

Short-Term Energy Outlook

STEO

August 2024



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Short-Term Energy Outlook

Overview

U.S. energy market indicators	2023	2024	2025
Brent crude oil spot price (dollars per barrel)	\$82	\$84	\$86
Retail gasoline price (dollars per gallon)	\$3.50	\$3.40	\$3.30
U.S. crude oil production (million barrels per day)	12.9	13.2	13.7
Natural gas price at Henry Hub (dollars per million British thermal units)	\$2.50	\$2.30	\$3.30
U.S. liquefied natural gas gross exports (billion cubic feet per day)	12	12	14
Shares of U.S. electricity generation			
Natural gas	42%	42%	40%
Coal	17%	16%	16%
Renewables	21%	23%	25%
Nuclear	19%	19%	19%
U.S. GDP (percentage change)	2.5%	2.4%	1.6%
U.S. CO₂ emissions (billion metric tons)	4.8	4.8	4.8

Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, August 2024

- Crude oil prices.** Although crude oil prices have fallen recently, we continue to expect crude oil prices will rise in the second half of 2024 (2H24). The Brent crude oil spot price ended July at \$81 per barrel (b), compared with an average for the month of \$85/b. We expect the Brent price will return to between \$85/b and \$90/b by the end of the year. Rising crude oil prices in our forecast are the result of falling global oil inventories. We estimate global oil inventories decreased by 0.4 million barrels per day (b/d) in 1H24 and will fall by 0.8 million b/d in 2H24. Inventory withdrawals stem in part from ongoing [OPEC+ production cuts](#). Although we expect crude oil prices to rise in the coming months, our forecast for the annual average Brent crude oil price in 2025 is down from a forecast of \$88/b in our July STEO, owing mostly to reduced oil consumption.
- World oil consumption.** We forecast that global consumption of liquid fuels will increase by 1.1 million b/d in 2024 and 1.6 million b/d in 2025, down from a forecast of 1.8 million b/d in our previous STEO. Most of the reduction in our oil consumption forecast is in China, where we expect slowing economic growth will continue to reduce diesel consumption.
- Jet fuel consumption.** Jet fuel consumption is rising based on increased air travel. In our August STEO, we forecast 3% more U.S. jet fuel consumption in 2024 [compared with 2023](#) and growth of another 3% in 2025. In our forecast, U.S. jet fuel consumption exceeds 2019's pre-pandemic level in 2025. We expect that relatively strong jet fuel consumption will cause jet fuel prices to rise by more than prices for other fuels in 2025.

- Natural gas markets.** Following a very hot July across much of the United States, we expect slightly milder weather in August will reduce natural gas consumption. We forecast natural gas consumed to generate electricity generation will average 46 billion cubic feet per day (Bcf/d) in August, [down 2% from July](#). Dry natural gas production in our forecast for August stays close to its level in July. Because of falling consumption and flat production, we expect the Henry Hub price to [stay relatively low](#), remaining below \$2.50/MMBtu through October. However, we expect seasonal increases in consumption for space heating, along with a ramp up in liquefied natural gas (LNG) exports from new facilities in Texas and Louisiana, will push the Henry Hub price to average about \$3.10/MMBtu from November through March.
- Electricity prices.** Residential electricity prices are increasing more slowly because of lower natural gas prices. We expect electricity prices will rise by about 1% this year for residential customers, which would be the lowest percentage growth since 2020. Natural gas prices started falling in 2023, and the resulting lower costs of producing electricity are now being reflected in retail electricity prices as regulatory authorities approve new rates.

Notable forecast changes

Current forecast: August 6, 2024; previous forecast: July 9, 2024	2024	2025
World liquid fuels consumption growth (million barrels per day)	1.1	1.6
Previous forecast	1.1	1.8
Change	0.0	-0.2
Brent crude oil spot price (dollars per barrel)	84	86
Previous forecast	86	88
Percentage change	-2.2%	-3.0%

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

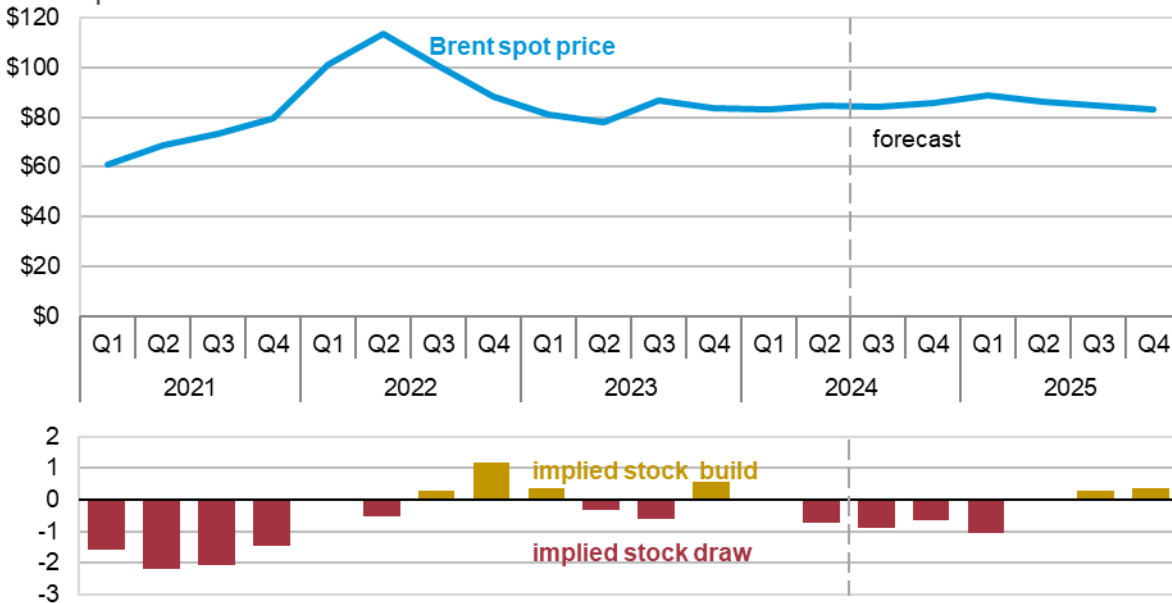
Global Oil Markets

Global oil prices and inventories

The Brent crude oil spot price averaged \$85 per barrel (b) in July, up \$3/b from the average in June. Although the monthly average Brent spot price was higher in July, daily spot prices fell toward the end of the month driven in part by signals that global economic conditions may be slowing, which has the potential to reduce global oil demand growth. Although market concerns about the economy have lowered crude oil prices in recent days, we still expect that the most recent round of [OPEC+ production cuts](#) will reduce global oil inventories over the next three quarters in our forecast and push oil prices higher.

