

VALUE FOCUS

Refining



2017 Issue I

Refining Overview

Despite profit margin improvement since the start of 2017, the high cost of RINs led to an increase in operating expenses which more than offset the decrease in cost of goods sold. Refiners' inputs and products are both commodities, which means that the price they pay for inputs and the prices they receive for their products are generally determined by the market. Therefore refiners earn profits through generating efficiencies, increasing their market share, and producing higher margin goods.

Although the price of refined products has been somewhat down over the first half of 2017, crack spreads increased over the first half of the year giving the downstream markets optimism about the rest of the year to come. Additionally, it is thought that the Trump administration will loosen some existing policies which are burdensome to the oil and gas industry. Overall, the industry has consolidated in order to increase operating leverage.

The data presented in this report includes the most recently available information as of October 31, 2017. This includes public company earnings metrics as of June 30 and information from the EIA as was available.



Oil and Gas Industry Services

Mercer Capital provides business valuation and financial advisory services to companies in the energy industry.

Services Provided

- Valuation of oil and gas companies
- Transaction advisory for acquisitions and divestitures
- Valuations for purchase accounting and impairment testing
- Fairness and solvency opinions
- Litigation support for economic damages and valuation and shareholder disputes

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Mercer Capital serves the following industry segments:

- Exploration & Production
- Refining and Marketing
- Oil Field Services
- Midstream Operations
- Alternative Energy

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Legislation

The refining industry is heavily regulated. The future impact of many regulations surrounding the oil and gas industry, however, is uncertain as President Trump ran as a friend to the oil and gas sector and promised to reduce regulations on the energy industry in order to boost the U.S. economy. President Trump named Scott Pruitt, who openly opposed the EPA, the agency's director. Current legislation surrounding the industry is summarized below.

The Renewable Fuels Standards Program continues to have a significant impact on the refining industry. RFS was signed into law by President George W. Bush in order to reduce greenhouse gas emissions and boost rural farm economies. Each November, the EPA issues rules increasing Renewable Fuel Volume Targets for the next year. RINs (Renewable Identification Numbers) are used to implement the Renewable Fuel Standards. At the end of the year, producers and importers use RINs to demonstrate their compliance with the RFS. Refiners and producers without blending capabilities can either purchase renewable fuels with RINs attached or they can purchase RINs through the EPA's Moderated Transaction System. While large integrated refiners have the capability to blend their own petroleum products with renewable fuels, small and medium sized merchant refiners do not have this capability and are required to purchase RINs, which have significantly increased in price. Additionally, since many pipelines do not allow blended products in their pipelines, ethanol and biodiesel have to be blended after the product reaches its destination. Many refiners expressed frustration with the current RFS on earnings calls in the second quarter of 2017.

During his campaign, **President Trump advocated for the RFS**, and in June 2017, he traveled to Iowa and expressed that he would "protect the corn-based ethanol and biofuels that power our country." However he also promised to help small and medium sized merchant refiners who were disadvantaged by RFS. The new RFS for 2018, which were released in mid-July, displayed a slight reduction in the volume requirements. A public hearing was held on August 1, 2017 and on October 17, 2017 the EPA provided a public notice and an opportunity to comment on potential reductions in the 2018/ 2019 biomass-based diesel, advanced biofuel, and total renewable fuel volumes. The final rule should be available in December.

In December of 2015 the Petroleum Refinery Sector Risk and Technology Review (RTR) and the New Source Performance Standards (NSPS) rule was passed in order to control air pollution from refineries and provide the public with information about refineries' air pollution. These regulations ranged from **fence line and storage tank monitoring** to more complex requirements for key refinery processing units. The **EIA estimates** the rule will cost refineries a total of

Legislation (continued)

\$40 million per year, while the **American Petroleum Institute (API)** argued that the annual cost would exceed \$100 million. The rule was expected to be fully implemented in 2018; however, President Trump's deregulation of the oil and gas sector makes us to question the future implementation of the rule.

On August 15, President Donald Trump **signed an executive order** aimed at speeding up the process for federal environmental reviews for energy and other infrastructure projects and holds agencies accountable if they fail to do so. Jack Gerard, President of the American Petroleum Institute (API) praised the order for its focus on speeding up projects saying, "We also look forward to President Trump as he signs an executive order aimed at **streamlining the permitting process** for infrastructure projects."

The State Department has approved three permits for the construction of pipelines extending from the U.S. to Mexico, including the **New Burogs Pipeline** which will move 108,000 bpd of refined products across the border. **Mexico is the number one importer of U.S. gasoline**, and the U.S. gulf coast exports more gasoline abroad than any other region of the U.S. New pipelines will likely facilitate the process of moving refined products from the U.S. to market in Mexico. However, negotiations of the North American Free Trade Agreement (NAFTA) remain unresolved. President Trump indicated that he will work to re-negotiate NAFTA rather than simply pull out of the agreement, but some in the oil and gas industry are still uneasy about the impact this would have. The API, CAPP, and AMEXHI are the top trade groups in the United States, Canada, and Mexico, respectively. Collectively representing more than 750 international oil and gas companies, they issued a **joint position paper** on August 2, stating their hope that current policies remain intact. They claim that reductions in investment protections or increases tariffs or trade barriers would have a negative impact on the industry and risk tens of millions of jobs that depend on trade in North America.

