



Short-Term Energy Outlook (STEO)

Forecast highlights

Global liquid fuels

- North Sea Brent crude oil spot prices averaged \$52 per barrel (b) in April, \$1/b higher than the March average and the fifth consecutive month that Brent crude oil spot prices averaged between \$50/b and \$55/b. EIA forecasts Brent prices to average \$53/b in 2017 and \$57/b in 2018. West Texas Intermediate (WTI) crude oil prices are forecast to average \$2/b less than Brent prices in both 2017 and 2018.
- NYMEX contract values for August 2017 delivery traded during the five-day period ending May 4 suggest that a range of \$37/b to \$63/b encompasses the market expectation for WTI prices in August 2017 at the 95% confidence level.
- Implied global petroleum and liquid fuels inventories are estimated to have increased by 0.4 million barrels per day (b/d) in 2016. EIA forecasts inventory builds to average 0.2 million b/d in 2017 and then increase to an average of 0.5 million b/d in 2018.
- U.S. crude oil production averaged an estimated 8.9 million b/d in 2016. U.S. crude oil production is forecast to average 9.3 million b/d in 2017 and almost 10.0 million b/d in 2018. EIA estimates that crude oil production for April 2017 averaged 9.1 million b/d, which is 0.2 million b/d above the April 2016 level and 0.6 million b/d above the recent monthly average low reached in September 2016.
- For the 2017 summer driving season (April through September), U.S. regular gasoline retail prices are forecast to average \$2.39/gallon (gal), compared with \$2.23/gal last summer. The higher forecast gasoline price is primarily the result of higher forecast crude oil prices. The annual average price for regular gasoline in 2017 is forecast to be \$2.34/gal, which, if realized, would result in the average U.S. household spending about \$160 more on motor fuel in 2017 compared with 2016.

Natural gas

- U.S. dry natural gas production is forecast to average 74.1 billion cubic feet per day (Bcf/d) in 2017, a 1.8 Bcf/d increase from the 2016 level. This increase reverses a 2016 production decline, which was the first annual decline since 2005. Natural gas production in 2018 is forecast to be 3.2 Bcf/d more than the 2017 level.

- In April, the average Henry Hub natural gas spot price was \$3.10 per million British thermal units (MMBtu), 22 cents/MMBtu above the March level. New natural gas export capabilities and growing domestic natural gas consumption contribute to the forecast Henry Hub natural gas spot price rising from an average of \$3.17/MMBtu in 2017 to \$3.43/MMBtu in 2018. NYMEX contract values for August 2017 delivery traded during the five-day period ending May 4 suggest that a range of \$2.47/MMBtu to \$4.49/MMBtu encompasses the market expectation for Henry Hub natural gas prices in August 2017 at the 95% confidence level.

