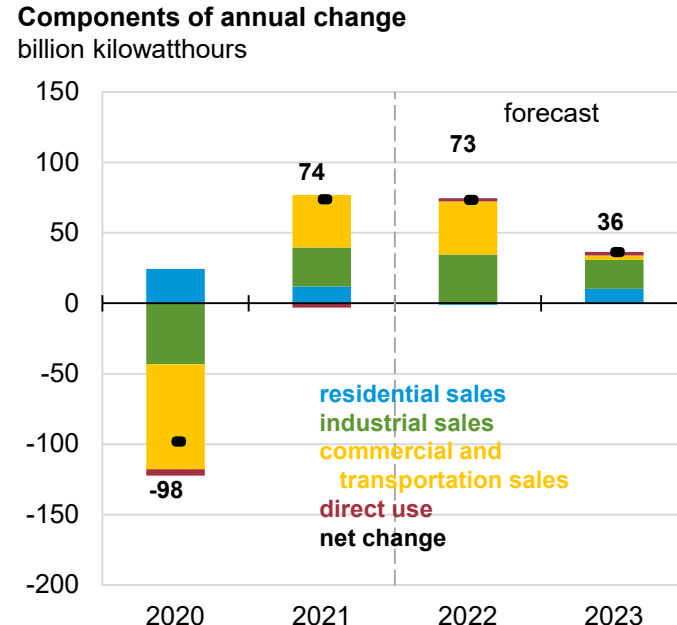
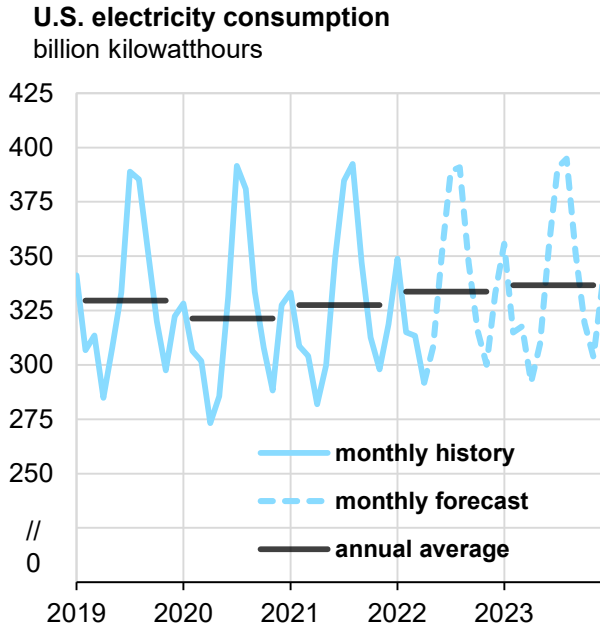
- Labor shortage
- Input costs
- Supply chain issues
- Capital restraint
- Pipeline constraints
- Price volatility

Links and contact information

- Email: naser.ameen@eia.gov
- Short Term Energy Outlook | eia.gov/outlooks/steo/
- Annual Energy Outlook | eia.gov/outlooks/aeo/
- Relevant *Today in Energy* and *In the News* articles:
 - [Three producing regions drove U.S. natural gas production in 2021](#)
 - [Average well productivity has increased in the Marcellus formation](#)
 - [Average well productivity has increased in the Haynesville formation](#)

Electricity markets

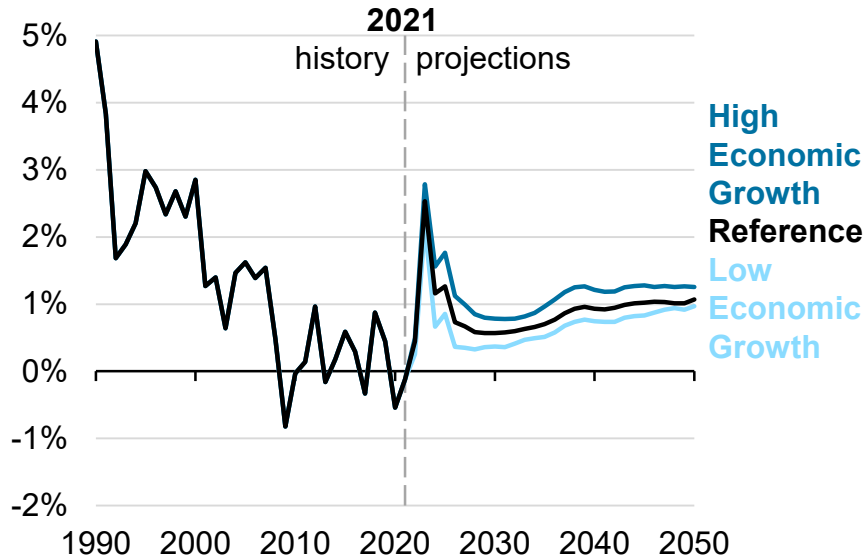
Electricity consumption and change by customer sector



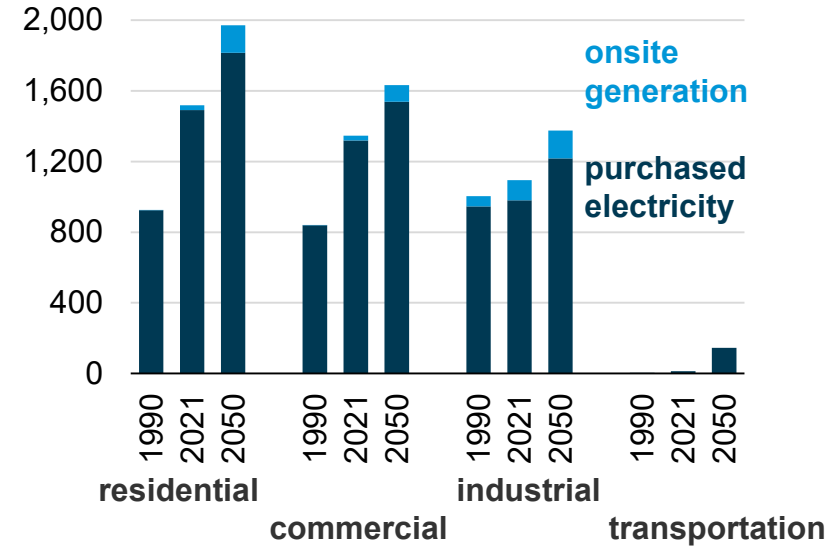
Source: U.S. Energy Information Administration, *Short Term Energy Outlook (STEO)* May 2022