Towards the end of the third quarter, Congressional Republicans introduced an outline of their plan for tax reform. With the goal of reducing the corporate tax rate and simplifying the overall tax code, the energy industry will likely be affected both positively and negatively. A corporate income tax rate decrease from 35% to 20% would help increase after-tax profits, but the simplification of the tax code will likely lead to a decrease in tax exemptions for the industry.

Oil & Gas

Market Overview

There are four main components to refined product prices: (1) Crude Oil Prices, (2) Wholesale Margins, (3) Retail Distribution Costs, and (4) Taxes. Generally, input prices and wholesale margins drive fluctuations in product prices as the last two are relatively stable. President Trump is working to reduce corporate taxes, which could boost earnings; however, tax policy does not change frequently. Thus, in order to understand refined product prices, we focus on the macroeconomics trends in the global oil and gas market which drive input prices.

Global oil prices settled around \$50/bbl over the first half of the year, and producers work to cut costs and increase efficiency in this new oil price environment. After instituting their first production cuts in eight years last quarter, OPEC and non-OPEC producers met in May, agreeing to extend production cuts for nine more months. OPEC's stated goal was keeping the **price of oil above \$50 per barrel** and aimed to bring stocks down to 2.7 billion barrels. Even if OPEC maintains production cuts, rising U.S. shale oil output is thought to temper the results of OPEC's reduction in supply.

As oil prices have remained depressed, the price differential between light sweet crude and heavy sour crude has decreased from a max differential of \$42.50 in December 2012 to an average of \$11 over the last month. Since the price of light sweet U.S. crude has fallen, the cost savings that companies used to realize when purchasing heavy feedstock cannot make up for the higher costs of cracking it. **As explained by *Canada Oil Sands Magazine***, "Refineries typically blend different grades of crude with varying quality specifications. Depending on the configuration of the refinery, each facility has a limited ability to handle heavy grades of crude and sulphur." U.S. refineries were traditionally retrofitted to handle heavy crude, because this allowed for higher refining margins. The U.S. traditionally has more complex refineries than Europe and Canada, allowing them to better crack heavy molecules into light value-add products such as jet fuel.

However, in mid-2014, U.S. refiners began struggling to keep up with the amount of light sweet crude available for sale in the U.S. markets since most refineries were not built to handle such light crude. It was thought that the initial relaxation and eventual elimination of the crude oil export ban would relieve U.S. refiners from this pressure, but the over-supply of oil across the globe dampened this effect.

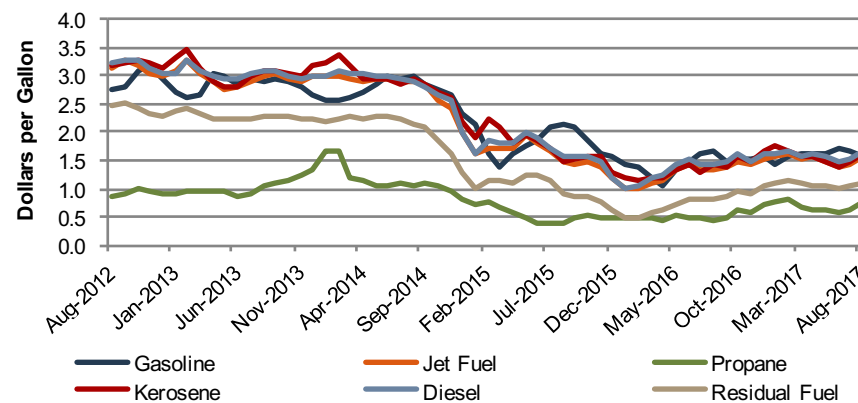
Because the price of light sweet crude and sour heavy crude has started to converge, there is potential for higher margins from light crude rather than heavy crude. Even if refiners have to pay the upfront investment costs to retrofit their facilities to handle lighter crude, they can face lower operating expenses going forward, as it is easier to refine light crude than heavy crude into higher margin products.

Refining & Marketing

Refined Product Prices

The price of gasoline fell to a low of \$1.05/gallon in February 2016, but has since increased by more than 50% to \$1.71/gallon as of August, which is the most recent data available.

Refined Product Prices



Source: EIA

YOY Change

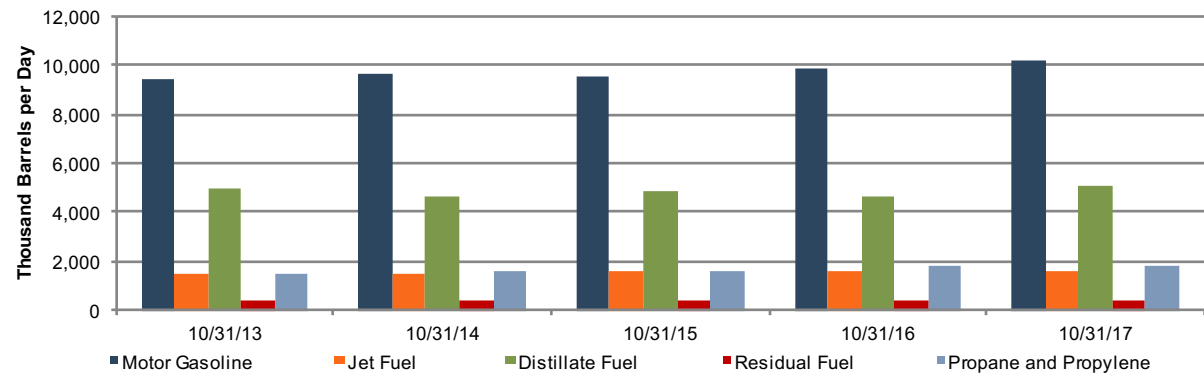
Gasoline	6.52%
Jet Fuel	9.91%
Propane	27.98%
Kerosene	7.60%
Diesel	8.01%
Residual	15.06%

