Short-Term Energy Outlook (STEO)

Forecast highlights

Global liquid fuels

- Brent crude oil spot prices averaged $72 per barrel (b) in April, an increase of $6/b from the March level and the first time monthly Brent crude oil prices have averaged more than $70/b since November 2014. EIA forecasts Brent spot prices will average $71/b in 2018 and $66/b in 2019, which are $7/b and $3/b higher, respectively, than in the April STEO. EIA expects West Texas Intermediate (WTI) crude oil prices to average $5/b lower than Brent prices in both 2018 and 2019. NYMEX WTI futures and options contract values for August 2018 delivery traded during the five-day period ending May 3, 2018, suggest a range of $54/b to $84/b encompasses the market expectation for August 2018 WTI prices at the 95% confidence level.

- For the 2018 April–September summer driving season, EIA forecasts U.S. regular gasoline retail prices to average $2.90/gallon (gal), 17 cents/gal higher than in last month’s STEO and up from an average of $2.41/gal last summer. The higher forecast gasoline prices are primarily the result of higher forecast crude oil prices. For the year 2018, EIA expects U.S. regular gasoline retail prices to average $2.79/gal. Monthly average gasoline prices are forecast to reach a summer peak of $2.97/gal in June, before falling to $2.86/gal in September.

- EIA estimates that U.S. crude oil production averaged 10.5 million barrels per day (b/d) in April, up 120,000 b/d from the March level. EIA projects that U.S. crude oil production will average 10.7 million b/d in 2018, up from 9.4 million b/d in 2017, and will average 11.9 million b/d in 2019, 0.4 million b/d higher than forecast in the April STEO. In the current outlook, EIA forecasts U.S. crude oil production will end 2019 at more than 12 million b/d.

- EIA forecasts that total crude oil and petroleum product net imports will fall from an annual average of 3.7 million b/d in 2017 to an average of 2.6 million b/d in 2018 and to 1.5 million b/d in 2019, which would be the lowest level of net imports since 1958.

- EIA estimates global petroleum and other liquid fuels inventories declined by 0.5 million b/d in 2017. In this forecast, global inventories grow by 0.2 million b/d in 2018 and by 0.6 million b/d in 2019.
Natural gas

• U.S. dry natural gas production averaged 73.6 billion cubic feet per day (Bcf/d) in 2017. EIA forecasts dry natural gas production will average 80.5 Bcf/d in 2018, establishing a new record. EIA expects natural gas production will rise again by 2.9 Bcf/d in 2019 to 83.3 Bcf/d.

• Growing U.S. natural gas production is expected to support increasing natural gas exports in the forecast. EIA forecasts net natural gas exports to increase from 0.4 Bcf/d in 2017 to an annual average of 2.0 Bcf/d in 2018 and 4.6 Bcf/d in 2019.

• EIA estimates that natural gas inventories increased by 22 billion cubic feet (Bcf) in April, ending the month 27% below the five-year average for the end of April. If confirmed in the monthly data, the April 2018 injection would be the smallest April injection since 1983. Preliminary data indicate April temperatures were the coldest for that month in the past 21 years, which contributed to low injections. Based on EIA’s forecast of rising production, natural gas inventories should increase by more than the five-year average rate of growth during current the injection season (April–October) to reach more than 3.5 trillion cubic feet on October 31, which would be 8% lower than the five-year average for the end of October.

• EIA expects Henry Hub natural gas spot prices to average $3.01/million British thermal units (MMBtu) in 2018 and $3.11/MMBtu in 2019. NYMEX futures and options contract values for August 2018 delivery that traded during the five-day period ending May 3, 2018, suggest that a range of $2.32/MMBtu to $3.40/MMBtu encompasses the market expectation for August 2018 Henry Hub natural gas prices at the 95% confidence level.

Electricity, coal, renewables, and emissions

• EIA expects the share of U.S. total utility-scale electricity generation from natural gas-fired power plants to rise from 32% in 2017 to 34% in both 2018 and 2019. The forecast electricity generation share from coal averages 29% in both 2018 and 2019, down from 30% in 2017. The nuclear share of generation was 20% in 2017 and is forecast to be 20% in 2018 and 19% in 2019. Nonhydropower renewables provided slightly less than 10% of electricity generation in 2017 and are expected to provide more than 10% in 2018 and nearly 11% in 2019. The generation share of hydropower was 7% in 2017 and is forecast to fall slightly below that level both 2018 and 2019.

