

Short-Term Energy Outlook

STEO

September 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	\$83	\$84
Retail gasoline price (dollars per gallon)	\$3.50	\$3.30	\$3.30
U.S. crude oil production (million barrels per day)	12.9	13.3	13.7
Natural gas price at Henry Hub (dollars per million British thermal units)	\$2.50	\$2.20	\$3.10
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%	39%
Coal	17%	16%	16%
Renewables	21%	23%	25%
Nuclear	19%	19%	19%
U.S. GDP (percentage change)	2.5%	2.6%	1.8%
U.S. CO₂ emissions (billion metric tons)	4.8	4.8	4.8

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

- New U.S. biofuels data.** Biomass-based diesel products are [making up an increasing share](#) of the total distillate fuel oil consumed in the United States. Beginning this month, we will publish forecasts for several new series that better capture how biofuels are being consumed and the share of total distillate fuel oil they account for. We expect that although U.S. total distillate fuel oil consumption will fall slightly this year to average 4.1 million barrels per day (b/d), biofuels will account for 9% (360,000 b/d) of that consumption, up from 8% last year and 5% in 2022.
- New propane retail price data.** Also starting this month, we will be publishing monthly retail propane price forecasts by region. In our forecast, the U.S. average retail propane price for the upcoming heating season (November–March) averages \$2.50 per gallon (gal), which would be unchanged from last winter. Prices for this winter range from an average of \$3.35/gal on the East Coast to \$2.00/gal in the Midwest, both of which are similar to last winter.
- Crude oil prices.** Despite a drop in the Brent crude oil spot price to \$73 per barrel (b) on September 6, we expect ongoing withdrawals from global oil inventories will push prices back above \$80/b this month. More oil will be taken out of inventories in the fourth quarter of 2024 (4Q24) that we previously expected because [OPEC+ announced that they will delay production increases](#) until December. Those increases had been set to start in October. Although market concerns over economic and oil demand growth, particularly in China, have increased, causing oil prices to fall, OPEC+ production cuts mean less oil is being produced globally than is being consumed. We expect the Brent crude oil spot price to average \$82/b in 4Q24 and average \$84/b in 2025.

- **Natural gas prices.** We forecast natural gas prices will remain relatively flat in the upcoming shoulder season during September and October before prices generally rise in 2025. Price increases in 2025 reflect U.S. natural gas production that does not keep pace with growth in [U.S. liquefied natural gas \(LNG\) exports](#). We expect the Henry Hub spot price will rise from less than \$2.00 per million British thermal units (MMBtu) in August to around \$3.10/MMBtu next year.
- **Electricity generation.** A [hot start to the summer](#) has contributed to rising electricity demand this year, which is spurring more electricity generation. We expect that U.S. electricity generators will produce 3% more electric power this year than they did in 2023. Most of this increase in generation is coming from solar power, but a significant amount is also coming from natural gas.
- **Solar generation.** [Significant capacity expansions](#) are supporting the increase in solar generation. Solar accounted for 59% of U.S. generating capacity additions in the first half of 2024, an increase that was supported by the development of [new battery storage capacity](#). We expect the largest gains in solar generation in 2024 in Texas (16 billion kilowatthours [BkWh]) and in California (9 BkWh).

Notable forecast changes

Current forecast: September 10, 2024; previous forecast: August 6, 2024

	2024	2025
Change in global oil inventories (million barrels per day)	-0.9	0.0
Previous forecast	-0.6	-0.1
Change	-0.3	0.1

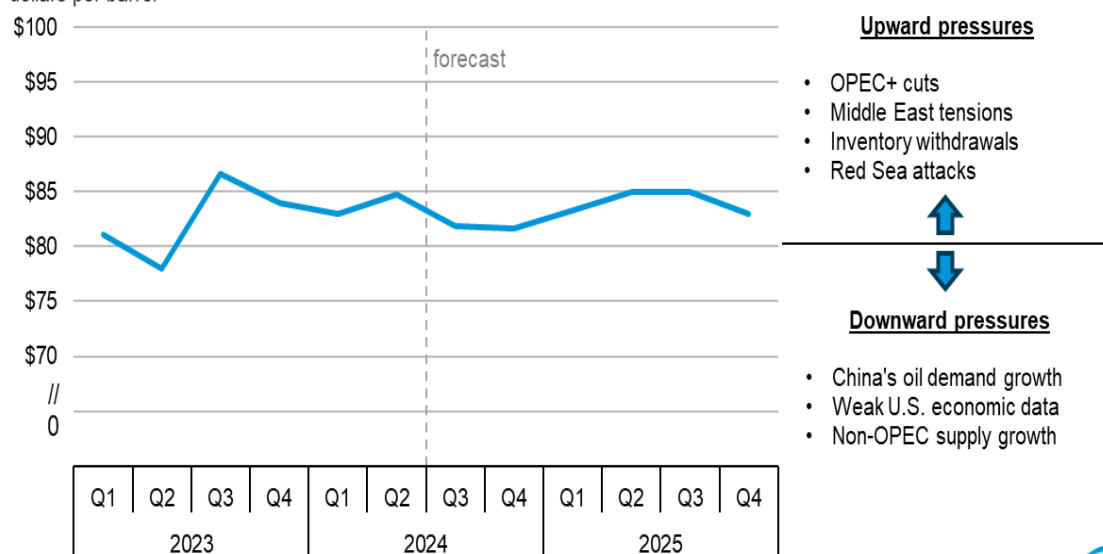
Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*

Global Oil Markets

Global oil prices and inventories

Although short-term prices have sometimes been volatile this year, oil prices have mostly traded within a relatively tight range. The Brent crude oil spot price averaged \$82 per barrel (b) in August, marking the eighth consecutive month where it averaged between \$80/b and \$90/b. Despite a drop in the Brent spot price to \$73/b on September 6, we expect ongoing withdrawals from global oil inventories stemming from OPEC+ production cuts will push the price back into that range relatively quickly.

