ENERGY LOGISTICS & DISTRIBUTION

Industry In-Sight™

SPRING / SUMMER 2019




JORDAN KNAUFF & COMPANY

ENERGY EQUIPMENT & INFRASTRUCTURE ALLIANCE

The Voice of the Energy Supply Chain

ENERGYBUILDERS

IN THIS REPORT

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All charts in this report are updated to the latest information available at the time of publication. Due to differing reporting dates for various data used throughout the report, all charts are not updated to the same ending period.

INTRODUCTION ... About This Report

We are pleased to offer this periodic report which provides a comprehensive compilation of energy information, insights and data. It aggregates critical planning and forecasting information from a myriad of sources into one resource for energy supply chain analysts and decision-makers.

The energy supply chain is an increasingly complex network of upstream, midstream and downstream providers of construction, equipment, materials and services. As shale gas-oil and renewable energy continue to expand in the U.S., additional infrastructure is needed to connect the new sources to the current network of pipelines, storage and transmission stations. Current and new members of the supply chain will need to expand in order to build and service the additional infrastructure.

We define the Energy Logistics & Distribution Industry as any energy production, transportation and storage activities that take place from the well-head to the refinery or gas processing plant through delivery to the end user. Industry members include: producers and distributors of oil and natural gas, natural gas liquids, refined fuels and propane; energy storage and pipeline operators; oil and gas field services; producers and distributors of lubricants, oils, greases and fluids; service contractors, capital equipment manufacturers; materials suppliers; as well as logistics, transportation and maintenance providers.

Segments covered in this Industry In-Sight™ include:

- Crude oil and refined products, natural gas, liquefied natural gas (LNG), natural gas liquids including propane and heating/fuel oil, as well as drilling activity.
- Renewables, including solar, wind, hydropower and ethanol.
- Logistics, including storage and terminals, pipelines, trucking, shipping and rail.
- Economic and financial data pertinent to the Energy Logistics & Distribution Industry.

It is our intention that this publication will provide value in the following areas:

- **Aggregate Information** – The Data Center provides comprehensive statistics on the Energy Logistics & Distribution Industry including, among others: prices (domestic and international), production, consumption, inventory, imports/exports, LNG terminals, drilling activity, solar and wind capacities, energy consumption by sector and source, tank and underground storage capacities and utilization, pipeline mileage and trucking conditions. In all, the report offers more than 70 individual charts covering these topics and more. All charts in this report are updated to the latest information available at the time of publication.
- **Input to Business Decisions** – As a relevant and informative reference for use when contemplating decisions that will have a meaningful impact on your business. Accordingly, we welcome any input, feedback and suggestions to help us include meaningful and timely topical content in future publications. We especially would like to receive suggestions for ideas on Hot Topics in the Energy Logistics & Distribution Industry.
- **Identification of Opportunities** – The breadth of information provided will enable owners and operators of energy logistics businesses to track developments in energy segments outside of their day-to-day focus.
- **Public and Transaction Comparables by Segment** – This section provides the tracking of a cross-section of publicly-traded companies and transactions in various segments of the Energy Logistics & Distribution Industry. The data include operating metrics, such as revenues and EBITDA (earnings before interest, taxes, depreciation and amortization); and valuation analyses such as total enterprise value / latest twelve months revenues and total enterprise value / latest twelve months EBITDA.

Thank you for taking the time to review this Energy Logistics & Distribution Industry In-Sight™. Our goal is to provide the most comprehensive and beneficial information possible. Please forward your feedback and suggestions to any member of the Jordan Knauff & Company or Energy Equipment and Infrastructure Alliance team members listed on the last two pages of this report.

INTRODUCTION

Who is the Energy Equipment & Infrastructure Alliance (EEIA)?

EEIA ... The Voice of the Energy Supply Chain

The energy supply chain is over 120,000 companies in sixty industries, annually contributing more than $170 billion to the U.S. economy, with hundreds of thousands of workers in communities throughout every state of the union. They provide construction, well services, capital equipment, supplies, logistics, professional services and technology in support of energy operations. They build energy infrastructure including production sites, transmission infrastructure, pipelines, storage facilities, processing plants and export terminals.

The shale energy revolution is transforming prosperity, security and quality of life in America. In a few short years, it has brought rising employment, income and opportunity to workers and businesses of all sizes and in all fifty states, often to communities that until recently have known limited prospects for growth. It has given Americans a cleaner environment, lower energy costs, renewed national competitiveness and energy security.

Creating a supportive public and policymaker environment for this miracle depends on active public engagement by energy supply chain stakeholders -- the non-oil and gas companies where energy-driven jobs and opportunities are greatest.

EEIA is that voice. We mobilize and lead the North American supply chain in pursuit of government policies that support full development of our energy resources, while protecting public health, safety and the environment. We also work for widespread public support for energy development.

The Energy Equipment & Infrastructure Alliance (EEIA) is active on all fronts: federal and state legislative, regulatory, judicial and public opinion. Our strength is based upon the supply chain's enormous fifty-state contributions to jobs, economic growth and community prosperity. We conduct economic research that measures and reports the facts about the energy supply chain's tremendous contributions to the American economy.

We are an organization of leading supply chain companies, trade associations and labor organizations. We are the voices of the businesses and workers of America's energy miracle.




INTRODUCTION

Who is Jordan Knauff & Company (JKC)?

JKC was founded in 2001 to undertake a distinct mission: to assemble and maintain a staff of top-notch investment banking personnel and offer their knowledge and experience to provide the best available investment banking services to middle-market companies, the entrepreneurs that lead them and the financial entities that transact with them. JKC has been active within the Energy Logistics & Distribution Industry as operators, investors, board members and investment bankers prior to the firm's founding in 2001.

On a combined basis, over the course of their careers our employees have completed over 200 transactions as investors, owners, operators, buyers, sellers and investment bankers of middle-market businesses across a variety of industries. The majority of our firm's broad transaction experience has been with private companies owned by one shareholder, a partnership, a family or private equity investors.

Experience has taught us that the owners and executives of middle-market businesses tend to have very different needs and goals in capital transactions from those that are common to capital events related to larger companies. Our personnel apply their considerable expertise to accomplish important goals: delivery of successful outcomes for our clients. Pursuant to that, we direct and manage all aspects of the capital transaction process, assist our clients with the management of important constituents (employees, customers, vendors and lenders), act as a teammate to other important client advisors (legal counsel, accountant, tax advisor) and collaborate with transaction counsel in the negotiations with the parties on the other side of the transaction.

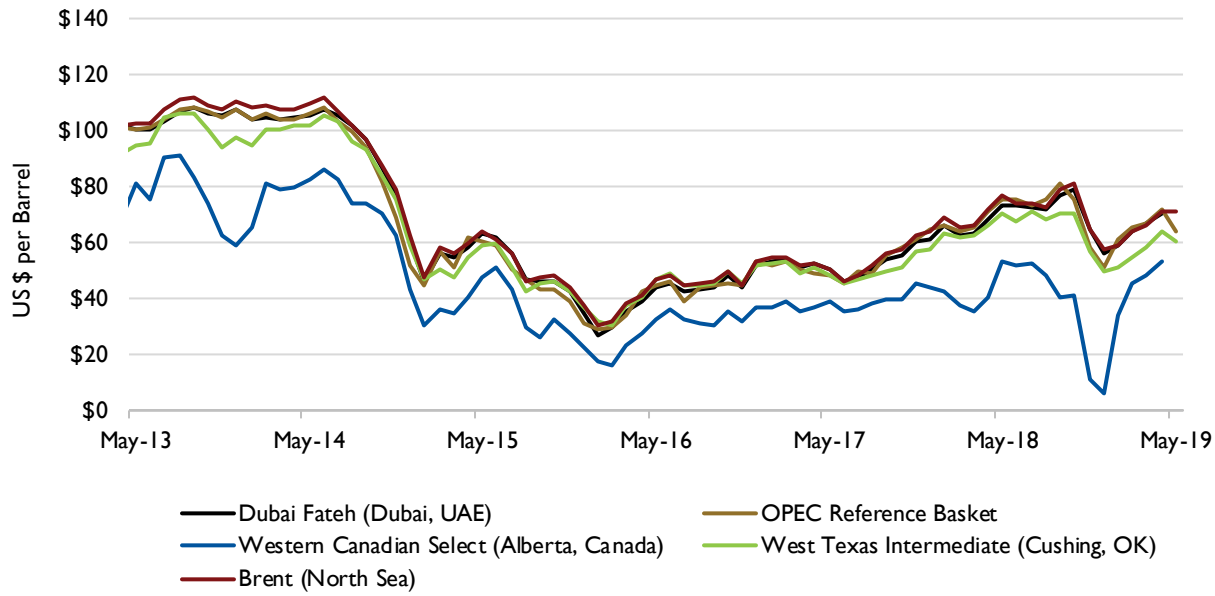
The Services We Provide

- Sell Companies: Generate a liquidity event on behalf of the owner(s) through whole, majority, or minority sale of assets, stock or units.
- Raise Capital: Representation of companies, management teams and entrepreneurs in the raising of senior debt, mezzanine debt or equity capital. Proceeds may be used for a variety of reasons, including, among others, recapitalizations, funding of growth, funding of acquisitions or liquidity for owners and investors.
- Acquisition Advisory: Assistance in sourcing and closing acquisitions -- whether it be a single transaction or a series of acquisitions as part of a consolidation strategy in an Industry Development Project™ (IDP) - a proprietary method for assisting private equity groups, companies or private investors that want to pursue multiple non-auction transactions within a single industry.
- Strategic Business Services: A suite of services for middle-market business owners and executives. Comprised of three components – Company Specific Valuation, Capital Road Map® and Strategic Industry Analysis – these services can be packaged together or used on an à la carte basis.

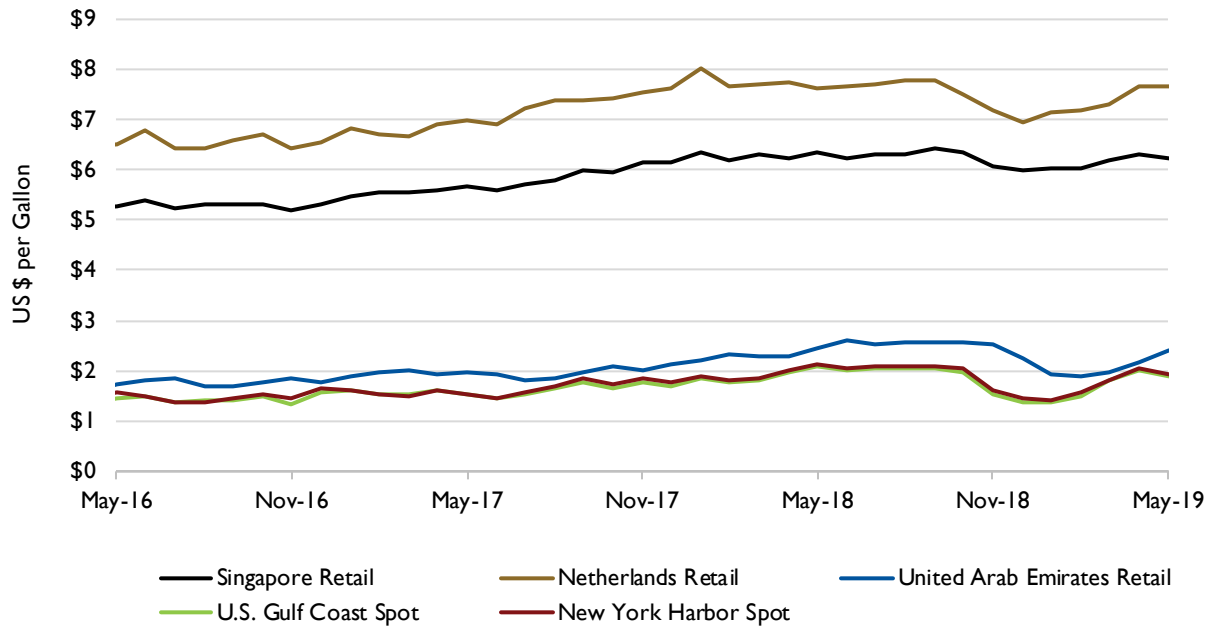
DATA CENTER

OIL

CRUDE OIL PRICES (MONTHLY AVERAGE) (1)



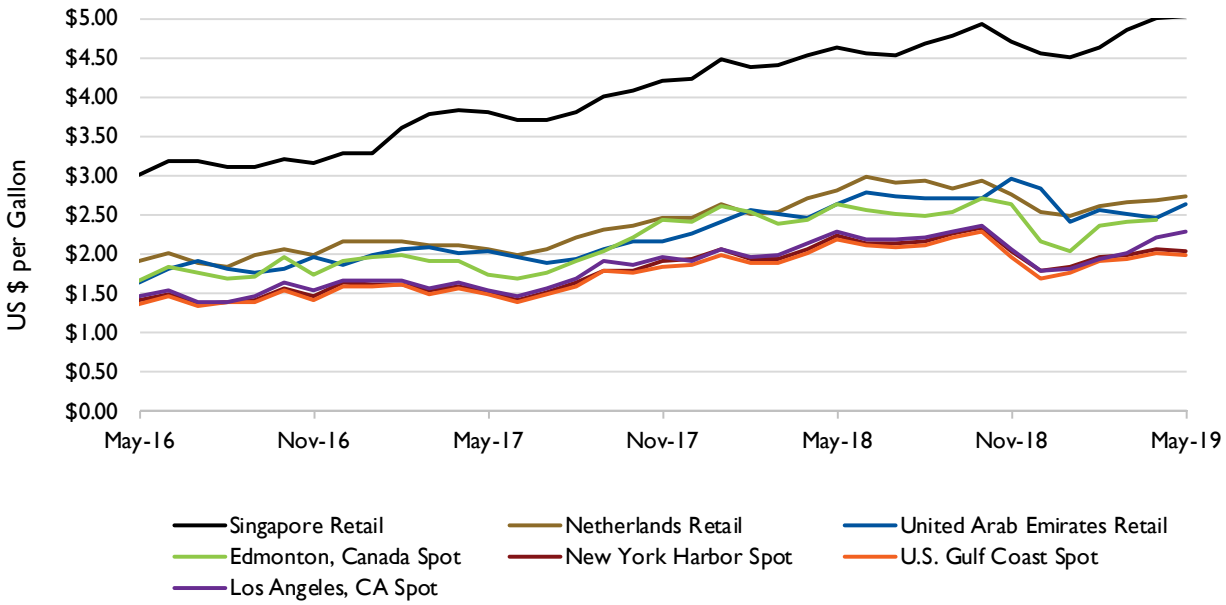
GASOLINE PRICES (MONTHLY AVERAGE) (2)



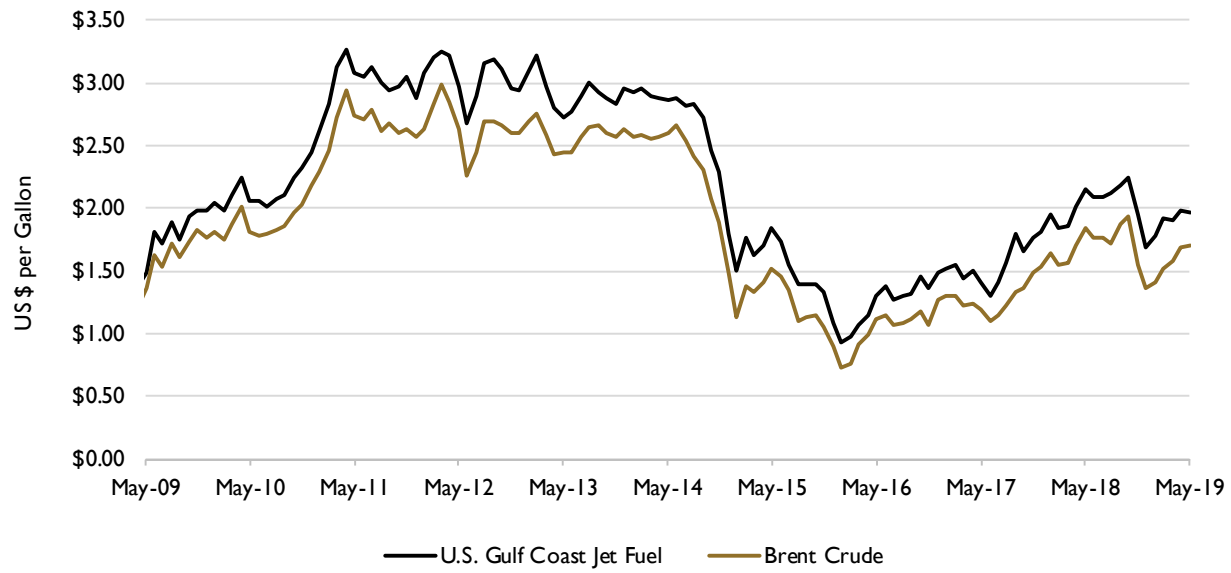
DATA CENTER

OIL

DIESEL PRICES (MONTHLY AVERAGE) (3)



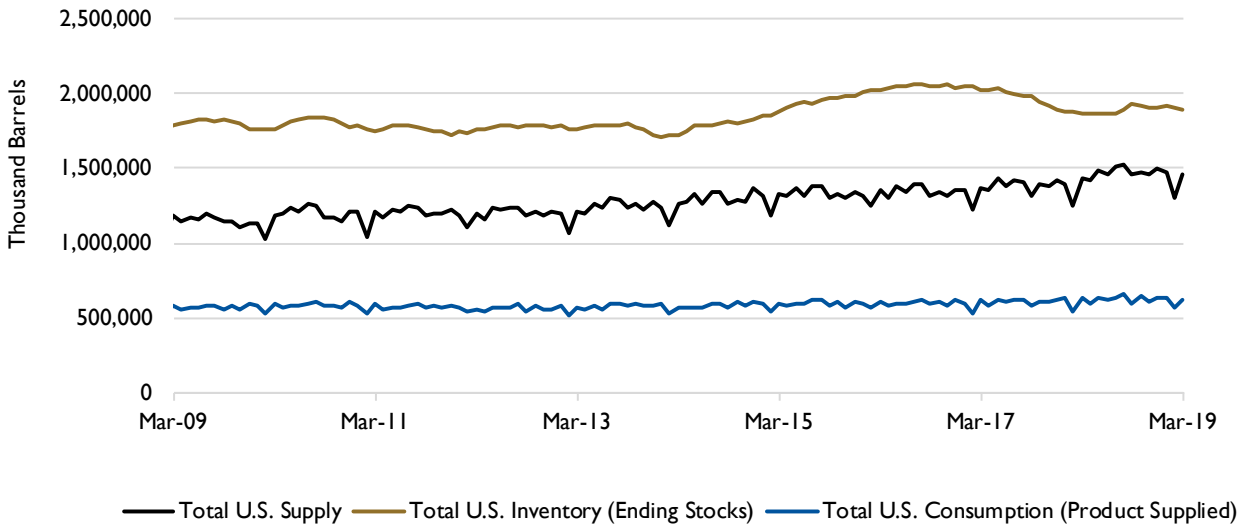
JET FUEL PRICES (MONTHLY AVERAGE) (4)



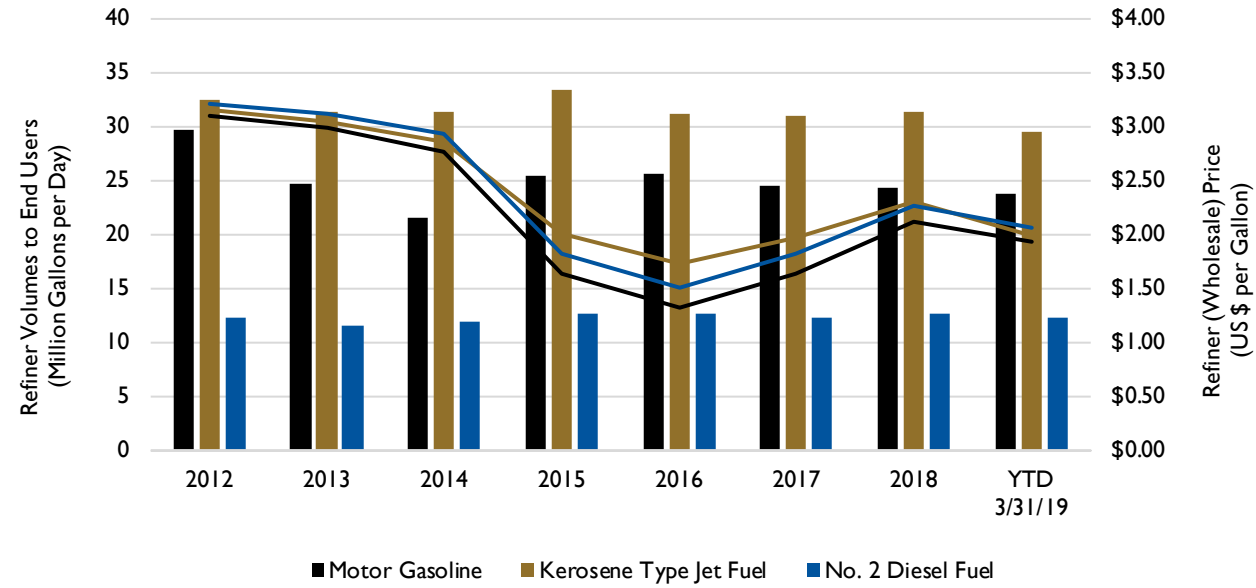
DATA CENTER

OIL

U.S. Crude Oil and Petroleum Products Supply, Inventory and Consumption (Monthly) (5)



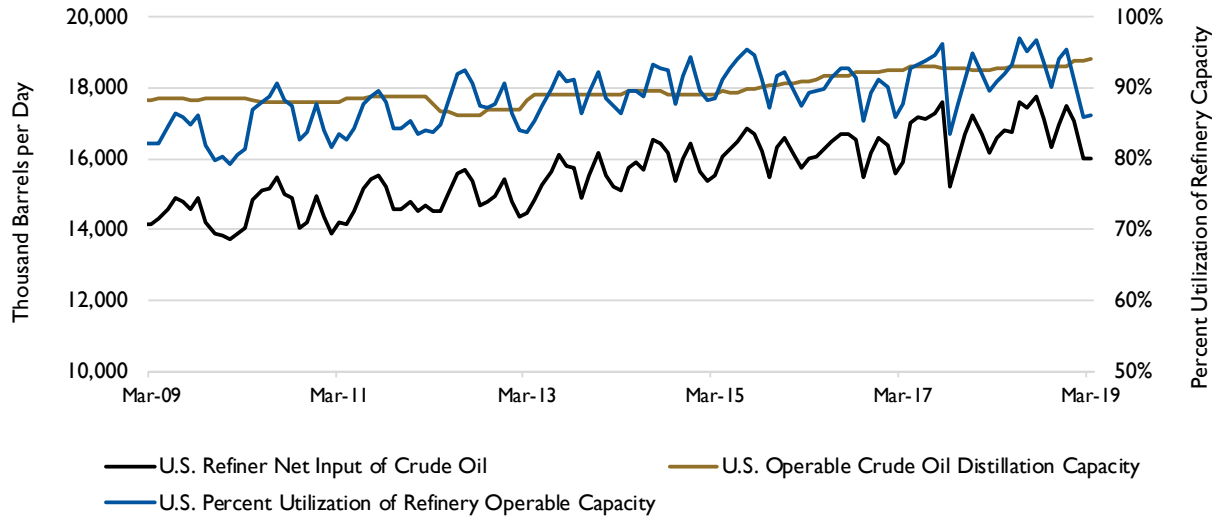
U.S. Refinery Volumes and Wholesale Prices of Petroleum Products (Annual Average) (6)



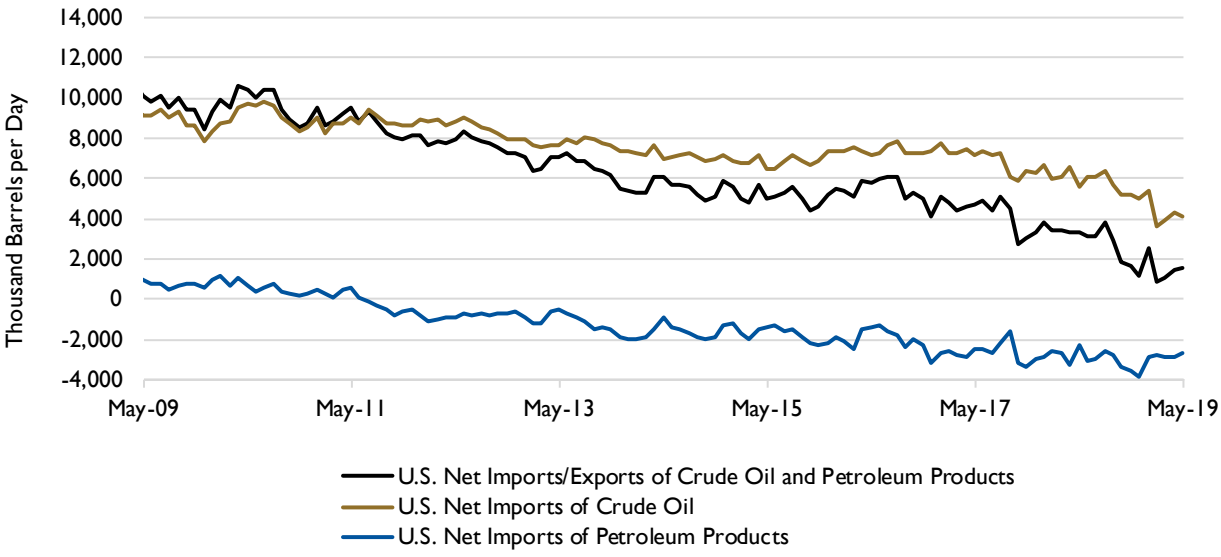
DATA CENTER

OIL

U.S. Crude Oil Refinery Input, Distillation Capacity and Refinery Utilization (Monthly Average) (7)



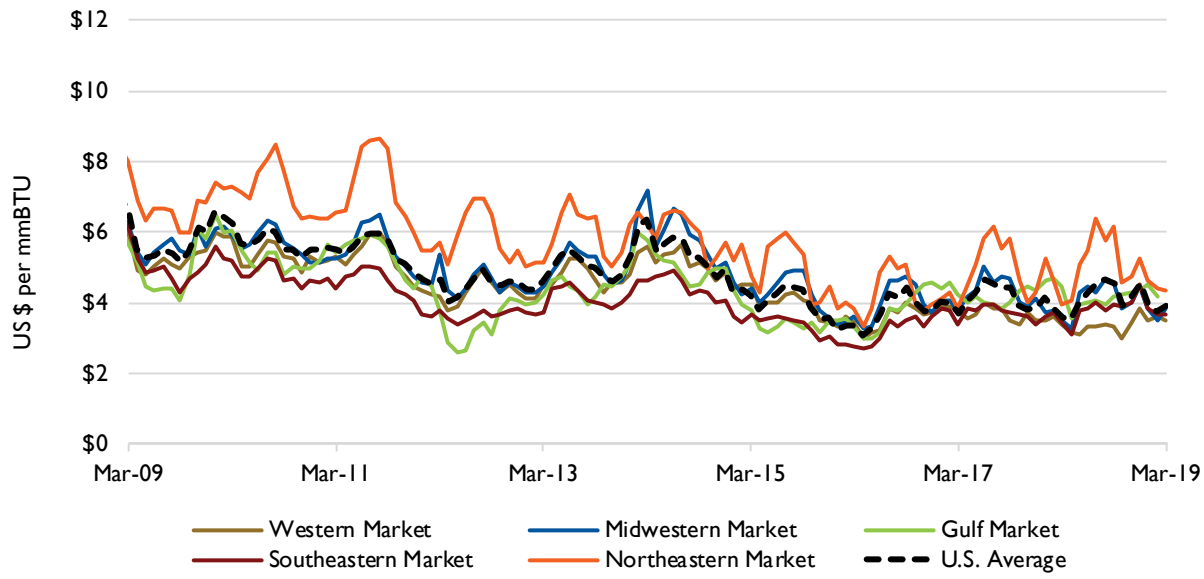
U.S. Crude Oil and Petroleum Products Imports and Exports (Monthly Average) (8)



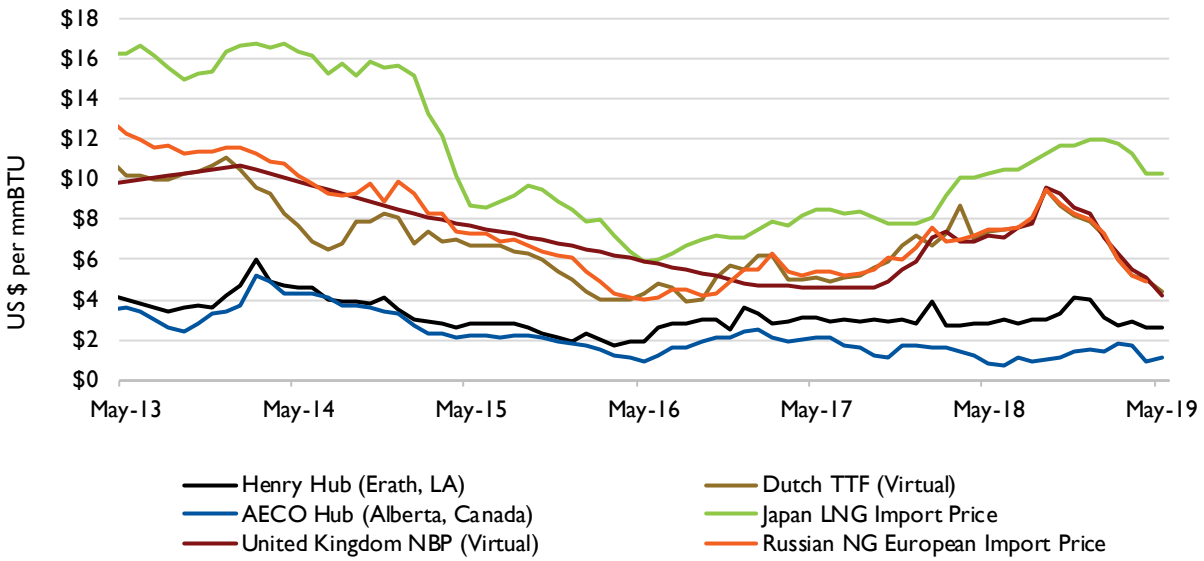
DATA CENTER

NATURAL GAS

DOMESTIC NATURAL GAS CITYGATE PRICES PER REGION (MONTHLY AVERAGE) (9)



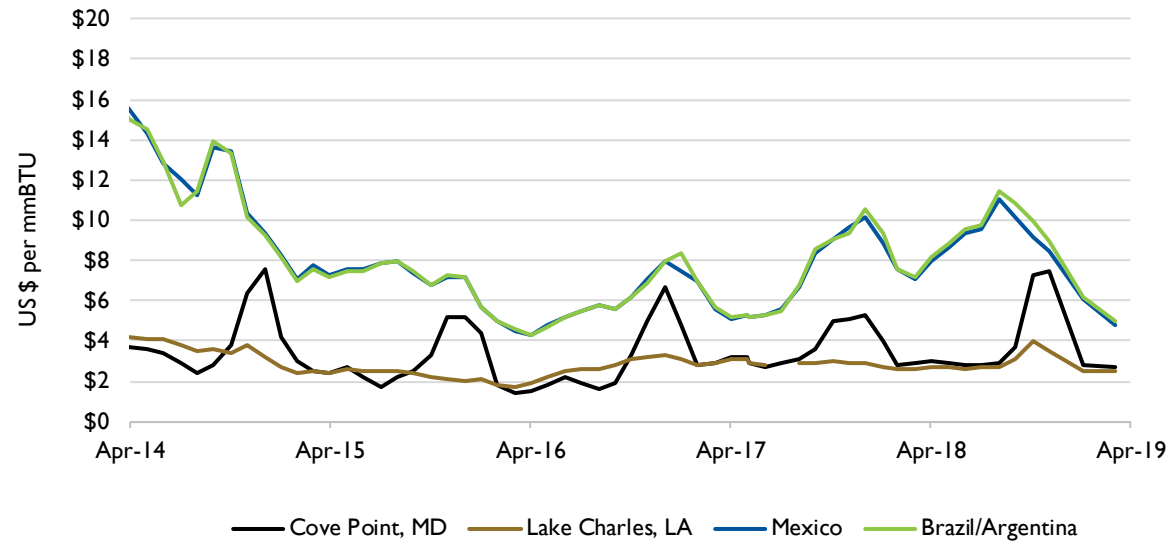
INTERNATIONAL NATURAL GAS PRICES (MONTHLY AVERAGE) (10)



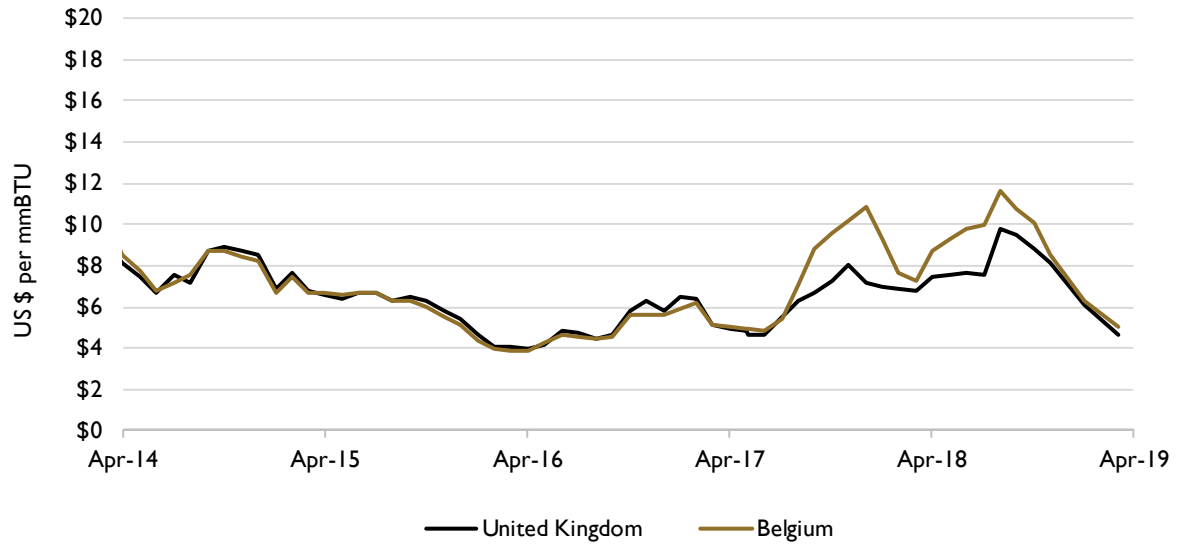
DATA CENTER

NATURAL GAS

AMERICAS LIQUEFIED NATURAL GAS PRICES (MONTHLY AVERAGE) (11)



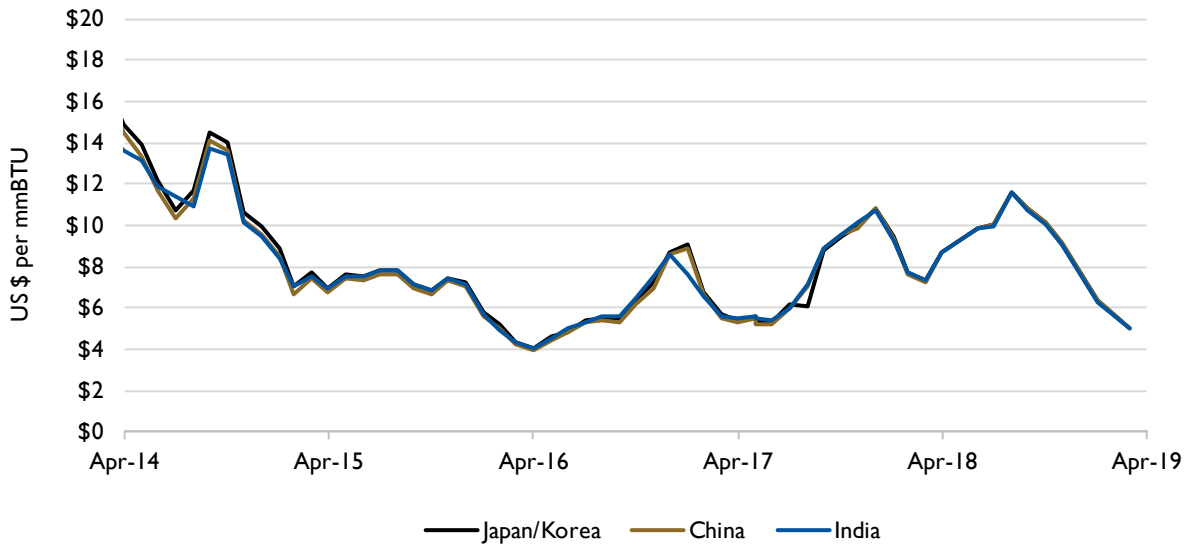
WESTERN EUROPE LIQUEFIED NATURAL GAS PRICES (MONTHLY AVERAGE) (12)



DATA CENTER

NATURAL GAS

ASIA LIQUEFIED NATURAL GAS PRICES (MONTHLY AVERAGE) (13)

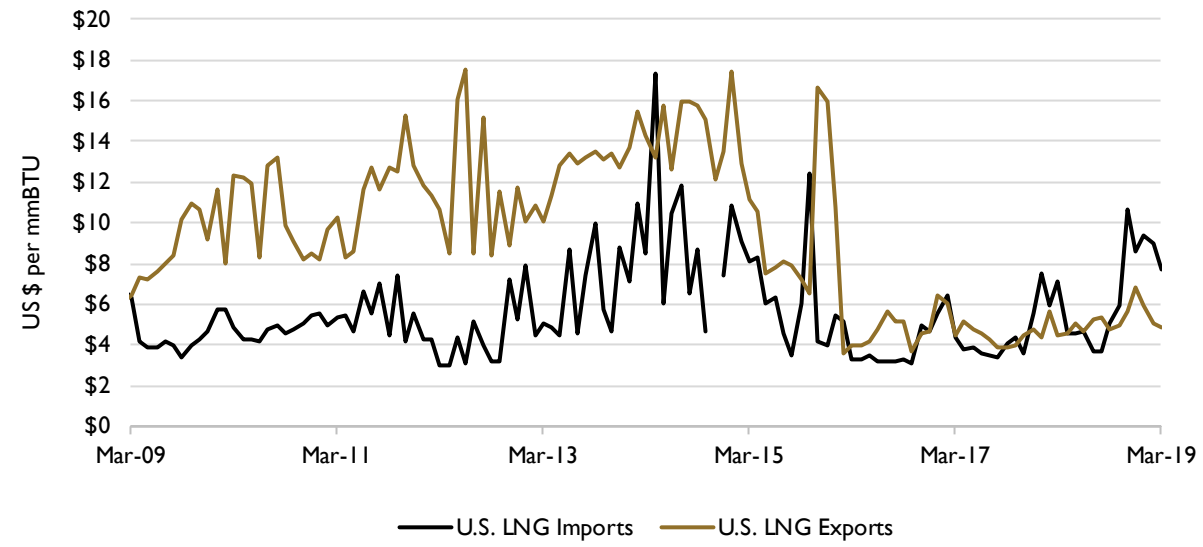


WORLD LIQUEFIED NATURAL GAS PRICES MAP (MONTHLY AVERAGE) (14)

