Independent Statistics & Analysis
U.S. Energy Information Administration

June 2018

Short-Term Energy Outlook (STEO)

Forecast highlights

Global liquid fuels

- Brent crude oil spot prices averaged $77 per barrel (b) in May, an increase of $5/b from the April level and the highest monthly average price since November 2014. EIA forecasts Brent spot prices will average $71/b in 2018 and $68/b in 2019. The 2019 forecast price is $2/b higher than in the May STEO. EIA expects West Texas Intermediate (WTI) crude oil prices will average almost $7/b lower than Brent prices in 2018 and $6/b lower than Brent prices in 2019. NYMEX WTI futures and options contract values for September 2018 delivery traded during the five-day period ending June 7, 2018, suggest a range of $52/b to $81/b encompasses the market expectation for September 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 $2.87/gallon (gal), 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. Monthly average gasoline prices are expected to reach a summer peak in June of $2.92/gal and are forecast to decline gradually afterwards to $2.84/gal in September.

- EIA estimates that U.S. crude oil production averaged 10.7 million barrels per day (b/d) in May, up 80,000 b/d from the April level. EIA projects that U.S. crude oil production will average 10.8 million b/d in 2018, up from 9.4 million b/d in 2017, and will average 11.8 million b/d in 2019.

- EIA forecasts that total U.S. 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 2.5 million b/d in 2018 and to 1.6 million b/d in 2019, which would be the lowest level of net oil imports since 1959.

- EIA forecasts crude oil production from the Organization of the Petroleum Exporting Countries (OPEC) will average 32.0 million b/d in 2018, a decrease of 0.4 million b/d from the 2017 level. OPEC crude oil production is expected to increase slightly to an average of 32.1 million b/d in 2019. The increase in production in 2019 is expected to occur despite falling production in Venezuela and Iran. EIA assumes these decreases will be offset by increasing production from Persian Gulf producers, primarily Saudi Arabia.

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 81.2 Bcf/d in 2018, establishing a new record. EIA expects natural gas production will rise again in 2019 to 83.8 Bcf/d.

- Growing forecast U.S. natural gas production supports increasing forecast liquefied natural gas (LNG) exports. LNG exports averaged 1.9 Bcf/d in 2017. EIA forecasts LNG exports to average 3.0 Bcf/d in 2018 and 5.1 Bcf/d in 2019. Dominion Energy's Cove Point LNG facility is ramping up exports. In April, the facility exported an estimated 13.4 Bcf, implying baseload utilization of 65%, and in May, it exported an estimated 23.5 Bcf, implying baseload utilization of 94%.

- EIA expects Henry Hub natural gas spot prices to average $2.99/million British thermal units (MMBtu) in 2018 and $3.08/MMBtu in 2019. NYMEX futures and options contract values for September 2018 delivery that traded during the five-day period ending June 7, 2018, suggest that a range of $2.38/MMBtu to $3.57/MMBtu encompasses the market expectation for September 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 2019. The forecast electricity generation share from coal averages 28% in 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 be about the same in 2018 and 2019.

- EIA forecasts coal production to decline by 2% to 756 million short tons (MMst) in 2018. The production decrease is largely attributable to a forecast decline of 5% in domestic coal consumption in 2018, with most of the decline is expected to be in the electric power sector. A forecast decline of 4% in coal exports also contributes to lower expected coal production in 2018. EIA expects coal production to decline by 2% in 2019.

- In 2017, EIA estimates that wind generation averaged 697,000 megawatthours per day (MWh/d). EIA forecasts that wind generation will rise to 746,000 MWh/d in 2018 and to 777,000 MWh/d in 2019. If factors such as precipitation and snowpack remain as forecast, conventional hydropower is forecast to generate 752,000 MWh/d in 2019, which would make it the first year that wind generation exceeds hydropower generation in the United States.