The U.S. annual average electricity growth rate remains below 1% across much of the projection period in the Reference case

U.S. electricity use growth rate, three-year rolling average
AEO2022 economic growth cases
 percentage growth



U.S. electricity use by end-use sector
AEO2022 Reference case
 billion kilowatthours

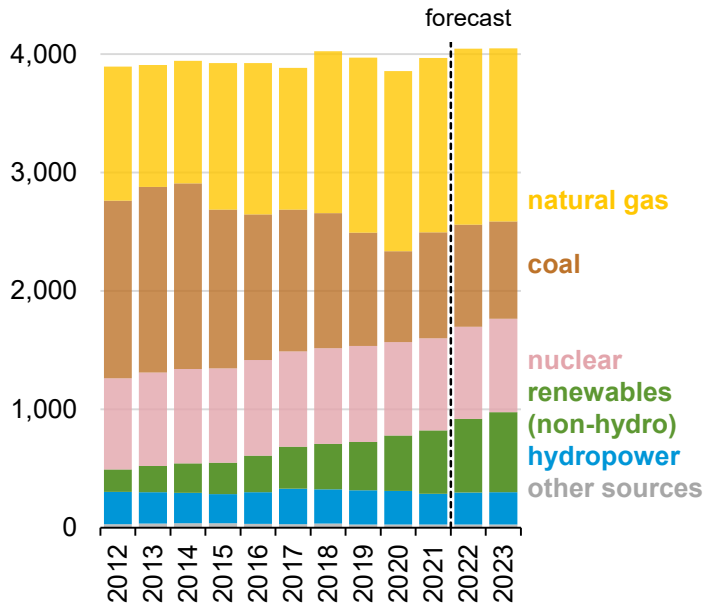


Source: U.S. Energy Information Administration, *Annual Energy Outlook 2022* (AEO2022)

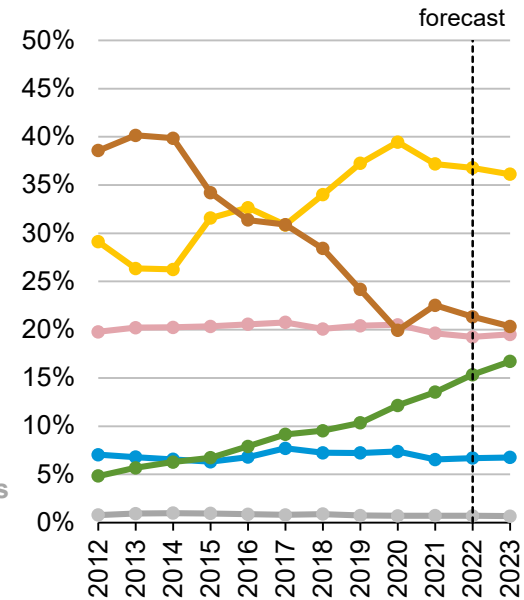
U.S. electricity generation and shares by source—Short Term Energy Outlook

U.S. electricity generation by source, all sectors

billion kilowatthours



percent share



Source: U.S. Energy Information Administration, *Short Term Energy Outlook (STEO)* May 2022

