Independent Statistics and Analysis
U.S. Energy Information Administration

Short-Term Energy Outlook

STEO

April 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**	**$89**	**$87**
Retail gasoline price (dollars per gallon)	**$3.50**	**$3.60**	**$3.60**
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**	**$2.20**	**$2.90**
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%	41%
Coal	17%	15%	14%
Renewables	21%	24%	25%
Nuclear	19%	19%	19%
U.S. GDP (percentage change)	**2.5%**	**2.5%**	**1.5%**
U.S. CO_2 emissions (billion metric tons)	**4.8**	**4.8**	**4.7**

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

- **Global oil consumption**. This month we revised the 2022 global liquid fuels consumption data available in our International Energy Statistics, increasing our assessment of global oil consumption that year by nearly 0.8 million barrels per day (b/d) compared to last month's STEO. The historic data serves as a baseline for our short-term forecasts, affecting our view of energy markets this year and next. This month's revision to historic data, as well as current market dynamics, led us to increase our forecasts for global oil consumption in 2024 and 2025 between 0.4 million b/d and 0.5 million b/d in both years.

- **Global oil prices.** We forecast the Brent crude oil spot price will average $90 per barrel (b) in the second quarter of 2024 (2Q24) $2/b more than our March STEO, and average $89/b in 2024. This increase reflects our expectation of strong global oil inventory draws during this quarter and ongoing geopolitical risks.

- **Natural gas inventories.** The U.S. winter natural gas withdrawal season ended with 39% more natural gas in storage compared with the five-year average. From April through October this year, we forecast less natural gas will be injected into storage than is typical, largely because we expect the United States will produce less natural gas on average in 2Q24 and 3Q24 compared with 1Q24. Despite lower production, we still expect the United States will have the most natural gas in storage on record when the winter withdrawal season begins in November. As a result of high inventories, we expect the Henry Hub spot price to average less than $2.00 per million British thermal units

(MMBtu) in 2Q24 before increasing slightly in 3Q24. Our forecast for all of 2024 averages about $2.20/MMBtu.

- **Electricity consumption.** We expect hotter summer temperatures this year compared with last year will increase residential electricity consumption by almost 4% in 2024 compared with last year. The rise in residential electricity consumption occurs primarily during the summer months (April–October), supported by our expectation of 7% more cooling degree days than last summer.

- **Coal exports.** After the Port of Baltimore was closed as a result of the collapse of the Francis Scott Key bridge, we reduced our forecast for coal exports by more than 30% in April and 20% in May compared with the March STEO. Baltimore is the second-largest export hub for coal in the United States.

Notable forecast changes

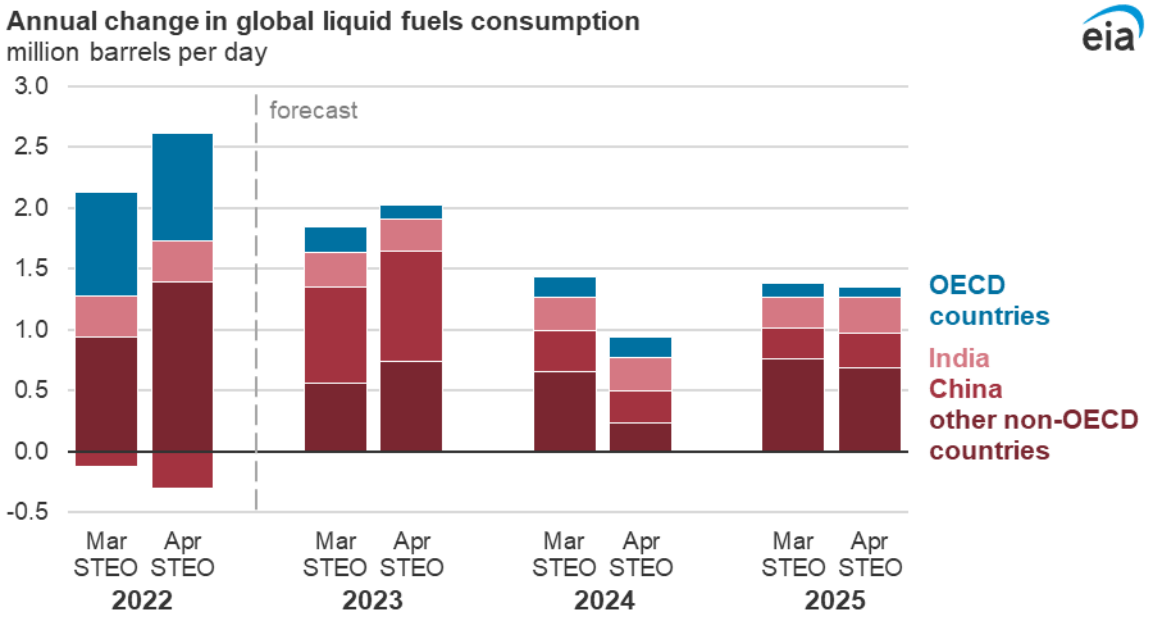
Current forecast: April 9, 2024; previous forecast: March 12, 2024	**2024**	**2025**
Coal exports (million short tons)	**94**	**105**
Previous forecast	101	106
Percentage change	-6.3%	-0.9%
Brent spot price (dollars per barrel)	**$89**	**$87**
Previous forecast	$87	$85
Percentage change	1.8%	2.6%
Retail gasoline price (dollars per gallon)	**$3.60**	**$3.60**
Previous forecast	$3.50	$3.40
Percentage change	3.1%	3.8%
Henry Hub spot price (dollars per million British thermal units)	**$2.20**	**$2.90**
Previous forecast	$2.30	$2.90
Percentage change	-5.2%	-1.7%
Global liquid fuels consumption (dollars per million British thermal units)	**103**	**104**
Previous forecast	102	104
Change	0.5	0.4

