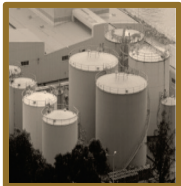


ENERGY LOGISTICS & DISTRIBUTION

Industry In-Sight™

SUMMER / FALL 2020



The Voice of the Energy Supply Chain



IN THIS REPORT

Introduction	5
Data Center	8
Data Center: Abbreviations & Acronyms, Definitions, Descriptions and Chart Notes	47
Hot Topics	62
Public and Transaction Comparables by Segment	67
Factoids: Little-known Facts and Stats	85

TABLE OF CONTENTS

INTRODUCTION	5
DATA CENTER	8
▪ OIL	
• Crude Oil and Gasoline Prices	8
• Diesel and Jet Fuel Prices	9
• U.S. Crude Oil and Petroleum Products Supply, Inventory and Consumption	10
• U.S. Refinery Volumes and Wholesale Prices of Petroleum Products	10
• U.S. Crude Oil Refinery Input, Distillation Capacity and Refinery Utilization	11
• U.S. Crude Oil and Petroleum Products Imports and Exports	11
▪ NATURAL GAS	
• Domestic and International Natural Gas Prices	12
• Americas and Western Europe Liquefied Natural Gas Prices	13
• Asia Liquefied Natural Gas Prices and World Liquefied Natural Gas Prices Map	14
• U.S. Import/Export Liquefied Natural Gas Prices and Natural Gas Plant Liquids Prices	15
• U.S. Natural Gas Production and Consumption and U.S. Natural Gas Supply and Inventory	16
• U.S. Natural Gas Consumption by End Use and U.S. Natural Gas Plant Liquids Production	17
• U.S. Liquefied Natural Gas Import and Export Volumes	18
• North America Liquefied Natural Gas Export Terminals – Proposed	18
• North America Liquefied Natural Gas Import/Export Terminals – Approved and Existing	19
▪ PROPANE AND HEATING/FUEL OIL	
• Heating Oil and Intermediate Fuel Oil aka “Bunker Fuel” Prices	20
• Propane Prices	21
• No. 1 Distillate Fuel Oil, Residual Fuel Oil Wholesale, Retail Sales Volume	21
• No. 2 Distillate Fuel Oil Wholesale, Retail Sales Volume	22
• Propane & Propylene and Distillate Fuel Oil Production and Consumption	22
• U.S. Ending Stocks of Propane & Propylene and Distillate Fuel Oil	23
▪ DRILLING ACTIVITY	
• U.S. Land Well Count, Rig Count and Wells per Rig	23
• U.S. Well Starts by Depth	24
• Percentage of Crude Oil and Natural Gas Production per Shale Region	24
• Drilled but Uncompleted (DUC) Wells vs. Crude Oil Price	25
• Hydraulic Fracturing Sand Consumption and Producer Price Index	25
• Crude Oil Production, Rig Count and Production per Rig	26
• Natural Gas Production, Rig Count and Production per Rig	26
• U.S. Drilling Rigs by Type	27
▪ RENEWABLES	
• Wind and Solar Prices	27
• U.S. Total Renewable Energy Consumption	28



TABLE OF CONTENTS

▪ RENEWABLES (Continued)	
• U.S. Solar, Wind and Hydroelectric Energy Consumption	28
• U.S. Wood, Waste, Biofuels and Geothermal Energy Consumption	29
• Corn and Ethanol Prices and Corn Cost per Gallon of Ethanol	29
• U.S. Solar	
– Energy Consumption and Net Generation	30
– Distributed Photovoltaic and Utility-Scale Electricity Generation by Sector	31
– Cumulative Capacity Installations	32
• U.S. Wind Power	
– Capacity Installations	32
– Utility-Scale Capacity Installations	33
– Under Construction or in Advanced Development	33
▪ U.S. AGGREGATED ENERGY CONSUMPTION	
• Energy Consumption by Sector and by Source	34
• Electricity Prices by Sector	35
▪ LOGISTICS	
• Storage and Terminals	
– Commercial Crude Oil, Petroleum and Other Liquids Commercial Inventory	36
– Natural Gas Underground Storage Capacity	37
– Crude Oil Refinery, Tank and Underground Storage Capacity and Utilization	37
• Pipelines	
– Crude Oil and Natural Gas Pipeline Mileage	38
– Crude Oil and Petroleum Products Pipeline Movements Between PADDs	38
– Natural Gas Cumulative Interstate Pipeline Systems Capacity	39
– Crude Oil and Petroleum Products Exports to Mexico	39
• Truckers	
– Truck Tonnage Index and Heavy Truck Sales	40
– Trucking Conditions Index and Freight Transportation Services Index	40
• Shipping	
– Crude Oil Refinery Receipts by Transportation Method	41
– Crude Oil Movements by Tanker and Barge Between PADDs	41
• Rail	
– Movements of Crude Oil by Rail	42
– Rail Carloads of Petroleum and Petroleum Products	42
▪ ECONOMIC / FINANCIAL	
• Manufacturers’ Monthly Shipments and Purchasing Managers’ Index	43
• U.S. New Housing Starts and Total U.S. Construction Spending	43
• London Interbank Offered Rate (LIBOR) and Bank Prime Loan Interest Rates	44

TABLE OF CONTENTS

- **ECONOMIC / FINANCIAL (Continued)**
 - Commercial and Industrial Loans vs. Banking Standards and U.S. Treasury Yield Curve 45
 - Corporate Spreads to Treasuries by Quality 46

- DATA CENTER: ABBREVIATIONS & ACRONYMS, DEFINITIONS, DESCRIPTIONS AND CHART NOTES**
 - Abbreviations & Acroynms 47
 - Definitions 48
 - Descriptions 50
 - Chart Notes 51

- HOT TOPICS** 62

- PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT**
 - Petroleum Products Equity Comparables and Selected Transactions 67
 - Natural Gas Equity Comparables 68
 - Natural Gas Selected Transactions 69
 - Propane and Heating/Fuel Oil Equity Comparables and Selected Transactions 70
 - Drilling Equity Comparables and Selected Transactions 71
 - Lubricants and Greases Equity Comparables and Selected Transactions 72
 - Solar Equity Comparables and Selected Transactions 73
 - Wind Equity Comparables and Selected Transactions 74
 - Oil and Gas Field Services Equity Comparables 75
 - Equipment and Physical Technology Equity Comparables 76
 - Oil and Gas Field Services, Equipment and Physical Technology Selected Transactions 77
 - Storage and Terminals Equity Comparables 78
 - Storage and Terminals Selected Transactions 79
 - Pipelines Equity Comparables 80
 - Pipeline Selected Transactions 81
 - Truckers Equity Comparables 82
 - Truckers Selected Transactions 83
 - Average Public EBITDA Trading Multiples – All JKC Energy Sectors 84

- FACTOIDS: LITTLE-KNOWN FACTS AND STATS** 85

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.

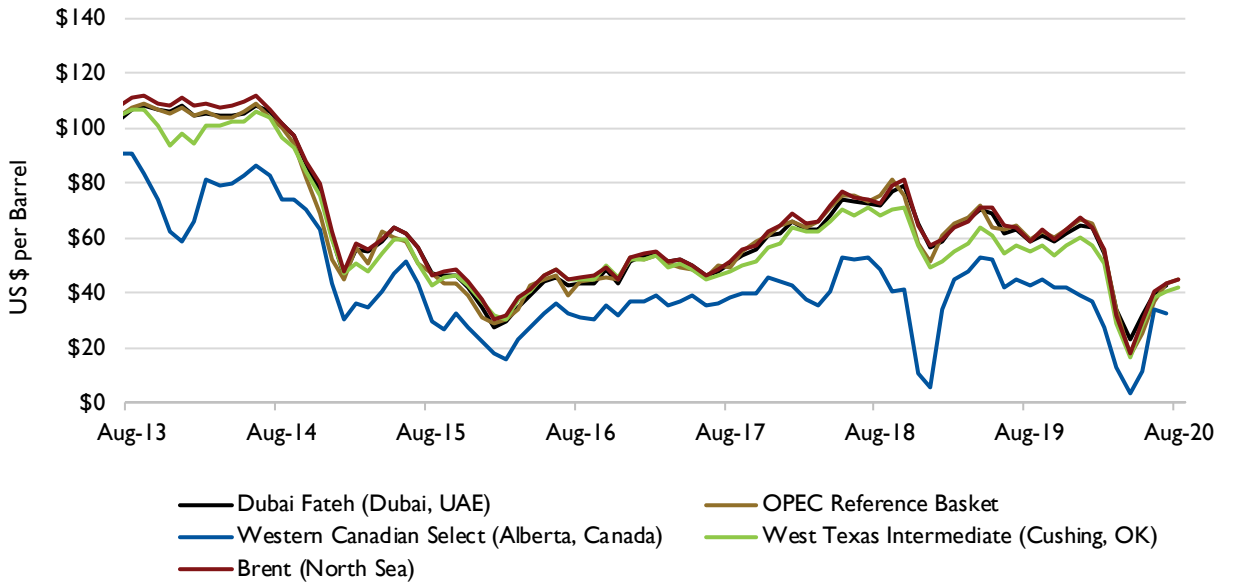
The Services We Provide

- **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.

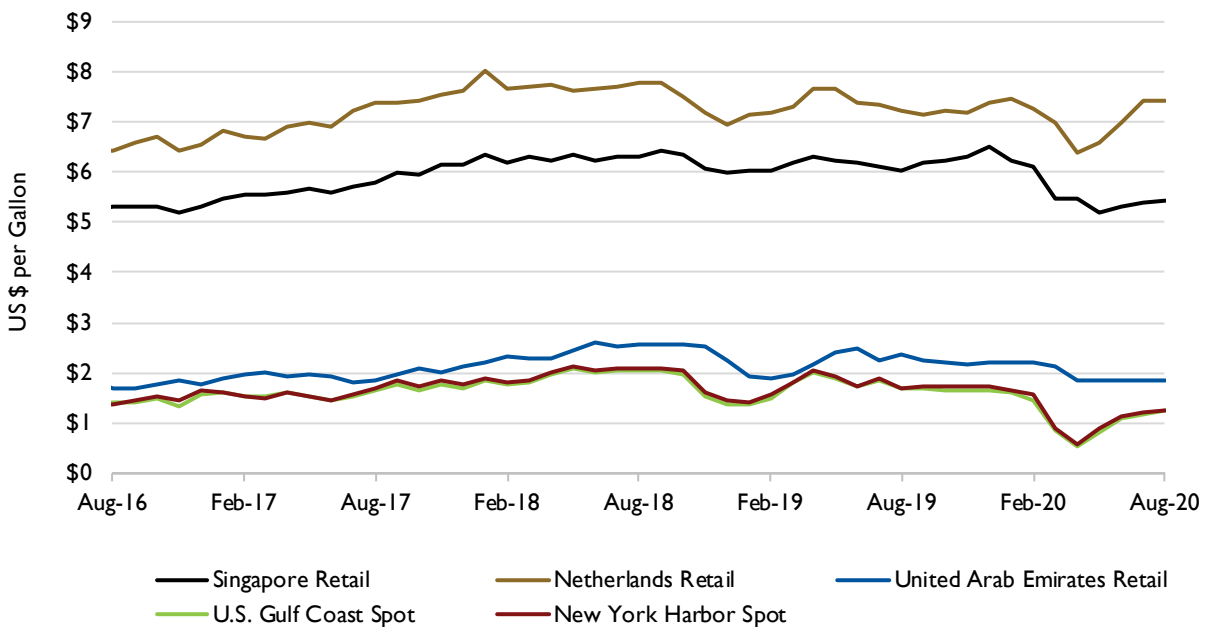
DATA CENTER

OIL

CRUDE OIL PRICES (MONTHLY AVERAGE) (1)



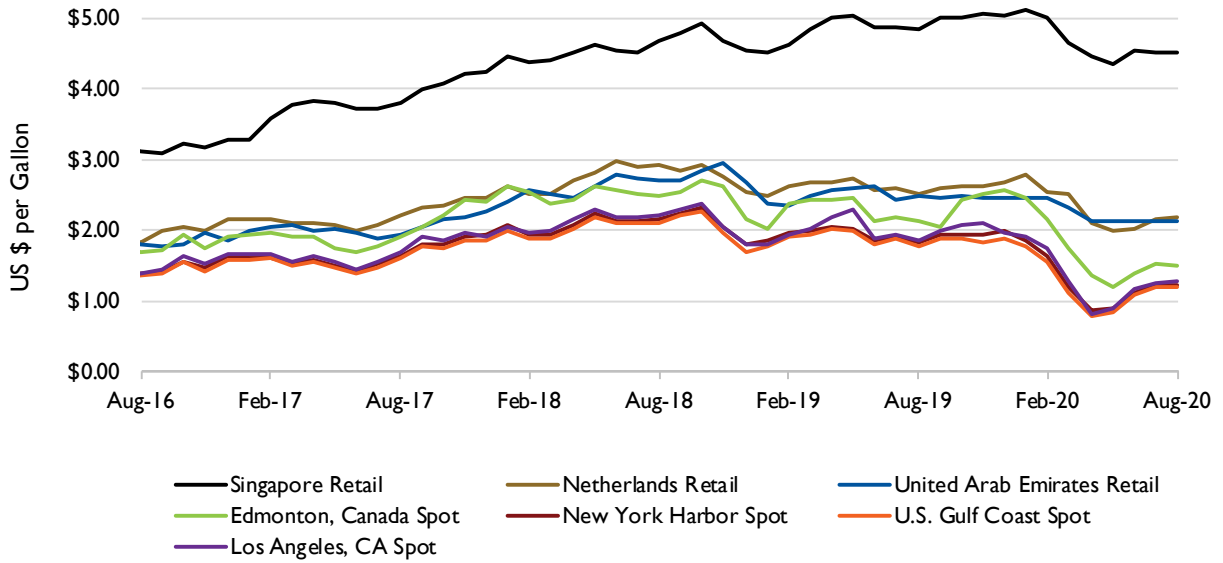
GASOLINE PRICES (MONTHLY AVERAGE) (2)



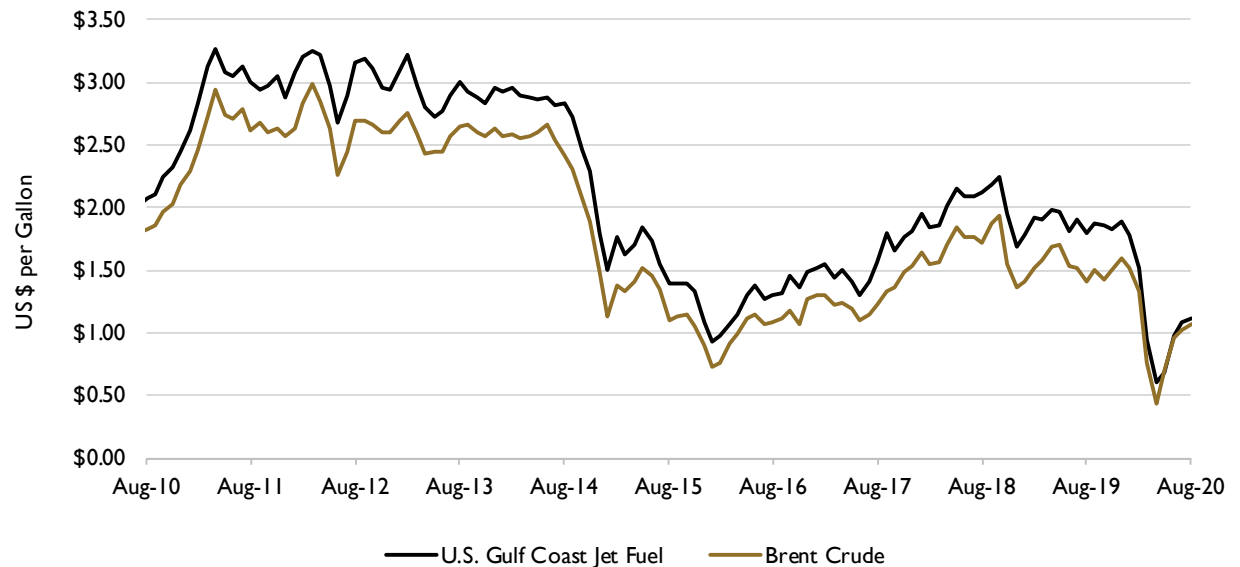
DATA CENTER

OIL

DIESEL PRICES (MONTHLY AVERAGE) (3)



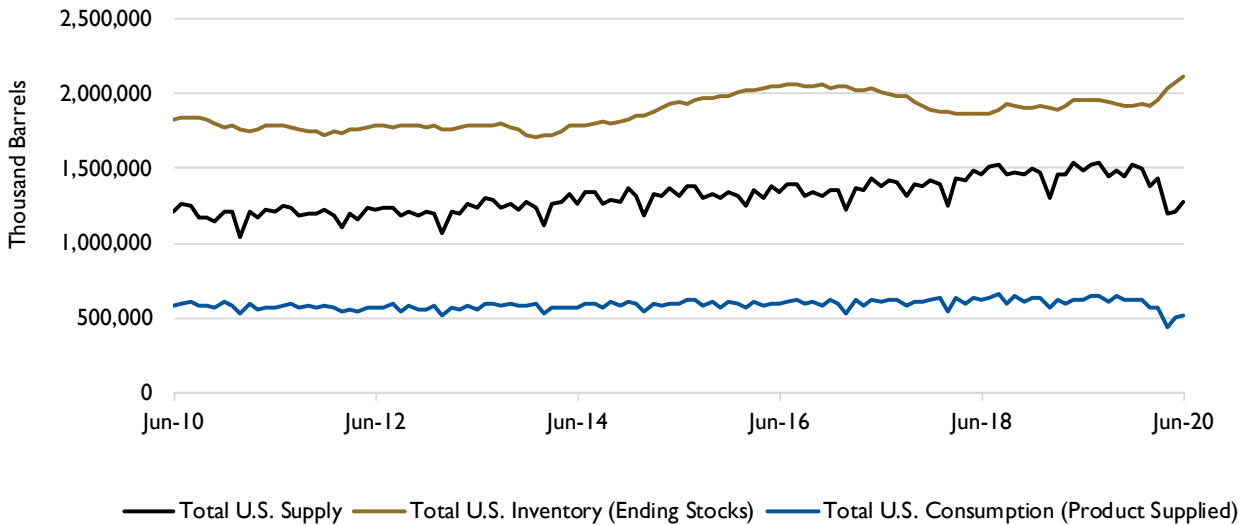
JET FUEL PRICES (MONTHLY AVERAGE) (4)