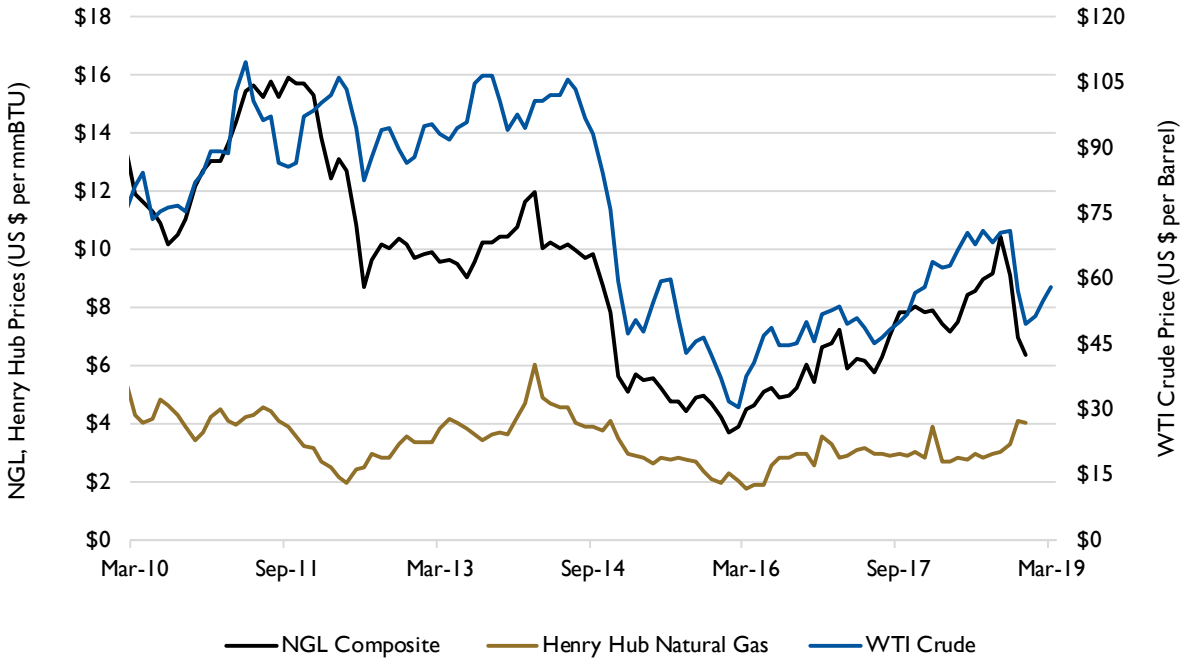
DATA CENTER

NATURAL GAS

U.S. IMPORT / EXPORT LIQUEFIED NATURAL GAS PRICES (MONTHLY AVERAGE) (15)



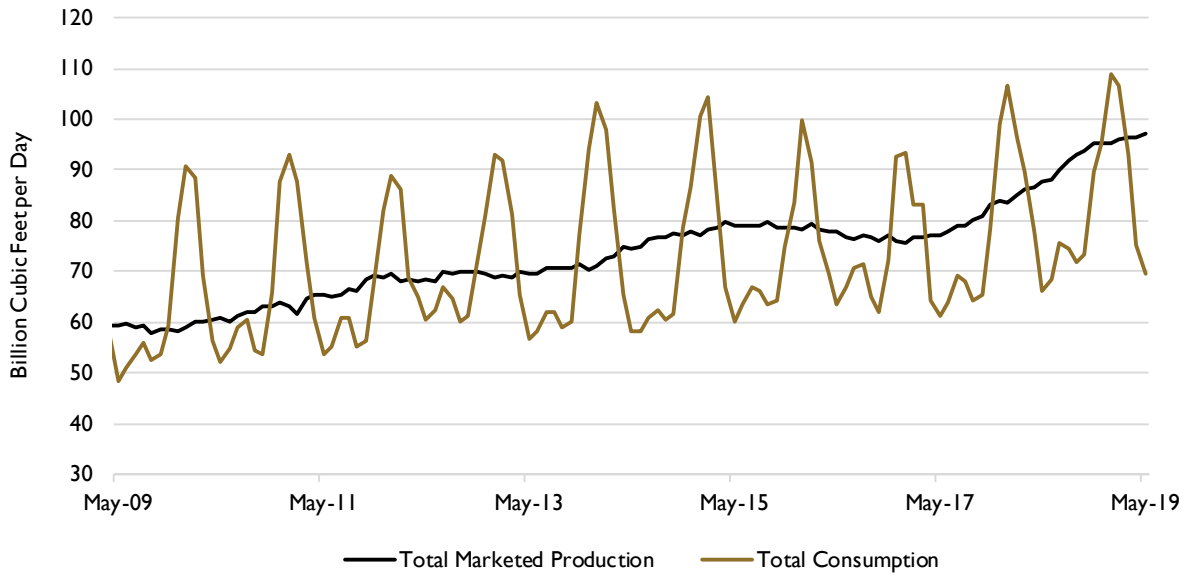
NATURAL GAS PLANT LIQUIDS PRICES (MONTHLY AVERAGE) (16)



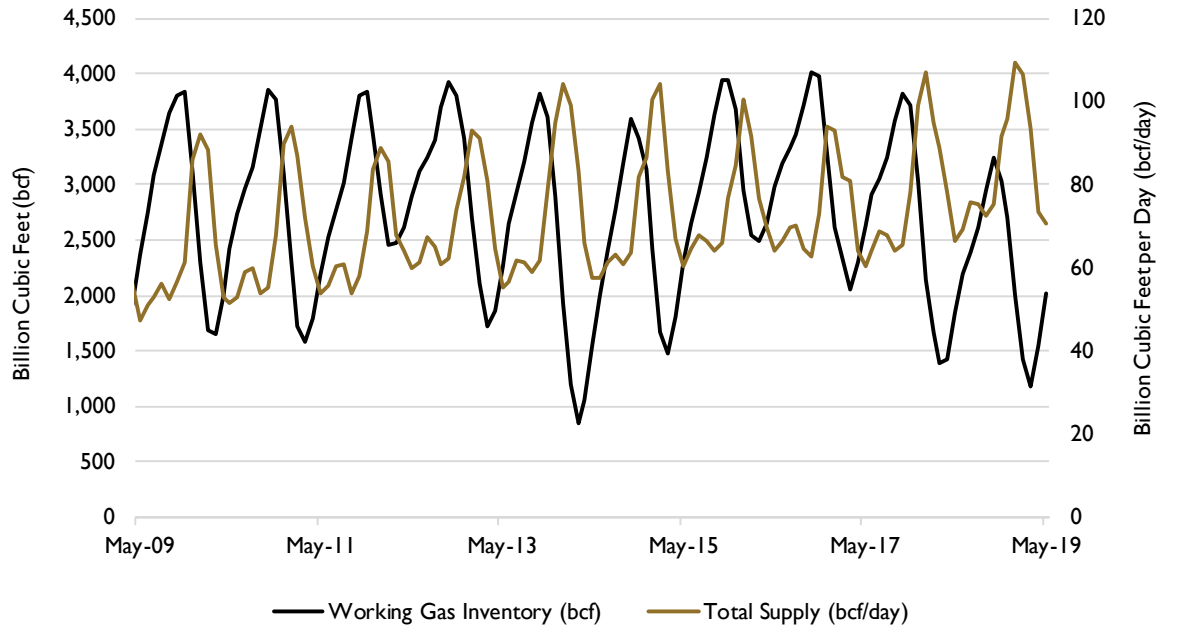
DATA CENTER

NATURAL GAS

U.S. Natural Gas Production and Consumption (Monthly) (17)



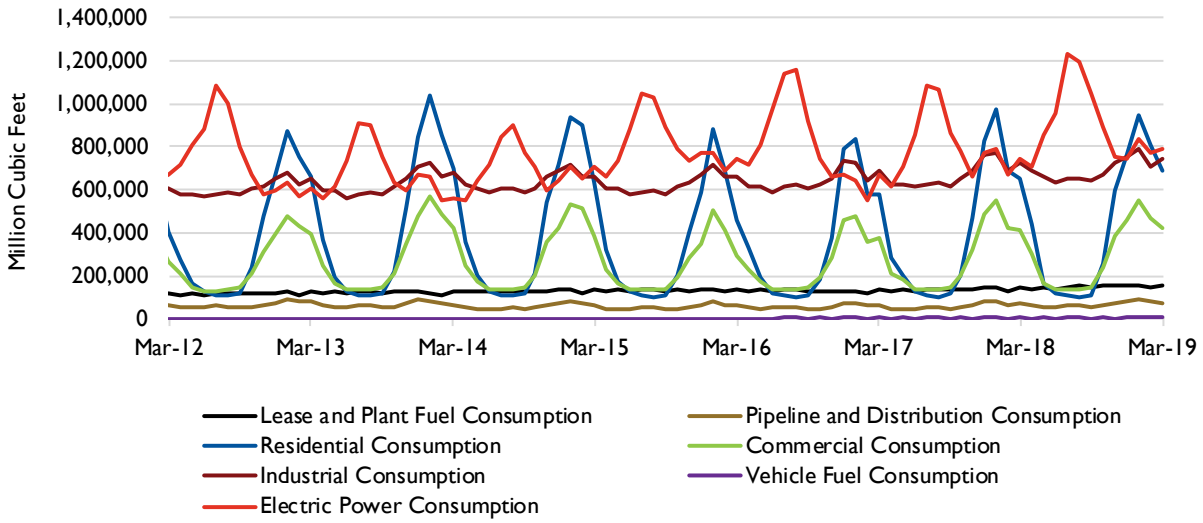
U.S. Natural Gas Supply and Inventory (Monthly) (18)



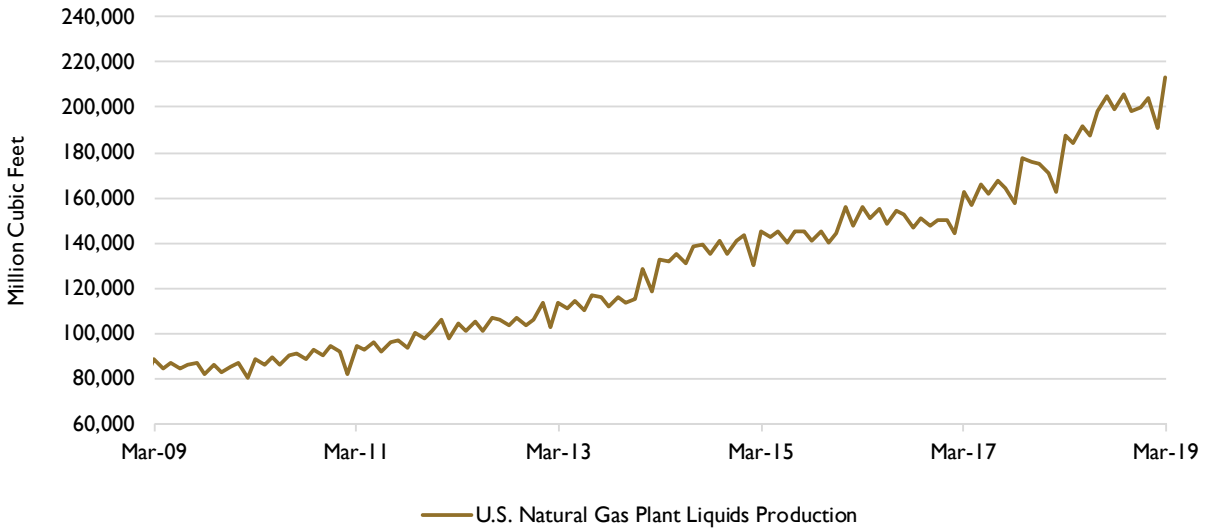
DATA CENTER

NATURAL GAS

U.S. NATURAL GAS CONSUMPTION BY END USE (MONTHLY) (19)



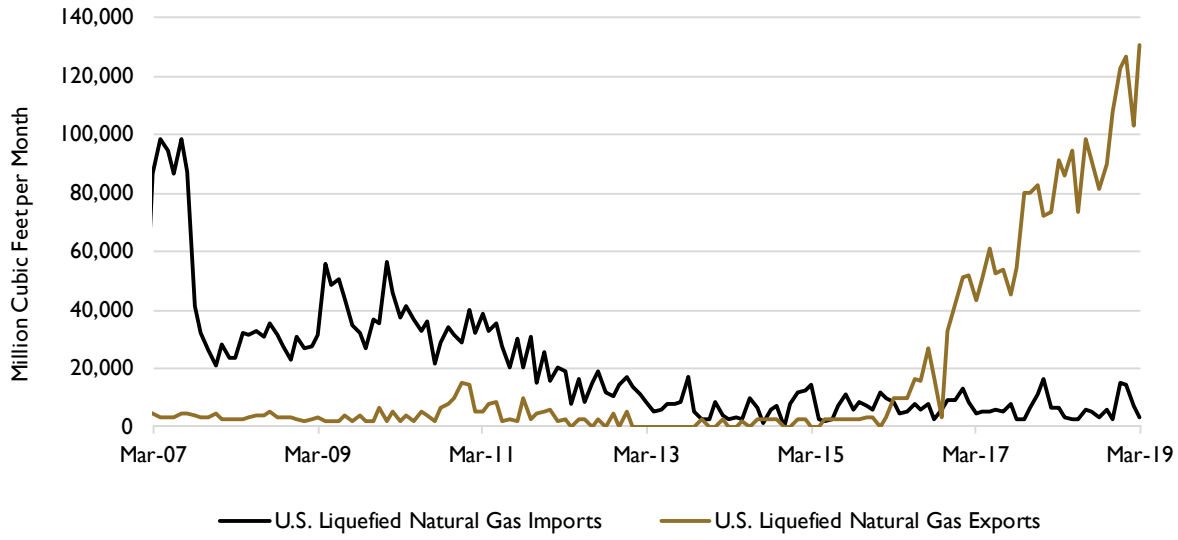
U.S. NATURAL GAS PLANT LIQUIDS PRODUCTION (MONTHLY) (20)



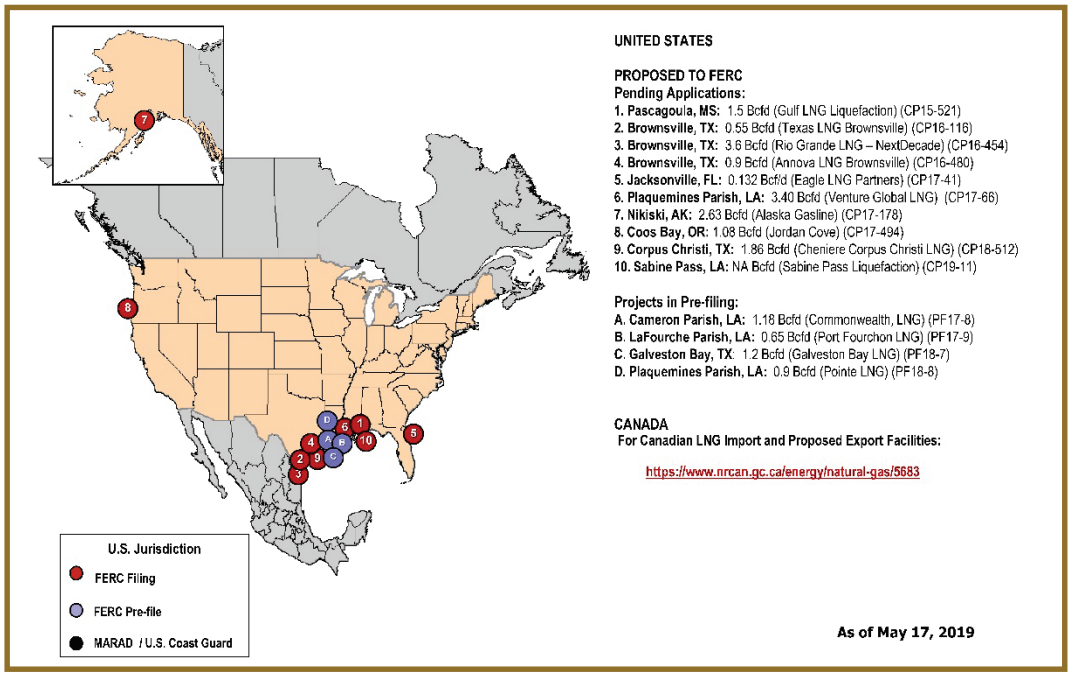
DATA CENTER

NATURAL GAS

U.S. LIQUEFIED NATURAL GAS IMPORT AND EXPORT VOLUMES (MONTHLY) (21)



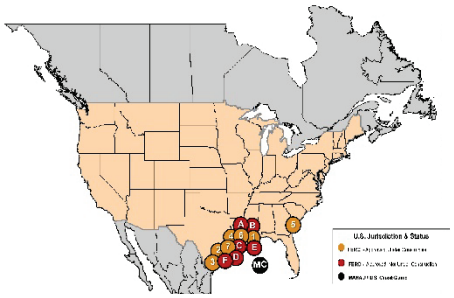
NORTH AMERICAN LNG EXPORT TERMINALS – *PROPOSED* (22)



DATA CENTER

NATURAL GAS

NORTH AMERICAN LNG IMPORT/EXPORT TERMINALS – *APPROVED* (23)



Import Terminals (Not Shown on Map)

UNITED STATES

APPROVED - UNDER CONSTRUCTION - FERC
None

APPROVED – NOT UNDER CONSTRUCTION – FERC
1. **Corpus Christi, TX:** 0.4 Bcfd (Cheniere – Corpus Christi LNG) (CP12-507)

APPROVED - NOT UNDER CONSTRUCTION - MARAD/Coast Guard
2. **Gulf of Mexico:** 1.0 Bcfd (Main Pass Energy Hub)
3. **Gulf of Mexico:** 1.4 Bcfd (TORP Technology-Bienville LNG)

CANADA
For Canadian LNG Import and Proposed Export Facilities go to:

https://www.nrcan.gc.ca/energy/natural-gas/5683

★ Trains 2 & 3

Export Terminals (Shown on Map)

UNITED STATES

APPROVED - UNDER CONSTRUCTION - FERC
1. **Hackberry, LA:** 2.1 Bcfd (Sempra–Cameron LNG) (CP13-25)
2. **Freeport, TX:** 2.14 Bcfd (Freeport LNG Dev/Freeport LNG Expansion/FLNG Liquefaction) (CP12-509) (CP15-518)
3. **Corpus Christi, TX:** 1.4 Bcfd (Cheniere – Corpus Christi LNG) (CP12-507)★
4. **Sabine Pass, LA:** 0.7 Bcfd Train 6 (Sabine Pass Liquefaction) (CP13-552)
5. **Elba Island, GA:** 0.35 Bcfd (Southern LNG Company) (CP14-103)
6. **Cameron Parish, LA:** 1.41 Bcfd (Venture Global Calcasieu Pass) (CP15-550)
7. **Sabine Pass, TX:** 2.1 Bcfd (ExxonMobil – Golden Pass) (CP14-517)

APPROVED – NOT UNDER CONSTRUCTION - FERC
A. **Lake Charles, LA:** 2.2 Bcfd (Southern Union – Lake Charles LNG) (CP14-120)
B. **Lake Charles, LA:** 1.08 Bcfd (Magnolia LNG) (CP14-347)
C. **Hackberry, LA:** 1.41 Bcfd (Sempra - Cameron LNG) (CP15-560)
D. **Port Arthur, TX:** 1.86 Bcfd (Port Arthur LNG) (CP17-20)
E. **Calcasieu Parish, LA:** 4.0 Bcfd (Driftwood LNG) (CP17-117)
F. **Freeport, TX:** 0.72 Bcfd (Freeport LNG Dev) (CP17-470)

APPROVED – NOT UNDER CONSTRUCTION – MARAD/Coast Guard
MC. **Gulf of Mexico:** 1.8 Bcfd (Delfin LNG)

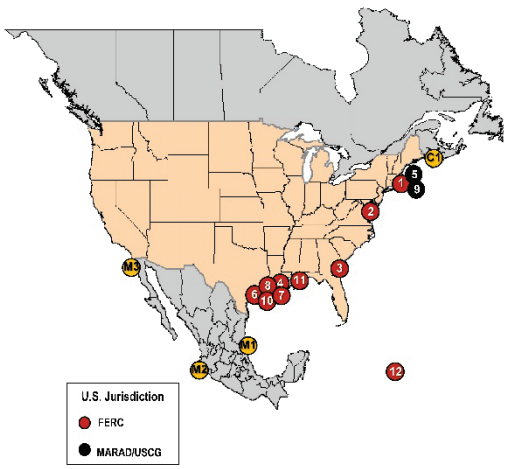
CANADA
For Canadian LNG Import and Proposed Export Facilities go to:

https://www.nrcan.gc.ca/energy/natural-gas/5683

★ Trains 2 & 3

As of May 8, 2019

NORTH AMERICAN LNG IMPORT/EXPORT TERMINALS – *EXISTING* (24)



As of May 8, 2019

Import Terminals (Shown on Map)

UNITED STATES
1. **Everett, MA:** 1.035 Bcfd (GDF SUEZ - DOMAC)
2. **Cove Point, MD:** 1.8 Bcfd (Dominion - Cove Point LNG)
3. **Elba Island, GA:** 1.6 Bcfd (El Paso - Southern LNG)
4. **Lake Charles, LA:** 2.1 Bcfd (Southern Union – Corpus Christi LNG) ★
5. **Offshore MA:** 0.8 Bcfd (Excelerate Energy – Northeast Gateway)
6. **Freeport, TX:** 1.5 Bcfd (Cheniere/Freeport LNG Dev.) ★
7. **Sabine, LA:** 4.0 Bcfd (Cheniere/Sabine Pass LNG) ★
8. **Hackberry, LA:** 1.8 Bcfd (Sempra - Cameron LNG)
9. **Offshore MA:** 0.4 Bcfd (GDF SUEZ – Neptune LNG)
10. **Sabine Pass, TX:** 2.0 Bcfd (ExxonMobil – Golden Pass) (Phase I & II)
11. **Pascagoula, MS:** 1.5 Bcfd (El Paso/Crest/Sonangol - Gulf LNG Energy)
12. **Peñuelas, PR:** 0.3 Bcfd (EcoElectrica)

CANADA
C1. **Saint John, NB:** 1.0 Bcfd (Repsol/Fort Reliance - Canaport LNG)

MEXICO
M1. **Altamira, Tamulipas:** 0.7 Bcfd (Shell/Total/Mitsui – Altamira LNG)
M2. **Baja California, MX:** 1.0 Bcfd (Sempra – Energia Costa Azul)
M3. **Manzanillo, MX:** 0.5 Bcfd (KMS GNL de Manzanillo)

★ Authorized to re-export delivered LNG

Export Terminals (Not Shown on Map)

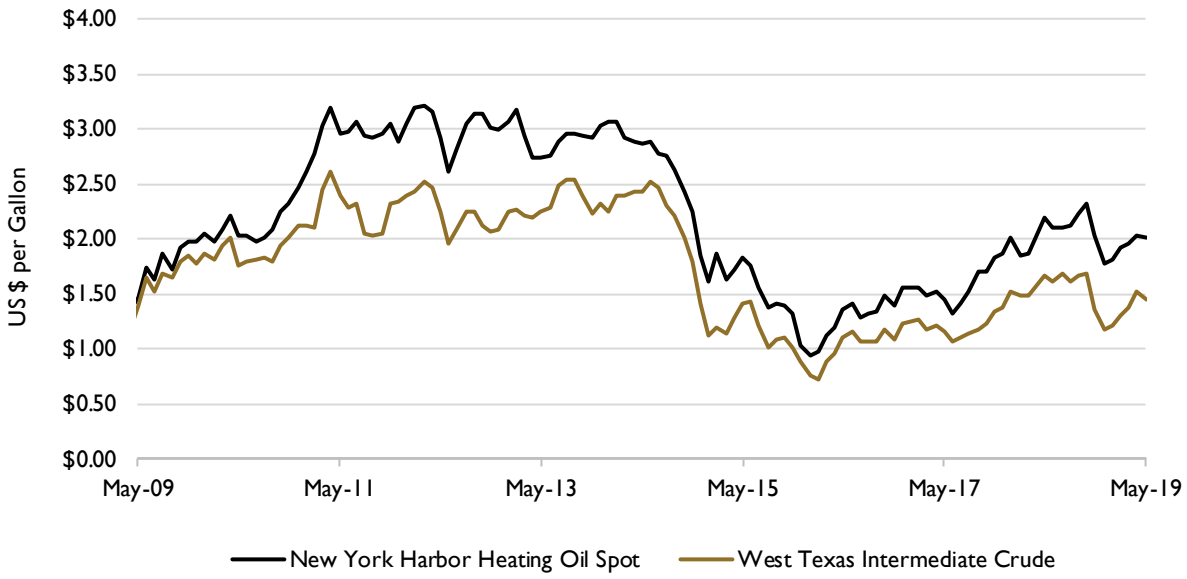
UNITED STATES

1. **Kenai, AK:** 0.2 Bcfd (ConocoPhillips)
2. **Sabine, LA:** 3.5 Bcfd (Cheniere/Sabine Pass LNG – Trains 1-5)
3. **Cove Point, MD:** 0.82 Bcfd (Dominion–Cove Point LNG)
4. **Corpus Christi, TX:** 0.71 Bcfd (Cheniere – Corpus Christi LNG Train 1)

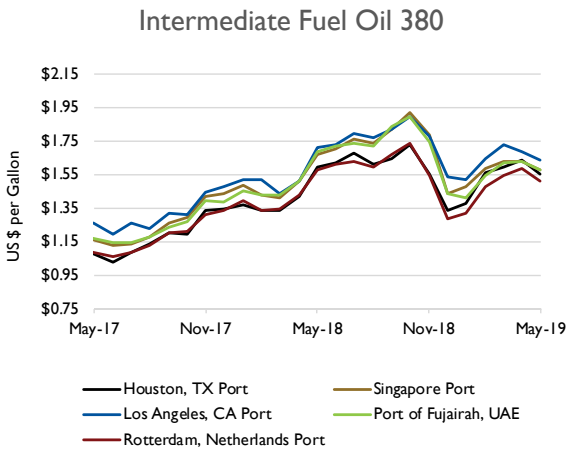
DATA CENTER

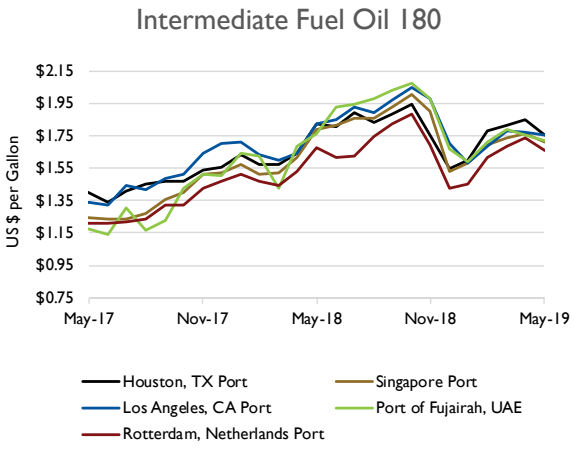
PROPANE AND HEATING/FUEL OIL

HEATING OIL PRICES (MONTHLY AVERAGE) (25)



INTERMEDIATE FUEL OIL AKA "BUNKER FUEL" PRICES (MONTHLY AVERAGE) (26)

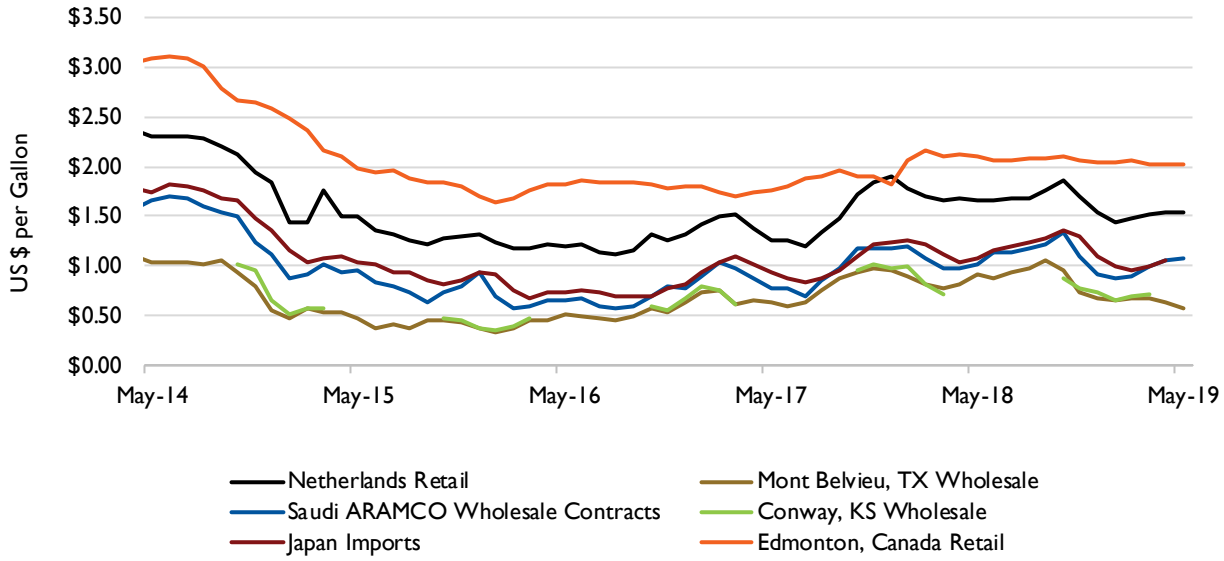




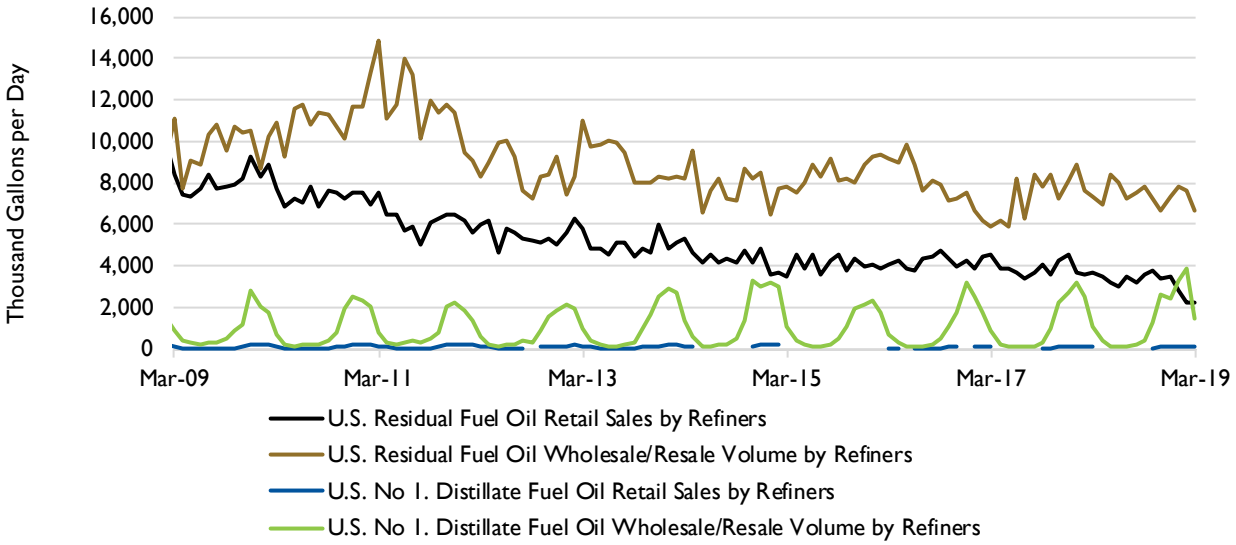
DATA CENTER

PROPANE AND HEATING/FUEL OIL

PROPANE PRICES (MONTHLY AVERAGE) (27)



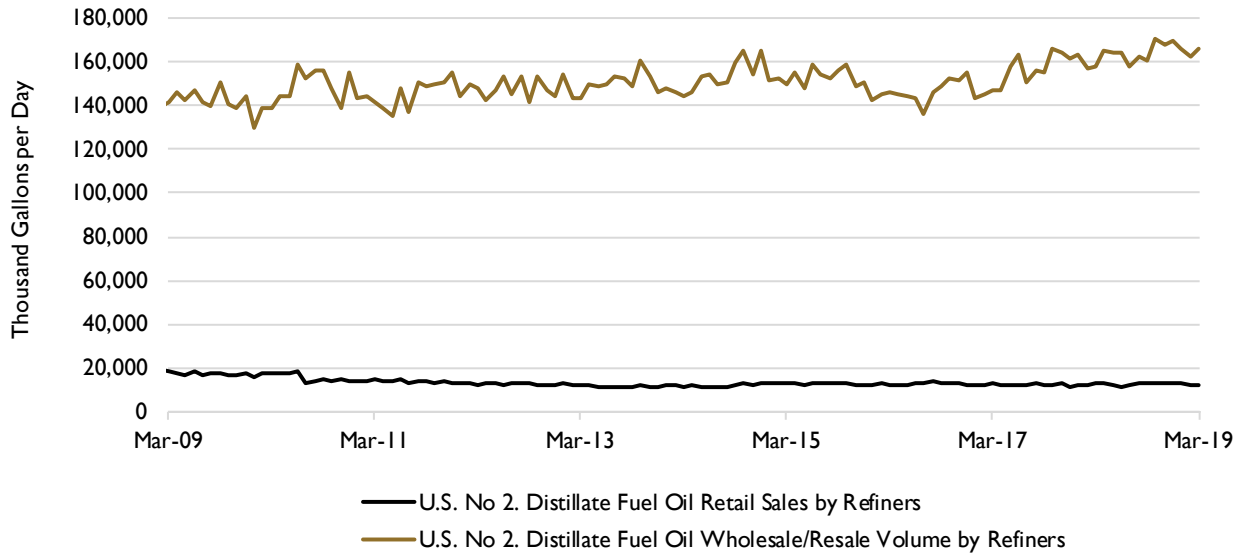
NO. 1 DISTILLATE FUEL OIL, RESIDUAL FUEL OIL WHOLESALE, RETAIL SALES VOLUME BY REFINERS (MONTHLY) (28)



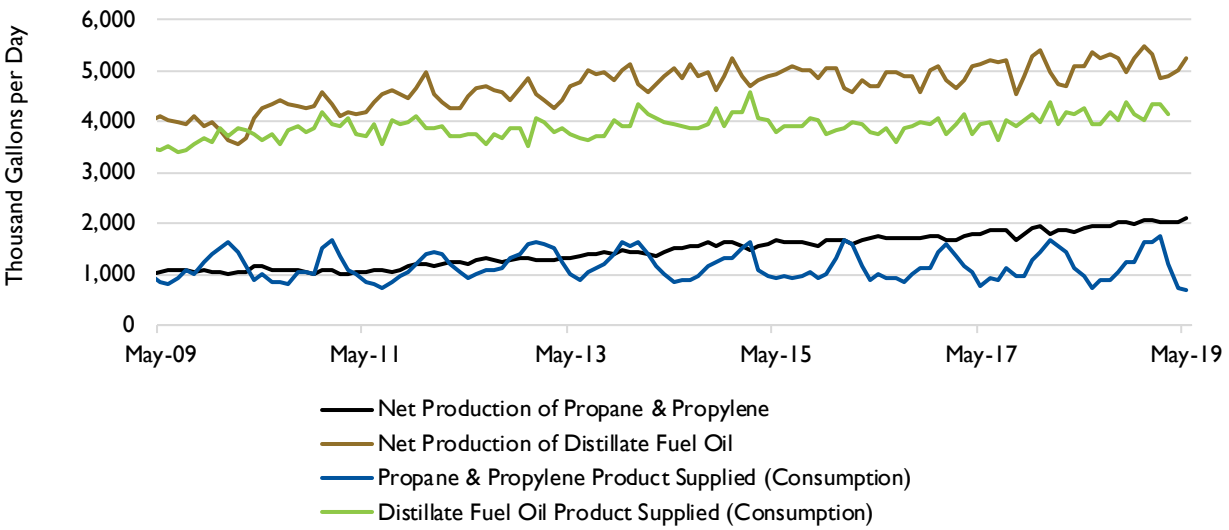
DATA CENTER

PROPANE AND HEATING/FUEL OIL

No. 2 Distillate Fuel Oil Wholesale, Retail Sales Volume by Refiners (Monthly) (29)