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

Global Oil Markets

Global oil consumption

This month's STEO incorporates the recent update to our International Energy Statistics for 2022. This update increased our assessment of global liquid fuels consumption for 2022 by nearly 0.8 million barrels per day (b/d) compared with last month's STEO. Most of this change reflects non-OECD consumption that is higher than we previously estimated. The higher baseline historical data for 2022 in turn increased our estimate of consumption in 2023 and our forecasts for 2024 and 2025. We now estimate that global liquid fuels consumption averaged 102.0 million b/d in 2023, a 2.0 million b/d increase from 2022 and about 1.0 million b/d higher than in last month's STEO. Global liquid fuels consumption in our forecast now averages 102.9 million b/d in 2024 and 104.3 million b/d in 2025, which is between 0.4 million b/d and 0.5 million b/d more in both years than in last month's STEO. Year-over-year forecast consumption growth in 2025 is largely unchanged compared with the March STEO.



Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook* (STEO), April 2024

Although the revisions to historical consumption resulted in more forecast petroleum consumption, they also decreased demand growth in 2024 compared with our previous STEO. However, the sources of growth remain the same; non-OECD Asian countries—particularly China and India—drive global liquid fuels demand growth in our forecast, although we also expect significant growth in the Middle East and United States.

Global oil prices and inventories

The Brent crude oil spot price averaged $85 per barrel (b) in March, a $2/b increase compared with February and the third consecutive month when the average Brent price increased. Oil prices continued to increase in March as a result of heightened geopolitical risk related to the attacks targeting commercial ships transiting the Red Sea shipping channel and general elevated tensions around the region. In addition, the recent extension of OPEC+ voluntary production cuts add to upward price

pressure right at a time of the year when oil demand typically increases because of the spring and summer driving seasons in the Northern Hemisphere.

The combination of flat production and rising consumption causes our forecast of global oil inventories to fall by more than 0.9 million b/d in 2Q24, which we expect will add upward pressure to oil prices. We expect the tighter market balance to keep oil prices relatively elevated, averaging $90 in 2Q24—$2/b higher than in last month's STEO.

We forecast oil inventories will begin increasing in 2025 because we assume OPEC+ production will increase when OPEC+ supply cuts expire. We forecast global oil inventories to increase by an average 0.4 million b/d in 2025, which we expect will put downward pressure on prices. We forecast the Brent crude oil price will decrease year-over-year from an average $90/b in 4Q24 to an average $86/b in 4Q25, with annual averages of $89/b in 2024 and $87/b in 2025.

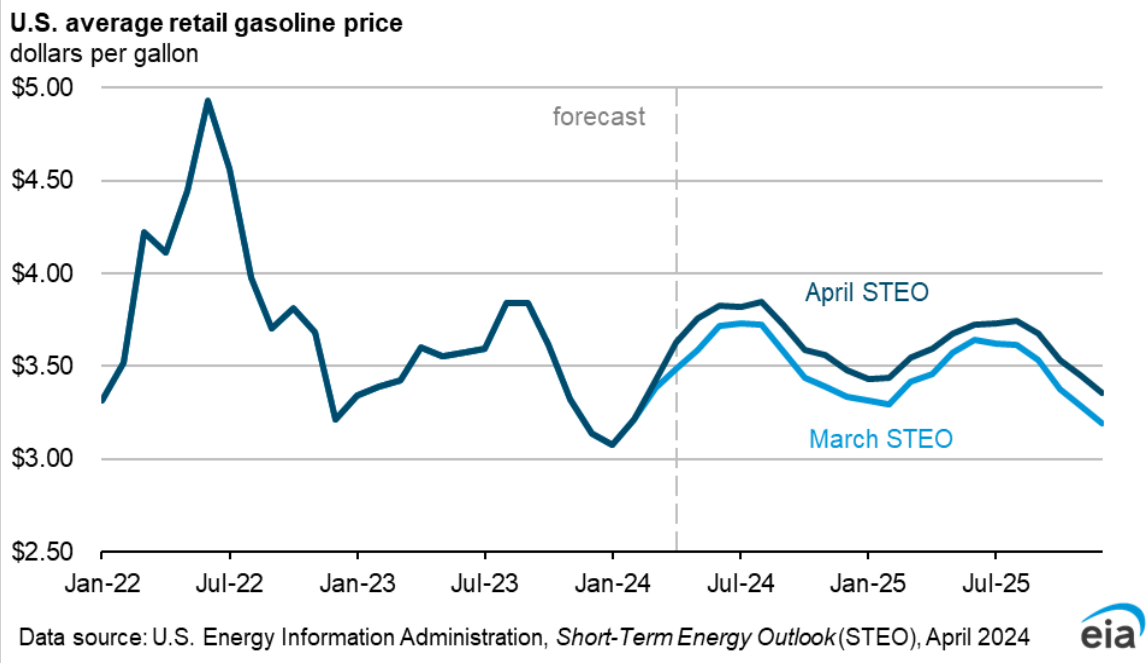
Global oil production

We expect global production of liquid fuels to increase by more than 0.8 million b/d in 2024, slowing from the 1.8 million b/d increase in 2023, as OPEC+ voluntary production cuts are offset by supply growth outside of OPEC+. Although forecast OPEC+ crude oil production in 2024 decreases by 0.9 million b/d compared with last year, forecast production outside of OPEC+ increases by 1.8 million b/d, led by the United States, Guyana, Brazil, and Canada. Global liquid fuels production in our forecast increases by 2.0 million b/d in 2025 as the OPEC+ production cuts expire and supply growth outside of OPEC+ continues to grow.