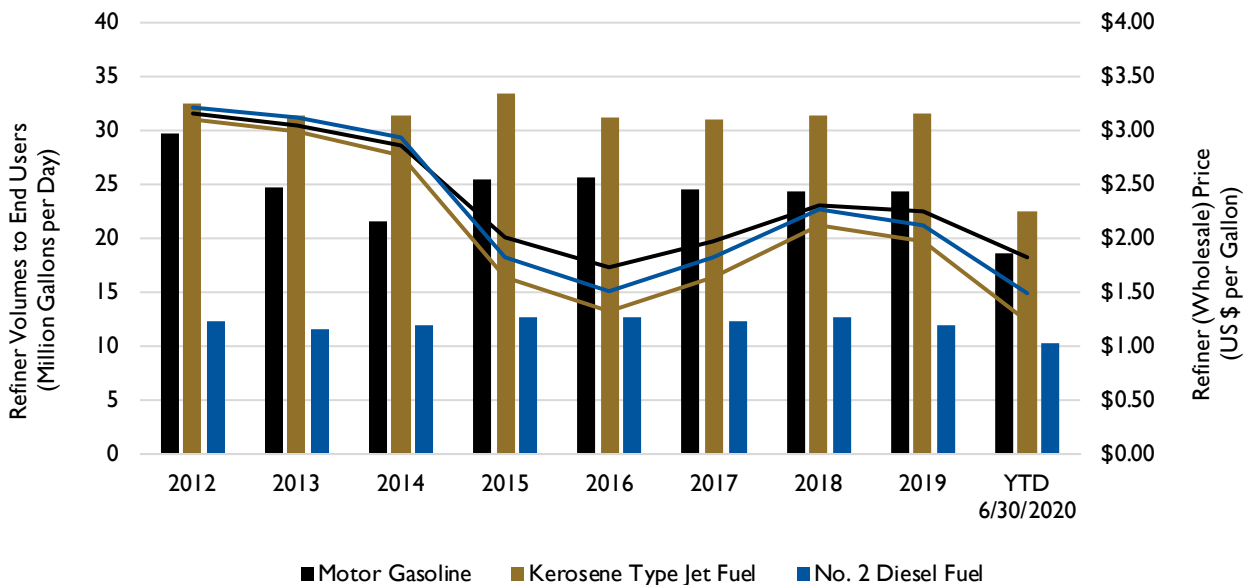
DATA CENTER

OIL

U.S. CRUDE OIL AND PETROLEUM PRODUCTS SUPPLY, INVENTORY AND CONSUMPTION (MONTHLY) ⁽⁵⁾



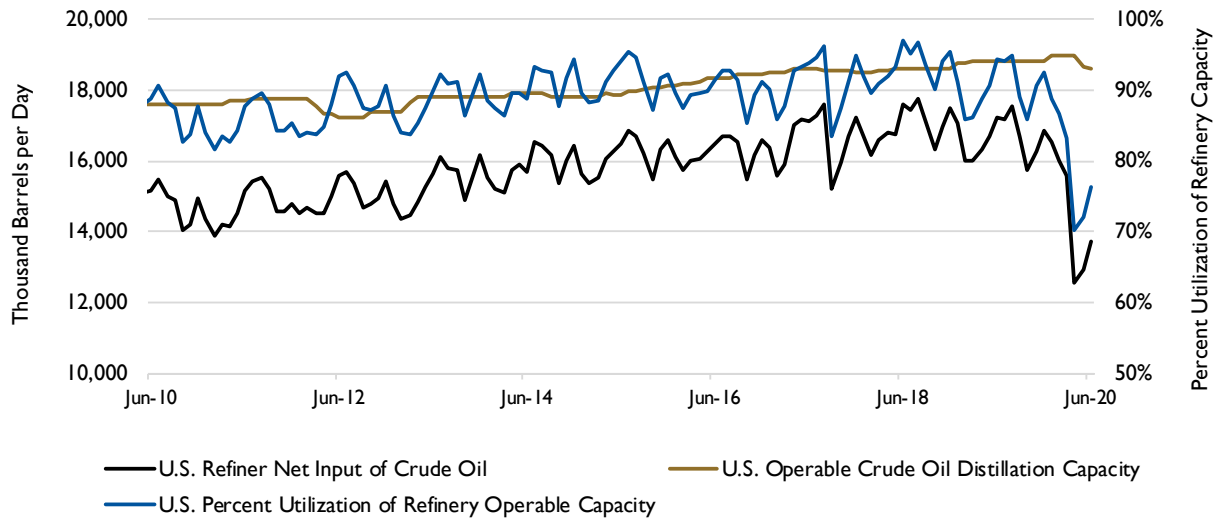
U.S. REFINERY VOLUMES AND WHOLESALE PRICES OF PETROLEUM PRODUCTS (ANNUAL AVERAGE) ⁽⁶⁾



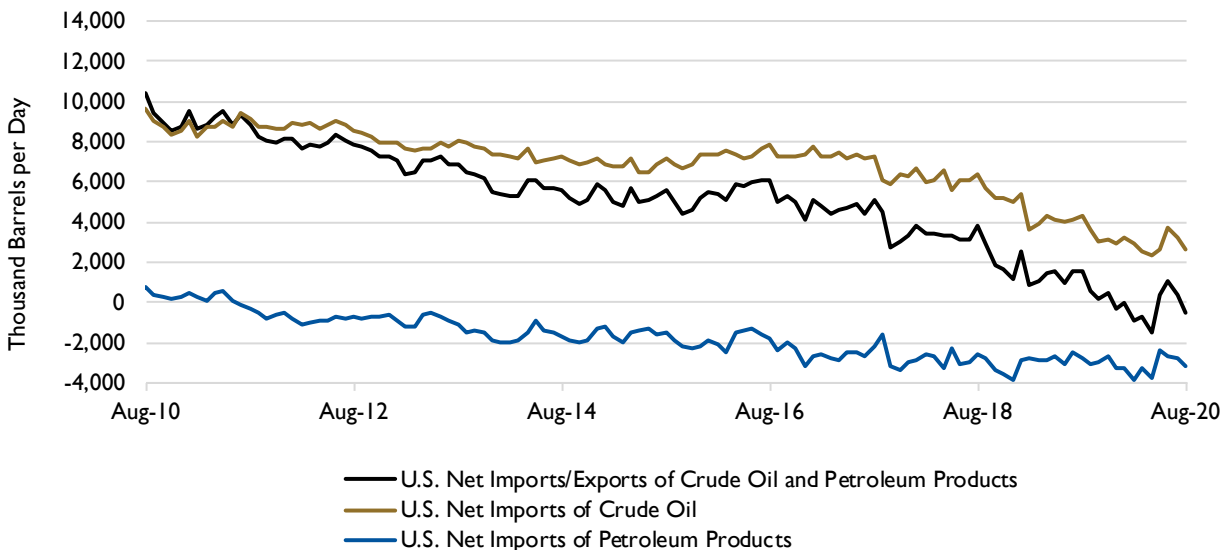
DATA CENTER

OIL

U.S. CRUDE OIL REFINERY INPUT, DISTILLATION CAPACITY AND REFINERY UTILIZATION (MONTHLY AVERAGE) ⁽⁷⁾



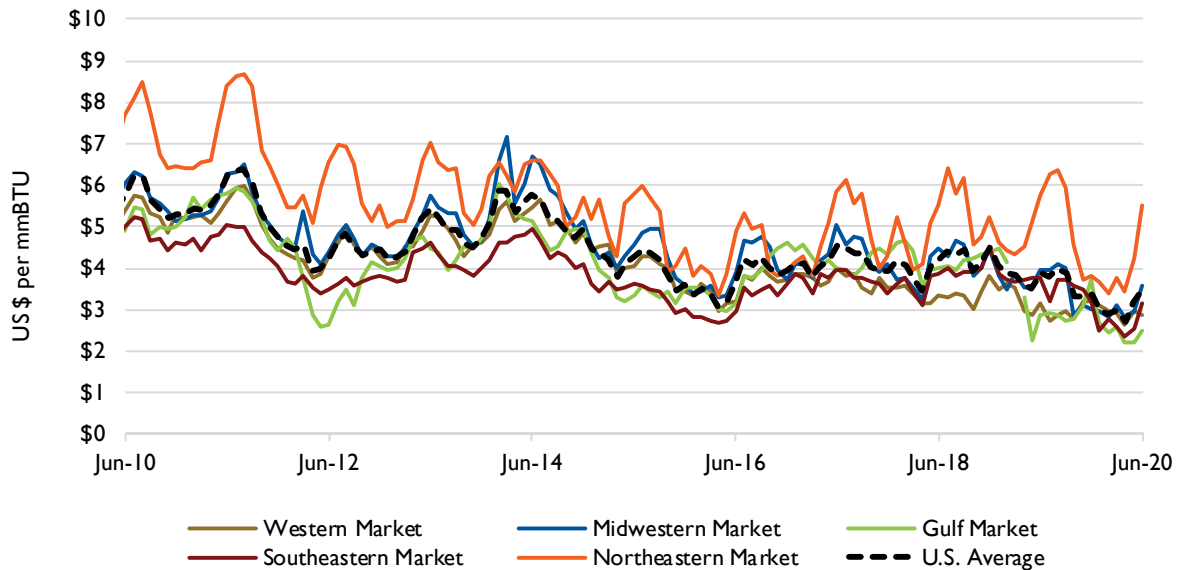
U.S. CRUDE OIL AND PETROLEUM PRODUCTS IMPORTS AND EXPORTS (MONTHLY AVERAGE) ⁽⁸⁾



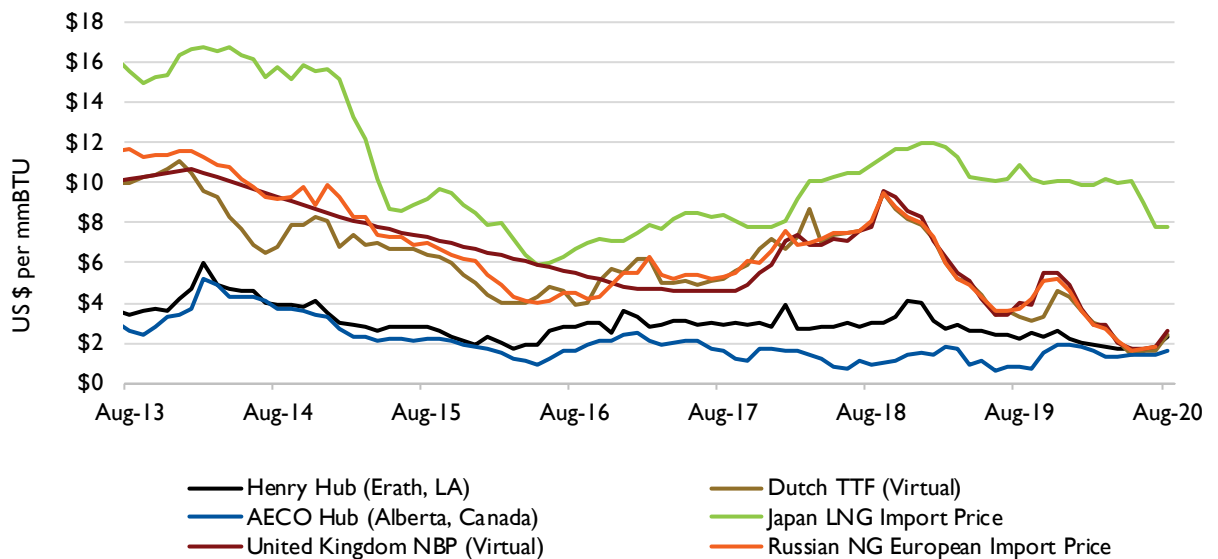
DATA CENTER

NATURAL GAS

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

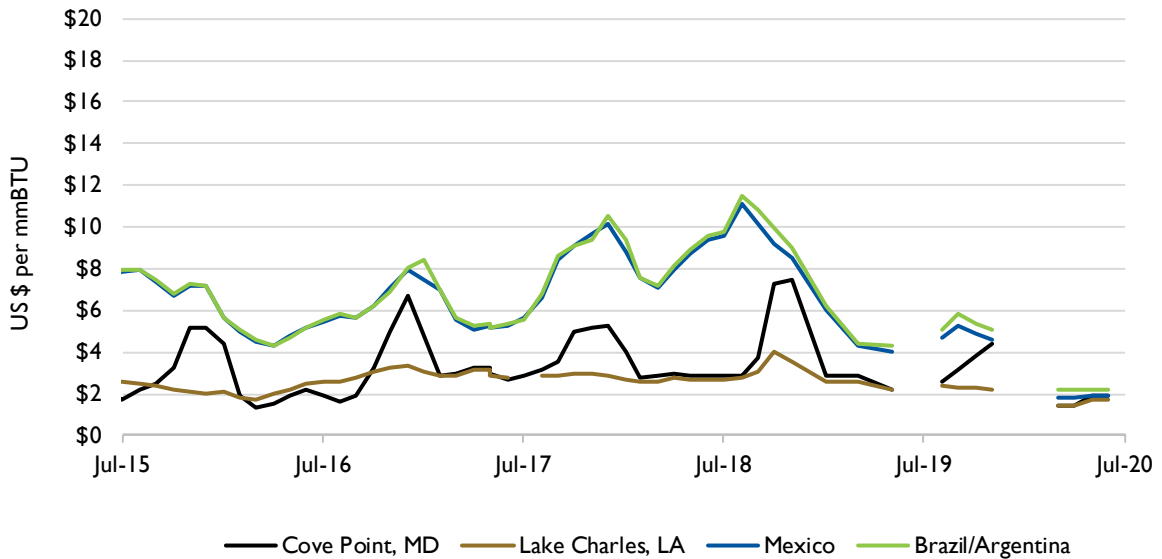


INTERNATIONAL NATURAL GAS PRICES (MONTHLY AVERAGE) (10)

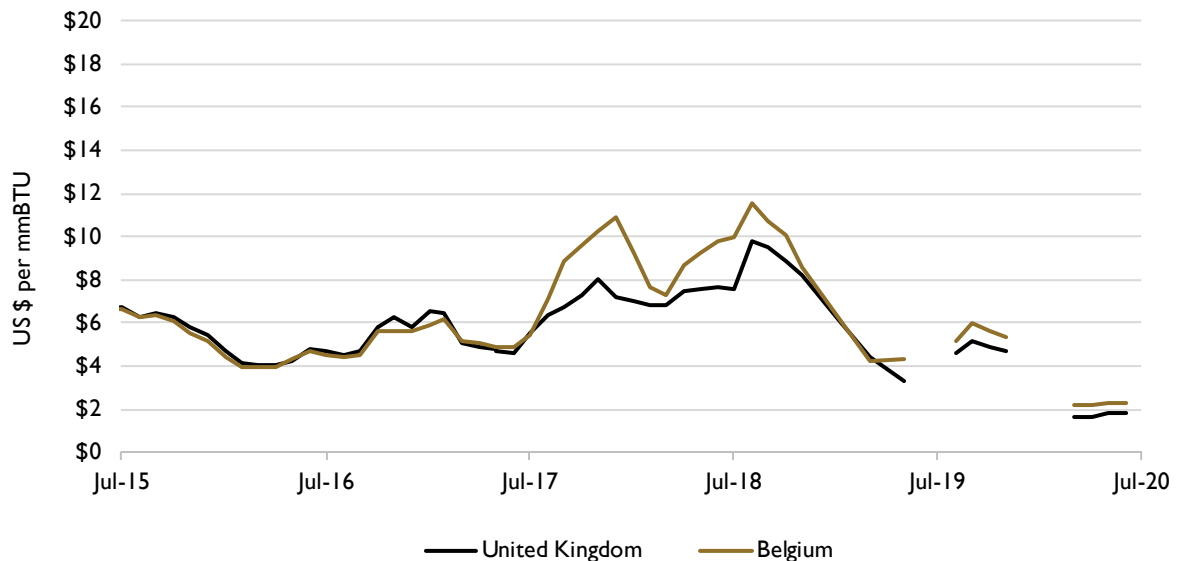


DATA CENTER NATURAL GAS

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



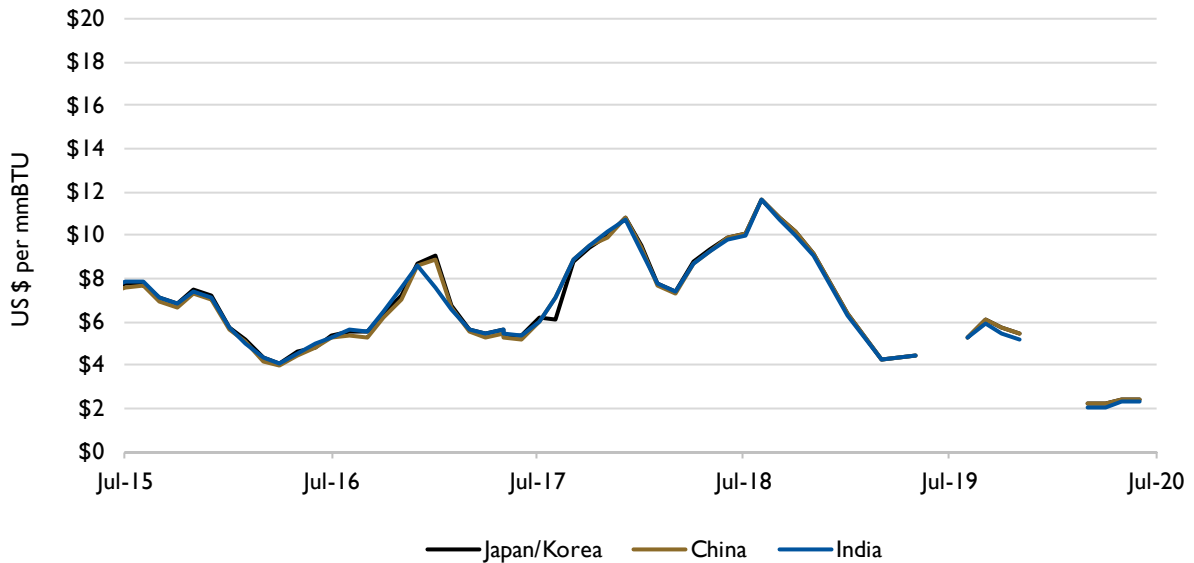
WESTERN EUROPE LIQUEFIED NATURAL GAS PRICES (MONTHLY AVERAGE) (12)



DATA CENTER

NATURAL GAS

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



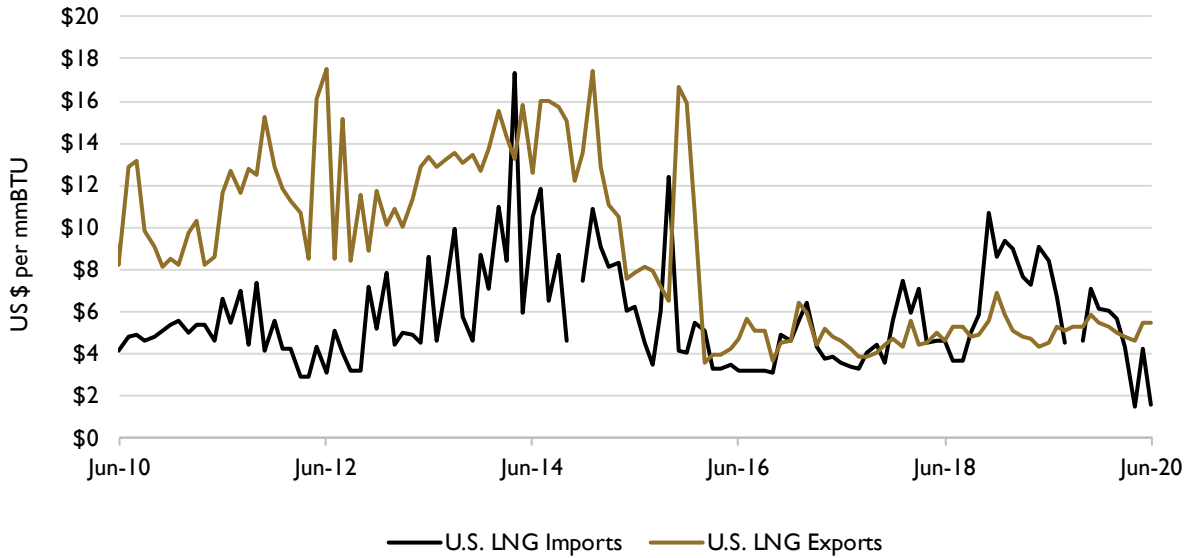
WORLD LIQUEFIED NATURAL GAS PRICES MAP (MONTHLY AVERAGE) (14)