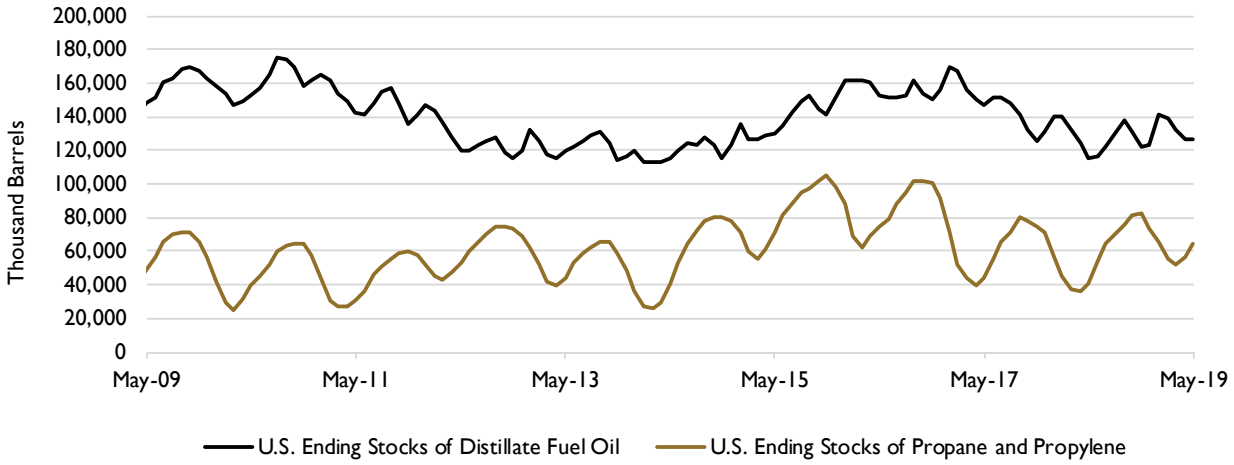
Propane & Propylene and Distillate Fuel Oil Production and Consumption (Monthly) (30)



DATA CENTER

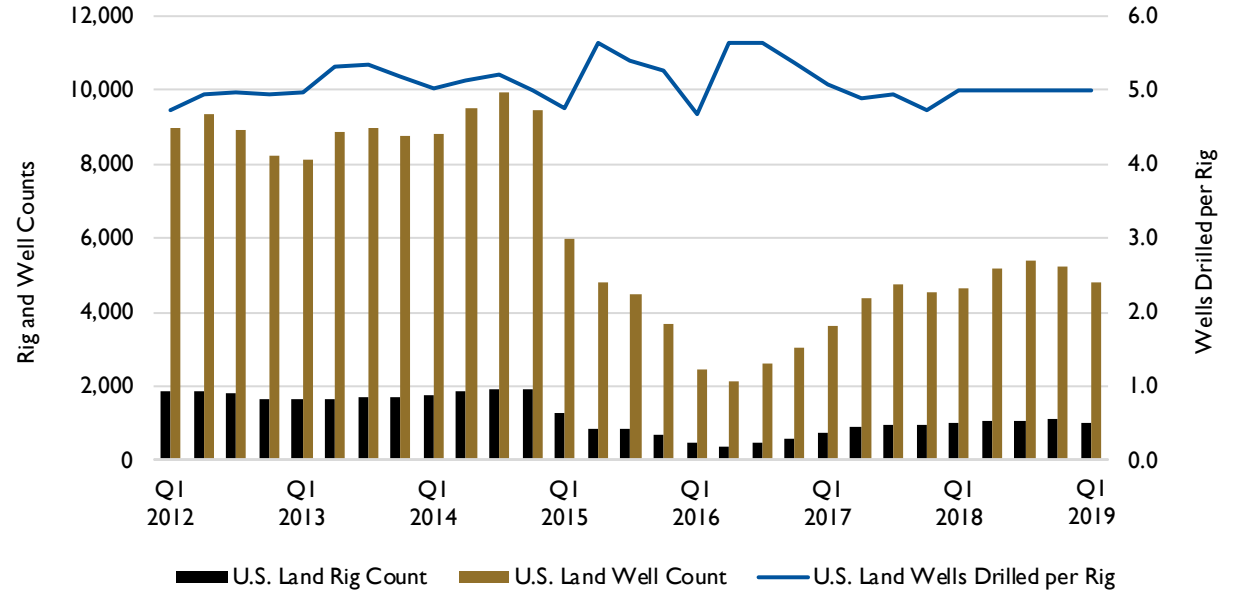
PROPANE AND HEATING/FUEL OIL

U.S. Ending Stocks of Propane & Propylene and Distillate Fuel Oil (Monthly Average) (31)



DRILLING ACTIVITY

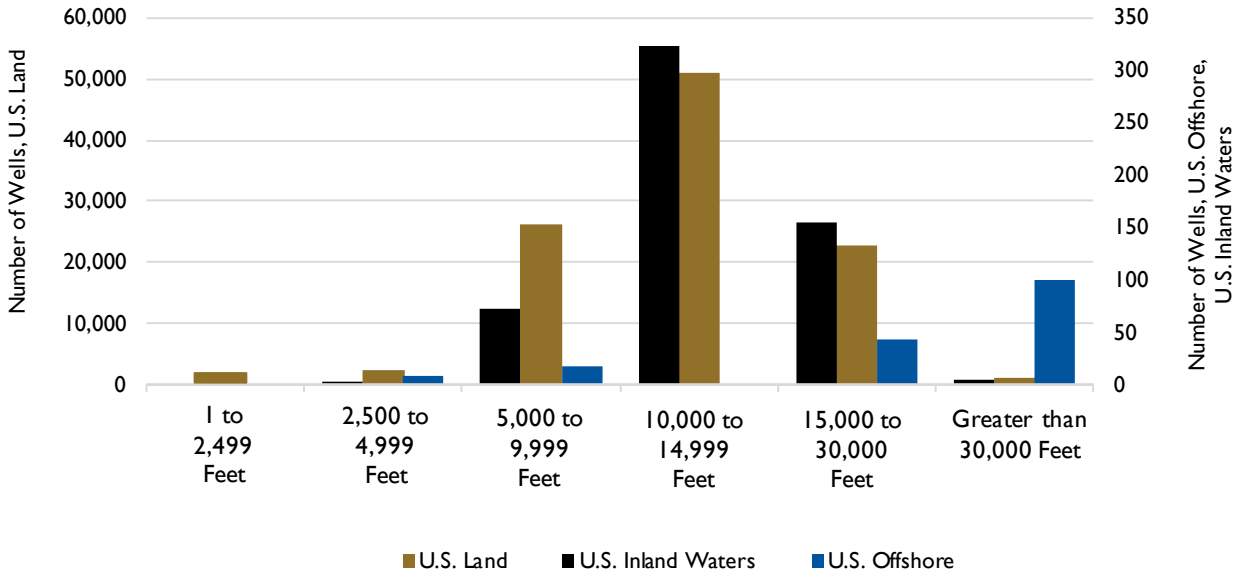
U.S. Land Well Count, Rig Count and Wells per Rig (Quarterly) (32)



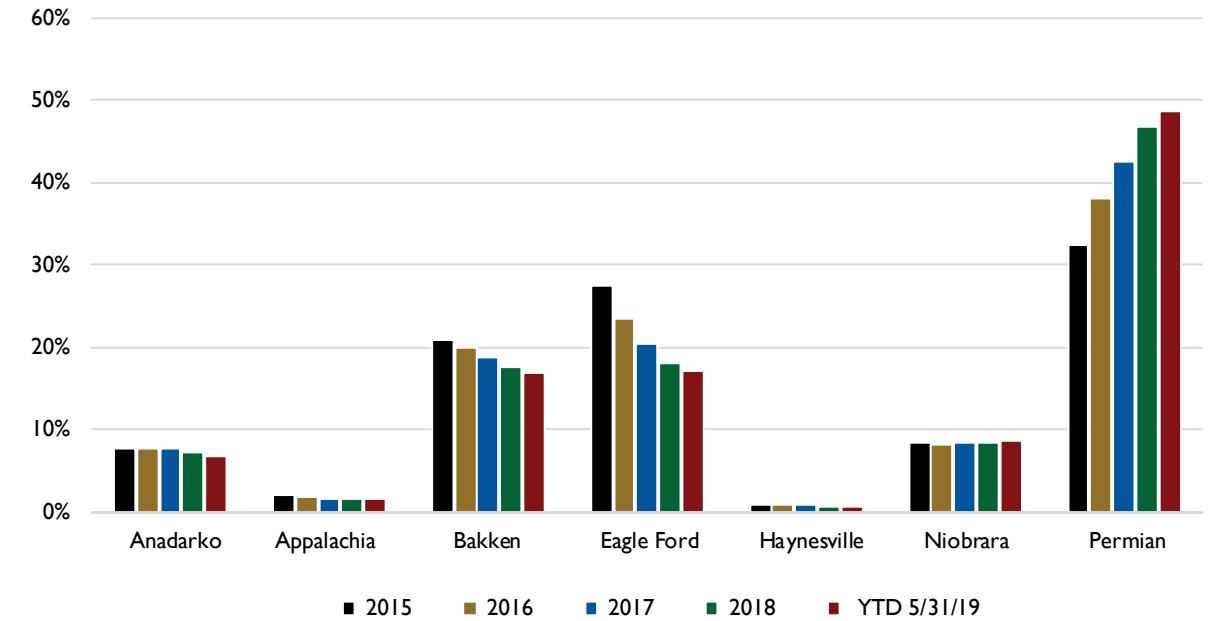
DATA CENTER

DRILLING ACTIVITY

U.S. WELL STARTS BY DEPTH (YEAR TO DATE MAY 31, 2019) (33)



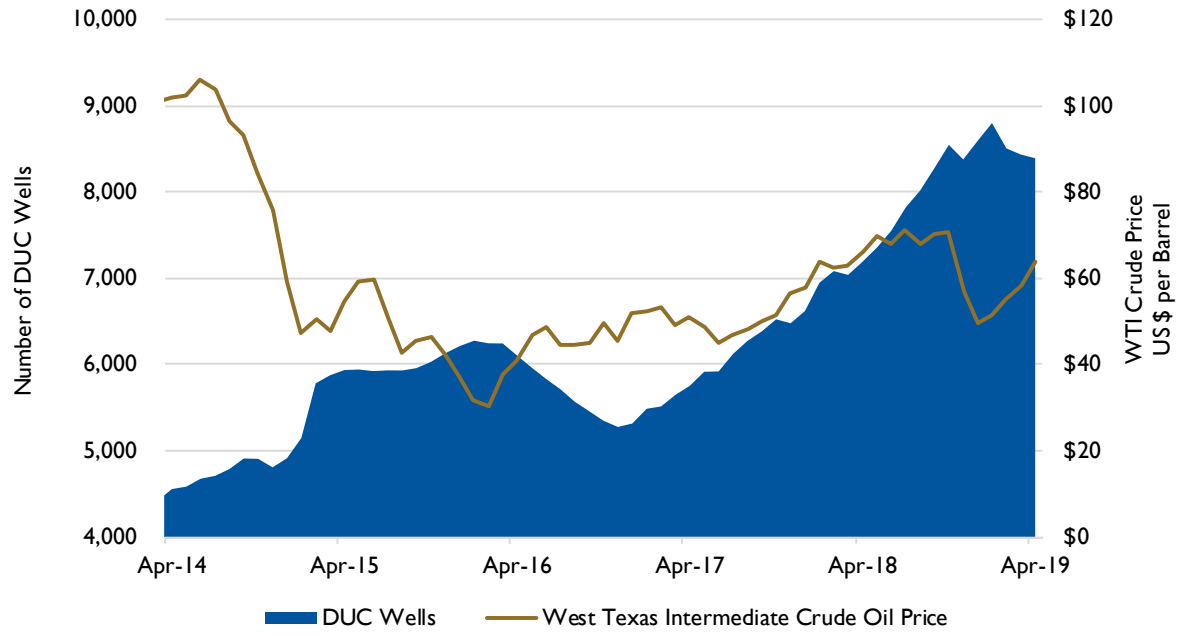
PERCENTAGE OF CRUDE OIL PRODUCTION PER SHALE REGION (MONTHLY) (34)



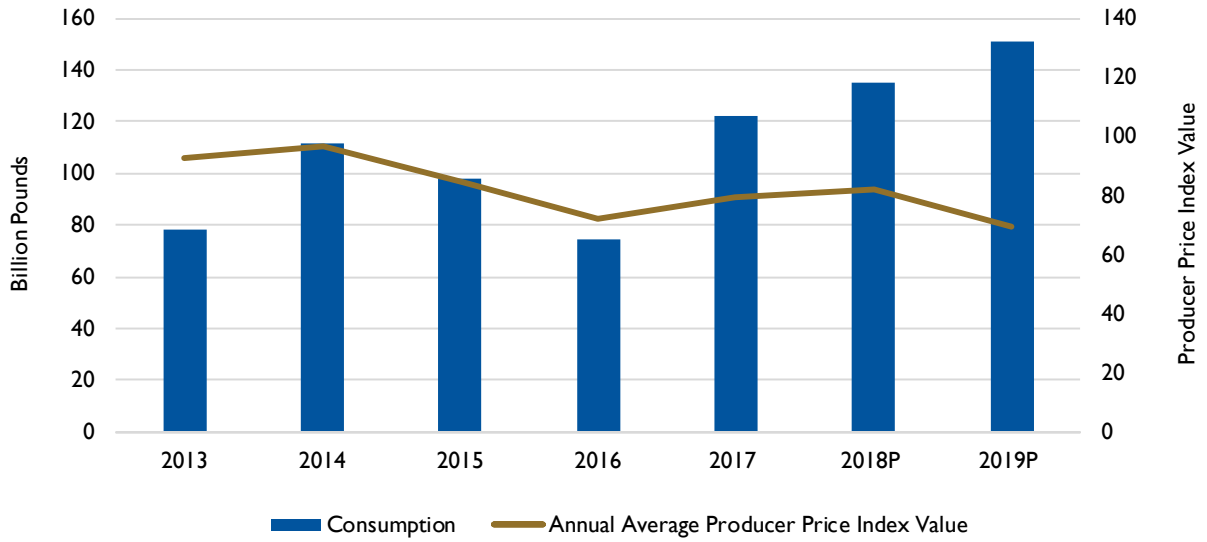
DATA CENTER

DRILLING ACTIVITY

DRILLED BUT UNCOMPLETED (DUC) WELLS VS. CRUDE OIL PRICE (MONTHLY) (35)



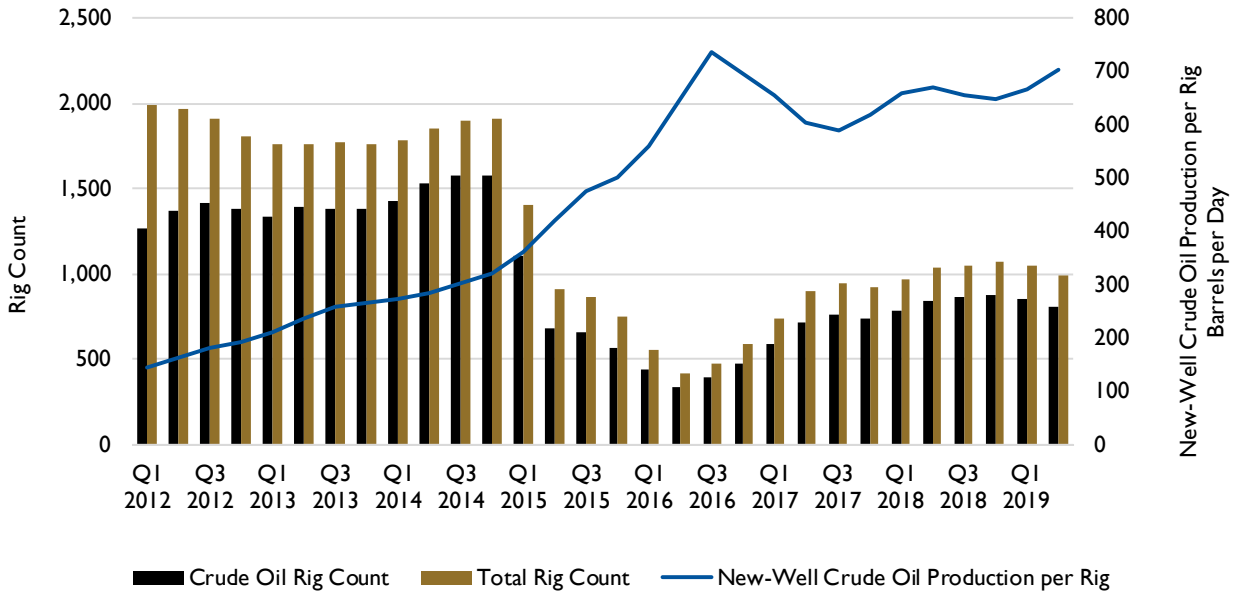
HYDRAULIC FRACTURING SAND CONSUMPTION AND PRODUCER PRICE INDEX (ANNUAL) (36)



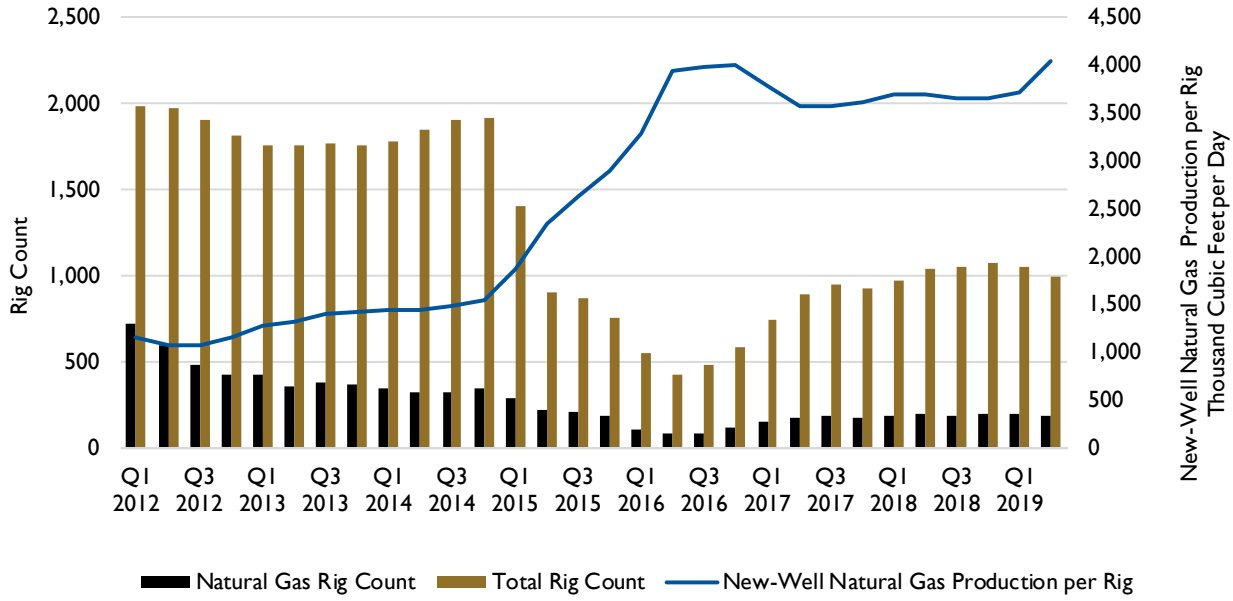
DATA CENTER

DRILLING ACTIVITY

CRUDE OIL PRODUCTION, RIG COUNT AND PRODUCTION PER RIG (QUARTERLY) (37)



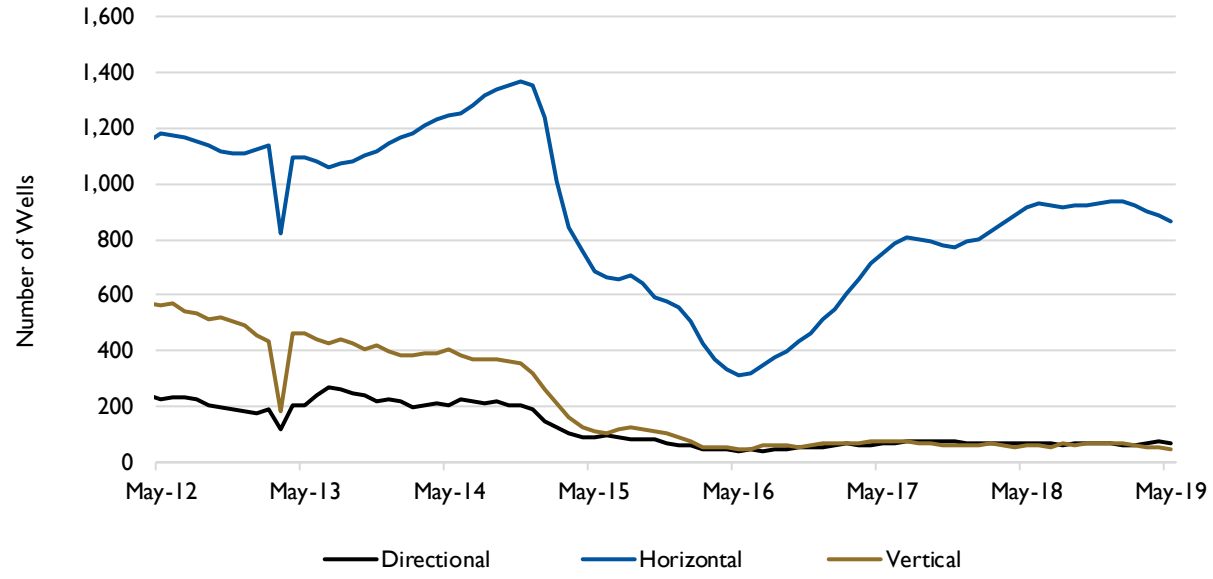
NATURAL GAS PRODUCTION, RIG COUNT AND PRODUCTION PER RIG (QUARTERLY) (38)



DATA CENTER

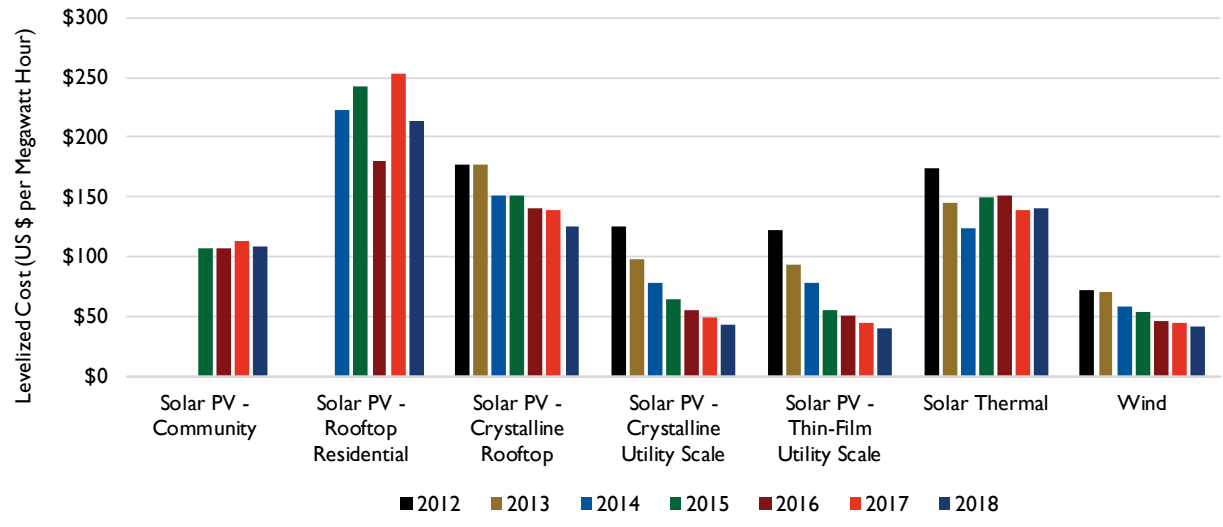
DRILLING ACTIVITY

U.S. Drilling Rigs by Type (Monthly) (39)



RENEWABLES

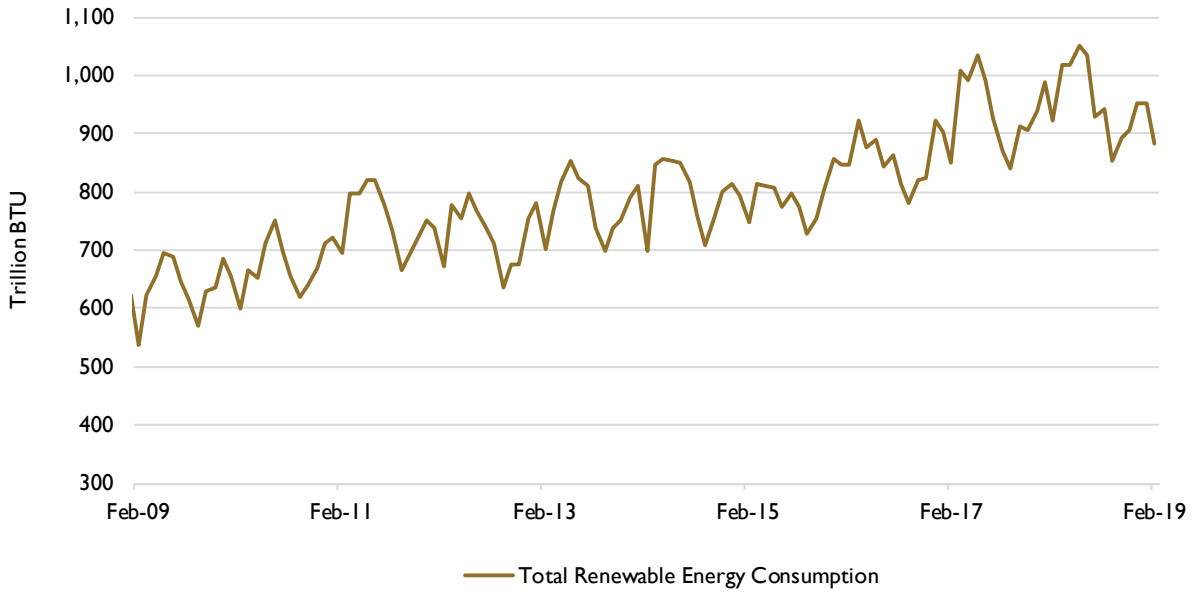
Wind and Solar Prices (Annual Average) (40)



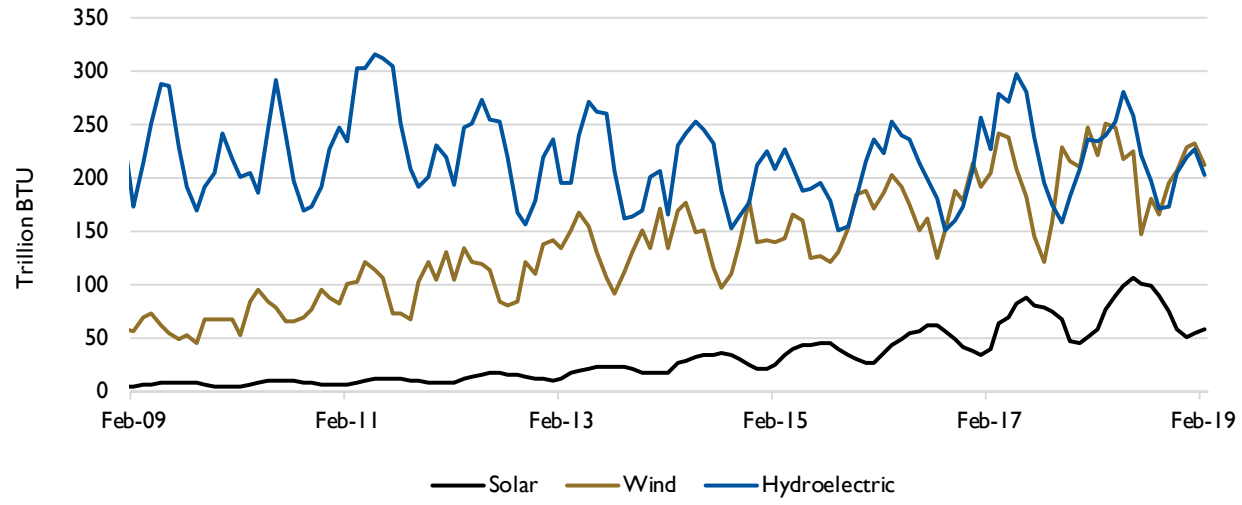
DATA CENTER

RENEWABLES

U.S. TOTAL RENEWABLE ENERGY CONSUMPTION (MONTHLY) (41)



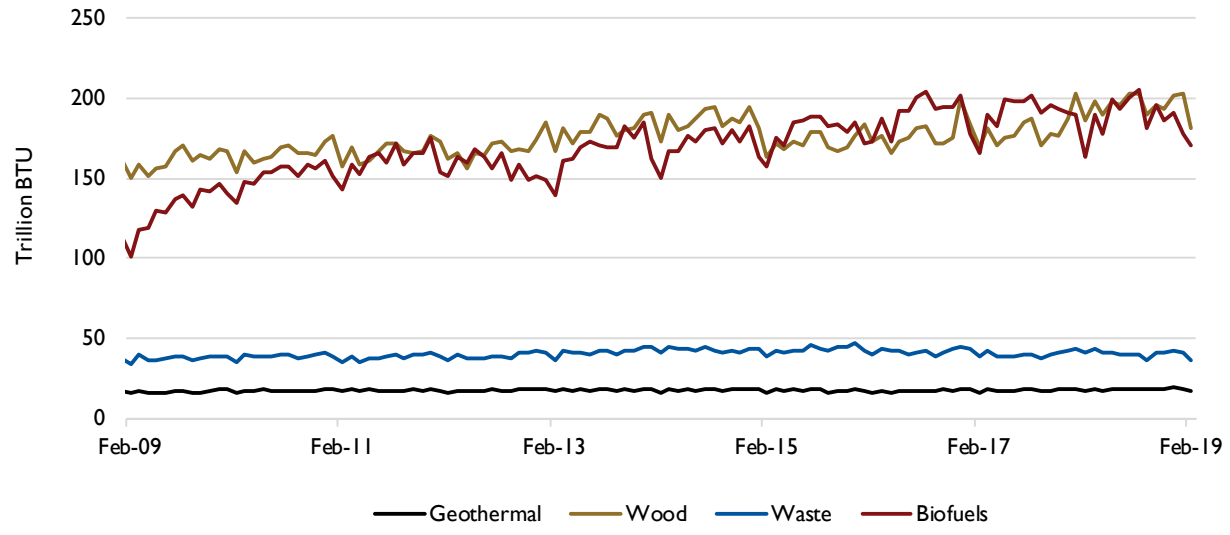
U.S. SOLAR, WIND AND HYRDOELECTRIC ENERGY CONSUMPTION (MONTHLY) (42)



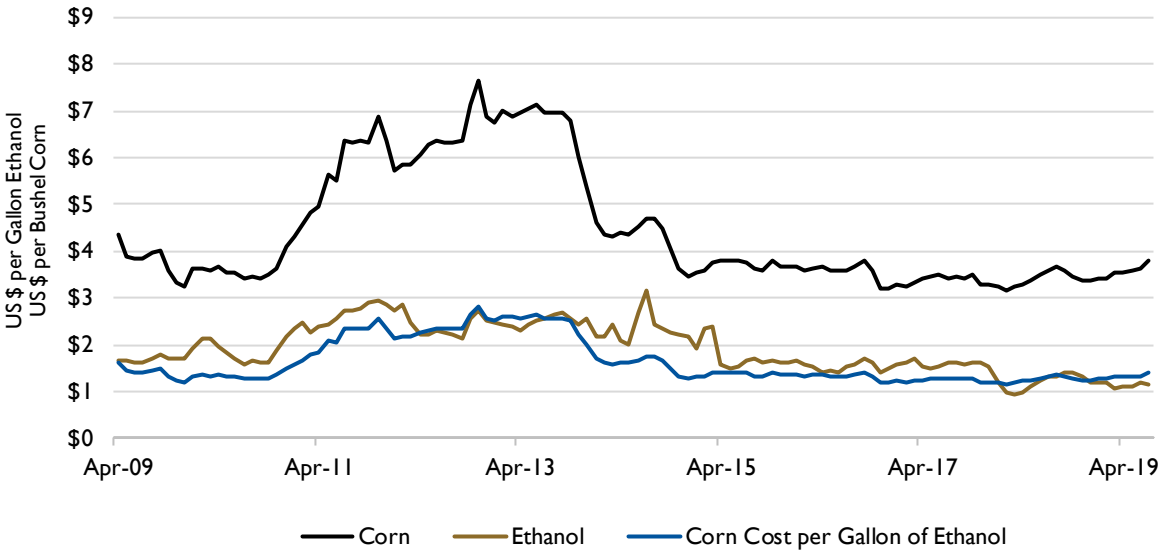
DATA CENTER

RENEWABLES

U.S. Wood, Waste, Biofuels and Geothermal Energy Consumption (Monthly) (43)



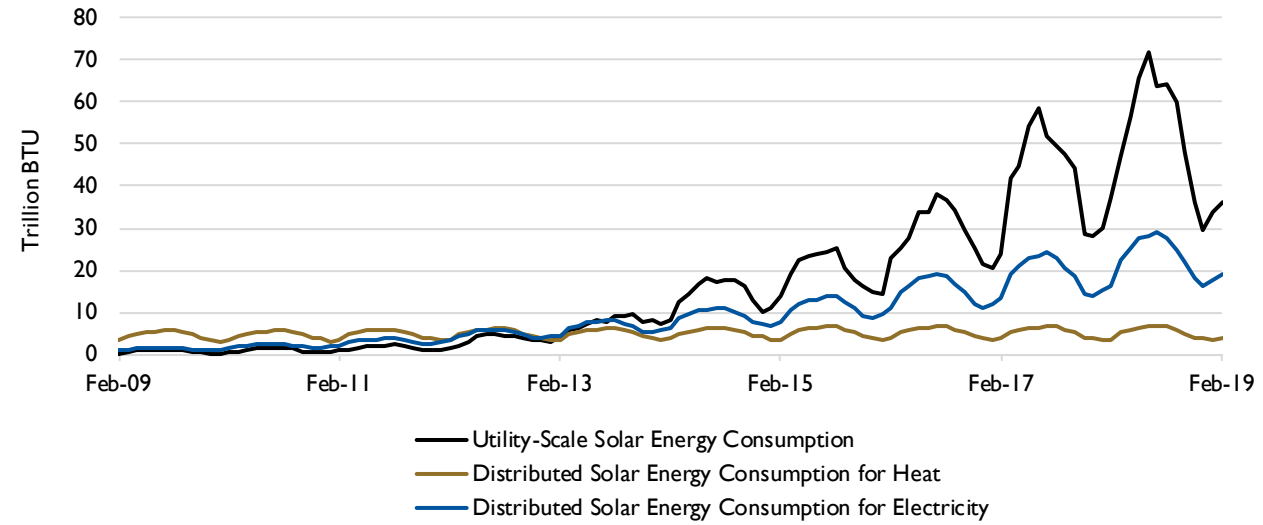
Corn and Ethanol Prices and Corn Cost per Gallon of Ethanol (Monthly Average) (44)



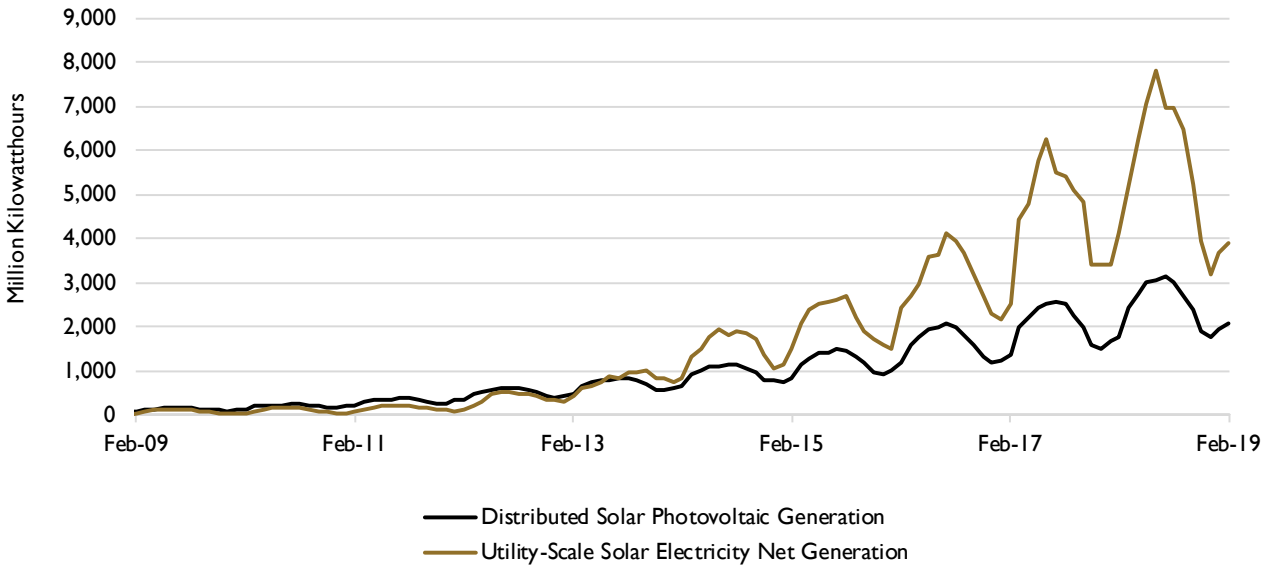
DATA CENTER

RENEWABLES

U.S. Solar Energy Consumption (Monthly) (45)



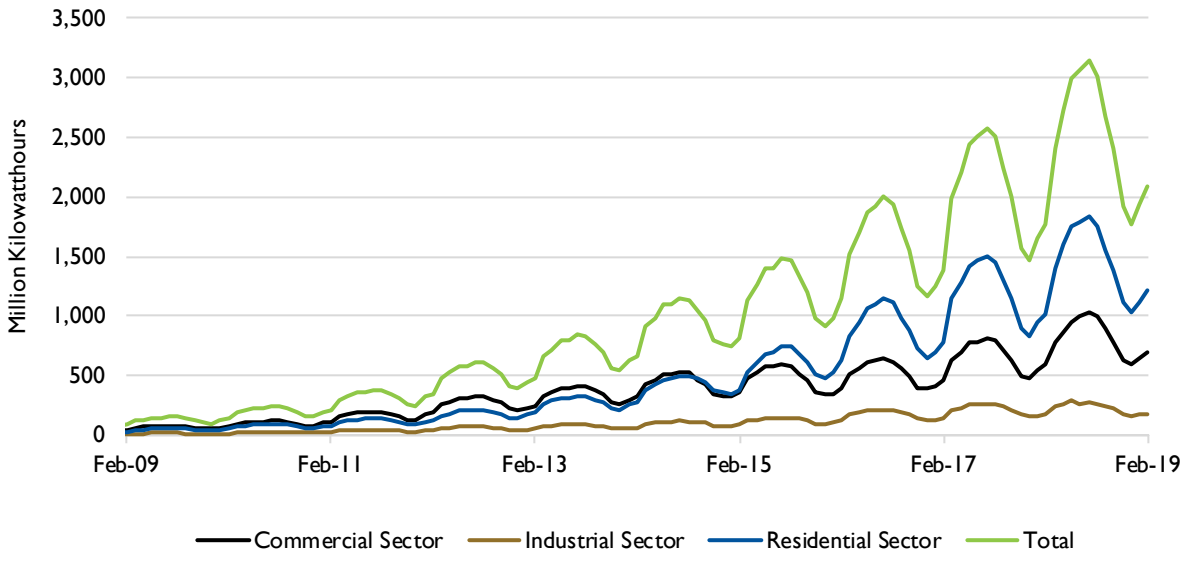
U.S. Solar Energy Net Generation (Monthly) (46)