Petroleum Products

Gasoline prices

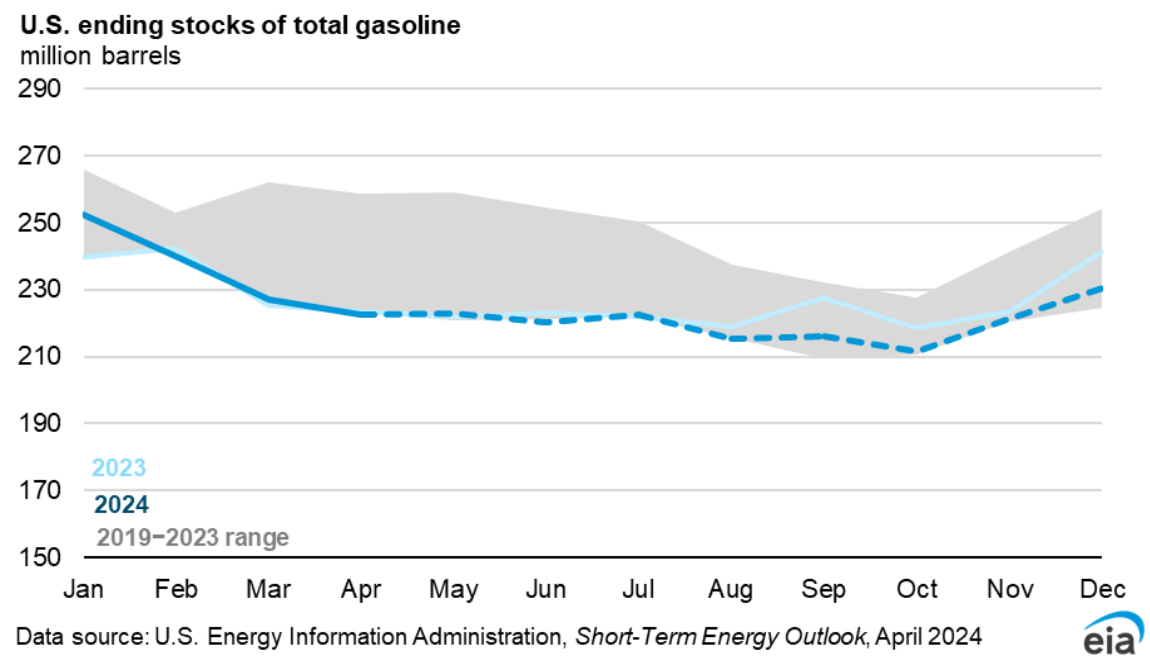
We forecast U.S. retail gasoline prices will average about $3.60 per gallon (gal) in 2024, an increase of about 10 cents/gal from our March STEO and a slight increase from the average price in 2023. This increase is driven by rising wholesale gasoline prices compared with the March STEO as well as higher crude oil prices. We now forecast the wholesale gasoline price will average more than $2.70/gal in 2024, also 10 cents/gal more than in 2023. The higher forecast wholesale gasoline prices compared with our March STEO reflects our expectation of more gasoline exports and lower gasoline inventories, leading to an increase in the 2024 annual average crack spread for gasoline relative to last month's forecast.