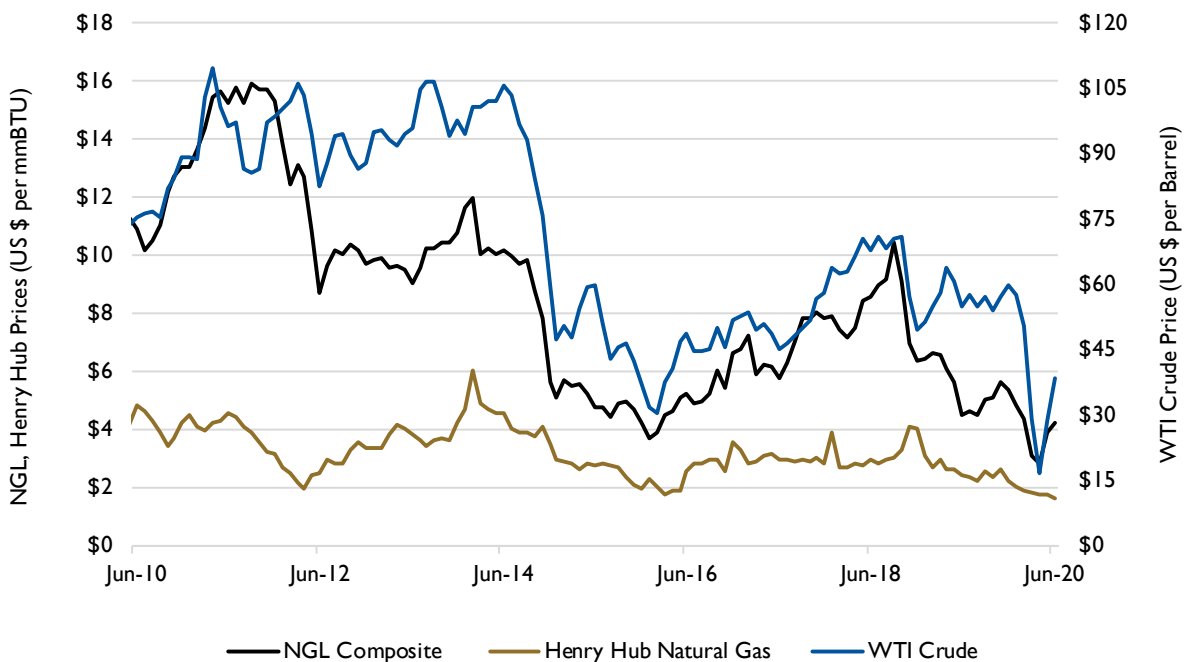
DATA CENTER

NATURAL GAS

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



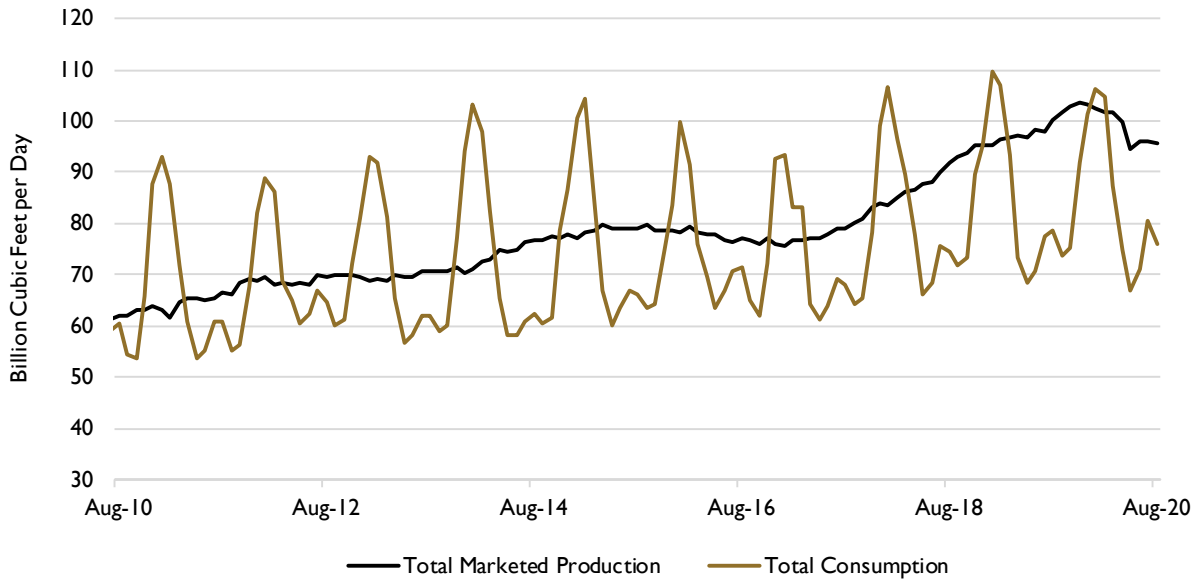
NATURAL GAS PLANT LIQUIDS PRICES (MONTHLY AVERAGE) ⁽¹⁶⁾



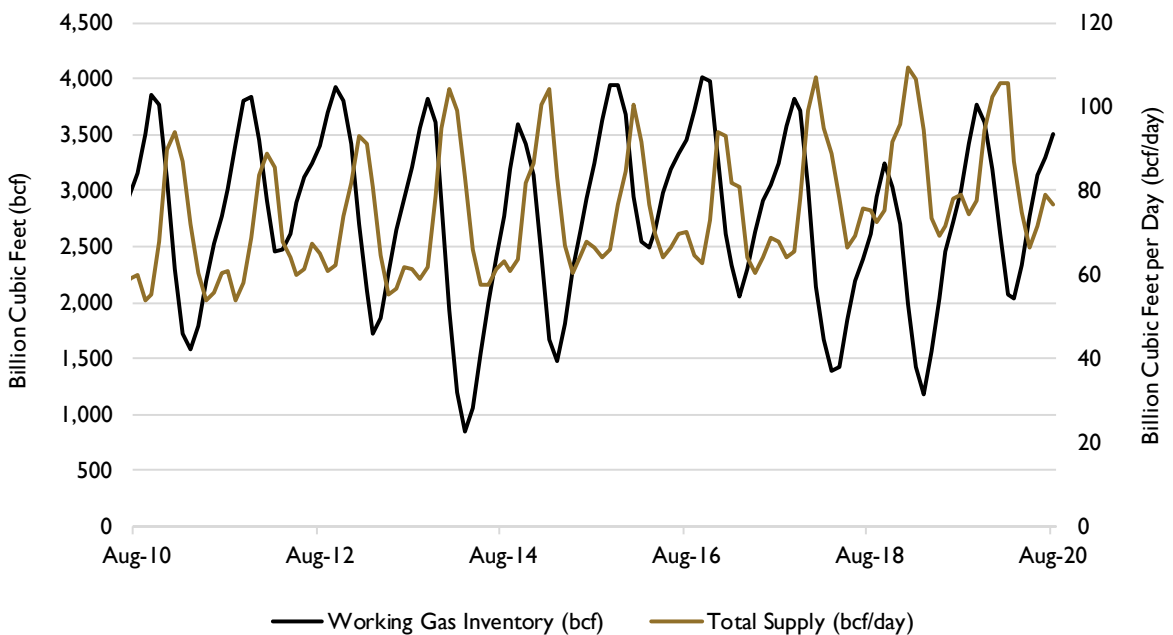
DATA CENTER

NATURAL GAS

U.S. NATURAL GAS PRODUCTION AND CONSUMPTION (MONTHLY) (17)



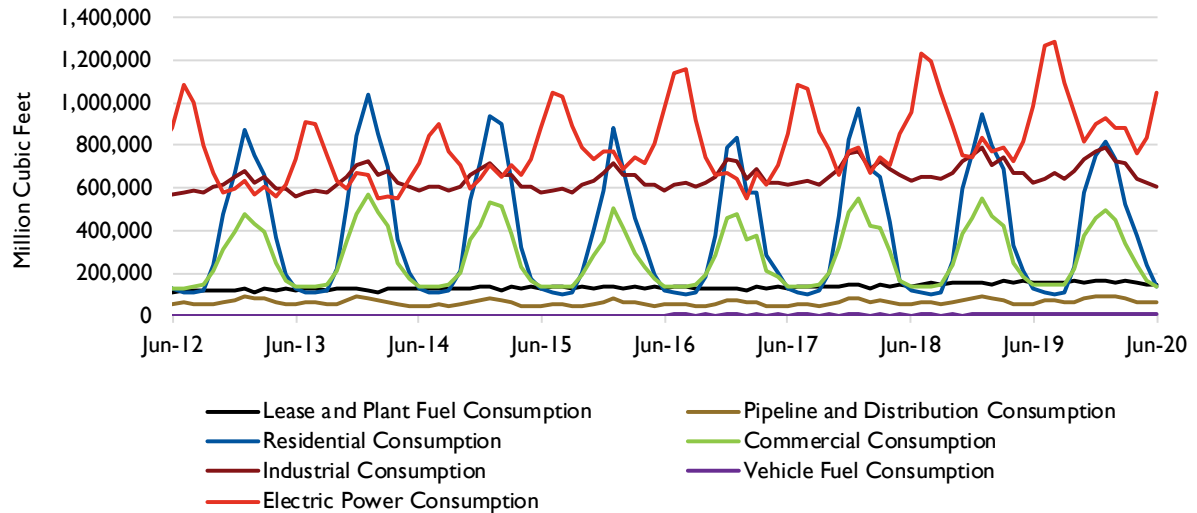
U.S. NATURAL GAS SUPPLY AND INVENTORY (MONTHLY) (18)



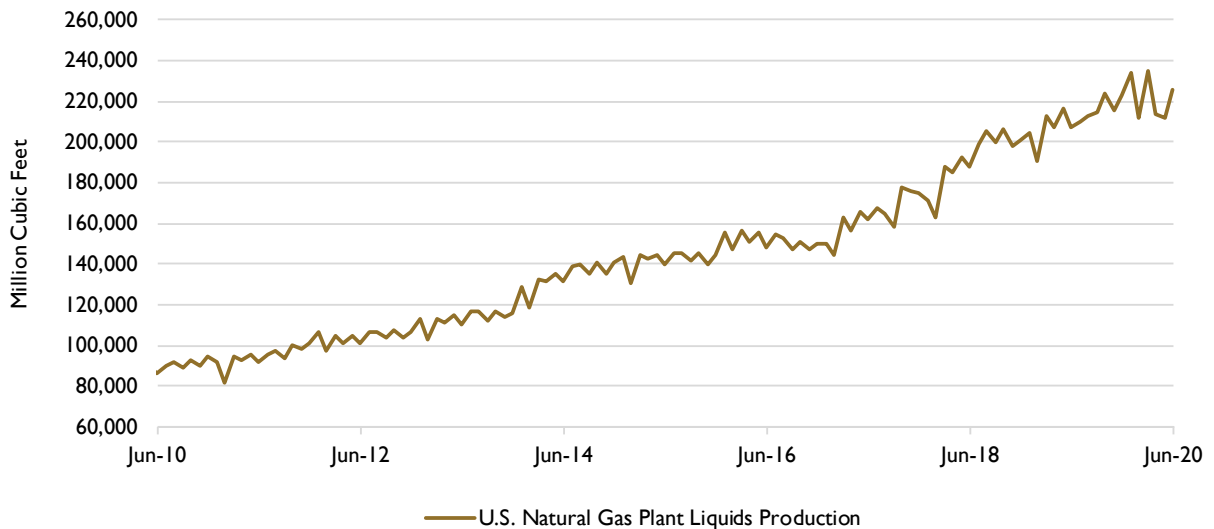
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NATURAL GAS

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



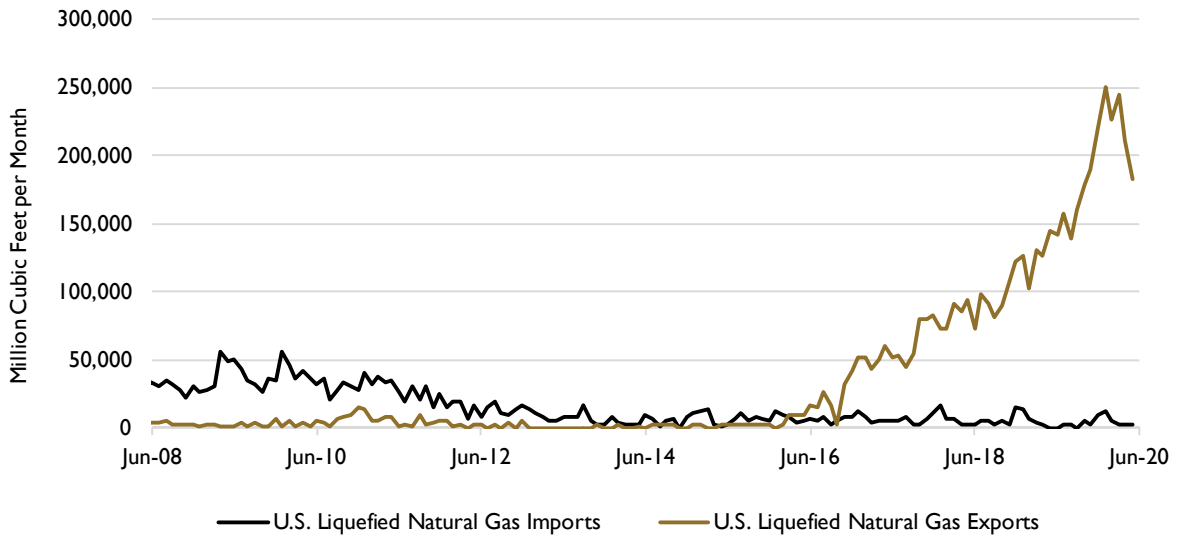
U.S. NATURAL GAS PLANT LIQUIDS PRODUCTION (MONTHLY) ⁽²⁰⁾



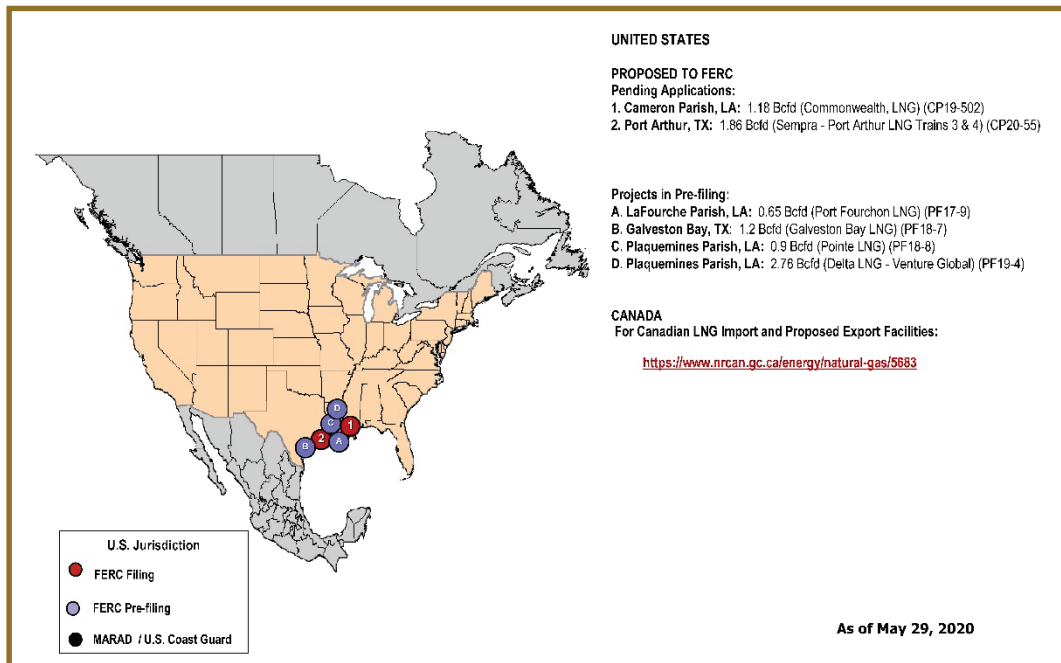
DATA CENTER

NATURAL GAS

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



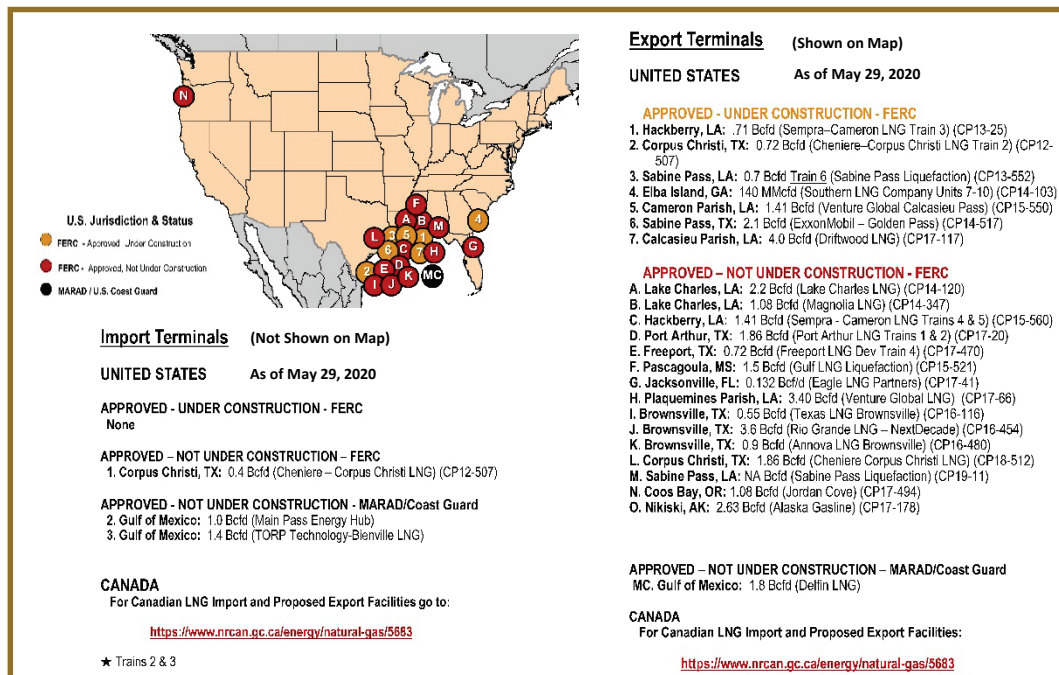
NORTH AMERICAN LNG EXPORT TERMINALS — PROPOSED ⁽²²⁾