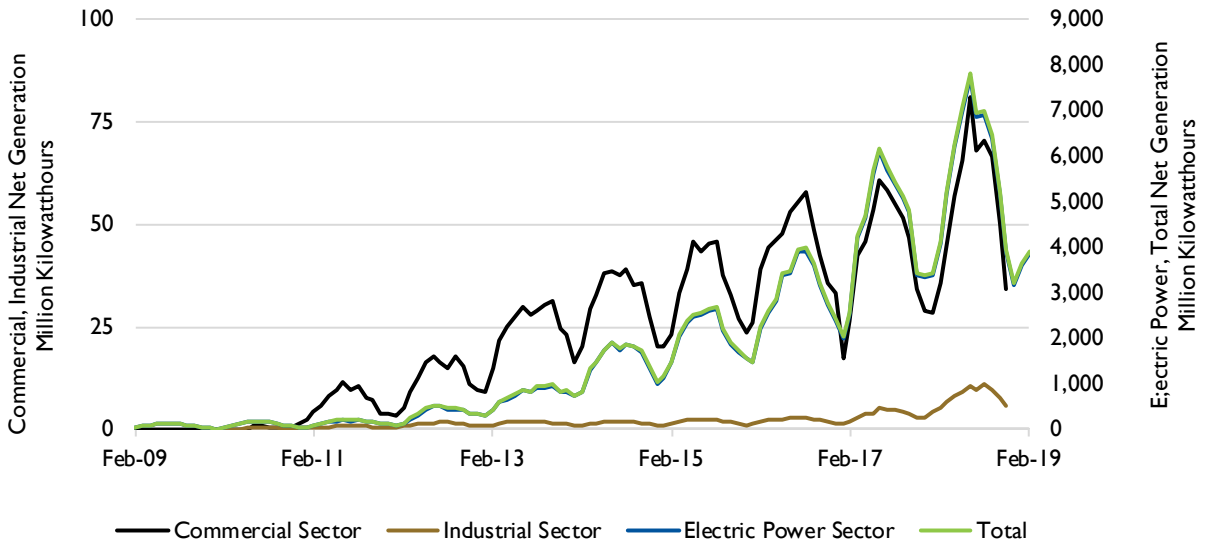
DATA CENTER

RENEWABLES

Distributed Solar Photovoltaic Generation by Sector (Monthly) (47)



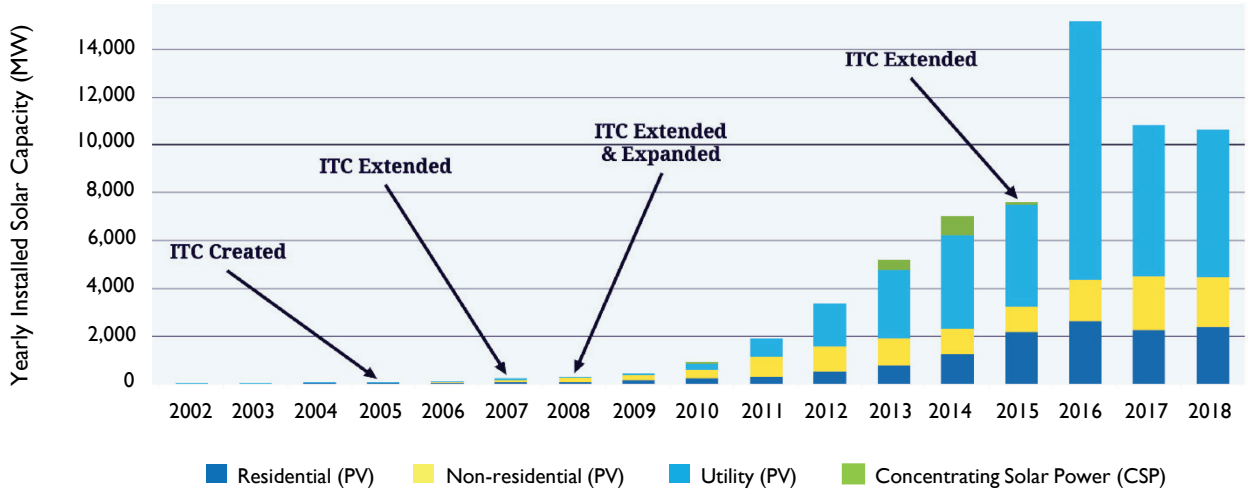
Utility-Scale Solar Electricity Net Generation by Sector (Monthly) (48)



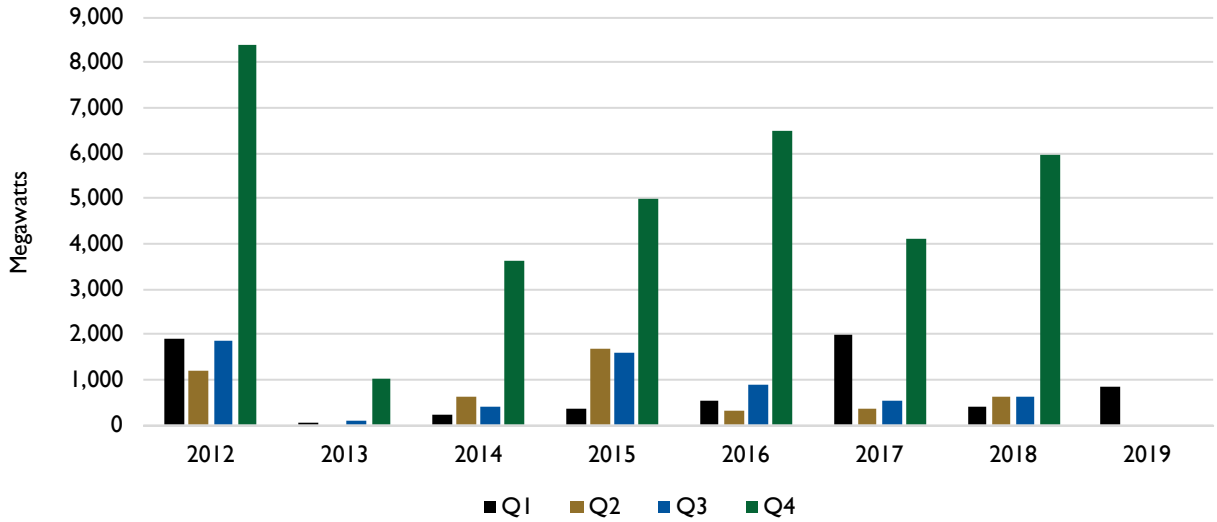
DATA CENTER

RENEWABLES

U.S. Solar Capacity Installations (Annual) (49)



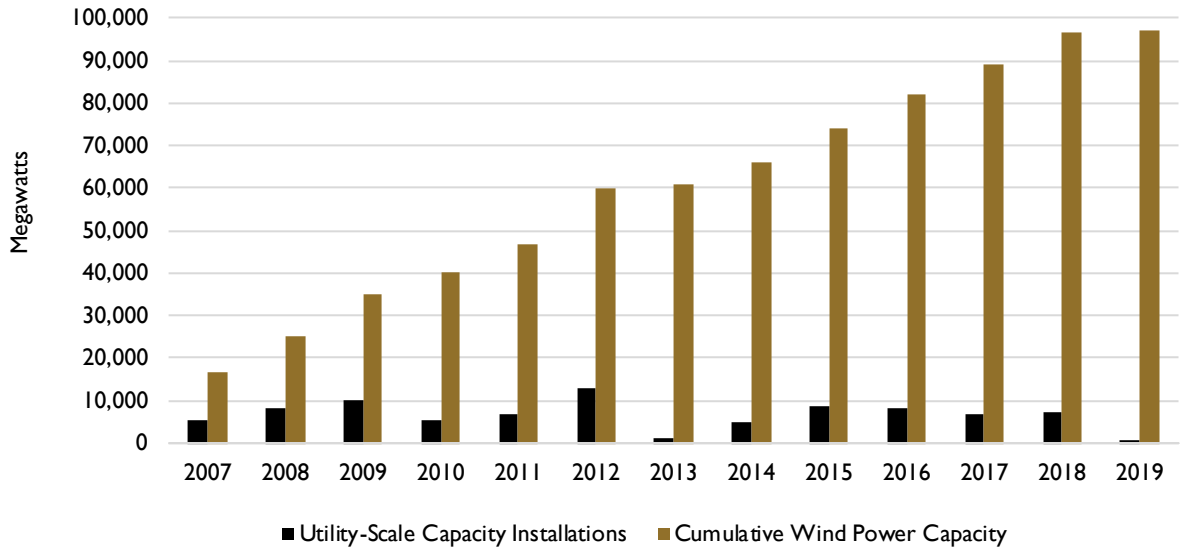
U.S. Wind Power Capacity Installations (Quarterly) (50)



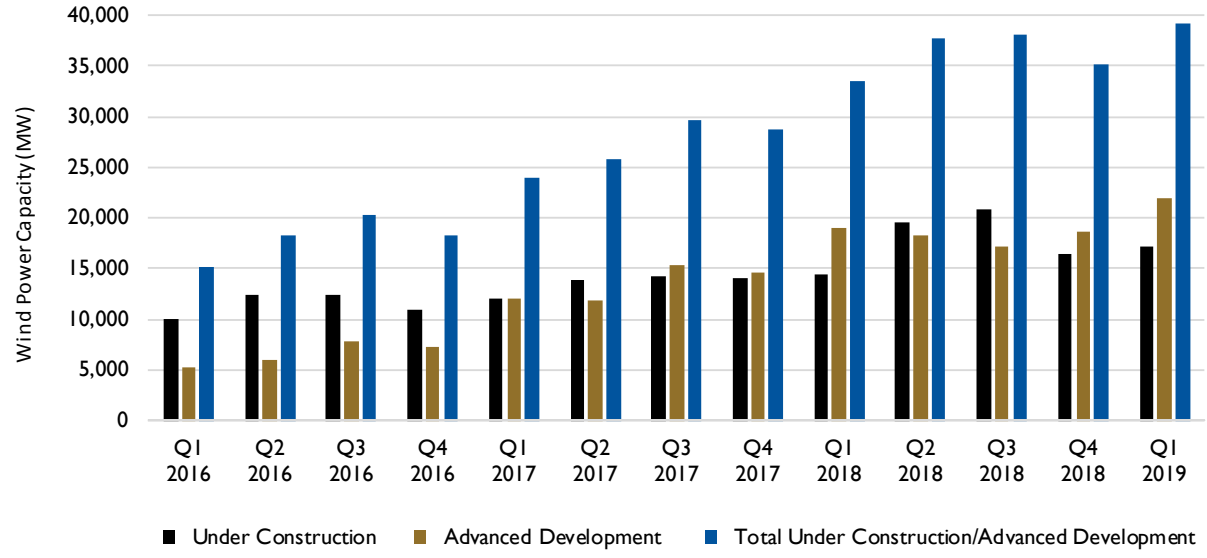
DATA CENTER

RENEWABLES

UTILITY-SCALE WIND POWER CAPACITY INSTALLATIONS (ANNUAL) (51)



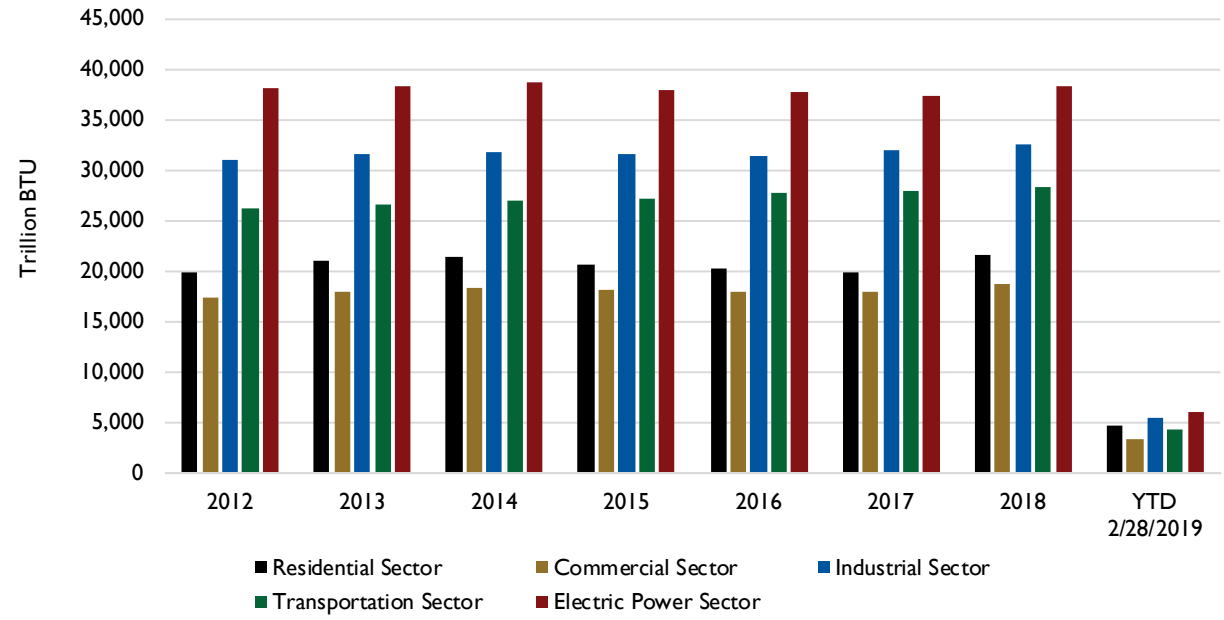
WIND POWER UNDER CONSTRUCTION OR IN ADVANCED DEVELOPMENT (QUARTERLY) (52)



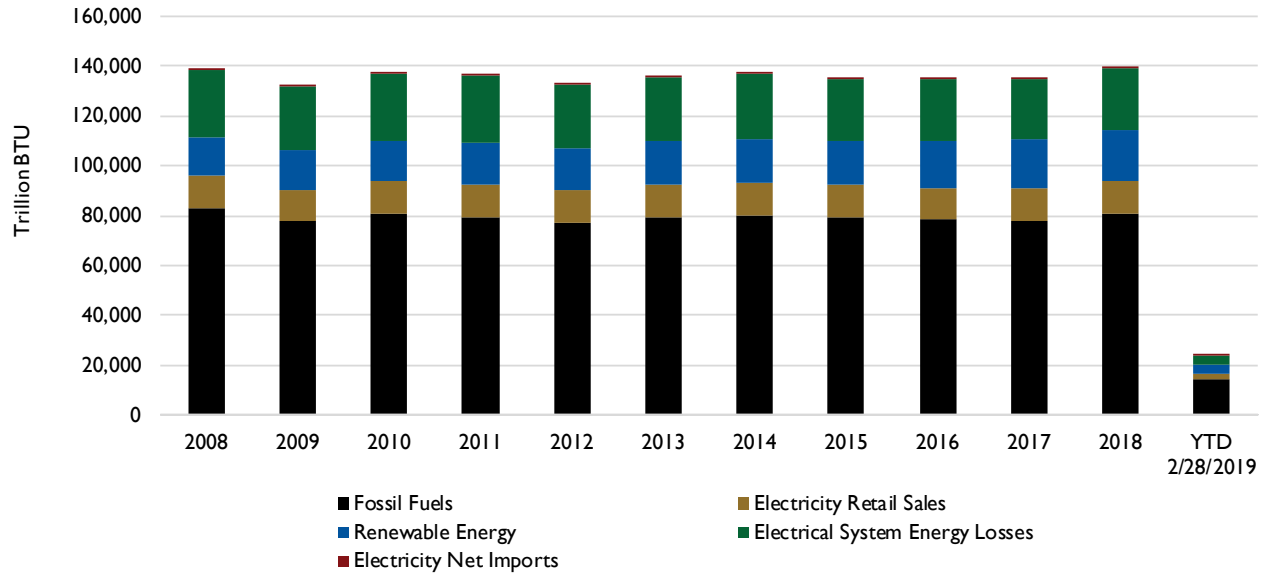
DATA CENTER

U.S. AGGREGATED ENERGY CONSUMPTION

ENERGY CONSUMPTION BY SECTOR (ANNUAL) (53)



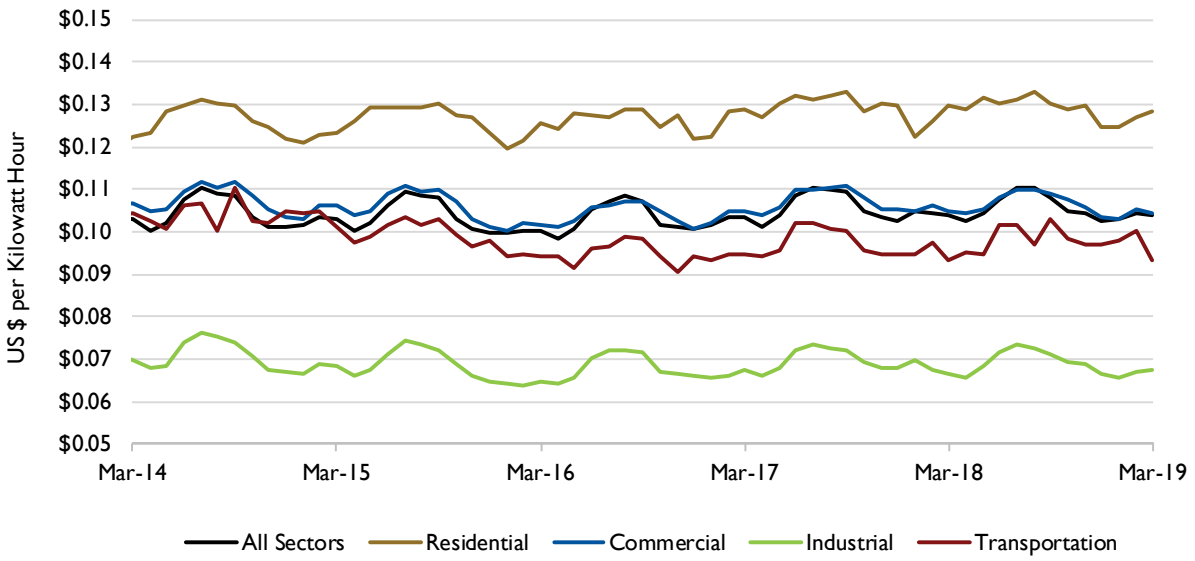
ENERGY CONSUMPTION BY SOURCE (ANNUAL) (54)



DATA CENTER

U.S. AGGREGATED ENERGY CONSUMPTION

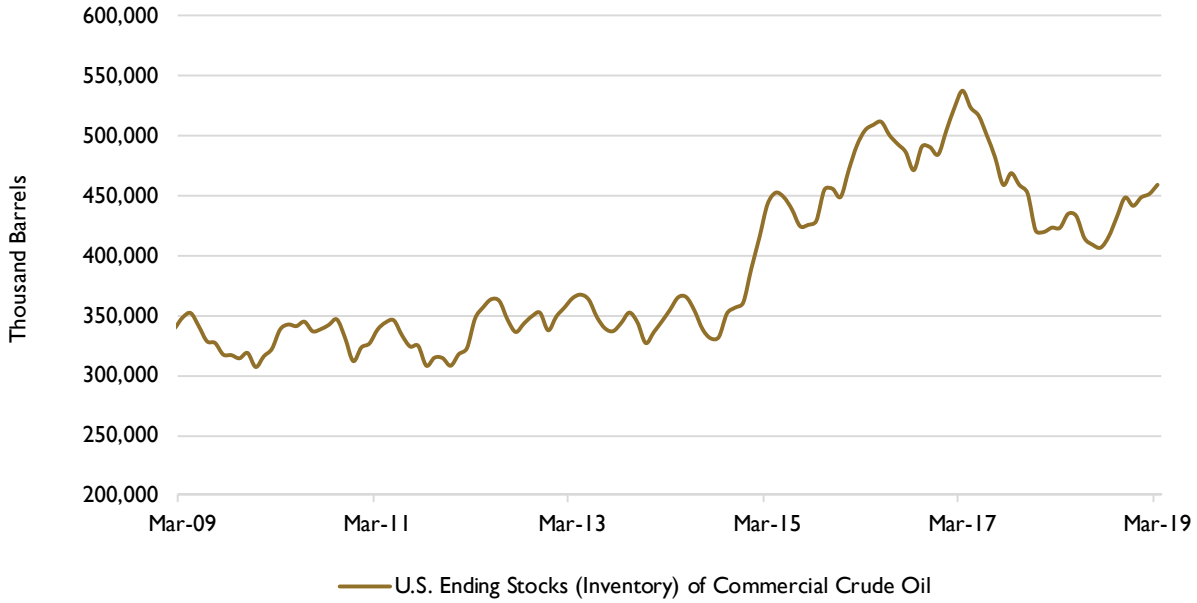
ELECTRICITY PRICES BY SECTOR (MONTHLY AVERAGE) (55)



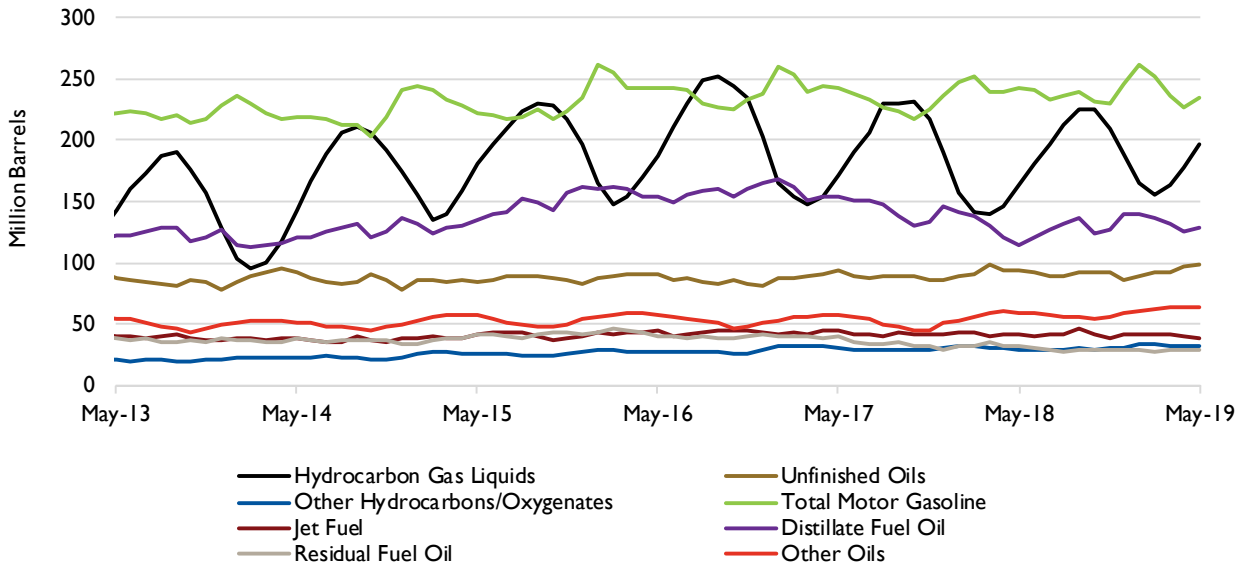
DATA CENTER

LOGISTICS - STORAGE AND TERMINALS

COMMERCIAL CRUDE OIL INVENTORY (MONTHLY) (56)



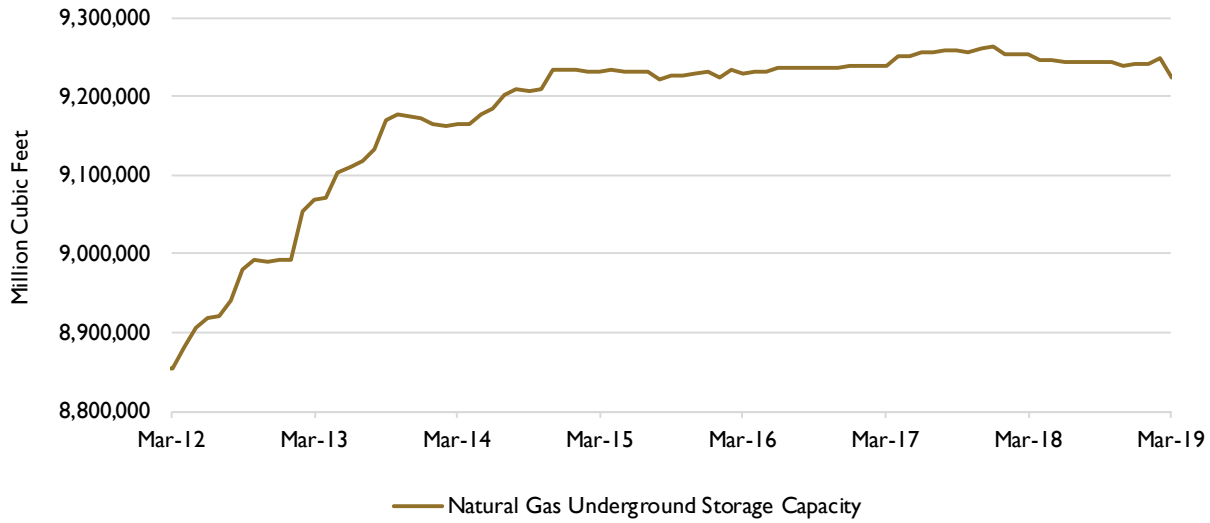
PETROLEUM AND OTHER LIQUIDS COMMERCIAL INVENTORY (MONTHLY) (57)



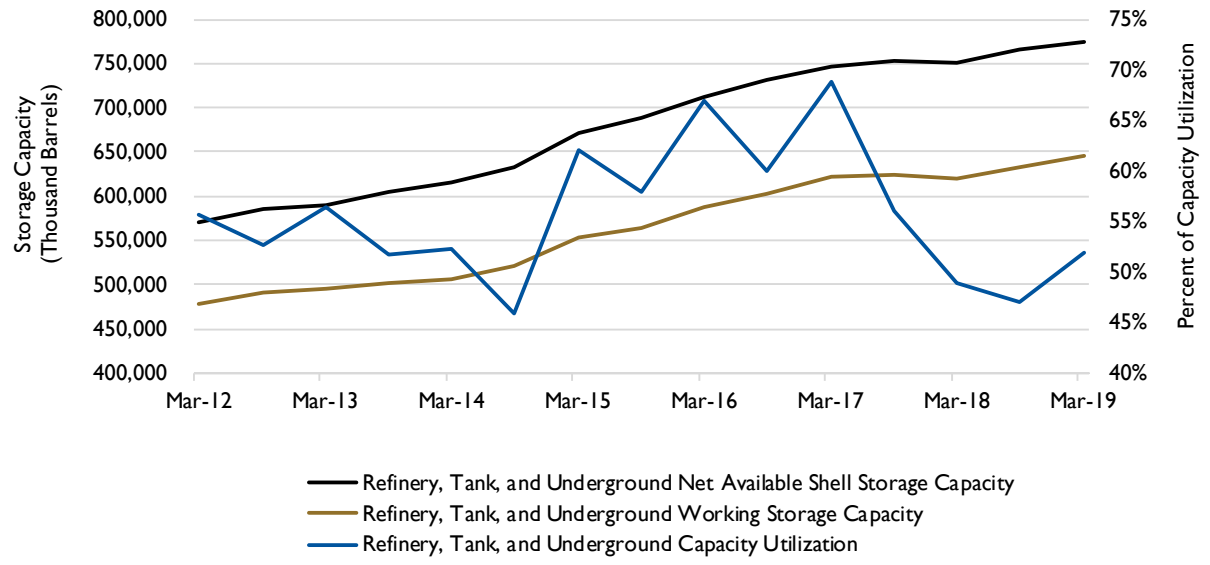
DATA CENTER

LOGISTICS - STORAGE AND TERMINALS

NATURAL GAS UNDERGROUND STORAGE CAPACITY (MONTHLY) (58)



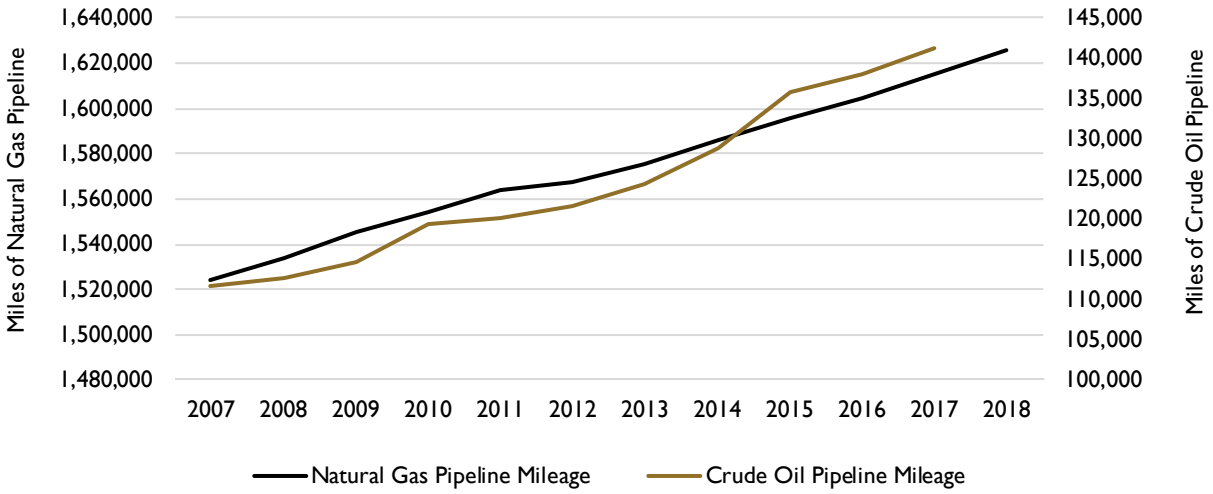
COMMERCIAL CRUDE OIL REFINERY, TANK AND UNDERGROUND STORAGE CAPACITY AND UTILIZATION (MONTHLY) (59)



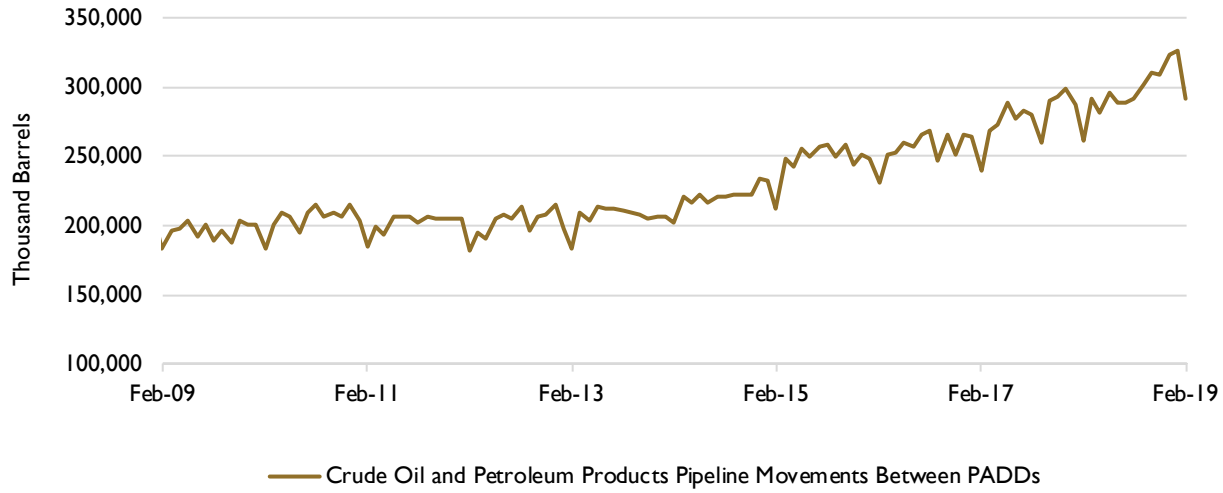
DATA CENTER

LOGISTICS - PIPELINES

CRUDE OIL AND NATURAL GAS PIPELINE MILEAGE (ANNUAL) (60)



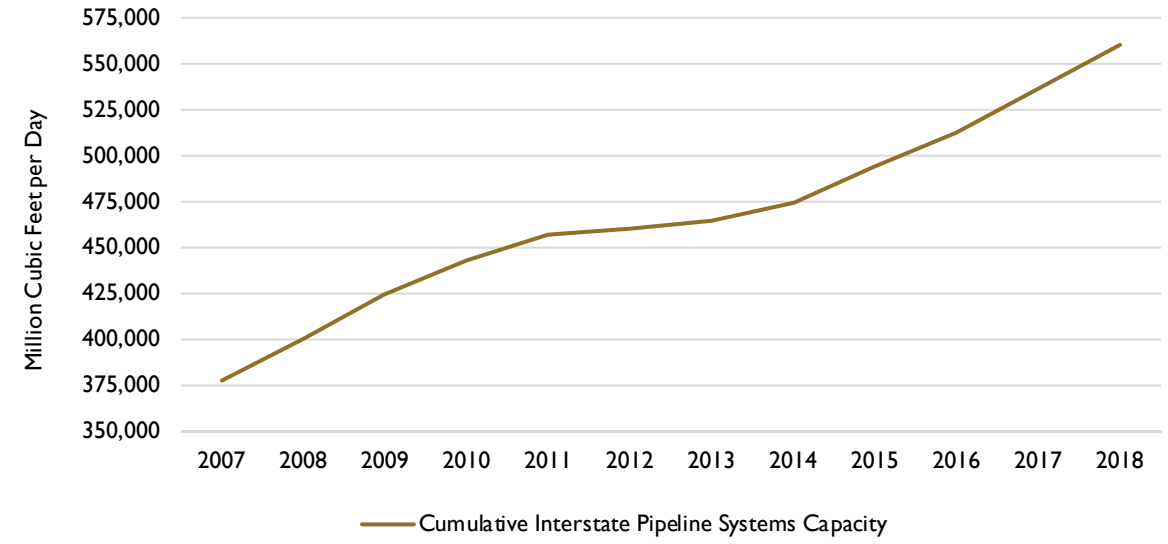
CRUDE OIL AND PETROLEUM PRODUCTS PIPELINE MOVEMENTS BETWEEN PETROLEUM ADMINISTRATION FOR DEFENSE DISTRICTS (PADDS) (MONTHLY) (61)



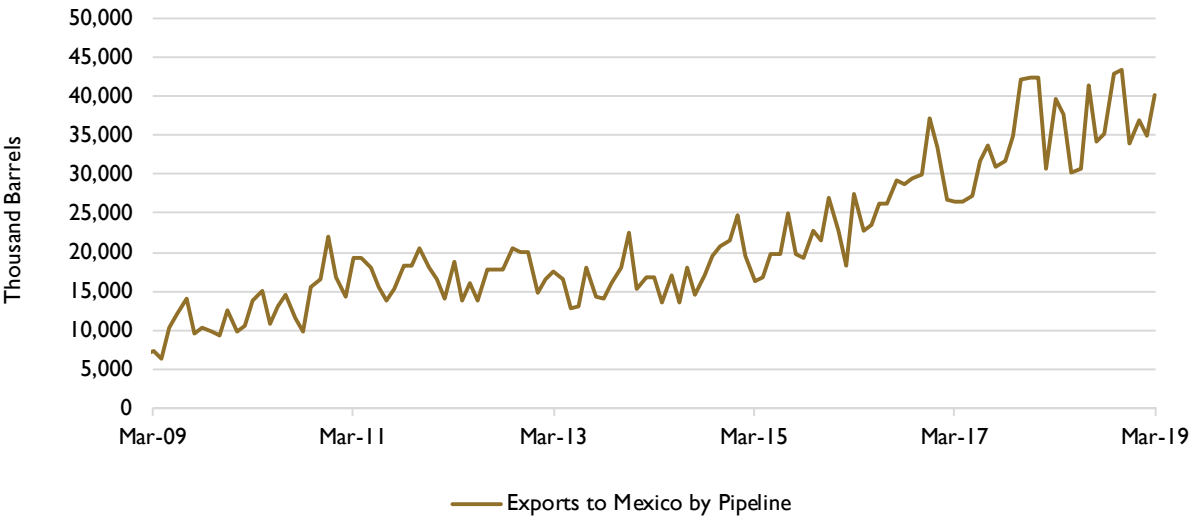
DATA CENTER

LOGISTICS - PIPELINES

NATURAL GAS CUMULATIVE INTERSTATE PIPELINE SYSTEMS CAPACITY (ANNUAL) (62)



CRUDE OIL AND PETROLEUM PRODUCTS EXPORTS TO MEXICO (MONTHLY) (63)

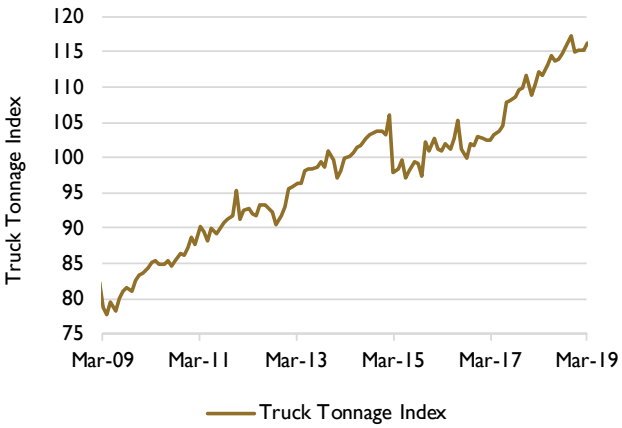


DATA CENTER

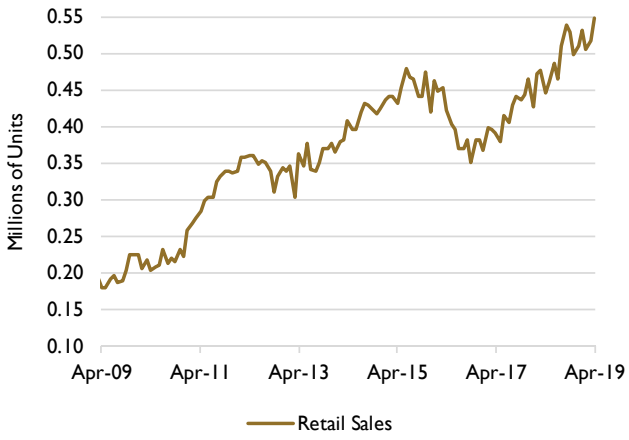
LOGISTICS - TRUCKERS

TRUCK TONNAGE INDEX (MONTHLY) (64)