Brent crude oil price and global oil inventory change

dollars per barrel



Data source: U.S. Energy Information Administration, Short-Term Energy Outlook, August 2024



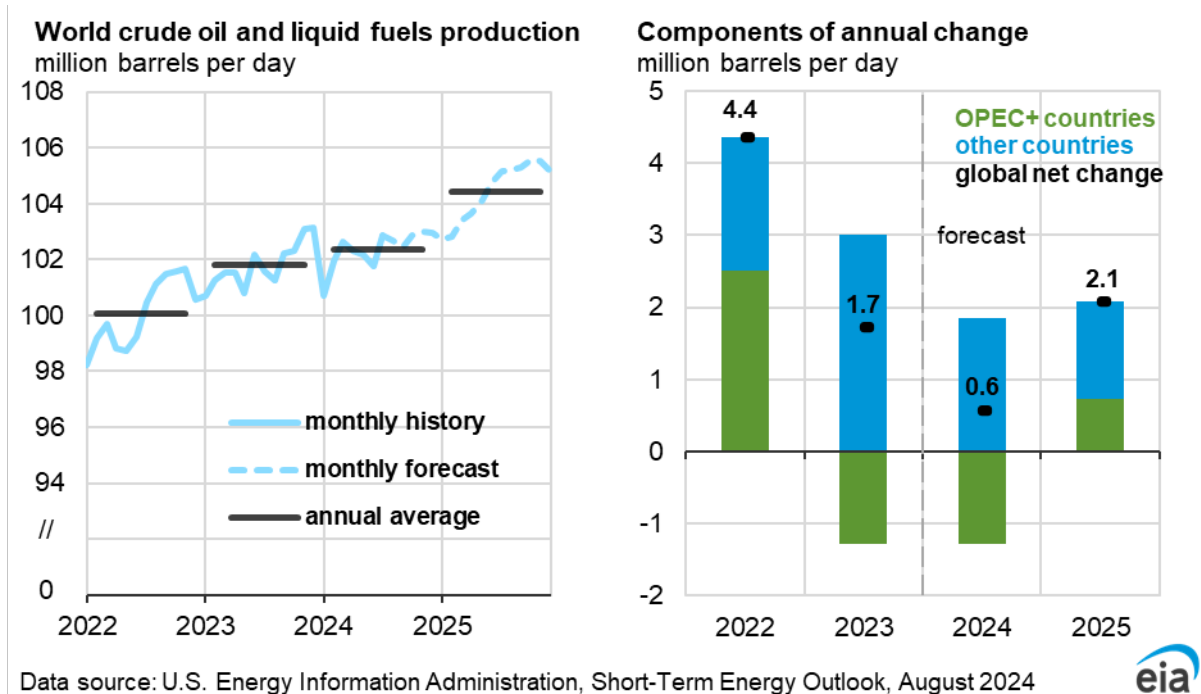
We expect the Brent crude oil spot price will increase from its current level below \$80/b to average \$85/b for the remainder of 2024 and \$89/b in the first quarter of 2025 (1Q25). The main source of this upward price pressure is falling global oil inventories resulting from OPEC+ production cuts. We expect global oil inventories will decrease by an average of 0.8 million barrels per day (b/d) in 2H24, with further declines in 1Q25.

We anticipate that the market will gradually return to moderate inventory builds in mid-2025 after the expiration of voluntary OPEC+ supply cuts in 4Q24 and as forecast production growth from countries outside of OPEC+ begins to outweigh global oil demand growth. We estimate that global oil inventories will increase by an average of 0.3 million b/d in the second half of 2025. We forecast the Brent price will average \$86/b in 2025 and fall to \$83/b by the end of the year.

Global oil production and consumption

Although OPEC+ cuts are limiting world oil production growth, we expect that growth outside of OPEC+ will remain strong. We forecast that global production of petroleum and other liquid fuels will increase by 0.6 million b/d in 2024, the net result of a 1.3 million-b/d decline from OPEC+ countries and a more than 1.8 million b/d-increase from countries outside of OPEC+, led by growth in the United States, Canada, [Guyana](#), and Brazil.