Brent crude oil spot price and upward and downward price pressures
dollars per barrel



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



Persistent economic concerns have reduced market expectations around global oil demand growth. Slowing global economic activity and [reduced fuel demand in China](#), one of the leading sources of global oil demand growth, as well as signs of slowing U.S. job growth in recent months, have limited any upward price momentum in recent months.

However, we still expect oil prices will rise in the coming months, driven by ongoing withdrawals from global oil inventories as a result of OPEC+ production cuts. The OPEC+ production cuts continue to cause less oil to be produced globally than is being consumed. Even before [OPEC+ announced that it will delay production increases](#) until December, we expected a significant reduction in global oil inventories through the end of this year. We now expect more oil will be taken out of inventories than we previously expected.

We estimate global oil inventories are falling by 0.9 million barrels per day (b/d) in 3Q24, and we expect they will decrease by more than 1.0 million b/d through 1Q25. As a result, we expect Brent prices will rise from \$74/b at the beginning of September to average \$82/b in December and \$83/b in 1Q25.

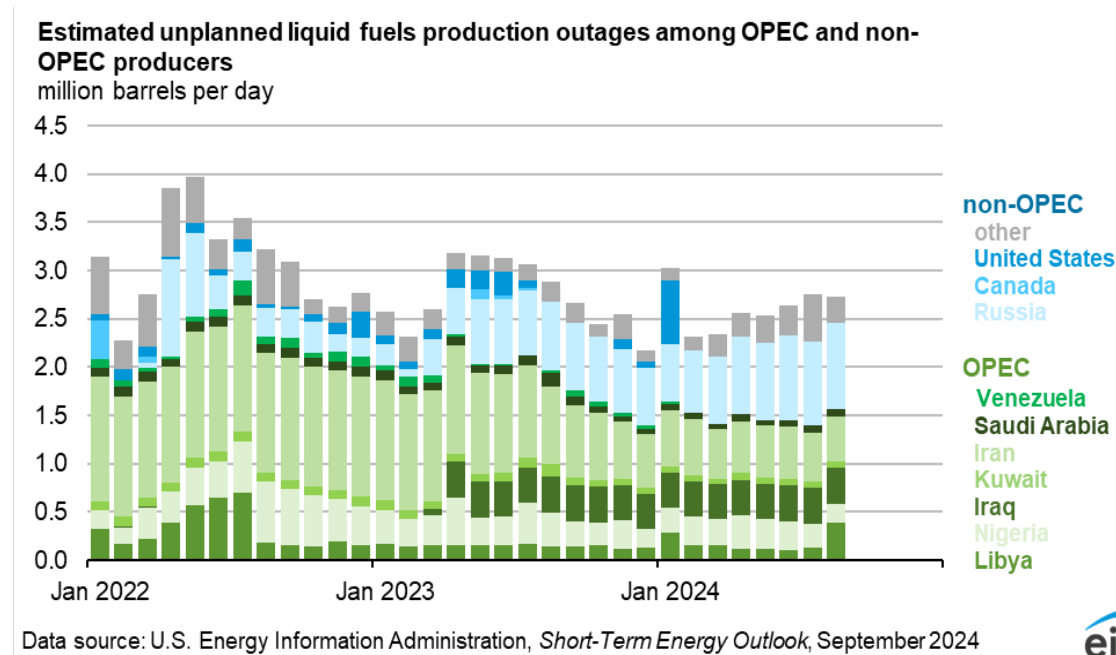
By mid-2025, we anticipate that the market will gradually return to moderate inventory builds as OPEC+ increases production through the year and as forecast production growth from countries outside of

OPEC+ begins to outweigh global oil demand growth. We estimate that global oil inventories will increase by an average of 0.5 million b/d in the second half of 2025 (2H25). We forecast the Brent price will average \$84/b in 2025.

Recent production outages in Libya add a new source of uncertainty for crude oil prices in the coming months. These outages compound existing uncertainties driven by [attacks on oil tankers in the Red Sea](#) shipping channel and the possibility the conflict in Gaza spills into neighboring countries, potentially disrupting regional oil production. Similarly, OPEC+ members could further delay the unwinding of voluntary oil production cuts now set to begin in December. Over the long term, whether global oil demand growth will outweigh supply growth from countries outside of OPEC+ remains a key uncertainty.

Global oil production and consumption

The duration of recent disruptions to crude oil production in Libya are a key uncertainty for the oil market in 4Q24. Political unrest and increased tensions between competing Libyan government factions have halted production across numerous oil fields in the country. Estimates are that production fell as low as 0.4 million b/d by the end of August, down from 1.1 million b/d in 1H24. We assume Libya's oil production will average 0.6 million b/d for the remainder of the year.



Although OPEC+ cuts and recent productions outages in Libya are limiting world oil production growth, we estimate that growth outside of OPEC+ will remain strong. We expect that global production of petroleum and other liquid fuels will increase by 0.3 million b/d in 2024. OPEC+ liquid fuels production in our forecast decreases by 1.4 million b/d in 2024, while production outside of OPEC+ increases by 1.7 million b/d, led by growth in the United States, Canada, Guyana, and Brazil. Global production of liquid fuels increases by 2.4 million b/d in 2025, with OPEC+ production increasing by 0.8 million b/d and 1.6 million b/d of production growth from countries outside of OPEC+.

