Independent Statistics and Analysis
U.S. Energy Information Administration

Short-Term Energy Outlook

STEO

December 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**	**$80**	**$74**
Retail gasoline price (dollars per gallon)	**$3.50**	**$3.30**	**$3.20**
U.S. crude oil production (million barrels per day)	**12.9**	**13.2**	**13.5**
Natural gas price at Henry Hub (dollars per million British thermal units)	**$2.50**	**$2.20**	**$3.00**
U.S. liquefied natural gas gross exports (billion cubic feet per day)	**12**	**12**	**14**
Shares of U.S. electricity generation			
Natural gas	42%	43%	40%
Coal	17%	15%	15%
Renewables	22%	23%	25%
Nuclear	19%	19%	19%
U.S. GDP (percentage change)	**2.9%**	**2.7%**	**2.1%**
U.S. CO_2 emissions (billion metric tons)	**4.8**	**4.8**	**4.8**

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

- **Global oil production.** Growth in oil production next year will come mostly from non-OPEC countries because of ongoing production restraint on the part of OPEC+. At its December 5 meeting, OPEC+ announced that it would delay production increases until April 2025. Those increases had been set to begin in January 2025. We forecast that global oil production will increase by 1.6 million barrels per day (b/d) in 2025, and we expect almost 90% of that growth will come from countries that do not participate in OPEC+.

- **Global oil prices.** We expect the Brent crude oil spot price will remain close to its current level in 2025, averaging $74 per barrel for the year, as oil markets will be relatively balanced on an annual average basis.

- **U.S. crude oil net imports.** Net imports of crude oil in the United States this year have remained close to 2023 volumes with increasing U.S. crude oil production supplying an almost equivalent increase in U.S. refinery runs. We expect U.S. crude oil production will continue increasing in 2025 even as U.S. refiners process less crude oil than they did this year, leading to net imports of crude oil falling by more than 20% to 1.9 million barrels per day (b/d) in 2025, which would be the least net imports of crude oil in any year since 1971.

- **Natural gas storage.** Natural gas inventories in our forecast remain above the five-year average (2019–2023) throughout the winter heating season (November—March) after ending the injection season 6% above the five-year average in mid-November. We expect natural gas inventories to total 1,920 billion cubic feet (Bcf) at the end of March 2025, which would be 2% more than the five-year average.

- **Natural gas prices.** Based on our expectation that the storage surplus to the five-year average will narrow over the winter, we forecast the U.S. benchmark Henry Hub spot price will increase from an average of just over $2.00 per million British thermal units (MMBtu) in November to an average of about $3.00/MMBtu for the rest of the winter heating season.

- **Electricity consumption.** We expect U.S. sales of 2% more electricity this winter compared with last winter. The increase is led by 3% more sales to residential customers because of colder weather than last winter. Although the winter heating season got off to a warm start in November, overall we expect this winter to be colder than last year, with 6% more heating degree days.

Notable forecast changes

Current forecast: December 10, 2024; previous forecast: November 13, 2024	**2024**	**2025**
U.S. natural gas end-of-year inventories (billion cubic feet)	**3,371**	**3,160**
Previous forecast	3,409	3,236
Percentage change	-1.1%	-2.3%

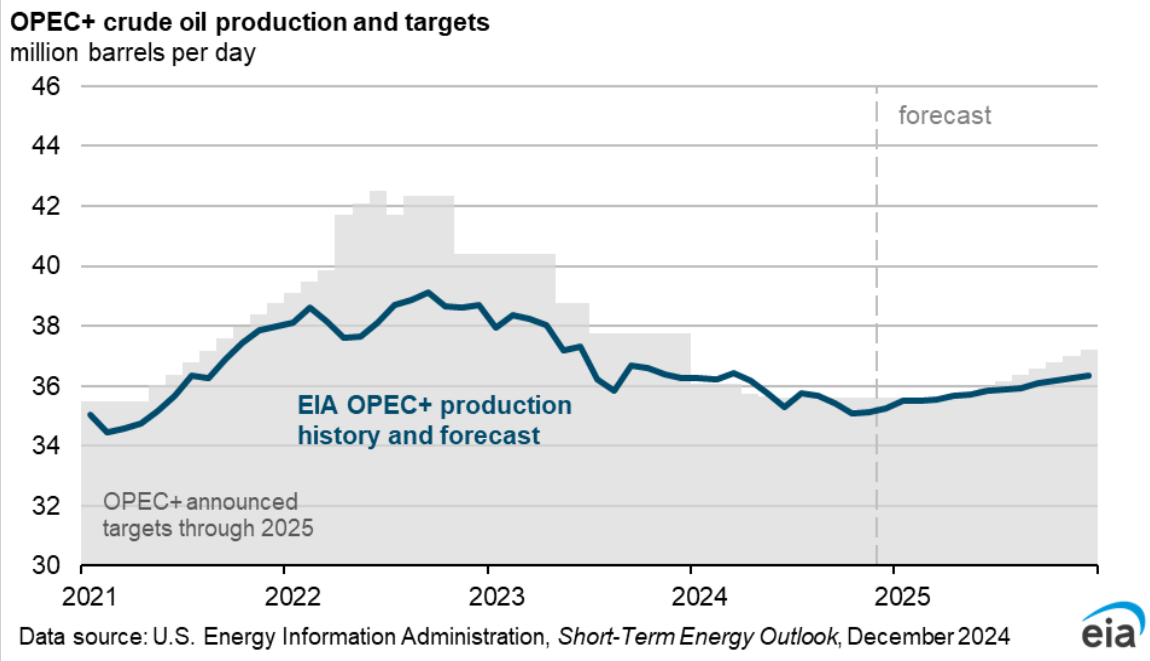
Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*
Note: Percentages are calculated from unrounded values.