Electricity, coal, renewables, and emissions

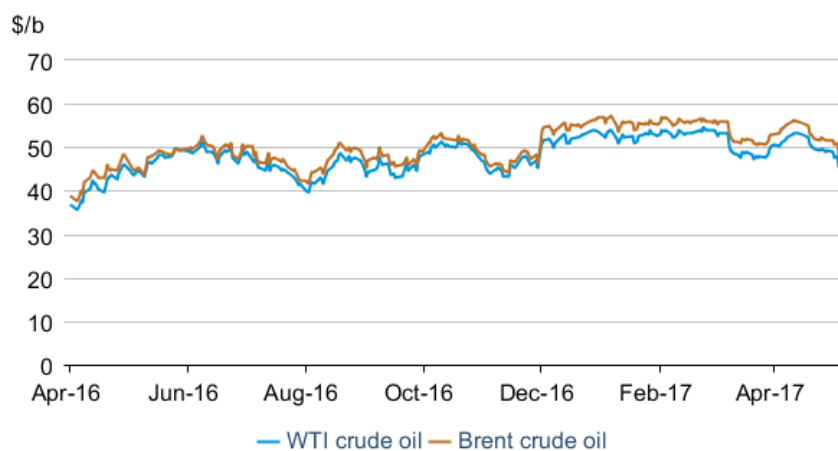
- Total U.S. electricity generation from utility-scale power plants averaged 11,150 gigawatthours per day in 2016. Forecast generation declines by 1.2% in 2017 and then grows by 1.9% in 2018. EIA expects the annual average U.S. residential electricity price to increase by 2.4% in 2017 and by 2.3% in 2018.
- EIA expects growth in demand for U.S. coal exports to contribute to a 5% increase in coal production in 2017. Forecast growth in coal-fired electricity generation leads to an additional 1% increase in coal production in 2018. EIA estimates the delivered coal price averaged \$2.11/MMBtu in 2016, a 5% decline from the 2015 price. Coal prices are forecast to increase in 2017 and 2018 to \$2.16/MMBtu and \$2.22/MMBtu, respectively.
- [Wind energy capacity](#) at the end of 2016 was 81 gigawatts (GW). EIA expects wind capacity additions in the forecast will bring total wind capacity to 102 GW by the end of 2018.
- Total utility-scale solar generation capacity is forecast to increase by 48% from 21 GW at the end of 2016 to 32 GW at the end of 2018. Utility-scale solar electricity generation is forecast to account for more than 1% of total utility-scale electricity generation in 2018.
- After declining by 1.7% in 2016, energy-related carbon dioxide (CO₂) emissions are projected to decrease by 0.7% in 2017 and then increase by 2.3% in 2018. Energy-related CO₂ emissions are sensitive to changes in weather, economic growth, and energy prices.

Petroleum and natural gas markets review

Crude oil

Prices: During the first half of April, crude oil prices rose, returning to the mid-\$50 per barrel (b) level where they had been from December through February. However, crude oil prices fell during the second half of April and on May 4 reached the lowest point since the end of November. Between April 3 and May 4, Brent crude oil front-month futures prices declined by \$4.74/b to settle at \$48.38/b, and West Texas Intermediate (WTI) front-month futures prices declined by \$4.72/b to settle at \$45.52/b (**Figure 1**). On average, however, Brent and WTI spot prices in April were \$0.72/b and \$1.73/b higher, respectively, than the March averages.

Figure 1. Crude oil front-month futures prices



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Reports from the Joint Organization of the Petroleum Exporting Countries (OPEC) and non-OPEC Ministerial Monitoring Committee suggested compliance with the [crude oil production cut agreement](#) remained high among its members in March. However, because global oil inventories remain high, oil ministers of several OPEC countries, including those of Saudi Arabia, Kuwait, and Iraq, have suggested their respective countries would support an extension to the crude oil production cut agreement for six months beyond the current end date in June. In addition to the voluntarily production cuts in several countries, Canada experienced an unplanned outage at an oil sands upgrader plant, which resulted in lower production of several Canadian crude oil streams.

Upside support for crude oil prices resulting from voluntary production cuts or unplanned outages over the past months has been countered by rising crude oil production in Libya and in the United States. Libya announced at the beginning of May that its crude oil production had increased to the highest level since late 2014. Further, U.S. crude oil production is estimated to have reached 9.1 million barrels per day (b/d) in April, the highest level since March 2016. The number of U.S. oil drilling rigs reached a two-year high at the beginning of May. Because of a lag between the deployment of drilling rigs and realized oil production, recent rig increases indicate

that U.S. oil production will likely rise further in the coming months. Expectations of supply growth in 2017, particularly in the United States, as well as concerns that a potential extension of the agreement will not reduce global inventories as quickly as expected contributed to a sharp drop in crude oil prices in the first week in May.

