

IICEC Energy Market Newsletter

28 June, 2017

Dutch TTF Gas Hub may become an Important European Benchmark

Increased pipeline and storage capacity, as well as new LNG handling facilities, have helped support the development and evolution of natural gas trading hubs in Europe. While hurdles remain before hubs provide reliable price preference over contracts, some key developments show that spot markets will continue to grow in the near-term.

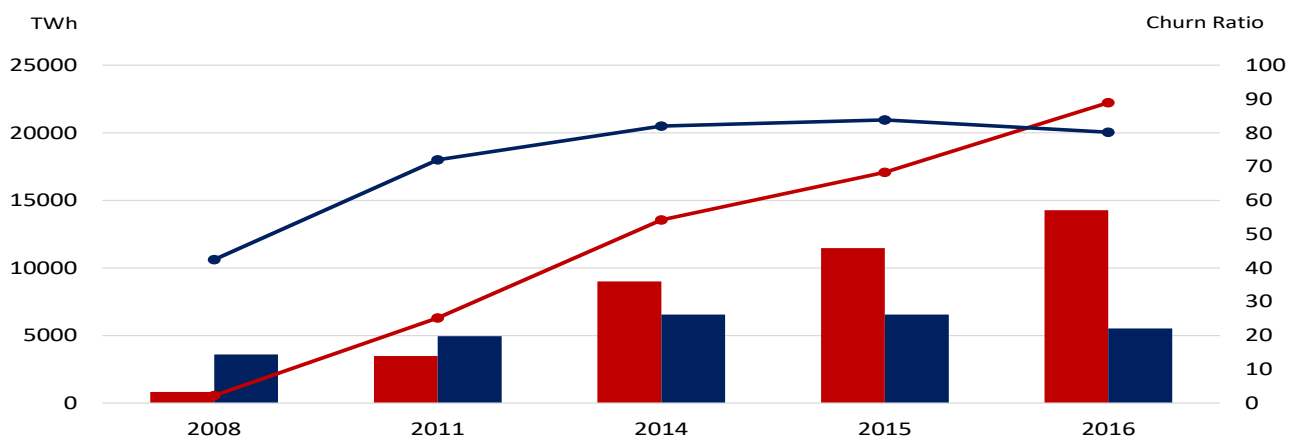
Britain's National Balancing Point (NBP) was historically the closest gas hub to a European benchmark. In recent years, the Dutch TTF hub has provided traders an alternative market in Europe, and as shown in Figure 1, TTF surpassed NBP last year to become the primary European hub based on the total traded volumes (TWh).ⁱ The number of companies that actively trade on TTF grew by 25% since 2014, while the number of traded products continues to grow, with a significant number of trades

extending beyond the front-month contract. This provides further-out trading liquidity.

TTF has also overcome NBP in terms of the churn ratio, which is the multiple of traded volume to actual physical throughput. A common rule-of-thumb is that commodity markets are deemed to have reached maturity when the churn is in excess of 10 times.

In the wake of Brexit, TTF may become the primary European hub.ⁱⁱ Based on its growth in the aforementioned areas, it may also become a true gas benchmark in Europe. This would provide an important mechanism for price discovery in Europe, for hedging U.S. LNG into Europe (due to the further-out trading liquidity), and for providing an alternative supply to long-term Russian contracts. However, due to transportation costs and other factors restricting natural gas trade between Northern or Western Europe and Southeastern Europe, there is a need for a regional gas-pricing hub in Southeastern Europe (Turkey would be in an excellent position to provide this).

Figure 1. Total traded volumes and churn ratios of TTF and NBP gas hubs



Natural Gas & LNG

(see Technical Appendix for more data)

Recent political fissures between Qatar, the world's largest LNG supplier, and Saudi Arabia have not appeared to impact regional gas prices. Some Japanese utilities appear to be using the crisis as an opportunity to review their long-term gas contracts with Qatar. While Moscow announced its neutrality in the conflict, Russia may take advantage of Qatar's current isolation to expand its gas exports and infrastructure development since Gazprom, Rosneft and Novatek are targeting the Middle East and North Africa as a promising market for their LNG exports. For example, Rosneft has initiated negotiations to export LNG to Kuwait and already exports LNG to Egypt. Rosneft and Gazprom are negotiating with Bahrain (Qatar's neighbor) to supply cargos for its new offshore terminal.