MEASURES GROSS TONNAGE OF FREIGHT

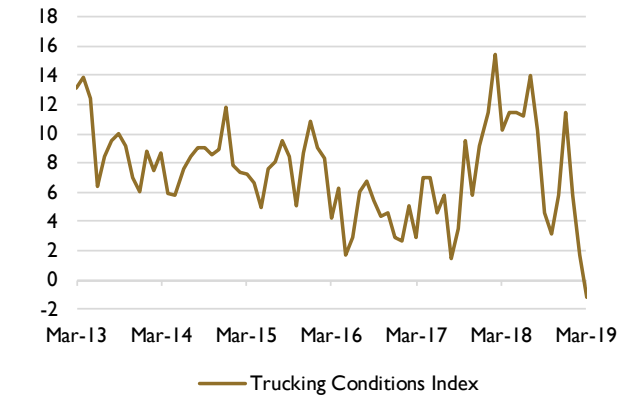


HEAVY TRUCK SALES (MONTHLY) (65)



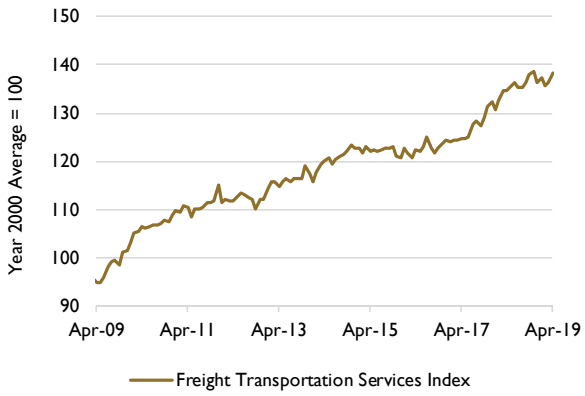
TRUCKING CONDITIONS INDEX (MONTHLY) (66)

INCLUDES FRIGHT VOLUMES, RATES, FLEET CAPACITY, BANKRUPTCIES, FUEL PRICE AND FINANCING



FREIGHT TRANSPORTATION SERVICES INDEX (MONTHLY) (67)

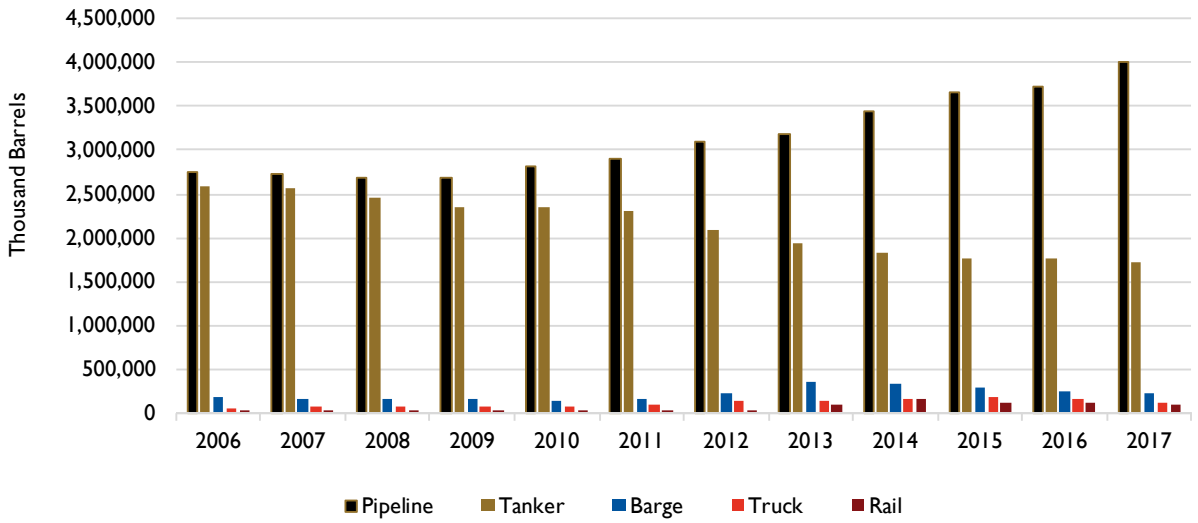
INCLUDES TRUCKING, RAIL, WATERWAYS, PIPELINES AND AIR FRIGHT



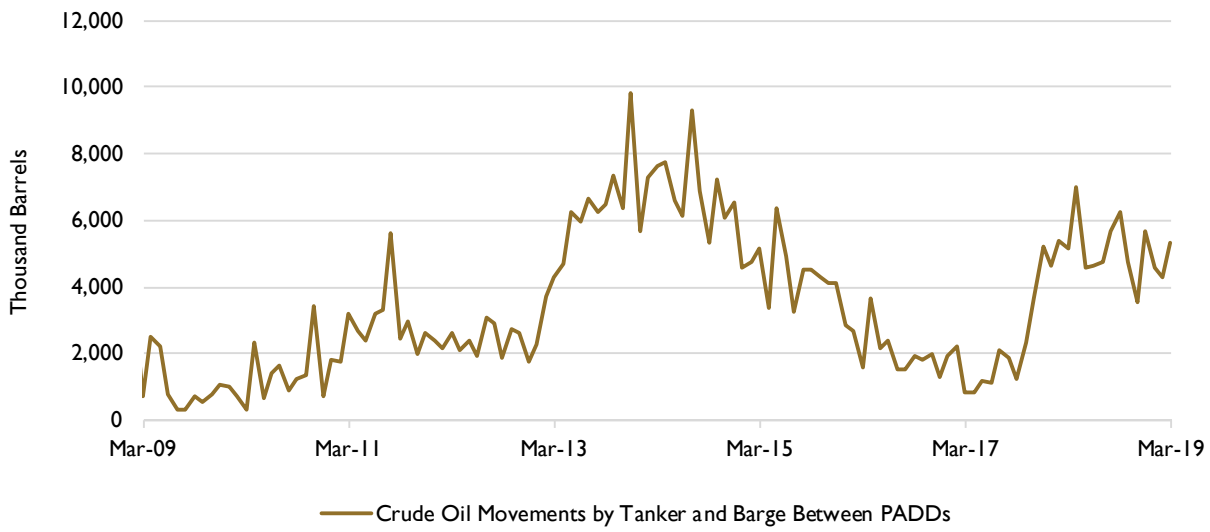
DATA CENTER

LOGISTICS - SHIPPING

CRUDE OIL REFINERY RECEIPTS BY TRANSPORTATION METHOD (ANNUAL) (68)



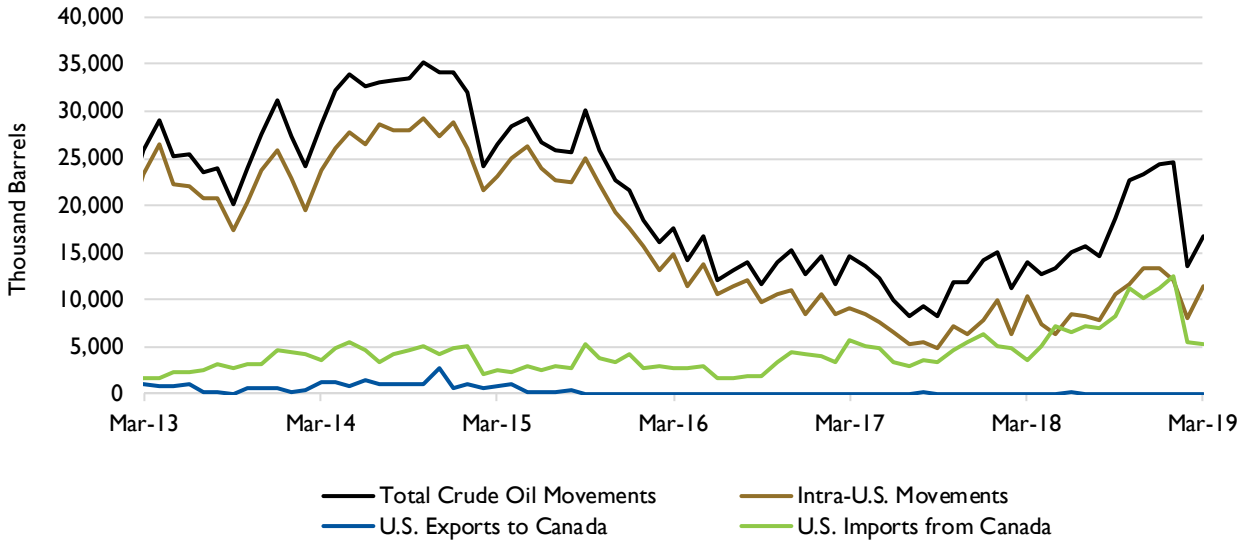
CRUDE OIL MOVEMENTS BY TANKER AND BARGE BETWEEN PETROLEUM ADMINISTRATION FOR DEFENSE DISTRICTS (PADDS) (MONTHLY) (69)



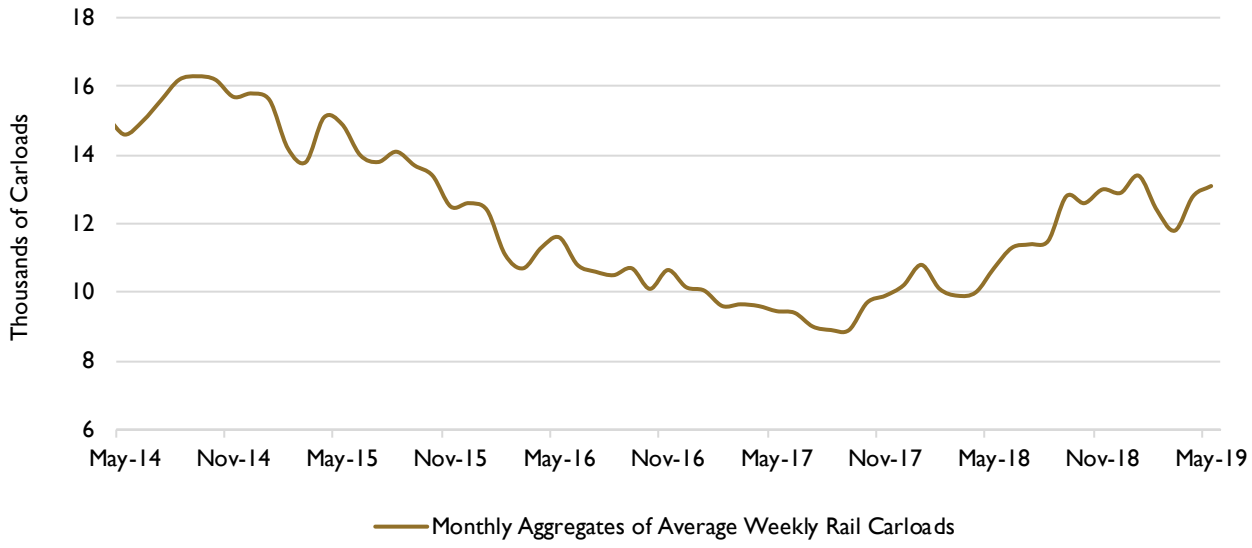
DATA CENTER

LOGISTICS - RAIL

MOVEMENTS OF CRUDE OIL BY RAIL (MONTHLY) (70)



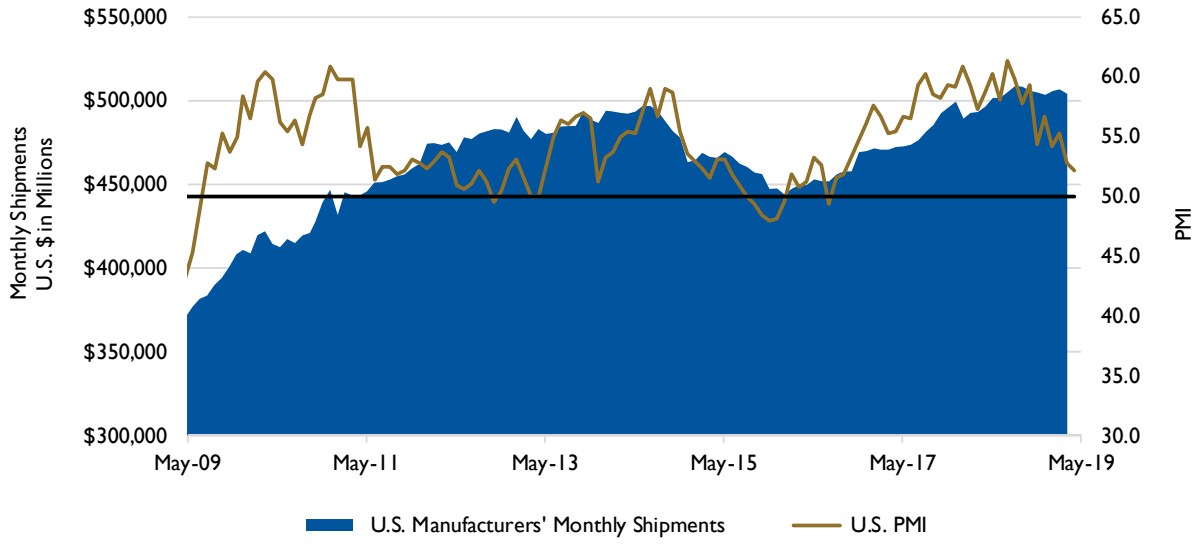
AVERAGE WEEKLY RAIL CARLOADS OF PETROLEUM AND PETROLEUM PRODUCTS (MONTHLY AGGREGATE) (71)



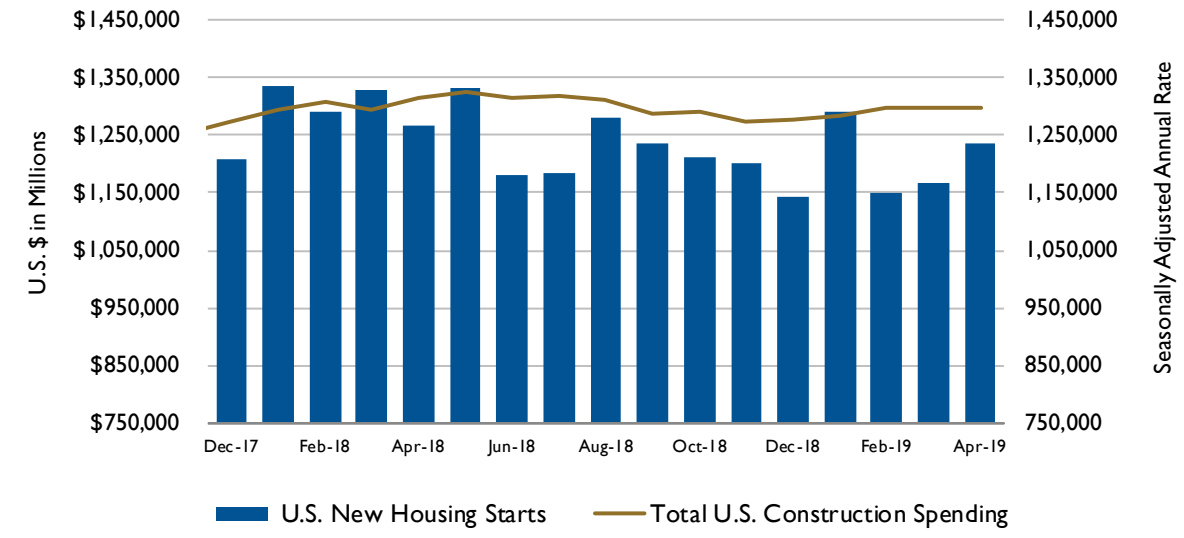
DATA CENTER

ECONOMIC / FINANCIAL

U.S. Manufacturers' Monthly Shipments and U.S. Purchasing Managers' Index (PMI) (Monthly) (72)



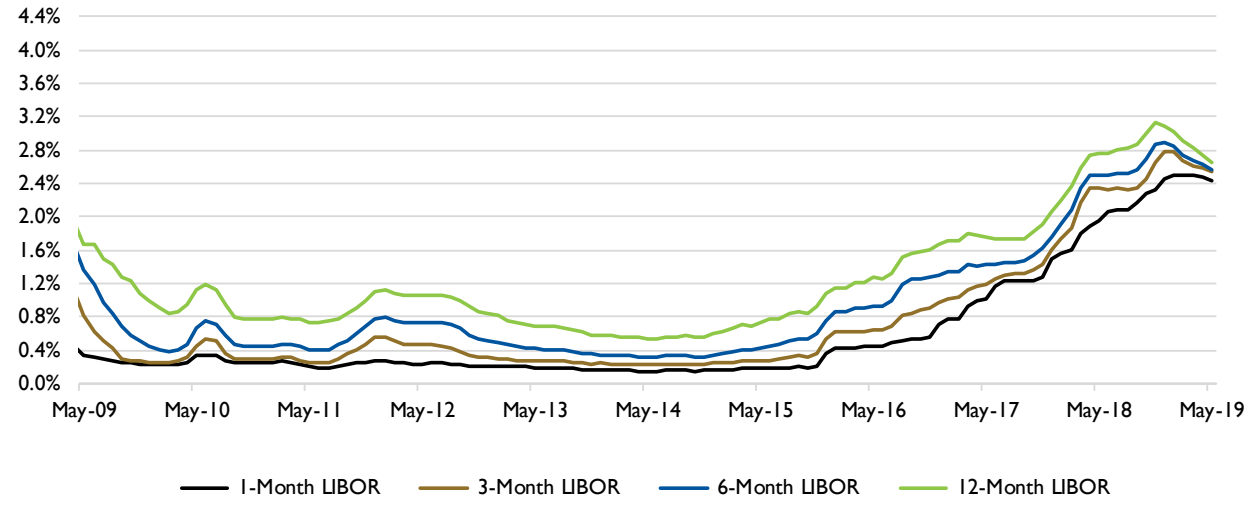
U.S. New Housing Starts and Total U.S. Construction Spending (Monthly) (73)



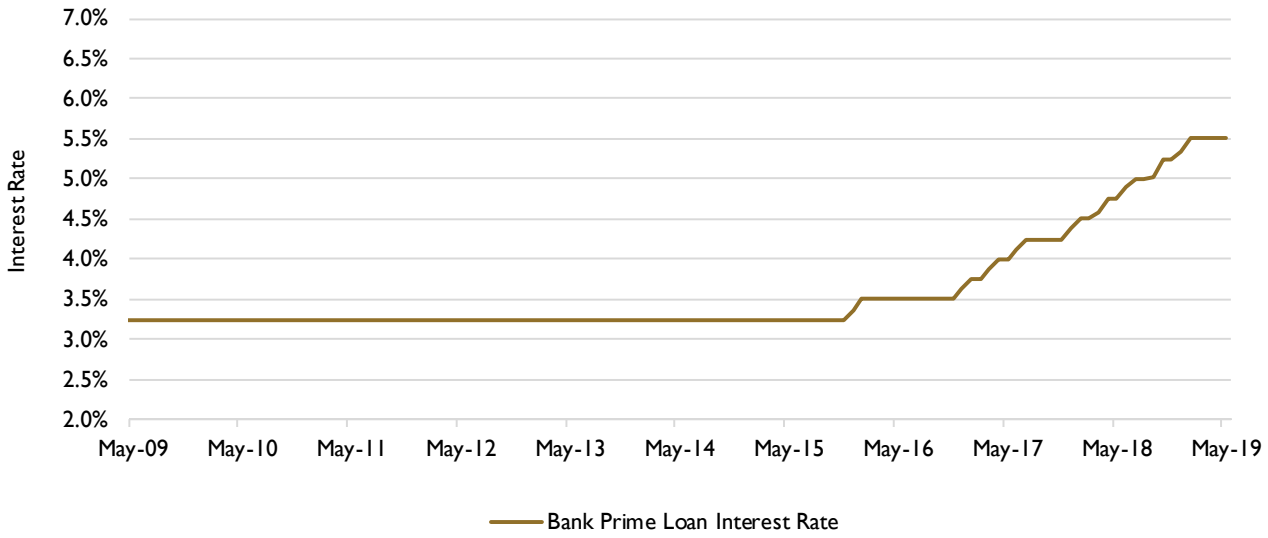
DATA CENTER

ECONOMIC / FINANCIAL

London Interbank Offered Rate (LIBOR) (Monthly Average) Based on U.S. Dollar (74)



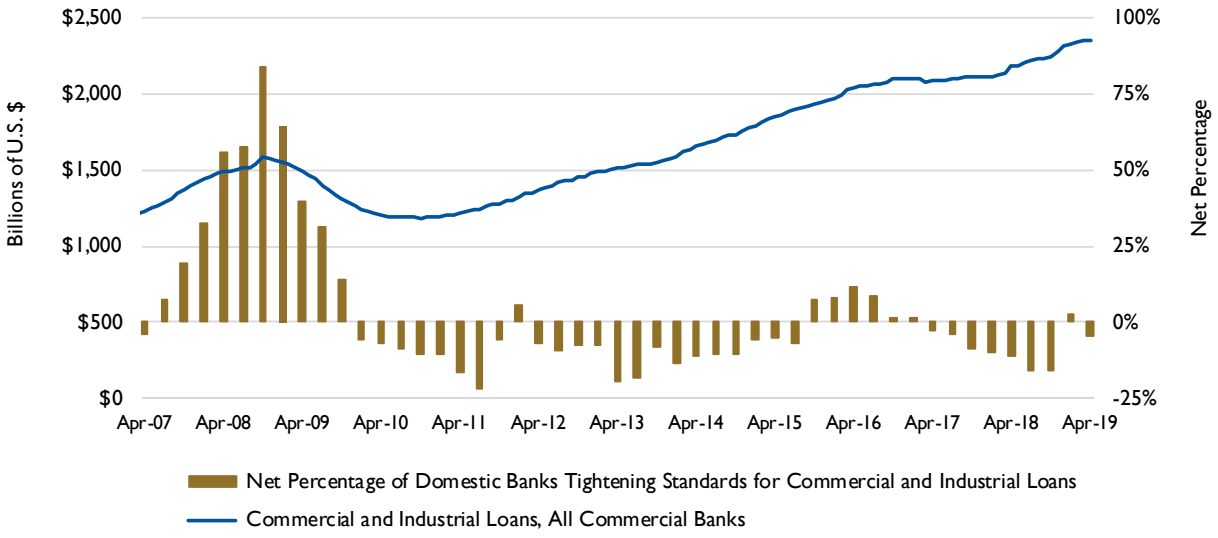
Bank Prime Loan Interest Rates (Monthly Average) (75)



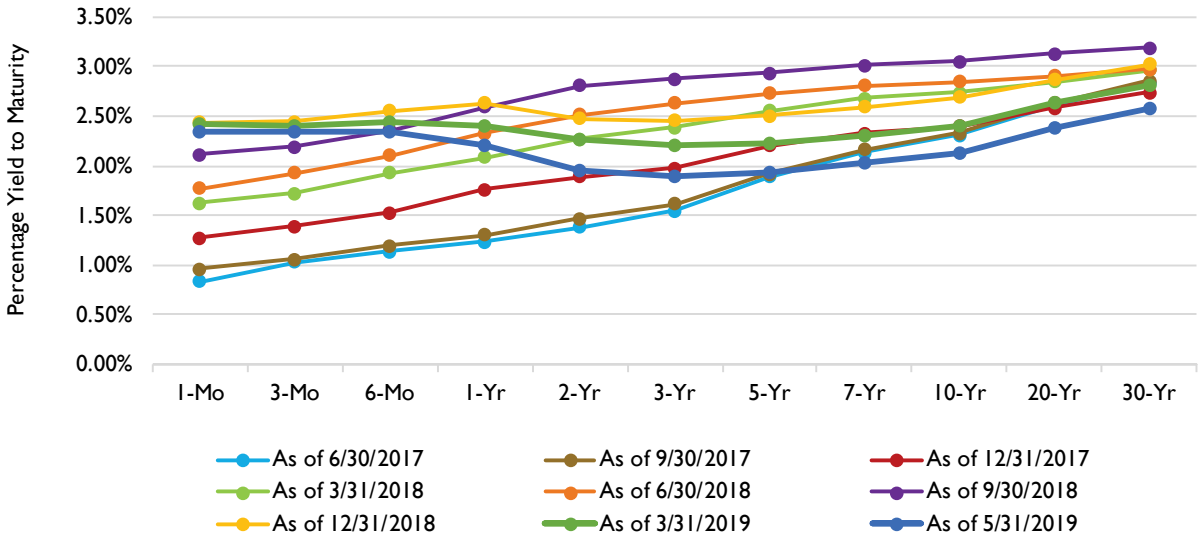
DATA CENTER

ECONOMIC / FINANCIAL

COMMERCIAL AND INDUSTRIAL LOANS VS. BANKING STANDARDS (QUARTERLY, MONTHLY) (76)



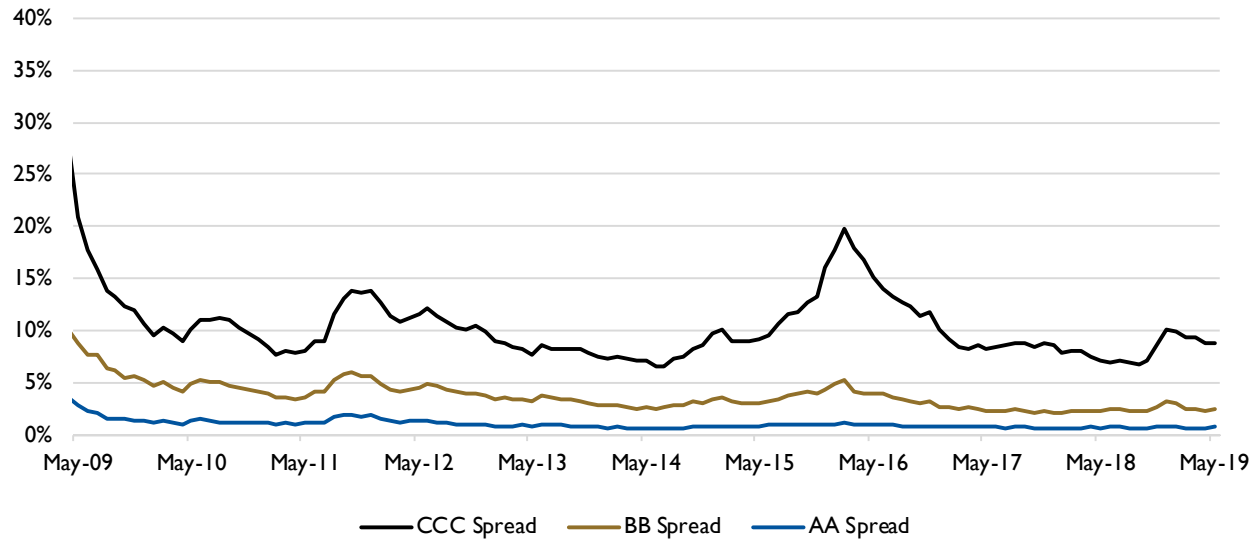
U.S. TREASURY YIELD CURVE (MONTHLY, ANNUAL) (77)



DATA CENTER

ECONOMIC / FINANCIAL

CORPORATE SPREADS TO TREASURIES BY QUALITY
(MONTHLY AVERAGE) (78)



DATA CENTER: ABBREVIATIONS & ACRONYMS, DEFINITIONS, DESCRIPTIONS AND CHART NOTES

ABBREVIATIONS & ACRONYMS

AECO – Alberta Energy Company
ARAMCO – Saudi Arabian Oil Company, formerly the Arabian-American Oil Company
BCF – Billion cubic feet
BTU – British thermal unit
CIF – Costs, insurance and freight
CMT – Constant maturity treasury
DUC – Drilled but uncompleted wells
EBITDA – Earnings before interest, taxes, depreciation and amortization
IFO – Intermediate fuel oil
ITC – Investment Tax Credit
LCOE – Levelized cost of energy
LIBOR – London Interbank Offered Rate
LNG – Liquefied natural gas
LPG – Liquefied petroleum gas
mmBTU – Millions of British Thermal Units
MTBE – Methyl tertiary butyl ether
MW – Megawatt
NBP – National Balancing Point
NGPL – Natural gas plant liquids
NYMEX – New York Mercantile Exchange
OAS – Option-adjusted spread
OPEC – The Organization of Petroleum Exporting Countries
PADD – Petroleum Administration for Defense District
PG&E – Pacific Gas & Electric
PMI – U.S. Purchasing Managers Index
PV – Photovoltaic
SoCal – Southern California
SPR – Strategic Petroleum Reserve
TETCO-M3 – Texas Eastern Transmission Corporation Pipeline Zone M3
TTF – Title Transfer Facility
UAE – United Arab Emirates
WTI – West Texas Intermediate crude oil

DATA CENTER: ABBREVIATIONS & ACRONYMS, DEFINITIONS, DESCRIPTIONS AND CHART NOTES

DEFINITIONS

Biofuels – liquid fuels and blending components produced from biomass feedstocks, used primarily for transportation.

British Thermal Unit (BTU) – A traditional unit of heat; it is defined as the amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit.

Ending Stocks – A proxy for inventory, defined as the total volume of a given commodity held in storage (leases, refineries, processing plants, pipelines, terminals, tank farms) at the end of the last day of a given month.

Distillate Fuel Oil – A general classification for a variety of petroleum fractions produced in petroleum distillation operations. Included within this classification are No. 1, No. 2 and No. 4 diesel fuels (used in on-highway and off-highway diesel engines), as well as No. 1, No. 2 and No. 4 fuel oils (used primarily for space heating and electric power generation).

Distributed Solar Energy – Refers to solar energy generated by small-scale photovoltaic generation plants. Small-scale is defined as a plant with capacity below one megawatt.

Index – A figure in a system or scale representing the average value of specified prices, shares, or other items as compared with some reference figure.

Intermediate Fuel Oil – Also known as IFO and Bunker Fuel, fuel utilized by ships and barges to facilitate international exchange of various commodities across an array of industries.

Investment Tax Credit – A federal policy tax incentive that supports the deployment of solar energy in the United States.

LIBOR – The London Interbank Offered Rate is the average interest rate at which leading banks borrow funds of a sizeable amount from other banks in the London market.

Liquefied Natural Gas – Natural gas that has been cooled to a liquid state, at about -260°Fahrenheit, for shipping and storage.

Liquefied Petroleum Gas – A group of hydrocarbon gases, primarily propane, normal butane and isobutene, derived from crude oil refining or natural gas processing.

Natural Gas Liquids – A group of hydrocarbons including ethane, propane, normal butane, isobutene and natural gasoline. Generally include natural gas plant liquids and all liquefied refinery gases except olefins.

Natural Gas Plant Liquids – Ethane, propane, butane, isobutane, pentane and pentane plus.

Petroleum Administration for Defense District (PADD) – A geographic aggregation of the 50 States and the District of Columbia into five Districts. PADD 1 is the East Coast region, PADD 2 is the Midwest region, PADD 3 is the Gulf Coast region and PADD 5 is the West Coast region.

Petroleum Products – Obtained from the processing of crude oil (including lease condensate), natural gas and other hydrocarbon compounds. Petroleum products include unfinished oils, liquefied petroleum gases, pentanes plus, aviation gasoline, motor gasoline, naphtha-type jet fuel, kerosene-type jet fuel, kerosene, distillate fuel oil, residual fuel oil, petrochemical feedstocks, special naphthas, lubricants, waxes, petroleum coke, asphalt, road oil, still gas and miscellaneous products.

DATA CENTER: ABBREVIATIONS & ACRONYMS, DEFINITIONS, DESCRIPTIONS AND CHART NOTES

DEFINITIONS

Product Supplied – A widely utilized proxy for consumption of petroleum products, measuring the disappearance of said products from primary sources. Primary sources include, among others, refineries, processing plants, blending plants, pipelines and bulk terminals.

Propylene – Petrochemical feedstock that is recovered from refinery or petrochemical processes. It is an olefinic hydrocarbon that is gaseous at standard temperature and pressure.

Residual Fuel Oil – The general classification for heavy oils that remain after lighter oils are distilled away in the process of petroleum refining.

Spot vs. Wholesale Price – "Spot" prices are defined by the U.S. Energy Information Administration as, "the price for a one-time open market transaction for immediate delivery of a specific quantity of a product at a specific location where the commodity is purchased 'on the spot' at current market rates."

In this report, certain charts contain both "spot" and "wholesale" prices for given commodities alongside each other within the same chart. In these instances, the wholesale prices shown are, in fact, wholesale market "spot" prices. Thus, the terms are interchangeable in charts where both terms are present in describing respective price series.

Strategic Petroleum Reserve (SPR) – An emergency fuel storage of crude oil maintained by the United States Department of Energy for use during periods of major supply interruption.

Virtual Trading Point – Commodity trading center created to service a specific geographic region but does not have a physical location.

DATA CENTER: ABBREVIATIONS & ACRONYMS, DEFINITIONS, DESCRIPTIONS AND CHART NOTES

DESCRIPTIONS

General Conversion Information

- International pricing data for various commodities were converted by JKC from the units utilized by the original data source (in the form of currency value per unit of energy content or volume) to appropriate domestic units (in the form of U.S. dollars per common domestic unit of energy content or volume) in order to allow for convenient, informative comparison of international and domestic commodity price series through displaying them on a singular chart in consistent units. Appropriate domestic units for a given commodity are determined by whatever units are most commonly utilized in the United States to denote prices of that commodity, per the U.S. Energy Information Administration.
- International currency units were converted to U.S. dollars using historical exchange rates published by x-rates.com.
- Energy content and volume conversion factors differ by commodity. International energy content or volume units were converted using the various sources listed below:
  - Google.com In-Browser Unit Converter
    - Alberta Energy Co. Hub Natural Gas – gigajoules to mmBTU
    - Dutch TTF Hub Natural Gas – megawatt hours to mmBTU
    - Houston; Los Angeles; Rotterdam; Singapore; Port of Fujairah, UAE IFO 380, IFO 180 Bunker Fuel – liters/kilogram to gallons per metric ton
  - Iowa State University Liquid Fuel Measurements and Conversions
    - Netherlands Retail LPG – liters to metric tons, metric tons to barrels
    - Saudi ARAMCO Propane – metric tons to barrels
    - Japan Propane Imports – metric tons to barrels
    - Holland Retail Gasoline – liters to gallons
    - Singapore Retail Gasoline – liters to gallons
    - UAE Gasoline – liters to gallons
    - Edmonton Diesel Fuel – liters to gallons
    - Singapore Retail Diesel – liters to gallons
    - Holland Retail Diesel – liters to gallons
    - UAE Diesel – liters to gallons
  - Official Nebraska Government Website
    - Netherlands Retail LPG – barrels to gallons
    - Saudi ARAMCO Propane – barrels to gallons
    - Japan Propane Imports – barrels to gallons
  - Lanka IOC Oil Company
    - Houston; Los Angeles; Rotterdam; Singapore; Port of Fujairah, UAE IFO 380, IFO 180 Bunker Fuel – density, in liters per kilogram

DATA CENTER: ABBREVIATIONS & ACRONYMS, DEFINITIONS, DESCRIPTIONS AND CHART NOTES

CHART NOTES

All charts in this report are updated to the latest information available at the time of publication. Due to differing reporting dates for various data used throughout the report, all charts are not updated to the same ending period.

(1) Crude Oil Prices

- Sources: U.S. Energy Information Administration (Brent, West Texas Intermediate), IndexMundi via WorldBank (Dubai Fateh), Alberta.ca Economic Dashboard (Western Canadian Select), OPEC.org and Quandl.com (OPEC Reference Basket).
- The Organization of Petroleum Exporting Countries (OPEC) reference basket is a composite of the following blends of crude oil: Saharan Blend (Algeria), Girassol (Angola), Oriente (Ecuador), Zafiro (Equatorial Guinea), Rabi Light (Gabon), Iran Heavy (Islamic Republic of Iran), Basra Light (Iraq), Kuwait Export (Kuwait), Es Sider (Libya), Bonny Light (Nigeria), Qatar Marine (Qatar), Arab Light (Saudi Arabia), Murban (United Arab Emirates), Merey (Venezuela).
- All prices are spot or wholesale.

(2) Gasoline Prices

- Sources: U.S. Energy Information Administration (New York Harbor, U.S. Gulf Coast), Trading Economics (Singapore, Netherlands Retail), United Arab Emirates Ministry of Energy (UAE Retail).
- New York Harbor Spot, U.S. Gulf Coast Spot, Netherlands Retail and Singapore Retail all represent the price history of conventional gasoline in their respective locations. United Arab Emirates Retail represents an aggregate of unleaded 95, unleaded 98 and unleaded 91 prices in the United Arab Emirates.

(3) Diesel Prices

- Sources: U.S. Energy Information Administration (U.S. Gulf Coast, New York Harbor, Los Angeles, CA), Ec.euopa.eu European Commission (Netherlands Retail), Knoema.com (Singapore Retail), United Arab Emirates (UAE Retail).
- New York Harbor, U.S. Gulf Coast and Los Angeles, CA prices represent ultra-low sulfur No. 2 diesel.
- Edmonton, Canada price represents low-sulfur diesel.
- Singapore Retail, United Arab Emirates Retail and Netherlands Retail prices represent conventional gasoil found at the pump. Gasoil is an alternative term for diesel commonly used throughout Europe.
- Netherlands Retail prices exclude taxes, Singapore Retail prices include taxes.

(4) Jet Fuel Prices

- Source: U.S. Energy Information Administration.
- All prices are spot or wholesale prices.