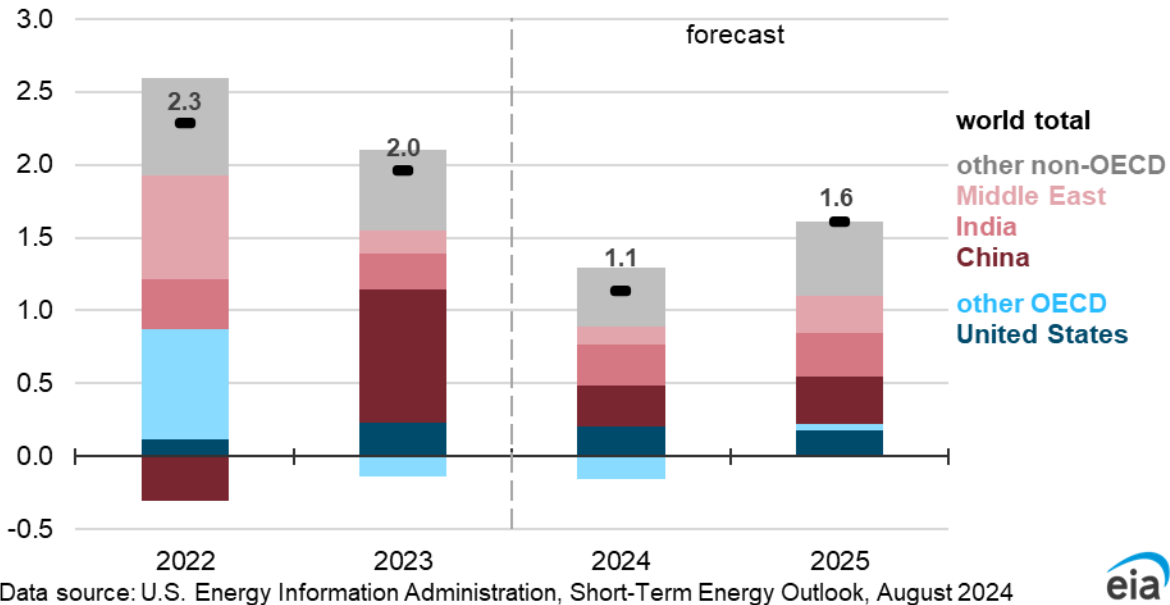
We expect that global production of liquid fuels will increase by 2.1 million b/d in 2025, as the OPEC+ voluntary production cuts unwind throughout the year. OPEC+ production increases by 0.7 million b/d, combined with 1.4 million b/d of production growth from countries outside of OPEC+.



The recent outbreak of wildfires near production centers in Alberta has reduced Canada’s crude oil production. We estimate that an average of 0.2 million b/d of Canada’s production was taken offline in July, but based on the latest reports of wildfires abating and crews returning to production fields, we assume that the outages will not persist.

In addition, the ramp up of the [Trans Mountain Expansion](#) pipeline has increased export capacity and alleviated distribution bottlenecks for Canada’s producers, with tanker tracking data showing many of those early volumes initially flowing to the United States—a [key consumer of Canadian crude oil](#). Despite the temporary disruption to supply, Canada’s liquid fuels production increases in our forecast by nearly 0.5 million b/d from 2023 through 2025.

Annual change in world liquid fuels consumption million barrels per day



We forecast that global consumption of liquid fuels will increase by 1.1 million b/d in 2024 and 1.6 million b/d in 2025; the latter is 0.2 million b/d less than in our previous STEO. Nearly all of our expected liquid fuels demand growth is from non-OECD countries, which increase their liquid fuels consumption by 1.1 million b/d in 2024 and 1.4 million b/d in 2025.

We reduced our forecast of petroleum consumption growth in China for 2024 and 2025 because of slower economic activity as well as updated monthly statistics showing reduced diesel demand, crude oil imports, and crude oil refinery runs in China. [China's GDP for 2Q24 grew 4.7% from last year](#), slightly less than the government's 5% target, reflecting slower investment in the country's real estate and construction sectors. We now forecast consumption of petroleum and liquid fuels consumption will grow in China by about 0.3 million b/d in 2024 and in 2025, which would be less than the 2015–2019 average growth rate of 0.5 million b/d.

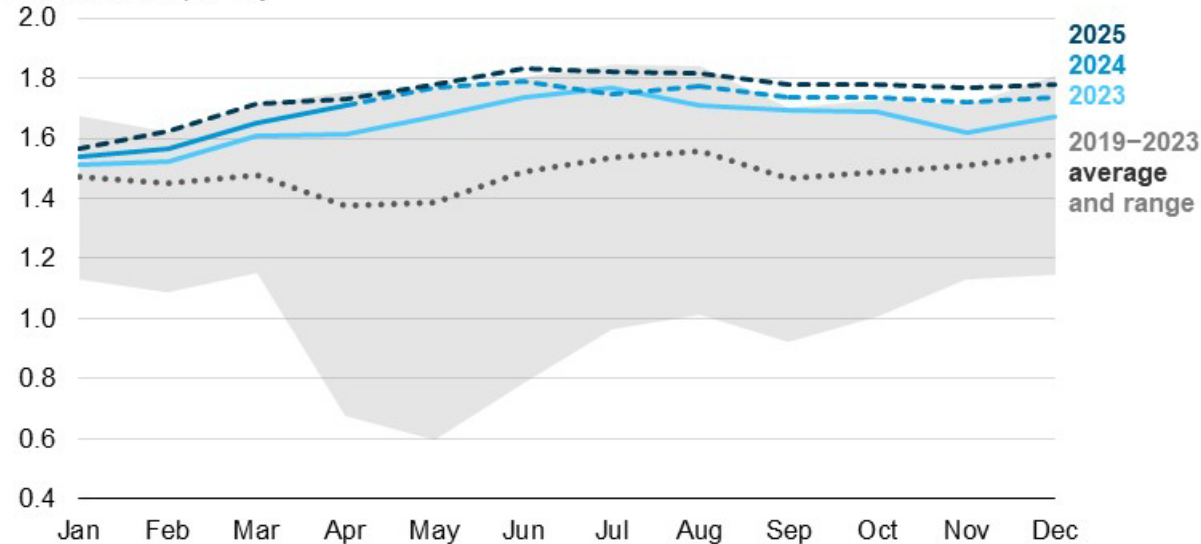
U.S. Petroleum Products

Jet fuel consumption

U.S. jet fuel consumption is rising due to increasing airline travel. In our August STEO, we forecast U.S. jet fuel consumption to increase by 3% in 2024 [compared with 2023](#) and another 3% in 2025. We forecast that U.S. jet fuel consumption will exceed 2019's pre-pandemic level in 2025. Jet fuel consumption is primarily driven by commercial air travel demand, which can be influenced by economic activity, employment, and the cost of air travel.

U.S. jet fuel consumption

million barrels per day

Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, August 2024

According to [TSA passenger volumes](#) from January through July 2024, 6% more passengers boarded flights at U.S. airports compared with the same period in both 2019 and 2023. Despite more passengers, jet fuel consumption this year remains below 2019 levels for a few reasons:

- Commercial airlines [continue to improve the fuel economy of their fleets](#) to reduce operating costs.
- U.S. airlines are shifting to larger (and more full) aircraft, so airlines have been flying more passengers per flight than in 2019, according to the July 12 [Industry Review and Outlook](#) from Airlines for America.
- Passengers are taking fewer [international flights](#), which consume more fuel.