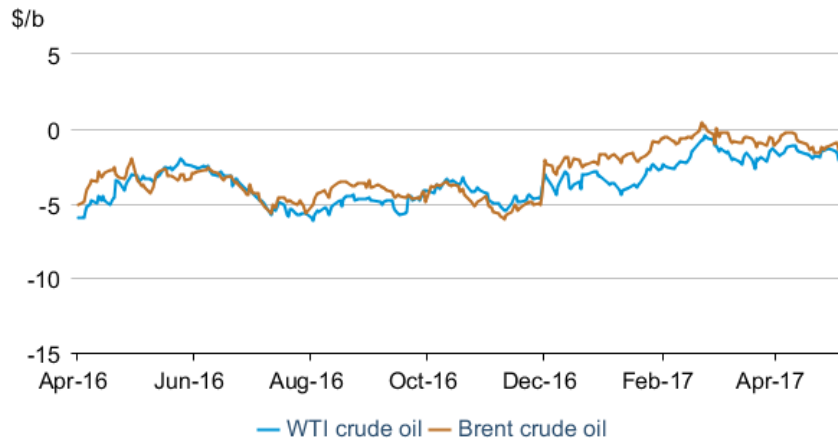
EIA projects that the global crude oil market in 2017 and 2018 will have more supply growth compared with the April STEO, resulting in a lower forecast of crude oil prices in the coming months. The Brent crude oil spot price is forecast to average \$53/b in 2017, down from \$54/b in the April STEO, and \$57/b in 2018, unchanged from the April STEO. WTI prices are expected to average \$2/b lower than Brent prices in both years.

Growth in global liquid fuels supply is expected to limit upward price pressure over the next year. World liquid fuels supply is projected to grow by 1.4 million b/d in 2017 and by 1.9 million b/d in 2018. Compared with the April STEO forecast, those growth estimates are higher by about 0.2 million b/d in 2017 and 0.1 million b/d in 2018. The upward revision to expected supply growth is based on higher expected crude oil production growth from the United States, Brazil, and Canada and more OPEC non-crude liquid production growth. Expected world liquid fuels consumption growth is largely unchanged from the previous STEO, with growth forecast at 1.6 million b/d in both 2017 and 2018.

EIA estimates U.S. commercial crude oil inventories declined by 7.4 million barrels during April, compared with an average increase of 7.4 million barrels over the past five years. The decline in U.S. crude oil inventories is likely because of the increase in gross inputs to refineries in April. In this STEO, EIA estimates that refinery inputs reached 17.2 million b/d in April, the highest on record for any month.

For most of April, the WTI 1st–13th month futures price spread narrowed relative to that of Brent, reflecting stronger near-term WTI prices as a result of the decline in U.S. crude oil inventories. The stronger near-term WTI prices movements relative to Brent suggests the global crude oil market likely did not experience crude oil inventory draws similar to those in the United States. However, with the decline of crude oil prices in early May, both WTI and Brent front-month prices weakened significantly compared with later-dated contracts. The WTI 1st–13th month futures price spread declined 29 cents/b to -\$2.06/b from April 3 to May 4 (**Figure 2**). The Brent 1st–13th month futures price spread declined 67 cents/b to -\$1.39/b over the same period.

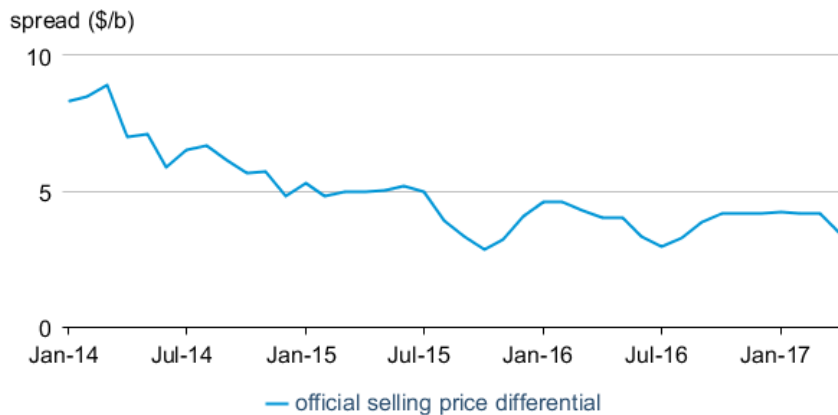
Figure 2. Crude oil front-month - 13th month futures price spread