Asian spot LNG prices fell slightly to \$5.40/mBtu this week as Taiwan and Japan were out of the market and only South Korea purchased cargoes for July-delivery. In the Atlantic Basin, spot LNG prices are around \$5.30/mBtu, a slight discount to Northeast Asia because of limited demand in the region and abundant supply.

Proposed restrictions on LNG exports in Australia are unlikely to re-deliver significant volumes of gas into the domestic market there.ⁱⁱⁱ The government's draft legislation, called the Australian Domestic Gas Security Mechanism, is likely to lead to a short-term-focused gas market that negatively impacts the development of larger-scale projects that require long-term price certainty. Meanwhile, the Mechanism may open up an arbitrage opportunity for the LNG producers to supply into the domestic market with greater earning potential than weak LNG spot markets.

Pipeline gas exports from Russia to Turkey increased by 14.6% in 1Q17 compared to 1Q16.^{iv}

Natural gas prices in the United Kingdom are expected to increase by more than expected this winter, as the country's largest gas storage facility has been unable to receive injections since 2016.

Oil Market

(see Technical Appendix for more data)

The Brent oil price was \$44.81/b on June 21, down \$9.19 since its recent peak of \$54/b in late-May. Prices peaked on May 24 and fell rapidly since then as rising production in the United States and Libya continue to hamper the OPEC-led effort to support the market by cutting production.

The Brent-WTI spread in June has averaged \$2.30/b, down measurably from May's \$2.80/b and April's \$2.70/b. The spread tightened earlier this month as WTI prices responded to production outages in Canada.

OPEC crude output fell by 110 kb/d to 32.61 mb/d last month as big losses in Nigeria more than offset higher Middle East output, according to the International Energy Agency (IEA).^v In late May 2017, OPEC, Russia, and other non-OPEC partners agreed to extend their cuts through first quarter 2018.

U.S. weekly crude production finally slowed in mid-May after a consistent rise since January; however, output growth has since returned. U.S. commercial crude inventories fell by 1.7 mb during the week ending June 9. Crude imports averaged 8.0 mb/d, down by 316 kb/d from the previous week. U.S. crude exports

increased by 165 kb/d from the previous week to 722 kb/d. Weekly exports reached an all-time high at 1.30 mb/d in late May.

Refined product prices for most regions were flat from April to May, as pessimism about crude prices translates to gasoline and diesel markets.

Renewables

Global: Bloomberg's New Energy Outlook (NEO) 2017 report says that renewable energy generation will account for one-third of the world's power by 2040.^{vi} NEO says wind and solar will account for 48% of installed capacity and 34% of electricity generation, compared to today's 12% and 5%, respectively. Australia's grid will be one of the most decentralized in the world, with around 45% of power generation capacity located behind-the-meter.

According to new data from the International Renewable Energy Agency (IRENA), 9.8 million people are employed by the renewable energy industry in 2016.^{vii} China is the world's leader with 3.64 million jobs, including in hydro. There were around 1.2 million jobs in the EU, and 876,000 jobs in Brazil.

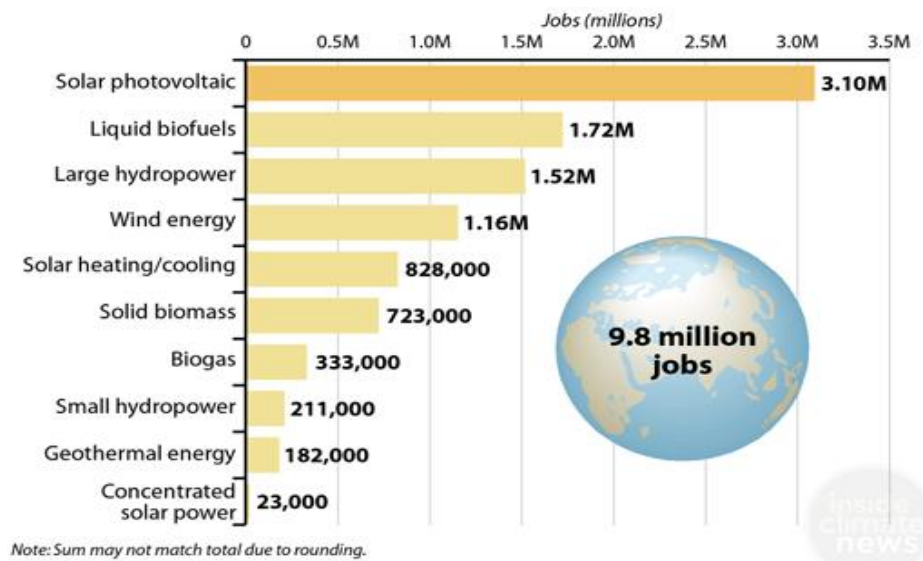
United States: For the first time, monthly electricity generation from wind and solar (including utility-scale plants and small-scale systems) exceeded 10% of total electricity generation in the United States in March 2017.^{viii} Despite President Trump's commitment to revitalizing the U.S. coal sector, it is likely that the significant gains made by these technologies in recent years will continue for the foreseeable future.