(5) U.S. Crude Oil and Petroleum Products Supply, Inventory and Consumption

- Source: U.S. Energy Information Administration.
- Crude Oil and Petroleum Products consist of natural gas plant liquids (ethane, propane, butane, isobutane, pentane), other liquids (hydrogen, oxygenates and renewable fuels like fuel ethanol, motor and aviation gasoline blending components, unfinished oils) and finished petroleum products (motor gasoline, aviation gasoline, kerosene-type jet fuel, kerosene, distillate fuel oil, residual fuel oil, petrochemical feedstocks, napthas, lubricants, waxes, petroleum cokes, asphalt and road oil, still gas, miscellaneous products).
- Supply is comprised of field production, renewable fuels and oxygenate plant net production, refinery and blender net production, imports and net Petroleum Administration for Defense District (PADD) receipts. Net PADD receipts represent the net volume of product movement into and out of each PADD by tanker, barge and pipeline.
- Ending Stocks is a proxy for inventory and is defined as primary stocks held in storage as of midnight on the last day of the month. Primary stocks include products held in storage at, or in, leases, refineries, natural gas processing plants, pipelines, tank farms and bulk terminals with the capacity to store at least 50,000 barrels or that can receive product by tanker, barge or pipeline. Ending Stocks include volumes in the Strategic Petroleum Reserve (SPR) maintained by the Federal Government for use during periods of major supply interruption.
- Product Supplied is a proxy for consumption as it measures the disappearance of said product from primary sources, including refineries, processing plants, blending plants, pipelines and bulk terminals.

DATA CENTER: ABBREVIATIONS & ACRONYMS, DEFINITIONS, DESCRIPTIONS AND CHART NOTES

(6) U.S. Refinery Volumes and Wholesale Prices of Petroleum Products

- Source: U.S. Energy Information Administration Petroleum Marketing Monthly.

(7) U.S. Crude Oil Refinery Input, Distillation Capacity and Refinery Utilization

- Source: U.S. Energy Information Administration Petroleum Supply Weekly.
- Net Input is defined as gross inputs less gross production. Crude Oil Refinery Net Input values are monthly aggregates of weekly net input averages, measured in thousands of barrels per day. The resulting values are represented as monthly average refinery inputs, measured in thousands of barrels per day.
- Refinery Capacity refers to the maximum amount of crude oil designed to flow into the distillation (or crude) unit of the refinery. Operable Capacity is equal to the sum of operating and idle capacity. Idle Capacity is capacity that is not in operation, not under active repair, and can be placed in operation within 30 days.

(8) U.S. Crude Oil and Petroleum Products Imports and Exports

- Source: U.S. Energy Information Administration Petroleum Supply Monthly.
- U.S. Net Imports of Petroleum Products data fall below zero at which point the U.S. becomes a net exporter.

(9) Domestic Natural Gas Citygate Prices per Region

- Source: U.S. Energy Information Administration.
- The prices shown are "Citygate" prices. A Citygate is defined as "a point or measuring station at which a distributing gas utility receives gas from a natural gas pipeline company or transmission system." The Citygate price represents the benchmark price for a given region, accounting for all costs of acquisition, storage, and transportation of gas as well as other charges associated with local distribution companies obtaining the gas for sale to end-users.
- The Western market contains Oregon, Washington, California, Nevada, Arizona, New Mexico, Utah, Wyoming, Colorado, Montana, and Idaho.
- The Midwestern market contains North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Minnesota, Iowa, Missouri, Arkansas, Wisconsin, Michigan, Illinois, and Indiana.
- The Gulf market contains Texas and Louisiana; the Southeastern market contains Florida, Mississippi, Alabama, Georgia, Tennessee, North Carolina, and South Carolina.
- The Northeastern market contains Kentucky, Virginia, West Virginia, Ohio, Pennsylvania, New York, Vermont, New Hampshire, Maine, Massachusetts, Rhode Island, Connecticut, Delaware, New Jersey, and Maryland.

(10) International Natural Gas Prices

- Sources: U.S. Energy Information Administration (Henry Hub), NGX Clearinghouse (AECO Hub), BP Statistical Review of World Energy 2017 (United Kingdom NBP), World Bank via Index Mundi (Russian NG European Import Price), Knoema via World Bank (Japan LNG Import), my.Elexys.be Market Information (Dutch TTF).
- Henry Hub serves as the primary global pricing benchmark.
- Alberta Energy Company (AECO) Hub serves North America.
- United Kingdom National Balancing Point (NBP) serves the British Isles.
- Dutch Title Transfer Facility (TTF) serves continental Europe.
- Virtual Trading Point (Virtual) does not have a physical location and was created to serve a specific region.
- Japan LNG Import Price represents aggregate import prices of liquefied natural gas in Japan and is a price benchmark serving the Asia-Pacific region. The price includes costs, insurance and freight (CIF).
- All price benchmarks above represent gaseous state natural gas transported by pipeline, with the exception of Japan LNG Import Price, which represents liquid state natural gas transported by ship.
- All prices are spot or wholesale.

(11), (12), (13) and (14) Liquefied Natural Gas Prices

- Sources: Federal Energy Regulatory Commission (U.S., Mexico, Belgium, India), World Bank via Bluegold Research (Brazil/Argentina, Japan/Korea, China, United Kingdom).
- All prices are "landed" prices. Landed price is the price received at the regasification terminal and is based on a netback calculation that removes the costs of pipeline transportation, regasification, waterborne shipping and liquefaction, so as to best represent the effective price to the producer or seller at a specific location or defined point.

DATA CENTER: ABBREVIATIONS & ACRONYMS, DEFINITIONS, DESCRIPTIONS AND CHART NOTES

(15) U.S. Import / Export Liquefied Natural Gas Prices
- Source: U.S. Energy Information Administration.
- All prices are spot or wholesale.

(16) Natural Gas Plant Liquids Prices
- Source: U.S. Energy Information Administration.
- Natural gas liquids spot prices at Mont Belvieu, TX.
- Natural Gas Plant Liquids (NGPL) Composite price includes ethane, propane, butane, isobutane and natural gasoline. Daily closing spot prices for each component are averaged into a monthly series, then weighted according to the portion of a representative natural gas plant liquids barrel that they occupy. The NGPL Composite price excludes natural gas liquids produced at crude oil refineries.

(17) U.S. Natural Gas Production and Consumption
- Source: U.S. Energy Information Administration.
- Marketed Production is equal to gross withdrawals of natural gas from production reservoirs, less gas used for reservoir re-pressuring, nonhydrocarbon gases removed in treating and processing operations, and quantities vented and flared (gas that is disposed of by release into the atmosphere).

(18) U.S. Natural Gas Supply and Inventory
- Source: U.S. Energy Information Administration.
- Working Gas is defined as the total amount of natural gas in storage less the amount of base gas. Base gas is the amount of gas intended as permanent inventory.

(19) U.S. Natural Gas Consumption by End Use
- Source: U.S. Energy Information Administration.

(20) U.S. Natural Gas Plant Liquids Production
- Source: U.S. Energy Information Administration.
- Natural Gas Plant Liquids Production refers to the sum of all production of ethane, propane, butane, isobutane, pentane and pentane plus.

(21) U.S. Liquefied Natural Gas Import and Export Volumes
- Source: U.S. Energy Information Administration.

(22), (23) and (24) North American LNG Import / Export Terminals – Proposed, Approved and Existing
- Source: Federal Energy Regulatory Commission.

(25) Heating Oil Prices
- Source: U.S. Energy Information Administration.
- Spot prices of No 2. heating oil at New York Harbor, alongside the spot prices of West Texas Intermediate crude oil for comparison purposes.

(26) Intermediate Fuel Oil aka "Bunker Fuel" Prices
- Source: Ship & Bunker.
- Intermediate Fuel Oil, also known as IFO and Bunker Fuel, is fuel utilized by ships and barges to facilitate international exchange of various commodities across an array of industries, including energy. It is classified in the maritime field by its viscosity, measured in centistokes. IFO 380 has a maximum viscosity of 380 centistokes, while IFO 180 has a maximum viscosity of 180 centistokes. IFO 380 is comprised of 98% residual fuel oil and 2% distillate fuel oil. IFO 180 is comprised of 88% residual fuel oil and 12% distillate fuel oil.

DATA CENTER: ABBREVIATIONS & ACRONYMS, DEFINITIONS, DESCRIPTIONS AND CHART NOTES

(27) Propane Prices

- Sources: U.S. Energy Information Administration (Conway, KS and Mont Belvieu, TX spot prices), Government of Canada National Energy Board (Edmonton, Canada trading hub prices), Ec.euopa.eu European Commission (Netherlands Retail prices), LPG Australia and news articles (Saudi ARAMCO contract prices), Knoema.com and Petroleum Association of Japan (Japan Imports prices).
- Conway, KS and Mont Belvieu, TX retail prices are propane prices, while Saudi ARAMCO Contracts and Japan Imports are liquefied petroleum gas (LPG) prices. Netherlands Retail and Edmonton, Canada retail prices are auto propane and exclude taxes.
- Propane and LPG prices are represented on the same chart due to the fact that propane is dealt in international marketplaces as LPG, and is referred to as LPG in many European and Asian countries. LPG is comprised of a mixture of propane and butane.
- Conway, KS wholesale prices are typically available only for the winter months (October through March), during which propane demand is driven by cold weather, therefore, the data series displayed is intermittent.

(28) No. 1 Distillate Fuel Oil, Residual Fuel Oil Wholesale, Retail Sales Volume by Refiners

- Source: U.S. Energy Information Administration.
- No. 1 Distillate Fuel Oil consists of No. 1 diesel fuel and No. 1 fuel oil. The former is used in high-speed diesel engines, including those used by metropolitan buses and smaller automobiles. No. 1 fuel oil is utilized primarily as fuel for portable outdoor stoves and heaters.
- Residual Fuel Oil is the general classification for heavy oils that remain after lighter oils are distilled away in the process of petroleum refining. Residual Fuel Oil includes No. 5 and No. 6 fuel oils. The former is used in steam-powered vessels, and the latter is used for electric power generation, space heating, vessel bunkering and industrial processes.
- All wholesale and retail sales volumes refer to those sold by refiners only.

(29) No. 2 Distillate Fuel Oil Wholesale, Retail Sales Volume by Refiners

- Source: U.S. Energy Information Administration.
- No. 2 Distillate Fuel Oil consists of No. 2 diesel fuel and No. 2 fuel oil (heating oil). No. 2 diesel fuel is utilized in on-and-off highway diesel engines, including those used by railroad locomotives, trucks, automobiles and agricultural machinery. No. 2 fuel oil (heating oil) is used for space heating and moderate capacity industrial/commercial burner units.
- All wholesale and retail sales volumes refer to those sold by refiners only.

(30) Propane & Propylene and Distillate Fuel Oil Production and Consumption

- Source: U.S. Energy Information Administration.
- Distillate Fuel Oil is a general classification for a variety of petroleum fractions produced in petroleum distillation operations. Included within this classification are No. 1, No. 2 and No. 4 diesel fuels (used in on-highway and off-highway diesel engines), as well as No. 1, No. 2 and No. 4 fuel oils (used primarily for space heating and electric power generation).
- Propylene is an important petrochemical feedstock that is recovered from refinery or petrochemical processes. It is an olefinic hydrocarbon that is gaseous at standard temperature and pressure.
- Product Supplied is a proxy for consumption as it measures the disappearance of said product from primary sources, including refineries, processing plants, blending plants, pipelines and bulk terminals.

(31) U.S. Ending Stocks of Propane & Propylene and Distillate Fuel Oil

- Source: U.S. Energy Information Administration.
- Distillate Fuel Oil is a general classification for a variety of petroleum fractions produced in petroleum distillation operations. Included within this classification are No. 1, No. 2 and No. 4 diesel fuels (used in on-highway and off-highway diesel engines), as well as No. 1, No. 2 and No. 4 fuel oils (used primarily for space heating and electric power generation).
- Propylene is an important petrochemical feedstock that is recovered from refinery or petrochemical processes. It is an olefinic hydrocarbon that is gaseous at standard temperature and pressure.
- Ending Stocks are defined as the total volume of a propane and propylene/distillate fuel oil held in storage as of the last day of the period. Ending Stocks are monthly averages of Ending Stocks reported at the end of each week during that month, not the amount of Ending Stocks reported at the end of the month. The resulting values are represented as monthly average inventory levels.

DATA CENTER: ABBREVIATIONS & ACRONYMS, DEFINITIONS, DESCRIPTIONS AND CHART NOTES

(32) U.S. Land Well Count, Rig Count and Wells per Rig

- Source: Platts S&P Global Quarterly Well Count Report.
- Well and rig count data include only those on United States land. Thus, no offshore data is included.
- Platts RigData U.S. Land Rig Count methodology states that a rig is added to the count every time a new oil platform, or rig, is set up on a given site, or every time an existing rig moves to a new location and drills on that site.
- Platts RigData derives U.S. Land Well Count data through tracking new drilling permits and drilling activity only. Thus, the wells comprising the U.S. Land Well Count do not necessarily have to be completed or produce oil or gas in order to be included. For this reason, the well count represented overstates the amount of completed and producing wells that exist on U.S. land.

(33) U.S. Well Starts by Depth

- Source: Platts RigData.
- Total number of well starts by depth on U.S. Land, U.S. Inland Waters and U.S. Offshore, respectively.

(34) Percentage of Oil Production per Shale Region

- Source: U.S. Energy Information Administration Drilling Productivity Report.
- Percentage of total U.S. crude oil production from each of the shale regions.

(35) Drilled but Uncompleted Wells vs. Crude Oil Price

- Source: U.S. Energy Information Administration Drilling Productivity Report.
- Drilled but Uncompleted (DUC) Wells are oil and gas wells that have been drilled but haven't gone through the process of completion (the process of installing well casing, tubing and other equipment that prepares a well for production). The number of DUC wells has significant implications on the domestic supply response to crude oil price changes. If crude oil prices decrease, it is theoretically likely that the amount of DUC wells will increase, and vice versa in an increasing crude oil price scenario. Therefore, the West Texas Intermediate Crude price is tracked for comparative purposes.

(36) Hydraulic Fracturing Sand Consumption and Producer Price Index

- Sources: IHS Markit (consumption), U.S. Bureau of Labor Statistics (producer price index).
- Hydraulic Fracturing Sand is sand utilized as a proppant in the process of hydraulic fracturing to help facilitate the extraction of oil and gas from subsurface rock formations.
- Total 2017 Hydraulic Fracturing Sand Consumption contains actual data for January through April 2017, while May through December 2017 consumption data is projected based on IHS Markit's ProppantIQ research.
- The Producer Price Index for Hydraulic Fracturing Sand measures the weighted average period-to-period change in the selling prices received by domestic producers of hydraulic fracturing sand.
- 2017 Producer Price Index shows annual average as of 9/29/2017.
- Hydraulic Fracturing Sand Producer Price Index Base = 100 at December 2012.

(37) and (38) Crude Oil and Natural Gas Production, Rig Count and Production per Rig

- Sources: U.S. Energy Information Administration Drilling Productivity Report (new-well crude oil and natural gas production per rig), Baker Hughes Inc. (rig count).
- New-Well Crude Oil or Natural Gas Production per Rig in each quarter represents the average of each month's value. New-well production per rig is estimated by dividing several trailing months of data on total production from new wells in each region by that region's monthly rig count, lagged by two months. New-well production per rig is intended to indicate an average rig's contribution to total crude oil production from new wells.
- The determination between a crude oil rig and a natural gas rig is made by the operating company at the time of issuance of the rig permit by the relevant state's permitting authority. The classification of a given rig as an oil or gas rig is based solely upon the operator's judgment after drilling an appraisal well and determining its specific hydrocarbon content. For example, if a well's production comes 50% from gas, 20% from Natural Gas Liquids and 30% from oil, it could either be listed as a gas rig, because gas comprises the largest share of hydrocarbons, or an oil rig because oil drives the well's economics. This determination is at the judgment of the operator.

DATA CENTER: ABBREVIATIONS & ACRONYMS, DEFINITIONS, DESCRIPTIONS AND CHART NOTES

(39) U.S. Drilling Rigs by Type

- Source: Baker Hughes North America Rotary Rig Count.
- A vertical well is a well that penetrates the earth vertically below the surface-mounted drilling platform, or the surface location of the well.
- A directional well is classified as one in which the surface location of the well is not vertically above the target reservoir. Thus, the well deviates horizontally from its surface location in order to reach the target reservoir, at a specific azimuth and incline. Azimuth measures the cardinal direction of the well's path relative to the surface location, and incline measures degrees of deviation from vertical.
- Per Baker Hughes methodology, a horizontal well is a type of directional well that deviates from vertical by greater than 80 degrees, or one in which the lower part of the wellbore is parallel to the "pay zone." The pay zone is the section of a reservoir that contains hydrocarbons that can be produced economically.

(40) Wind and Solar Prices

- Source: Lazard's Levelized Cost of Energy Analysis 2012-2016.
- The Levelized Cost of Energy (LCOE) is the net present value of the per-megawatt hour cost of building and operating a generating plant over an assumed financial life and duty cycle. It is utilized as a means of comparing the cost-competitiveness of various energy-generating technologies of unequal life spans, project sizes, capital profiles and capacities.
- The respective levelized costs of each generation technology for each year are a simple average of the high and low values of the cost range associated with that generating technology during that year.
- Solar PV refers to solar photovoltaic.
- Solar PV – Community refers to a solar power plant whose electricity is shared by more than one household.
- Solar PV – Rooftop Residential refers to a Solar PV system that has its solar panels mounted on the rooftop of a residential structure.
- Solar PV – Crystalline Rooftop refers to crystalline solar panels mounted on rooftops. Crystalline panels are a type of solar panel that achieves the photoelectric effect, the chemical process that converts solar (light) energy to electricity, through use of crystalline silicone solar cells.
- Solar PV – Crystalline Utility-Scale refers to a solar power plant that uses crystalline panels to generate power that is fed into the grid, supplying a utility with energy.
- Solar PV – Thin Film Utility-Scale refers to a solar power plant that uses thin-film solar panels to generate power that is fed into the grid, supplying a utility with energy. Thin-film panels differ from crystalline panels in that the photoemissive materials, those which produce an electric current when contacted by sufficient solar energy, are not cut from crystals.
- Solar Thermal refers to solar technology that generates thermal energy to heat water or other fluids, rather than generating electricity.

(41) U.S. Total Renewable Energy Consumption

- Source: U.S. Energy Information Administration Monthly Energy Review.
- Total Renewable Energy Consumption is comprised of hydroelectric, geothermal, solar, wind, wood, waste and biofuels.
- Waste refers to biomass waste and is organic non-fossil material of biological origin that is a byproduct or a discarded product. Biomass waste includes municipal solid waste from biogenic sources, landfill gas, sludge waste, agricultural crop byproducts, straw and other biomass solids, liquids and gases.
- Biofuels are liquid fuels and blending components produced from biomass feedstocks, used primarily for transportation. Biomass is organic, non-fossil material comprised of decayed biological matter.

(42) U.S. Solar, Wind and Hydroelectric Energy Consumption

- Source: U.S. Energy Information Administration Monthly Energy Review.

(43) U.S. Wood, Waste, Biofuels and Geothermal Energy Consumption

- Source: U.S. Energy Information Administration Monthly Energy Review.
- Biofuels are liquid fuels and blending components produced from biomass feedstocks, used primarily for transportation. Biomass is organic, non-fossil material comprised of decayed biological matter.

(44) Corn and Ethanol Prices and Corn Cost per Gallon of Ethanol

- Source: U.S. Department of Agriculture Economic Research Service (corn and ethanol price).

DATA CENTER: ABBREVIATIONS & ACRONYMS, DEFINITIONS, DESCRIPTIONS AND CHART NOTES

(45) U.S. Solar Energy Consumption

- Source: U.S. Energy Information Administration Monthly Energy Review.
- Utility-scale solar energy refers to solar energy generated by plants with a capacity of at least one megawatt that is transmitted via the transmission grid to a high volume of consumers. Thus, Utility-Scale Solar Energy Consumption represents consumption of solar energy generated at plants with capacity of at least one megawatt.
- Distributed solar energy refers to solar energy generated by small-scale generating plants with capacity below one megawatt that is distributed over a specific locality with a small volume of consumers relative to utility-scale energy consumers. Thus, Distributed Solar Energy Consumption represents consumption of solar energy generated at small-scale generating plants.

(46) U.S. Solar Energy Net Generation

- Source: U.S. Energy Information Administration Monthly Energy Review.
- Distributed Solar Photovoltaic Generation refers to energy generated by small-scale photovoltaic generation plants. Small-scale is defined as a plant with capacity below one megawatt. Photovoltaic generation refers to solar energy generated by photovoltaic solar panels.
- Utility-Scale Solar Electricity Net Generation refers to generation of solar energy by plants with capacity equal to or above one megawatt. Net generation is defined as the amount of gross generation less electrical energy consumed by the generating plant for service or auxiliaries.

(47) Distributed Solar Photovoltaic Generation by Sector

- Source: U.S. Energy Information Administration Monthly Energy Review.
- Distributed Solar Photovoltaic Generation refers to energy generated by small-scale photovoltaic generation plants. Small-scale is defined as a plant with capacity below one megawatt. Photovoltaic generation refers to solar energy generated by photovoltaic solar panels.

(48) Utility-Scale Solar Electricity Net Generation by Sector

- Source: U.S. Energy Information Administration Monthly Energy Review.
- Utility-Scale Solar Electricity Net Generation refers to generation of solar energy by plants with capacity equal to or above one megawatt. Net generation is defined as the amount of gross generation less electrical energy consumed by the generating plant for service or auxiliaries.
- Gaps in the data represent periods for which there was no data reported, or the data value was trivially small and thus deemed unnecessary to report.

(49) U.S. Solar Capacity Installations

- Source: Solar Energy Industries Association Q1 2017 Solar Market Insight Report.
- The Investment Tax Credit (ITC) is a federal policy tax incentive that supports the deployment of solar energy in the United States. The ITC allows those who install a solar system to claim up to 30% of the price paid to install the system as a tax credit when filing Federal taxes, thereby significantly discounting the cost associated with transitioning to solar energy.

(50) U.S. Wind Power Capacity Installations

- Source: American Wind Energy Association U.S. Wind Energy Quarterly Market Report.
- Wind Power Generation Capacity Installations refers to non-utility-scale wind power capacity additions. Utility-scale is defined as installations of wind turbines larger than 100 kilowatts.

(51) Utility-Scale Wind Power Capacity Installations

- Source: American Wind Energy Association U.S. Wind Energy Quarterly Market Report.
- Utility-Scale Wind Capacity includes installations of wind turbines larger than 100 kilowatts. Capacity installations may not always equate to an equal increase in cumulative wind power capacity due to decommissioned, uprated and repowered wind turbines.

DATA CENTER: ABBREVIATIONS & ACRONYMS, DEFINITIONS, DESCRIPTIONS AND CHART NOTES

(52) Wind Power Under Construction or in Advanced Development

- Source: American Wind Energy Association (AWEA) U.S. Wind Energy Quarterly Market Report.
- AWEA defines projects as being "in advanced development" if it has not yet begun construction, but has either signed a power purchase agreement, announced a firm turbine order, or been announced to proceed under utility ownership.

(53) U.S. Aggregated Energy Consumption by Sector

- Source: U.S. Energy Information Administration.
- Energy consumed by the electric power sector is primary energy only. Primary energy is energy in its original form, before any transformation to secondary or tertiary forms of energy. For example, coal can be converted to synthetic gas and then to electricity. Under these circumstances, coal is primary energy, synthetic gas is secondary energy and electricity is tertiary energy.

(54) U.S. Aggregated Energy Consumption by Source

- Source: U.S. Energy Information Administration.
- Total consumption of each category of energy is as accurate as possible. However, some data is unavailable or unreported and, thus, some total consumption values may be understated.
- Fossil Fuels includes coal, petroleum-based products, natural gas and natural gas-based products.
- Renewable Energy includes conventional hydroelectric, solar, biomass, nuclear, geothermal and wind.
- Biomass is a renewable energy source derived from organic matter such as wood, crop waste, or garbage, with wood being the largest contributor.
- Fossil Fuels and Renewable Energy consumption represent consumption of primary energy, which is energy in its original form, before transformation to secondary or tertiary forms of energy. Thus, to arrive at total energy consumption, Electricity Retail Sales (representing consumption of secondary and tertiary forms of energy) is added alongside consumption of Fossil Fuels and Renewable Energy.
- Electrical System Energy Losses are a deduction from total energy consumption, and are incorrectly represented as positively contributing to total energy consumption. Thus, total energy consumption figures in each year are overstated by the amount of electrical system energy losses.

(55) Electricity Prices by Sector

- Source: U.S. Energy Information Administration.

(56) Commercial Crude Oil Inventory

- Source: U.S. Energy Information Administration.
- U.S. Ending Stocks of Commercial Crude Oil represents stocks (inventory) of crude oil held in storage for commercial use. This figure excludes both lease stock and volumes in the Strategic Petroleum Reserve (SPR). Lease stock is crude oil stored in tanks at sites where producers are drilling on leased land. They're excluded from total commercial crude oil inventory because they aren't yet available for commercial use. The SPR is petroleum maintained by the Federal Government for use during periods of major supply interruption.
- Ending stocks (inventory) are primary stocks of crude oil held in storage as of midnight on the last day of the month. Primary stocks include crude oil held in storage at, or in, leases, refineries, natural gas processing plants, pipelines, tank farms and bulk terminals with the capacity to store a minimum of 50,000 barrels of petroleum products or that can receive petroleum products by tanker, barge or pipeline.

(57) Petroleum and Other Liquids Commercial Inventory

- Source: U.S. Energy Information Administration.
- Hydrocarbon Gas Liquids (HGLs) are molecules of carbon and hydrogen in various combinations. HGLs include alkanes, or paraffins (ethane, propane, butane, isobutene, natural gasoline) and alkenes, or olefins (ethylene, propylene, butylene, isobutylene).
- Unfinished Oils are all oils that require further processing and are produced by partial refining of crude oil. Unfinished Oils include napthas and lighter oils, kerosene and light gas oils, heavy gas oils and residuum.
- Other Hydrocarbons/Oxygenates are substances that increase the amount of oxygen in various gasoline blends when added to them. This category includes fuel ethanol, methanol and methyl tertiary butyl ether (MTBE).
- Total Motor Gasoline includes finished motor gasoline and motor gasoline blending components.

DATA CENTER: ABBREVIATIONS & ACRONYMS, DEFINITIONS, DESCRIPTIONS AND CHART NOTES

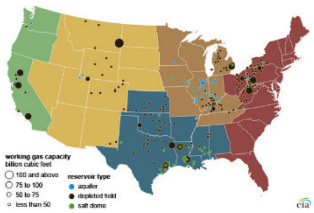
(57) Petroleum and Other Liquids Commercial Inventory (continued)

- Distillate Fuel Oil is a general classification for a variety of petroleum fractions produced in petroleum distillation operations. Included within this classification are No. 1, No. 2 and No. 4 diesel fuels (used in on-highway and off-highway diesel engines), as well as No. 1, No. 2 and No. 4 fuel oils (used primarily for space heating and electric power generation).
- Residual Fuel Oil is the general classification for heavy oils that remain after lighter oils are distilled away in the process of petroleum refining. Residual Fuel Oil includes No. 5 and No. 6 fuel oils. The former is used in steam-powered vessels, and the latter is used for electric power generation, space heating, vessel bunkering and industrial processes.
- Other Oils include aviation gasoline blending components, finished aviation gasoline, kerosene, petrochemical feedstocks, special napthas, lubricants, waxes, petroleum coke, asphalt and road oil, still gas and miscellaneous products.

(58) Natural Gas Underground Storage Capacity

- Source: U.S. Energy Information Administration.
- Underground Storage Capacity refers to total natural gas storage capacity in underground storage facilities called "salt domes," which are caverns hollowed out in subsurface salt formations. Salt domes are the primary means of natural gas storage in the United States.

U.S. Underground Natural Gas Storage Facilities by Type (July 2015)



(59) Commercial Crude Oil Refinery, Tank and Underground Storage Capacity and Utilization

- Source: U.S. Energy Information Administration.
- Commercial Crude Oil Storage Capacity refers to working storage capacity. Working capacity is the volume difference between a crude oil storage tank's maximum safe fill capacity and the volume below which pump suction is ineffective, called tank bottoms.
- Crude Oil Shell Storage Capacity is the design capacity of a petroleum storage tank. It includes tank bottoms, working storage capacity and contingency space. Contingency space is defined as available storage space above the defined maximum operating inventory level that remains empty during normal operations. Shell Storage Capacity is always greater than or equal to working storage capacity.
- Crude Oil Storage Capacity data is released only twice per year for the months of March and September. Thus, the data series excludes inventory levels for all months other than March and September of each year.

(60) Crude Oil and Natural Gas Pipeline Mileage

- Source: Pipeline and Hazardous Materials Safety Administration.
- The chart includes information from only Federal Energy Regulatory Commission-regulated pipeline companies.
- Crude Oil Pipeline Mileage represents total mileage of pipelines dedicated to the transport of crude oil and those dedicated to the transport of petroleum products. Pipeline Mileage for crude oil includes trunk lines only.
- Pipeline Mileage for natural gas includes both trunk and gathering lines.
- Trunk lines are synonymous with transmission lines, which are large, cross-country pipelines that move oil or gas from producing areas to refineries. Gathering lines are pipelines that transport oil or gas from the area in which it was produced to a storage facility which acts as an intermediate stop before transportation by truck, railcar, or trunk line.

(61) Crude Oil and Petroleum Products Pipeline Movements Between Petroleum Administration for Defense Districts (PADDs)

- Source: Federal Reserve Bank of St. Louis, with data provided by the U.S. Energy Information Administration.
- Crude Oil and Petroleum Products Pipeline Movements Between PADDs represents the total volume of crude oil and petroleum products transported between each PADD. The data does not include movements within each PADD.

DATA CENTER: ABBREVIATIONS & ACRONYMS, DEFINITIONS, DESCRIPTIONS AND CHART NOTES

(62) Natural Gas Cumulative Interstate Pipeline Systems Capacity

- Source: U.S. Energy Information Administration.
- Cumulative Interstate Capacity refers to capacity of natural gas pipelines crossing between states. Thus, capacity of intrastate pipelines is not included and the data should not be interpreted as representing total capacity of natural gas pipelines.

(63) Crude Oil and Petroleum Products Exports to Mexico

- Source: U.S. Energy Information Administration.
- Petroleum Products include pentanes plus, liquefied petroleum gases, unfinished oils, finished motor gasoline, motor gasoline blending components, oxygenates, fuel ethanol, distillate fuel oil, kerosene, kerosene-type jet fuel, special napthas, residual fuel oil, waxes, petroleum coke, asphalt and road oil, lubricants and miscellaneous products.

(64) Truck Tonnage Index

- Source: U.S. Department of Transportation, Bureau of Transportation Statistics.
- The Truck Tonnage Index measures the gross tonnage of freight that is transported by motor carriers for a given month. The Index serves as an indicator of shipping activity in the United States.
- Created by the U.S. Department of Transportation, Bureau of Transportation Statistics via information published in the American Trucking Association (ATA) Monthly Truck Tonnage Report.
- In January 2018, ATA revised the seasonally adjusted index back five years as part of its annual revision. In addition, ATA re-indexed the seasonally adjusted and not seasonally adjusted tonnage indexes to 2015 = 100 back to 1973.

(65) Heavy Truck Sales

- Source: Federal Reserve Bank of St. Louis.
- Heavy Trucks are trucks with more than 14,000 pounds gross vehicle weight.

(66) Trucking Conditions Index

- Source: FTR Transportation Intelligence.
- The Trucking Conditions Index summarizes the status of the trucking industry through tracking changes in six major conditions including freight volumes, freight rates, fleet capacity, fleet bankruptcies, fuel price and financing.
- An index value greater than zero represents a positive environment in the truck market, and an index value below zero represents a negative environment. An index value above 10 is a sign that volumes, prices and margin are in a solidly favorable range.

(67) Freight Transportation Services Index

- Source: Federal Reserve Bank of St. Louis.
- The Freight Transportation Services Index measures the output of the for-hire freight transportation industry and consists of data from for-hire trucking, rail, inland waterways, pipelines and air freight.

(68) Crude Oil Refinery Receipts by Transportation Method

- Source: U.S. Energy Information Administration.
- Refinery Receipts by Pipeline, Tanker, Barge, Truck and Rail refer to total volumes of crude oil of domestic and international origin that are in transit to, or received by, domestic refineries. Volumes of crude oil in transit via pipeline are excluded from receipts. Foreign crude oil is included in receipts only after entry through customs.
- Refinery inputs track volumes of crude oil that are entered into refining processes (e.g., distillation units, cokers, etc.).
- The volume difference between refinery receipts and refinery inputs is that which is in transit but not yet received by refineries plus that which has been received and is held in bonded storage, awaiting entry into refining processes.

(69) Crude Oil Movements by Tanker and Barge Movements Between Petroleum Administration for Defense Districts (PADDs)

- Source: U.S. Energy Information Administration.
- The data series shown on the chart is an aggregate of all crude oil movements between Petroleum Administration for Defense Districts (PADDs). This includes crude oil movement from PADD 1 to PADD 2 and PADD 3; PADD 2 to PADD 1 and PADD 3; and PADD 3 to PADD 1, PADD 2 and PADD 5.
- PADD 1 is the East Coast region, PADD 2 is the Midwest region, PADD 3 is the Gulf Coast region and PADD 5 is the West Coast region.

DATA CENTER: ABBREVIATIONS & ACRONYMS, DEFINITIONS, DESCRIPTIONS AND CHART NOTES

(70) Movements of Crude Oil by Rail
- Source: U.S. Energy Information Administration.

(71) Average Weekly Rail Carloads of Petroleum and Petroleum Products
- Source: Association of American Railroads.
- Monthly aggregates of the average weekly number of rail carloads transporting petroleum and petroleum products in the United States.
- Excludes the U.S. operations of Canadian railroads.

(72) U.S. Manufacturers' Monthly Shipments and U.S. Purchasing Managers' Index (PMI)
- Sources: For Manufacturers' Monthly Shipments - U.S. Census Bureau Manufacturers' Shipments, Inventories and Orders Survey; and for U.S. Purchasing Managers' Index (PMI) – Institute for Supply Management Manufacturing Report on Business®.
- A PMI above 50 represents expansion within the manufacturing sector compared with the prior month.

(73) U.S. New Housing Starts and Total U.S. Construction Spending
- Source: U.S. Census Bureau.

(74) London Interbank Offered Rate (LIBOR), Based on U.S. Dollar
- Source: ICE Benchmark Administration Limited via the Federal Reserve Bank of St. Louis.
- The London Interbank Offered Rate is the average interest rate at which leading banks borrow funds of a sizeable amount from other banks in the London market. LIBOR is the most widely used benchmark or reference rate for short term interest rates. The chart values are monthly percent averages of daily figures and are not seasonally adjusted.

(75) Bank Prime Loan Interest Rates
- Source: Federal Reserve Bank of St. Louis.
- The Bank Prime Loan Interest Rate is that posted by a majority of top 25 (by assets in domestic offices) insured, U.S.-chartered commercial banks. Prime is one of several base rates used by banks to price short-term business loans.
- The chart values are monthly percent averages of daily figures and are not seasonally adjusted.

(76) Commercial and Industrial Loans vs. Banking Standards
- Source: Federal Reserve Bank of St. Louis.
- Net Percentage of Domestic Banks Tightening Standards for Commercial and Industrial Loans to large and middle-market firms. Quarterly, not seasonally adjusted.
- Commercial and Industrial Loans, All Commercial Banks. Monthly, seasonally adjusted.

(77) U.S. Treasury Yield Curve
- Source: U.S. Treasury.
- U.S. Treasury Yield Curve rates are commonly referred to as Constant Maturity Treasury (CMT) rates. Yields are interpolated by the U.S. Treasury from the daily yield curve.
- The curve, which relates the yield on a security to its time to maturity, is based on the closing market bid yields on actively traded U.S. Treasury securities in the over-the-counter market.

(78) Corporate Spreads to Treasuries by Quality
- Source: Federal Reserve Bank of St. Louis.
- Corporate Spreads to Treasuries represent the spread, or difference, between the yield curve of an index of corporate bonds of a given rating category and the spot rate U.S. Treasury curve. The spot rate U.S. Treasury curve is a yield curve that uses U.S. Treasury spot rates rather than yields, and represents the rate for a zero-coupon U.S. Treasury bond.
- The corporate bond yield indexes are Bank of America Merrill Lynch Option-Adjusted Spread (OAS) Indexes for all bonds with a given investment rating of AA, BB or CCC or below that are publically issued in the U.S. domestic market. Each respective OAS index is calculated using each constituent bond's OAS, weighted by market capitalization. A bond's OAS is the bond's yield spread relative to the risk-free rate of return, typically the U.S. Treasury securities yield, adjusted to account for an embedded option.

HOT TOPICS

OPPORTUNITIES IN ENERGY INFRASTRUCTURE

America's amazing oil and natural gas production growth, and the investment in related infrastructure this has driven, have exceeded anyone's imagination of just a few years ago. Crude oil production is now at an all-time high of about 12 million barrels per day and is forecast to reach 13 million by the fourth quarter of 2019, more than double 2010 production. Growth is driven in part by exports, forecast to reach 4.5 million barrels per day by 2020, growing from essentially zero in 2015 following the end of the export ban that had been in place since 1975.

Similarly, U.S. natural gas production grew by 10 billion cubic feet per day (bcf/d) in 2018 to 89.6 bcf/d, an 11% increase from 2017. The growth was the largest annual production increase in history, reaching a record high for the second consecutive year. Those records make the U.S. the world's leading producer in both categories, compliments of incredible output growth from U.S. shale.

A second phenomenon has gone hand-in-hand with this result: growth of energy infrastructure. That story is still playing out, and the numbers are equally amazing. Oil and natural gas infrastructure are critically inter-connected throughout the value chain. Upstream infrastructure includes production complexes and gathering systems; midstream includes pipelines, compression, pumping and storage; downstream includes LNG and crude oil export terminals, processing plants, power generation and local distribution. Each segment is dependent on all the others.

Infrastructure must expand in lock-step with production growth. Gas, oil and other liquids cannot be produced without the supporting infrastructure to move product from the well-head to the point of consumption, whether in the U.S or the global marketplace. That means more pipelines, storage facilities, export terminals, processing plants, power generation and local distribution systems.

The scale of business opportunity and job creation in building and operating this new infrastructure is staggering, especially in the supply chain, which includes construction, equipment, materials, services and supplies. Here are some rough metrics of that opportunity:

- The Energy Equipment & Infrastructure Alliance (EEIA) is following $85 billion of new investment in 52 major liquids and natural gas pipeline projects, proposed or under construction, totaling 17,000 miles – and this includes only the big projects in the $400+ million range. Contact info@eeia.org if you'd like a list.