Refining & Marketing

Refined Product Volumes

Refined product production has generally increased, with the exception of residual fuel, over the last five years. Residual fuel production decreased at a compound annual rate of 6.2% since October 2012 due to both decreases in supply and demand. Refiners have prioritized the production of lighter, more profitable products over residual fuel decreasing the supply. And the power sector has shifted from relying residual fuel to natural gas, decreasing demand. The production of motor gasoline and jet fuel has increased at a growth rate of 2.1% and 1.0% respectively from October 2012 to October 2017. Over the last few months, however, production of refined products, excluding residual fuel, fell due to the shutdown of refineries along the gulf coast during hurricane Harvey. The Gulf Coast region has more than half the **refining capacity** in the United States. Although the EIA predicts that the fuel economy of light duty vehicles will lead to a decline in consumption of travel fuels, the recent increase in exports has encouraged refiners to continue increasing production. Additionally, propane production has increased as the U.S. became a net exporter of propane.

Refined Product Volumes



Source: EIA

Refining & Marketing

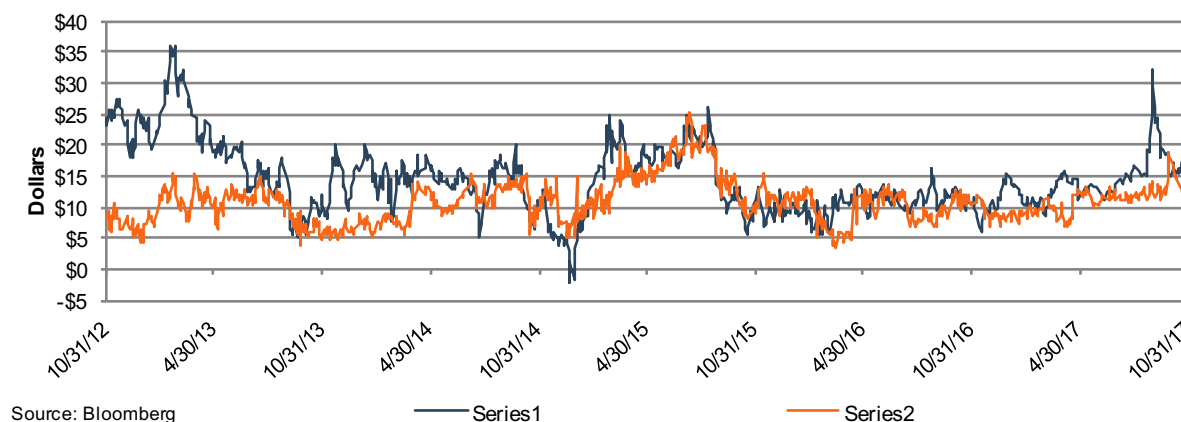
Crack Spread

The crack spread is the price differential between crude oil and its refined oil products. The 3-2-1 crack spread approximates refinery yield using the industry average for refinery production. For every three barrels of crude oil the refinery processes, it makes two barrels of gasoline and one barrel of distillate fuel.

Historically, the WTI Cushing 3-2-1 crack spread was higher than the Brent Crude 3-2-1 Crack Spread because U.S. producers were not allowed to export crude except to Canada and the price of WTI crude was depressed. However, as the cost of crude fell around the world and the export ban was lifted, crack spreads converged.

Crack spreads **demonstrate some seasonality**, increasing in the summer, as the amount of miles driven increases, and decreasing in the winter, which is a period of lower demand. Because many refiners were forced to shut down due to **damage caused by Hurricane Harvey**, the crack spread peaked at the end of August and the price of refined products spiked due to product shortages. The spread has since fallen back to approximately \$18 per barrel of WTI.