Global Oil Markets

Global oil prices and inventories

The Brent crude oil spot price averaged $74 per barrel (b) in November, $1 less than the average in October. Crude oil prices fell slightly in November following a ceasefire between Israel and Hezbollah in Lebanon. The ceasefire removed some of the risk premium present in oil prices, which had reflected the potential for attacks on oil infrastructure and a disruption to oil supplies. In addition, signs of weakening global oil demand growth, primarily centered on slowing oil demand growth in China, continued to weigh on prices.

On December 5, OPEC+ members agreed to delay production increases that were set to begin in January 2025 until April 2025. At the meeting, the group also announced production targets through 2026. Our forecast assumes OPEC+ will generally raise production in line with the new target levels through much of 2025, as the announced targets align with the production that we expect will keep oil markets relatively balanced next year.



We expect global oil inventories will end 2025 near their current volume. We estimate that ongoing OPEC+ production cuts have contributed to global oil inventory withdrawals of about 0.4 million barrels per day (b/d) on average in 2024, and we expect that the extension of OPEC+ production cuts will cause inventories to fall by 0.7 million b/d the first quarter of 2025 (1Q25). However, we expect the subsequent ramp up in OPEC+ production and continued supply growth outside of OPEC+ will lead to an average inventory build of 0.1 million b/d over the remainder of 2025.

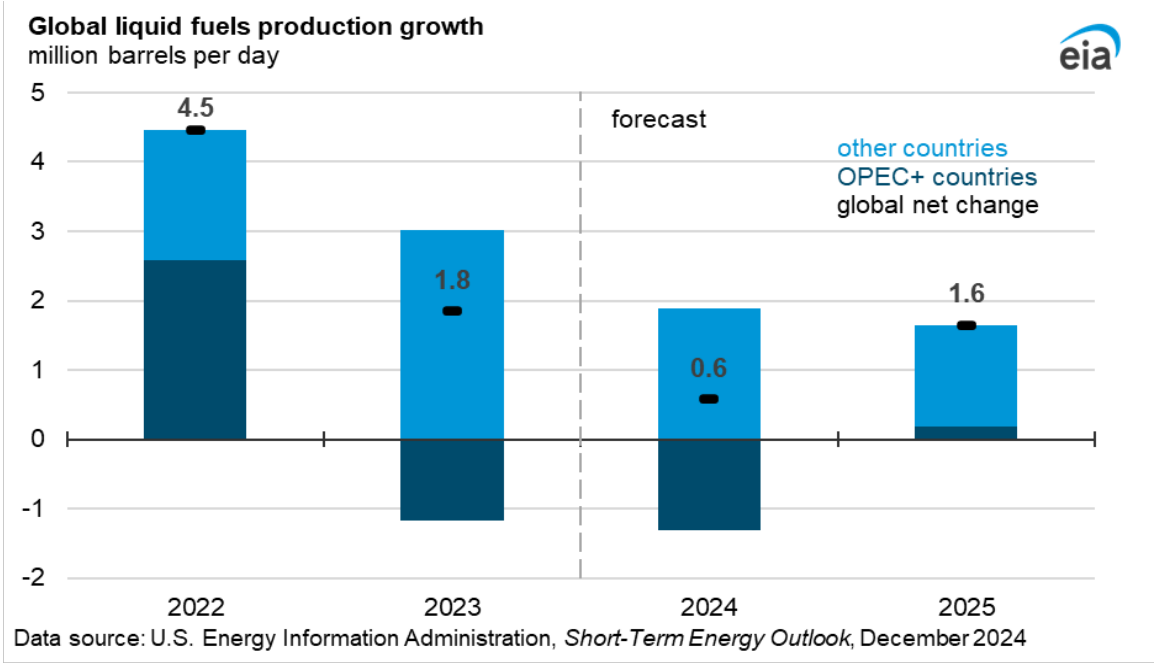
We forecast that inventory builds will put some downward pressure on crude oil prices later in 2025, with Brent falling from an average of $74/b in 1Q25 to an average of $72/b in 4Q25. In our forecast, the 2025 annual average Brent price is $74/b, down from an average of $80/b this year.

As discussed in the November STEO, we continue to see at least two main sources of price uncertainty: the course of the ongoing Middle East conflict and OPEC+ members' willingness to adhere to voluntary production cuts. The volatility and risk premium associated with the conflict in the Middle East moderated in recent weeks before prices increased again on December 9 following Syrian President Bashar al-Assad's ouster. An escalation in the regional conflict has potential to reduce oil supplies, and regional political uncertainty can increase the risk premium. Second, although we assess that OPEC+ producers will likely continue to limit production below recently announced targets in 2025, the potential for weakening commitment among OPEC+ producers to continue cutting production adds downside risk to oil prices.

Global oil consumption and production

Countries that are not part of the OPEC+ agreement are driving increases in global liquid fuels production this year, and we forecast that trend will continue in 2025. We estimate that global liquid fuels production has increased by 0.6 million b/d in 2024. Production outside of OPEC+ is up 1.9 million b/d this year, led by growth in the United States, Canada, and Guyana, but that growth has been partly offset by a 1.3 million b/d reduction in production from OPEC+ participants.

We expect global production of liquid fuels will increase in 2025 by more than 1.6 million b/d, with almost 90% of the growth coming from countries outside of OPEC+.