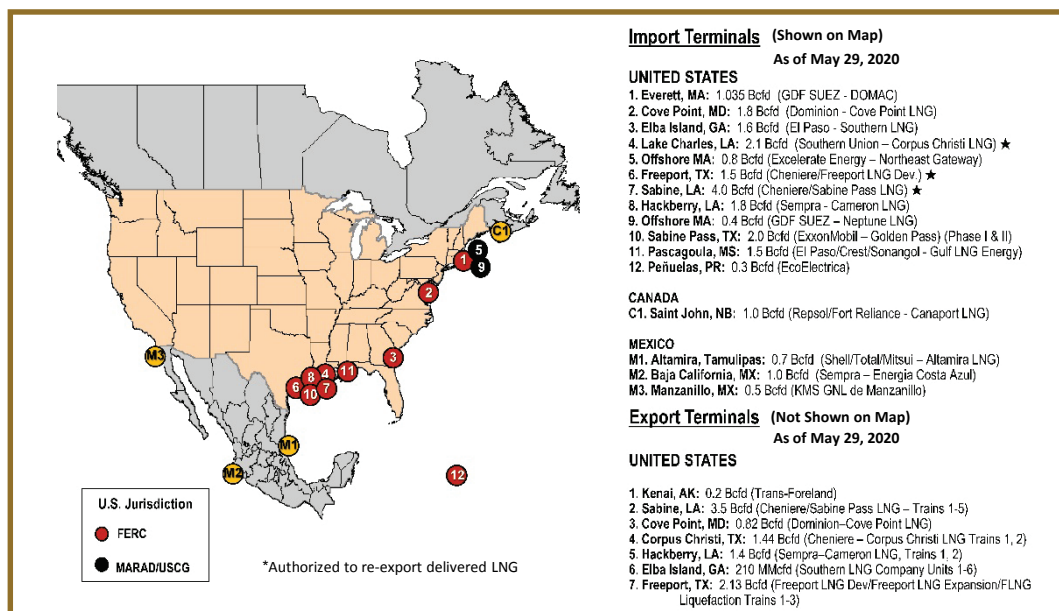
DATA CENTER

NATURAL GAS

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



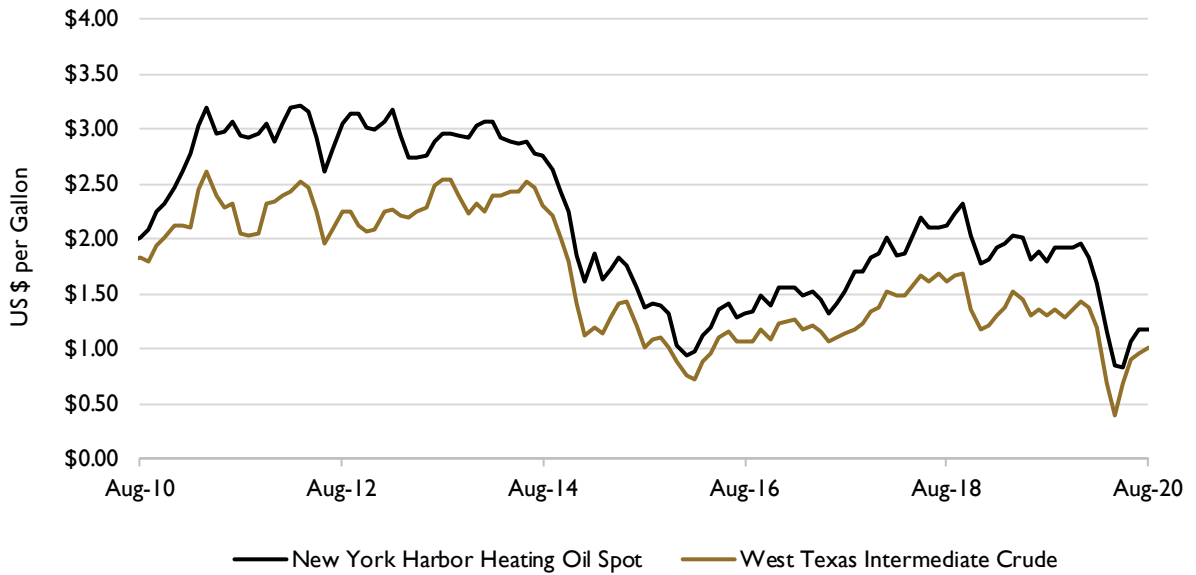
NORTH AMERICAN LNG IMPORT/EXPORT TERMINALS — *EXISTING* (24)



DATA CENTER

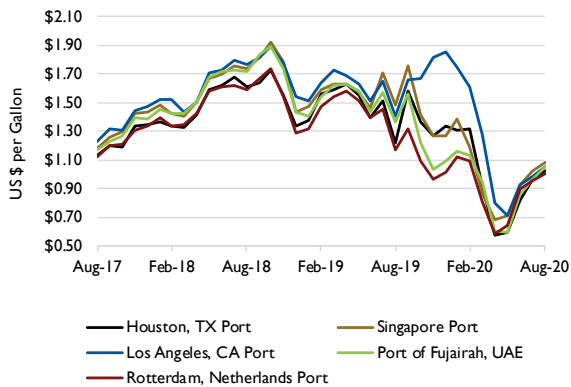
PROPANE AND HEATING/FUEL OIL

HEATING OIL PRICES (MONTHLY AVERAGE) (25)

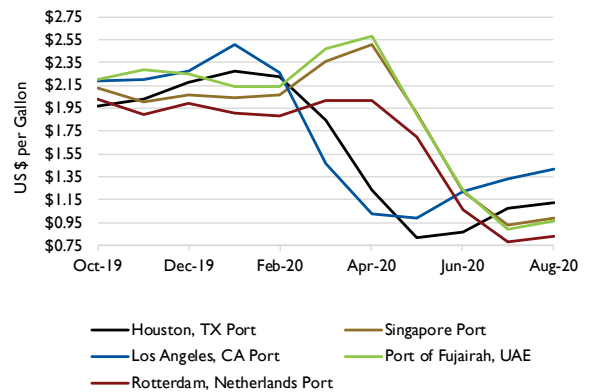


INTERMEDIATE FUEL OIL AKA “BUNKER FUEL” PRICES (MONTHLY AVERAGE) (26)

Intermediate Fuel Oil 380



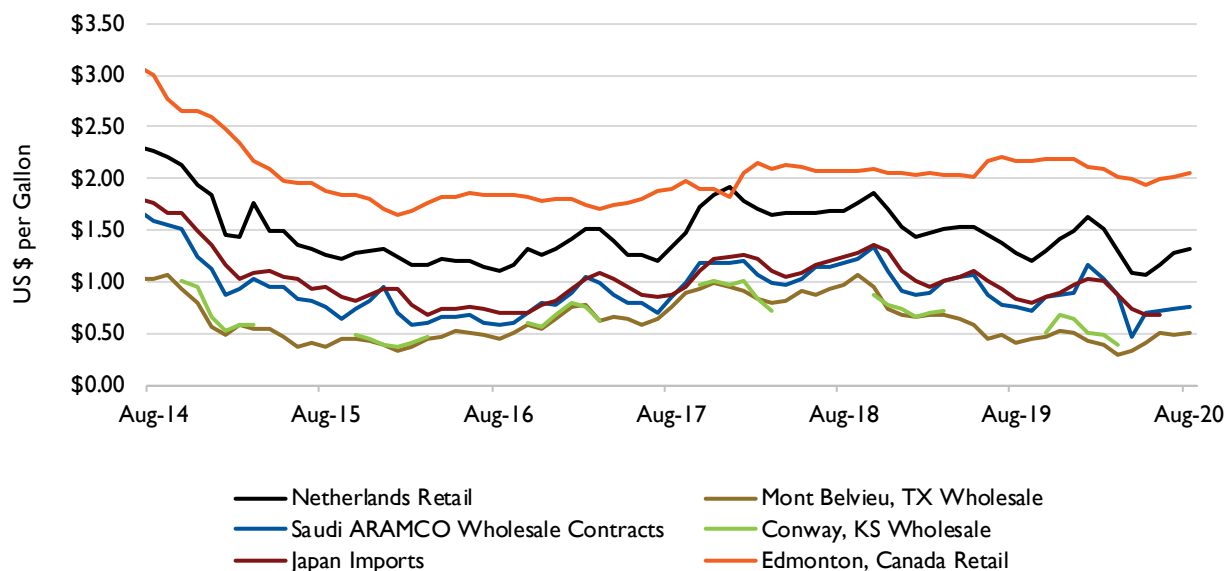
Very Low Sulfur Fuel Oil (VLSFO)



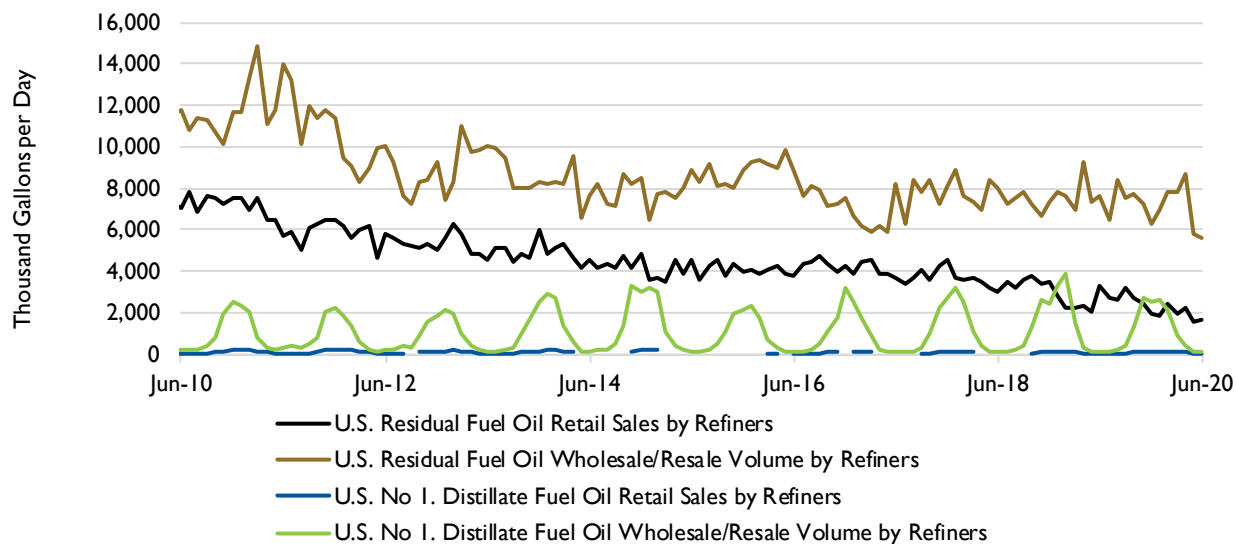
DATA CENTER

PROPANE AND HEATING/FUEL OIL

PROPANE PRICES (MONTHLY AVERAGE) (27)



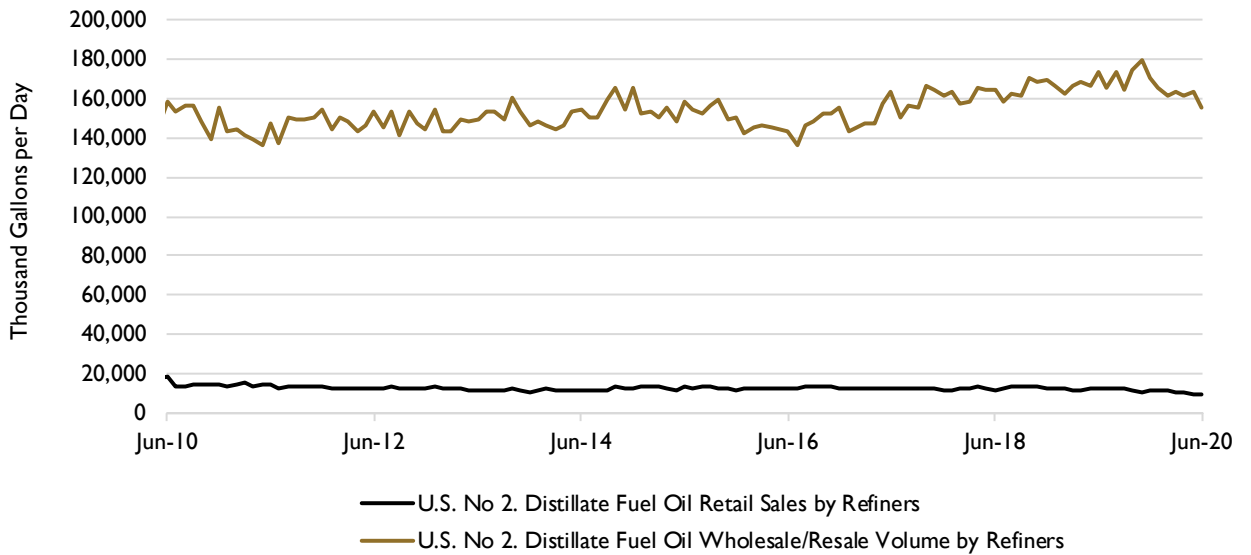
NO. 1 DISTILLATE FUEL OIL, RESIDUAL FUEL OIL WHOLESALE, RETAIL SALES VOLUME BY REFINERS (MONTHLY) (28)



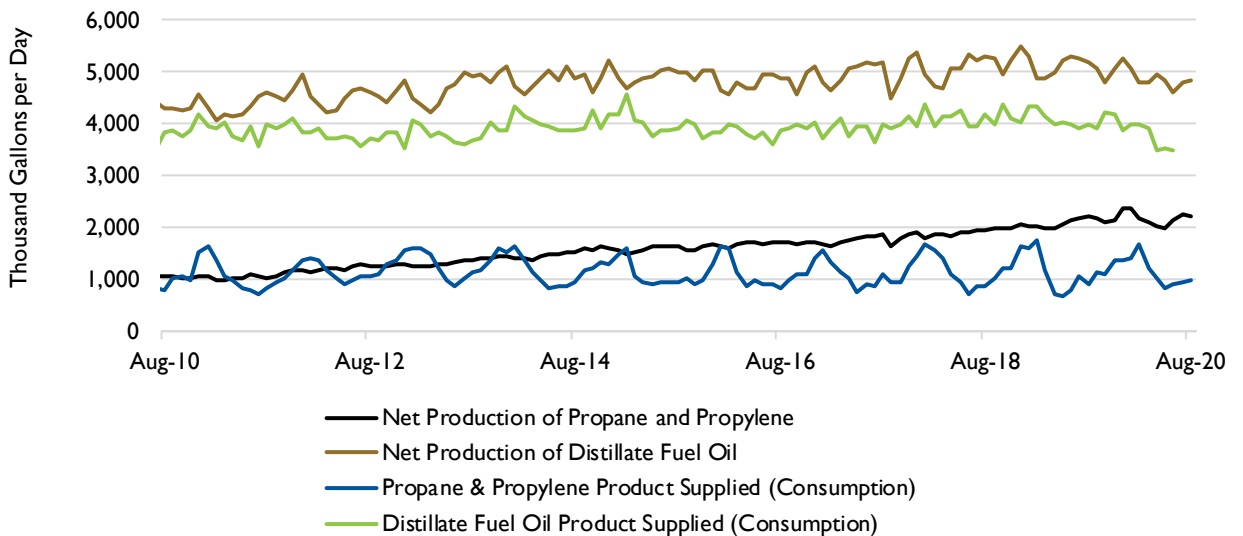
DATA CENTER

PROPANE AND HEATING/FUEL OIL

NO. 2 DISTILLATE FUEL OIL WHOLESALE, RETAIL SALES VOLUME BY REFINERS (MONTHLY) ⁽²⁹⁾



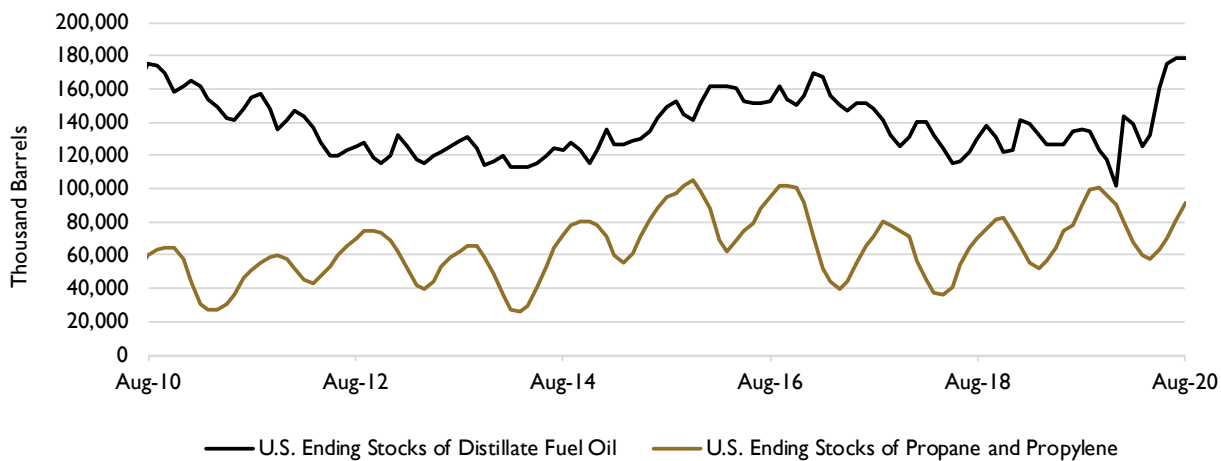
PROPANE & PROPYLENE AND DISTILLATE FUEL OIL PRODUCTION AND CONSUMPTION (MONTHLY) ⁽³⁰⁾