A recent report from the IEA suggests that despite President Trump's proposal to exit the Paris climate accords, cities and business groups in the United States are determined to help achieve U.S. Paris targets.^{ix} IIEEC Director Professor Carmine Difiglio provided similar views in a recent interview with *Hurriyet* (19.06.2017, <http://www.hurriyet.com.tr/iklimi-paris-degil-temiz-enerji-kurtarir-40495321>, English translation is available in: <http://iieec.sabanciuniv.edu/sites/iieec.sabanciuniv.edu/files/Prof-Difiglio-Hurriyet-Interview.pdf>).

Ms. Merve Erdil interviewing Professor Carmine Difiglio



Figure 2. Global Renewable Energy Employment by technology, 2016



Economics

Asia: Japan's GDP grew markedly less in 1Q17 than previously thought, though the underlying pace of expansion remained strong, according to government data.^x First-quarter GDP grew by an annualized 1%, down from an initial estimate of 2.2%, due to a lower private sector inventory. In China, economic growth took a step back in April as factory output, investment, and retail sales all tapered off. Recent regulatory curbs aimed at limiting debt risks appear to be having broad economic impacts.^{xi} While China must continue reforms that will provide longer-term stability, the IMF finds that serious near-term risks to the economy have mostly receded. The IMF forecasts China's gross domestic product to grow 6.7% this year — edging up from a previous estimate of 6.6%—in line with government forecasts.^{xii}

Europe: The Eurozone economy experienced a growth rate of 0.5% for 1Q17.^{xiii} Eurozone wages increased by 1.4%, slower than 4Q16's 1.6%, despite a pickup in economic growth that has seen unemployment rates fall to eight-year

lows.^{xiv} In Germany, the outlook for 2Q17 was revised upward by the government as German

exports continue to grow while the account surplus is expected to continue to fall.^{xv} The German economy grew 0.6% in 1Q17 compared to last quarter, driven by strong exports, booming construction and higher household and state spending. Elsewhere, 1Q17 growth estimates were 0.4% for France and 0.3% for Britain.^{xvi}

Turkey: According to official statistics, the economy grew by 5.0% in 1Q17.^{xvii} A rebound in domestic demand and exports played a key role in pushing up growth, according to the Turkish Statistical Institute (TÜİK). Exports of goods and services increased by 10.6%, while imports of goods and services increased by 0.8% in 1Q17.

United States: The Federal Reserve recently raised short-term interest rates by 0.25%, the third rate hike since December.^{xviii} The increase had little impact on bond markets, a sign that the increase was expected. In a sign of confidence, the Fed upgraded its forecast for

U.S. economic growth and unemployment for this year. Fed officials also cut their forecast for inflation to 1.6%, down from 1.9% in March.

The U.S. economy grew at an annualized rate of 1.2% in 1Q17, causing the New York Federal Reserve to lower its 2017 forecast for U.S. economic growth from 2.3% to 1.9%. The unemployment rate remains at its lowest level since 2001.^{xix}

Geopolitics & Supply

OPEC: The producer group's output fell by 110 kb/d in May to 32.61 mb/d, according to IEA. Only four countries were producing at or below the levels they agreed to in November: Saudi Arabia, Angola, Kuwait, and Qatar. According to OPEC, the group's production for May was 32.1 mb/d.^{xx} OPEC's compliance to its 1.2 mb/d supply cut averaged 96% for the first four months of 2017. After last month's renewed commitment to extending cuts through the 1Q18, it is likely that average output will remain near current levels through then, despite recent swings from Libya and Nigeria.