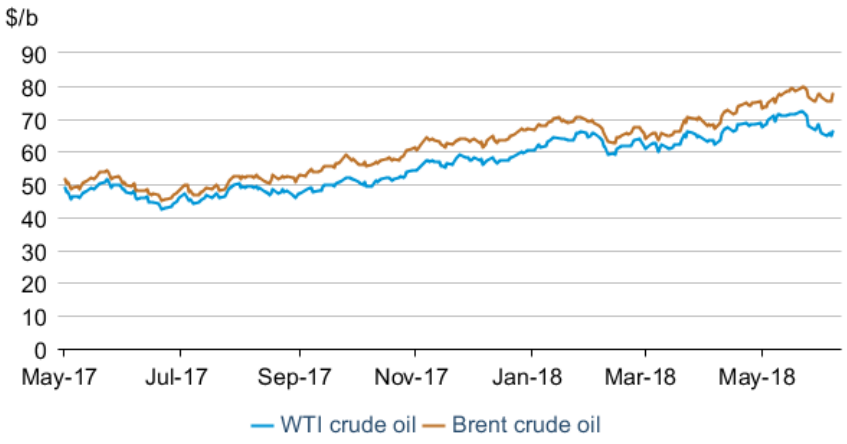
- After declining by 0.9% in 2017, EIA forecasts that energy-related carbon dioxide (CO2) emissions will rise by 1.1% in 2018 and by 0.2% in 2019. Energy-related CO2 emissions are sensitive to changes in weather, economic growth, energy prices, and fuel mix.

Petroleum and natural gas markets review

Crude oil

Prices: The front-month futures price for Brent crude oil settled at $77.32 per barrel (b) on June 7, an increase of $4.19/b from May 1. Front-month futures prices for West Texas Intermediate (WTI) crude oil for delivery at Cushing, Oklahoma, decreased by $1.30/b during the same period, settling at $65.95/b on June 7 **(Figure 1)**. May Brent and WTI monthly average spot prices were $4.87/b and $3.73/b higher, respectively, than the April average spot prices.

Figure 1. Crude oil front-month futures prices



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

Brent crude oil prices traded above $80/b on an intraday basis briefly in late May before declining during the first week of June. Prices increased in May as crude oil production declined for several members of the Organization of the Petroleum Exporting Countries (OPEC), including Venezuela and Nigeria, and as markets accounted for the uncertainty surrounding Iran's future crude oil production levels. In early May, the United States announced it would withdraw from the Joint Comprehensive Plan of Action (JCPOA) and reinstitute sanctions on companies doing business with Iran. Even though essentially no U.S. companies are directly involved with Iranian companies, many European and Asian banks, insurers, and oil companies announced they might reduce commercial activity with Iran in light of potential U.S. sanctions. Sanctions will likely have a direct effect on the Iranian oil sector, which would limit crude oil exports and production from the country by the end of 2018.

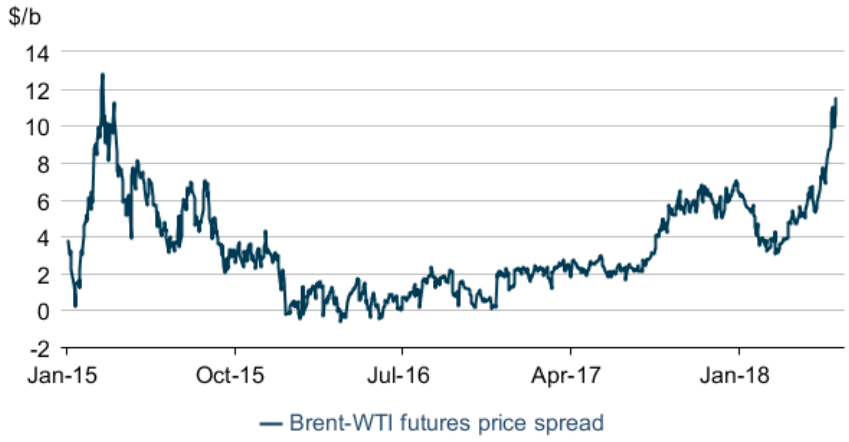
OPEC, Russia, and other non-OPEC countries meet on June 22, 2018, to assess current oil market conditions as they relate to their existing crude oil production reductions, which are scheduled to continue through the end of 2018. Oil ministers from Saudi Arabia and Russia have

announced they will re-evaluate the production reduction agreement given the accelerated output declines from Venezuela and the uncertainty surrounding Iran's production levels. In this forecast, EIA assumes some supply increases from major oil producers in 2019. However, depending on the outcome of the June 22 meeting, the magnitude of any supply response is uncertain. Currently, EIA forecasts global oil inventories will increase by 210,000 barrels per day (b/d) in 2019, which EIA expects will put modest downward pressure on crude oil prices in the second half of 2018 and in 2019.