We forecast more jet fuel to be consumed in 2025 in the United States than in 2019 based on our assumption that U.S. flight departures and TSA passenger volumes will continue to grow. Sources of uncertainty in the forecast include aircraft [supply-chain issues](#) that could worsen [aircraft shortages](#) and [air traffic controller shortages](#).

Petroleum product crack spreads

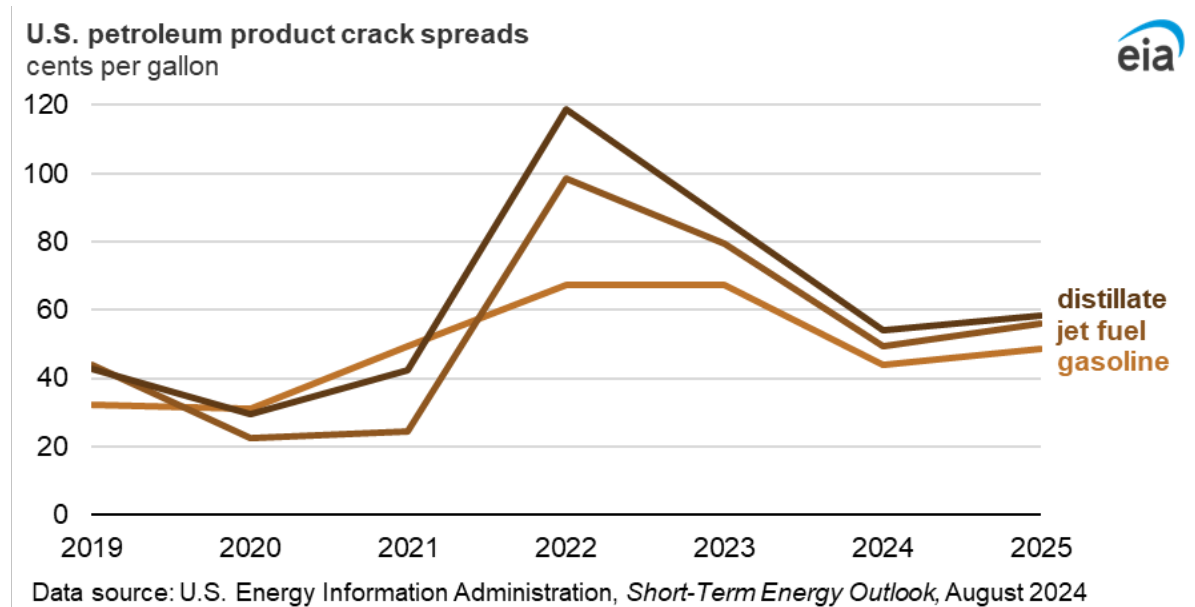
In our forecast, increases in U.S. jet fuel consumption cause the wholesale price of jet fuel to rise by more than gasoline and diesel prices next year. We expect more jet fuel will be consumed next year in the United States than before the pandemic in 2019, but we expect gasoline and distillate consumption to remain below 2019 volumes.

Crack spreads are the difference between the price for wholesale refined products and the price of an equivalent volume of crude oil. We use them as an estimate of refinery margins for various fuels. In the

first seven months of 2024, the jet fuel crack spread has been, on average, higher than the gasoline crack spread and about equal to the distillate fuel oil crack spread.

We forecast strong jet fuel consumption to drive increases in U.S. refinery margins for jet fuel, and consequently the crack spread in 2025. As jet fuel consumption increases, we expect jet fuel inventories to decrease to near-five-year (2019–2023) lows beginning in 2Q25.

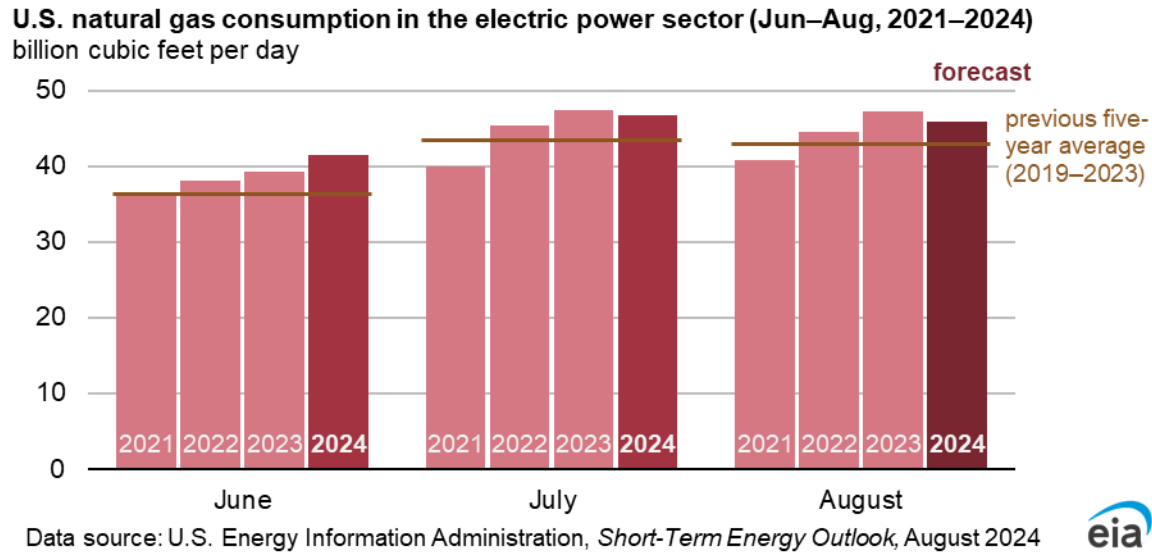
We forecast 4% less consumption of gasoline in the United States in 2025 than in 2019 and 3% less distillate fuel oil consumption. We forecast inventories for all three transportation fuels to be below their five-year averages in 2025 and for crack spreads to average higher in 2025 than in 2024.