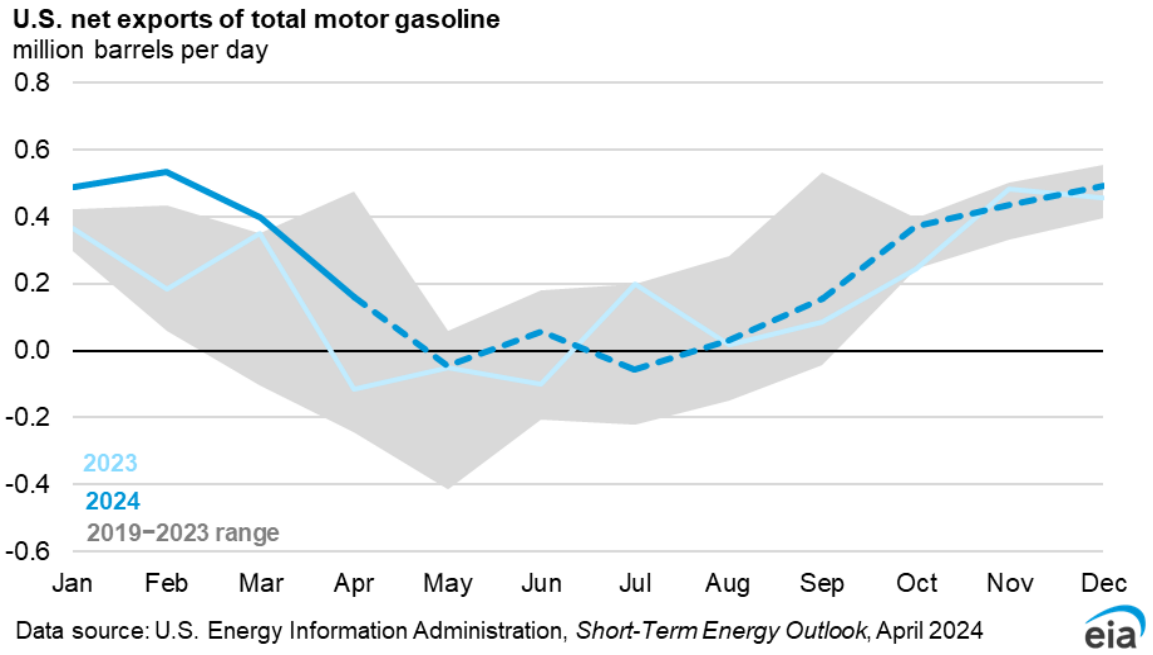
We expect higher crude oil prices will put additional upward pressure on the gasoline price this year compared with 2023. Our forecast that crude oil prices in 2024 will be higher than we expected last month is responsible for about half of the increase in average 2024 gasoline prices compared to the March STEO. Retail and distribution margins for gasoline—the difference between the average retail price and the refiner price for resale—were lower in February and March compared with the same months in 2023. Retail and distribution margins can reflect a wide variety of factors including taxes, wages, and regional and logistical complications. We forecast these lower retail margins to dampen the effect of higher crude oil prices and crack spreads on overall retail prices this year. Retail and distribution margins can be volatile, and they present a source of uncertainty for retail gasoline prices this summer and through the rest of the year; higher margins than we expect could lead to higher gasoline prices.

Gasoline inventories and net trade

We have reduced our forecast for end-of-period motor gasoline stocks by almost 7 million barrels in 2Q24 compared to the March STEO. Our outlook for gasoline inventories has gradually decreased since the beginning of 2024 as lower refinery production and higher net exports (exports minus imports) of gasoline have contributed to stronger-than-expected inventory draws so far this year. As a result, we now expect end-of-month gasoline inventories to average about 4 million barrels lower throughout 2024 compared with our previous forecast, contributing to tight market conditions for gasoline during the summer.



Data from our *Weekly Petroleum Status Report* show higher gasoline net exports so far this year, which led us to revise our outlook for gasoline trade compared with our last forecast. We expect gasoline net exports to increase slightly from 2023 levels this year. Damage related to Ukraine's attacks on Russian refineries will contribute to slightly lower international supplies because of reduced Russian production. We estimate this will have a relatively limited impact on global gasoline availability because Russian refiners tend to produce significantly more diesel than gasoline, and because increasing liquid fuels production at new refineries in the Middle East will partially ease international supply pressures. However, further constraints on global gasoline availability could increase gasoline net exports from the United States this year, presenting further uncertainty for our U.S. gasoline forecast.



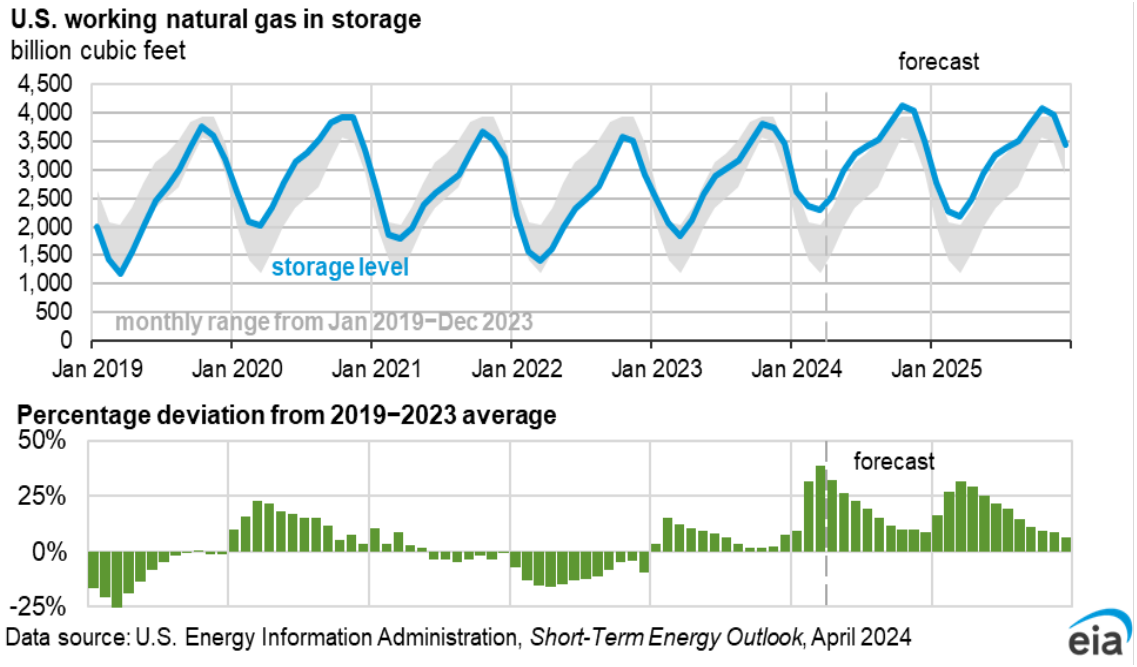
Natural Gas

Natural gas storage

We estimate that U.S. natural gas storage inventories were 39% higher at the end of the withdrawal season (November–March) than the five-year (2019–2023) average. The United States started the winter heating season with a 5% surplus to the five-year average. The surplus at the start of winter and a mild winter that resulted in below-average natural gas consumption in the residential and commercial sectors led to the large storage inventory surplus at the end of March. The large storage surplus contributed to low natural gas prices throughout the first quarter of 2024 (1Q24). Natural gas prices at the U.S. benchmark Henry Hub averaged less than $2.00 per million British thermal units (MMBtu) in both February and March. We forecast the Henry Hub price to average less than $2.00/MMBtu in 2Q24 and about $2.20/MMBtu for all of 2024.