DATA CENTER

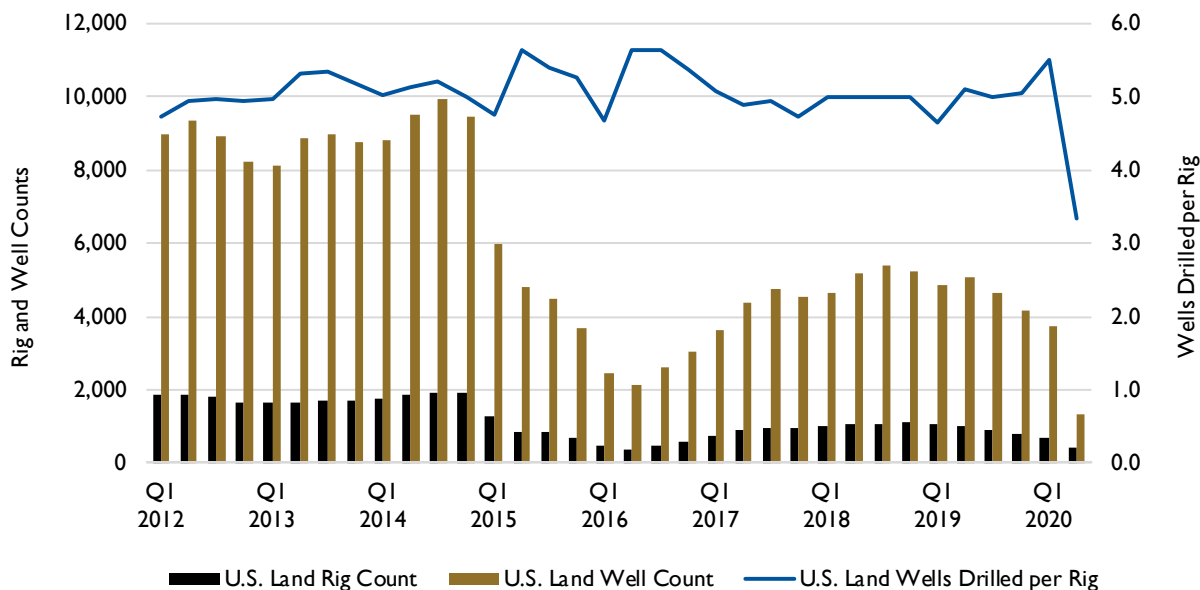
PROPANE AND HEATING/FUEL OIL

U.S. ENDING STOCKS OF PROPANE & PROPYLENE AND DISTILLATE FUEL OIL (MONTHLY AVERAGE) ⁽³¹⁾



DRILLING ACTIVITY

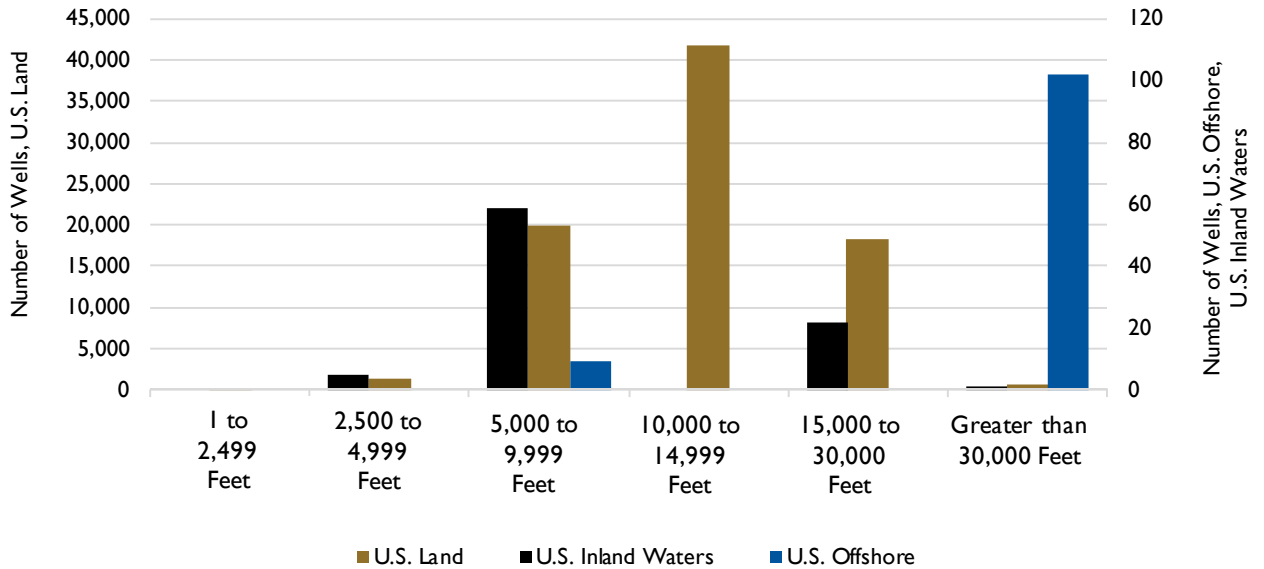
U.S. LAND WELL COUNT, RIG COUNT AND WELLS PER RIG (QUARTERLY) ⁽³²⁾



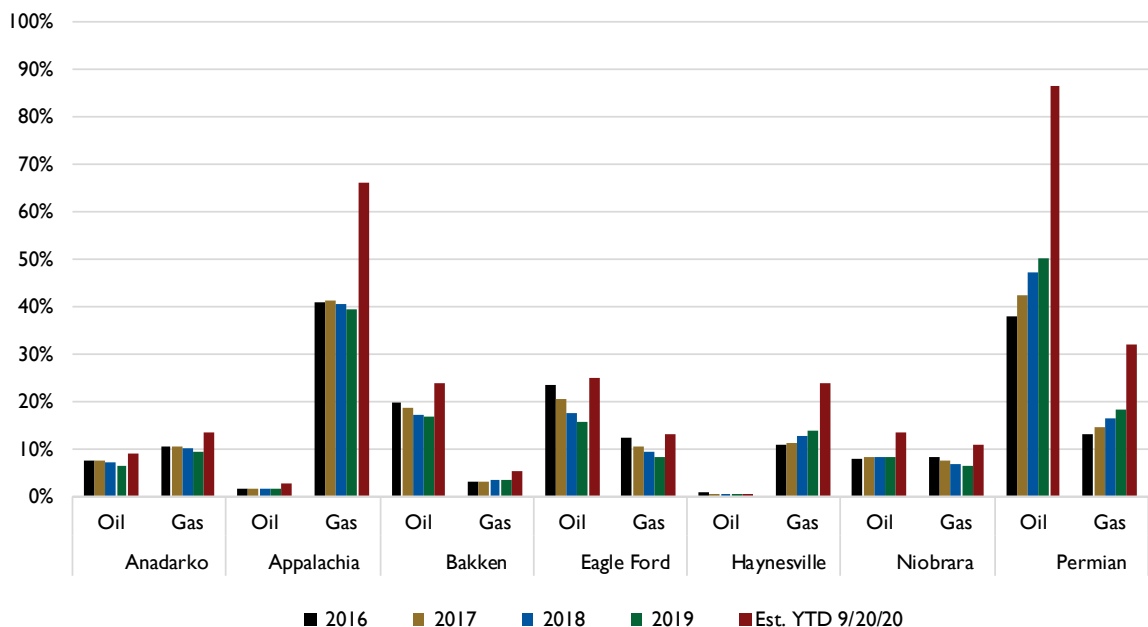
DATA CENTER

DRILLING ACTIVITY

U.S. WELL STARTS BY DEPTH (YEAR TO DATE AUGUST 30, 2020) (33)



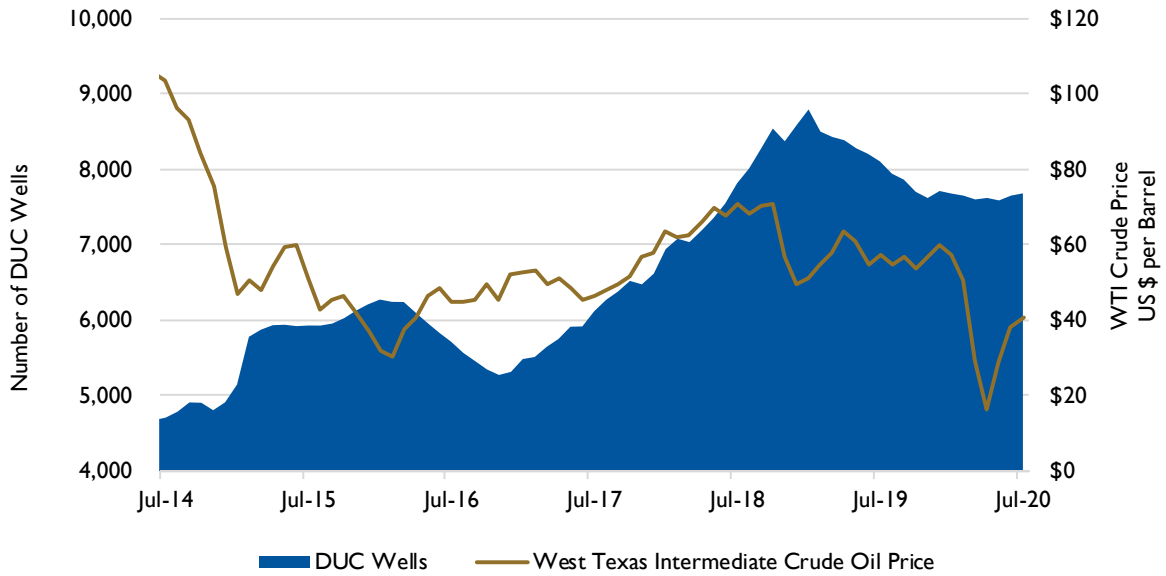
PERCENTAGE OF CRUDE OIL AND NATURAL GAS PRODUCTION PER SHALE REGION (ANNUAL) (34)



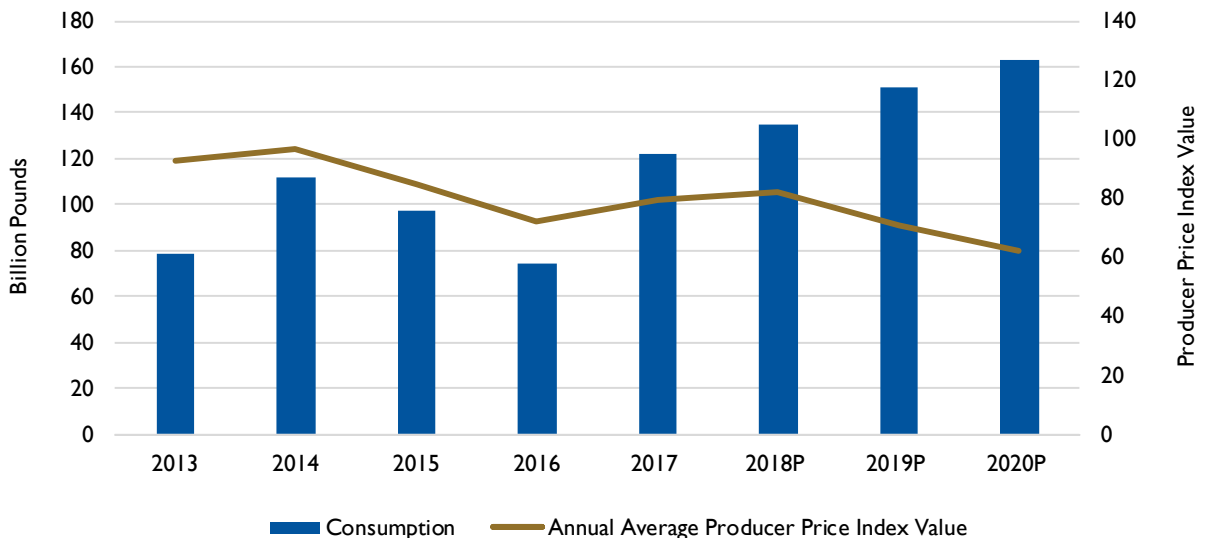
DATA CENTER

DRILLING ACTIVITY

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



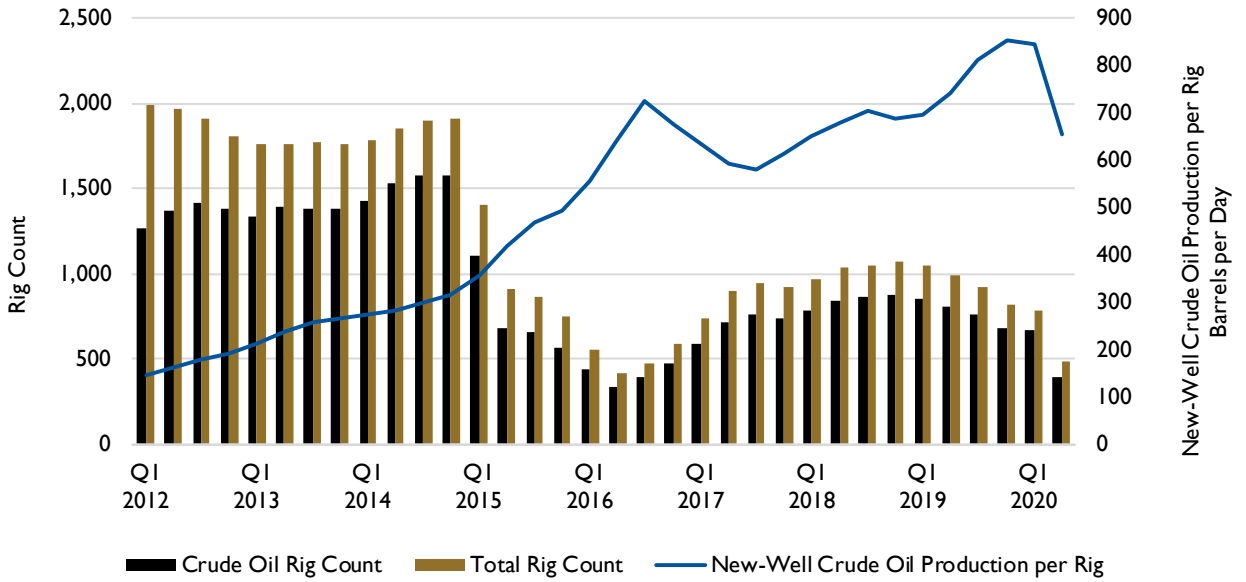
HYDRAULIC FRACTURING SAND CONSUMPTION AND PRODUCER PRICE INDEX (ANNUAL) ⁽³⁶⁾



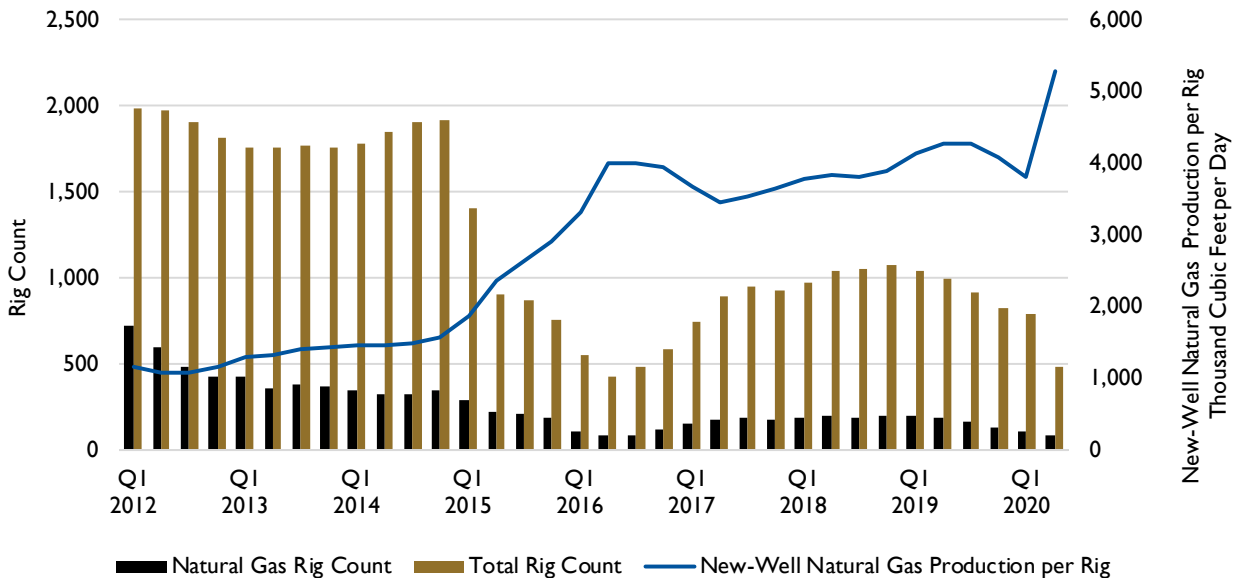
DATA CENTER

DRILLING ACTIVITY

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

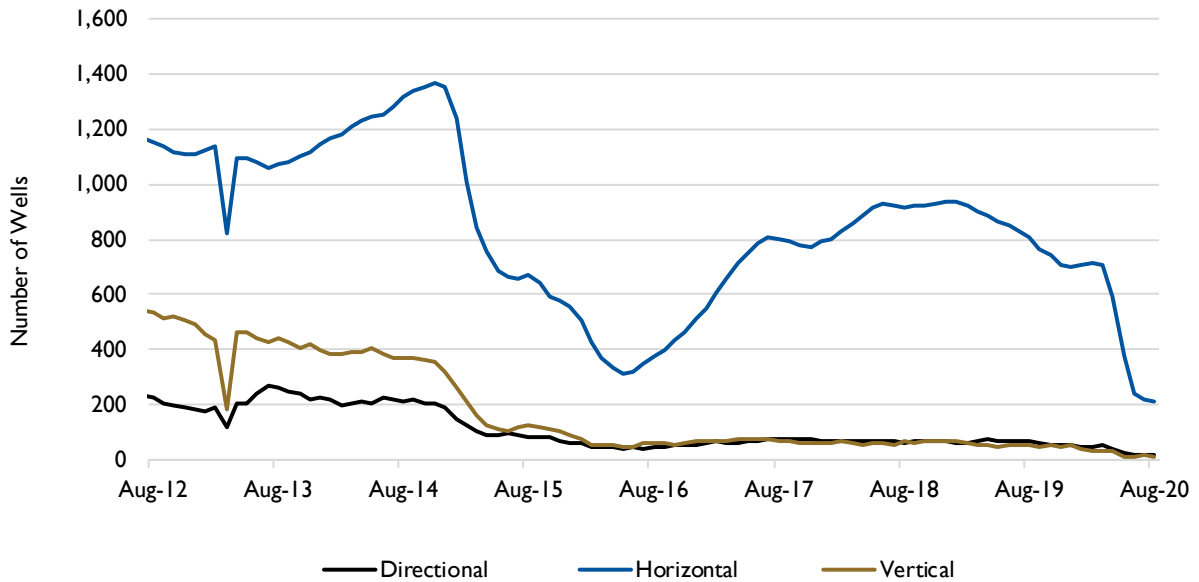


NATURAL GAS PRODUCTION, RIG COUNT AND PRODUCTION PER RIG (QUARTERLY) (38)



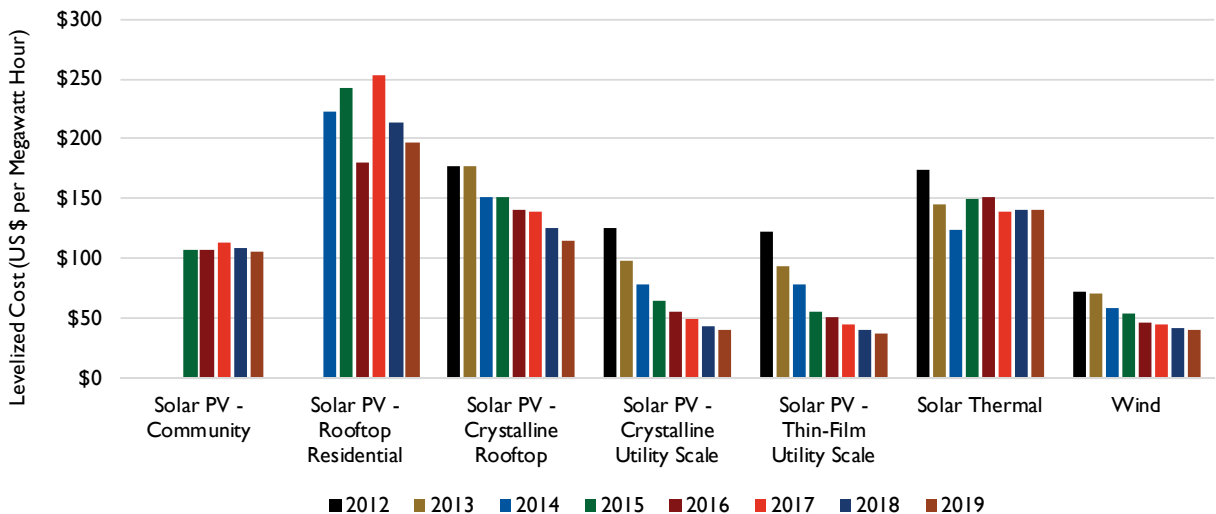
DATA CENTER DRILLING ACTIVITY

U.S. DRILLING RIGS BY TYPE (MONTHLY) (39)