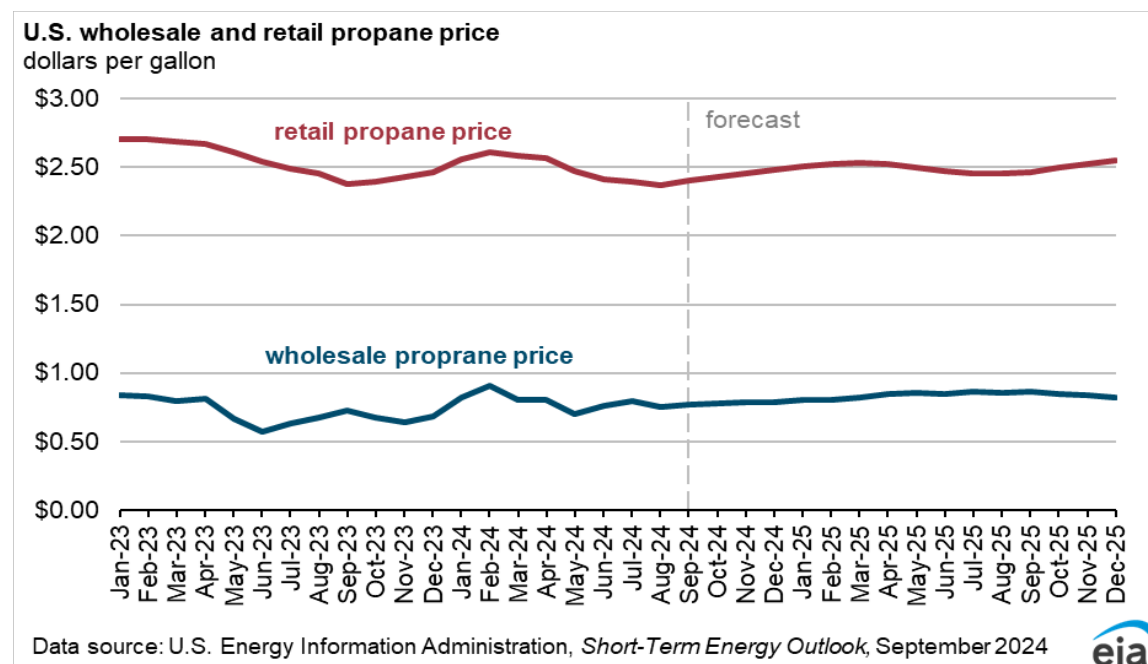
We forecast that global consumption of liquid fuels will increase by 0.9 million b/d in 2024 and 1.5 million b/d in 2025. Our 2024 forecast is down 0.2 million b/d from last month and our 2025 forecast is down 0.1 million b/d due to downward revisions to demand in China and OECD Europe. Most of the expected liquid fuels demand growth is from non-OECD countries, which increase their liquids consumption by 1.0 million b/d in 2024 and 1.3 million b/d in 2025. We revised our forecast petroleum consumption growth in China for 2024 and 2025 down because of slower economic activity as well as new monthly statistics showing a slowdown in diesel demand, jet fuel consumption, and crude oil refinery runs in China. We now forecast China's petroleum and liquid fuels consumption will grow by about 0.1 million b/d in 2024 and 0.3 million b/d in 2025.

U.S. Petroleum Products

Mont Belvieu propane price forecast

We forecast the U.S. benchmark wholesale propane price in Mont Belvieu, Texas, will average 80 cents per gal (gal) during the 2024–25 winter heating season that runs from November through March, which is 4% (3 cents/gal) more than during the 2023–24 winter heating season.

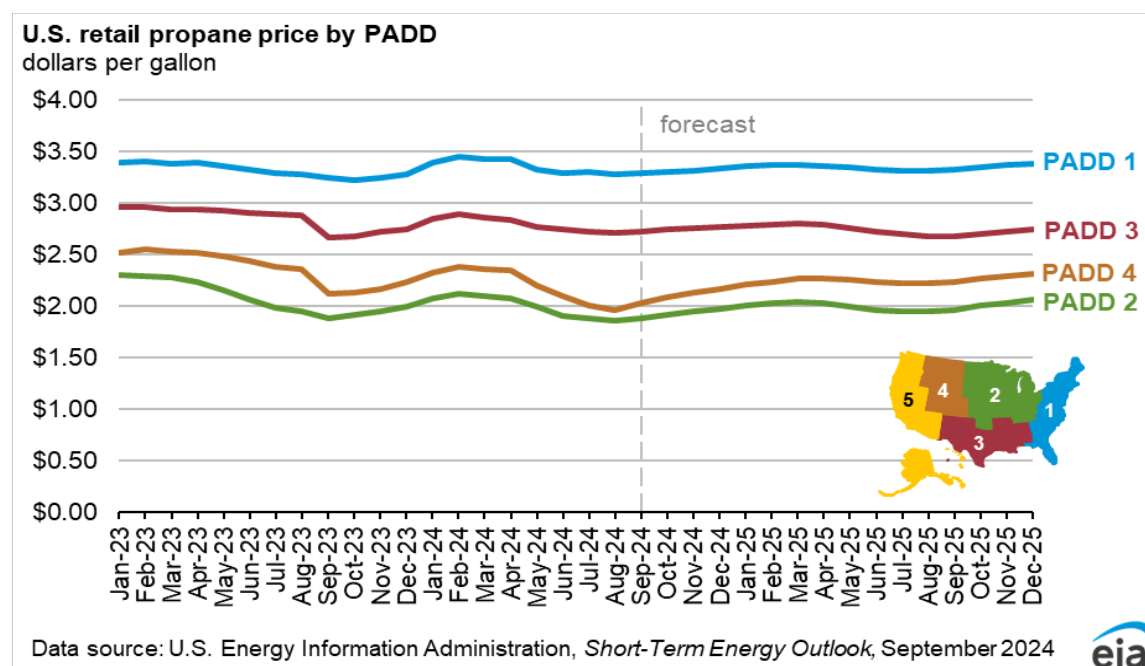
U.S. propane prices often exhibit seasonality, where prices increase in the winter, especially if the winter is colder-than-normal, increasing demand for propane's use in space heating. We expect the Mont Belvieu spot price will increase from 76 cents/gal in August to end the winter at 82 cents/gal in March, when inventories fall to their seasonal low. We use [heating degree days](#) (HDDs) as a measure of how cold temperatures are—more HDDs indicate colder temperatures. We forecast HDDs this winter to be near the 10-year average. Wholesale propane prices are driven by [increases in the Brent crude oil price and Henry Hub natural gas price](#) during the upcoming winter. Despite our increased forecast of U.S. field production of propane compared with last year, growing demand from global markets for U.S. propane also puts some upward pressure on prices.



Retail propane price forecast

Relatively unchanged wholesale propane prices in our forecast between this winter and last means retail propane prices will also be close to those last winter. Our retail propane price forecast is closely linked to our Mont Belvieu wholesale propane price forecast. Beginning this month, in each STEO we will publish a monthly retail propane price forecast by region. Previously, we only published a winter-average price forecast in the STEOs from October through March. In the summer of 2024, we started collecting retail propane price data from April to October, in addition to our [existing data collection](#) during the winter heating season. This enhancement in our data collection allowed us to expand our forecast for retail propane prices.