Natural Gas

Natural gas consumption

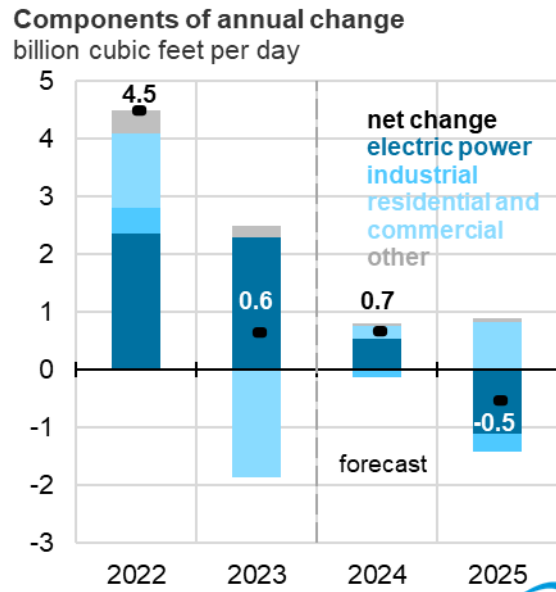
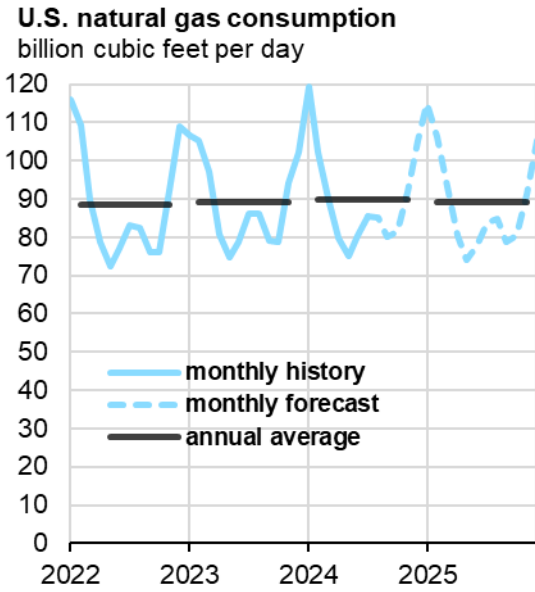
After a hot start to the summer, we expect close-to-normal temperatures will reduce U.S. natural gas consumption in August. We forecast natural gas consumption in the United States in August will fall slightly from July because of less natural gas consumption in the electric power sector. The electric power sector consumed 13% (5 Bcf/d) more natural gas in July than it did in June because of a heat wave and subsequent [spike in natural gas-fired electricity generation](#).



Because electricity is used to meet demand for air conditioning during warm weather, natural gas consumption in the U.S. electric power sector is the primary driver of total natural gas consumption in the summer months. We forecast natural gas consumed to generate electricity in the United States to average 46 Bcf/d in August, down 2% from July.

U.S. natural gas consumption in the electric power sector in July approached the record level set a year earlier, despite Hurricane Beryl leaving millions of homes and businesses in Texas [without electricity for several days](#) in early July. More natural gas is consumed regularly to generate electricity in Texas than any other state, according to our [Natural Gas Monthly](#). Heat wave conditions in other States in early July, particularly those in the West Coast and in the Northeast, and increased use of natural gas-fired electricity generation offset any declines in natural gas consumption for electric power because of the hurricane.

For 2024, we forecast about 1% more natural gas consumption in the United States than last year, averaging 90 Bcf/d. An increase in consumption in the residential and commercial sectors and the electric power sector offsets a decline in natural gas consumption in the industrial sector. Our forecast U.S. natural gas consumption declines by 1% in 2025 because of less consumption in the electric power sector. The forecast decline in U.S. natural gas-fired generation is the result of our assumption that next summer will be slightly cooler than this summer, reducing overall electricity generation, as well as the expansion of electricity generation for solar.



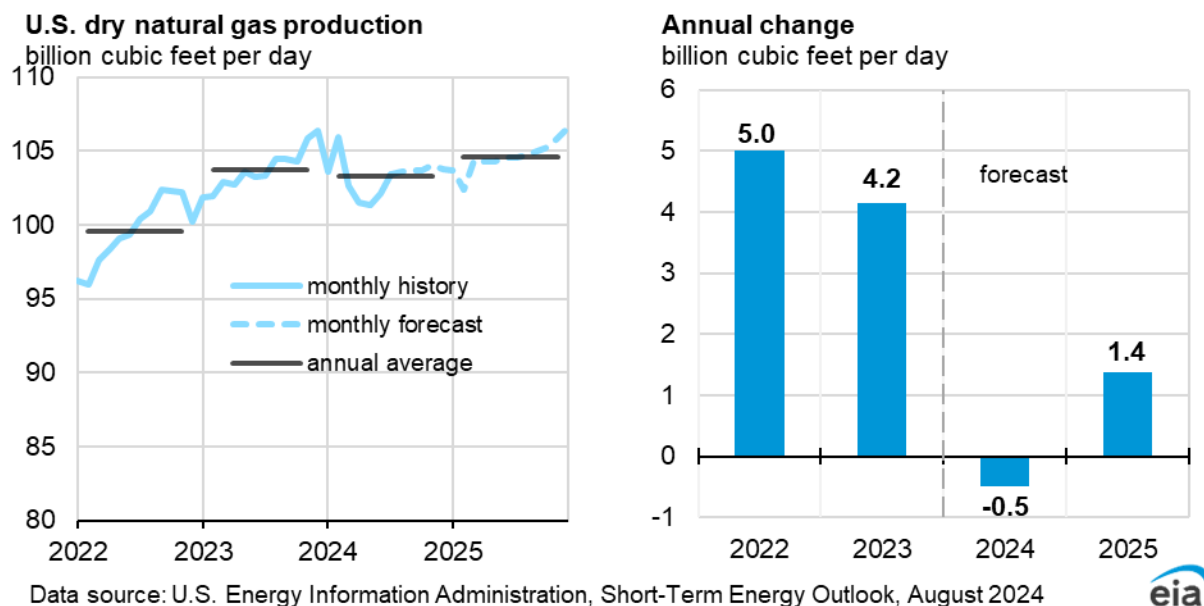
Data source: U.S. Energy Information Administration, Short-Term Energy Outlook, August 2024



Natural gas production and prices

U.S. dry natural gas production averaged 103 Bcf/d in July, up about 1% (1 Bcf/d) from June. We forecast natural gas production in August to be about the same as it was in July, but 1% (1 Bcf/d) less than in August 2023. [Record-low Henry Hub natural gas spot prices in 1H24](#) led producers to curtail natural gas production earlier this year. EQT, the largest natural gas producer in the United States, recently announced that it would continue to curtail production by [about 0.5 Bcf/d through 2H24](#).