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Price spreads between Brent and medium-sour Middle Eastern crude oils continue to narrow, making light, sweet crude oil from the Atlantic Basin more price competitive for consumers in Asia. Reports from trade press indicate that crude oil exports from West Africa and Europe to Asia have increased over the past few months. In February, for the first time, the United States exported more crude oil to China than to any other country. Increased flows of light, sweet crude oil into Asia are lowering prices of local Asian crude oils of similar quality. In April, the price differential between the official selling price of a basket of mostly light, sweet crude oils set by Malaysia’s state-owned oil company, Petronas, and Dated Brent fell to \$3.50/b from more than \$4/b between October 2016 and March 2017 (Figure 3).

Figure 3. Malaysia crude oil official selling price differential to Dated Brent

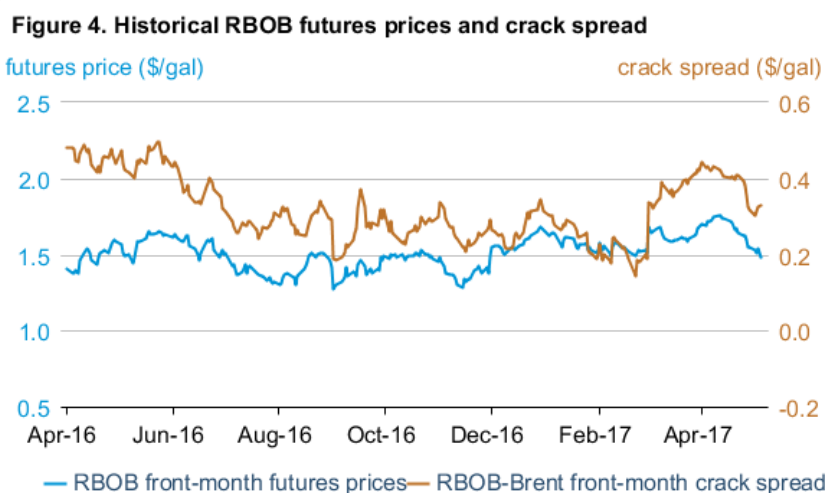


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Petroleum products

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) declined 21 cents per gallon (gal) since April 3, settling at \$1.48/gal on May 4 (**Figure 4**). The RBOB-Brent crack spread (the difference between the price of RBOB and the price of Brent crude oil) declined 10 cents/gal, settling at 33 cents/gal over the same period.

Despite weekly data showing April 2017 gasoline consumption plus exports set a new five-year high for the month, [gasoline crack spreads](#) averaged the lowest for the month of April since 2013. High gross refinery inputs contributed to a counter-seasonal rise in gasoline inventories, pressuring gasoline crack spreads to lower levels than in previous years. In this STEO, EIA estimates that U.S. total motor gasoline inventories rose 0.9 million barrels in April, compared with an average decline of 4.4 million barrels over the past five years.



Bloomberg L.P., RBOB=reformulated blendstock for oxygenate blending

Gasoline spot market: The spot price premium of New York Harbor conventional gasoline over Gulf Coast conventional gasoline was 1 cent/gal on average in April (**Figure 5**), 7 cents/gal lower than the average premium over the past five years. High gasoline inventory levels in [Petroleum Administration for Defense District \(PADD\) 1](#) (the East Coast), along with an increase in U.S. gasoline exports, may have contributed to the narrow premium of New York Harbor gasoline over Gulf Coast gasoline. On the East Coast, total gasoline inventories have remained high since the start of 2017, either reaching or setting new five-year highs. However, gasoline inventories in PADD 3 (the Gulf Coast) have generally stayed within the five-year range so far in 2017. Because most U.S. gasoline exports [originate from PADD 3](#), initial data from the [Weekly Petroleum Status Report](#) showing U.S. finished gasoline exports rose by almost 0.1 million barrels per day (b/d) from March to April likely helped to limit gasoline stock builds on the U.S. Gulf Coast given the high level of refinery runs.