We forecast that U.S. retail propane prices will average about \$2.50/gal this winter, almost unchanged from last winter. Like wholesale propane prices, retail propane prices typically increase in the winter when retail propane inventories draw down and demand increases. Retail propane prices vary significantly across regions based on local supply and consumption dynamics. Propane used for heating is most common in rural areas, and around [one-third of the households heated with propane](#) are in the Midwest. We forecast Midwest (PADD 2) retail propane prices for the winter heating season to average \$2.00/gal. On the East Coast (PADD 1), we forecast average retail propane prices this winter will be about \$3.35/gal. On the Gulf Coast (PADD 3), we forecast a \$2.80/gal average price this winter. And in the Rocky Mountains (PADD 4), we forecast a \$2.20/gal average price. We do not publish a forecast for West Coast (PADD 5) retail propane prices because we do not collect historical data to support this forecast.



New STEO biofuels table

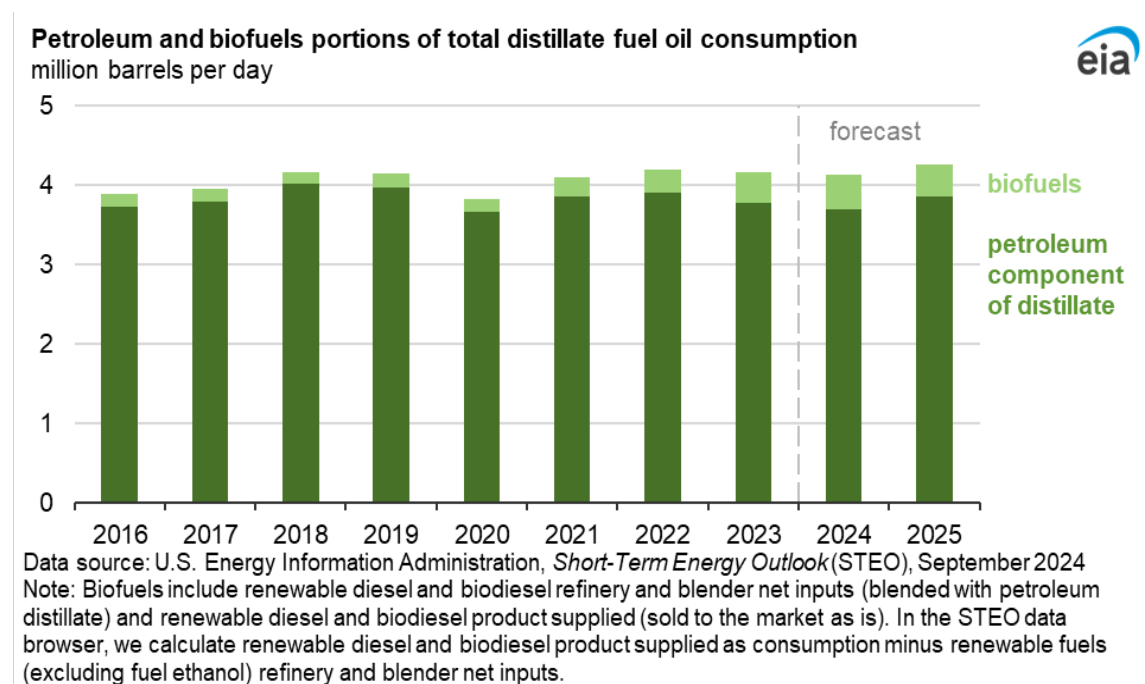
Biomass-based diesel products are [making up an increasing share](#) of total distillate fuel oil consumed in the United States. Most of this growth is occurring on the West Coast because of state-level policies in that region, notably California's [Low Carbon Fuel Standard](#). Beginning this month, we will publish

forecasts for several new series that help to better capture how biofuels are being consumed and overall demand for distillate fuels. The most notable of these series is *total distillate fuel oil consumption*—a category that includes petroleum-based distillate fuel oil, renewable diesel, and biodiesel.

Previously, we only published product supplied of distillate fuel oil (the proxy we use for consumption) in [STEO Table 4a](#). These data included volumes of [biodiesel](#) and [renewable diesel](#) reported to EIA as refiner and blender net inputs. However, distillate fuel oil product supplied does not include the larger volume of biofuel consumption that we report as standalone biodiesel and renewable diesel product supplied, although much is likely blended with petroleum-based distillate fuel downstream of what we capture in our surveys. Our new data series, called total distillate fuel oil consumption, adds these biodiesel and renewable diesel product supplied volumes to petroleum-based distillate fuel oil product supplied. This new series provides a more complete picture of all fuels being used as distillate fuel oil.

Our data show that in 2023 total distillate fuel oil consumption was 4.2 million b/d in the United States, of which 92.5% was petroleum-based diesel and 7.5% (310,000 b/d) was either biodiesel or renewable diesel. We expect that although total distillate fuel oil consumption will fall slightly this year to 4.1 million b/d, the biofuel component will rise to 360,000 b/d.