From April through October this year, we forecast less natural gas will be injected into storage than is typical, largely because we expect the United States will produce less natural gas on average in 2Q24 and 3Q24 compared with 1Q24. Despite lower production, we still expect the United States will end the injection season with 4,120 Bcf of natural gas in storage, 10% more than the five-year average and the most on record.

We forecast U.S. dry natural gas production to average about 103 billion cubic feet per day (Bcf/d) from April through October, down slightly from last year's average of 104 Bcf/d for the same period. We forecast U.S. natural gas consumed for electricity generation to average 38 Bcf/d from April through October, about the same as during the same period last year. If dry natural gas production declines substantially more than we forecast or natural gas consumed for electricity generation increases more than we forecast due to hotter summer temperatures, then inventories could fall below our forecast, potentially resulting in higher prices.

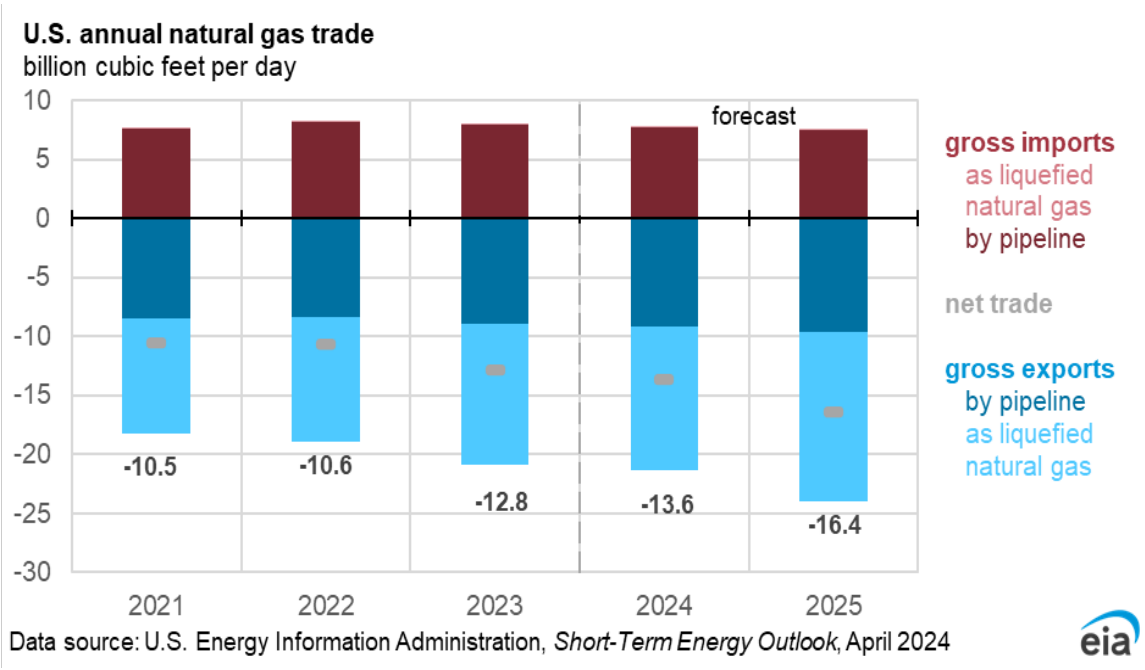


Natural gas trade

We expect U.S. liquefied natural gas (LNG) exports to average 12 Bcf/d in 2024, a 2% increase compared with last year. In 2025, LNG exports increase by an additional 2 Bcf/d (18%) because three of the five LNG export projects currently under construction are expected to start operations and ramp up to full production.

We forecast that U.S. LNG export facilities will run at similar utilization rates as in 2023, adjusted for seasonality and annual maintenance on liquefaction trains. In April and May 2024, we expect LNG exports to decline compared with April and May 2023 because two of the three trains at the Freeport LNG export facility are undergoing annual maintenance, coinciding with lower global LNG demand in importing countries during the shoulder season. Later in 2024, we expect Plaquemines LNG Phase I and Corpus Christi Stage 3 to begin LNG production and load first cargoes by the end of the year. In 2025, the developers of the Golden Pass LNG plan to place the first two trains of this new three-train LNG export facility in service.

We expect U.S. natural gas exports by pipeline to grow by almost 1 Bcf/d over the forecast period, mainly because of increased natural gas exports to Mexico. We expect several pipelines in Mexico—Tula-Villa de Reyes, Tuxpan–Tula, and Cuxtal Phase II connecting to the Energía Mayakan pipeline on the Yucatán Peninsula—to reach full service in 2024–25. These pipelines started partial service in 2022–23 but are not yet fully operational. In addition, flows via the Sur de Texas-Tuxpan underwater pipeline are likely to increase slightly in 2024, delivering natural gas from the United States to Mexico's first LNG export project: Fast LNG Altamira.