U.S. crude oil prices in the Permian region as well as in Cushing, Oklahoma, traded lower than Brent in May. This continued the trend of lower prices for inland U.S. crude oils as a result of constraints in pipeline capacity for transporting crude oil to the U.S. Gulf Coast for refining or for export, as discussed in the May and April STEOs. The Brent–WTI front-month futures price spread, in particular, widened to $11.43/b on June 7, its widest level since February 2015 **(Figure 2)**. Although transportation constraints to the U.S. Gulf Coast are primarily affecting Permian Basin crude oils, the rapid increase in the Brent–WTI futures price spread in May and early June suggests some constraints are developing in crude oil transported from Cushing, Oklahoma (where the WTI futures contract is delivered), to the Gulf Coast.

Because transportation options out of Cushing are limited, it remains uncertain how much the spread could narrow if Gulf Coast refiners increase refinery runs, which were lower than expected in May. In addition, U.S. crude oil exports are currently limited to higher cost options which, unless port infrastructure buildout is expanded, will likely maintain a wide Brent–WTI spread. EIA is increasing the forecast of the Brent–WTI spot price spread for the second half of 2018 and 2019, from $5.49/b to $7.67/b and $5.12/b to $5.79/b, respectively.

Figure 2. Brent-WTI futures price spread



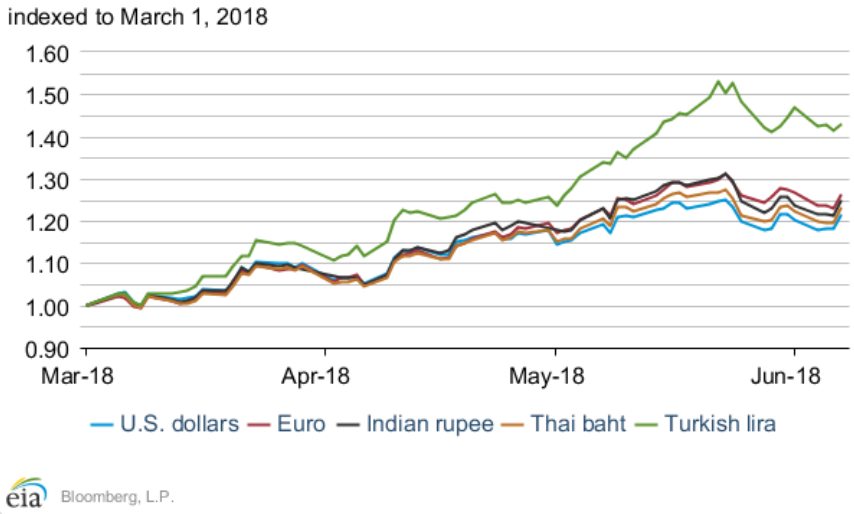
eia CME Group and Intercontinental Exchange, as compiled by Bloomberg L.P.

Oil prices by currency: The currencies of several crude oil importing countries depreciated against the U.S. dollar in recent weeks, reversing some of the appreciation from the second half of 2017 through the first quarter of 2018. In U.S. dollars, Brent crude oil prices increased by 21%

from March 1 through June 7. However, crude oil prices increased by 23% in Thai baht, 25% in Indian rupees, 26% in euros, and 43% in Turkish lira during the same period **(Figure 3)**.

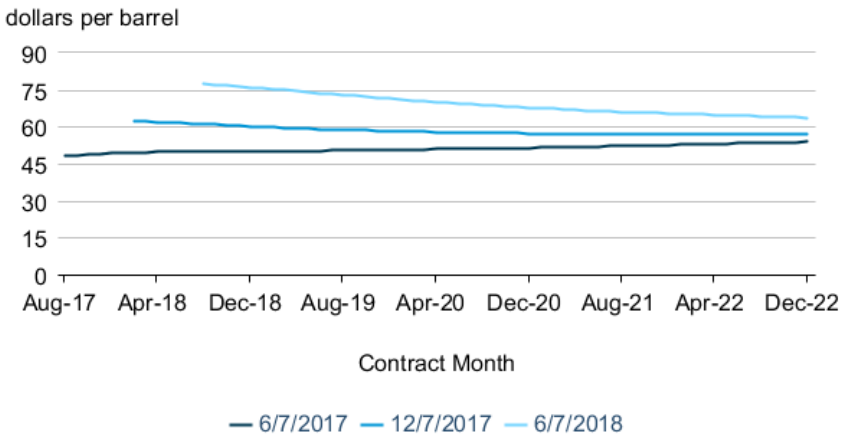
Even though most leading economic indicators point to continuing economic growth in Europe and emerging markets, political uncertainty in several countries could be contributing to currency depreciation, which makes crude oil imports more expensive. Some emerging market economies reduced energy subsidies when oil prices fell in 2014–16, and the increase in prices during the past year has led some to call for a reinstitution of subsidies. Trade disputes between the United States and other countries would also affect the demand for other countries' goods and could have contributed to U.S. dollar appreciation. In addition, concerns about sovereign debt levels in several European countries led to a significant increase in bond yields and depreciation of the euro in late May.