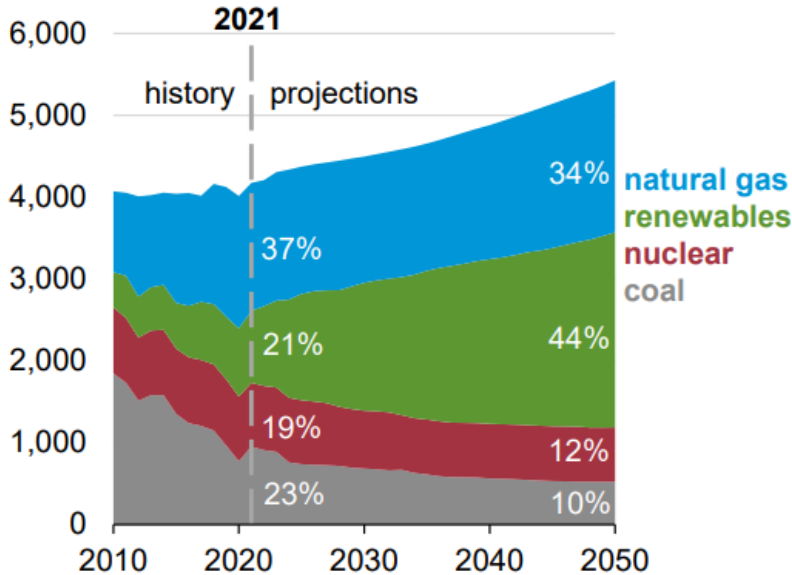




U.S. electricity generation and shares from selected fuels and renewable sources

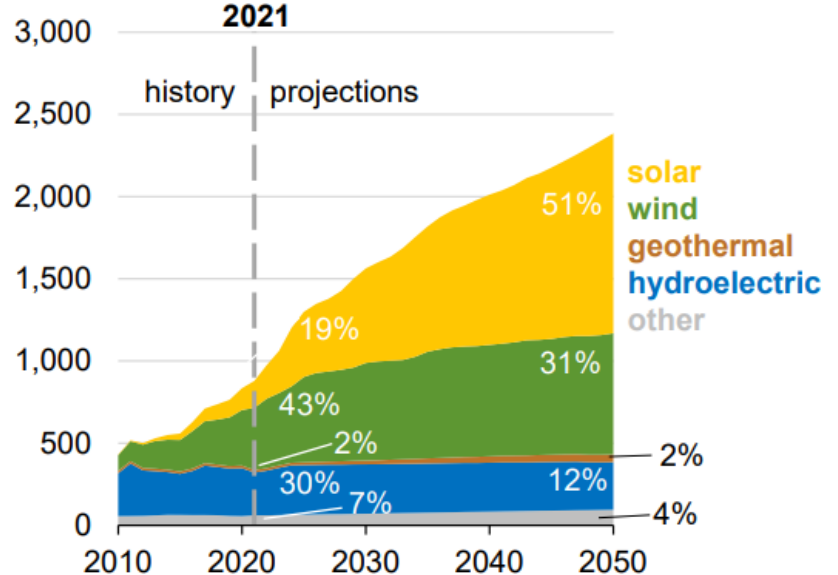
U.S. electricity generation from selected fuels
AEO2022 Reference case

billion kilowatthours



U.S. renewable electricity generation, including end use
AEO2022 Reference case

billion kilowatthours

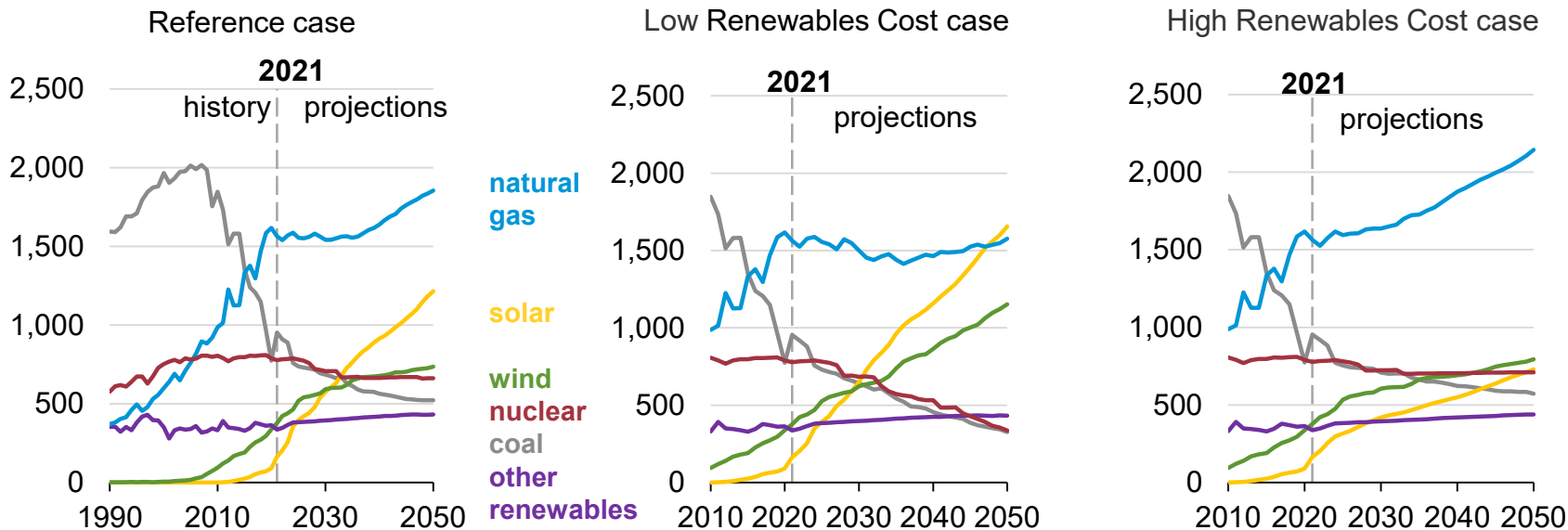


Source: U.S. Energy Information Administration, *Annual Energy Outlook 2022* (AEO2022)

Renewables consumption for electricity generation grows significantly in all cases, even as it trades off with nuclear, coal, and natural gas

U.S. electricity generation

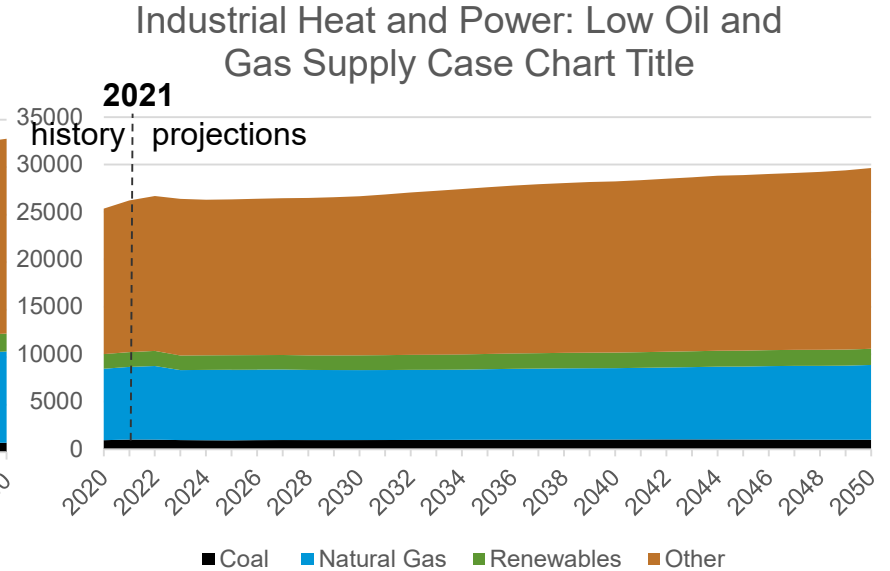
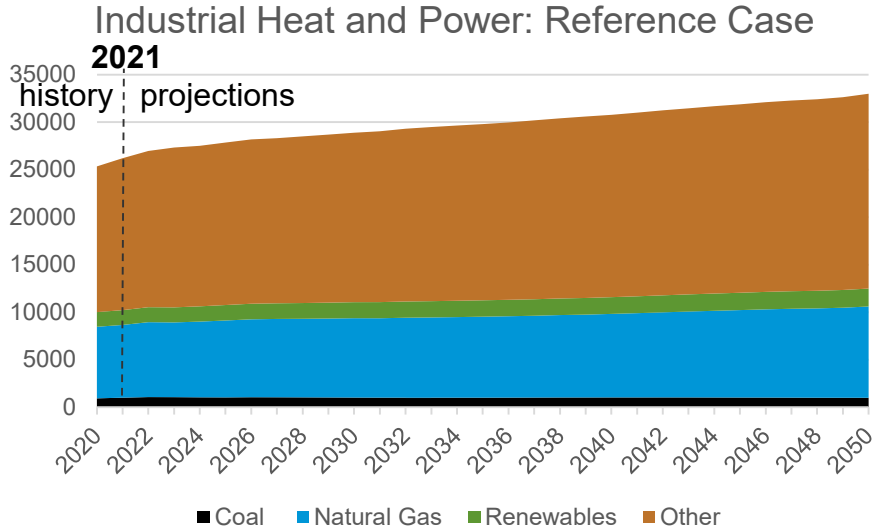
billion kilowatthours