Electricity, Coal, and Renewables

Electricity consumption

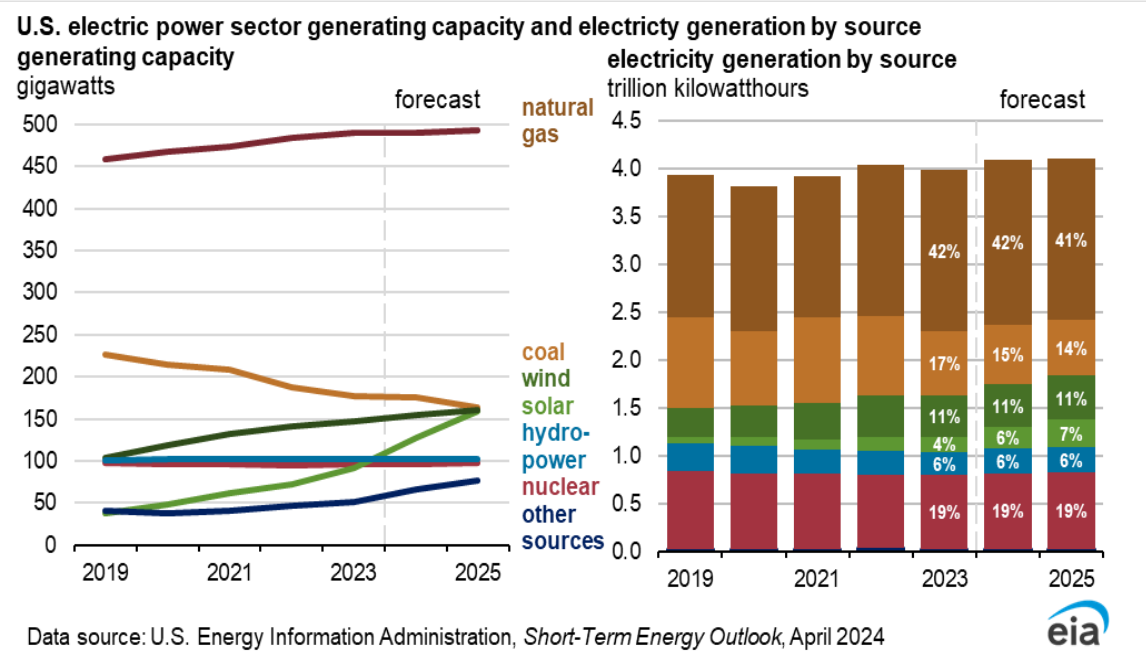
We forecast sales of electricity to U.S. end-use customers will increase by 2% in 2024 compared with 2023 and by 1% in 2025. The expected growth contrasts with a 2% decrease in electricity sales in 2023 compared with 2022. We expect electricity consumption to grow in all major consuming sectors this year, with forecast growth especially strong in the residential sector, where we expect it to increase by 4%. Much of the forecast year-over-year growth in residential electricity occurs this summer. We expect a hotter summer this year, with 7% more forecast cooling degree days in 2Q24 and 3Q24 than the same quarters in 2023.

U.S. electricity sales to non-residential customers in the commercial and industrial sectors grow in the forecast by 2% annually in 2024 and 1% in 2025. In some regions, we expect relatively little growth in non-residential electricity demand because vacancies in office buildings remain high compared with pre-pandemic levels. Areas of the country with concentrations of new large computing customers, such as data centers, have the fastest forecast growth in total non-residential electricity consumption; we expect the West South Central and West North Central Census Regions together will contribute 50% of total U.S. non-residential electricity sales growth in 2024 and almost 90% of growth in 2025.

Electricity generation

Generation from renewable energy sources is the main contributor to growth in U.S. electricity generation over the STEO forecast. In particular, the electric power sector added 19 gigawatts (GW) of solar capacity in 2023 (a 27% increase), and we expect 37 GW will be added in 2024 and another 32 GW will be added in 2025. With this new capacity, we expect solar will provide 6% of total U.S. electricity generation in 2024 and 7% in 2025, up from a 4% share in 2023.

The increased generation from solar is likely to slow growth in generation from natural gas-fired power plants, even with relatively low natural gas prices in the forecast. We expect the share of total U.S. natural gas-fired generation in 2024 to average 42%, similar to 2023, before declining to 41% in 2025. We don't expect any new combined-cycle gas turbine plants in 2024, another reason why natural gas-fired generation makes up a smaller portion of electricity generation. Low natural gas prices will continue to reduce coal-fired generation; the forecast U.S. coal generation share falls to 15% in 2024 and 14% in 2025, compared with 17% last year.