Oil consumption growth in our forecast continues to be less than the pre-pandemic trend. We forecast that global consumption of liquid fuels will increase by 0.9 million b/d in 2024 and 1.3 million b/d in 2025, which are both less than the pre-pandemic 10-year average of 1.5 million b/d of annual growth, as well as below the oil demand growth seen during the 2021–2023 pandemic recovery.

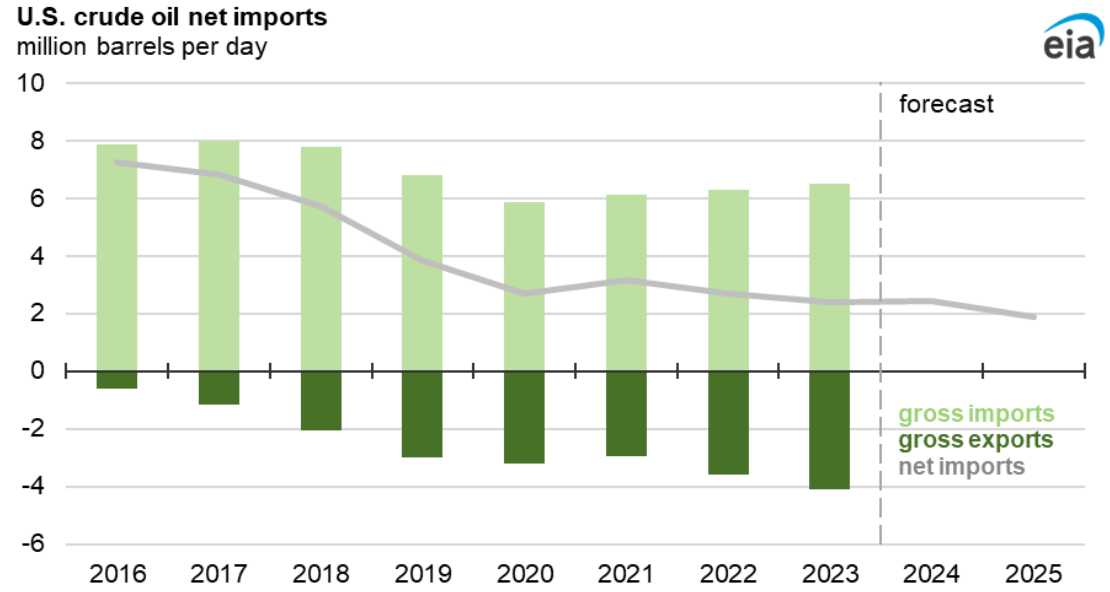
Non-OECD countries drive almost all global oil consumption growth in our forecast. Much of this growth is in Asia, where India is now the leading source of global oil demand growth in our forecast. We expect

India will increase its consumption of liquid fuels by 0.2 million b/d in 2024 and by more than 0.3 million b/d in 2025, driven by rising demand for transportation fuels. We forecast China's liquid fuels consumption will grow by less than 0.1 million b/d in 2024 and by almost 0.3 million b/d in 2025. We estimate that OECD oil consumption will be relatively unchanged across 2024 and 2025, with a slight decline this year and a slight increase next year.

U.S. Petroleum Products

Crude oil net imports

In our forecast, a combination of increasing domestic crude oil production and decreasing U.S. refinery runs means reduced net imports of crude oil next year. We forecast that net imports of crude oil into the United States will fall to 1.9 million barrels per day (b/d) in 2025, down from 2.5 million b/d this year, and the least crude oil net imports in a year since 1971. Total U.S. crude oil production in our forecast increases by 0.3 million b/d in 2025. At the same time, we expect U.S. refineries will process 0.2 million b/d less crude oil next year, down to 16.0 million b/d.



Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook; Petroleum Supply Monthly*, December 2024

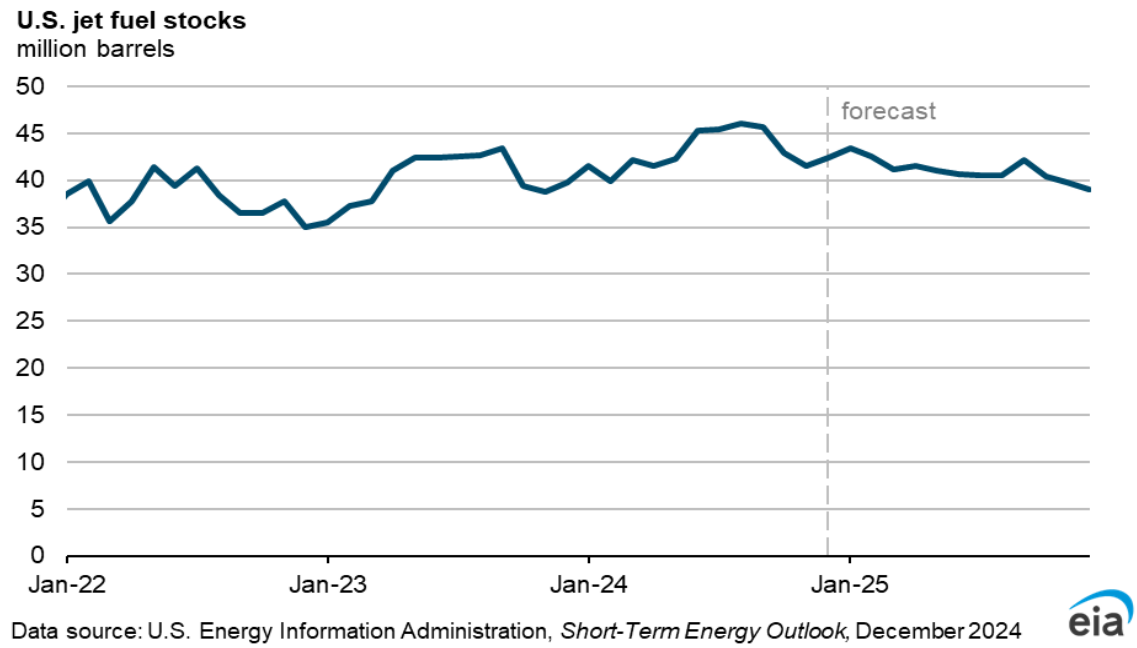
Net imports of crude oil this year have remained close to 2023 volumes because increasing U.S. crude oil production has met an almost equivalent increase in U.S. refinery runs. We do not forecast gross imports or gross exports, but we can look at historical data to better understand the forecast for net imports. U.S. imports of crude oil from Canada have remained strong this year. Our forecasts from earlier in 2024 had assumed exports from Canada's Trans Mountain Pipeline expansion, which was completed in mid-2024, would mostly be sent to China. However, because of slowing oil demand growth in China, most of the crude oil from the Trans Mountain pipeline has gone to refineries on the U.S. West Coast. Data from July 2024 showed the most U.S. imports of crude oil since June 2019, at more than 7.1 million b/d, and imports this year have been similar to 2023. At the same time, U.S. exports of crude oil through 3Q24 have been similar, on average, to exports during the same period in 2023. These factors