Note: Other renewables category includes electricity generation from hydroelectric, geothermal, wood, and other biomass sources.

Source: U.S. Energy Information Administration, *Annual Energy Outlook 2022* (AEO2022)

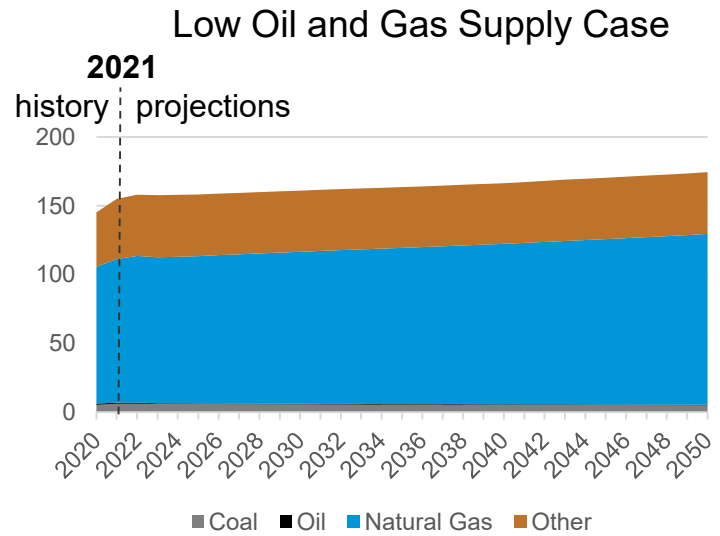
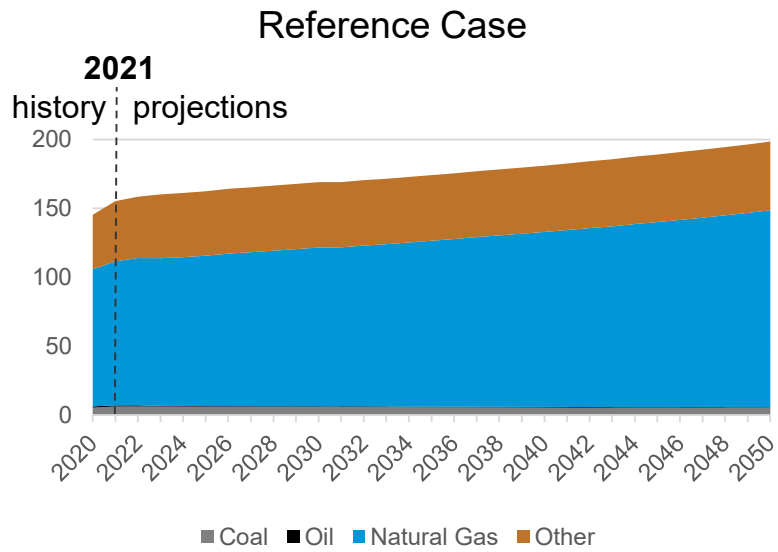
Fuel for Industrial Heat and Power (trillion btu)



Source: U.S. Energy Information Administration, *Annual Energy Outlook 2022* (AEO2022)

Note: Other includes mostly petroleum products

Non-Utility Generation: Industrial Combined Heat and Power (billion kwh)