Iran: Many observers suspect that Iran's production growth has stalled near 3.75 mb/d, after boosting output by around 800 kb/d since last year.^{xxi} Iran desperately needs new investment in order to even maintain production at some of its more mature fields. For now, Iran appears to remain committed to extending the production cuts to March.

Iraq: Oil production increased by 44 kb/d from April to May to 4.42 mb/d. Iraq has yet to reduce production enough to meet its promised quota of 4.35 mb/d since the cuts began. So far this year, Iraqi compliance with its coordinated cut is around 56%.

Libya: Crude production surged by more than 178 kb/d to 730 kb/d as the country's rival

factions moved toward reconciliation.^{xxii} However, there have been multiple attempts to make peace in the last few years, most of which were short-lived. While the domestic political and security situations remain tenuous, Libya's crude production revival may undermine OPEC's strategy to reduce global supplies. Libya has remained exempt from the OPEC cuts and will continue to be exempt through March 2018.

Nigeria: While production was down significantly due to attacks on energy infrastructure, production is finally recovering and is currently up by more than 174 kb/d to 1.68 mb/d.^{xxiii} Nigeria is also exempt from the OPEC coordinated production quotas.

Qatar: The energy minister says Qatar remains committed to coordinating with OPEC on cutting production despite the recent severing of diplomatic ties with Saudi Arabia and UAE.^{xxiv} Qatar accounts for approximately 2% of OPEC's output.

Venezuela: The average price of Venezuelan crude fell for the third consecutive week.^{xxv} A primary driver has been lower demand in the United States due to increased gasoline stocks. During the week ending June 16, the average price for its export blend averaged \$40.89, down \$0.85 from the previous week. This cuts into the country's oil revenues, as the world's largest holder of oil reserves remains teetering on the edge of economic collapse.

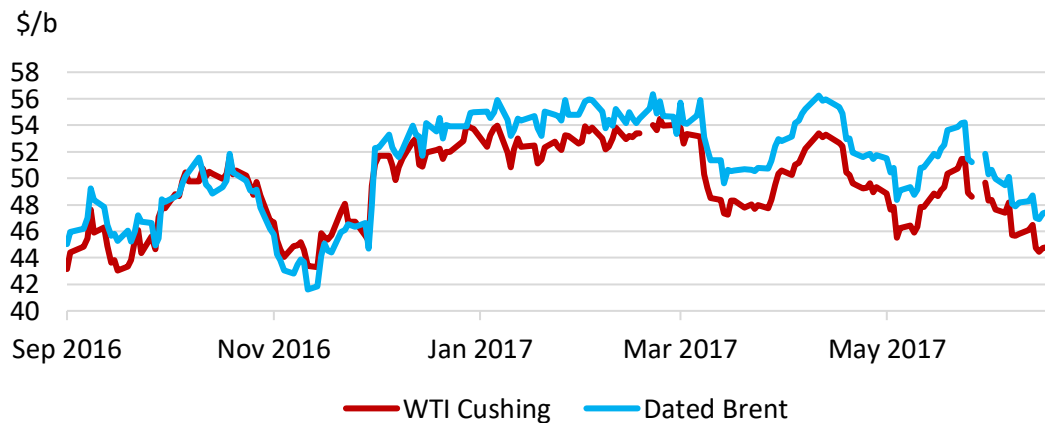
IICEC Energy Market Newsletter Technical Appendix

1. Oil Market

Oil Supply and Prices:

- **The Brent oil price was down \$9.19/b since its recent peak of \$54/b in late-May.** Prices peaked on May 24 and fell rapidly since then as rising production in the United States and Libya hamper the OPEC-led effort to support the market by cutting production.
- **OPEC crude output fell by 110 kb/d to 32.61 mb/d as big losses in Nigeria due to oil sector sabotage more than offset higher Middle East output, according to the IEA.^{xxvi}** OPEC will likely maintain some degree of production restraint through 2018. In late May 2017, OPEC, Russia, and other non-OPEC partners agreed to extend their cuts through first quarter 2018.