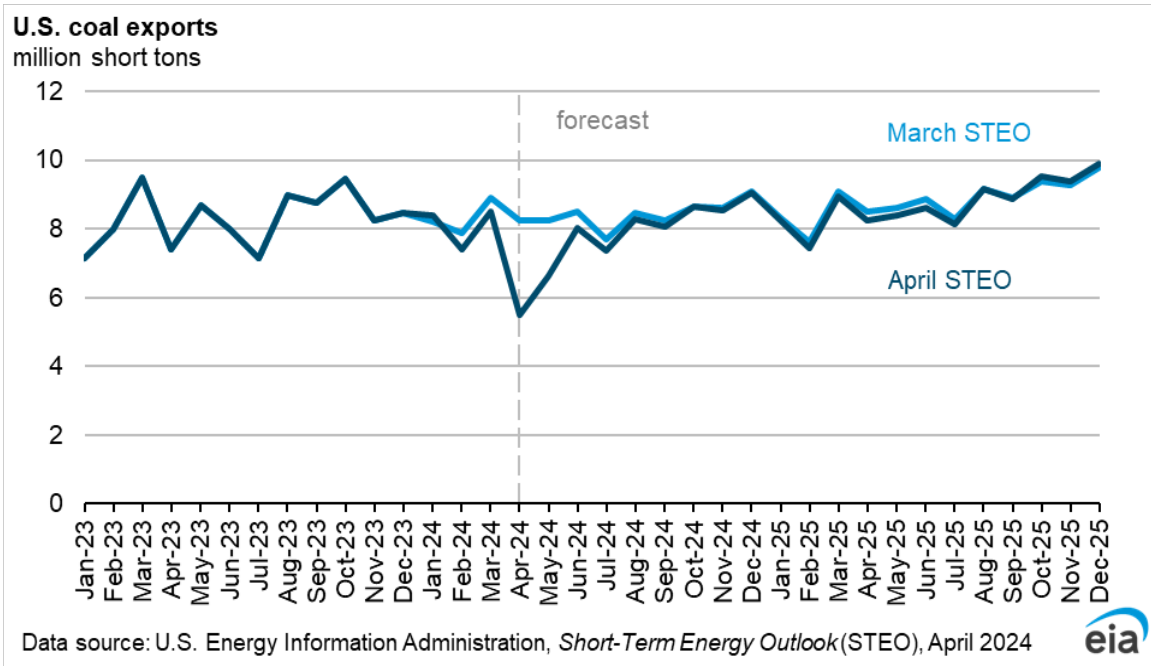
Coal markets

After the Port of Baltimore was closed as a result of the collapse of the Francis Scott Key bridge, we reduced our forecast for U.S. coal exports by almost 3 million short tons (MMst)—more than 30%-in April and 2 MMst—about 20%--in May compared with the March STEO. The port is the second-largest export hub for coal in the United States.

We do not expect this event to have a significant long-term impact on U.S. exports coal exports. The price and quality of coal are important factors contributing to international demand for U.S. coal, and we assume some coal previously exported from Baltimore will be shipped from other U.S. ports. However, with the full closure of the port of Baltimore through at least May, as well as uncertainty around when the port will fully open and how long it will take to clear bottlenecks, we expect U.S. coal exports to total 94 MMst in 2024 down 6% relative to the March STEO. We expect exports in 2025 to increase to 105 MMst in 2025, similar to our forecast in the March STEO.

As a result of growth in electricity generation from renewable sources and low natural gas prices we expect coal-fired generation to decline, resulting in the electric power sector's coal consumption to decline by 8% in 2024 and to further decline by 5% in 2025. As exports temporarily drop in 2Q24 and electric power consumption declines, we forecast coal production to be 5% lower in April and 4% lower

in May compared with the March STEO. With exports and consumption both down relative to the March STEO, we have lowered our forecast for coal production in 2024 to about 485 MMst.



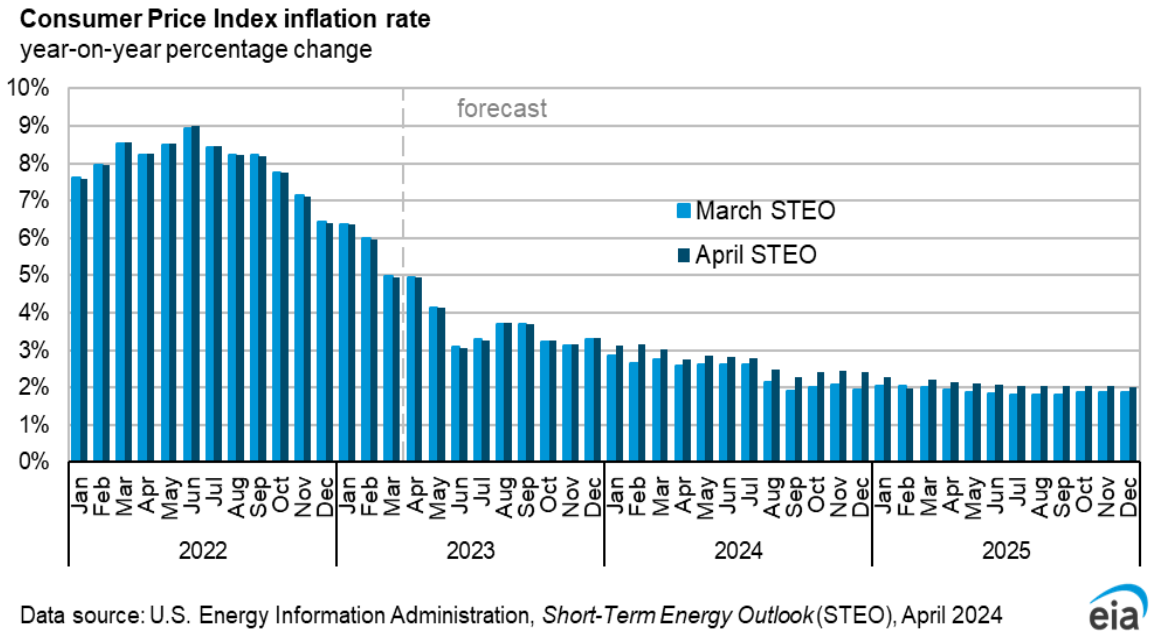
Economy, Weather, and CO_2

U.S. macroeconomics

Our forecast for April 2024 assumes real GDP will grow by 2.5% in 2024 and 1.5% in 2025, mostly unchanged from the forecast in March. Our U.S. macroeconomic forecasts are based on S&P Global's macroeconomic model. We incorporate STEO energy price forecasts into the model to obtain the final macroeconomic assumptions.