Figure 3. Brent crude oil prices in various currencies



Long-dated futures prices: Prices for longer-dated futures contracts have increased by a larger percentage during the past six months than they did during the second half of 2017. Brent crude oil prices for December 2022 delivery, for example, increased by 6% from June 7, 2017, to December 7, 2017. In the following six months from December 7, 2017, to June 7, 2018, the price of the same December 2022 contract increased by 12%, settling at more than $60/b **(Figure 4)**. Upstream crude oil production projects with long lead times and investment periods often use futures prices several years in advance to aid final investment decisions. Higher prices for longer-dated futures contracts could trigger increased investment interest in upstream projects that would begin producing oil in future years.

Figure 4. Brent futures curves



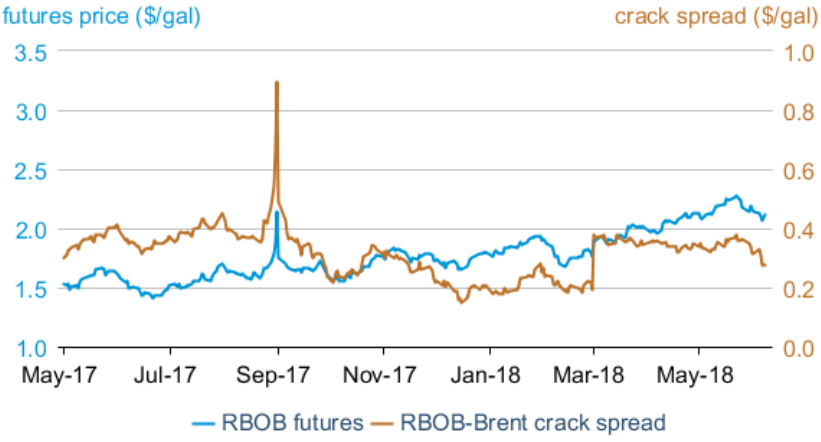
eia Bloomberg, Intercontinental Exchange

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 $2.11 per gallon (gal) on June 7 **(Figure 5)**, an increase of 3 cents/gal from May 1. The RBOB–Brent crack spread (the difference between the price of RBOB and the price of Brent crude oil) declined by 7 cents/gal to settle at 27 cents/gal over the same period.

Higher-than-average U.S. gasoline inventories continue to put downward pressure on the gasoline crack spread, despite EIA estimates that U.S gasoline consumption neared or surpassed monthly five-year highs from March through May. STEO estimates U.S. gasoline inventories were 239.0 million barrels at the end of May, 9.5 million barrels higher than the five-year average for May.

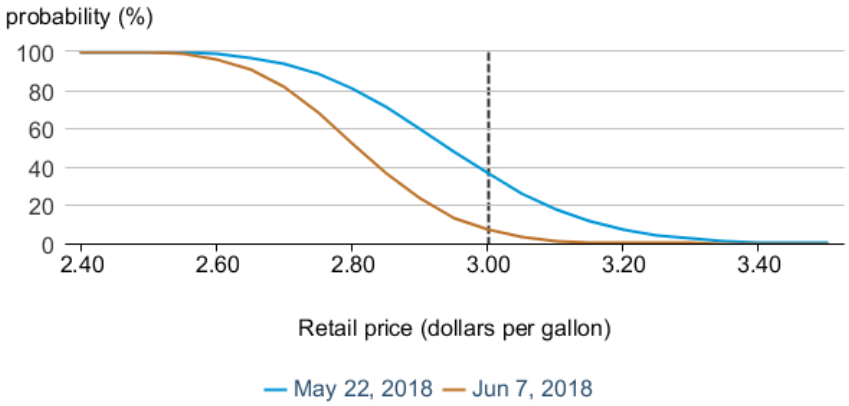
Figure 5. Historical RBOB front-month futures prices and crack spread



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

This forecast estimates that the U.S. average retail price of regular grade gasoline will reach its peak this year in June at an average of $2.92/gal and then begin to decline. The U.S. average retail gasoline price is forecast to fall to an average of $2.91/gal in July. A probability calculated using futures and options data indicates that there is roughly a 7% chance of U.S. retail gasoline prices reaching an average of $3.00/gal in July. In the five trading days ending June 7, the July 2018 RBOB futures contract averaged $2.11/gal. Options prices imply this contract has a 7% probability of exceeding $2.30/gal, which typically leads to a retail price of $3.00/gal at the contract's expiration at that time of year **(Figure 6)**. The probability of reaching $3.00/gal was at 36% on May 22, when RBOB prices reached the highest level since late 2014.