• EIA forecasts coal production to decline by 3% to 751 million short tons (MMst) in 2018. The production decrease is largely attributable to a forecast decline of 4% in domestic coal consumption in 2018, with most of the decline expected to be in the electric power sector. A 9% forecast decline in coal exports also contributes to lower expected coal production in 2018. EIA expects coal production to remain nearly unchanged in 2019 at 752 MMst.
In 2017, EIA estimates that wind generated an average of 697,000 megawatthours per day (MWh/d). EIA forecasts that wind generation will rise to 741,000 MWh/d in 2018 and to 766,000 MWh/d in 2019. If factors such as precipitation and snowpack remain as forecast, conventional hydropower is forecast to generate 747,000 MWh/d in 2019, making it the first year that wind generation would exceed hydropower generation in the United States.

After declining by 0.9% in 2017, EIA forecasts that energy-related carbon dioxide (CO2) emissions will increase by 1.4% in 2018 and by 0.4% in 2019. Energy-related CO2 emissions are sensitive to changes in weather, economic growth, and energy prices.

Petroleum and natural gas markets review

Crude oil

**Prices:** The front-month futures price for North Sea Brent crude oil settled at $73.62 per barrel (b) on May 3, an increase of $5.98/b from April 2. Front-month futures prices for West Texas Intermediate (WTI) crude oil for delivery at Cushing, Oklahoma, increased by $5.42/b during the same period, settling at $68.43/b on May 3 (Figure 1). April Brent and WTI monthly average spot prices were $6.09/b higher and $3.53/b higher, respectively, than the March average spot prices.

![Figure 1. Crude oil front-month futures prices](chart)

At the end of April, crude oil prices reached their highest levels since 2014, following five consecutive quarters of global oil inventory draws. Since January 2017, the beginning of the crude oil production cut agreement among certain countries within and outside the Organization of the Petroleum Exporting Countries (OPEC), global petroleum inventories have declined at an average rate of more than 0.5 million barrels per day (b/d). Excluding Libya, Nigeria, and Equatorial Guinea—countries not subject to the production reductions—OPEC
countries produced an estimated 29.3 million barrels b/d in April, the lowest levels since April 2015 and 0.4 million b/d below the agreed-upon production reductions.

Oil prices may have also risen in anticipation of the potential reinstatement of sanctions on Iran, which could contribute to declines in the country’s crude oil production. Uncertainty surrounding extension of the Joint Comprehensive Plan of Action (JCPOA) could contribute to increased price volatility.

Further, strong global oil demand growth has added to upward price pressures. EIA estimates that global oil consumption in the first quarter of 2018 was 1.9 million b/d (2%) higher than it was in the first quarter of 2017.

Backwardation (when near-term prices are higher than longer-dated prices) also increased in April and reached the highest levels since 2014, indicating high demand for immediate oil deliveries. The Brent and WTI 1st–13th spread increased $1.05/b and $1.50/b, respectively, from April 2 to settle at $5.66/b and $6.23/b, respectively, on May 3 (Figure 2). The increase in the backwardation of crude oil prices suggests there is an incentive for holders of oil in physical storage to sell on spot markets. STEO estimates that U.S. commercial crude oil inventories in April were 1.5% lower than the five-year average for that month, and total petroleum inventories in countries within the Organization for Economic Cooperation and Development (OECD) are estimated to have ended April slightly below the five-year average.

**Crude oil price spreads:** WTI crude oil priced in Midland, Texas, declined sharply compared with Brent in April. Pipeline constraints in the Permian region continue to contribute to lower crude oil prices there relative to other regions, as discussed in the April STEO. As production grows beyond the capacity of existing pipeline infrastructure, producers must use more expensive forms of transportation, including rail and trucks. As a result, WTI Midland price spreads widened to the largest discount to Brent since 2014. The WTI Midland differential to Brent settled at -$17.69/b on May 3, which represents a widening of $9.76/b since April 2 (Figure 3).
U.S. light, sweet crude oil priced outside of the Permian region also declined in comparison to Brent, but not to the same extent as WTI Midland crude oil. Transportation constraints are not a significant factor for crude oil priced in Cushing, Oklahoma, or on the U.S. Gulf Coast. However, more negative **U.S. light, sweet crude oil** differentials may suggest other constraints, including limitations in processing increasing amounts of this type of crude oil on the part of U.S. refineries. Midwest and Gulf Coast refinery inputs are at or near all-time highs for this time of year. Light Louisiana Sweet crude oil prices reached their lowest level compared with Brent prices in more than two years in late April, settling at -$1.59/b below Brent on May 3. WTI Cushing spot prices also fell relative to Brent, declining by $1.06/b from April 2 to settle at -$5.19/b on May 3. In addition to some potential refinery constraints, **infrastructure at export terminals** on the U.S. Gulf Coast could limit the scale of U.S. crude oil exports in the near-term. These low differentials may reflect the additional transportation costs to export light sweet crude oil to other regions such as Asia.