We forecast U.S. natural gas production to average 103 Bcf/d in 2024, down slightly from 2023, and then increase to average of 105 Bcf/d in 2025. The main drivers for our forecast of growth in U.S. production next year are an increasing Henry Hub price and growing natural gas demand as feedgas for liquefied natural gas (LNG) projects scheduled to come on line in 2H24 and 2025.



The U.S. benchmark Henry Hub spot price averaged \$2.07 per million British thermal units (MMBtu) in July. We forecast the price will average about \$2.60/MMBtu for the rest of 2024 (August–December), which is slightly less than the average of \$2.69/MMBtu during the same period in 2023, and we expect the price to average \$2.30/MMBtu for all of 2024. If natural gas production is greater and consumption in the electric power sector is less than we expect, prices could be lower than in our forecast.

Electricity, Coal, and Renewables

Electricity generation

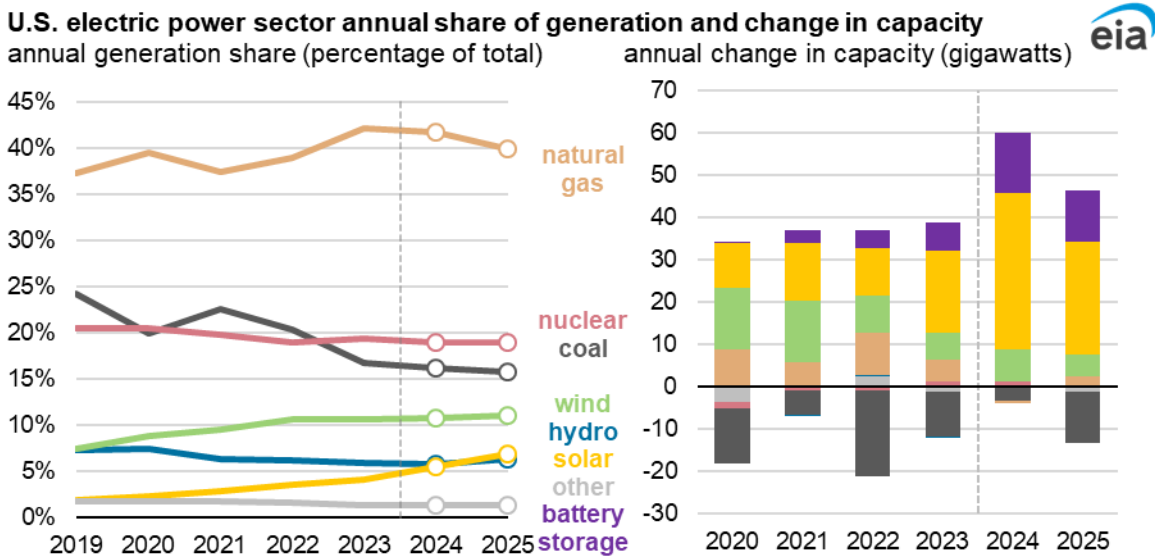
We forecast that U.S. power plants will generate about 4,300 billion kilowatthours of electricity in 2024, which would be 3% more than in 2023, in response to a hotter-than-normal start to summer and increasing power consumption by the residential and [commercial sectors](#). Forecast electricity generation grows by an additional 1% in 2025.

The [fastest-growing source](#) of electricity in the United States is solar power. We expect utility-scale solar in the electric power sector to account for 5% of U.S. generation in 2024, up from 4% last year, and to increase to a share of 7% in 2025. Current plans indicate the electric power sector will increase solar generating capacity by 64 gigawatts (GW) (71%) between 2023 and 2025. Similarly, wind power capacity is set to increase 13 GW (9%) over the next two years, but its generation share remains relatively stable at 11% of total U.S. generation.

The intermittent generation patterns of solar and wind are assisted by additions of [battery storage](#) capacity, which charge during low-cost periods of the day and generate power during high-cost periods. We expect battery storage capacity will grow by 26 GW (169%) between 2023 and 2025.

Although natural gas continues to provide more U.S. electricity generation than any other source, we expect growing generation from renewables will displace more natural gas over time. The forecast natural gas generation share in 2024 averages 42%, similar to what it was in 2023, and falls to 40% in

2025. We expect coal’s generation share will fall to a record low of 16% in 2024 as a result of recent capacity retirements and [lower utilization rates of the remaining coal fleet](#).