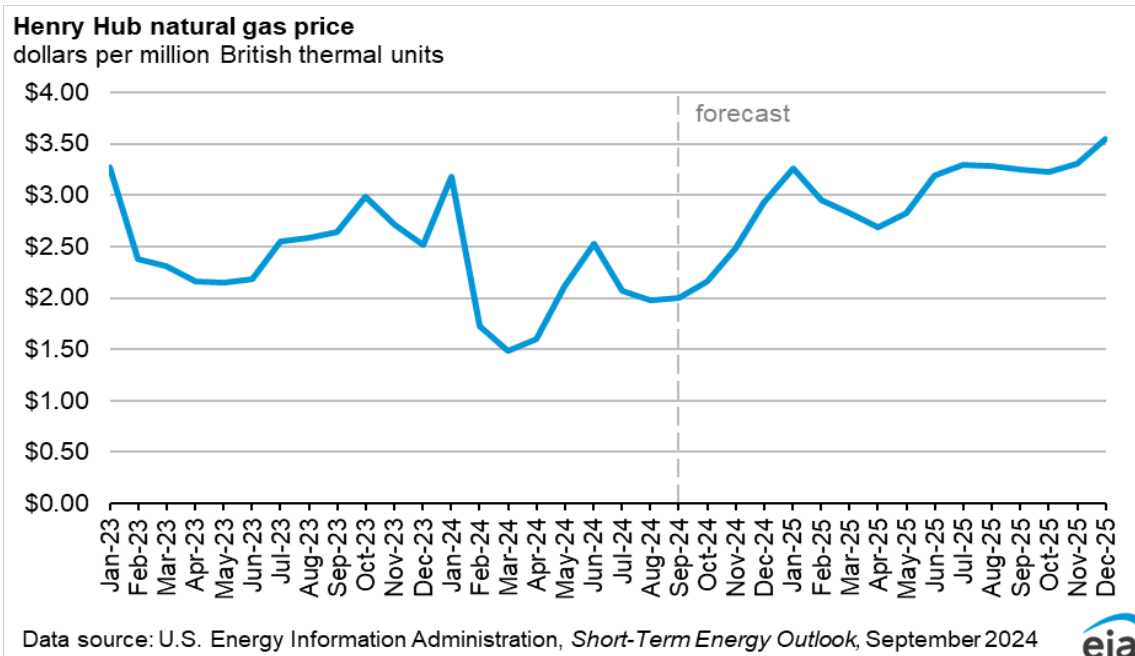
Our new total distillate fuel oil category and other STEO biofuel forecasts are available in [STEO Table 4d](#) as well as in the [STEO Data Browser](#).



Natural Gas

Natural gas prices

We forecast that natural gas prices will remain relatively flat in the upcoming shoulder season of September and October before generally rising in 2025. The U.S. benchmark Henry Hub natural gas price averaged \$1.98 per million British thermal units (MMBtu) in August, down 4% from July.



September Henry Hub prices in our forecast remain close to prices in August, as we enter the shoulder season when less natural gas is consumed overall and before demand for space heating increases in the United States. We expect U.S. natural gas consumption to decline by 8% to 79 billion cubic feet per day (Bcf/d) between August and September.

With relatively flat production and reduced natural gas consumption because of a seasonal decrease in demand from the electric power sector, we expect the Henry Hub natural gas spot price to stay close to \$2.00/MMBtu the next couple of months and remain below \$3.00/MMBtu through the end of 2024.

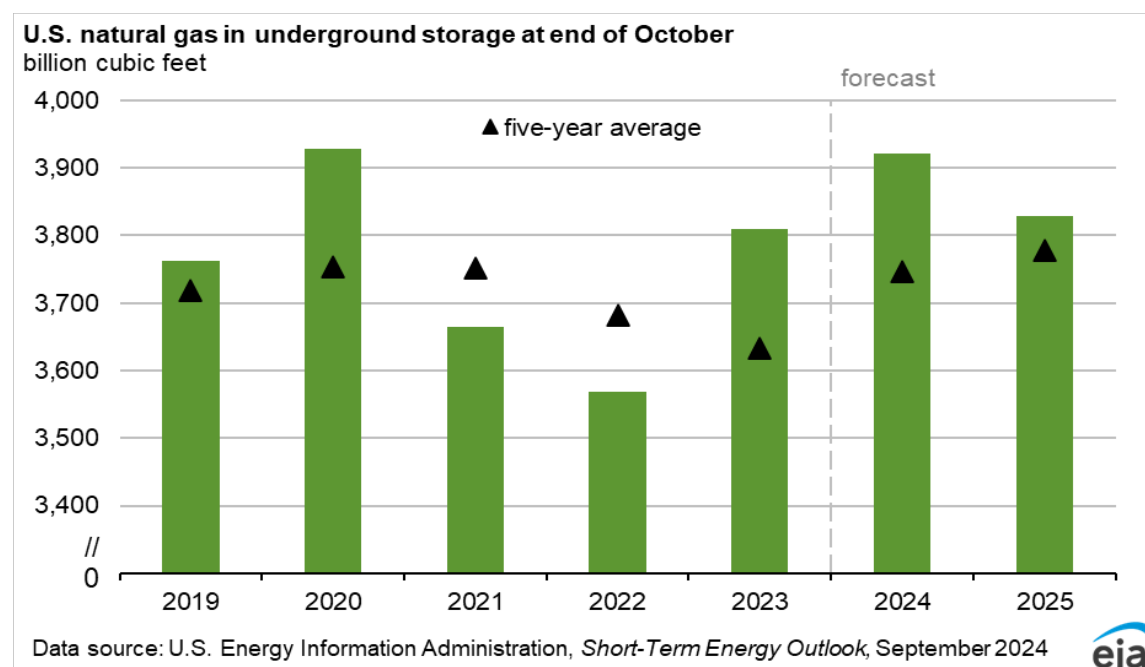
In 2025, we expect prices to rise as liquefied natural gas (LNG) exports increase while domestic consumption and production remain relatively flat for much of the year. We forecast U.S. consumption of natural gas to average about 90 Bcf/d in 2025, which is about the same as our forecast for total consumption in 2024. However, we expect that LNG exports will rise by more than 2 Bcf/d (17%) next year as [export capacity expands](#).

We expect U.S. dry natural gas production will remain relatively unchanged over the next several months as some producers, particularly in the Marcellus and Haynesville regions, [continue to curtail production](#) until prices rise. U.S. dry natural gas production averages 104 Bcf/d in 4Q24 in our forecast and 105 Bcf/d during 2025. Most of the growth in natural gas production comes in late 2025 when we

expect new LNG export facilities to ramp up production. We forecast the Henry Hub price to average around \$2.20/MMBtu in 2024 and \$3.10/MMBtu in 2025.