contributed to net imports in 2024 remaining about the same as 2023. Despite these recent trends, we forecast net imports will decrease next year because of the increase in crude oil production will likely lead to rising crude oil exports. A decrease in refinery runs because of a reduction in U.S. refinery capacity will also contribute to lower crude oil net imports in 2025. Although the United States is a net importer of crude oil, we are a net exporter of petroleum products overall.

Jet fuel stocks

After reaching a six-year high in August, U.S. jet fuel stocks will generally decline through 2025, reversing a trend of generally rising stocks over the past two years. Consumption of jet fuel remained below pre-pandemic levels this year and declined compared with 2023 in some months, resulting in stock builds. In addition, rising jet fuel yields and production on the U.S. West Coast contributed to record-high jet fuel stocks in the region this summer. Next year, however, we forecast U.S. jet fuel stocks will decline because of both growing consumption and less refinery production of jet fuel following U.S. refinery closures. Jet fuel refinery yields will also decline as refiners shift production toward distillate fuel oil, consumption of which we expect to grow more than jet fuel, reducing jet fuel production. We forecast that jet fuel stocks will fall by more than 5 million barrels (12%) from August 2024 to August 2025. If realized, this decline will be close to the largest drawdown in jet fuel stocks over any one-year period in the past 10 years. We forecast that jet fuel stocks will fall below 40 million barrels by the end of 2025, which will be the least since November 2023.

We expect these large stock withdrawals will increase jet fuel crack spreads (the difference between petroleum product prices and crude oil prices). We forecast the jet fuel crack spread will increase to 51 cents per gallon (gal) next year, up from 46 cents/gal in 2024.



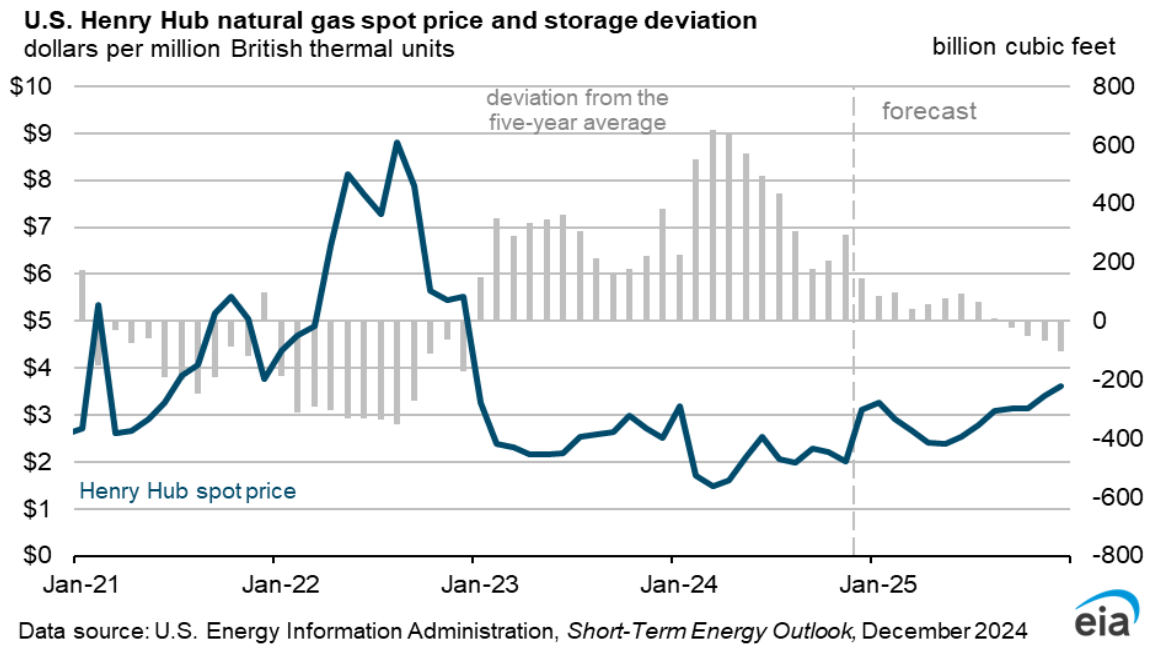
Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, December 2024

Natural Gas

Natural gas storage and prices

U.S. natural gas prices fell for the second month in a row in November as mild autumn weather persisted in the first half of the month and the Lower 48 states entered the winter heating season with 6% more working natural gas in storage than the previous five-year (2019–2023) average.