Figure 6. Probability of July 2018 retail gasoline exceeding different price levels at expiration



eia U.S. Energy Information Administration, CME Group

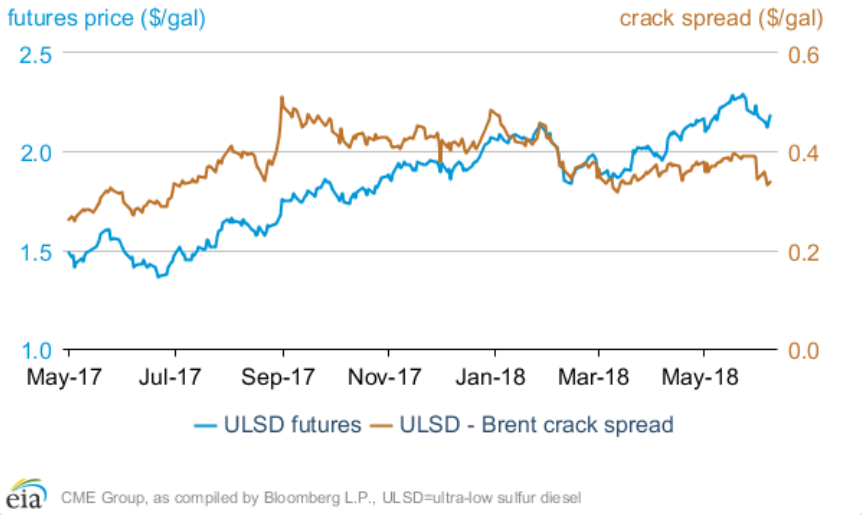
Ultra-low sulfur diesel prices: The ultra-low sulfur diesel (ULSD) front-month futures price increased 8 cents/gal from May 1 to settle at $2.18/gal on June 7. The ULSD–Brent crack spread (the difference between the price of ULSD and the price of Brent crude oil) declined 2 cents/gal to settle at 34 cents/gal over the same period **(Figure 7)**.

The ULSD crack spread fell sharply on May 31. This decline may have been caused by a rise in U.S. distillate stocks during that week, in contrast to a decline in crude oil stocks, and also potentially by lower-than-normal trading volumes for futures contracts at the end of every month as they expire. The rise in U.S. refinery utilization at the end of May, particularly on the U.S. Gulf Coast, could have been responsible for the rise in petroleum product inventories.

Despite increased production contributing to a lower ULSD crack spread, U.S. distillate consumption is still robust, even as this year's heating season ended. In the June STEO, EIA estimates that distillate consumption in May was 4.0 million b/d, the highest for the month since 2007, and it also estimates that distillate consumption will be near five-year highs through the summer months. Distillate consumption is likely supported by continued growth in U.S. industrial activity. U.S. industrial production reached a record high in April, surpassing the previous record set in late 2014. Further, several trucking indicators show increased trucking

tonnage and trucking demand in the United States this year, which supports increased demand for diesel fuel.

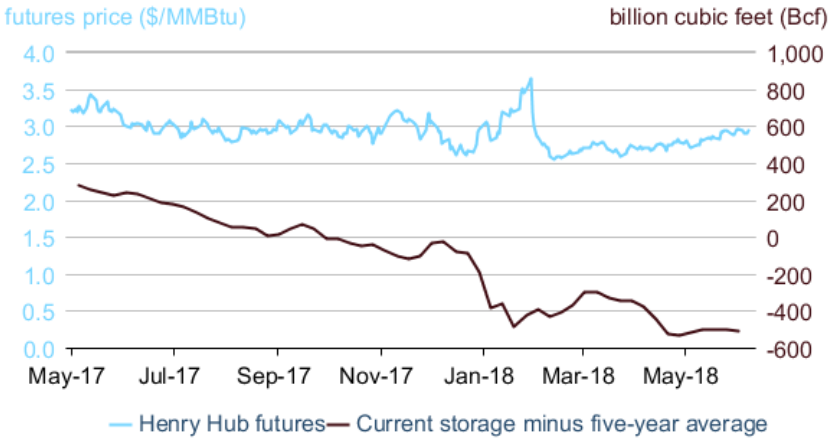
Figure 7. Historical ULSD front-month futures price and crack spread