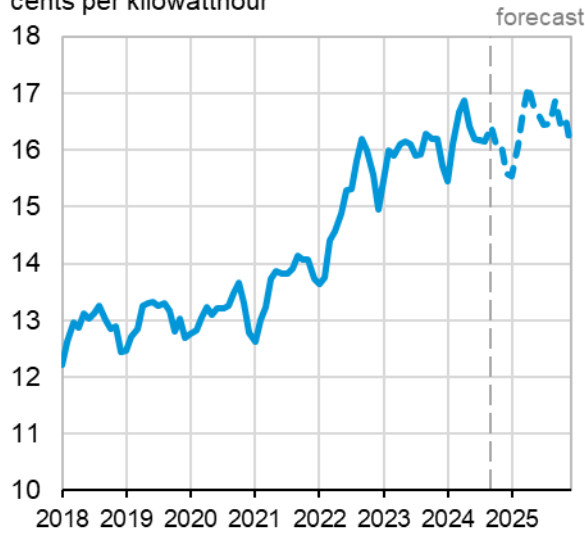
Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, August 2024

Residential electricity prices

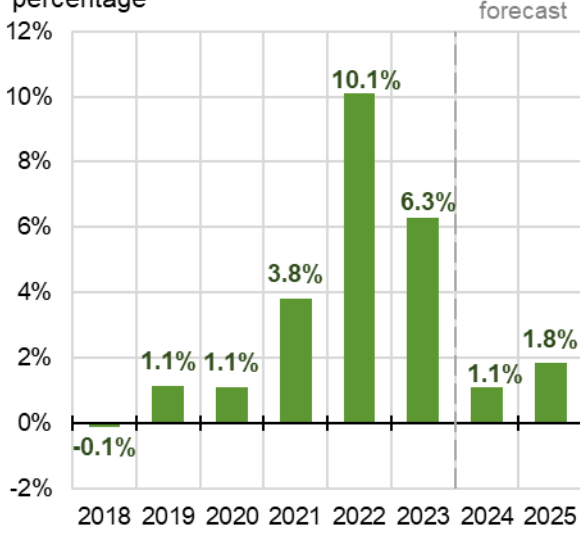
Our forecast growth rate in residential electricity prices this year would represent the slowest rise in electricity rates since 2020. Electricity prices increased by an annual average of almost 7% between 2021 and 2023 as a result of [highly volatile](#) natural gas prices, which is the primary fuel used for power generation. We expect that the U.S. price of electricity to residential end-use customers will average 16.2 cents per kilowatthour in 2024, which would be 1% higher than the average price in 2023. The forecast average U.S. price to residential end-use customers increases by about 2% in 2025.

U.S. natural gas [prices started falling in 2023](#), and the resulting lower costs of producing electricity are now being reflected in retail electricity prices after regulatory authorities have approved new rates. Although natural gas prices in our forecast are lower this year than they were from 2021 through 2023, other factors continue to cause electricity prices to rise. Electricity rates also reflect costs for delivering electricity to end-use customers. Utilities have faced increased costs for [building new transmission lines and distribution upgrades](#) in recent years, which are offsetting declines in fuels prices.

U.S. monthly nominal residential electricity price
cents per kilowatthour



Annual growth in nominal residential electricity prices
percentage

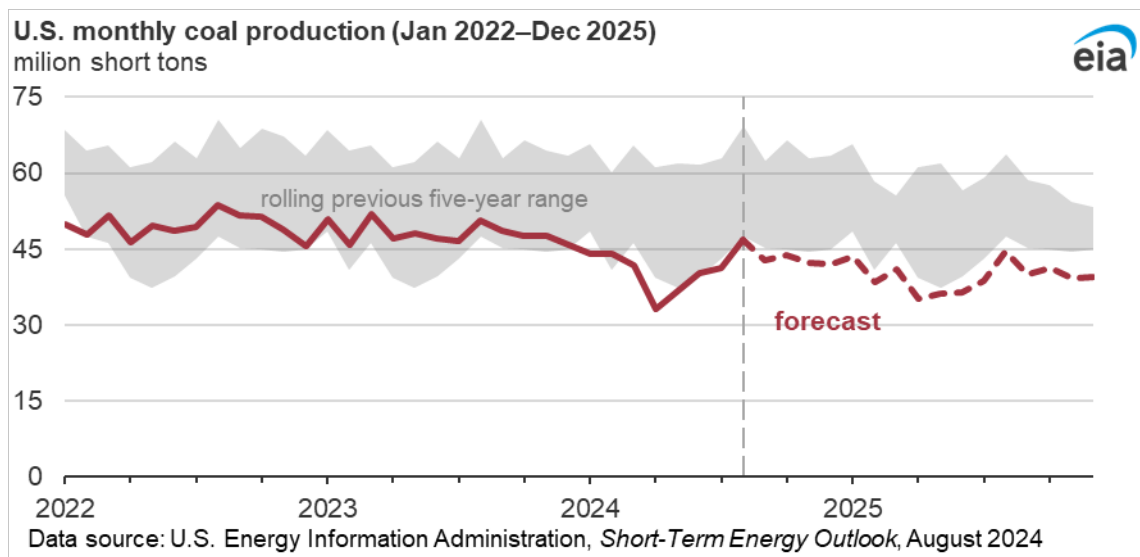


Data source: U.S. Energy Information Administration, Short-Term Energy Outlook, August 2024

Coal markets

For 2024, we forecast that coal production in the United States will total about 500 million short tons (MMst), a 14% decline from last year, and we forecast a further 5% drop in production in 2025. Although coal exports in our forecast remain robust, ongoing declines in coal production are the result of less coal being used to generate electric power domestically due to relatively low natural gas prices and 12 GW of coal-fired electricity generating capacity going into retirement.

We expect the U.S. electricity power sector will consume 384 MMst of coal this year, 1% less than it did in 2023. We expect the power sector will consume an additional 2% less coal next year. With U.S. coal production falling more quickly than coal consumption, we expect that coal will be consumed from inventories next year. The U.S. [electric power sector's coal inventories](#) stood at 120 MMst at the end of July, and we forecast those inventories will be reduced to 118 MMst at the end of 2024 and 84 MMst at the end of 2025.