By mid-2019, EIA expects enough pipeline capacity will exist in the Permian region to transport crude oil to the U.S. Gulf Coast, eventually decreasing the spread between U.S. and international crude oil prices.

**Figure 3. U.S. crude oil spot price differentials to Brent**

EIA is revising higher its Brent price forecast for 2018 and 2019 by $7/b and $3/b, respectively, from the April STEO. EIA projects Brent prices to remain higher than $70/b through the remainder of 2018, and then decline to $65/b by the end of 2019. Because of the increasing transportation and export constraints in the United States, EIA expects the spread between Brent and WTI to average $5/b in both 2018 and 2019. Despite these factors, WTI prices are still expected to be higher than forecasted in the April STEO.

Because of the higher price environment, EIA is increasing its U.S. crude oil production forecast for 2019 by 0.4 million b/d, compared with the April STEO. EIA now expects U.S. crude oil production to average 10.7 million b/d in 2018 and 11.9 million b/d in 2019. However, because crude oil prices in the Permian region are expected to remain significantly lower than WTI
Cushing prices until mid-2019, EIA does not expect crude oil production in that region to rise as sharply as it would under a scenario with no transportation constraints.

The revised U.S. crude oil production growth forecast is the main contributor to increased global liquid fuels supply in 2018 and 2019. With increased U.S. crude oil production, EIA expects global petroleum inventories to increase by 0.6 million b/d on average in 2019, compared with the expectation of a less than 0.2 million b/d build 2018. EIA expects the higher forecast inventory growth in 2019 compared with 2018 will put downward pressure on oil prices toward the end of 2018 and into 2019.

**Money manager positions:** Money managers increased their net long positions in both Brent and WTI futures contracts in March and April, pushing the ratio of their long positions to short positions to the highest level since 2011, when data on Brent positions first became available (Figure 4). Combined money manager long positions increased by 41% during the past year, whereas short positions declined by 72%. Money manager net long positions tend to increase when crude oil prices increase. Other sentiment indicators include an increase in the price of call options (derivatives that increase in value when the underlying security price increases) compared with put options (derivatives which increase in value when the underlying security price decreases). Declining crude oil inventories and increased geopolitical concerns have contributed to a more bullish sentiment in crude oil markets.

![Figure 4. Combined WTI and Brent money manager open interest](image)

**Petroleum products**

**Gasoline prices:** The front-month futures price of reformulated blendstock for oxygenate blending (RBOB, the petroleum component of gasoline used in many parts of the country) settled at $2.09 per gallon (gal) on May 3 (Figure 5), an increase of 12 cents/gal since April 2. The RBOB–Brent crack spread (the difference between the price of RBOB and the price of Brent crude oil) declined slightly by 2 cents/gal to settle at 33 cents/gal over the same period.
The U.S. gasoline crack spread averaged 34 cents/gal in April, the lowest for April since 2011. Despite continued year-over-year growth in U.S. gasoline consumption and gasoline exports in April, gasoline stocks remain high in much of the United States. STEO estimates that U.S. gasoline stocks in April were 7 million barrels higher than the five-year average for that month.

Weak gasoline crack spreads are also evident in other regions of the world. The Northwest Europe gasoline–Brent spot price crack spread averaged 19 cents/gal in April, the lowest for that month since 2011 (Figure 6). The Singapore gasoline–Dubai/Oman spot price crack spread averaged 20 cents/gal in April, the lowest since at least 2011.

Gasoline stocks in the Amsterdam-Rotterdam-Antwerp trade hub in Europe reached a record high at the end of March and have been above the five-year average since the start of 2018.
Similarly, light distillate stocks (which include gasoline) in Singapore also reached a record high at the end of March and have been above the five-year average for most of the year.