Natural gas storage

We expect less natural gas [storage injections](#) than the five-year average (2019–2023) through the remainder of this year’s injection season (April–October). Nevertheless, we expect inventories will end the injection season on October 31 with 5% more natural gas than the five-year average, down from a surplus of 11% at the end of August. Our anticipation of a narrowing surplus to the five-year average supports our expectation of rising prices in the coming months. If U.S. natural gas production is less than our forecast and consumption increases, leading to inventories ending the injection season closer to the five-year average, natural gas prices could be higher than forecast. At the same time, with peak hurricane season approaching, if LNG exports were disrupted because of a hurricane on the Gulf Coast, resulting in more U.S. inventories than expected, natural gas prices could be lower than in our forecast.



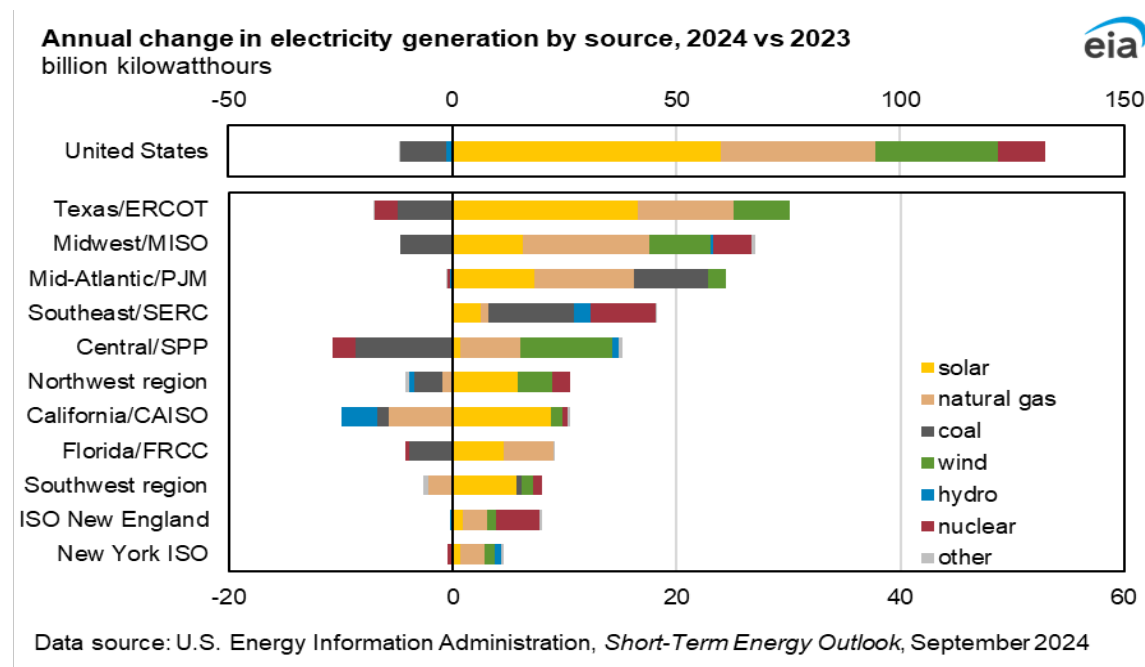
Electricity, Coal, and Renewables

Electricity generation

A [hot start to the summer](#) increased electricity generation this year. We forecast the U.S. power sector will generate 3% (121 billion kilowatthours [BkWh]) more electricity this year than in 2023, as a result of both more air-conditioning demand earlier in the summer and our expectation of increases in electricity demand during the fourth quarter. We forecast the U.S. power sector will generate an additional 1% (60 BkWh) more electricity in 2025, largely because of ongoing growth in electricity demand, particularly from the industrial sector.

Solar power continues to supply most of the increase in U.S. electricity generation. Nationwide, we forecast a 37% increase in solar power (60 BkWh) this year. The second-leading source of growth in U.S.

generation is natural gas, with a 2% increase (35 BkWh), followed by smaller increases in wind (up 6%, or 27 BkWh) and nuclear (up 1%, or 11 BkWh).



Generation by utility-scale solar-powered facilities is growing across all regions of the United States and is set to increase by 34% nationwide this year, supported by the rapid installation of new solar projects. [Solar generating capacity](#) grew in the first half of 2024 by 12 gigawatts, 59% of capacity additions across all types of energy sources during that period. This increase in solar capacity is aided by parallel development of [battery storage](#), which provides power to the grid during the rapid ramping up or down of solar power during the early morning or evening hours. We expect annual solar generation will increase the most between 2023 and 2024 in Texas/ERCOT (17 BkWh) and in California/CAISO (9 BkWh).

Low natural gas fuel costs and higher overall electricity demand are contributing to increased generation by natural gas-fired power plants in the United States this year. A small number of new combined-cycle power plants have come online in the past year, but that new generating capacity has been offset by retirements at other natural gas plants. Forecast natural gas generation in 2024 is increasing the most in the Midwest (up 11 BkWh) and in the Mid-Atlantic (up 9 BkWh). We expect less natural gas generation in California this year (down 6 BkWh) and in the Southwest (down 2 BkWh), in response to large increases in solar generation.

Generation from coal-fired power plants is down in most regions as it continues being displaced by increased generation from natural gas and renewables, along with [coal plant retirements](#). Coal-to-natural gas switching is most evident in the Central/SPP region, where we forecast 9 BkWh less coal generation this year than in 2023.