Natural Gas

Prices: The front-month natural gas futures contract for delivery at the Henry Hub settled at $2.93/million British thermal units (MMBtu) on June 7, an increase of 13 cents/MMBtu from May 1 **(Figure 8)**. This year, the coldest April in the past 21 years resulted in a delayed start to the summer injection season. The 2018 summer injection season did not start until April 27, four weeks later than in 2017. Working natural gas stocks as of June 1 were 1,817 billion cubic feet (Bcf), 31% lower than the year-ago level and 22% lower than the five-year (2013–17) average for that time of year. The large working natural gas inventory deficit and the late start to the storage injection season contributed to higher Henry Hub prices despite record production growth. EIA estimates that dry natural gas production in May reached 81.3 Bcf per day, 13% higher than in May 2017. EIA projects dry natural gas production to increase by 10% in 2018 and by 3% in 2019. The Henry Hub natural gas spot price averaged $2.80/MMBtu in May, the same price as in April.

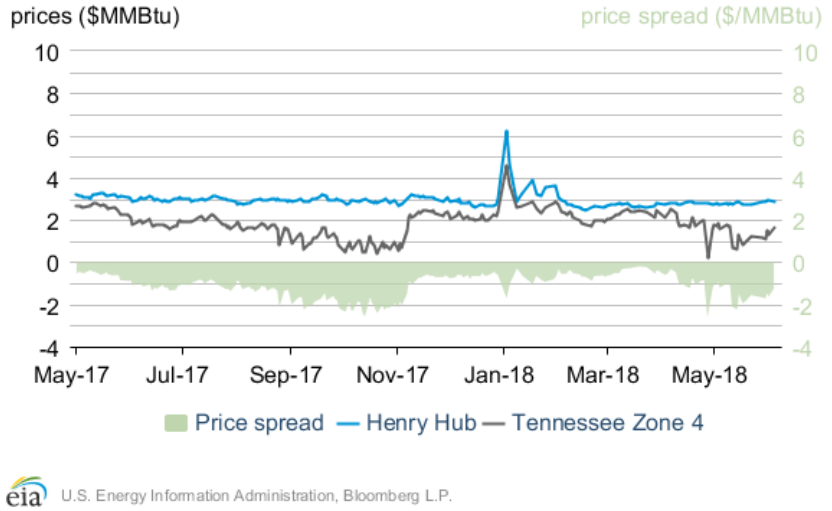
Figure 8. U.S. natural gas front-month futures prices and storage



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

The difference between the Henry Hub and Tennessee Zone 4 (TZ4) spot prices, which reflect prices in northeast Pennsylvania, narrowed in November 2017 but began widening again in April 2018, falling below -$2/MMBtu before settling at -$1.23/MMBtu on June 4 **(Figure 9)**. The TZ4 to Henry Hub spot price spread tends to narrow during winter months when regional demand is higher and to widen during the summer season when demand is lower. The spread also may be widening because pipeline takeaway capacity is constrained in northeast Pennsylvania. The Atlantic Sunrise project, which will connect producing regions in northeastern Pennsylvania to markets in the U.S. Mid-Atlantic and U.S. Southeast, is under construction with an expected start date of mid-2018. Once that project is completed, the TZ4 to Henry Hub spot price spread is likely to narrow.

Figure 9. Henry Hub and Tennessee Zone 4 natural gas spot prices



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

Notable forecast changes

- EIA forecasts that the Brent–West Texas Intermediate (WTI) crude oil price spread will average almost $7 per barrel (b) in 2018 and $6/b in 2019, compared with a forecast of about $5/b in both years in the May STEO. The wider spread reflects growing U.S. crude oil production, particularly in West Texas, that has led to transportation constraints between the U.S. Gulf Coast and both West Texas and Cushing, Oklahoma (the delivery point for the WTI crude oil futures contract). These transportation constraints reflect the current shortage of available pipeline capacity to meet the growing demand for moving crude oil from Cushing to the Gulf Coast.

- EIA forecasts crude oil production from the Organization of the Petroleum Exporting Countries (OPEC) will average 32.0 million barrels per day (b/d) in 2018 and 32.1 million b/d in 2019. Those levels are 0.2 million b/d and 0.3 million b/d lower, respectively, than forecast in the May STEO. The lower forecast production levels reflect lower expected crude oil production in Venezuela and Iran.

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