The U.S. benchmark Henry Hub natural gas spot price averaged just over $2.00 per million British thermal units (MMBtu) in November, down slightly from $2.20/MMBtu in October. With cold late November and early December weather over much of the eastern part of the country, spot prices rose. We forecast the Henry Hub spot price will average $3.00/MMBtu for the rest of the winter heating season, which ends in March, and just under $3.00/MMBtu in 2025.



We forecast natural gas inventories will remain above the five-year average all winter. Because of relatively flat natural gas production in our forecast, and because current forecasts by the National Oceanic and Atmospheric Administration show a colder-than-normal December, we expect natural gas inventories to fall by about 590 billion cubic feet (Bcf) in December, 34% more than the five-year average withdrawal for the month. However, our forecast assumes weather will be milder than normal in 1Q25, which would mean less natural gas withdrawn from inventory than is typical for the first quarter. We expect natural gas inventories to be 2% above the five-year (2020–2024) average by the end of March 2025 at 1,920 Bcf.

U.S dry natural gas production in our forecast averages 103 billion cubic feet per day (Bcf/d) in 1Q25, which is flat compared with 4Q24. For the year, we forecast natural gas production will increase 1% in 2025 due to increased production in the Permian and Eagle Ford regions, where natural gas production is primarily associated with oil production. We also expect more production in the Haynesville region

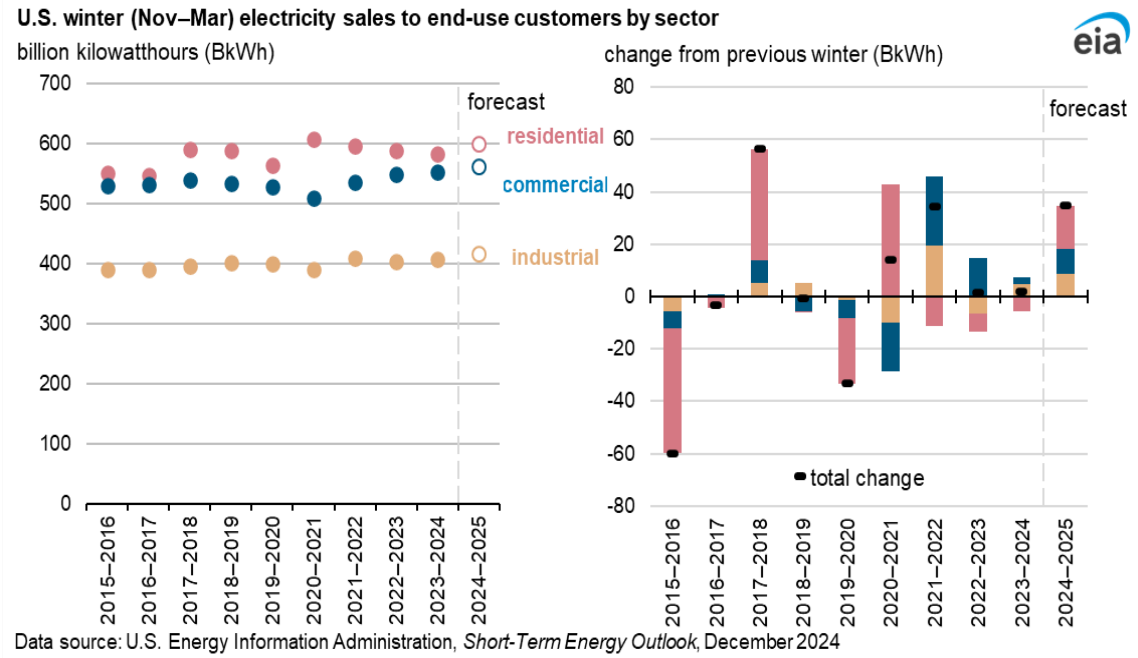
because of higher prices and increased demand from nearby new liquefied natural gas (LNG) export projects that will be ramping up production.

U.S. LNG exports in our forecast are averaging nearly 12 Bcf/d in 2024, essentially flat compared with last year. We expect LNG exports to increase by 15% in 2025, reaching almost 14 Bcf/d, as export capacity expands with Plaquemines LNG and Corpus Christi LNG Stage 3, which are both expected to start LNG exports by the end of December. On November 21, Plaquemines LNG received approval from the Federal Energy Regulatory Commission (FERC) to introduce hazardous fluids to liquefaction Block 1 (first two trains), and Corpus Christi Stage 3 received a similar approval from FERC on November 27. These approvals are a key step for these facilities to begin liquefying natural gas for export.

Electricity, Coal, and Renewables

Electricity consumption

Weather is one of the primary drivers affecting year-to-year changes in electricity consumption. For the upcoming winter (November–March), we expect U.S. electricity sales to all end users will total about 1,580 billion kilowatthours (BkWh), 2% more than the previous winter, driven by space heating demand as a result of an expected 6% increase in winter heating degree days.