Figure 3. Benchmark Crude Prices



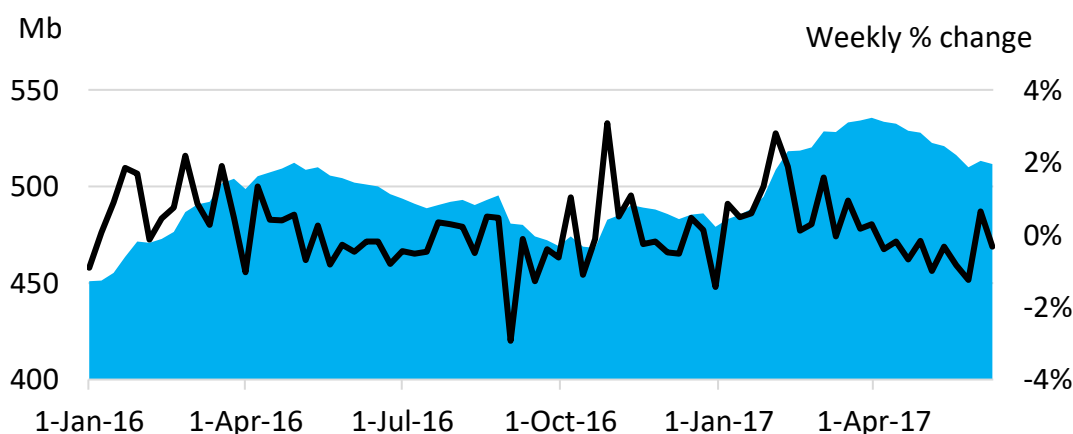
- **The Brent-WTI spread in June has averaged \$2.3/b, down measurably from May's \$2.80/b and April's \$2.69/b.** The spread tightened earlier this month as Brent prices fell more than WTI, as the North American market reacted to extended production outages in Canada (a major supplier of crude to the United States). Meanwhile, many traders reduced their WTI net-long position in U.S. markets, causing shorts to increase by 32% in recent days, according to CFTC data.

- **U.S. weekly crude production finally slowed in mid-May after a consistent rise since January; however, output growth has since returned.** Weekly production reached 9.33 mb/d for the week ending June 9, up from the previous week's 9.32 mb/d, and up by nearly 100 kb/d since the same week in April, according to EIA. U.S. oil production began to grow in the 4Q16 after declining over the first three quarters of last year. Average production for 2016 (8.9 mb/d) was below 2015 (9.4 mb/d), though still 1.3 mb/d higher than the average for 2011-2015.

Crude Storage:

- **OECD stocks are likely to remain flat from April to May, near 16.2 mb, according to IEA's preliminary data.** OECD industry stocks fell for a second consecutive month in March, by 32.9 mb, to 3,025 mb, according to IEA. This implies a total stock increase of 24.1 mb in 1Q2017 led by a large build in January. Commercial crude stocks in the OECD reached a record high in March due to higher U.S. production and lower demand from refiners.
- **U.S. commercial crude inventories fell by 1.7 mb during the week ending June 9.** At 511.5 mb, U.S. crude oil inventories are in the upper range for this time of year, based on the five-year average. Crude imports averaged 8 mb/d, down by 316 kb/d from the previous week. U.S. crude exports increased by 165 kb/d from the previous week to 722 kb/d. Weekly exports reached an all-time high of 1.30 mb/d in late May.

