



Short-Term Energy Outlook (STEO)

Forecast highlights

Global liquid fuels

- Brent crude oil spot prices averaged \$74 per barrel (b) in July, largely unchanged from the average in June. EIA expects Brent spot prices will average \$72/b in 2018 and \$71/b in 2019. EIA expects West Texas Intermediate (WTI) crude oil prices will average about \$6/b lower than Brent prices in 2018 and in 2019. NYMEX WTI futures and options contract values for November 2018 delivery that traded during the five-day period ending August 2, 2018, suggest a range of \$54/b to \$84/b encompasses the market expectation for November WTI prices at the 95% confidence level.
- U.S. regular gasoline retail prices averaged \$2.85 gallon (gal) in July, down 4 cents/gal from the average in June. EIA expects that 2018 monthly average gasoline prices **peaked in May** and forecasts prices will remain relatively flat in the coming months, averaging \$2.83/gal in September. EIA expects regular gasoline retail prices to average \$2.76/gal in 2018 and in 2019.
- EIA estimates that U.S. crude oil production averaged 10.8 million barrels per day (b/d) in July, up 47,000 b/d from June. EIA forecasts 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 11.7 million b/d in 2019.
- EIA forecasts total global liquid fuels inventories to decrease by 0.2 million b/d in 2018 compared with 2017, followed by an increase of 0.3 million b/d in 2019. This outlook of relatively stable inventory levels over the forecast period contributes to a forecast of monthly average Brent crude oil prices remaining relatively stable between \$70/b and \$73/b, from August 2018 through the end of 2019.

Natural Gas

- EIA estimates dry natural gas production was 81.8 billion cubic feet per day (Bcf/d) in July, up 0.4 Bcf/d from June. EIA forecasts dry natural gas production will average 81.1 Bcf/d in 2018, up by 7.5 Bcf/d from 2017 and establishing a new record high. EIA expects natural gas production will rise again in 2019 to 84.1 Bcf/d.
- EIA forecasts that pipeline exports of natural gas, which averaged 6.7 Bcf/d in 2017, will average 7.0 Bcf/d in 2018 and 8.5 Bcf/d in 2019. Increasing natural gas production in the

United States and the completion of new pipelines that carry U.S. natural gas to demand centers in Mexico contribute to the expected increase. In June, two new pipelines in Mexico were placed in service that will distribute natural gas from the United States to destinations in Mexico. In addition, EIA forecasts exports of liquefied natural gas (LNG) rise from 1.9 Bcf/d in 2017 to 3.0 Bcf/d in 2018 and to 5.1 Bcf/d in 2019. This growth contributes to U.S. net exports of natural gas averaging 2.0 Bcf/d in 2018 and 5.4 Bcf/d in 2019, compared with 0.3 Bcf/d in 2017.

- EIA expects Henry Hub natural gas spot prices to average \$2.96/million British thermal units (MMBtu) in 2018 and \$3.10/MMBtu in 2019. NYMEX futures and options contract values for November 2018 delivery that traded during the five-day period ending August 2, 2018, suggest a range of \$2.33/MMBtu to \$3.48/MMBtu encompasses the market expectation for November Henry Hub natural gas prices at the 95% confidence level.