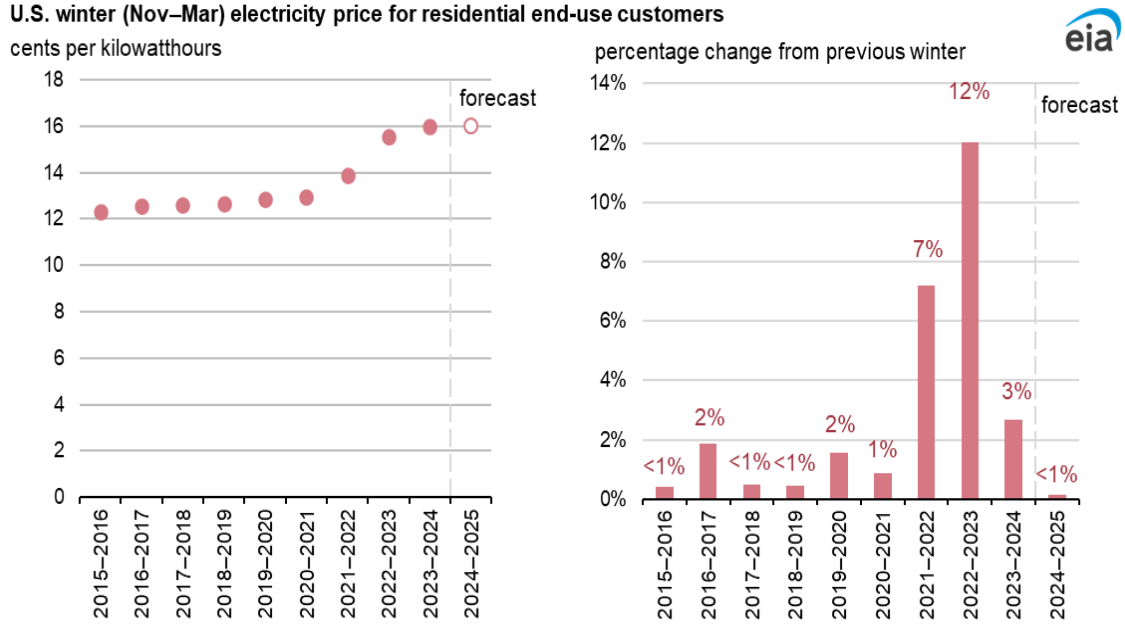


Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, December 2024

The residential sector is responsible for the most consumption of electricity in the United States, and our expectation of colder temperatures this winter leads us to a forecast 3% (17 BkWh) increase in consumption compared with last winter. Forecast winter electricity sales in the U.S. commercial sector grow by 2% (10 BkWh) due to the colder weather and continued growth in power demand from data centers. U.S. industrial electricity sales this winter grow by 2% (9 BkWh).

Retail electricity prices

We expect U.S. residential sector retail electricity prices will average 16 cents per kilowatthour (kWh) this winter, which would be about the same as the average residential price last winter. Over the past three winters, nominal year-over-year increases in residential electricity prices averaged 7%. The relatively flat growth in forecast electricity prices this winter reflects 2% lower costs of natural gas for power generation compared to last winter and increased levels of low-cost renewable generation.

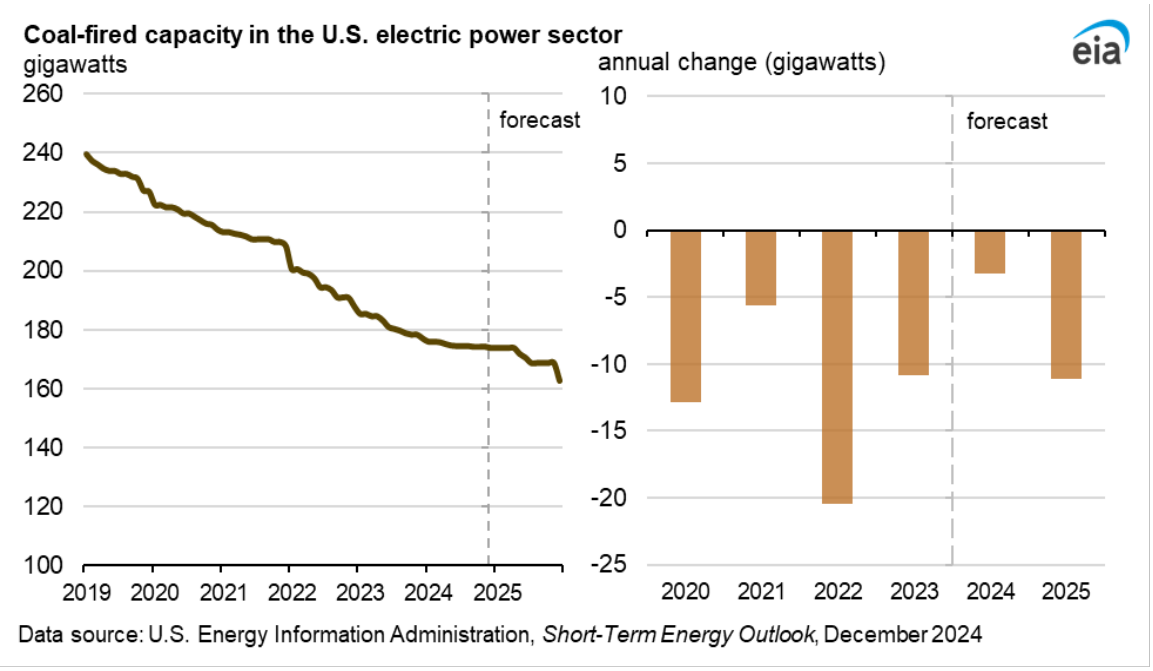


Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, December 2024

Coal markets

We expect coal consumption to remain steady in the United States during 2025, increasing by 1% to 409 million short tons (MMst) from 2024 after falling by 5% between 2023 and 2024. The 2025 increase in consumption is primarily the result of our forecast 1% increase in electric power consumption next year. In the United States, the electric power sector consumes approximately 90% of the coal consumed domestically. Steady consumption in 2025 is a result of higher natural gas prices and increased electricity demand. It also follows a slowdown in coal plant retirements in 2024, when utilities retired 3 gigawatts (GW) of coal-fired generation compared with 11 GW in 2023.