Figure 4. Weekly U.S. Crude Oil Stocks

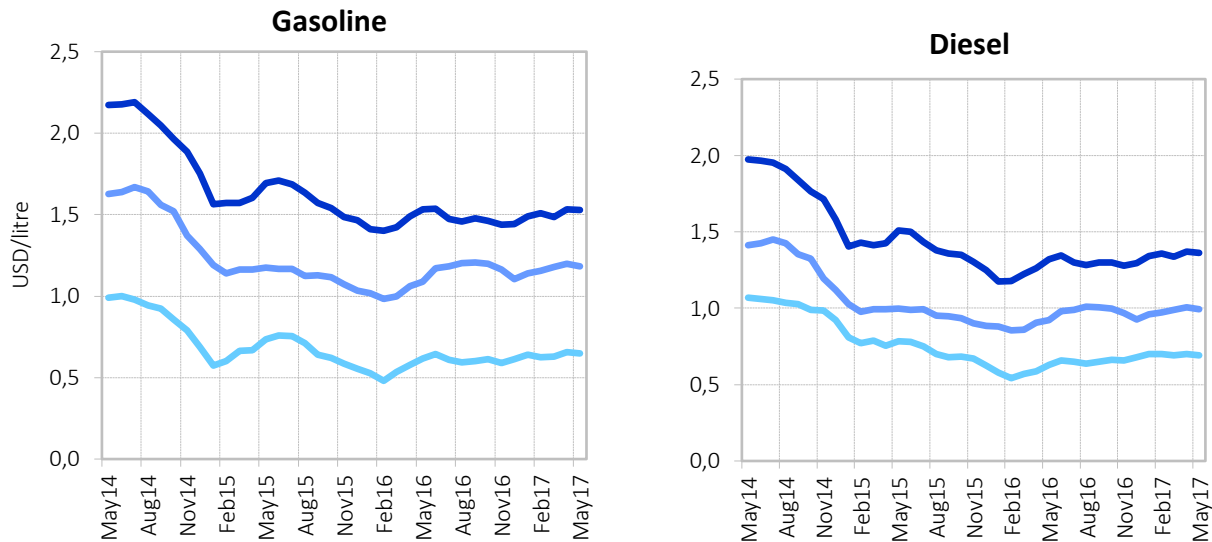


Select Product Markets:

- **Most product prices were flat from April to May, as pessimism about crude prices weighs on product markets (Figure 5).** Gasoline was the strongest performer last month, reflecting higher demand and tighter specifications for summer fuels, while diesel price rises were more limited. While the average prices for gasoline

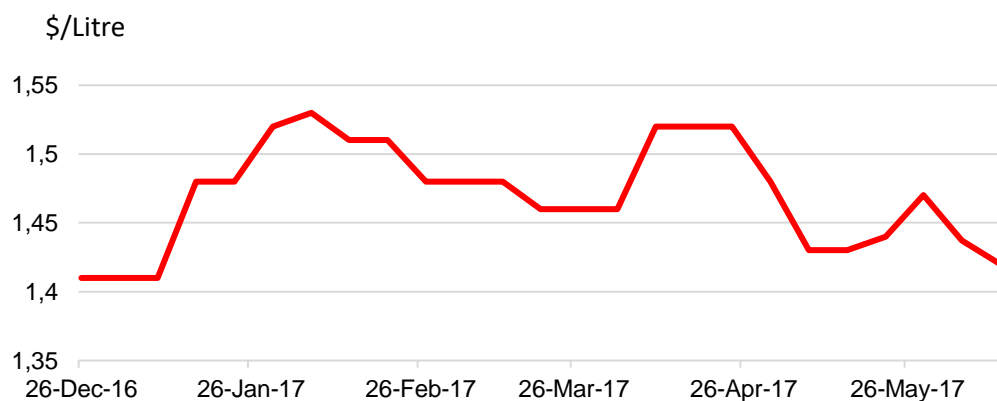
and diesel are shown below in Figure 5, according to recent data from the European Commission, the range of petrol prices has grown across Europe in recent months.

Figure 5. Select Monthly Product Prices in Europe, Japan, and North America



- **Gasoline prices in Turkey** are shown in Figure 6, with prices falling 4% since the beginning of May. Since January, average gasoline prices increased by \$0.01.

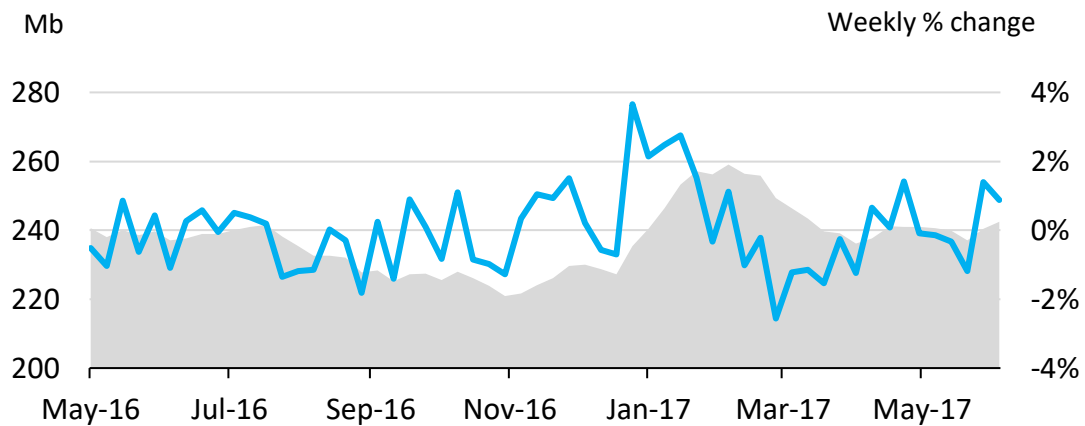
Figure 6. Weekly Average Gasoline Prices in Turkey