Electricity, coal, renewables, and emissions

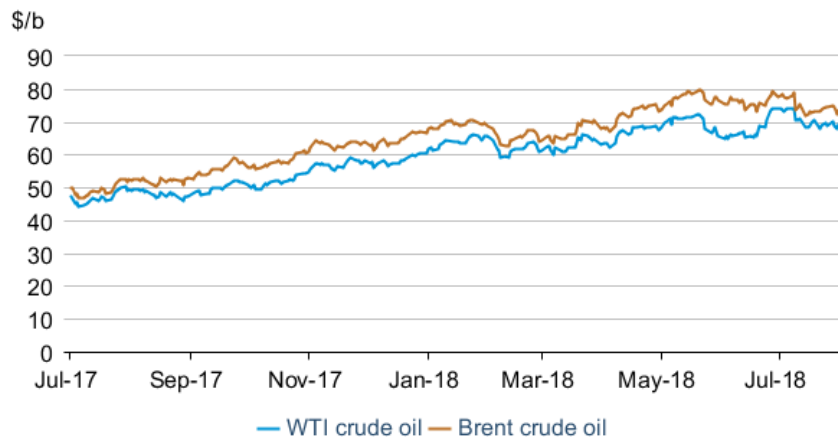
- EIA expects the share of U.S. total utility-scale electricity generation from natural gas-fired power plants to rise from 32% in 2017 to 34% in 2018 and to 35% in 2019. EIA's forecast electricity generation share from coal averages 28% in 2018 and 27% in 2019, down from 30% in 2017. The nuclear share of generation was 20% in 2017 and is forecast to be 20% in 2018 and then fall to 19% in 2019. Nonhydropower renewables provided slightly less than 10% of electricity generation in 2017 and EIA expects it 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 be about the same in 2018 and 2019.
- In 2017, EIA estimates that wind generation averaged 697,000 megawatthours per day (MWh/d). EIA forecasts that wind generation will rise by 7% to 746,000 MWh/d in 2018 and by 5% in to 782,000 MWh/d in 2019.
- Although solar power generates less electricity in the United States than wind power, solar power continues to grow. EIA expects solar generation will rise from 211,000 MWh/d in 2017 to 260,000 MWh/d in 2018 (an increase of 23%) and to 290,000 MWh/d in 2019 (an increase of 12%).
- EIA forecasts coal production will decline by 1.1% to 766 million short tons (MMst) in 2018 despite a 5.7% (6 MMst) increase in coal exports. The production decrease is largely attributable to a forecast decline of 2.1% (15 MMst) in domestic coal consumption in 2018. EIA expects coal production to decline by 1.8% (14 MMst) in 2019 because coal exports and coal consumption are both forecast to decrease.
- After declining by 0.9% in 2017, EIA forecasts that energy-related carbon dioxide (CO₂) emissions will rise by 2.0% in 2018. The increase largely reflects higher natural gas consumption because of a colder winter and warmer summer than in 2017. Emissions are forecast to decline by 0.8% in 2019. Energy-related CO₂ emissions are sensitive to changes in weather, economic growth, energy prices, and fuel mix.

Petroleum and natural gas markets review

Crude oil

Prices: The front-month futures price for Brent crude oil settled at \$73.45 per barrel (b) on August 2, a decrease of \$3.85/b from July 2. The front-month futures price for West Texas Intermediate (WTI) crude oil for delivery at Cushing, Oklahoma, decreased by \$4.98/b during the same period, settling at \$68.96/b on August 2 (**Figure 1**).

Figure 1. Crude oil front-month futures prices



eia CME Group and Intercontinental Exchange, as compiled by Bloomberg L.P.

Crude oil prices declined during July as several key oil producers increased production from the first half of 2018 and as a major supply disruption that many analysts expected to persist for several months was resolved quickly. Crude oil production from most members of the Organization of the Petroleum Exporting Countries (OPEC), Russia, and other exporting countries were estimated to be higher in July compared with the first-half average of 2018. In addition, a faster-than-expected return of Libyan crude oil production following last month's unplanned supply outage could have put downward pressure on crude oil prices. Despite these developments, oil supply disruption risk increased during July because of Iranian threats to block the [Strait of Hormuz](#) and Saudi Arabia's decision to halt oil shipments through the Bab al-Mandeb strait amid Yemeni Houthi rebel attacks. This increased disruption risk could be contributing to higher price volatility. Petroleum [inventories](#) remain slightly lower than five-year (2013–17) average levels, and any actual outages could cause crude oil prices to increase.

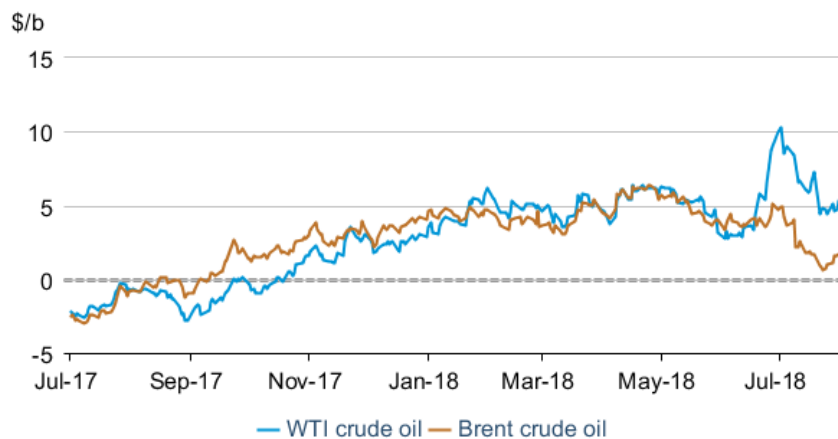
EIA forecasts that global petroleum inventories will decrease by an average of 0.1 million barrels per day (b/d) during the final five months of 2018 and then increase by an average of 0.3 million b/d in 2019. EIA forecasts Brent crude oil prices to average \$73/b in the second half of 2018 and to decline to an average of \$71/b in 2019. Although forecast inventory builds in 2019 put modest downward pressure on crude oil prices, competing upside and downside price risks will play a large role in price formation during the forecast period. Upside price risks stem largely from the possibility of supply outages amid a market where petroleum inventories are lower