Crack Spread



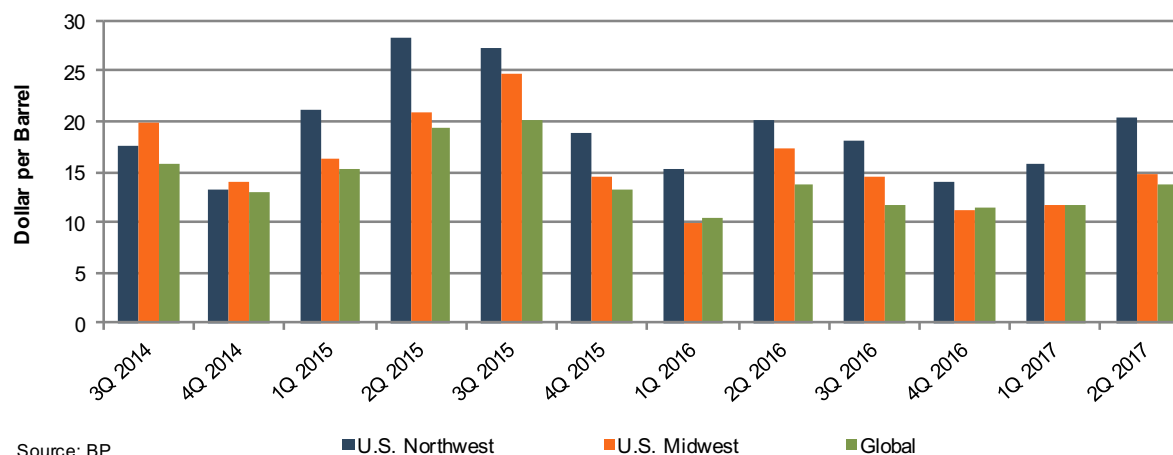
Refining & Marketing

Refiner Marker Margin

The **refiner marker margin (RMM)** is a general indicator, calculated quarterly by British Petroleum, which shows the estimated profit refiners earn from refining one barrel of crude.

Refiners' margins increased dramatically in the second and third quarters of 2015 as the price of crude fell and the price of refined petroleum products lagged behind. Refiners in the U.S. North West were making between \$27 and \$28 per barrel of oil, while global margins barely reached \$20 per barrel. However, starting in the fourth quarter of 2015 refined product prices fell, refiners' margins tightened, and the geographic gap in margins narrowed. After some short-lived relief in margin pressure in the second quarter of 2016, margins tightened before expanding back to where there were in the second quarter of 2016. Going forward, margins are expected to increase pending the price of refined products continues to recover and regulations relax.

Refiner Marker Margin



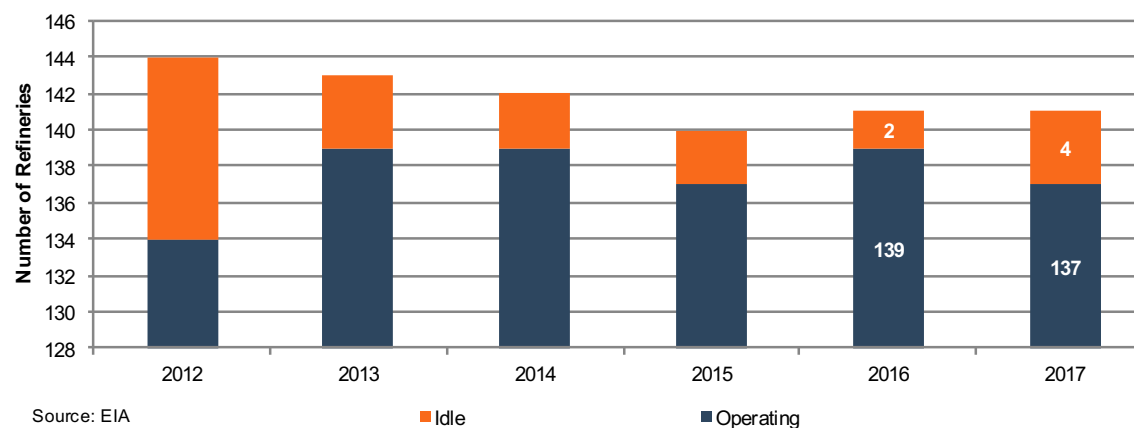
Refining & Marketing

Operating & Idle Refineries

As of January 1, 2017, the most recent information available, the number of operating refineries totaled 141, consistent with last year, when the total number of refineries increased for the first calendar year since 2008. Since then, refining capacity increased with the opening of one new refinery.

In the first half of 2017, **Magellan Midstream Partners LP opened a new refinery** in Corpus Christi, Texas that has condensate splitters with capacity of 42,500 bpd. No refineries have been permanently shut down this year.

Total Number of Operating and Idle Refineries as of January 1, 2017



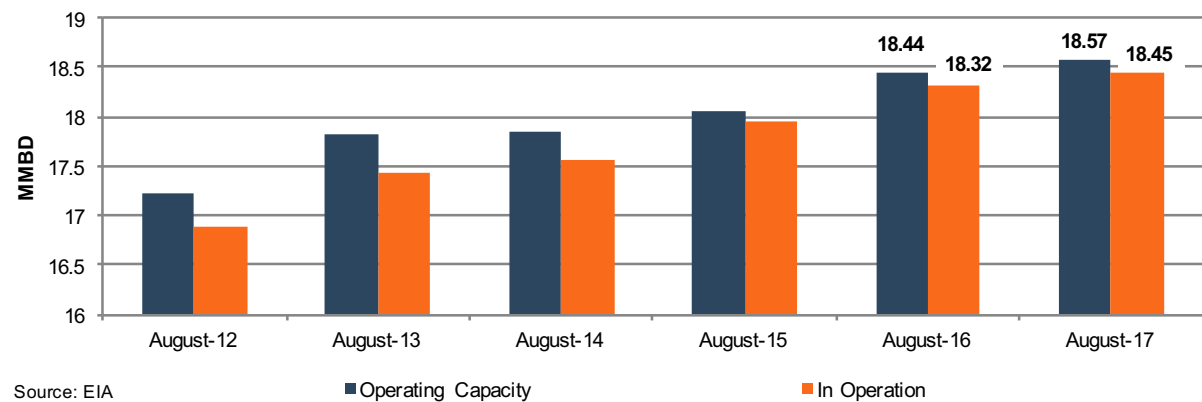
Refining & Marketing

Operating & Idle Refineries

(continued)

Refinery utilization rates increased from 92.2% in July 2016 to 95.0% in July 2017 but fell back to 92.8% in August 2017 (the most recent data available) as refineries went offline due to Hurricane Harvey.