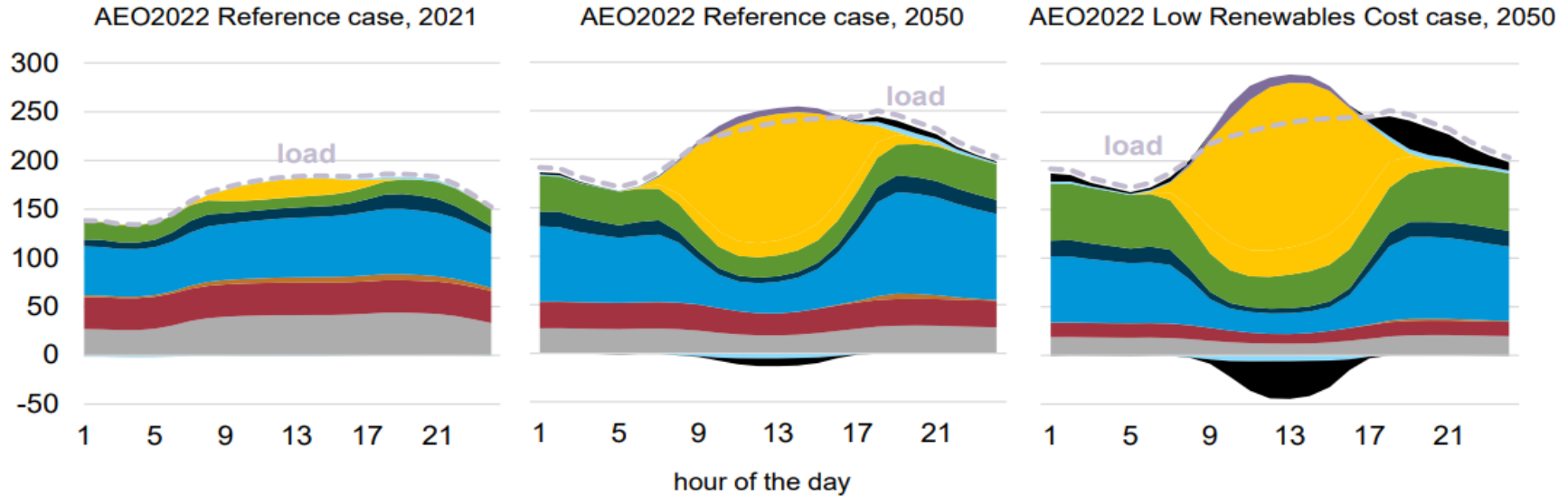
Source: U.S. Energy Information Administration, *Annual Energy Outlook 2022* (AEO2022)

Note: Other includes renewables, petroleum, and synthetic gas products

U.S. electricity generation by source

Hourly U.S. electricity generation and load by fuel for selected cases and representative years

billion kilowatthours



curtailment battery storage pumped storage solar wind hydroelectric natural gas combined-cycle natural gas and oil peakers nuclear coal

Note: Negative generation represents charging of energy storage technologies such as pumped hydro and battery storage. Hourly dispatch estimates are illustrative and are developed to determine curtailment and storage operations; final dispatch estimates are developed separately and may differ from total utilization as this figure shows. Solar includes both utility-scale and end-use photovoltaic electricity generation

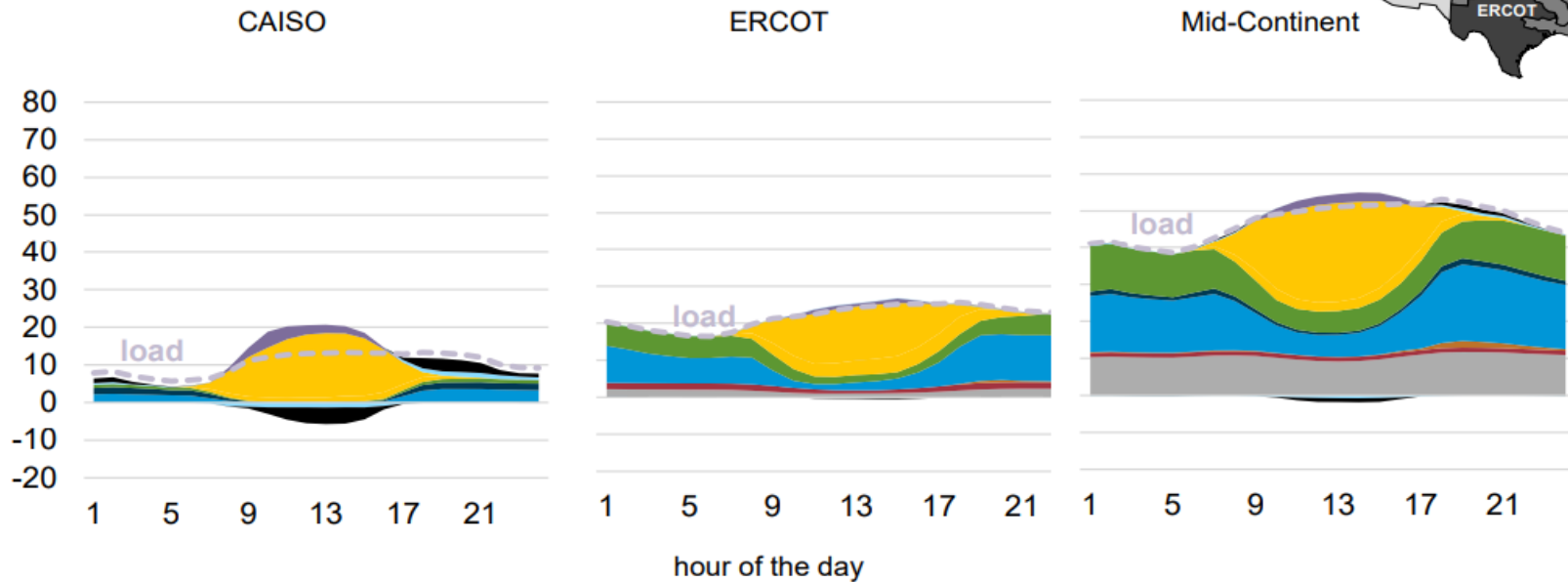
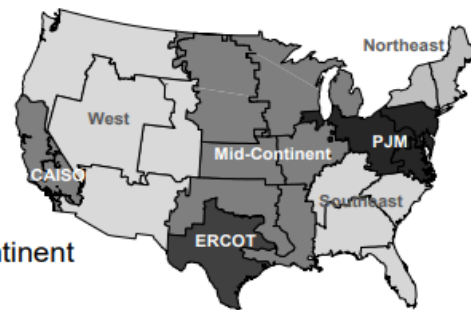
Source: U.S. Energy Information Administration, *Annual Energy Outlook 2022* (AEO2022)