than average and OPEC spare crude oil production capacity is low. Downside price risks stem largely from the demand side, because economic growth could be lower than expected and put downward pressure on oil demand growth and prices.

Increased supply availability in the Atlantic basin market has likely affected the shape of the Brent futures curve. The Brent 1st–13th month spread settled at \$1.73/b on August 2, a decrease of \$3.00/b since July 2, to reach the lowest levels since September 2017 (**Figure 2**). Price spreads in the front part of the Brent futures curve, such as the 1st–2nd month spread, have exhibited contango (when near-term futures contracts are lower than longer-dated ones) in recent weeks, suggesting near-term demand for crude oil in global waterborne markets is less than available supply.

In contrast to the waterborne crude oil market, local conditions in the North American midcontinent contributed to steep backwardation (when near-term prices are higher than longer-dated ones) in the middle of July. Crude oil refinery inputs in the Midwest, Petroleum Administration for Defense District (PADD) 2, for example, reached a record high in early June and remained higher than the five-year range during July. Crude oil inventories in Cushing, Oklahoma, declined by more than 5 million barrels from June 29 through July 27. The WTI 1st–13th month spread approached a four-year high of \$10.24/b on July 3, eventually declining to \$5.32/b on August 2.

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

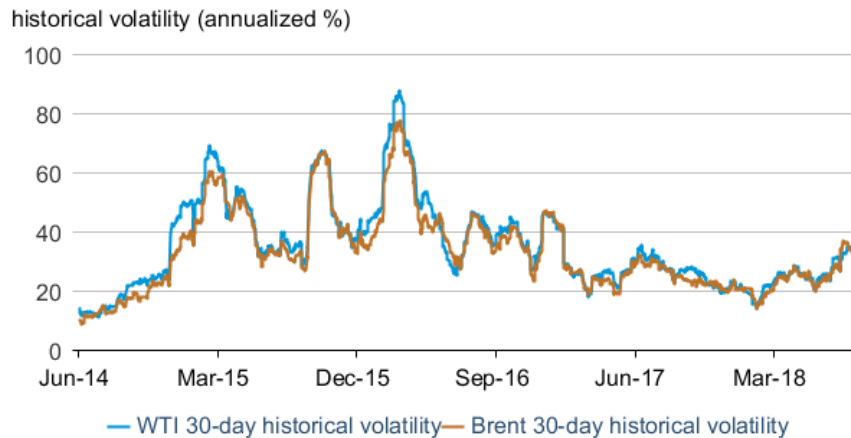


 CME Group and Intercontinental Exchange, as compiled by Bloomberg L.P.

Historical volatility: Unlike implied volatility, which is a calculated measure from options prices, **historical volatility** measures the magnitude of daily changes in closing prices for a commodity during a given time in the past. Brent and WTI 30-day historical volatility increased from July 2 to August 2, settling at 32.8% and 34.8%, respectively (**Figure 3**). In the second half of 2017, historical volatility had declined as Brent crude oil prices steadily increased from the mid-\$40/b level to more than \$60/b by the end of the year. Compliance with OPEC’s voluntary supply reductions was high and generally in line with market expectations. Global demand growth was also stable for most regions of the world. In contrast, different factors in 2018 could be

contributing to higher volatility. Price increases have been largely driven by unplanned supply disruptions and the potential for further supply losses later in 2018. In addition, concerns regarding the pace of future economic and oil consumption growth has likely contributed to demand-side uncertainty.