RENEWABLES

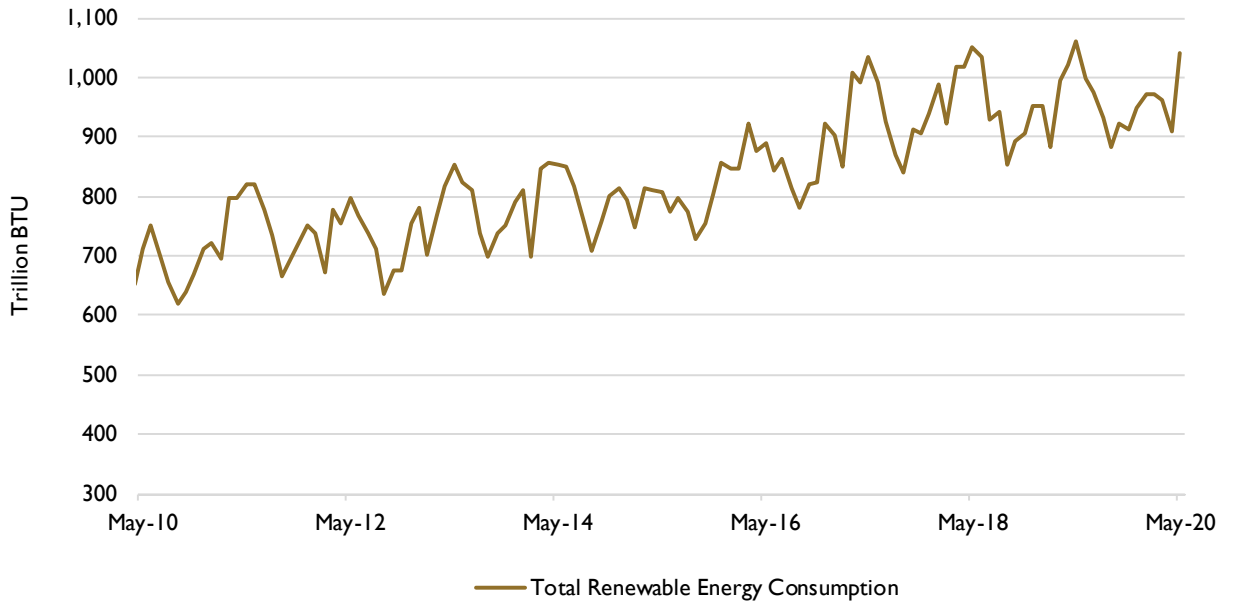
WIND AND SOLAR PRICES (ANNUAL AVERAGE) (40)



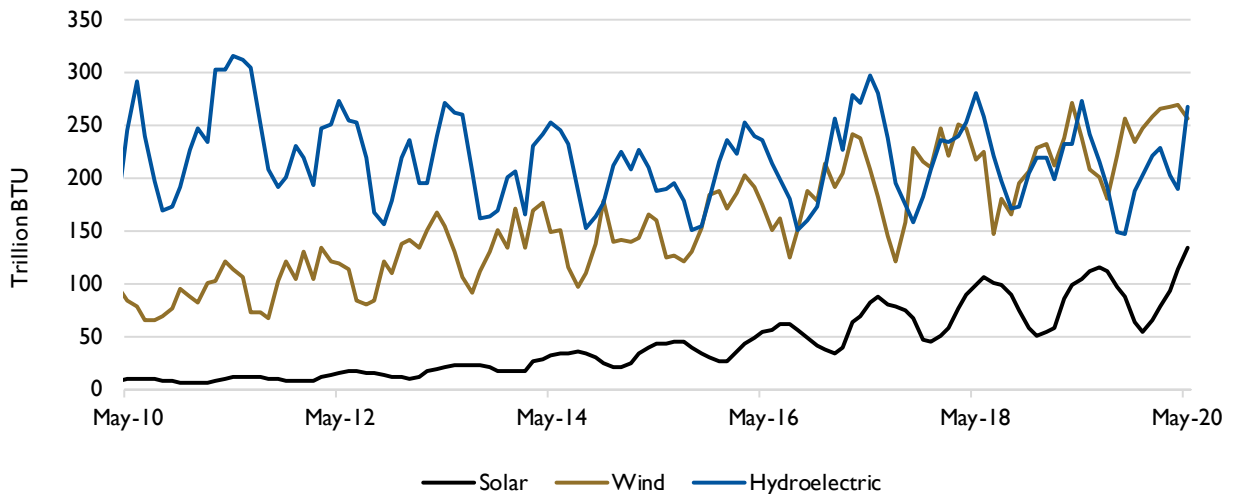
DATA CENTER

RENEWABLES

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



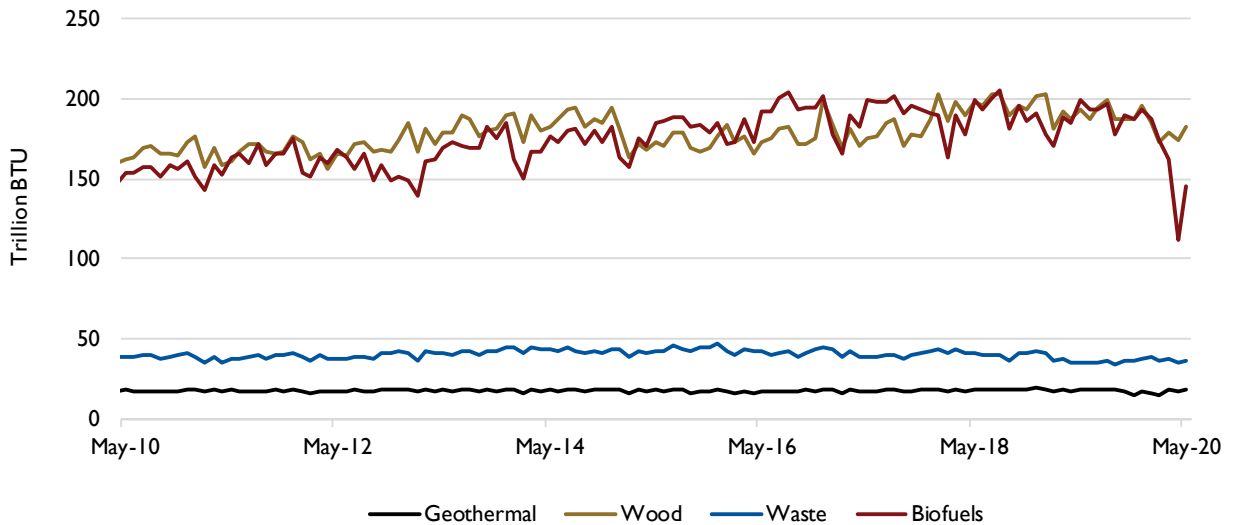
U.S. SOLAR, WIND AND HYDROELECTRIC ENERGY CONSUMPTION (MONTHLY) (42)



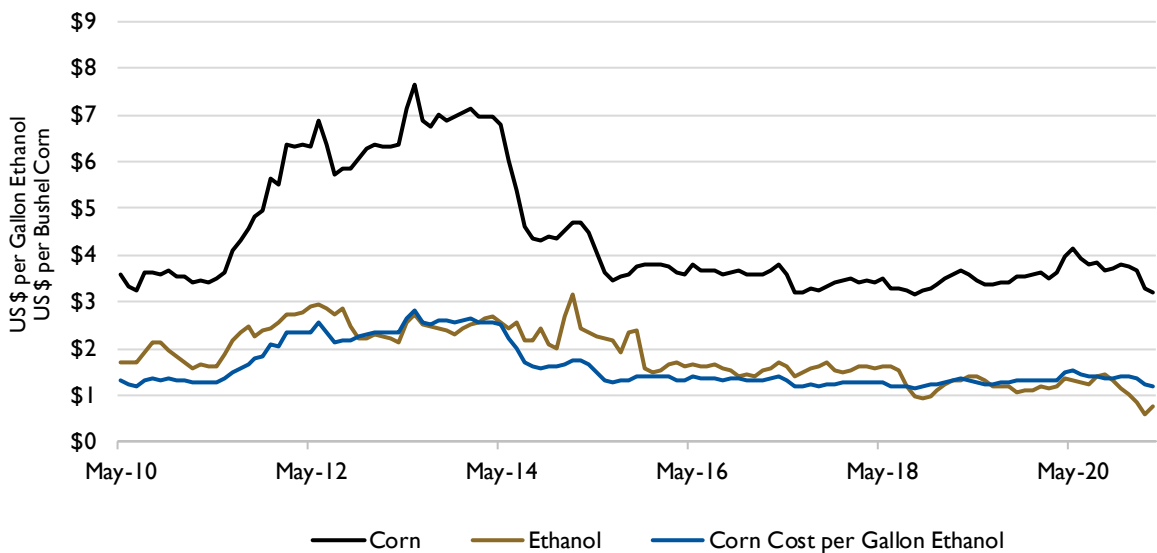
DATA CENTER

RENEWABLES

U.S. WOOD, WASTE, BIOFUELS AND GEOTHERMAL ENERGY CONSUMPTION (MONTHLY) (43)

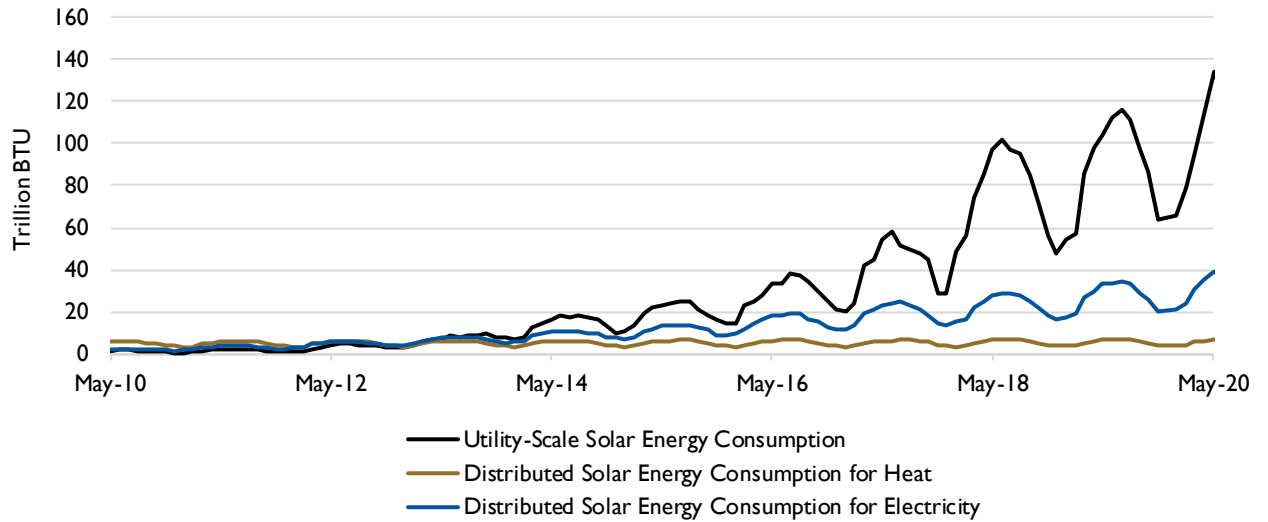


CORN AND ETHANOL PRICES AND CORN COST PER GALLON OF ETHANOL (QUARTERLY) (44)

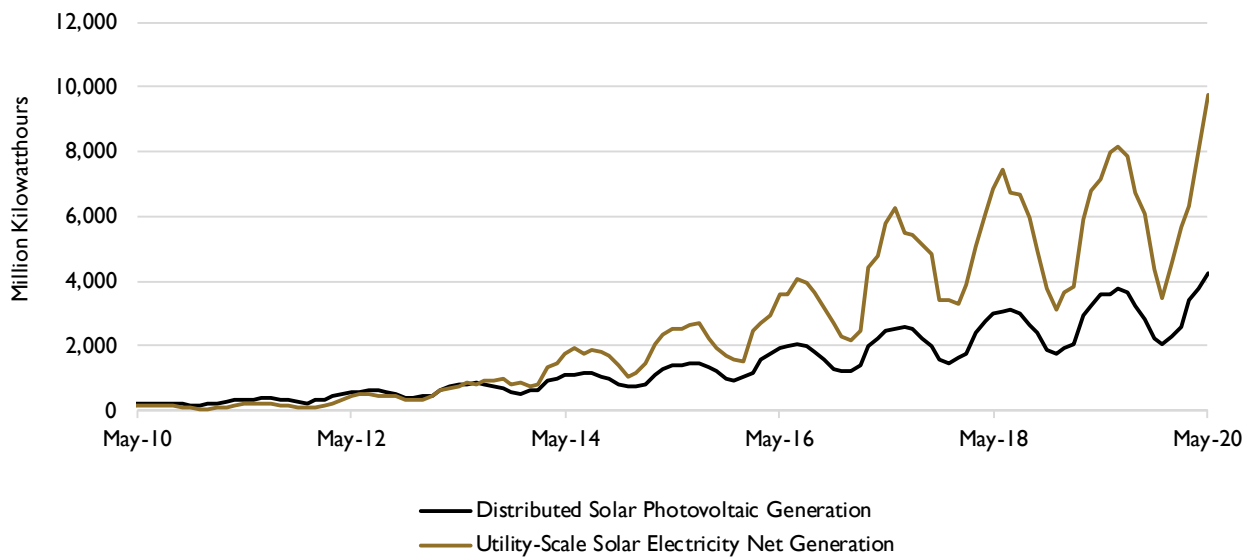


DATA CENTER RENEWABLES

U.S. SOLAR ENERGY CONSUMPTION (MONTHLY) ⁽⁴⁵⁾



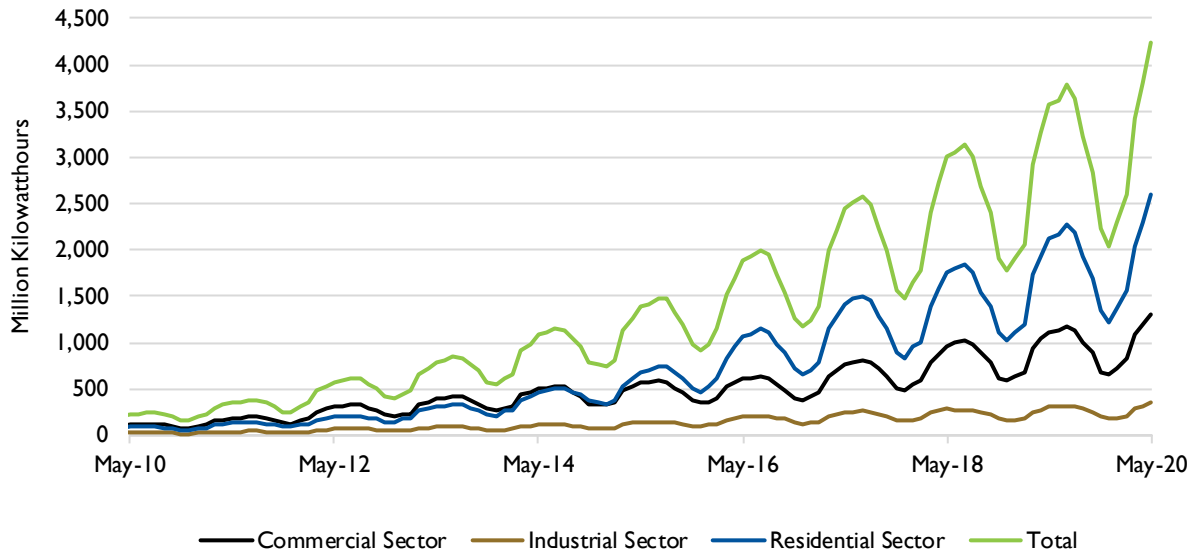
U.S. SOLAR ENERGY NET GENERATION (MONTHLY) ⁽⁴⁶⁾



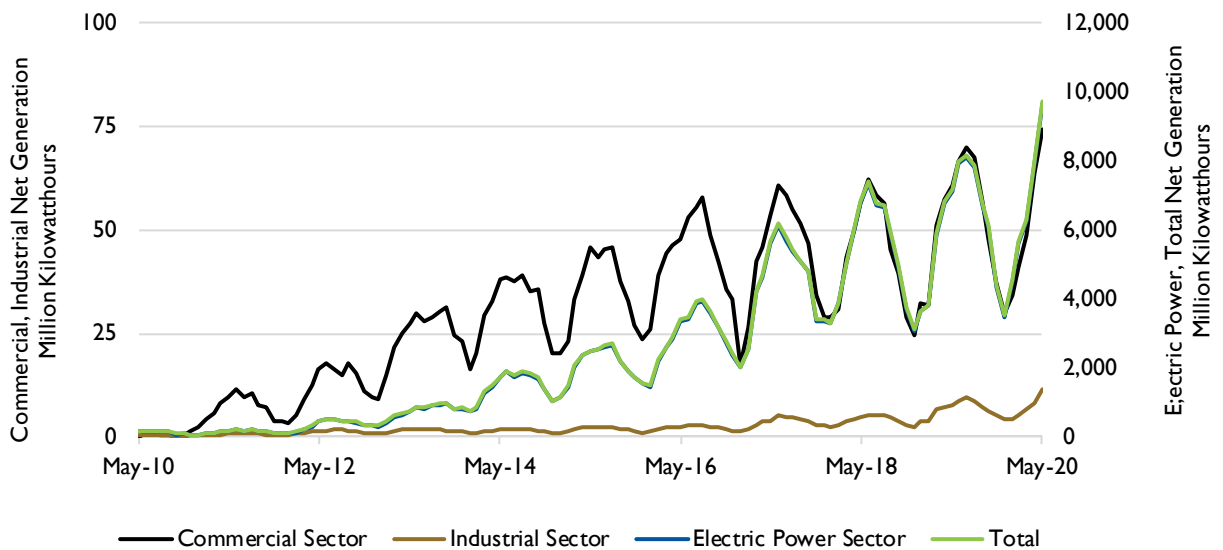
DATA CENTER

RENEWABLES

DISTRIBUTED SOLAR PHOTOVOLTAIC GENERATION BY SECTOR (MONTHLY) (47)