Regional U.S. electricity generation by source

Hourly U.S. electricity generation and load by fuel type and region in 2050

AEO2022 Reference case

billion kilowatthours

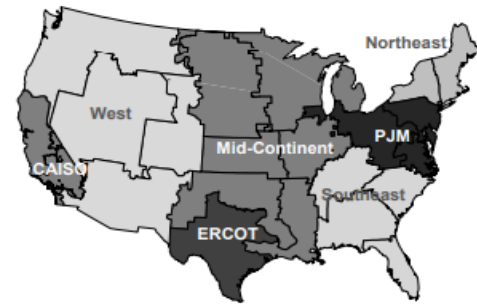


curtailment battery storage pumped storage solar wind hydroelectric natural gas combined-cycle natural gas and oil peakers nuclear coal

Source: U.S. Energy Information Administration, *Annual Energy Outlook 2022* (AEO2022)

Regional U.S. electricity generation by source

Hourly U.S. electricity generation and load by fuel type and region in 2050
AEO2022 Reference case
 billion kilowatthours

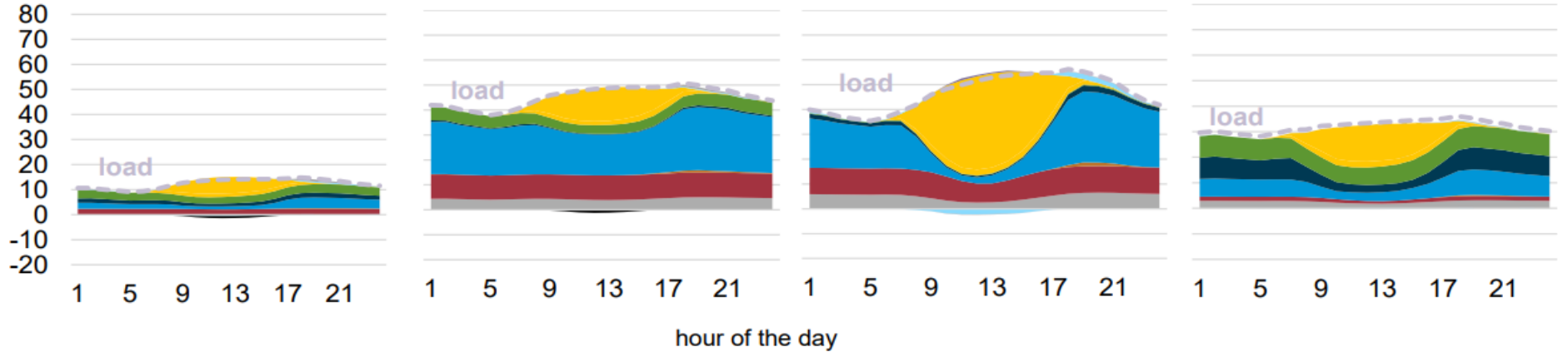


Northeast

PJM

Southeast

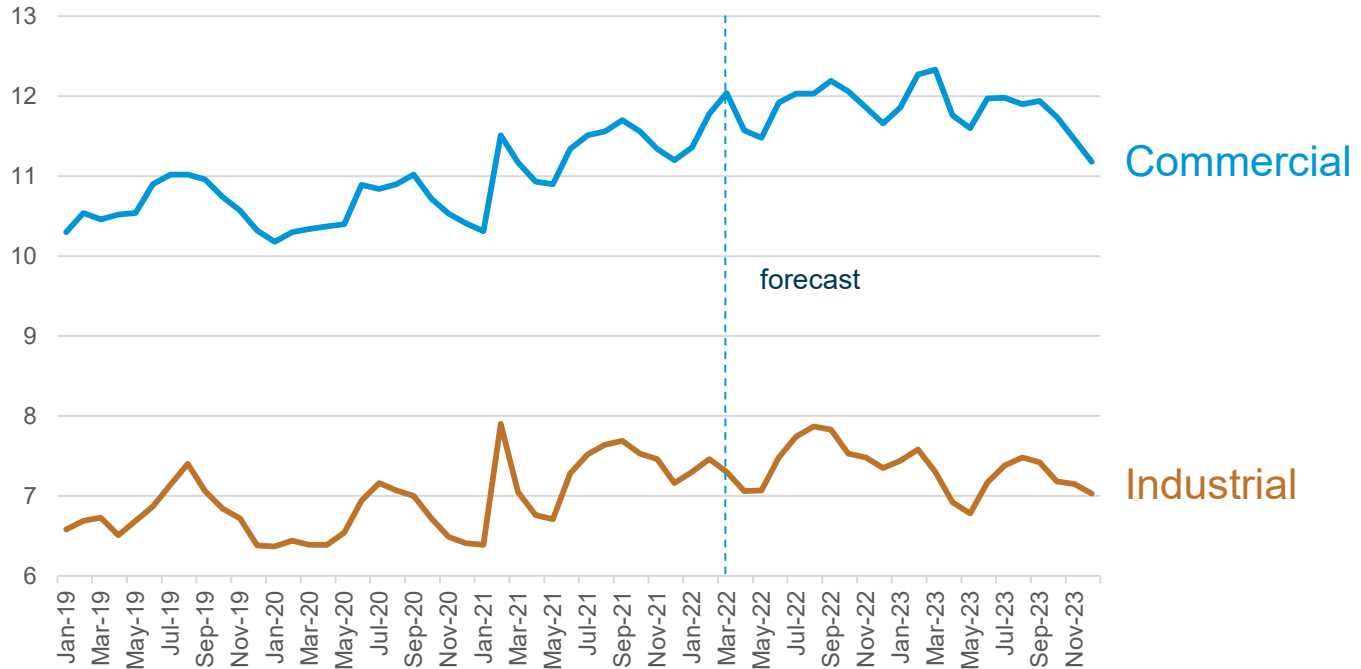
West



curtailment battery storage pumped storage solar wind hydroelectric natural gas combined-cycle natural gas and oil peakers nuclear coal