Capacity of Operating and Idle Refineries



Market Valuations & Transaction Activity

Uncertainty in the refining industry led to a standstill in M&A activity in early 2016 as companies waited to understand the future of the refining sector after the collapse of oil prices and the lifting of the export ban. In the second half of 2016, M&A activity increased as market participants merged in an effort to outlast the downturn. Since there is little opportunity for organic growth in the current market, companies have turned to buying growth through acquisitions. There was little M&A activity in the first half of 2017, so we analyzed the trends of consolidation seen in 2015 and 2016.

Western Refining bought Northern Tier Energy at the end of 2015 for approximately 5.3x EBITDA and 80% of revenue. Northern Tier was structured as a master-limited partnership which is a dividend-paying investment vehicle that is given certain tax breaks. The acquisition of Northern Tier helped **Western Refining's RIN compliance**. A year later, Western Refining and Tesoro Corporation merged to form Andeavor. Tesoro bought Western Refining for 10.6x EBITDA and 80% of revenues. The new company is now the fourth largest independent refiner in the U.S.. NASDAQ reported that the acquisition is expected to deliver “**cost synergies of \$350 million to \$425 million** within the first two years, generating substantial stockholders value.”

Earnings multiples from transactions can vary due to strategic motivations behind each transaction. Thus, we can also look to the public market in order to see a marketable minority perspective of value.

Announced Date	Target	Buyer	Total Consideration to Shareholders	Implied Enterprise Value	LTM Revenue	LTM EBITDA	Enterprise Value to:	
							LTM Revenue	LTM EBITDA
11/17/16	Western Refining, Inc.	Tesoro Corporation	\$3,761	\$6,209	\$7,698	\$586	0.8x	10.6x
10/14/16	Alon US Energy, Inc.	Delek US Holdings, Inc.	\$273	\$935	\$3,604	\$85	0.3x	11.0x
10/26/15	Northern Tier Energy LP	Western Refining, Inc.	\$1,491	\$2,665	\$3,303	\$502	0.8x	5.3x
3/31/15	Alon US Energy, Inc.	Delek US Holdings, Inc.	\$584	\$1,602	\$6,124	\$359	0.3x	4.5x
Average			\$1,527	\$2,853	\$5,182	\$383	0.5x	7.8x
Median			\$1,038	\$2,134	\$4,864	\$431	0.5x	7.9x

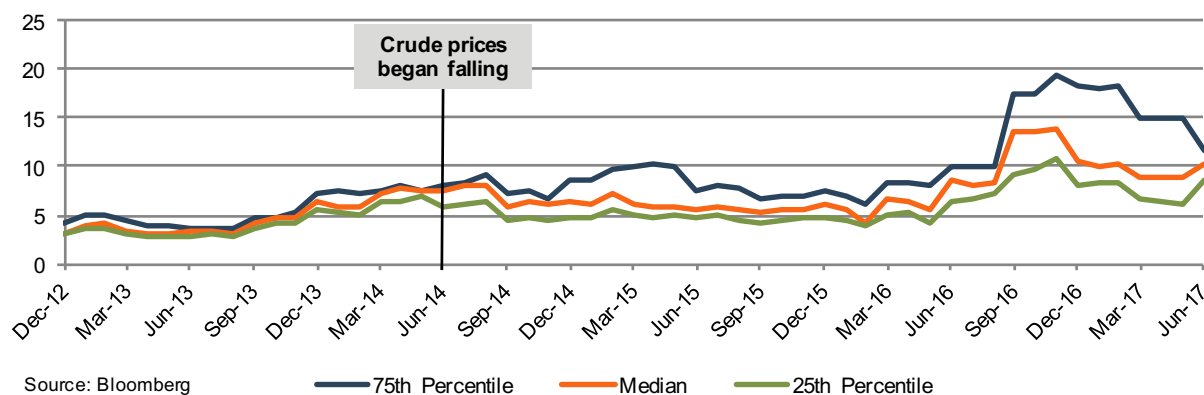
Source: Capital IQ

Market Valuations & Transaction Activity

(continued)

Since the fall of crude prices in 2014, valuation multiples have been through multiple cycles of compression and expansion. For refiners, low oil prices initially signal higher profit margins, as refined oil product prices are not perfectly correlated with input prices. This is especially true for non-transportation refined product prices (such as asphalt, butane, coke, sulfur, and propane) whose prices are even less likely to respond to changes in the price of crude oil. Thus, upon the initial fall of prices, earnings increased because the price of refined petroleum products did not fall as quickly as the price of crude. Additionally, the low prices of crude oil and natural gas decreased refiners' own operating expenses as refining is itself an energy intensive process and natural gas is used to power refineries. When earnings increased, valuation multiples fell because investors believed that these higher earnings were short lived and refined product prices would also fall. Earnings fell in 2015 as product prices decreased. Over the last year, earnings have fallen as the price of refined petroleum products remain depressed and operating expenses increased from RIN expenses. At the end of 2016, median EV/ EBITDA multiples were 10x and have since fluctuated but appear to be in the same range as of June 30, 2017, as shown in the chart below.