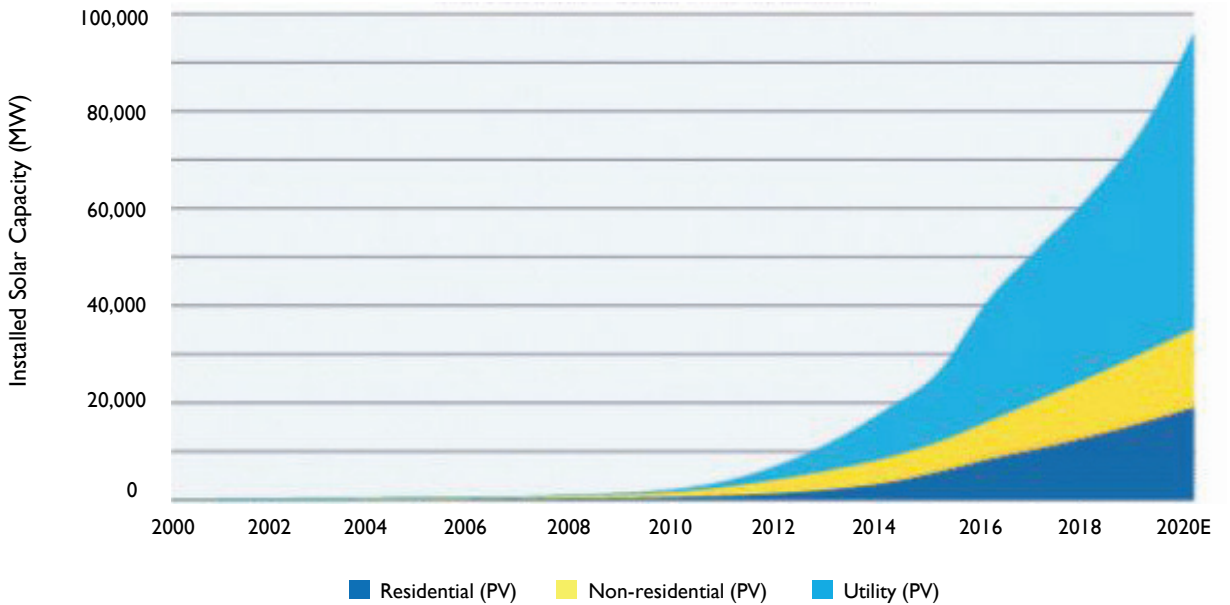


UTILITY-SCALE SOLAR ELECTRICITY NET GENERATION BY SECTOR (MONTHLY) (48)

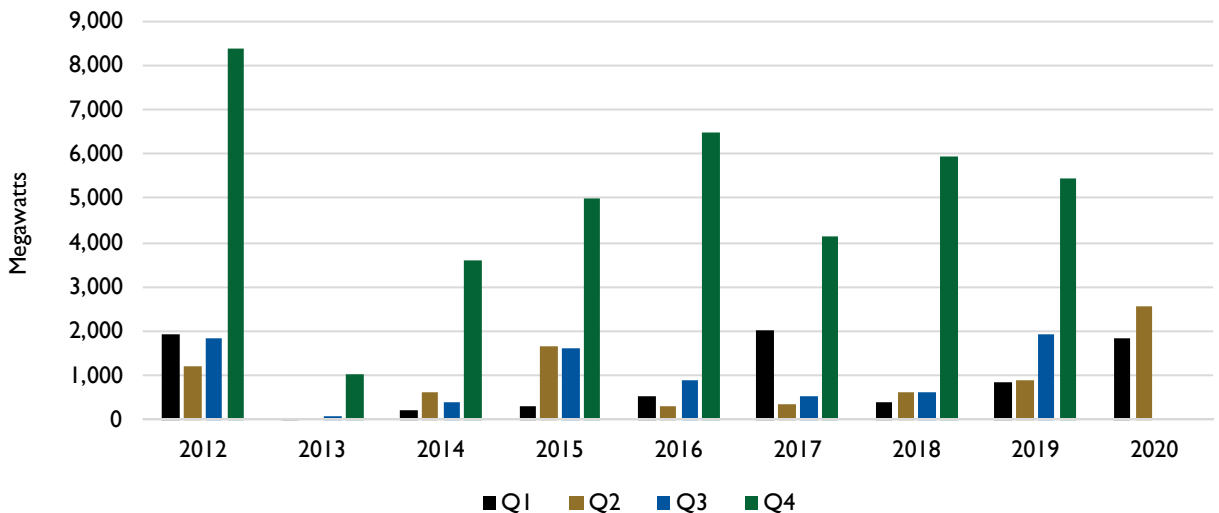


DATA CENTER RENEWABLES

U.S. CUMULATIVE SOLAR INSTALLATIONS (ANNUAL) (49)

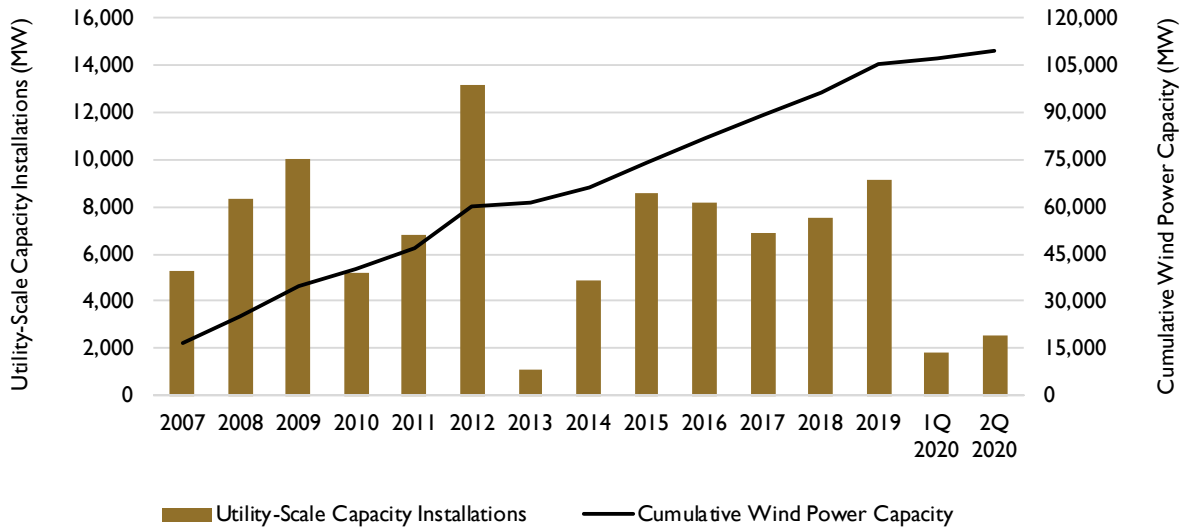


U.S. WIND POWER CAPACITY INSTALLATIONS (QUARTERLY) (50)

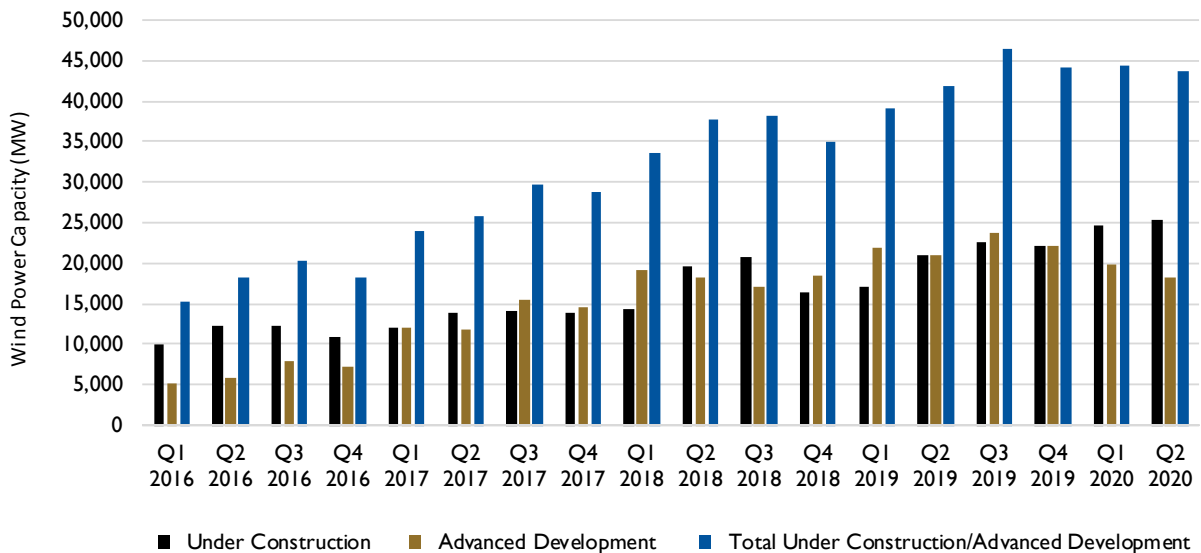


DATA CENTER RENEWABLES

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



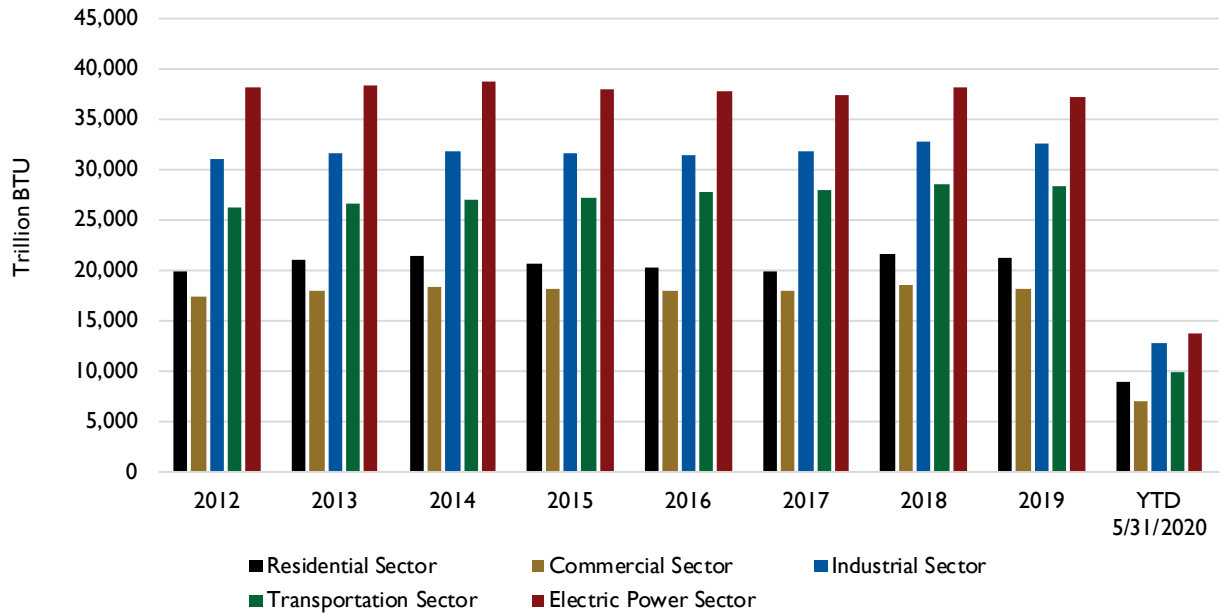
WIND POWER UNDER CONSTRUCTION OR IN ADVANCED DEVELOPMENT (QUARTERLY) ⁽⁵²⁾



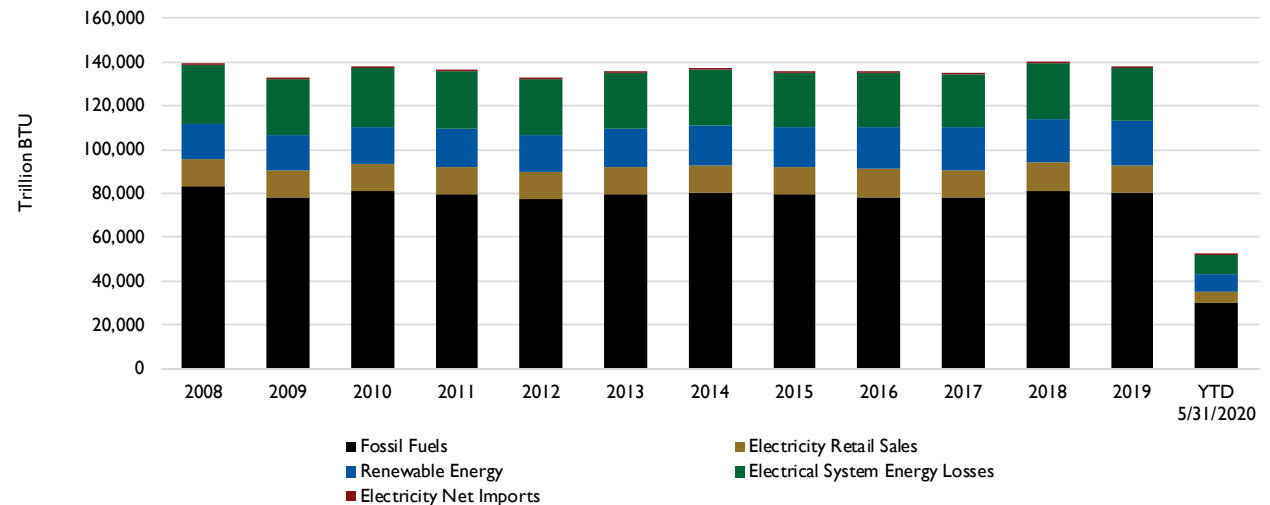
DATA CENTER

U.S. AGGREGATED ENERGY CONSUMPTION

ENERGY CONSUMPTION BY SECTOR (ANNUAL) ⁽⁵³⁾



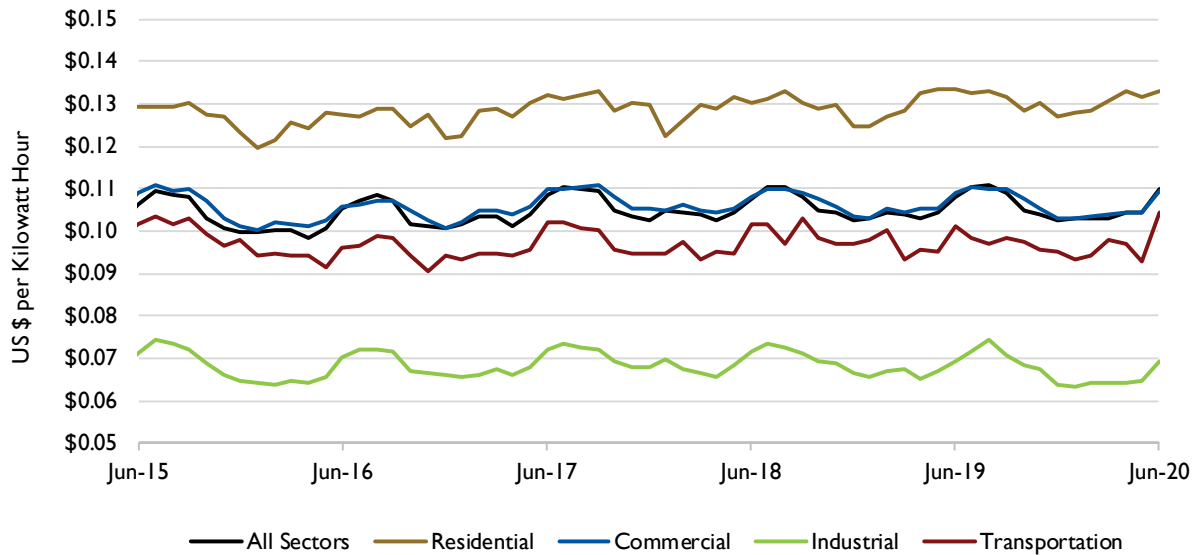
ENERGY CONSUMPTION BY SOURCE (ANNUAL) ⁽⁵⁴⁾



DATA CENTER

U.S. AGGREGATED ENERGY CONSUMPTION

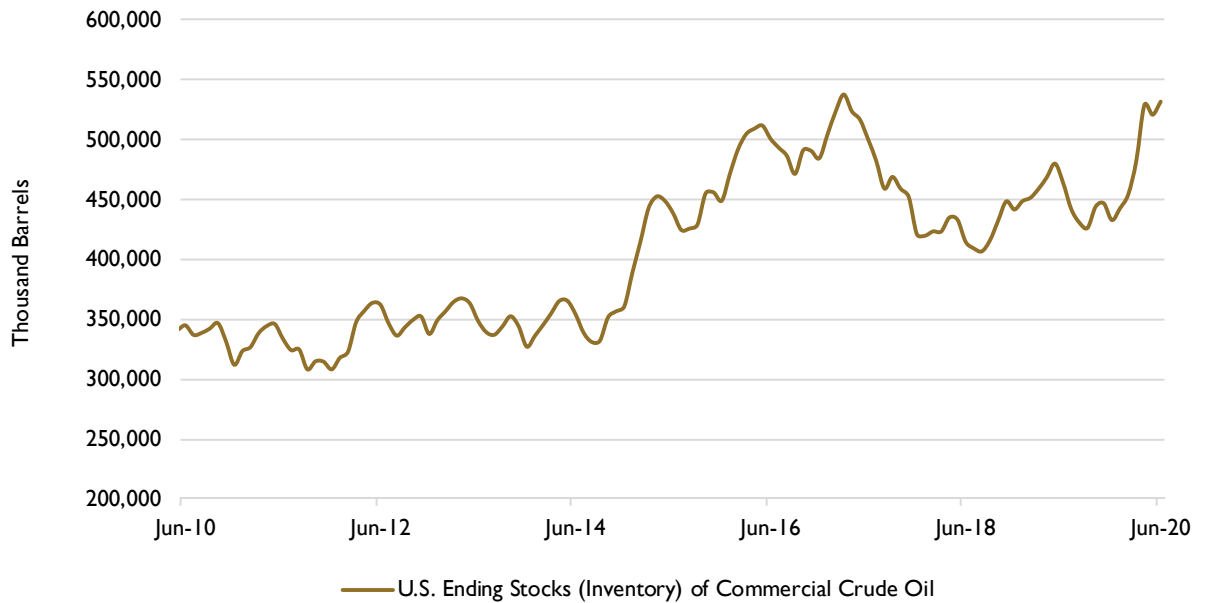
ELECTRICITY PRICES BY SECTOR (MONTHLY AVERAGE) (55)



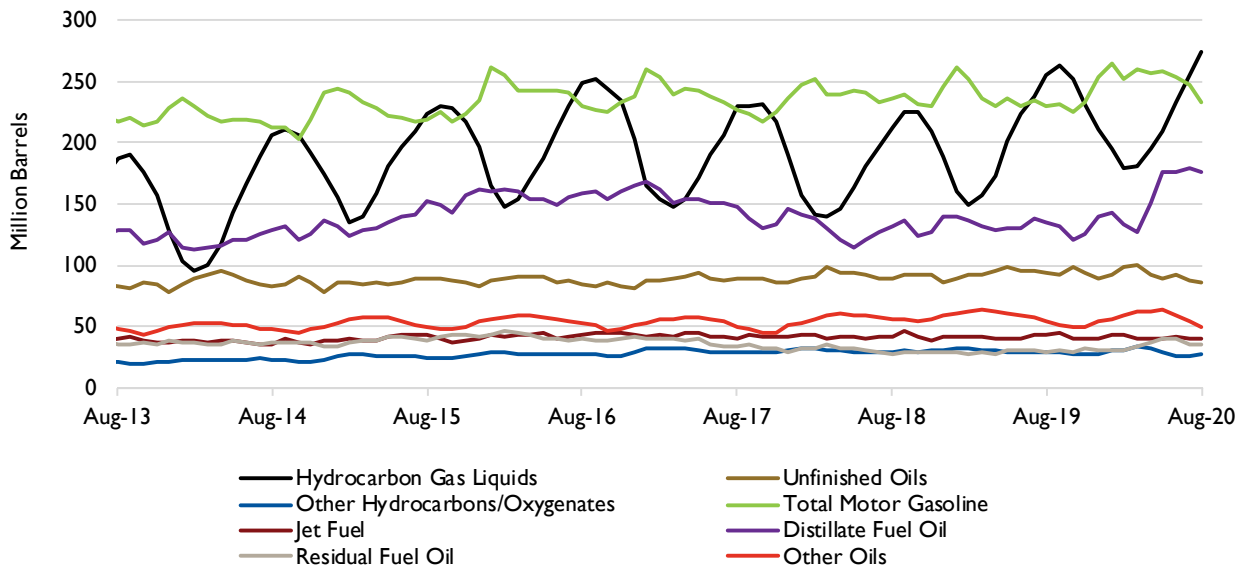
DATA CENTER

LOGISTICS - STORAGE AND TERMINALS

COMMERCIAL CRUDE OIL INVENTORY (MONTHLY) (56)