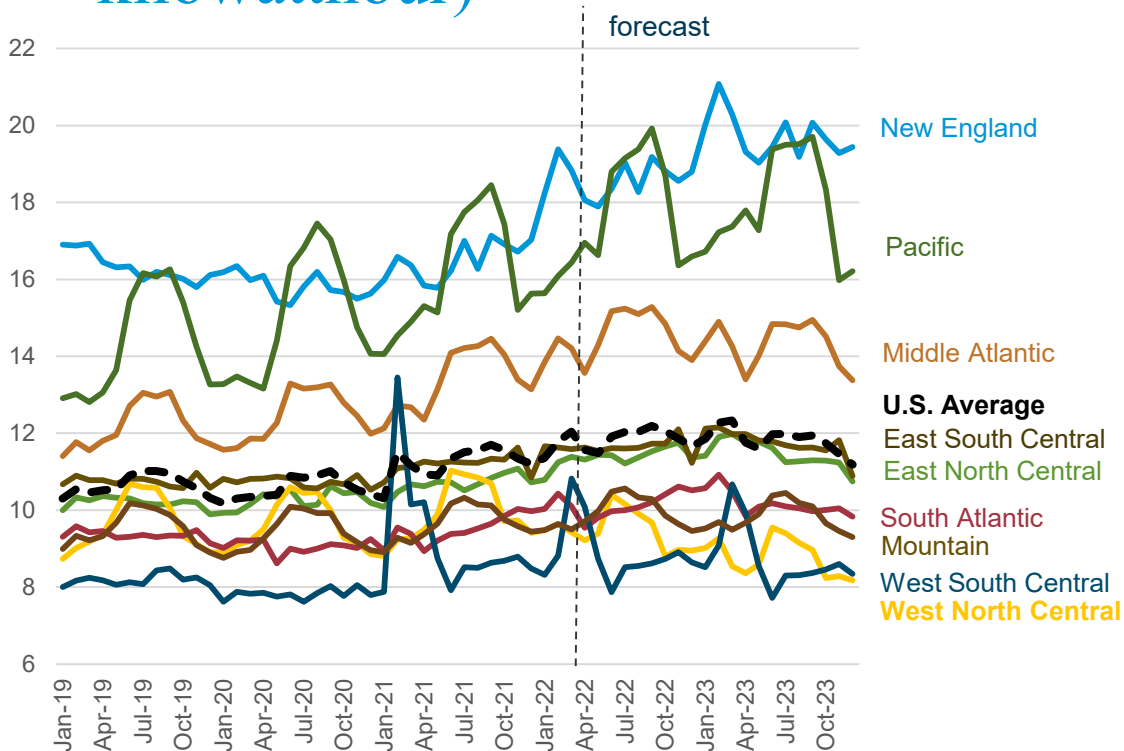
Source: U.S. Energy Information Administration, *Annual Energy Outlook 2022* (AEO2022)

Short Term Energy Outlook: Monthly Commercial and Industrial Electricity Price Forecasts (cents per kilowatthour)



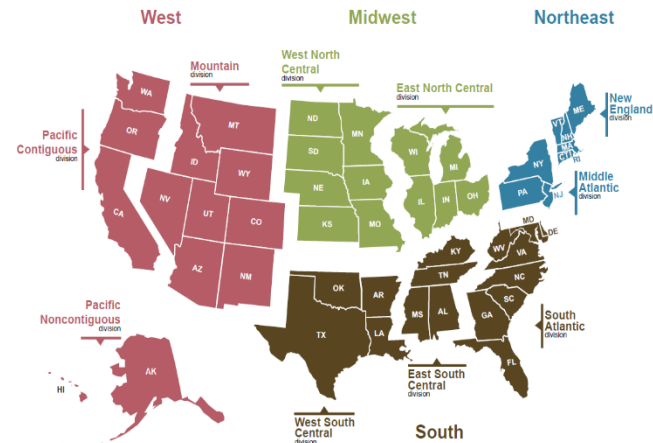
Source: U.S. Energy Information Administration, *Short-Term Energy Outlook (STEO)* May 2022

STEO Regional Commercial Electricity Prices (cents per kilowatthour)



Source: U.S. Energy Information Administration, *Short-Term Energy Outlook* (STEO) May 2022