Despite relatively flat U.S. coal consumption next year, we expect coal production will fall more sharply as coal-fired power plants reduce their inventories. We forecast that coal production will fall to 472 MMst in 2025, down by 7% from 2024. Moreover, we expect retirements of coal-fired generating capacity to increase again to 11 GW in 2025, while 9 GW of wind generation capacity and 25 GW of solar generation capacity come online. The combination of a modest increase in consumption from operating coal plants and a decline in coal production will reduce coal inventories held by power plants from 131 MMst at the end of this year to 100 MMst by the end of 2025.

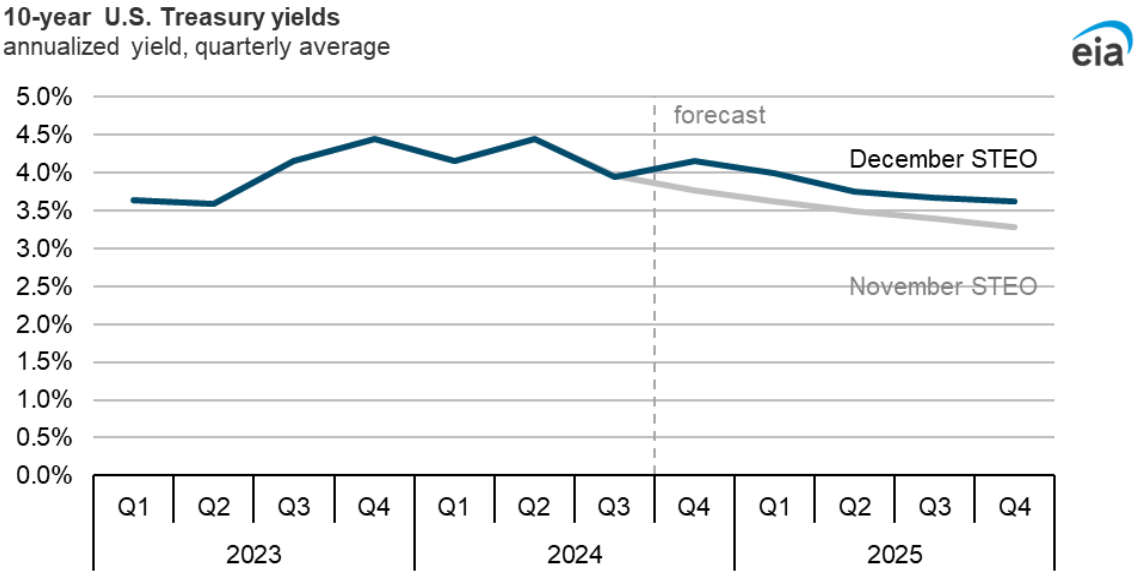


Economy, CO_2, and Weather

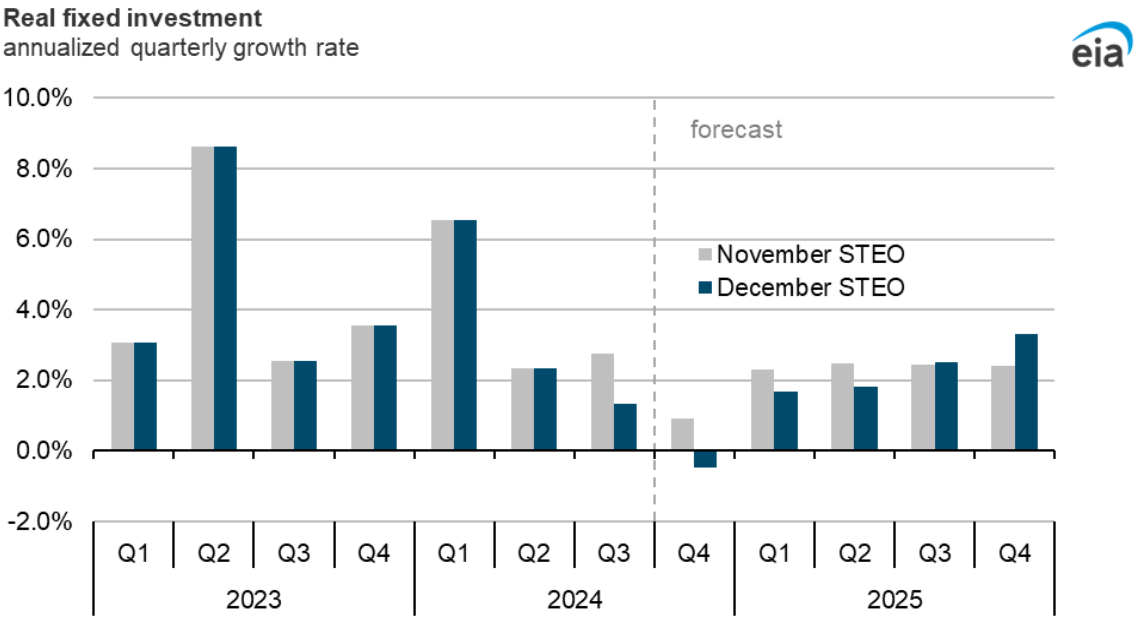
U.S. macroeconomics

Our macroeconomic forecast for December 2024 is mostly unchanged compared with November. We assume real GDP will grow by 2.7% in 2024 and 2.1% in 2025, both of which are unchanged from last month. The largest difference from last month comes in 4Q24, when we now assume GDP will grow at an annualized rate of 1.5% compared with 1.9% assumed in the November STEO. The macroeconomic forecasts in the STEO are based on S&P Global's macroeconomic model. We incorporate STEO energy price forecasts into the model to obtain the final macroeconomic assumptions.