Figure 5. New York Harbor - Gulf Coast conventional gasoline spot price differentials



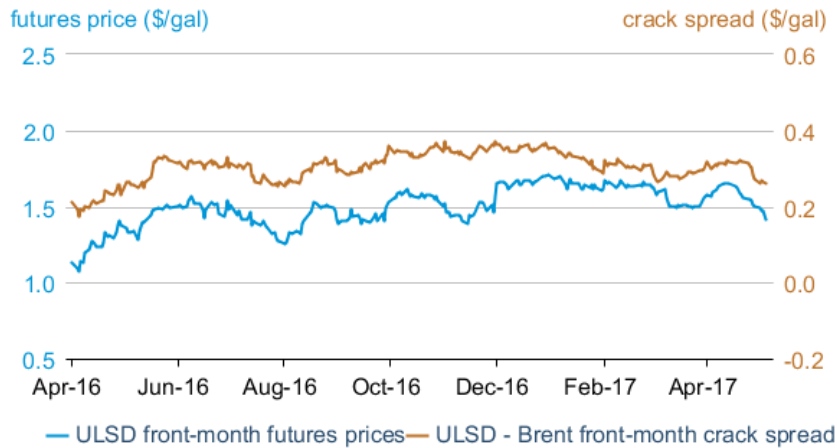
eia Bloomberg L.P.

Ultra-low sulfur diesel prices: The ultra-low sulfur diesel (ULSD) futures price decreased 15 cents/gal since April 3, settling at \$1.41/gal on May 4. The ULSD-Brent crack spread declined by 4 cents/gal, settling at 26 cents/gal over the same period (**Figure 6**). Compared with last April, however, the ULSD crack spread was 9 cents/gal higher on average this year.

In contrast to U.S. gasoline stocks, [U.S. distillate stocks](#) declined from March to April, despite high refinery runs. U.S. distillate consumption set a new five-year high in April, as increasing activity in the U.S. industrial and transportation sectors may be supporting domestic distillate consumption. [U.S. industrial production growth](#) in the first quarter of 2017 accelerated from the third and fourth quarters of 2016. In addition, [weekly rail traffic data](#) from the Association of American Railroads indicate that rail traffic, which uses diesel fuel, has been higher so far in 2017 than during the same period in 2016. Also, oil and natural gas drilling rigs use diesel fuel in their operations and transport, and the increase in drilling activity in 2017 is likely also contributing to higher diesel consumption.

In addition to U.S. domestic consumption, U.S. distillate exports have remained stable at about 1.1 million b/d, on average, since January. However, during the week ending April 14, [U.S. distillate exports](#) set a weekly record of 1.4 million b/d. Declining distillate stocks and strong distillate consumption domestically and internationally have kept ULSD crack spreads in 2017 above 2016 levels.