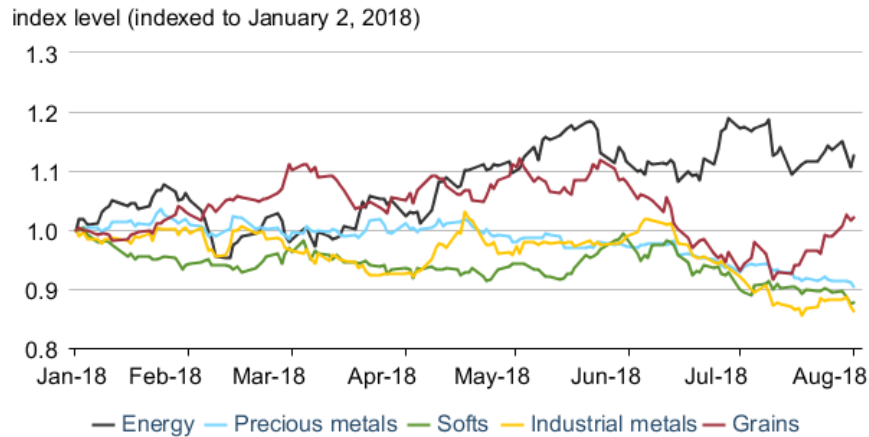
Figure 3. Crude oil historical volatility



eia U.S. EIA, Bloomberg L.P.

Energy and nonenergy commodities: Energy commodity prices have increased more than prices for nonenergy commodities this year. The [Standard & Poor’s Goldman Sachs Commodity Index \(S&P GSCI\)](#) energy component is heavily weighted toward crude oil and petroleum product prices. The S&P GSCI energy index is up 13% from the beginning of the year through August 2. During the same period the S&P GSCI grains index increased by 2%, the precious metals index declined by 10%, the softs index (which includes coffee, sugar, cocoa, and cotton) declined by 12%, and the industrial metals index declined by 14% (**Figure 4**). Oil supply disruptions and other petroleum-specific factors have likely contributed to the divergence in commodity price trends, with nonenergy commodity prices likely affected by tariffs.

Figure 4. Select S&P GSCI components



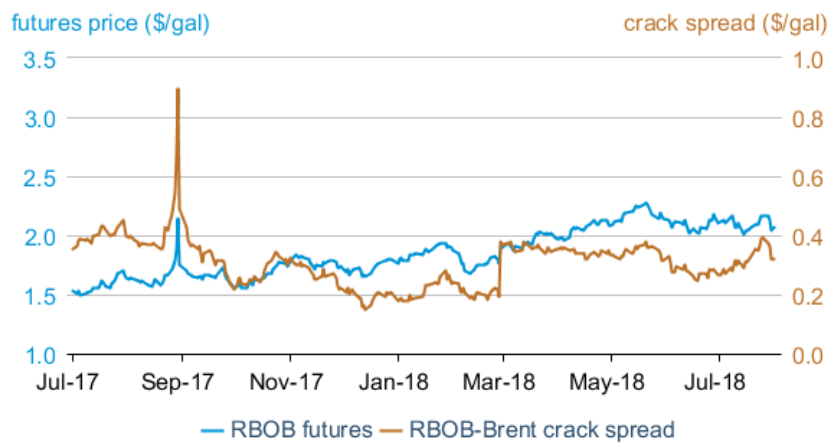
eia Bloomberg L.P.

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 \$2.07 per gallon (gal) on August 2 (**Figure 5**), a decrease of 4 cents/gal from July 2. The RBOB–Brent crack spread (the difference between the price of RBOB and the price of Brent crude oil) rose by 5 cents/gal to settle at 32 cents/gal over the same period.

The RBOB–Brent crack spread rose in July as total motor gasoline inventories fell for [five consecutive weeks](#) through the week ending July 27. EIA estimates that total motor gasoline inventories fell by 9.0 million barrels from June to July, compared with the five-year (2013–17) average decline of 2.7 million barrels during the same period.

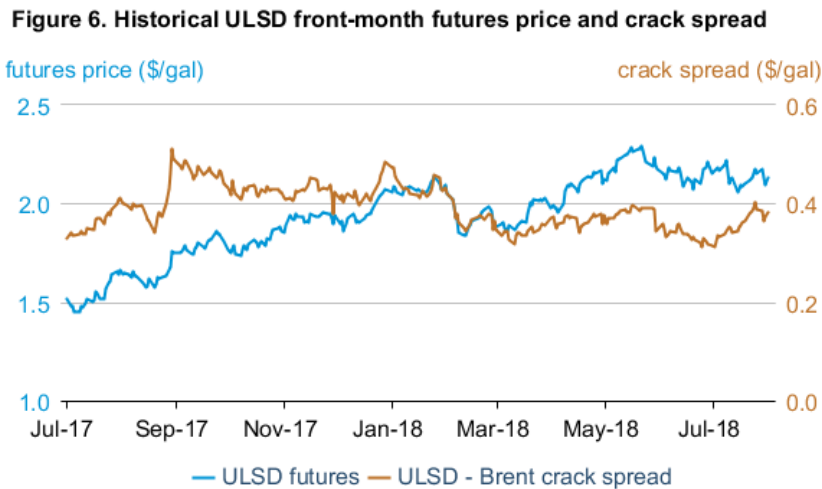
Figure 5. Historical RBOB front-month futures prices and crack spread



eia CME Group, as compiled by Bloomberg L.P., RBOB=reformulated blendstock for oxygenate blending