Even though the target for the federal funds rate has declined by 75 basis points since September, 10-year Treasury yields and other long-term interest rates have risen over the same period. The yield on 10-year U.S. Treasury bonds has increased from 3.6% to 4.4% and is currently 0.4 percentage points higher than what we assumed in November.



Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook* (STEO); Standard & Poor's Global, December 2024



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

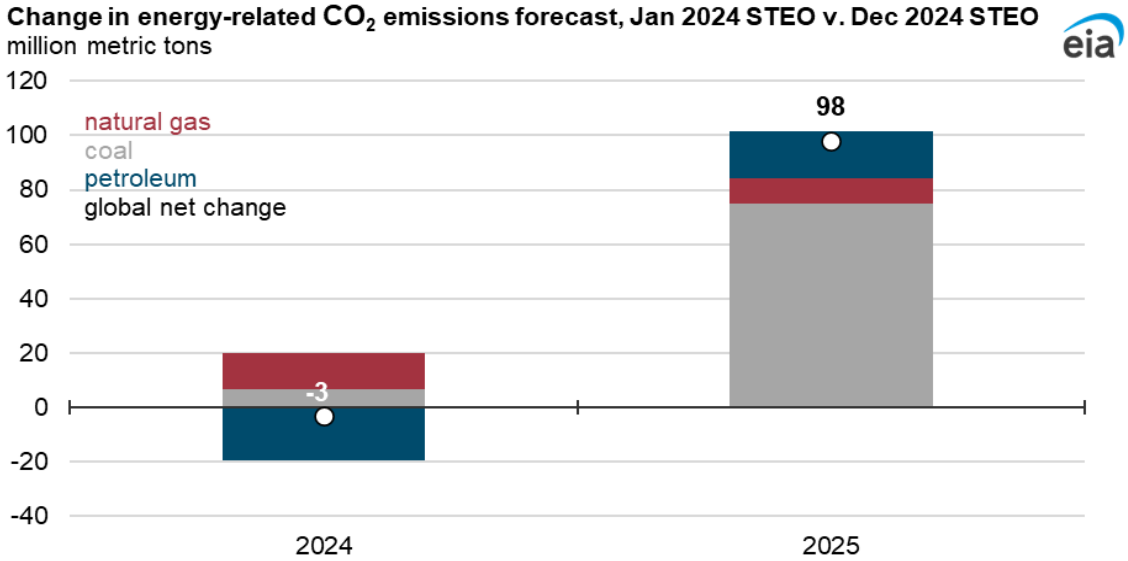
The result of the increase has been increased borrowing costs, which are reflected in our assumptions regarding the trajectory of real fixed investment. We now assume that real fixed investment will contract in 4Q24 and slow growth in 1H25 will contribute to slower GDP growth in 4Q24.

Emissions

Our December forecast of U.S. energy-related carbon dioxide (CO_2) emissions in 2024 and 2025 has changed slightly since our initial January 2024 STEO. These changes to our emissions forecast can be seen in both 2024 and 2025 across several fuels.

Our forecast of total energy-related U.S. CO_2 emissions in 2024 has changed by less than 1% since January as a result of offsetting differences in emissions among fossil fuels. Our forecast for petroleum emissions is lower than it was in our January outlook mostly because there has been less distillate consumption than we expected. Distillate consumption in 2024 is lower than we forecast in our January STEO because of less manufacturing activity than expected and, to a lesser degree, more use of biofuels. These decreases are offset by more CO_2 emissions from natural gas than expected because of low natural gas fuel costs as well as relatively hotter summer weather, which increased natural gas-fired generation to meet air-conditioning demand.

Although we expect CO_2 emissions in 2025 to about the same as they were in 2024, our forecast for 2025 CO_2 emissions is 2% (or around 100 million metric tons) higher than it was in forecast in our January 2024 outlook. The outlook for more emissions in 2025 is mostly associated with an upward revision in coal-fired electricity generation. Compared with our January forecast, we expect more coal generation in 2025 due to an upward revision in overall electricity demand associated with rising electricity consumption from data centers. Increased petroleum product consumption, mostly motor gasoline, also increased our 2025 emissions estimates. We attribute this upward revision in consumption partially to an upward revision in disposable income, amid other factors influencing supply and demand for gasoline.



Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook* (STEO), December 2024
Note: Differences in forecast emissions are expressed here as the December STEO emissions forecast minus the January STEO emissions forecast, by year and fuel category.

Weather

Based on current forecasts and data from NOAA, we expect a colder December than we have experienced recently, with 770 heating degree days (HDDs) across the United States in December, 24% more than December 2023 and 9% more than the 10-year December average. The cold weather in December more than offsets the warmer start to the winter in November, which had 12% fewer HDDs than the 10-year November average. As a result, we expect the 2024–2025 winter heating season

(November—March) will be colder than last winter, averaging 3,210 HDDs overall (6% more HDDs), but still slightly warmer than the previous 10-year winter average (2% fewer HDDs).