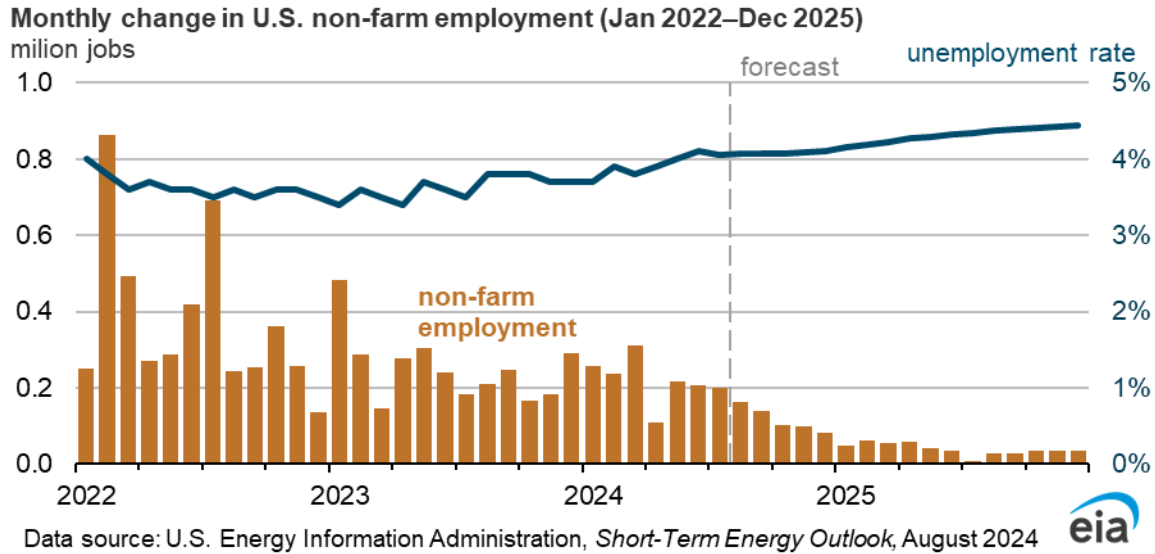


Economy, Weather, and CO₂

U.S. macroeconomics

The Bureau of Labor Statistics (BLS) reported that the U.S. unemployment rate for June was slightly higher than in our July STEO. As a result, we now expect a higher unemployment rate throughout our forecast than we expected last month. The unemployment rate in June was 4.1%, an increase of 0.2 percentage points from what we assumed in last month's STEO. Our forecast now shows the unemployment rate will reach 4.4% by 4Q25, compared with the July STEO forecast of 4.1% in 4Q25. BLS data also showed that the U.S. economy added 206,000 jobs in June, for an average monthly gain of 222,000 jobs during 1H24. Our forecast assumes that job gains will slow to an average of 131,000 per month in 2H24 and 39,000 per month in 2025.

The BLS released [employment statistics for July on Friday August 2](#), after we had completed our analysis for this report. The BLS reported that the unemployment rate rose to 4.3% in July, and the U.S. economy added 114,000 jobs for the month. Although the rising unemployment rate and slowing job growth are directionally consistent with our forecast, they represent an employment situation that is declining more sharply than our forecast assumes. In general, the labor market outlook affects our forecast for gasoline consumption. Assuming all other factors remain equal, fewer employed workers means less driving and less gasoline consumption. Fewer employed workers could also mean less disposable income for consumers on average resulting in less economic activity and reduced energy consumption.



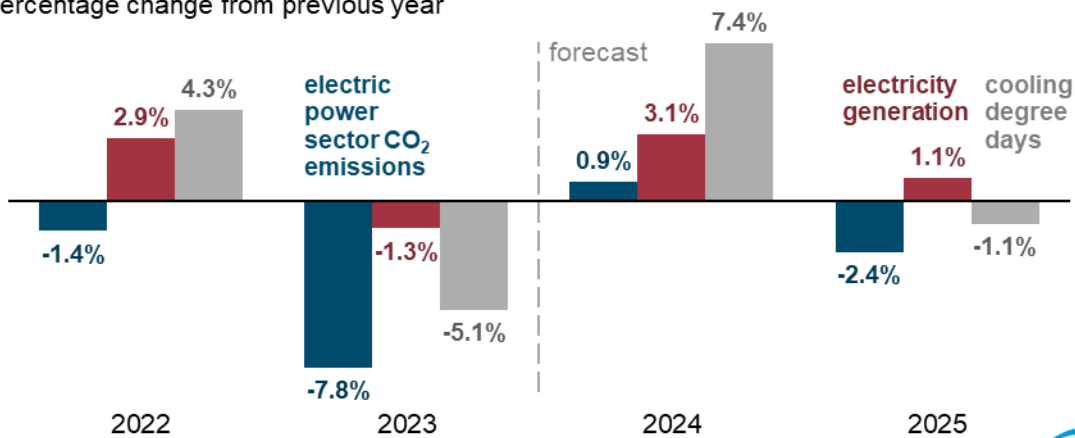
Emissions

We expect U.S. energy-related carbon dioxide (CO₂) emissions to be relatively unchanged between 2023 and 2025. CO₂ emissions in 2024 remain close to 2023 levels as emissions from natural gas, which increase by 1%, are offset by lower CO₂ emissions from coal, which decrease by 1%. These changes reflect increasing electricity generation from natural gas and decreasing generation from coal.

We expect a warmer 2024, with 7% more cooling degree days than in 2023. We expect notable growth in cooling demand in 2024, increasing U.S. electricity generation by 3%. This growth in generation is met by renewables as well as by fossil fuels, notably natural gas, leading to a slight increase in electric power sector CO₂ emissions. CDDs and demand for cooling fall slightly in our forecast for 2025, and we forecast a slight decrease in electric power emissions, primarily from less natural gas-fired generation. As renewable generation continues to grow, the emissions intensity of electricity declines, falling by 2% in 2024 and by 3% in 2025, down to 0.33 metric tons per megawatthour by the end of the forecast. Most growth in renewable generation comes from solar, followed by wind and hydropower.

U.S. electric power CO₂ emissions, electricity generation, and cooling degree days

percentage change from previous year



Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, August 2024



Weather

Overall, our forecast assumes 2024 is a relatively hot year. Initial data from the National Oceanic and Atmospheric Administration show average U.S. temperatures in July were similar to July 2023, which was hotter than normal. However, the regions experiencing hot weather have shifted from last summer. In July, the Pacific region experienced 12% more CDDs than a year ago, and CDDs in the Northeast totaled 4% more than a year ago. But the West South Central Census Division (which includes Texas) experienced 17% fewer CDDs compared with the [very hot July of last year in that region](#).