Refining EV/EBITDA Multiples



Guideline Public Company Valuation Multiples

Refining and Marketing valuation multiples over the past two years have been somewhat inflated due to compressed profit margins and have since began to normalize. Phillips 66 and Andeavor's EV/EBITDA multiples are still somewhat inflated as current earnings are not representative of long-term investor expectations. Earnings multiples are still high for most refineries which suggest that market participants believe that margins in the refining industry are still somewhat low and earnings are expected to recover further as President Trump rolls out his plans to decrease corporate taxes and to loosen oil and gas regulations.

Company Name	Ticker	LTM		EBITDA Margin	Enterprise Value @ 6/30/2017	YOY Change in Enterprise Value	EV/EBITDA Multiple
		Revenues	EBITDA				
CVR Refining	CVRR	5,195	235	4.5%	1,428	-8.4%	6.1x
Delek	DK	na	na	na	2,071	na	na
Holly Frontier	HFC	12,342	712	5.8%	7,268	23.1%	10.2x
Marathon Oil Corp	MPC	60,715	4,461	7.3%	46,230	25.4%	10.4x
Andeavor	PBF	19,033	414	2.2%	4,970	37.2%	12.0x
Phillips 66	PSX	79,201	2,161	2.7%	51,660	4.2%	23.9x
Average		\$35,297	\$1,597	4.5%	\$18,938	16.3%	12.5x
Median		\$19,033	\$712	4.5%	\$6,119	23.1%	10.4x

Presented in \$000,000s
Source: Bloomberg

* Tesero changed its name to Andeavor following its acquisition of Western Refining

* Delek acquired Alon

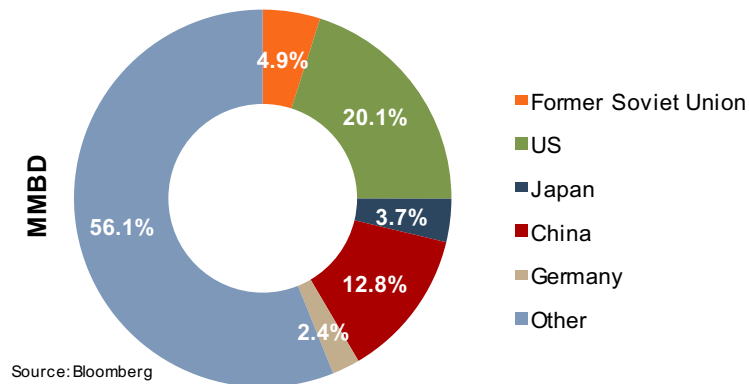
APPENDIX A

World Demand

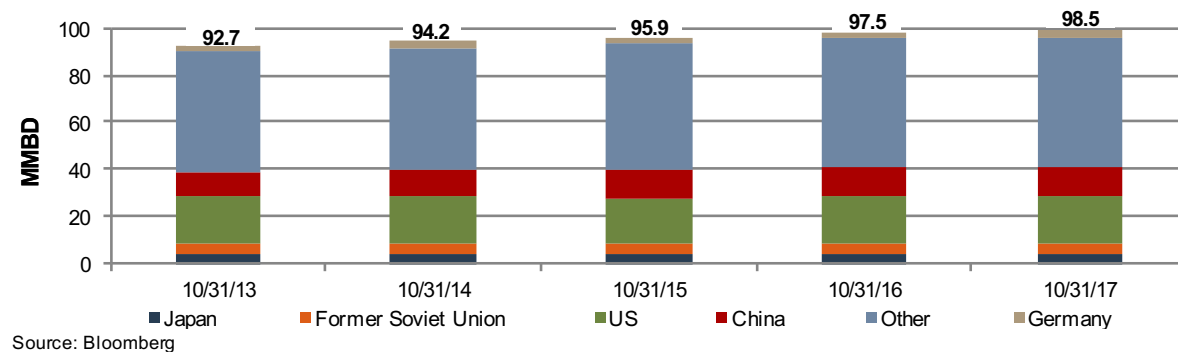
98.5
mboe/d

World Daily Consumption Of Crude Oil and Liquid Fuels: October 2017

As of October 31, 2017 total world daily consumption equaled 98.5 million barrels per day.



World Daily Consumption of Crude Oil and Liquid Fuels¹



¹ Germany's consumption as of December 2016 will be available between August and December of 2017. Thus, it was assumed to have remained constant.