Ultra-low sulfur diesel prices: The ultra-low sulfur diesel (ULSD) front-month futures price settled at \$2.13/gal on August 2 (**Figure 6**), a decrease of 2 cents/gal from July 2. The ULSD–Brent crack spread (the difference between the price of ULSD and the price of Brent crude oil) rose by 7 cents/gal to settle at 38 cents/gal over the same period.

Distillate stocks rose for the second consecutive month, increasing by 6.4 million barrels (5%) from June to July. Despite this increase, distillate inventories continue to [remain low for this time of year](#), which likely contributed to the increase in the crack spread. EIA forecasts that distillate stocks will be near or lower than the five-year low through December.

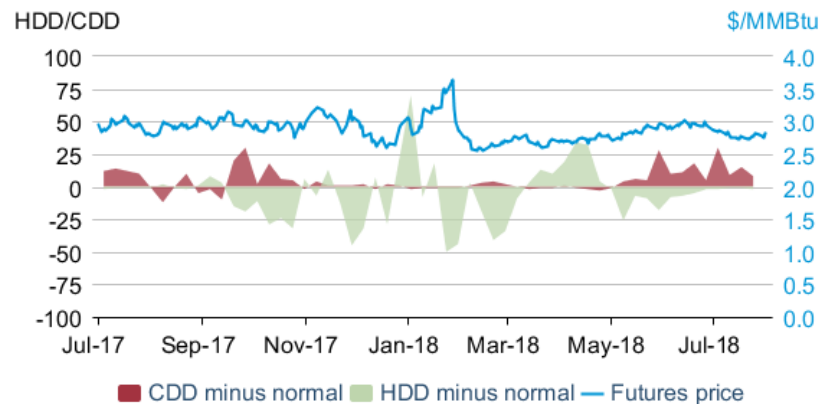


CME Group, as compiled by Bloomberg L.P., ULSD=ultra-low sulfur diesel

Natural Gas

Prices: The front-month natural gas futures contract for delivery at the Henry Hub settled at \$2.82/million British thermal units (MMBtu) on August 2, a decrease of 5 cents/MMBtu from July 2 (**Figure 7**). The Henry Hub natural gas spot price averaged \$2.84/MMBtu in July, 13 cents/MMBtu lower than in June. Both natural gas futures and spot prices fell despite the much hotter-than-normal weather for July. U.S. cooling degree days (CDD) averaged 11% higher than normal for July, which contributed to higher natural gas demand. EIA estimates that natural gas consumption for power generation reached a record high in July. The high demand likely slowed the pace of inventory injections. Natural gas inventories remained 565 billion cubic feet (Bcf) lower than the five-year (2013–17) average for the week ending July 27.

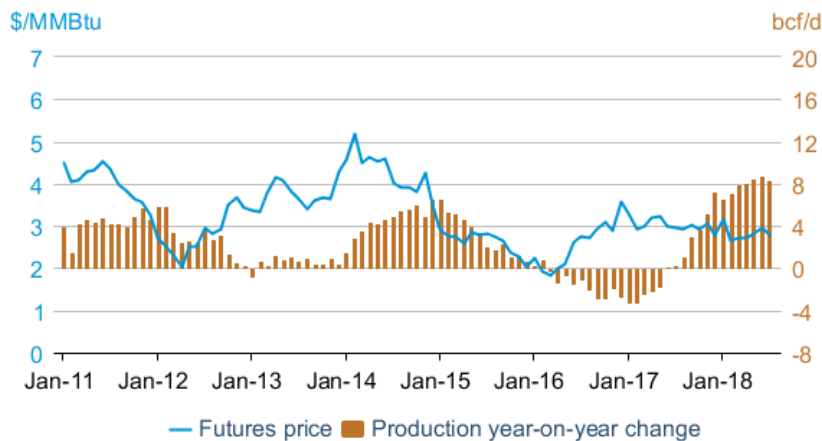
Figure 7. Natural gas front-month futures prices and actual minus historical average HDD and CDD



eia CME Group and National Oceanic and Atmospheric Administration, as compiled by Bloomberg L.P.