Trade press reports indicate that higher refinery runs in areas including China and Europe have resulted in increased supply of gasoline. China has been increasing refinery yields of gasoline relative to distillate over the past several years and is exporting more gasoline, depressing regional prices. High gasoline inventories in Europe may be tempered in the coming months by the potential for increased exports to the United States, when U.S. gasoline consumption reaches its seasonal high.

**Ultra-low sulfur diesel prices**: The ultra-low sulfur diesel (ULSD) front-month futures price increased 13 cents/gal from April 2 to settle at $2.11/gal on May 3. The ULSD–Brent crack spread (the difference between the price of ULSD and the price of Brent crude oil) declined by 1 cent/gal to settle at 36 cents/gal over the same period (Figure 7).

ULSD front-month futures prices were at a premium to RBOB front-month futures prices on average in April, an unusual occurrence for that time of year. Gasoline prices generally start trading at a premium to ULSD prices in March when the RBOB futures contract represents the more expensive summer grade of gasoline. In addition to the factors that may be weakening gasoline prices globally, colder-than-normal temperatures in parts of the United States may have increased demand for heating oil in April, and strong economic growth and rising oil and natural gas drilling activity could also be contributing to growing diesel demand and supporting ULSD prices.

In Petroleum Administration for Defense District (PADD) 1B, which includes the New York Harbor delivery point of the ULSD futures contract, distillate stocks have fallen since February and reached 17.8 million barrels at the end of April, close to the five-year low. Further, trade press reports indicate that less distillate is being transported from the U.S. Gulf Coast to the U.S. East Coast because of increased exports and international demand for distillate. Initial estimates for distillate exports indicate exports reached a weekly record of 1.7 million b/d for the week of April 20, 2018. Further, distillate exports averaged 1.4 million b/d for the four weeks ending April 27, 2018, which would be a record high for the month of April if confirmed in monthly data.
Natural Gas

The front-month natural gas futures contract for delivery at Henry Hub settled at $2.73 per million British thermal units (MMBtu) on May 3, an increase of 4 cents/MMBtu from April 2 (Figure 8). April 2018 was the coldest April in the past 21 years. Cold temperatures contributed to withdrawals from working natural gas stocks during the first three weeks of the month. This month is the first time since at least 1994 that net withdrawals from storage continued into the third week of April. As of April 27, working gas stocks were 40% lower than the year-ago level and 28% lower than the five-year (2013–17) average for that time of year.

Despite inventories falling to more than 500 Bcf below the five-year average by end of April, natural gas prices have remained relatively flat. Similar to price movements in March, natural gas futures prices in April traded in the narrowest range since 1995, with a difference of just 22 cents/MMBtu between the high and low prices. In comparison, natural gas futures prices traded in a 41-cent range on average each month in 2017. EIA expects that higher natural gas production during the injection season will offset current low storage levels and keep price movements moderate. The Henry Hub natural gas spot price averaged $2.80/MMBtu in April, 10 cents/MMBtu higher than in March.
Increasing demand for ethane has contributed to a widening spread between ethane spot prices and natural gas futures prices, which averaged $1.04/MMBtu in April 2018 (Figure 9). The wider differential provides incentives for natural gas processors to extract more ethane from the natural gas stream for consumption and export. Ethane production has grown from 1.3 million barrels per day (b/d) in September 2017 to an estimated 1.6 million b/d in April 2018. STEO projects ethane production will average 1.7 million b/d in 2018 and 1.9 million b/d in 2019.

Notable forecast changes

- EIA forecasts that Brent crude oil spot prices will average $71 per barrel (b) in 2018 and $66/b in 2019. These are $7/b and $3/b higher, respectively, than in the April STEO.
• EIA forecasts that U.S. crude oil production will average 11.9 million barrels per day (b/d) in 2019, 0.4 million b/d higher than forecast in the April STEO. The higher crude oil production forecast in 2019 reflects West Texas Intermediate (WTI) crude oil prices that are expected to average $64/b during the second half of 2018 and first half of 2019, compared with last month’s forecast of $57/b during this period. However, because crude oil prices in the Permian region are expected to remain significantly lower than WTI Cushing prices until mid-2019, EIA does not expect crude oil production growth in that region to rise as sharply as it would under a scenario with no transportation constraints.

• For more information, see the detailed table of STEO forecast changes.