Figure 6. Historical ULSD futures price and crack spread

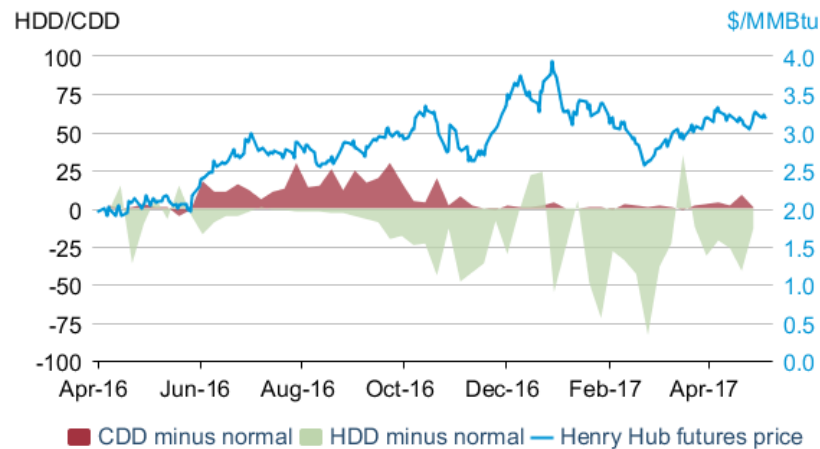


eia Bloomberg L.P., ULSD=ultra-low sulfur diesel

Natural Gas

Prices: The front-month natural gas futures contract for delivery at Henry Hub settled at \$3.19 per million British thermal units (MMBtu) on May 4, an increase of 6 cents/MMBtu from April 3 (**Figure 7**). On April 27, the front-month futures contract moved from the May delivery contract to the June delivery contract, which was priced higher to account for increased summer demand for natural gas power generation. The natural gas spot price averaged \$3.10/MMBtu in April, up 22 cents/MMBtu from March.

Figure 7. Actual minus historical average HDD and CDD

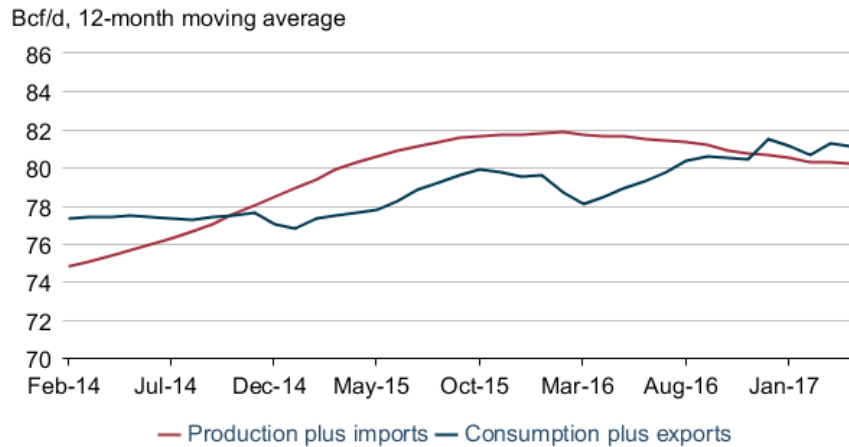


eia Bloomberg L.P., U.S. Energy Information Administration

For the four weeks ending April 28, natural gas storage injections averaged 51 billion cubic feet (Bcf) per week, almost 10 Bcf per week more than the five-year average build for those weeks. With these storage injections, stocks increased well above the five-year average level for April, although they remain below last year's level. With natural gas production returning to growth in

recent months after declining in 2016, higher natural gas exports have helped moderate inventory builds this year. At the end of 2016, the 12-month moving average of consumption plus exports rose above production plus imports and remained higher through April (**Figure 8**). EIA expects this trend to continue through the rest of 2017, putting modest upward pressure on prices.

Figure 8. Natural gas market fundamentals



 U.S. Energy Information Administration

Notable forecast changes

- EIA forecasts dry natural gas production will average 74.1 Bcf/d in 2017, an increase of 1.0 Bcf from the April STEO. EIA forecasts dry gas production will average 77.3 Bcf/d in 2018, an increase of 0.2 Bcf/d from the April STEO. EIA now forecasts gross natural gas exports will average 8.5 Bcf/d in 2017 and 10.0 Bcf/d in 2018, both of which are 0.4 Bcf/d higher than previously forecast.
- This month's STEO forecast for wind power capacity in 2018 is 7% higher than in the April STEO because of new information about planned capacity additions. Wind capacity is now projected to rise from 88 GW in 2017 to 102 GW in 2018, an increase of 16%.
- EIA forecasts coal exports to average 63 million short tons (MMst) in 2017 and 60 MMst in 2018, these are 5% and 14% higher, respectively, than forecast in the April STEO. The export forecast is higher than last month because of slightly lower expected domestic use of coal for electricity generation and because of higher assumed global coal prices.
- For more information, see the [detailed STEO table of forecast changes](#).

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