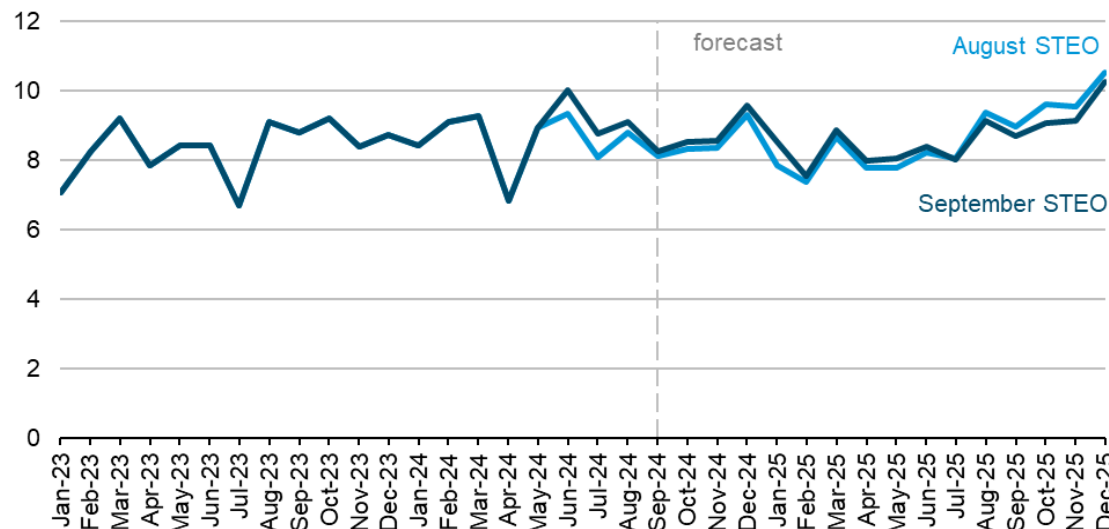
Coal markets

Despite a drop in U.S. metallurgical coal exports in July, we have raised our forecast for coal exports after incoming data showing strong exports in 1H24. However, we expect exports may fall slightly with a

potential slowing of global demand for U.S. coal. U.S. metallurgical coal exports fell 26% in July after a 34% jump in June that pushed total U.S. exports to 10 million short tons (MMst). However, the July drop was likely temporary, resulting from a more normal flow of export shipments after a June spike in exports as the Port of Baltimore reopened following the [Key Bridge collapse](#). After the strong pace of metallurgical coal exports in 1H24, especially to the key U.S. coal export market of India where steel demand [is rising](#), we raised our forecast of metallurgical coal exports for 2024 by 6% to 53 MMst from our August STEO. We forecast metallurgical coal exports to remain steady at 52 MMst in 2025, although the potential for a [decline in steel demand in China](#) is a possible downside risk to the forecast.

Meanwhile, thermal coal exports rose 7% in July. We have kept our forecast of [thermal coal exports](#) mostly unchanged at 53 MMst, as global coal-fired power generation [remains level](#) in 2024. We expect thermal coal exports to total 52 MMst in 2025. As a result, we forecast total U.S. coal exports of 105 MMst in 2024, up 5% from 2023.

U.S. coal exports
million short tons



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

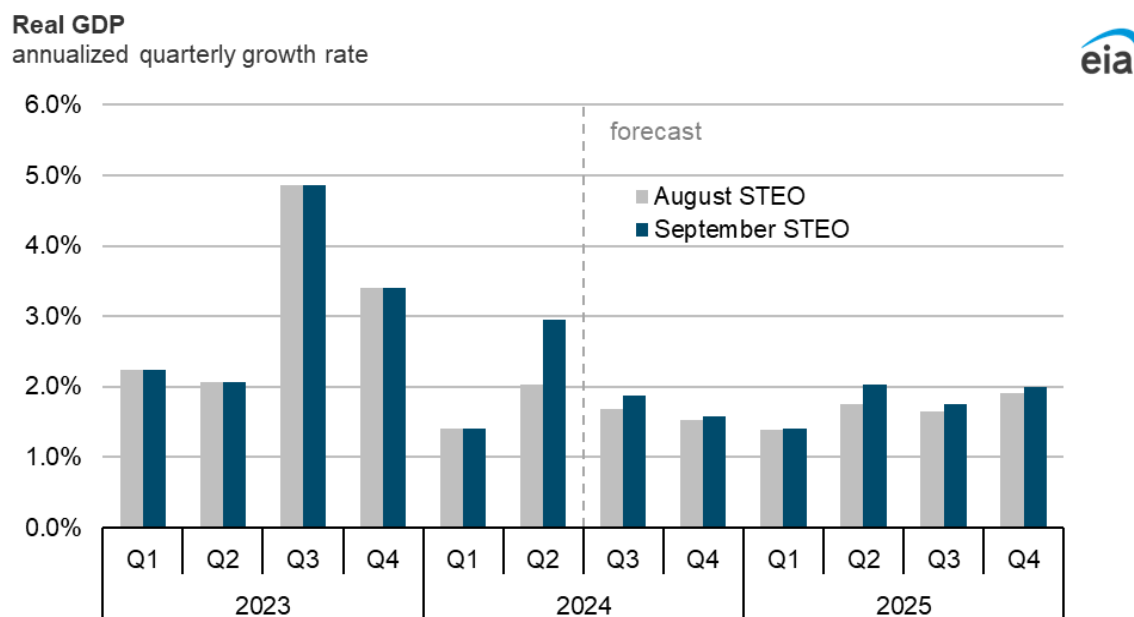


Despite an increase in exports this year, U.S. coal production will decline because of falling domestic consumption. We forecast U.S. coal production will total about 500 MMst in 2024, down 13% from last year. With the shoulder season for electric generation approaching after cooler temperatures than normal in August for the mid-Atlantic and the Midwest, we have lowered our forecast of U.S. electric power coal consumption for 2024 by 1% to 379 MMst compared with the August STEO, and we expect overall coal consumption to be down 2% from 2023. We expect coal production will fall by more than consumption in 2024 as withdrawals from inventories supply a significant share of consumption this year.