Production: Despite the record-high natural gas power burn and relatively low natural gas inventory levels, record-high natural gas production growth could be keeping prices from rising. EIA estimates that U.S. dry natural gas production reached 81.8 Bcf per day (Bcf/d) during July 2018, a year-over-year increase of 8.4 Bcf/d (11%) (**Figure 8**). March through July saw the largest year-on-year increases in natural gas production on record, as drilling productivity improvements contributed to accelerated production growth. EIA expects that natural gas production will continue to increase, reaching 84.3 Bcf/d by the end of 2019.

Figure 8. Natural gas futures prices and year-on-year change in production

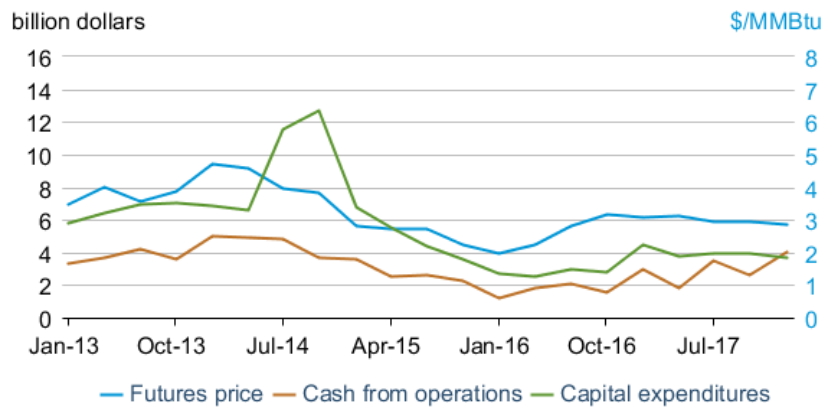


eia U.S. Energy Information Administration, CME Group, as compiled by Bloomberg L.P.

First-quarter 2018 financials: Cash flow from operations for 22 U.S. publicly traded oil and natural gas producers whose production is at least 60% natural gas rose to \$4 billion in the first quarter of 2018, the highest since the third quarter of 2014 (**Figure 9**). Natural gas production for this group of companies increased by 12% in the first quarter of 2018 from a year earlier, leading to higher upstream revenue and cash flow from operations even though futures prices

fell slightly during this period. Throughout 2017 and the first quarter of 2018, natural gas production steadily increased while capital expenditures remained relatively flat. Cash flow from operations exceeded capital expenditures in the first quarter of 2018 for the first time in five years, which may have contributed to these companies' decisions to spend more on share repurchases than in any quarter in the past five-year period.

Figure 9. Cash from operations and capital expenditures for 22 U.S. natural gas producers



eia U.S. Energy Information Administration, Evaluate Energy, CME Group, as compiled by Bloomberg L.P.

Notable forecast changes

- EIA now forecasts Brent crude oil prices to average \$71 per barrel (b) and West Texas Intermediate (WTI) crude oil prices to average more than \$64/b in 2019. Both of these forecasts are \$2/b higher than the forecast from the July STEO. The higher price forecast reflects a lower forecast for global oil supply in 2019 that was only partially offset by lower forecast oil demand for next year. EIA now expects global oil inventories to rise by about 0.3 million b/d next year, which is almost 0.4 million b/d less than previously forecast.
- On June 22, 2018, the Republic of Congo (Congo Brazzaville) became the newest member of OPEC. Congo Brazzaville is the third-largest oil producer in the sub-Saharan region after Nigeria and Angola, and it is the seventh African nation to join the organization. Beginning with the August STEO, Congo Brazzaville's crude oil production is included in OPEC's total crude oil supply for both history and the forecast. In July, EIA estimates that Congo Brazzaville produced 325,000 b/d of crude oil.
- As a result of incoming data reported in the [Annual Electric Generator survey](#) (EIA-860), EIA has re-evaluated its assumptions for electric power sector solar capacity additions in 2019. The current STEO forecasts that 6.3 gigawatts (GW) of utility-scale solar capacity will come online in 2019, compared with a forecast of 11.4 GW of new capacity in the

July STEO. Most of these capacity additions are scheduled to come online in the fourth quarter of 2018.

- For more information, see the [detailed table of STEO forecast changes](#).

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