- **For the week ending June 9, U.S. crude oil refinery inputs averaged 17.3 mb/d, up 29 kb/d from last week's average.** Gasoline production increased as a result, while refineries operated at 94.4% of their operable capacity. U.S. gasoline stocks

increased by 2.1 mb, and they remain in the upper limit of the five-year average for this time of year. The national average retail regular gasoline price decreased to \$2.366 per gallon on June 12, \$0.048 lower than last week's prices and \$0.033 less than a year ago.

Figure 7. Weekly U.S. Gasoline Stocks and % Change

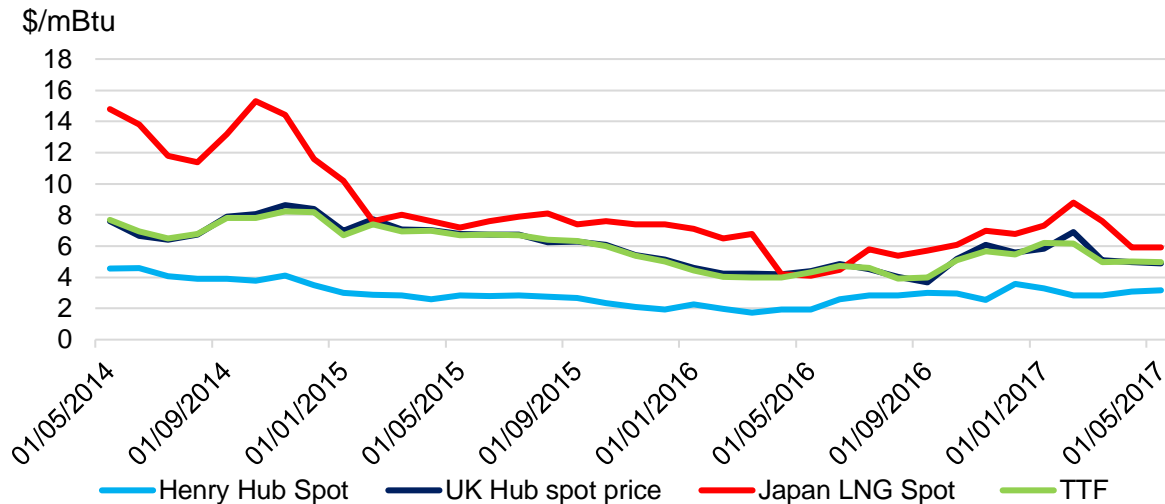


2. Natural Gas & LNG

Prices:

- **Asian spot LNG prices fell \$0.05 to \$5.40/mBtu this week as Taiwan and Japan were out of the market and only South Korea purchased cargoes for July-delivery.^{xxvii}** Some incremental spot interest from South Korea along with an outage of Train 1 at Gorgon LNG has given some support to spot LNG prices going into the summer demand season. However, Japanese end-users have not been as active in the spot market as they are able to cover current demand with long-term contracted volumes.
- **Spot LNG prices in the Atlantic Basin are currently around \$5.30/mBtu, a slight discount to Northeast Asia because of limited demand in the region and abundant supply.** Meanwhile, Sabine Pass in the United States will soon begin commercial operation of Train 3.