HOT TOPICS

OPPORTUNITIES IN ENERGY INFRASTRUCTURE (CONTINUED)

- We also track another $185 billion of investment in 27 LNG export terminal projects applied for, on the drawing boards or under construction.
- None of this includes countless smaller projects, including pipeline laterals to export terminals, power plants, storage facilities, processing plants, manufacturing facilities, and local distribution systems.
- In a May 2019 report, "Chemical Investment Linked to U.S. Shale Gas", the American Chemistry Council reports $204 billion of natural gas-dependent chemical processing plants under construction, planned or built since 2010, including new facilities, expansions and factory re-starts.

Driving this robust infrastructure investment is the outlook for continuing rapid growth in natural gas demand – for both domestic consumption and export:

- The U.S. Energy Information Administration (EIA) forecasts additions to U.S. natural gas-fired electric generating capacity will add up to 235 gigawatts by 2050, up about 50% from today's in-service capacity of 475 gigawatts, as we continue the switch toward lower-carbon fuels.
- Current generating capacity consumes about 30 bcf/d of natural gas, which means the new capacity additions will require 10 to 15 bcf/d of additional production along with necessary new pipeline delivery capacity.
- Another 25 bcf/d of natural gas will be needed to supply fifteen LNG export terminals already under construction or fully permitted, with most coming online between now and 2024. Another twelve projects amounting to 17 bcf/d of additional capacity have been applied for.
- Pipeline exports to Mexico, now at about 5 bcf/d, have the potential to double over the next several years. Existing cross-border capacity, primarily from Texas, already equals 11 bcf/d. Mexican natural gas consumption for power generation and industrial use continues to grow while domestic production declines. U.S imports will fill the gap as Mexico adds needed new internal pipelines.

HOT TOPICS

OPPORTUNITIES IN ENERGY INFRASTRUCTURE (CONTINUED)

- This all adds up conservatively to at least 40 bcf/d of new production on top of the 90 bcf/d of current production – or a 45% increase in production over the next two to three decades. Over half of this will come in the next five to seven years from exports alone.

So, with easily more than $500 billion of oil and gas-driven infrastructure investment in prospect over the next decade, what could possibly go wrong? Here are a few candidates:

- Climate change politics and zero-carbon proponents are gaining strength, resources and political allies throughout all levels of government. The debate around the "Green New Deal" will intensify as the election gets closer. An adverse 2020 outcome isn't out of the question and could put much of this picture at risk.

- Adding to the opposition's deep pockets, Michael Bloomberg recently announced he is spending $500 million to influence state and local policymakers to stop building any new natural gas-fired power plants and retire all coal-fired power plants.

- Opponents are targeting pipelines because they are essential to natural gas and petroleum production and consumption. Tactics include attacking federal, state and local construction permits through court challenges. Several major projects have been brought to a halt.

The irony is that natural gas for power generation has lowered carbon emissions in this country to the greatest extent anywhere in the world – back to levels of the early 1990's – putting the U.S. on track to meet what would have been our Paris climate goals.

U.S. LNG exports can help mitigate greenhouse gas emissions from the world's worst culprits: China and India. China today emits four times more CO2 than does the U.S., and India's is equal to ours. Both countries' emissions are growing, while ours are declining. But to help other countries emulate our successes, we need substantially more production, pipelines and export capacity here at home.

Add the fact that fast-ramping natural gas plants are essential to bringing intermittent wind and solar generation into the grid. These are strong climate-related arguments for expanding our natural gas production and associated pipeline, generating and export infrastructure.

HOT TOPICS

OPPORTUNITIES IN ENERGY INFRASTRUCTURE (CONTINUED)

Yet to be heard from are U.S. consumers increasingly suffering the real-life consequences of their elected leaders restricting pipeline capacity. One of New York's main gas distribution companies, Con Edison, has begun refusing new connections or expanded service in Westchester County and Manhattan. Another, National Grid, has done the same in Brooklyn and Queens. Both cases are largely because the Northeast Supply Enhancement pipeline project's permits have been denied by both New York and New Jersey, and the Constitution pipeline, carrying gas from the Marcellus, has been denied by New York. This is also preventing new natural gas power plants from being developed to replace retiring nuclear and coal capacity, foreshadowing growing energy shortages and inevitably higher costs to consumers.

Look for the debate to continue and intensify as we approach the 2020 elections.

HOT TOPICS

UPDATE ON THE SUCCESS OF CHINA'S CRUDE OIL FUTURES

It has been a little more than a year since China launched yuan-denominated crude oil futures contracts on the Shanghai International Energy Exchange (INE) in March 2018, and there are signs that the new contracts are being accepted into a market dominated by West Texas Intermediate crude oil (WTI) traded in New York and Brent crude oil (Brent) traded in London. Designed specifically to attract international participants, China hopes the Shanghai crude futures will create a new China-based global pricing point for crude oil alongside the incumbent international crude benchmarks like Brent and WTI. The creation of the Shanghai oil futures followed years of planning by the Chinese and are a key part of Beijing's broader strategy to gain clout in global oil trade and turn the yuan into a credible challenger to the dollar.

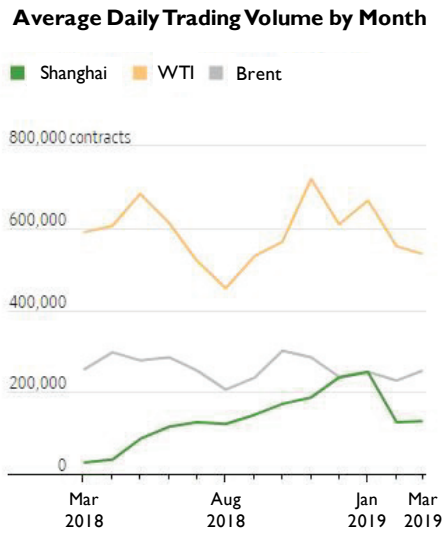
The value of Shanghai crude futures reflects the price of medium sour crudes stored in bonded tanks close to refining locations on the coast of China. The Chinese see the Shanghai contract as a path to reignite international interest in the yuan, which has fallen amid the currency's slump against the dollar and government interventions in the market since 2015. While most Chinese commodity markets are open only to domestic investors, foreign investors have been allowed to trade the INE contract since its launch, with the Ministry of Finance granting a three-year tax exemption on trading profits.

According to the INE, 52 overseas agencies have registered with the exchange mainly from Hong Kong, Singapore, Britain, the Republic of Korea and Japan. These agencies are serving customers from Britain, Australia, Switzerland, Singapore, Cyprus, Seychelles, as well as Hong Kong and Taiwan.

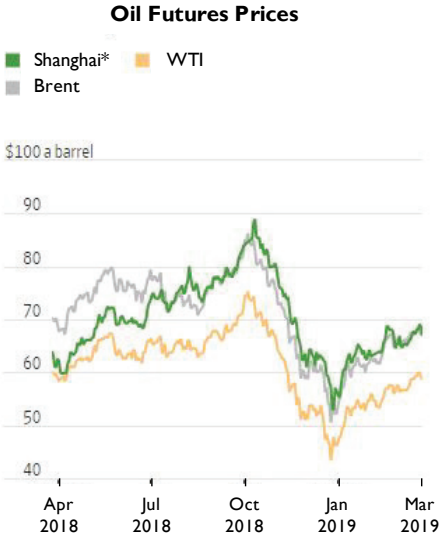
The success of any new futures contract and market is typically measured by its liquidity, depth and open interest. In the case of a physically settled contract, the delivery mechanism of the new contract is also closely scrutinized by the market. Over the past year, China's yuan-denominated crude oil futures' trading volume has grown strongly while prices have closely tracked global benchmarks. In January 2019, daily trading volume of front-month crude oil futures on the INE averaged 248.5 million barrels of oil. This made up roughly 20% of global trading in similar contracts and were close to trading volumes in Brent front-month oil contracts in London, according to The Wall Street Journal. At the end of March, the benchmark Shanghai contract's trading volume made up approximately 14% of the global activity in similar futures, or about half that of Brent's volume.[1] The bulk of crude oil trading still takes place in the U.S., where the benchmark is the WTI contract.

HOT TOPICS

UPDATE ON THE SUCCESS OF CHINA'S CRUDE OIL FUTURES (CONTINUED)



Note: 1 contract = 1,000 barrels of oil.



*Converted from yuan at March 26, 2019 exchange rate.

Source: The Wall Street Journal.(1)

But despite a surge in volumes, most trading in the yuan-based contracts has been initiated by domestic, rather than foreign players. INE data from mid-December shows that around 92% of the trading volume and about 80% of the open interest was accounted for by domestic Chinese traders, and retail investors accounted for slightly over three quarters of the volume and over half the open interest.(2) To become more successful, the market needs a more diverse group of participants, including producers, end-users and international shippers to offset the dominance of the Chinese traders. There are also signs that trading in Shanghai is to a large extent driven by speculators. One indication is that trading volumes regularly far surpass the outstanding positions in the contracts. These factors suggest China still has a way to go before oil futures in Shanghai can become a truly international benchmark.

Since the 1970's, the U.S. dollar has been the default currency for pricing and trading in the global oil market. In 1974, the United States and Saudi Arabia signed an agreement committing the Saudis to accept only dollars for all its oil sales. A year later, dollar-only trading was extended to all of the members of the Organization of Petroleum Exporting

HOT TOPICS

UPDATE ON THE SUCCESS OF CHINA'S CRUDE OIL FUTURES (CONTINUED)

Countries (OPEC). This created what became known as the petrodollar system, giving the United States the advantage of being able to use its own currency to purchase oil, while other countries that need to buy oil had to build their own dollar reserves.

Those deals, and the petrodollar system that followed, were based on the fact that the United States was the dominant buyer of oil at the time. The United States consumed more oil in each year of the 1970's than China consumes today. Things are different now. The United States has almost doubled its domestic crude production capacity over the past decade or so using shale oil technologies, which has made the country a net oil exporter for the first time in 75 years. Instead, China has become the world's largest oil importer, with nearly 70% of its demand met by imports. China's demand is expected to grow from a current level of approximately 600 million tons per year to more than 750 million tons per year by 2040.[3] With limited domestic production capacity, China is likely to continue to rely largely on crude imports. The yuan-denomination market allows Chinese commercial participants to hedge risk while paying in domestic currency which, in turn, will give the country more leverage to price global energy supplies. A prudent move for China given their ever-accelerating dependence on foreign oil.

It could be years before the Shanghai futures really challenge the petrodollar system and the WTI or Brent crude oil benchmarks. It would require non-Chinese buyers to be comfortable with not just currency risk, but also the level of government involvement in INE trading, the dominance of Chinese participants and physical delivery at facilities controlled by Chinese companies.

In addition, structural issues within China's oil industry, including the virtual monopoly of the nation's top three state-run producers and the government's firm grip on pricing, could hinder China's effort to create a vibrant futures market. Ultimately it is the market comprised of buyers, sellers and financial traders who will decide, but substantial global trading of oil paid for with the yuan is an increasingly likely reality.

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1) The Wall Street Journal, China's Oil Futures Give New York and London a Run for Their Money, March 27, 2019.
2) S&P Global Platts, Insight from Shanghai: China's International Crude Contract Marks First Birthday, March 27, 2019.
3) China Plus, Petroyuan: A Fledgling With the Potential to Soar, February 3, 2019.
4) The National, Oil Markets Key to Success of China's Crude Futures Ambition, April 19, 2019.
5) China Daily, Shanghai Futures Exchange Launches Crude Oil Futures Index, March 27, 2019.
6) Nikkei Asian Review, Shanghai Shakes Up Global Oil Trading, October 17, 2018.

PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

PETROLEUM PRODUCTS

EQUITY COMPARABLES (1)

Petroleum Products (United States & Canada)

Company	LTM[2] Revenues	LTM[2] EBITDA	LTM[2] Margin	Stock Price 03/31/19	% of 52-Week High	Market Cap	Total Enterprise Value[3]	TEV / LTM Revenues	TEV / LTM EBITDA	Net Debt[4]/ EBITDA
Calumet Specialty Products Partners, LP	$3,598	$269	7.5%	$3.56	40.7%	$276	$1,843	0.5x	6.9x	6.1x
Chevron Corporation	157,123	33,181	21.1	123.18	94.0	234,050	260,202	1.7x	7.8x	0.9x
CVR Energy, Inc.	7,073	832	11.8	41.20	86.4	4,142	5,266	0.7x	6.3x	0.9x
EnLink Midstream, LLC	7,710	1,107	14.4	12.78	69.5	6,222	13,807	1.8x	12.5x	4.1x
Gibson Energy Inc.	5,168	329	6.4	17.19	97.2	2,485	3,342	0.6x	10.2x	2.8x
Exxon Mobil Corporation	275,542	37,507	13.6	80.80	92.5	342,172	383,660	1.4x	10.2x	1.1x
HollyFrontier Corporation	17,483	2,087	11.9	49.27	59.2	8,355	10,185	0.6x	4.9x	1.2x
Keyera Corp.	3,156	599	19.0	23.58	81.0	4,993	6,740	2.1x	11.2x	3.4x
Marathon Petroleum Corporation	106,112	8,057	7.6	59.85	67.7	40,258	75,973	0.7x	9.4x	3.7x
Parkland Fuel Corporation	11,459	768	6.7	30.55	86.0	4,462	6,125	0.5x	8.0x	3.5x
Phillips 66	110,969	6,043	5.4	95.17	76.8	43,241	53,882	0.5x	8.9x	1.9x
NuStar Energy LP	1,972	664	33.7	26.89	92.3	2,898	7,336	3.7x	11.0x	5.2x
Valero Energy Corporation	109,365	6,227	5.7	84.83	66.8	35,426	42,617	0.4x	6.8x	1.4x
Median			**11.8%**		**81.0%**			**0.7x**	**8.9x**	**2.8x**
Mean			**12.7%**		**77.7%**			**1.2x**	**8.8x**	**2.8x**

SELECTED TRANSACTIONS

Announced / Closed Date	Target(s)	Acquirer	Total Enterprise Value (TEV)	TEV / Revenues	TEV / EBITDA
4/24/2019	Anadarko Petroleum Corporation (NYSE:APC)	Occidental Petroleum Corporation (NYSE:OXY)	$57,809.2	4.4x	7.6x
10/22/2018	EnLink Midstream Partners, LP (NYSE:ENLK)	EnLink Midstream, LLC (NYSE:ENLC)	$12,923.5	1.7x	12.2x
8/27/2018	Blue Ridge Mountain Resources, Inc. (OTCPK:BRMR)	Eclipse Resources Corporation (NYSE:ECR)	$348.0	3.6x	12.8x
8/1/2018	Energy Transfer Operating, LP	Energy Transfer, LP (NYSE:ET)	$69,430.8	2.1x	10.9x
5/17/2018	Enbridge Energy Partners, LP (NYSE:EEP)	Enbridge Inc. (TSX:ENB)	$15,925.8	6.6x	10.1x
4/30/2018	Andeavor (NYSE:ANDV)	Marathon Petroleum Corporation (NYSE:MPC)	$35,103.0	0.9x	12.7x
11/8/2017	Alon USA Partners, LP	Delek US Holdings, Inc. (NYSE:DK)	$1,050.4	0.5x	5.9x
4/5/2017	Houghton International Inc.	Quaker Chemical Corporation (NYSE:KWR)	$1,415.4	-	11.8x
2/2/2017	ONEOK Partners, LP	ONEOK, Inc. (NYSE:OKE)	$23,722.4	2.7x	12.9x

(1) Matching public companies to middle-market companies is an imperfect comparable analysis due to the variables of size, equipment, markets, etc. Nonetheless JKC's research has yielded this list as the closest available.
(2) LTM is defined as last twelve months.
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(4) Net Debt is defined as total debt less cash and cash equivalents.

PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

NATURAL GAS

EQUITY COMPARABLES (1)

Natural Gas (United States & Canada)

Company	LTM[2] Revenues	LTM[2] EBITDA	LTM[2] Margin	Stock Price 03/31/19	% of 52-Week High	Market Cap	Total Enterprise Value[3]	TEV / LTM Revenues	TEV / LTM EBITDA	Net Debt[4]/ EBITDA
Alliant Energy Corporation	$3,605	$1,223	33.9%	$47.13	98.4%	$11,126	$17,249	4.8x	14.1x	5.0x
AltaGas Ltd.	3,948	860	21.8	13.16	61.8	3,631	12,613	3.2x	14.7x	7.4x
Atmos Energy Corporation	2,979	1,127	37.8	102.93	98.9	12,031	15,559	5.2x	13.8x	3.1x
Avista Corporation	1,384	442	31.9	40.62	76.8	2,669	4,790	3.5x	10.8x	4.8x
Baytex Energy Corp.	947	581	61.3	1.70	36.4	944	2,518	2.7x	4.3x	2.7x
Calumet Specialty Products Partners, LP	3,598	269	7.5	3.56	40.7	276	1,843	0.5x	6.9x	6.1x
Cenovus Energy Inc.	15,890	2,655	16.7	8.68	78.2	10,665	16,931	1.1x	6.4x	2.7x
Chesapeake Utilities Corporation	706	148	21.0	91.21	96.1	1,494	2,110	3.0x	14.2x	4.3x
Corning Natural Gas Holding Corporation	37	9	25.5	19.85	84.5	60	119	3.3x	12.8x	5.6x
Crestwood Equity Partners LP	3,374	294	8.7	35.19	86.8	2,546	5,094	1.5x	17.3x	6.3x
Dominion Energy, Inc.	13,758	6,123	44.5	76.66	99.3	61,282	98,258	7.1x	16.0x	7.0x
EnLink Midstream, LLC	7,710	1,107	14.4	12.78	69.5	6,222	13,807	1.8x	12.5x	4.1x
Enbridge Inc.	34,797	8,072	23.2	36.21	97.4	73,262	130,367	3.7x	16.2x	6.2x
Enterprise Products Partners LP	35,779	7,268	20.3	29.10	96.8	63,580	89,852	2.5x	12.4x	3.7x
Epsilon Energy Ltd.	30	14	46.3	4.09	88.3	118	103	3.5x	7.5x	(1.2)x
Eversource Energy	8,576	2,628	30.6	70.95	98.2	22,513	37,192	4.3x	14.2x	5.8x
Genesis Energy, LP	2,807	572	20.4	23.30	91.3	2,856	7,069	2.5x	12.4x	6.3x
National Fuel Gas Company	1,675	715	42.7	60.96	98.8	5,260	7,282	4.3x	10.2x	2.8x
New Jersey Resources Corporation	2,869	206	7.2	49.79	96.1	4,420	6,093	2.1x	29.5x	6.1x
Northwest Natural Holding Company	728	250	34.4	65.63	91.4	1,896	2,838	3.9x	11.3x	3.6x
MDU Resources Group, Inc.	4,646	627	13.5	25.83	87.2	5,077	7,132	1.5x	11.4x	3.7x
OGE Energy Corp.	2,268	775	34.2	43.12	98.5	8,612	11,665	5.1x	15.0x	4.2x
ONE Gas, Inc.	1,656	442	26.7	89.03	98.4	4,681	6,244	3.8x	14.1x	3.6x
ONEOK, Inc.	12,271	2,314	18.9	69.84	97.0	28,747	38,196	3.1x	16.5x	4.5x
RGC Resources, Inc.	68	20	28.6	26.51	84.6	213	302	4.4x	15.5x	4.3x
South Jersey Industries, Inc.	1,757	292	16.6	32.07	87.3	2,954	6,043	3.4x	20.7x	9.6x
Southwest Gas Holdings, Inc.	2,959	620	21.0	82.26	95.7	4,369	6,657	2.2x	10.7x	3.6x
Summit Midstream Partners, LP	520	253	48.6	9.73	54.9	715	2,287	4.4x	9.0x	4.9x
Targa Resources Corp.	10,328	1,281	12.4	41.55	70.2	9,659	17,725	1.7x	13.8x	5.7x
TC Energy Corporation	10,282	6,261	60.9	44.91	97.6	41,457	82,402	8.0x	13.2x	6.0x
Valener Inc	67	0	0.0	19.57	99.9	770	904	13.6x	NM	NM
Median			**23.2%**		**91.4%**			**3.4x**	**13.5x**	**4.7x**
Mean			**26.8%**		**85.7%**			**3.7x**	**13.2x**	**4.8x**

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PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

NATURAL GAS

SELECTED TRANSACTIONS (1)

Announced / Closed Date	Target(s)	Acquirer	Total Enterprise Value (TEV)	TEV / Revenues	TEV / EBITDA
4/24/2019	Anadarko Petroleum Corporation (NYSE:APC)	Occidental Petroleum Corporation (NYSE:OXY)	$57,809.2	4.4x	7.6x
11/8/2018	Western Gas Partners, LP (NYSE:WES)	Western Gas Equity Partners, LP (NYSE:WGP)	$13,427.9	6.5x	12.0x
10/22/2018	EnLink Midstream Partners, LP (NYSE:ENLK)	EnLink Midstream, LLC (NYSE:ENLC)	$12,923.5	1.7x	12.2x
10/9/2018	Antero Midstream Partners LP (NYSE:AM)	Antero Midstream GP LP (NYSE:AMGP)	$7,359.7	7.7x	11.5x
9/28/2018	American Midstream Partners, LP (NYSE:AMID)	ArcLight Capital Partners, LLC	$1,595.1	2.0x	14.2x
8/27/2018	Blue Ridge Mountain Resources, Inc. (OTCPK:BRMR)	Eclipse Resources Corporation (NYSE:ECR)	$348.0	3.6x	12.8x
8/1/2018	Energy Transfer Operating, LP	Energy Transfer, LP (NYSE:ET)	$69,430.8	2.1x	10.9x
5/17/2018	Williams Partners LP (NYSE:WPZ)	The Williams Companies, Inc. (NYSE:WMB)	$57,052.1	7.0x	14.1x
4/25/2018	Rice Midstream Partners LP (NYSE:RMP)	EQM Midstream Partners, LP (NYSE:EQM)	$2,443.1	7.7x	9.9x
11/1/2017	Southcross Energy Partners, LP (NYSE:SXE)	American Midstream Partners, LP (NYSE:AMID)	$624.1	1.0x	14.8x
7/19/2017	Avista Corporation (NYSE:AVA)	Hydro One Limited (TSX:H)	$5,332.4	3.7x	11.3x
5/15/2017	Ceiba Energy Services Inc. (TSXV:CEB)	Secure Energy Services Inc. (TSX:SES)	$28.2	4.3x	30.3x
4/3/2017	Rockies Express Pipeline LLC	Tallgrass Energy Partners, LP (NYSE:TEP)	$4,043.9	-	7.3x
2/21/2017	Delta Natural Gas Company, Inc. (NasdaqGS:DGAS)	PNG Companies LLC	$260.2	3.7x	13.7x
2/1/2017	ONEOK Partners, LP	ONEOK, Inc. (NYSE:OKE)	$23,721.4	2.3x	12.9x
1/25/2017	WGL Holdings, Inc. (NYSE:WGL)	AltaGas Ltd. (TSX:ALA)	$6,634.5	2.7x	15.3x

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PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

PROPANE AND HEATING/FUEL OIL

EQUITY COMPARABLES (1)

Propane and Heating/Fuel Oil (United States & Canada)

Company	LTM[2] Revenues	LTM[2] EBITDA	LTM[2] Margin	Stock Price 03/31/19	% of 52-Week High	Market Cap	Total Enterprise Value[3]	TEV / LTM Revenues	TEV / LTM EBITDA	Net Debt[4]/ EBITDA
AmeriGas Partners, LP	$2,787	$583	20.9%	$30.87	70.5%	$2,871	$5,844	2.1x	10.0x	4.8x
Ferrellgas Partners, LP	1,789	194	10.8	1.31	32.8	127	2,233	1.2x	11.5x	11.3x
NGL Energy Partners LP	24,017	388	1.6	14.03	97.6	1,747	4,294	0.2x	11.1x	5.5x
Spire Inc.	1,995	527	26.4	82.29	98.8	4,175	6,960	3.5x	13.2x	5.2x
Star Group, LP	1,792	88	4.9	9.60	95.0	499	666	0.4x	7.6x	2.2x
Suburban Propane Partners, LP	1,316	282	21.4	22.41	91.2	1,382	2,670	2.0x	9.5x	4.4x
UGI Corporation	7,520	1,325	17.6	55.42	93.4	9,634	14,381	1.9x	10.9x	3.1x
Median			**17.6%**		**93.4%**			**1.9x**	**10.9x**	**4.8x**
Mean			**14.8%**		**82.8%**			**1.6x**	**10.5x**	**5.2x**

SELECTED TRANSACTIONS

Announced / Closed Date	Target(s)	Acquirer	Total Enterprise Value (TEV)	TEV / Revenues	TEV / EBITDA
4/2/2019	AmeriGas Partners, LP (NYSE:APU)	UGI Corporation (NYSE:UGI)	$6,149.2	2.2x	10.5x
3/26/2019	Substantially all of the Propane Distribution Assets of Phelps Sungas, Inc. and BMK of Geneva, Inc.	Superior Plus Corp. (TSX:SPB)	$19.5	-	-
2/7/2019	Propane Assets and Operations of Propane Retailer in West Coast	Suburban Propane, LP	$12.0	-	-
1/30/2019	Wholesale Propane Business of Gas Supply Resources LLC	NGL Energy Partners LP (NYSE:NGL)	$90.0	-	-
10/18/2018	Propane Distribution Assets of Musco Fuel & Propane LLP	Superior Plus Corp. (TSX:SPB)	$14.5	-	-
10/11/2018	Salathe Gas Company, LLC/North Star Exchange, Inc.	Ferrellgas Partners, LP (NYSE:FGP)	-	-	-
9/18/2018	Propane Distribution and Other Assets of Porco Energy Corp	Superior Plus Corp. (TSX:SPB)	$15.5	-	-
9/14/2018	United Liquid Gas Company	Superior Plus Corp. (TSX:SPB)	-	-	-
7/12/2018	Diamond Propane, Inc.	Ferrellgas Partners, LP (NYSE:FGP)	-	-	-
5/30/2018	NGL Propane, LLC	Superior Plus Energy Services, Inc.	$900.0	-	10.6x
5/8/2018	Propane Distribution Assets of Blue Flame Gas Inc.	Superior Plus Corp. (TSX:SPB)	$8.0	-	-
2/14/2018	Propane Distribution Assets and the Fuels and Lubricants Business of Hi-Grade Oil Co.	Superior Plus Energy Services, Inc.	$6.4	-	-

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PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

DRILLING

EQUITY COMPARABLES (1)

Drilling (United States & Canada)

Company	LTM[2] Revenues	LTM[2] EBITDA	LTM[2] Margin	Stock Price 03/31/19	% of 52-Week High	Market Cap	Total Enterprise Value[3]	TEV / LTM Revenues	TEV / LTM EBITDA	Net Debt[4]/ EBITDA
AKITA Drilling Ltd.	$107	$14	12.6%	$2.43	43.3%	$97	$158	1.5x	11.6x	5.1x
Baker Hughes, a GE Company	23,093	2,864	12.4	27.72	73.4	14,273	35,325	1.5x	12.3x	1.7x
CES Energy Solutions Corp.	975	105	10.7	2.04	40.6	543	909	0.9x	8.7x	3.4x
Diamond Offshore Drilling, Inc.	999	227	22.7	10.49	47.9	1,442	2,962	3.0x	13.1x	7.7x
Ensco Rowan plc	1,694	236	13.9	15.72	41.3	1,719	6,123	3.6x	26.0x	19.2x
Ensign Energy Services Inc.	1,005	235	23.4	4.00	74.3	628	1,915	1.9x	8.1x	5.4x
Halliburton Company	23,992	4,167	17.4	29.30	53.4	25,566	34,037	1.4x	8.2x	2.4x
Helmerich & Payne, Inc.	2,814	756	26.9	55.56	74.7	6,140	6,361	2.3x	8.4x	0.3x
Independence Contract Drilling, Inc.	177	45	25.2	2.77	52.0	214	332	1.9x	7.4x	2.7x
National Oilwell Varco, Inc.	8,598	858	10.0	26.64	54.3	10,215	11,569	1.3x	13.5x	2.4x
Precision Drilling Corporation	1,178	279	23.7	2.37	59.5	697	1,901	1.6x	6.8x	4.3x
Secure Energy Services Inc.	2,260	127	5.6	6.12	86.7	982	1,298	0.6x	10.2x	2.6x
Trinidad Drilling Ltd.	461	111	24.2	1.26	79.6	344	719	1.6x	6.4x	3.4x
Unit Corporation	828	364	44.0	14.24	49.0	793	1,645	2.0x	4.5x	1.9x
Median			**20.0%**		**53.8%**			**1.6x**	**8.5x**	**3.1x**
Mean			**19.5%**		**59.3%**			**1.8x**	**10.4x**	**4.5x**

SELECTED TRANSACTIONS

Announced / Closed Date	Target(s)	Acquirer	Total Enterprise Value (TEV)	TEV / Revenues	TEV / EBITDA
10/8/2018	Rowan Companies plc (NYSE:RDC)	Ensco plc (NYSE:ESV)	$3,133.2	3.3x	20.7x
10/1/2018	Sidewinder Drilling LLC	Independence Contract Drilling Inc. (NYSE:ICD)	$291.8	2.6x	45.1x
8/27/2018	Blue Ridge Mountain Resources, Inc. (OTCPK:BRMR)	Eclipse Resources Corporation (NYSE:ECR)	$347.9	3.6x	12.8x
8/13/2018	Trinidad Drilling Ltd. (TSX:TDG)	Ensign Energy Services Inc. (TSX:ESI)	$714.0	1.5x	5.1x
6/5/2018	Xtreme Drilling Corp.	AKITA Drilling Ltd. (TSX:AKT.A)	$155.0	2.8x	162.4x
2/15/2018	Layne Christensen Company (NasdaqGS:LAYN)	Granite Construction Incorporated (NYSE:GVA)	$491.9	1.0x	16.5x
5/30/2017	Atwood Oceanics, Inc. (NYSE:ATW)	Ensco plc (NYSE:ESV)	$1,759.6	2.2x	4.7x
5/19/2017	Savanna Energy Services Corp.	Total Energy Services Inc. (TSX:TOT)	$458.2	1.4x	16.6x

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PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

LUBRICANTS AND GREASES

EQUITY COMPARABLES (1)

Lubricants and Greases (United States & Canada)

Company	LTM[2] Revenues	LTM[2] EBITDA	LTM[2] Margin	Stock Price 03/31/19	% of 52-Week High	Market Cap	Total Enterprise Value[3]	TEV / LTM Revenues	TEV / LTM EBITDA	Net Debt[4]/ EBITDA
Albemarle Corporation	$3,385	$929	27.4%	$81.98	75.4%	$8,681	$10,004	3.0x	10.8x	1.6x
Ashland Global Holdings Inc.	3,733	606	16.2	78.13	90.2	4,892	7,247	1.9x	12.0x	3.9x
Clean Harbors, Inc.	3,331	490	14.7	71.53	98.7	3,995	5,289	1.6x	10.8x	3.1x
CSW Industrials, Inc.	350	75	21.4	57.29	95.6	863	861	2.5x	11.5x	0.1x
FMC Corporation	4,812	1,302	27.1	76.82	82.6	10,110	12,782	2.7x	9.8x	2.5x
Ingevity Corporation	1,175	334	28.4	105.61	87.7	4,410	5,084	4.3x	15.2x	4.3x
Kraton Corporation	1,966	350	17.8	32.18	59.6	1,027	2,506	1.3x	7.2x	4.5x
NewMarket Corporation	2,237	390	17.4	433.56	95.8	4,851	5,549	2.5x	14.2x	2.0x
Ocean Bio-Chem, Inc.	42	5	12.3	3.41	71.3	32	35	0.8x	6.8x	0.9x
Quaker Chemical Corporation	867	120	13.9	200.33	92.3	2,672	2,606	3.0x	21.7x	(0.3)x
Stepan Company	1,984	223	11.3	87.52	91.8	1,971	1,947	1.0x	8.7x	0.2x
Synalloy Corporation	307	28	9.2	15.20	61.3	136	208	0.7x	7.3x	4.5x
Trecora Resources	281	21	7.3	9.09	58.3	224	320	1.1x	15.5x	5.5x
Valvoline Inc.	2,319	438	18.9	18.56	80.1	3,493	4,715	2.0x	10.8x	2.8x
Median			**16.8%**		**85.2%**			**2.0x**	**10.8x**	**2.7x**
Mean			**17.4%**		**81.5%**			**2.0x**	**11.6x**	**2.5x**

SELECTED TRANSACTIONS

Announced / Closed Date	Target(s)	Acquirer	Total Enterprise Value (TEV)	TEV / Revenues	TEV / EBITDA
4/23/2019	Synalloy Corporation (NasdaqGM:SYNL)	Privet Fund Management, LLC	$308.8	1.0x	10.9x
9/13/2018	MPM Holdings Inc. (OTCPK:MPMQ)	KCC Corporation (KOSE:A002380); SJL Partners; Wonik QnC Corporation (KOSDAQ:A074600)	$2,664.9	1.0x	7.4x
8/15/2018	KMG Chemicals, Inc.	Cabot Microelectronics Corporation (NasdaqGS:CCMP)	$1,606.5	3.5x	13.5x
4/5/2017	Houghton International Inc.	Quaker Chemical Corporation (NYSE:KWR)	$1,415.4	1.8x	11.8x
1/31/2017	Sealweld Corporation	KMG Electronic Chemicals Luxembourg Holdings Sarl; KMG Industrial Lubricants Canada, Inc.	$17.3	1.4x	6.6x
9/25/2016	LANXESS Solutions US Inc.	LANXESS Deutschland GmbH	$2,450.7	1.4x	8.2x

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PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

SOLAR

EQUITY COMPARABLES (1)

Solar (United States & Canada)

Company	LTM[2] Revenues	LTM[2] EBITDA	LTM[2] Margin	Stock Price 03/31/19	% of 52-Week High	Market Cap	Total Enterprise Value[3]	TEV / LTM Revenues	TEV / LTM EBITDA	Net Debt[4]/ EBITDA
Boralex Inc.	$374	$224	60.0%	$14.19	80.3%	$1,265	$3,747	10.0x	16.7x	11.3x
Capital Power Corporation	994	493	49.6	23.42	96.5	2,385	4,884	4.9x	9.9x	3.6x
NextEra Energy Partners, LP	736	469	63.7	46.64	92.1	2,619	9,745	13.2x	20.8x	7.5x
NRG Energy, Inc.	9,578	1,503	15.7	42.48	97.3	11,851	17,811	1.9x	11.9x	4.1x
TerraForm Power, Inc.	864	558	64.5	13.74	96.7	2,874	9,088	10.5x	16.3x	10.3x
Vivint Solar, Inc.	291	(59)	(20.3)	4.97	66.8	597	1,800	6.2x	NM	NM
Median			**54.8%**		**94.3%**			**8.1x**	**16.3x**	**7.5x**
Mean			**38.9%**		**88.3%**			**7.8x**	**15.1x**	**7.3x**

SELECTED TRANSACTIONS

Announced / Closed Date	Target(s)	Acquirer	Total Enterprise Value (TEV)	TEV / Revenues	TEV / EBITDA
2/5/2018	8point3 Energy Partners LP (NasdaqGS:CAFD)	Capital Dynamics, Inc.	$1,671.3	23.8x	17.0x
5/4/2017	Up to 20 Megawatts of Solar Energy Power Generation Assets	Kontrol Energy Corp. (CNSX:KNR)	$22.6	-	4.1x
3/7/2017	TerraForm Global, Inc. (NasdaqGS:GLBL)	Orion US Holdings 1 LP	$1,651.8	6.6x	17.2x
1/20/2016	Capstone Infrastructure Corporation	Irving Infrastructure Corp.	$1,435.1	-	12.7x
12/3/2014	Hawaiian Electric Industries, Inc. (NYSE:HE)	NextEra Energy, Inc. (NYSE:NEE)	$4,398.8	1.3x	8.5x

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(4) Net Debt is defined as total debt less cash and cash equivalents.

PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

WIND

EQUITY COMPARABLES (1)

Wind (United States & Canada)

Company	LTM[2] Revenues	LTM[2] EBITDA	LTM[2] Margin	Stock Price 03/31/19	% of 52-Week High	Market Cap	Total Enterprise Value[3]	TEV / LTM Revenues	TEV / LTM EBITDA	Net Debt[4]/ EBITDA
Algonquin Power & Utilities Corp.	$1,630	$651	40.0%	$11.25	98.3%	$5,516	$10,045	6.2x	15.4x	5.6x
Avangrid, Inc.	6,455	1,842	28.5	50.35	92.3	15,558	22,216	3.4x	12.1x	3.6x
Boralex Inc.	374	224	60.0	14.19	80.3	1,265	3,747	10.0x	16.7x	11.3x
Brookfield Renewable Partners LP	3,014	1,900	63.0	31.87	99.6	9,916	30,221	10.0x	15.9x	5.2x
Innergex Renewable Energy Inc.	450	301	66.9	10.53	95.5	1,402	5,210	11.6x	17.3x	11.8x
NextEra Energy Partners, LP	736	469	63.7	46.64	92.1	2,619	9,745	13.2x	20.8x	7.5x
Northland Power Inc.	1,173	856	73.0	17.66	90.0	3,182	9,449	8.1x	11.0x	6.4x
Pattern Energy Group Inc.	496	324	65.3	22.00	98.2	2,158	5,483	11.1x	16.9x	7.4x
TerraForm Power, Inc.	864	558	64.5	13.74	96.7	2,874	9,088	10.5x	16.3x	10.3x
TransAlta Renewables Inc.	337	204	60.5	10.13	99.3	2,669	3,342	9.9x	16.4x	3.3x
Median			**63.4%**		**96.1%**			**10.0x**	**16.3x**	**6.9x**
Mean			**58.6%**		**94.2%**			**9.4x**	**15.9x**	**7.2x**

SELECTED TRANSACTIONS

Announced / Closed Date	Target(s)	Acquirer	Total Enterprise Value (TEV)	TEV / Revenues	TEV / EBITDA
10/30/2017	Alterra Power Corp. (TSX:AXY)	Innergex Renewable Energy Inc. (TSX:INE)	$745.0	10.6x	31.0x
7/28/2017	Boralex Inc. (TSX:BLX)	Caisse de dépôt et placement du Québec	$3,437.5	12.5x	20.3x
6/19/2017	Pattern Energy Group Inc. (NasdaqGS:PEGI)	Public Sector Pension Investment Board	$4,313.7	12.2x	18.6x
3/7/2017	TerraForm Global, Inc. (NasdaqGS:GLBL)	Orion US Holdings 1 LP	$1,651.8	6.6x	17.2x
1/20/2016	Capstone Infrastructure Corp.	Irving Infrastructure Corp.	$1,435.1	-	12.7x

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PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

OIL AND GAS FIELD SERVICES

EQUITY COMPARABLES (1)

Oil and Gas Field Services (United States & Canada)

Company	LTM(2) Revenues	LTM(2) EBITDA	LTM(2) Margin	Stock Price 03/31/19	% of 52-Week High	Market Cap	Total Enterprise Value(3)	TEV / LTM Revenues	TEV / LTM EBITDA	Net Debt(4)/ EBITDA
Archrock, Inc.	$929	$349	37.6%	$9.78	71.1%	$1,275	$2,796	3.0x	8.0x	4.6x
Baker Hughes, a GE Company	23,093	2,864	12.4	27.72	73.4	14,273	35,325	1.5x	12.3x	1.7x
Blueknight Energy Partners, LP	434	55	12.7	1.03	21.2	42	(72)	(0.2)x	(1.3)x	4.8x
CARBO Ceramics Inc.	209	(29)	(13.8)	3.50	29.5	98	114	0.5x	NM	NM
Cathedral Energy Services Ltd.	118	(3)	(2.5)	0.49	36.1	24	25	0.2x	NM	NM
CES Energy Solutions Corp.	975	105	10.7	2.04	40.6	543	909	0.9x	8.7x	3.4x
Cypress Energy Partners, LP	341	22	6.6	7.40	87.0	89	172	0.5x	7.6x	3.6x
Dawson Geophysical Company	155	4	2.4	2.93	34.9	68	41	0.3x	11.3x	(4.0)x
Eco-Stim Energy Solutions, Inc.	41	(23)	(55.3)	0.04	0.8	1	13	0.3x	NM	NM
ENGlobal Corporation	53	(2)	(4.2)	0.51	34.7	14	8	0.1x	NM	NM
Enservco Corporation	53	7	12.9	0.53	35.3	29	69	1.3x	10.1x	6.5x
Ensign Energy Services Inc.	1,005	235	23.4	4.00	74.3	628	1,915	1.9x	8.1x	5.4x
Enterprise Group, Inc.	16	1	4.5	0.14	30.2	8	14	0.9x	19.6x	9.9x
Essential Energy Services Ltd.	133	13	9.7	0.22	44.1	32	48	0.4x	3.7x	1.7x
High Arctic Energy Services Inc.	147	31	20.9	2.84	87.1	144	120	0.8x	3.9x	(0.3)x
Hyduke Energy Services Inc.	10	(6)	(63.1)	0.02	13.9	1	7	0.7x	NM	NM
Innospec Inc.	1,505	202	13.4	83.35	96.3	2,067	2,156	1.4x	10.7x	0.6x
Keane Group, Inc.	2,046	346	16.9	10.89	64.2	1,137	1,408	0.7x	4.1x	0.9x
Matrix Service Company	1,311	40	3.0	19.58	76.0	524	453	0.3x	11.4x	(1.2)x
McDermott International, Inc.	8,308	350	4.2	7.44	31.8	1,351	4,581	0.6x	13.1x	10.5x
Mullen Group Ltd.	964	144	14.9	8.96	70.8	940	1,320	1.4x	9.2x	2.9x
Newpark Resources, Inc.	931	102	11.0	9.16	78.6	827	933	1.0x	9.1x	1.5x
North American Construction Group Ltd.	360	74	20.4	11.64	87.7	292	565	1.6x	7.7x	4.0x
Parkland Fuel Corporation	11,459	768	6.7	30.55	86.0	4,462	6,125	0.5x	8.0x	3.5x
Pioneer Energy Services Corp.	592	81	13.7	1.77	27.9	137	548	0.9x	6.7x	5.5x
Precision Drilling Corporation	1,178	279	23.7	2.37	59.5	697	1,901	1.6x	6.8x	4.3x
Profire Energy, Inc.	44	9	19.8	1.79	33.8	85	70	1.6x	8.0x	(1.7)x
ProPetro Holding Corp.	1,866	454	24.3	22.54	96.7	2,260	2,197	1.2x	4.8x	0.2x
Secure Energy Services Inc.	2,260	127	5.6	6.12	86.7	982	1,298	0.6x	10.2x	2.6x
Select Energy Services, Inc.	1,515	229	15.1	12.02	67.3	963	1,269	0.8x	5.6x	0.4x
Shawcor Ltd.	1,053	83	7.9	14.97	69.3	1,050	1,099	1.0x	13.2x	1.2x
Smart Sand, Inc.	222	67	30.3	4.45	54.7	183	230	1.0x	3.4x	1.3x
STEP Energy Services Ltd.	577	70	12.1	1.53	15.8	102	303	0.5x	4.3x	2.9x
USA Compression Partners, LP	679	381	56.2	15.61	81.0	1,505	3,744	5.5x	9.8x	4.8x
Median			**12.3%**		**61.8%**			**0.9x**	**8.0x**	**2.9x**
Mean			**9.2%**		**55.8%**			**1.0x**	**8.2x**	**2.8x**

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PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

EQUIPMENT AND PHYSICAL TECHNOLOGY

EQUITY COMPARABLES (1)

Equipment and Physical Technology (United States & Canada)

Company	LTM[2] Revenues	LTM[2] EBITDA	LTM[2] Margin	Stock Price 03/31/19	% of 52-Week High	Market Cap	Total Enterprise Value[3]	TEV / LTM Revenues	TEV / LTM EBITDA	Net Debt[4]/ EBITDA
AKITA Drilling Ltd.	$107	$14	12.6%	$2.43	43.3%	$97	$158	1.5x	11.6x	5.1x
Aveda Transportation and Energy Services Inc.	170	13	7.8	0.78	98.1	45	101	0.6x	7.6x	4.4x
CSI Compressco LP	457	96	21.1	2.84	37.0	133	782	1.7x	8.1x	6.8x
Enerflex Ltd.	1,349	163	12.1	14.28	93.7	1,276	1,365	1.0x	8.4x	0.4x
Exterran Corporation	1,362	203	14.9	16.85	53.7	609	994	0.7x	4.9x	2.2x
Forum Energy Technologies, Inc.	1,086	48	4.4	5.11	31.9	561	1,032	1.0x	21.7x	11.1x
Gardner Denver Holdings, Inc.	2,691	616	22.9	27.81	78.8	5,573	7,033	2.6x	11.4x	2.3x
Geospace Technologies Corporation	86	7	7.9	12.94	76.5	176	150	1.7x	22.0x	(2.0)x
Gulf Island Fabrication, Inc.	232	(19)	(8.3)	9.17	79.1	140	61	0.3x	NM	NM
Halliburton Company	23,992	4,167	17.4	29.30	53.4	25,566	34,037	1.4x	8.2x	2.4x
Hanwei Energy Services Corp.	8	(1)	(11.4)	0.02	62.5	4	7	0.9x	NM	NM
Helix Energy Solutions Group, Inc.	742	156	21.0	7.91	72.6	1,177	1,337	1.8x	8.6x	2.9x
ION Geophysical Corporation	183	39	21.4	14.44	46.7	202	292	1.6x	7.4x	3.5x
Key Energy Services, Inc.	506	20	4.0	4.06	22.1	83	276	0.5x	13.6x	10.4x
McCoy Global Inc.	39	2	5.5	0.64	53.8	17	13	0.3x	6.0x	(0.5)x
Mitcham Industries, Inc.	43	(10)	(24.2)	3.93	86.0	48	60	1.4x	NM	NM
Nabors Industries Ltd.	3,123	788	25.2	3.44	38.8	1,234	4,793	1.5x	6.1x	4.1x
National Oilwell Varco, Inc.	8,598	858	10.0	26.64	54.3	10,215	11,569	1.3x	13.5x	2.4x
Natural Gas Services Group, Inc.	69	23	32.9	17.31	64.8	228	176	2.6x	7.8x	(1.7)x
PHX Energy Services Corp.	253	29	11.4	2.43	95.3	141	157	0.6x	5.4x	1.8x
RigNet, Inc.	243	26	10.6	9.77	40.6	190	246	1.0x	9.5x	2.5x
RPC, Inc.	1,619	310	19.1	11.41	56.5	2,456	2,339	1.4x	7.6x	(0.2)x
Schlumberger Limited	32,865	6,674	20.3	43.57	57.8	60,387	75,861	2.3x	11.4x	2.2x
SEACOR Holdings Inc.	860	149	17.4	42.28	71.7	776	1,105	1.3x	7.4x	2.1x
Solaris Oilfield Infrastructure, Inc.	216	133	61.7	16.44	81.5	458	585	2.7x	4.4x	(0.0)x
Strad Energy Services Ltd.	92	21	23.3	1.05	80.6	60	70	0.8x	3.3x	0.8x
Superior Drilling Products, Inc.	19	4	20.8	1.32	26.1	33	40	2.1x	10.2x	1.5x
TechnipFMC plc	12,341	1,398	11.3	23.52	68.4	10,577	9,298	0.8x	6.7x	0.1x
TerraVest Industries Inc.	224	35	15.8	9.73	96.9	166	247	1.1x	7.0x	2.3x
TETRA Technologies, Inc.	1,043	160	15.3	2.34	45.8	294	1,236	1.2x	7.7x	5.6x
Weatherford International plc	5,667	635	11.2	0.70	18.6	700	8,125	1.4x	12.8x	12.5x
ZCL Composites Inc.	129	16	12.4	7.47	80.8	228	227	1.8x	14.2x	(0.1)x
Median			**13.8%**		**60.1%**			**1.4x**	**8.1x**	**2.3x**
Mean			**14.0%**		**61.5%**			**1.3x**	**9.5x**	**2.9x**

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PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

OIL AND GAS FIELD SERVICES AND EQUIPMENT AND PHYSICAL TECHNOLOGY

SELECTED TRANSACTIONS (1)

Announced / Closed Date	Target(s)	Acquirer	Total Enterprise Value (TEV)	TEV / Revenues	TEV / EBITDA
3/20/2019	Red Bone Services LLC/Tecton Energy Services Ltd.	KLX Energy Services Holdings, Inc. (NasdaqGS:KLXE)	$82.5	-	4.8x
1/20/2019	ZCL Composites Inc. (TSX:ZCL)	Shawcor Ltd. (TSX:SCL)	$233.7	1.7x	12.5x
10/29/2018	Adler Hot Oil Service, LLC.	Enservco Corporation (AMEX:ENSV)	$12.5	0.7x	4.3x
6/5/2018	Xtreme Drilling Corp.	AKITA Drilling Ltd. (TSX:AKT.A)	$155.0	2.8x	162.4x
5/1/2018	KLX Inc. (NasdaqGS:KLXI)	Aviall Inc.	$4,482.9	-	15.7x
4/16/2018	Aveda Transportation and Energy Services Inc. (TSXV:AVE)	Daseke Companies, Inc.	$2,139.8	0.7x	4.8x
1/16/2018	USA Compression Partners, LP (NYSE:USAC)	Energy Transfer Partners, LP (NYSE:ETP); Energy Transfer Equity, LP (NYSE:ETE)	$2,033.4	7.3x	14.3x
1/2/2018	Archrock Partners, LP	Archrock, Inc. (NYSE:AROC)	$2,405.5	4.3x	10.5x
12/11/2017	Pure Technologies Ltd.	Xylem Inc. (NYSE:XYL)	$395.2	4.0x	26.5x
5/19/2017	Savanna Energy Services Corp.	Total Energy Services Inc. (TSX:TOT)	$458.2	1.8x	16.6x
5/15/2017	Ceiba Energy Services Inc.	Secure Energy Services Inc. (TSX:SES)	$27.2	4.5x	29.2x
4/24/2017	Flowchem Ltd.	KMG Chemicals, Inc. (NYSE:KMG)	$495.0	N/A	11.5x
3/13/2017	Amec Foster Wheeler plc (LSE:AMFW)	John Wood Group PLC (LSE:WG.)	$4,032.4	0.6x	10.6x
12/12/2016	Seventy Seven Energy Inc.	Patterson-UTI Energy, Inc. (NasdaqGS:PTEN)	$1,878.9	3.1x	18.8x
10/13/2016	Critical Flow Solutions Inc.	CIRCOR International, Inc. (NYSE:CIR)	$214.0	1.8x	8.6x

(1) Total Enterprise Value is defined as market capitalization plus total debt less cash and cash equivalents.

PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

STORAGE AND TERMINALS

EQUITY COMPARABLES (1)

Storage and Terminals (United States & Canada)

Company	LTM[2] Revenues	LTM[2] EBITDA	LTM[2] Margin	Stock Price 03/31/19	% of 52-Week High	Market Cap	Total Enterprise Value[3]	TEV / LTM Revenues	TEV / LTM EBITDA	Net Debt[4]/ EBITDA
Alliant Energy Corporation	$3,605	$1,223	33.9%	$47.13	98.4%	$11,126	$17,249	4.8x	14.1x	5.0x
AltaGas Ltd.	3,948	860	21.8	13.16	61.8	3,631	12,613	3.2x	14.7x	7.4x
Blueknight Energy Partners, LP	434	55	12.7	1.03	21.2	42	(72)	(0.2)x	(1.3)x	4.8x
Buckeye Partners, LP	3,954	844	21.3	34.02	79.7	5,461	10,184	2.6x	12.1x	4.7x
Chart Industries, Inc.	1,130	152	13.5	90.52	94.6	2,860	3,291	2.9x	21.6x	3.0x
EnLink Midstream, LLC	7,710	1,107	14.4	12.78	69.5	6,222	13,807	1.8x	12.5x	4.1x
EQM Midstream Partners, LP	1,514	1,240	81.9	46.17	72.4	9,255	13,344	8.8x	10.8x	3.7x
Gibson Energy Inc.	5,168	329	6.4	17.19	97.2	2,485	3,342	0.6x	10.2x	2.8x
Green Plains Partners LP	96	64	67.2	15.84	88.0	367	507	5.3x	7.9x	2.8x
Magellan Midstream Partners, LP	2,777	1,248	45.0	60.63	83.2	13,848	17,909	6.4x	14.3x	3.6x
MPLX LP	6,402	3,176	49.6	32.89	84.3	26,120	40,604	6.3x	12.8x	4.5x
NuStar Energy LP	1,972	664	33.7	26.89	92.3	2,898	7,336	3.7x	11.0x	5.2x
Median			**27.7%**		**83.7%**			**3.5x**	**12.3x**	**4.3x**
Mean			**33.4%**		**78.6%**			**3.9x**	**11.7x**	**4.3x**

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PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

STORAGE AND TERMINALS

SELECTED TRANSACTIONS (1)

Announced / Closed Date	Target(s)	Acquirer	Total Enterprise Value (TEV)	TEV / Revenues	TEV / EBITDA
5/10/2019	Buckeye Partners, LP (NYSE:BPL)	IFM Global Infrastructure Fund	$10,500.3	2.7x	18.6x
11/8/2018	Western Gas Partners, LP (NYSE:WES)	Western Gas Equity Partners, LP (NYSE:WGP)	$13,427.9	6.5x	12.0x
10/22/2018	EnLink Midstream Partners, LP (NYSE:ENLK)	EnLink Midstream, LLC (NYSE:ENLC)	$12,923.5	1.7x	12.2x
10/18/2018	Valero Energy Partners LP	Valero Energy Corporation (NYSE:VLO)	$4,069.8	7.6x	10.5x
9/19/2018	Dominion Energy Midstream Partners, LP (NYSE:DM)	Dominion Energy, Inc. (NYSE:D)	$10,405.4	13.6x	19.7x
8/1/2018	Energy Transfer Partners, LP (NYSE:ETP)	Energy Transfer Equity, LP (NYSE:ETE)	$69,412.3	2.1x	10.8x
7/30/2018	Four Corners Area Assets	Harvest Midstream Company	$1,125.0	-	13.2x
7/10/2018	Transmontaigne Partners LP (NYSE:TLP)	TLP Acquisition Holdings LLC	$1,254.3	6.1x	11.5x
6/29/2018	Boardwalk Pipeline Partners, LP	Boardwalk GP LP	$6,792.1	5.3x	8.3x
5/17/2018	Enbridge Energy Partners, LP (NYSE:EEP)	Enbridge Inc. (TSX:ENB)	$15,925.8	6.6x	10.1x
4/30/2018	Andeavor (NYSE:ANDV)	Marathon Petroleum Corporation (NYSE:MPC)	$35,101.9	0.9x	12.7x
4/26/2018	Rice Midstream Partners LP (NYSE:RMP)	EQM Midstream Partners, LP (NYSE:EQM)	$2,443.1	7.7x	9.9x
3/26/2018	Tallgrass Energy Partners, LP (NYSE:TEP)	Tallgrass Equity, LLC	$4,176.5	6.4x	6.9x
8/29/2017	Arc Logistics Partners LP (NYSE:ARCX)	Zenith Energy U.S. Logistics Holdings, LLC	$658.0	6.2x	10.4x
8/14/2017	Western Refining Logistics, LP (NYSE:WNRL)	Andeavor Logistics LP (NYSE:ANDX)	$1,842.8	0.8x	14.4x
6/19/2017	Rice Energy Inc. (NYSE:RICE)	EQT Corporation (NYSE:EQT)	$10,239.2	9.9x	34.1x
6/2/2017	AMTROL Inc.	Worthington Steel of Michigan, Inc.	$283.0	1.1x	7.4x
5/18/2017	PennTex Midstream Partners, LP	Energy Transfer Partners, LP (NYSE:ETP)	$562.6	7.3x	18.9x
5/15/2017	Ceiba Energy Services Inc. (TSXV:CEB)	Secure Energy Services Inc. (TSX:SES)	$28.2	4.3x	30.3x
4/4/2017	World Point Terminals, LP (NYSE:WPT)	World Point Terminals Inc.	$611.3	5.9x	10.0x
2/1/2017	ONEOK Partners, LP	ONEOK, Inc. (NYSE:OKE)	$23,721.4	2.7x	12.9x

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PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

PIPELINES

EQUITY COMPARABLES (1)

Oil and Gas Pipelines (United States & Canada)

Company	LTM[2] Revenues	LTM[2] EBITDA	LTM[2] Margin	Stock Price 03/31/19	% of 52-Week High	Market Cap	Total Enterprise Value[3]	TEV / LTM Revenues	TEV / LTM EBITDA	Net Debt[4]/ EBITDA
Antero Midstream Corporation	$199	NA	NA	$13.78	69.2%	$6,982	$6,979	35.1x	NM	NM
ATCO Ltd.	3,525	1,397	39.6	33.67	97.8	3,849	14,303	4.1x	10.2x	5.6x
Blueknight Energy Partners, LP	434	55	12.7	1.03	21.2	42	(72)	(0.2)x	(1.3)x	4.8x
Buckeye Partners, LP	3,954	844	21.3	34.02	79.7	5,461	10,184	2.6x	12.1x	4.7x
Crestwood Equity Partners LP	3,374	294	8.7	35.19	86.8	2,546	5,094	1.5x	17.3x	6.3x
Enable Midstream Partners, LP	3,478	1,087	31.3	14.32	74.3	6,204	10,874	3.1x	10.0x	4.0x
Enbridge Inc.	34,797	8,072	23.2	36.21	97.4	73,262	130,367	3.7x	16.2x	6.2x
Energy Transfer LP	55,326	9,624	17.4	15.37	80.1	40,260	96,654	1.7x	10.0x	4.9x
Enterprise Products Partners LP	35,779	7,268	20.3	29.10	96.8	63,580	89,852	2.5x	12.4x	3.7x
Equitrans Midstream Corporation	1,514	1,229	81.2	21.78	92.8	5,538	14,712	9.7x	12.0x	4.2x
EQM Midstream Partners, LP	1,514	1,240	81.9	46.17	72.4	9,255	13,344	8.8x	10.8x	3.7x
Genesis Energy, LP	2,807	572	20.4	23.30	91.3	2,856	7,069	2.5x	12.4x	6.3x
Gibson Energy Inc.	5,168	329	6.4	17.19	97.2	2,485	3,342	0.6x	10.2x	2.8x
Inter Pipeline Ltd.	1,950	896	46.0	16.54	86.2	6,752	10,952	5.6x	12.2x	5.0x
Kinder Morgan Canada Limited	297	136	45.9	11.93	28.4	417	(2,245)	(7.6)x	(16.5)x	2.8x
Kinder Morgan, Inc.	14,155	6,369	45.0	20.01	97.9	45,295	80,961	5.7x	12.7x	5.7x
ONEOK, Inc.	12,271	2,314	18.9	69.84	97.0	28,747	38,196	3.1x	16.5x	4.5x
Plains All American Pipeline, LP	34,032	3,037	8.9	24.51	88.5	17,808	29,288	0.9x	9.6x	3.1x
Sanchez Midstream Partners LP	82	37	45.9	2.15	16.2	38	564	6.9x	15.0x	4.5x
SemGroup Corporation	2,409	306	12.7	14.74	55.0	1,167	4,074	1.7x	13.3x	7.0x
Southcross Energy Partners, LP	585	41	7.0	0.25	13.7	20	550	0.9x	13.4x	12.9x
Summit Midstream Partners, LP	520	253	48.6	9.73	54.9	715	2,287	4.4x	9.0x	4.9x
Targa Resources Corp.	10,328	1,281	12.4	41.55	70.2	9,659	17,725	1.7x	13.8x	5.7x
TC PipeLines, LP	715	613	85.7	37.36	98.5	2,664	4,860	6.8x	7.9x	3.3x
The Williams Companies, Inc.	8,652	3,726	43.1	28.72	89.1	34,801	58,419	6.8x	15.7x	6.3x
TC Energy Corporation	10,282	6,261	60.9	44.91	97.6	41,457	82,402	8.0x	13.2x	6.0x
Western Midstream Partners, LP	2,161	1,141	52.8	31.36	81.2	14,204	21,480	9.9x	18.8x	6.3x
Median			**27.2%**		**86.2%**			**3.1x**	**12.3x**	**4.9x**
Mean			**34.5%**		**75.2%**			**4.8x**	**11.0x**	**5.2x**

(1) Matching public companies to middle-market companies is an imperfect comparable analysis due to the variables of size, equipment, markets, etc. Nonetheless JKC's research has yielded this list as the closest available.
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(4) Net Debt is defined as total debt less cash and cash equivalents.

PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

PIPELINES

SELECTED TRANSACTIONS (1)

Announced / Closed Date	Target(s)	Acquirer	Total Enterprise Value (TEV)	TEV / Revenues	TEV / EBITDA
5/10/2019	Buckeye Partners, LP (NYSE:BPL)	IFM Global Infrastructure Fund	$10,500.3	2.7x	18.6x
11/8/2018	Western Gas Partners, LP (NYSE:WES)	Western Gas Equity Partners, LP (NYSE:WGP)	$13,427.9	6.5x	12.0x
10/18/2018	Valero Energy Partners LP	Valero Energy Corporation (NYSE:VLO)	$4,069.8	7.6x	10.5x
10/9/2018	Antero Midstream Partners LP (NYSE:AM)	Antero Midstream GP LP (NYSE:AMGP)	$7,359.7	7.7x	11.5x
9/28/2018	American Midstream Partners, LP (NYSE:AMID)	ArcLight Capital Partners, LLC	$1,595.1	2.0x	14.2x
7/10/2018	Transmontaigne Partners LP (NYSE:TLP)	TLP Acquisition Holdings LLC	$1,254.3	6.1x	11.5x
5/17/2018	Williams Partners LP	The Williams Companies, Inc. (NYSE:WMB)	$57,090.5	7.0x	14.1x
5/17/2018	Enbridge Energy Partners, LP (NYSE:EEP)	Enbridge Inc. (TSX:ENB)	$15,925.8	6.6x	10.1x
5/10/2018	Amberjack Pipeline Company LLC	Shell Midstream Partners, LP (NYSE:SHLX)	$1,928.7	8.2x	9.4x
3/26/2018	Tallgrass Energy Partners, LP (NYSE:TEP)	Tallgrass Equity, LLC	$4,176.5	6.4x	6.9x
8/15/2017	Western Refining Logistics, LP (NYSE:WNRL)	Andeavor Logistics LP (NYSE:ANDX)	$1,843.8	0.8x	14.4x
12/20/2016	Howard Midstream Partners, LP	Alberta Investment Management Corporation	$1,394.7	4.3x	14.4x
11/21/2016	Sunoco Logistics Partners LP	Energy Transfer Partners, LP (NYSE:ETP)	$15,527.3	1.5x	13.7x
10/24/2016	JP Energy Partners LP	American Midstream Partners, LP (NYSE:AMID)	$465.0	-	11.3x
5/31/2016	Rose Rock Midstream, LP	SemGroup Corporation (NYSE:SEMG)	$1,649.9	-	10.4x
2/1/2016	Dominion Energy Questar Corporation	Dominion Energy, Inc. (NYSE:D)	$6,092.9	-	9.7x

(1) Total Enterprise Value is defined as market capitalization plus total debt less cash and cash equivalents.

PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

TRUCKERS

EQUITY COMPARABLES (1)

Truckers (United States & Canada)

Company	LTM[2] Revenues	LTM[2] EBITDA	LTM[2] Margin	Stock Price 03/31/19	% of 52-Week High	Market Cap	Total Enterprise Value[3]	TEV / LTM Revenues	TEV / LTM EBITDA	Net Debt[4]/ EBITDA
Adams Resources & Energy, Inc.	$1,808	$16	0.9%	$39.06	77.6%	$165	$52	0.0x	3.2x	(7.2)x
ArcBest Corporation	3,106	228	7.3	30.79	59.8	786	782	0.3x	3.4x	0.4x
Covenant Transportation Group, Inc.	931	137	14.7	18.98	53.9	349	561	0.6x	4.1x	2.0x
Daseke, Inc.	1,718	169	9.9	5.09	50.0	328	1,033	0.6x	6.1x	4.3x
Heartland Express, Inc.	594	170	28.6	19.28	89.0	1,580	1,418	2.4x	8.4x	(1.0)x
Hess Corporation	6,378	2,755	43.2	60.23	80.5	18,251	23,491	3.7x	8.5x	1.9x
J.B. Hunt Transport Services, Inc.	8,756	1,130	12.9	101.29	76.9	11,014	12,160	1.4x	10.8x	1.2x
Knight-Swift Transportation Holdings Inc.	5,277	991	18.8	32.68	69.7	5,654	6,502	1.2x	6.6x	0.9x
Landstar System, Inc.	4,604	380	8.3	109.39	85.0	4,388	4,335	0.9x	11.4x	(0.4)x
Marten Transport, Ltd.	800	156	19.5	17.83	72.6	973	916	1.1x	5.9x	(0.5)x
Old Dominion Freight Line, Inc.	4,109	1,086	26.4	144.39	84.8	11,717	11,572	2.8x	10.7x	(0.2)x
P.A.M. Transportation Services, Inc.	542	97	17.8	48.94	69.9	290	494	0.9x	5.1x	1.9x
Patriot Transportation Holding, Inc.	113	10	8.6	18.80	79.0	63	42	0.4x	4.4x	(2.0)x
Parkland Fuel Corporation	11,459	768	6.7	30.55	86.0	4,462	6,125	0.5x	8.0x	3.5x
Roadrunner Transportation Systems, Inc.	2,153	10	0.5	10.50	12.1	394	1,016	0.5x	102.1x	36.2x
Ryder System, Inc.	8,685	2,120	24.4	61.99	77.5	3,302	9,858	1.1x	4.7x	3.4x
Saia, Inc.	1,672	248	14.9	61.10	70.2	1,565	1,686	1.0x	6.8x	0.9x
Schneider National, Inc.	5,032	661	13.1	21.05	69.0	3,726	3,708	0.7x	5.6x	0.0x
TFI International Inc.	3,859	527	13.7	29.53	80.6	2,519	3,710	1.0x	7.0x	3.1x
Titanium Transportation Group Inc.	133	15	11.5	1.03	57.5	38	77	0.6x	5.1x	4.3x
Universal Logistics Holdings, Inc.	1,504	163	10.8	19.68	52.2	559	944	0.6x	5.8x	2.7x
USA Truck, Inc.	543	51	9.3	14.44	49.5	117	277	0.5x	5.5x	3.6x
Werner Enterprises, Inc.	2,491	460	18.4	34.15	79.8	2,407	2,498	1.0x	5.4x	0.1x
YRC Worldwide Inc.	5,060	249	4.9	6.69	56.9	226	874	0.2x	3.5x	4.4x
Median			**13.0%**		**71.4%**			**0.8x**	**5.8x**	**1.6x**
Mean			**14.4%**		**68.3%**			**1.0x**	**10.3x**	**2.7x**

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PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

TRUCKERS

SELECTED TRANSACTIONS (1)

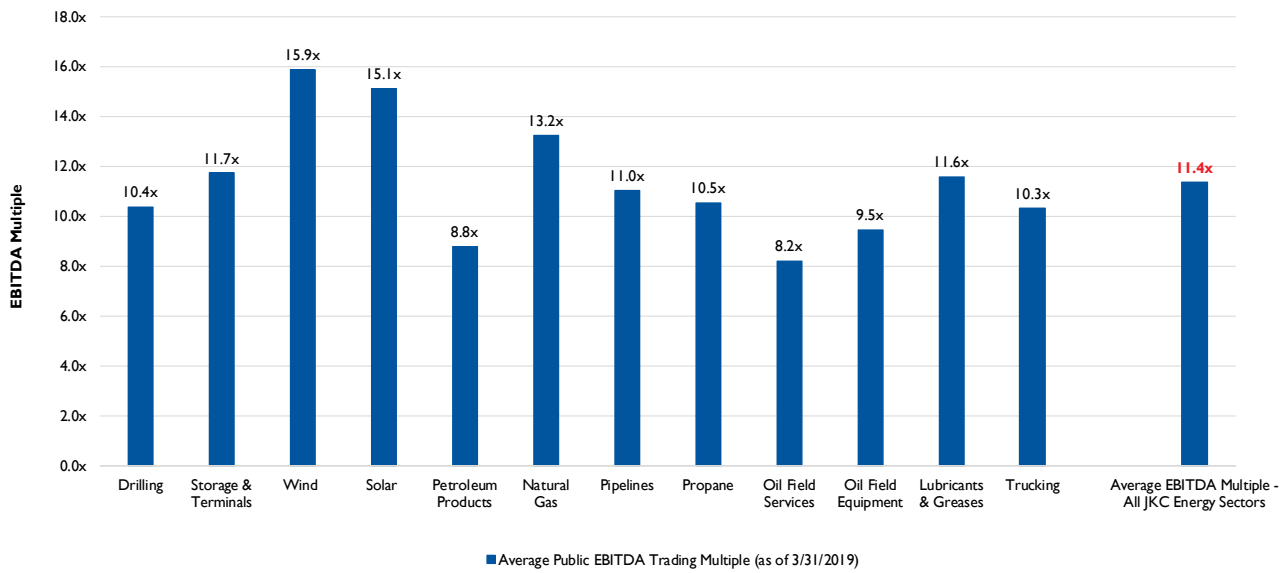
Announced / Closed Date	Target(s)	Acquirer	Total Enterprise Value (TEV)	TEV / Revenues	TEV / EBITDA
11/5/2018	CaseStack, Inc.	Hub Group, Inc. (NasdaqGS:HUBG)	$255.0	1.1x	11.6x
8/31/2018	Mode Transportation, LLC	York Capital Management	$238.5	-	10.0x
12/7/2017	Keen Transport, Inc.	Wallenius Wilhelmsen ASA (OB:WALWIL)	$64.0	0.8x	6.4x
7/19/2016	Span-Alaska Transportation, Inc.	Matson Logistics, Inc.	$197.6	-	9.4x
5/2/2016	Trimac Transportation Ltd.	Trimac Corporation	$215.9	-	5.9x
9/9/2015	Con-way Inc.	XPO Logistics, Inc. (NYSE:XPO)	$3,057.0	-	6.2x
8/17/2015	Liberty International Inc.	Janel Corporation (OTCPK:JANL)	$2.3	-	26.6x
7/28/2015	Stagecoach Cartage and Distribution, LLC	Roadrunner Transportation Systems, Inc. (NYSE:RRTS)	$40.0	-	5.7x
5/25/2015	Hodges Trucking Company, LLC	Rodan Transport (U.S.A.) Ltd.	$42.0	-	3.0x
5/6/2015	Quality Distribution Inc.	Apax Partners LLP	$823.3	-	12.0x
5/4/2015	Bridge Terminal Transport Inc.	XPO Logistics, Inc. (NYSE:XPO)	$100.0	-	8.1x
4/21/2015	Command Transportation, LLC	Echo Global Logistics, Inc. (NasdaqGS:ECHO)	$391.0	-	10.6x
1/20/2015	Wheels Group Inc.	Radiant Global Logistics Ltd.	$80.1	-	13.5x

(1) Total Enterprise Value is defined as market capitalization plus total debt less cash and cash equivalents.

PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

AVERAGE PUBLIC EBITDA TRADING MULTIPLES

ALL JKC ENERGY SECTORS (AS OF 3/31/2019)



FACTOIDS: LITTLE-KNOWN FACTS AND STATS

Petroleum Products (1)

- As of 2017, the following countries had the world's largest reserves of crude oil:
  - Venezuela - 301 billion barrels;
  - Saudi Arabia - 266 billion barrels; and
  - Canada - 170 billion barrels (non OPEC country).
- U.S. dependence on imported oil peaked in 2005.

Natural Gas (2)

- When natural gas is used directly from the place where it is extracted from the ground, to appliances in your home, it achieves 92% energy efficiency.
- When you factor in energy use and emissions along the full fuel cycle, households with natural gas versus all-electric appliances produce 37% lower greenhouse gas emissions.

Propane and Heating/Fuel Oil

- There is an extensive range of household appliances and other equipment that can be powered by propane: water heaters, ovens and ranges, outdoor lighting, patio heaters, pool and spa-tub heaters, outdoor grills and indoor and outdoor fireplaces, not to mention backup generators.(3)
- About 20% of households in the Northeast region use heating oil as their main space heating fuel.(4)

(1) U.S. Energy Information Administration.
(2) American Gas Association.
(3) Poore's Propane.
(4) Santa Energy.

FACTOIDS: LITTLE-KNOWN FACTS AND STATS

Lubricants and Greases (1)

- In 2016, the top two producers of lubricants were China and the United States who produced almost 7 million metric tons and 6 million metric tons, respectively. India was in third position with production of only 1.5 million metric tons.
- More than half of the global lubricant demand in 2016 was seen in the Asia-Pacific region (including the rest of the world), while the Americas accounted for 28% of demand and Europe accounted for the remaining 19%.

Solar (2)

- The earth receives about 1,366 watts of direct solar radiation per square meter.
- Space missions by various countries use solar energy to power their spaceships.

Wind (2)

- The first modern wind turbine was built in 1940's in Vermont.
- Wind turbines create electricity while wind mills produce mechanical energy.

(1) Lubes'n'Greases Magazine.
(2) Conserve Energy Future.

FACTOIDS: LITTLE-KNOWN FACTS AND STATS

Oil and Gas Field Services

- The offshore service market is projected to increase by a robust 4% this year, according to Rystad Energy forecasts. Rystad Energy forecasts offshore spending will outgrow spending on onshore shale activities this year.
- The U.S. oil and gas field services industry includes about 11,000 establishments (single-location companies and units of multi-location companies) with combined annual revenue of about $70 billion.(1)

Equipment and Physical Technology (2)

- Oil fields and downstream plants will continue to increase their adoption of sophisticated sensors, with a large proportion of the resulting data being collected from edge computing devices and managed by data historians as the core data system.
- Most upstream oil and gas companies are now moving to cloud-based platforms where they can host their business applications related to areas like sub-surface, land and production systems. The trend is towards 100% cloudification of all new applications within a couple of years.

Storage and Terminals

- There are various tank designs depending on the needs and usage - fixed roof and floating roof, open top and closed top, flat bottom, cone bottom, slope bottom and dish bottom, and single walled and double walled. The design is chosen specifically to handle pressure conditions of the liquid being stored, prevent leakage and corrosion, and manage fumes and ventilation.(3)
- The world's largest storage facility for oil is located in Cushing, Oklahoma. This tank farm has the ability to hold up to 62 million of oil barrels which is almost enough to fill all the tanks of around half of all the cars in the United States.(4)

(1) First Research.
(2) Accenture.
(3) Student Energy.
(4) Castagra.

FACTOIDS: LITTLE-KNOWN FACTS AND STATS

PIPELINES (1)

- Many of the country's pipelines have been built within the last few decades, and in recent years, construction of more has been spurred on by the fracking boom. The total mile count of crude oil pipelines (currently 79,000) has increased over 60% between 2004 and 2017.
- Natural gas distribution and estimated service pipeline miles increased 72% between 1984 and 2017.

TRUCKERS (2)

- The most common thing trucks haul is machinery, followed by electronics and motorized vehicles.
- Truck driver is the most common occupation in 29 states.

(1) FrackTracker Alliance.
(2) Trucker Path.

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ABOUT JORDAN KNAUFF & COMPANY

Jordan Knauff & Company was founded in 2001 to undertake a distinct mission: to assemble and maintain a staff of top-notch investment banking personnel and offer their knowledge and experience to provide the best available investment banking services to middle-market companies, the entrepreneurs who lead them and the financial entities that transact with them. On a combined basis, over the course of their careers our employees have completed over 200 transactions as investors, owners, operators, buyers, sellers and investment bankers of middle-market businesses across a variety of industries. The majority of our firm's broad transaction experience has been with private companies owned by one shareholder, a partnership, a family or private equity investors.

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EEIA is a Washington, D.C.-based trade association representing the North American natural gas and petroleum production, transportation and processing infrastructure supply chain. That supply chain is comprised of 60 industries that provide construction, equipment, materials, services and supplies to energy infrastructure and operations. EEIA advocates for sound legislative and regulatory policies at the federal and state levels. Our members include companies, trade associations and labor organizations operating in the energy sector. We advocate for our industries both directly with policymakers, and through mobilization of business leaders and workers to act and speak for the value and benefits of full and responsible development of our energy resources in their communities and with their political leaders.

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