Economy, Weather, and CO₂

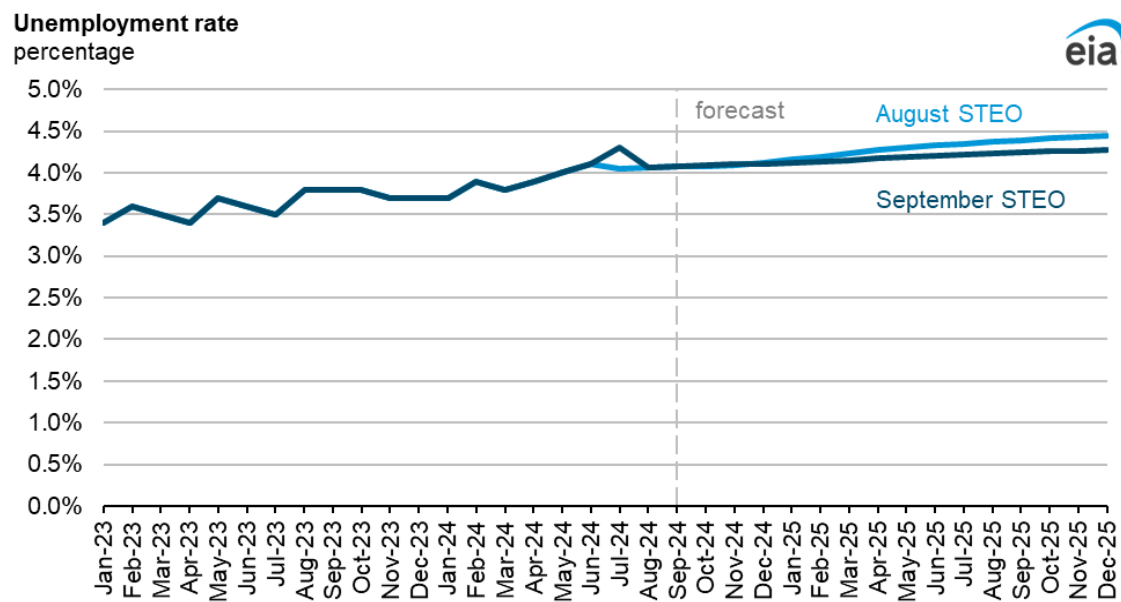
U.S. macroeconomics

Our forecast for September 2024 assumes real GDP will grow by 2.6% in 2024 and 1.8% in 2025, both revised up 0.2 percentage points from our August STEO. We revised our assumptions based on updated data from the Bureau of Economic Analysis. Their [most recent estimate](#) shows that real GDP grew at an annualized rate of 3.0% in the second quarter of 2024 (2Q24), 1.0 percentage point higher than the growth rate assumed in last month's forecast.



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

The higher GDP growth came alongside signs of a softening U.S. labor market. The unemployment rate stands at [4.2% as of August 2024](#), an down of 0.1 percentage point from July. Although this data was released after we finished our analysis for this month's STEO, the small decrease was in line with assumptions in our forecast.. Compared, with last month's STEO, our forecast assumes the unemployment rate will be slightly lower in 2025.



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

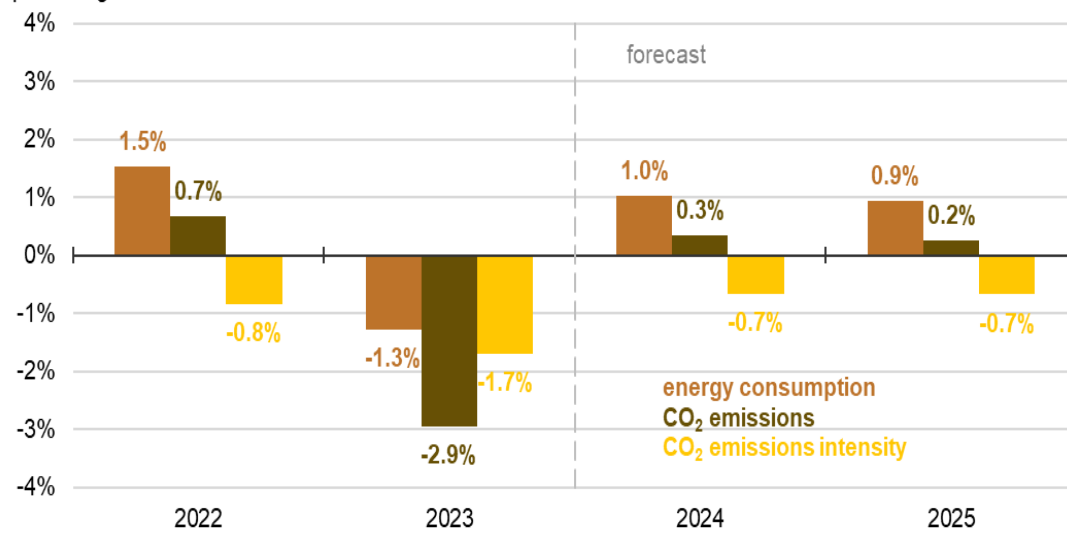
The macroeconomic forecasts are based on S&P Global's macroeconomic model. We incorporate STEO energy price forecasts into the model to obtain our final macroeconomic assumptions.

Emissions

We expect U.S. energy-related carbon dioxide (CO₂) emissions to remain flat between 2023 and 2025. In 2024, the stability of total CO₂ emissions is a result of rising natural gas consumption across sectors this year offset by less generation from coal. Emissions in 2025 remain unchanged as a less than 1% decrease in natural gas emissions, caused by a decrease in natural gas-fired electricity generation, is offset by a 1% increase in petroleum emissions, associated with increased diesel consumption.

Although we expect U.S. CO₂ emissions to remain stable, we expect the carbon intensity of energy, or total energy-related CO₂ emissions per unit of energy consumed, to decline by 1% in both 2024 and 2025. This reduction is primarily caused by renewable energy sources supplying an increasing share of U.S. energy. We expect U.S. primary energy consumption to grow by almost 1% in both years, with more than 50% of this growth met by solar, wind, and hydropower. Increased use of renewable energy sources allows overall energy consumption to grow without raising emissions, therefore lowering carbon intensity.

Annual change in U.S. energy consumption, energy-related CO₂ emissions, and CO₂ emissions intensity percentage



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



Weather

Although the summer got off to a much hotter start than last year, 3Q24 is set to be a bit milder than last year. Our forecast assumes the United States will average about 200 [cooling degree days](#) (CDDs) in September, 2% fewer cooling degree days than in September 2023, contributing to a slightly cooler third quarter in 2024 than in 2023. However, because of the heat waves earlier this summer, we expect all of 2024 to be hotter than 2023, totaling 1,570 CDDs overall (6% more CDDs than 2023). We expect a cooler start to the 2024–2025 winter heating season (November–March), with 9% more heating degree days in 4Q24 than in 4Q23.