Figure 8. Select Natural Gas Prices



- **Weekly U.S. natural gas spot prices fell \$0.09 to \$2.90/mBtu on June 14, with a weekly high of \$3.08/mBtu.** The weekly high was attributed to higher temperatures in most major U.S. markets that led to increased power demand. U.S. LNG exports increased last week, with five vessels (combined LNG-carrying capacity of 18.2 Bcf) departed Sabine Pass, while one vessel (LNG-carrying capacity 3.8 Bcf) was loading at the terminal on Wednesday.
- **Natural gas prices in the United Kingdom are expected to increase by more than average this coming winter, as the country's largest gas storage facility—accounting for 70% of the country's total storage capacity—has been unable to receive injections since 2016.**^{xxviii} Injections at the Rough facility were stopped in the first quarter of 2016 in response to safety concerns raised by a well-testing program, which revealed potential containment failures in a number of wells.

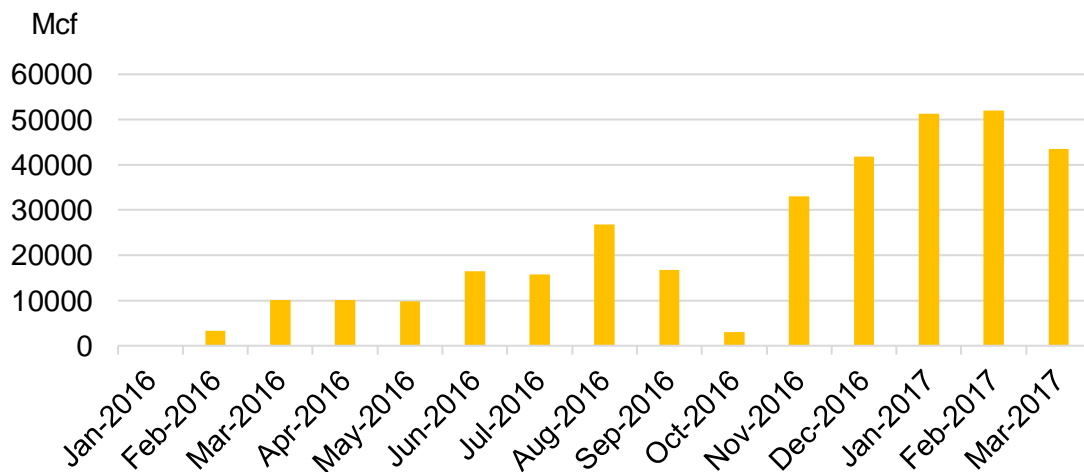
Supply:

- **While the future of Qatar's regional supply commitments is far from certain, it is important to note that Qatar—which represented 30% of global LNG supply in 2016—has been actively diversifying its trade partners in recent years.** If the blockades currently imposed on Qatar limit its LNG exports to UAE and Egypt—two countries supporting the action—it is unlikely that the loss of those markets will significantly impact Qatar's ability to secure new buyers, according to a recent study.^{xxix}
- **The Trump administration's U.S. - China Economic Cooperation Plan, signed in May, includes a provision related to making it easier for Chinese firms to enter into long-term contracts with U.S. LNG exporters.** It appears that the provision is

largely ceremonious. While some volumes of U.S. LNG have already shipped to China on the spot market, the Plan clarifies that China will be treated “no less favorably than other non-FTA partners with regard to LNG export authorization.”^{xxx} It is also worth noting that a large share of U.S. LNG contracts are held by intermediaries that are able to sell U.S.-produced LNG to customers that do not have contracts with U.S. LNG exporters.

- **Pipeline gas exports from Russia to Turkey increased by 26% in January-March 2017 compared to 2016 and by 14.6% compared to the same period last year, according to Gazprom.**^{xxxi} Meanwhile, the two countries are pursuing the development of the Turkish Stream gas pipeline project, which would add an additional 31.4 billion cubic meters per year (bcm/y) of export capacity.
- **Recent restrictions on LNG exports in Australia are unlikely to re-deliver significant volumes of gas into the domestic market there.**^{xxxii} The government’s draft legislation, called the Australian Domestic Gas Security Mechanism, is likely to lead to a short-term-focused gas market that negatively impacts the development of larger-scale projects that require long-term price certainty. The Mechanism, originally announced in April, would give the government the ability to impose export restrictions on east coast LNG producers that draw excessive amounts of gas from third parties for export. Meanwhile, the Mechanism may open up an arbitrage opportunity for the LNG producers to deliver into the domestic market with greater earning potential than weak LNG spot markets.

Figure 9. U.S. LNG exports since January 2016





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