Overall, the macroeconomic forecast we use for the STEO is similar to last month. However, the small upward revision to the forecast for the Consumer Price Index (CPI) is notable. Inflation, measured as the year-over-year growth rate of the CPI, declined from a peak of 9.0% in June 2022 to 3.2% in February 2024. Our forecast assumes that CPI inflation will continue to decline but will not reach 2.0% until the first quarter of 2025 (1Q25). We previously assumed CPI inflation would reach 2.0% by 3Q24, two quarters earlier. Therefore, forecasts on monetary policy have also been revised by other agencies. We now assume that the U.S. Federal Reserve will wait until June, as opposed to May, to reduce its target for the Federal Funds Rate.

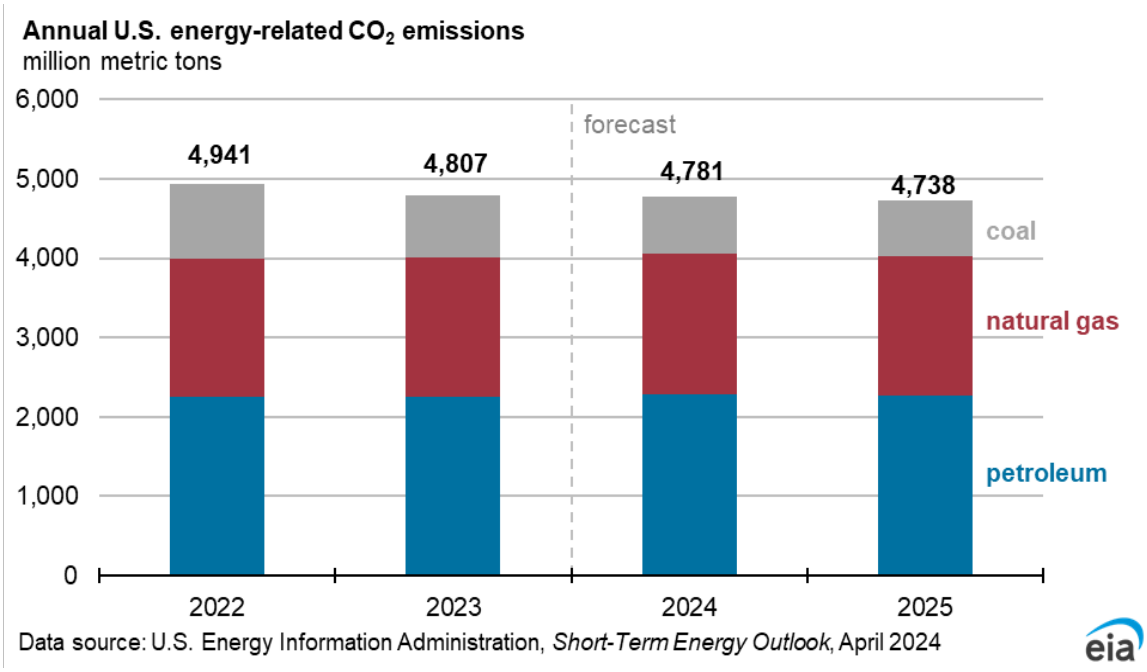
Our forecast assumes the unemployment rate will rise gradually, reaching 3.8% by the end of 2024 and 4.2% by the end of 2025.



Emissions

Total U.S. energy-related carbon dioxide (CO_2) emissions decrease by 1% in 2024 in our forecast, driven exclusively by a decrease in coal consumption. Coal-related CO_2 emissions decline by 8% as a result of decreasing coal-fired electricity generation. As coal-fired electricity generation declines, several other generation sources grow, most notably solar. Natural gas and petroleum-related CO_2 emissions both increase by about 1%; slight increases in the electric power sector's natural gas consumption are partly offset by decreased consumption in the industrial sector, and petroleum product consumption rises slightly. CO_2 emissions are expected to decrease by an additional 1% in 2025 driven by slight decreases in total consumption of coal, natural gas, and petroleum products.

Decreasing CO_2 emissions in our STEO forecast are consistent with emissions trends observed over the last several years. However, analysis of emissions by fossil fuel component provides valuable insights into the nature of these reductions. Petroleum and natural gas are the two largest sources of U.S. energy-related CO_2 emissions. However, most emissions reductions in recent years come from coal, which represents the smallest share of total emissions. This trend in decreasing coal-related CO_2 emissions is observed largely in the electric power sector, where decreases in coal-fired generating capacity contribute to notable decreases in domestic coal consumption.



Weather

March 2024 was milder than March 2023. The United States averaged 500 HDDs in March, 15% fewer HDDs than in March 2023, which contributed to an overall relatively mild winter season (November 2023–March 2024). We expect 2Q24 and 3Q24to be hotter in 2024 than it was last year, with 7% more CDDs than the same period in 2023.