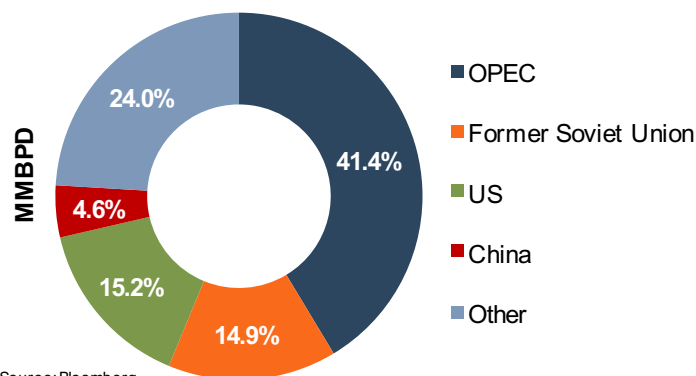
APPENDIX B

World Supply

97.9
mboe/d

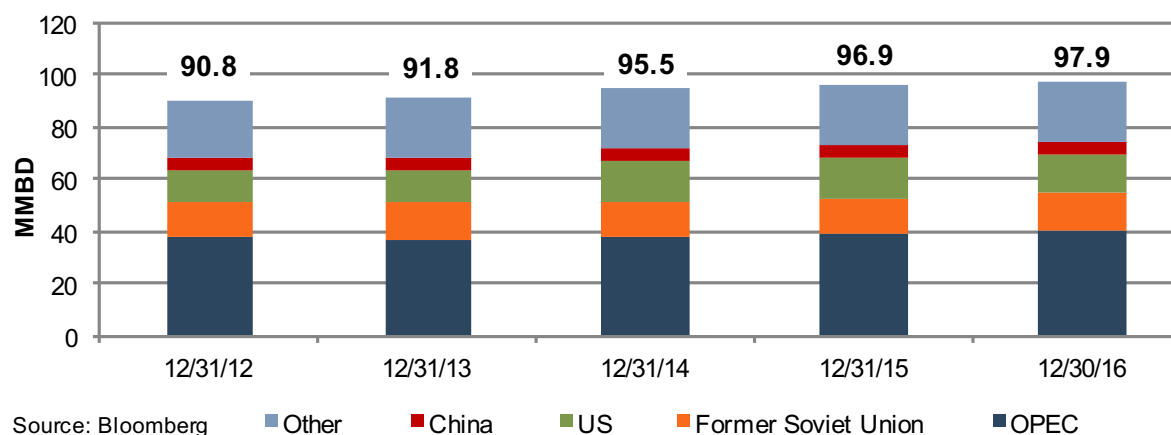
World Daily Production of Crude Oil: December 2016

As of December 31, 2016, the most recent information available, world daily production totaled 97.9 million barrels per day.²



Source: Bloomberg

World Daily Production of Crude Oil



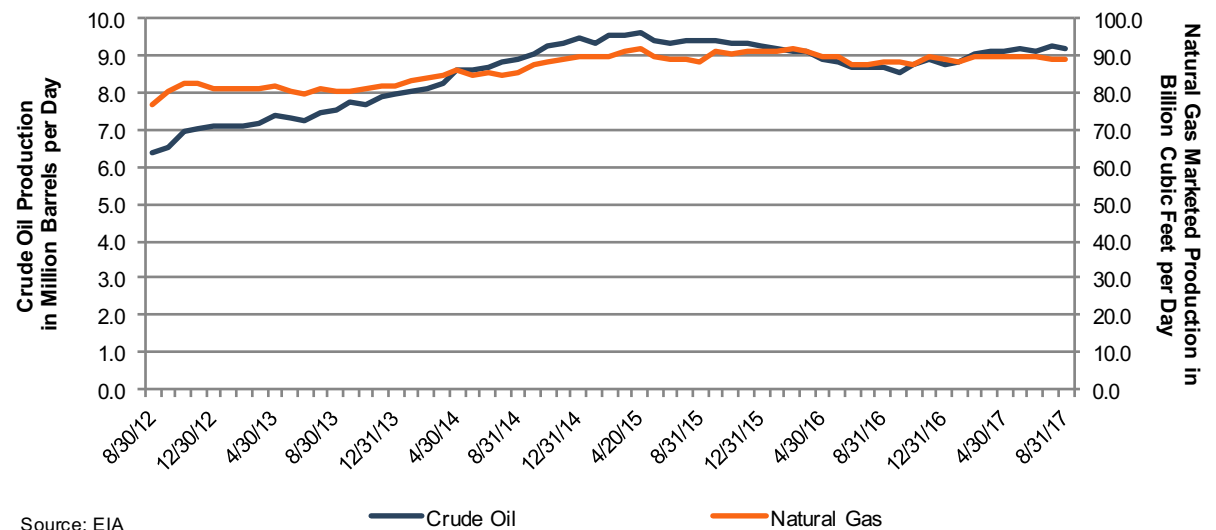
²World Supply is updated annually by Bloomberg.

APPENDIX C

Domestic Supply

Domestic production of crude oil peaked in April 2015 at 9.63 Mmb/d. As of August 31, 2017, oil production had fallen by 5% to 9.2Mmb/d. Domestic production of natural gas slowly increased until February 2016 when production peaked at 92.01 Bcf/d. Since then production has fallen by approximately 3% to 89.0 Bcf/d in August 2017 (the most recent data available).