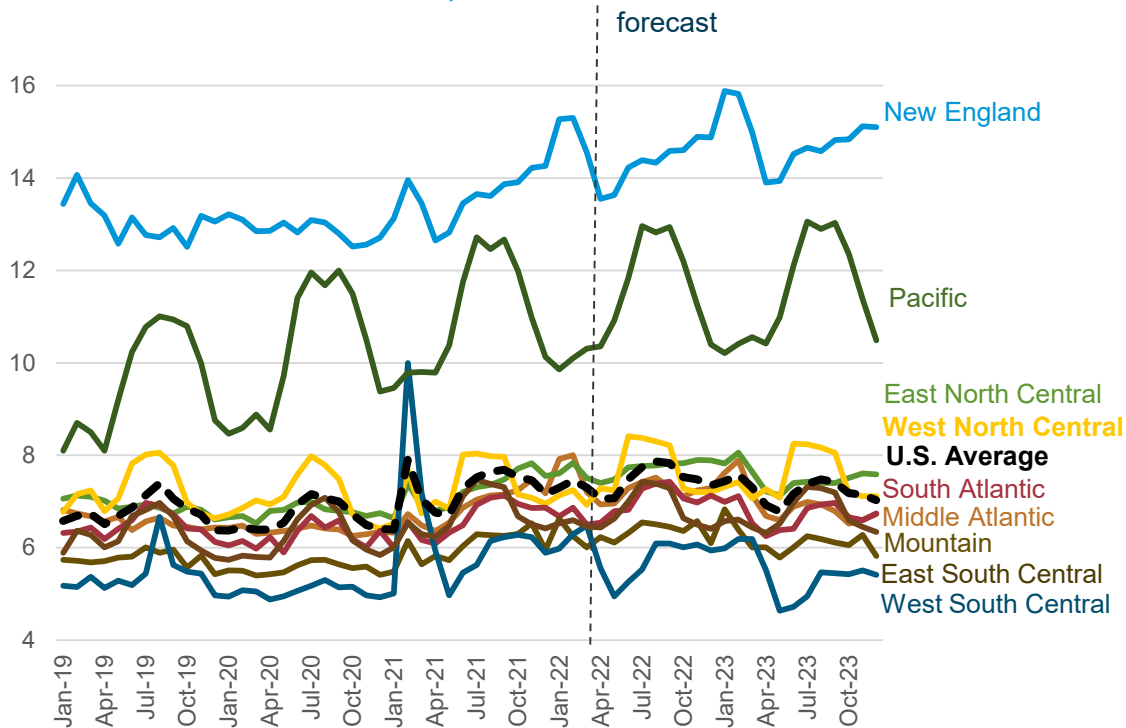
U.S. Census regions and divisions



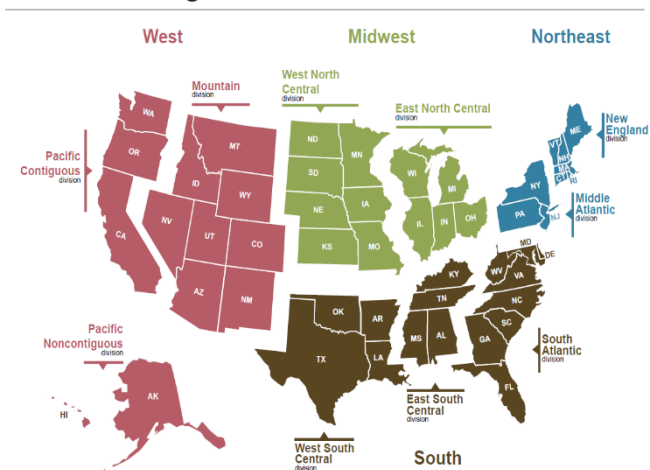
Source: U.S. Energy Information Administration, *Short-Term Energy Outlook*



STEO Regional Industrial Electricity Prices (cents per kilowatthour)



U.S. Census regions and divisions

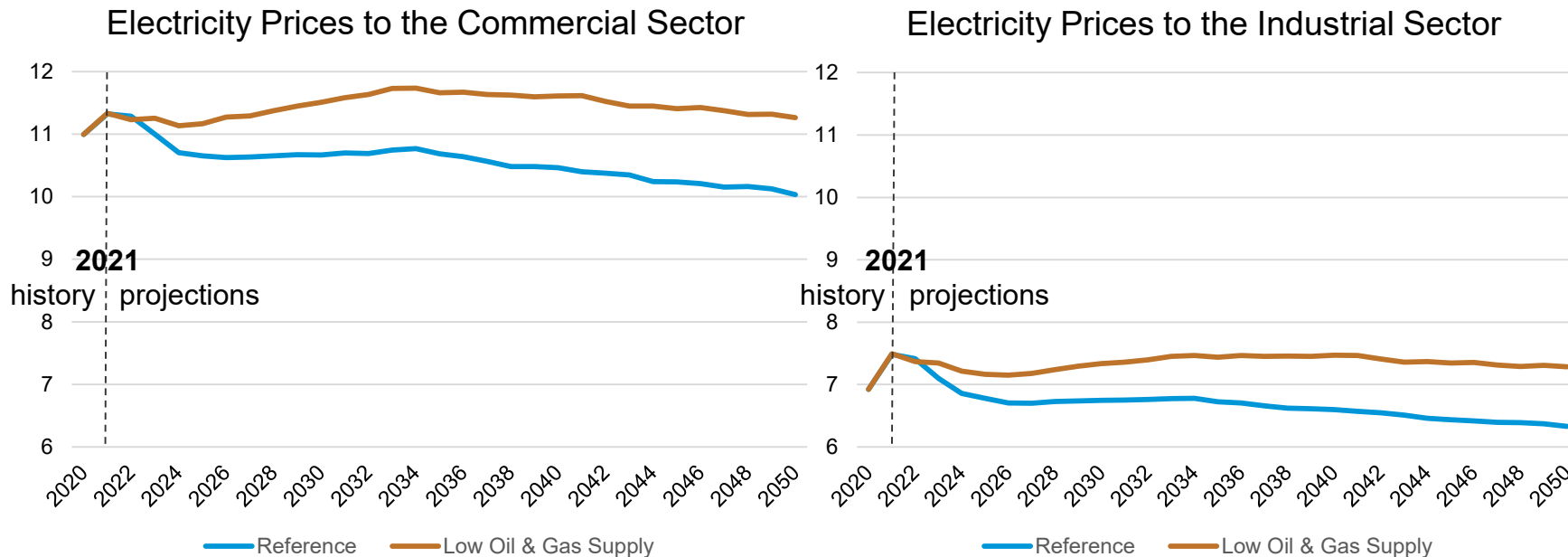


Source: U.S. Energy Information Administration, *Short-Term Energy Outlook*



Source: U.S. Energy Information Administration, *Short-Term Energy Outlook* (STEO) May 2022

Annual Energy Outlook Electricity Price Projections (2021 cents per kilowatthour)



Source: U.S. Energy Information Administration, *Annual Energy Outlook 2022* (AEO2022)

Questions?

Electricity sources, products, and contact information

- EIA Electricity Page | <https://www.eia.gov/electricity/>
- Electricity Data | <https://www.eia.gov/electricity/data.php>
- *Electric Power Monthly* | <https://www.eia.gov/electricity/monthly/>
- *Electric Power Annual* | <https://www.eia.gov/electricity/annual/>
- *Annual Energy Outlook* | www.eia.gov/outlooks/aeo/
- *International Energy Outlook* | <https://www.eia.gov/outlooks/ieo/>
- *Short-Term Energy Outlook* | <https://www.eia.gov/outlooks/steo/>
- Lori Aniti | lori.aniti@eia.gov