U.S. Crude Oil and Natural Gas Production

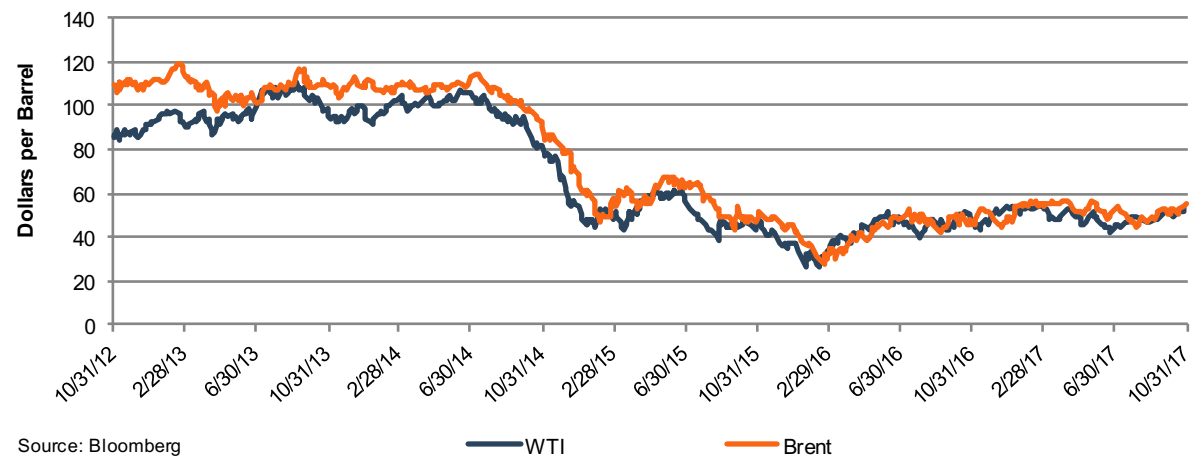


Source: EIA

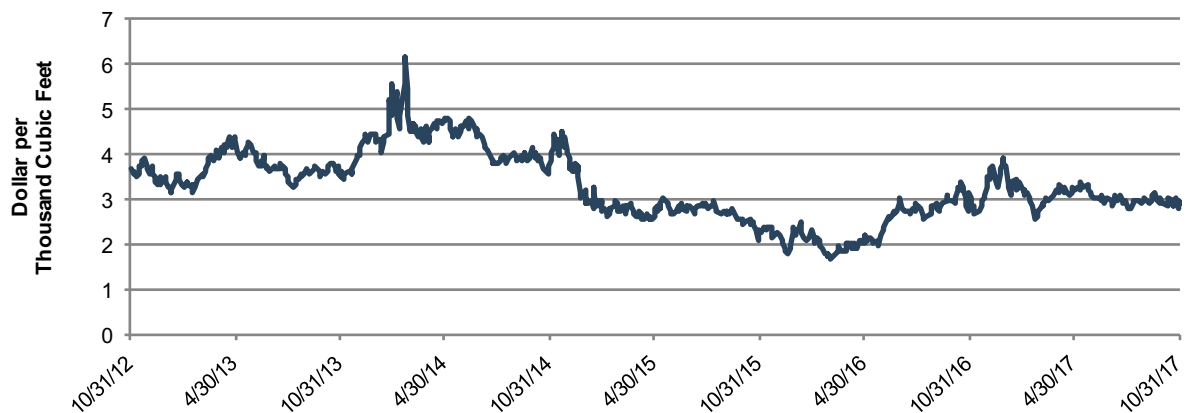
APPENDIX D

Commodity Prices

Crude Oil Spot Prices



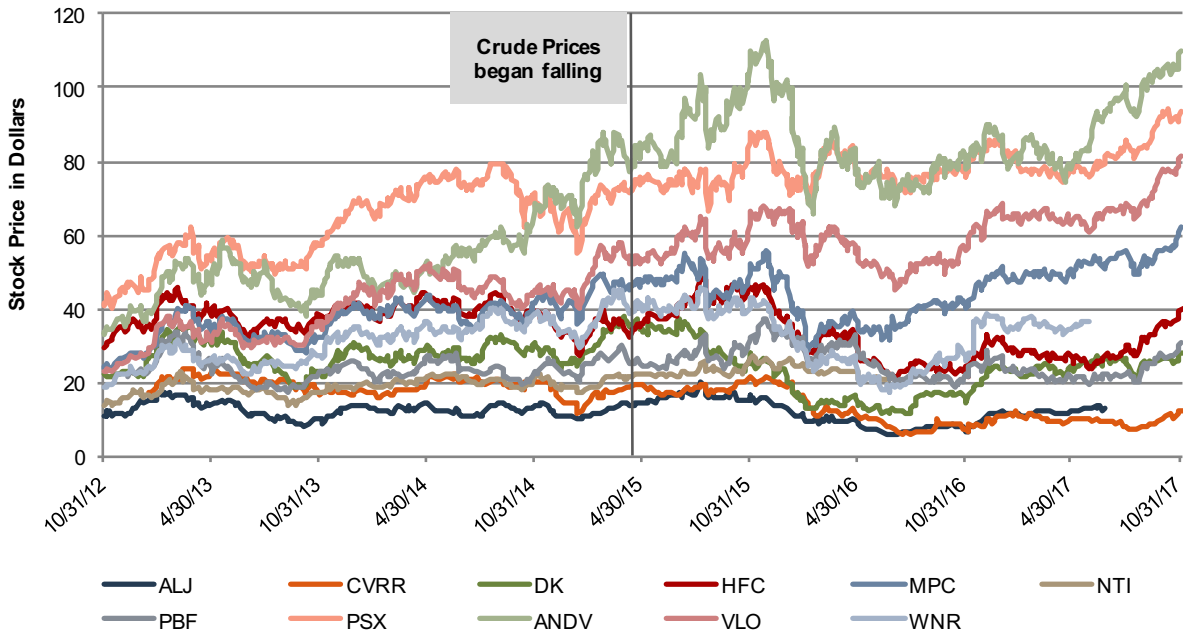
Henry Hub Natural Gas Spot Prices



APPENDIX E

Stock Performance

Stock Performance of Refining Companies



Source: Bloomberg