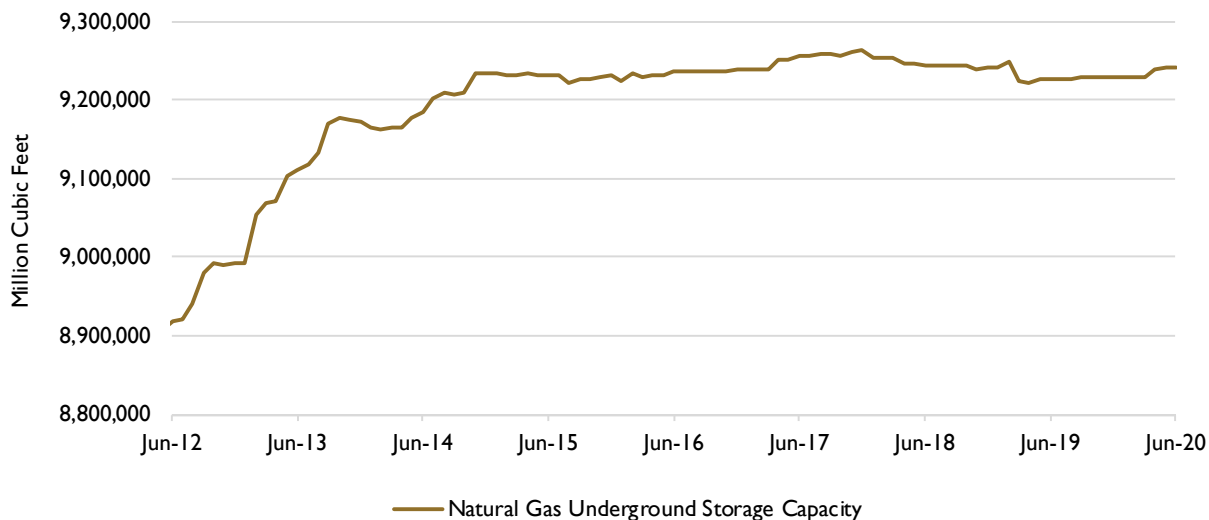
PETROLEUM AND OTHER LIQUIDS COMMERCIAL INVENTORY (MONTHLY) (57)



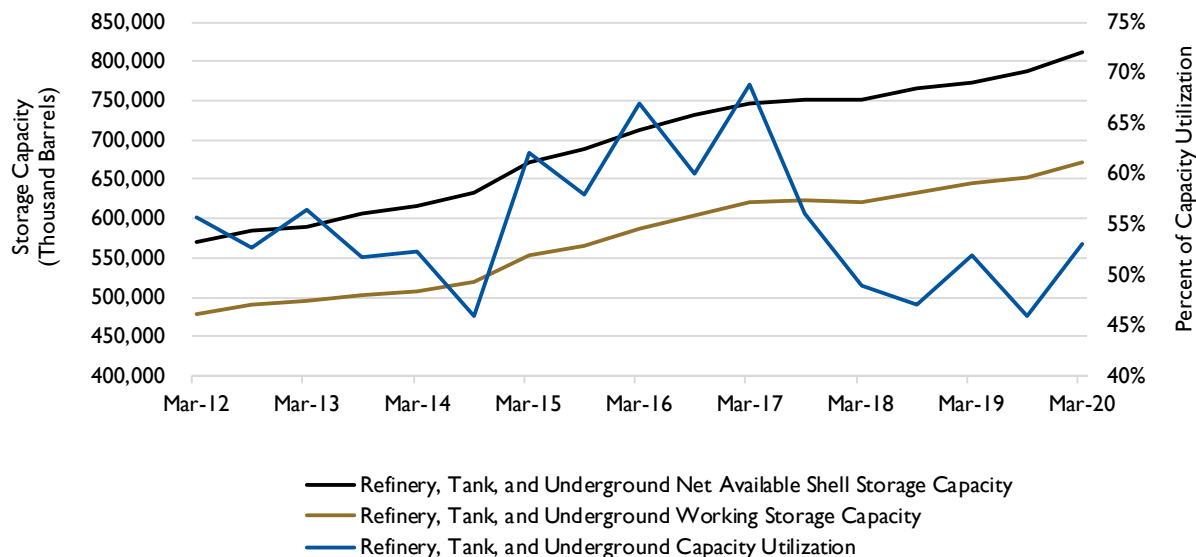
DATA CENTER

LOGISTICS - STORAGE AND TERMINALS

NATURAL GAS UNDERGROUND STORAGE CAPACITY (MONTHLY) (58)



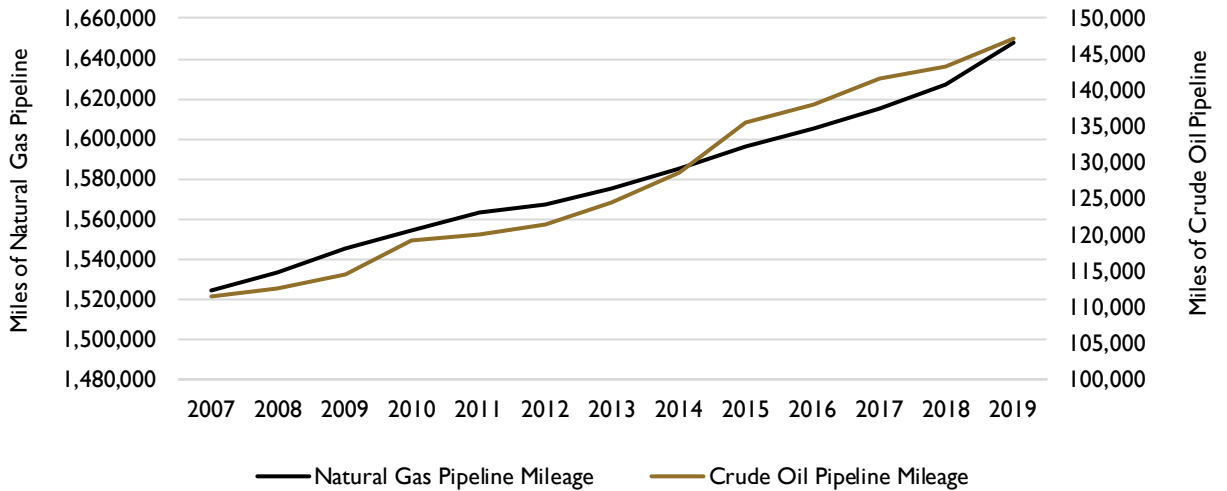
COMMERCIAL CRUDE OIL REFINERY, TANK AND UNDERGROUND STORAGE CAPACITY AND UTILIZATION (MONTHLY) (59)



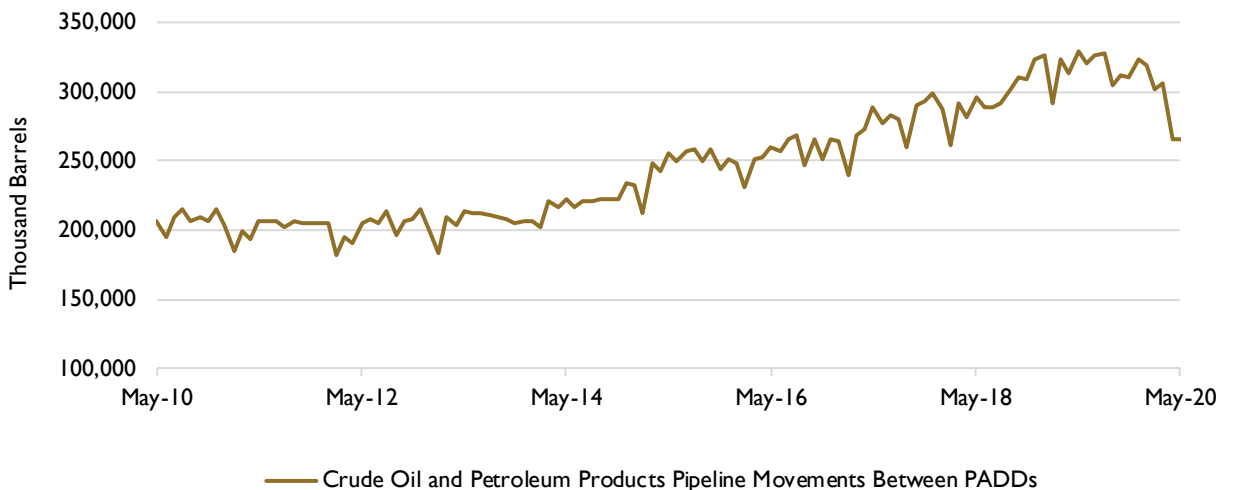
DATA CENTER

LOGISTICS - PIPELINES

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



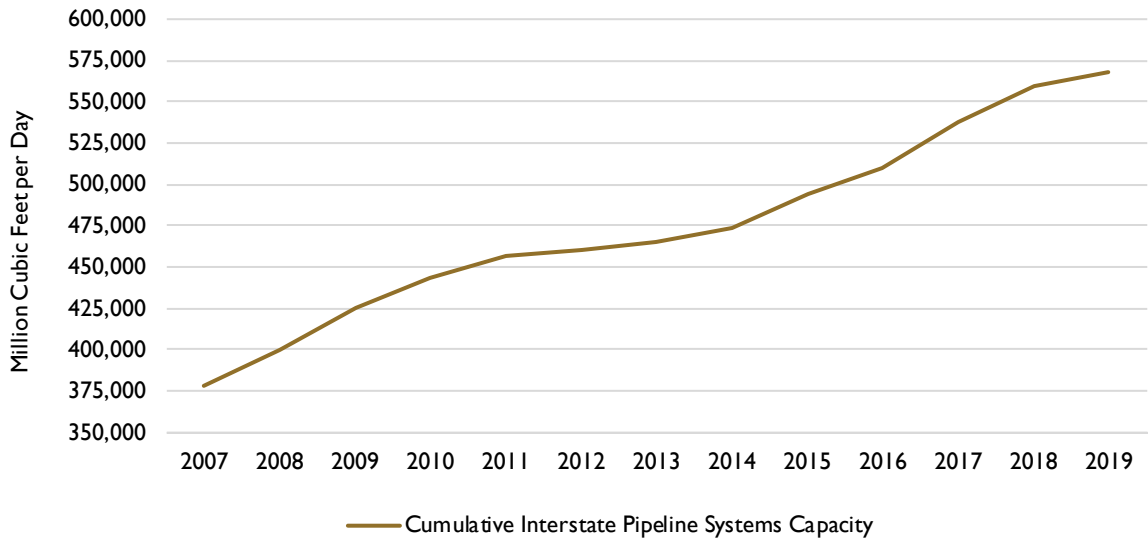
CRUDE OIL AND PETROLEUM PRODUCTS PIPELINE MOVEMENTS BETWEEN PETROLEUM ADMINISTRATION FOR DEFENSE DISTRICTS (PADDs) (MONTHLY) (61)



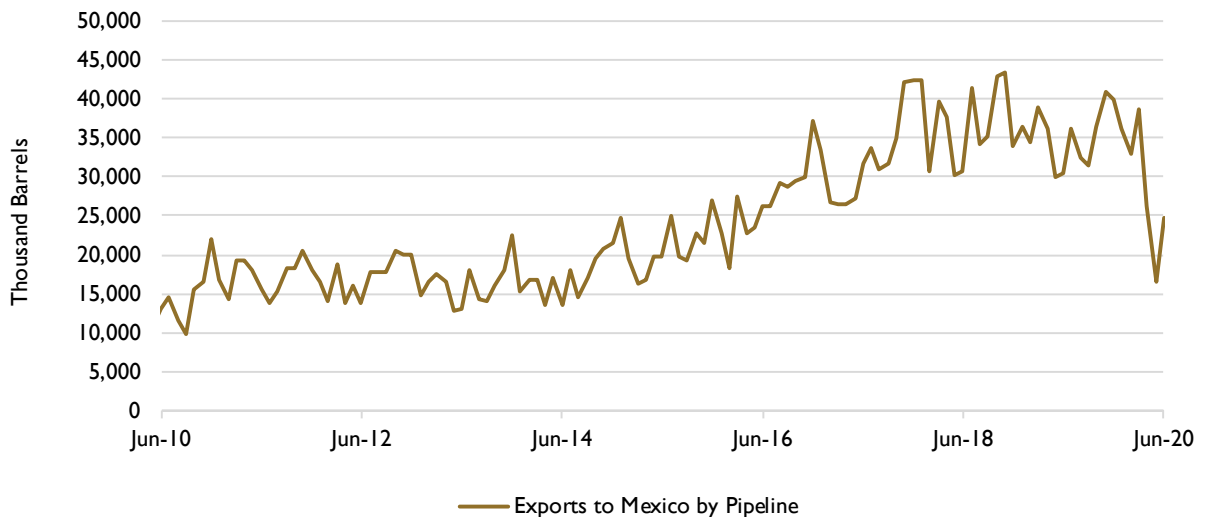
DATA CENTER

LOGISTICS - PIPELINES

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



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

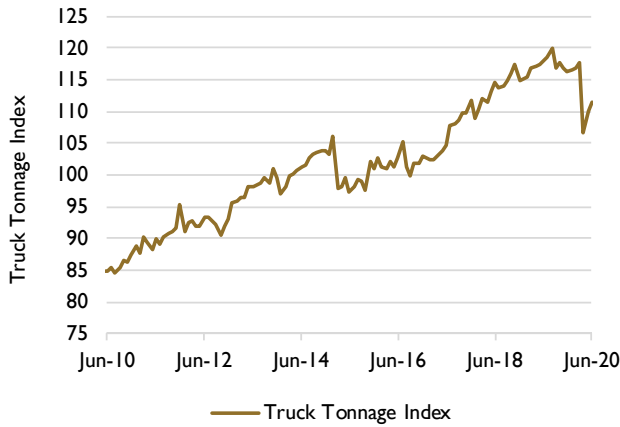


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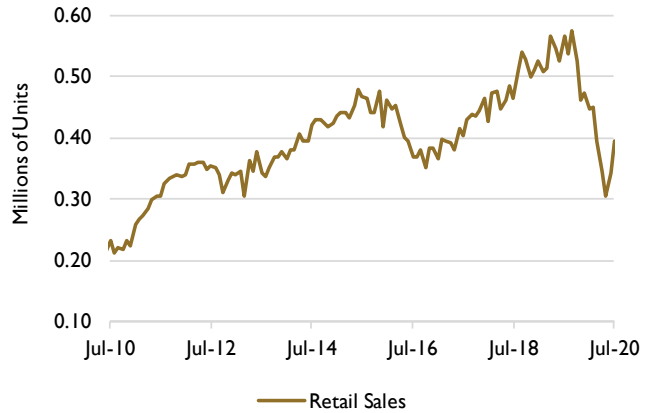
LOGISTICS - TRUCKERS

TRUCK TONNAGE INDEX (MONTHLY) (64)

MEASURES GROSS TONNAGE OF FREIGHT

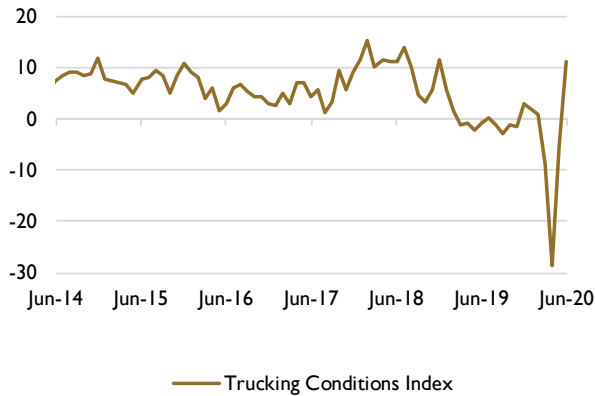


HEAVY TRUCK SALES (MONTHLY) (65)



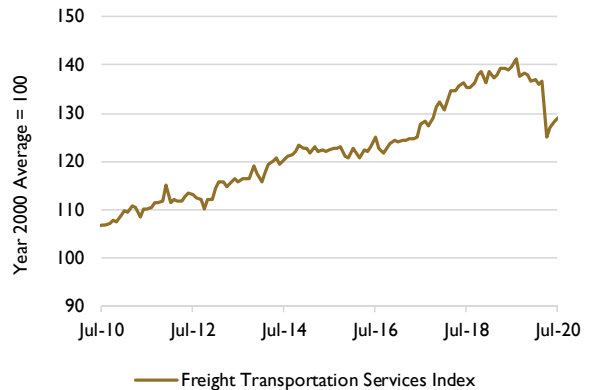
TRUCKING CONDITIONS INDEX (MONTHLY) (66)

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



FREIGHT TRANSPORTATION SERVICES INDEX (MONTHLY) (67)

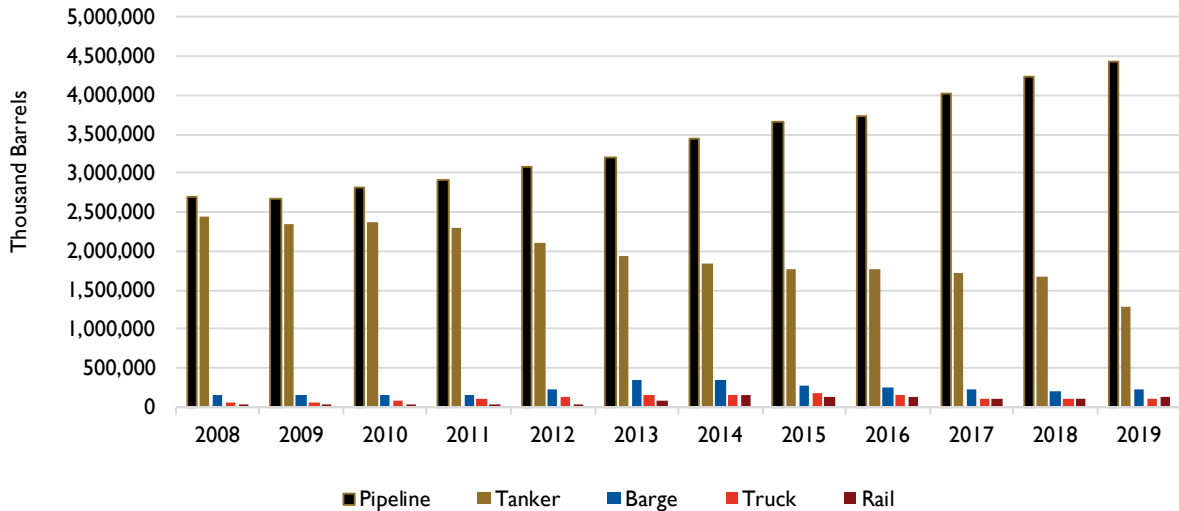
INCLUDES TRUCKING, RAIL, WATERWAYS, PIPELINES AND AIR FREIGHT



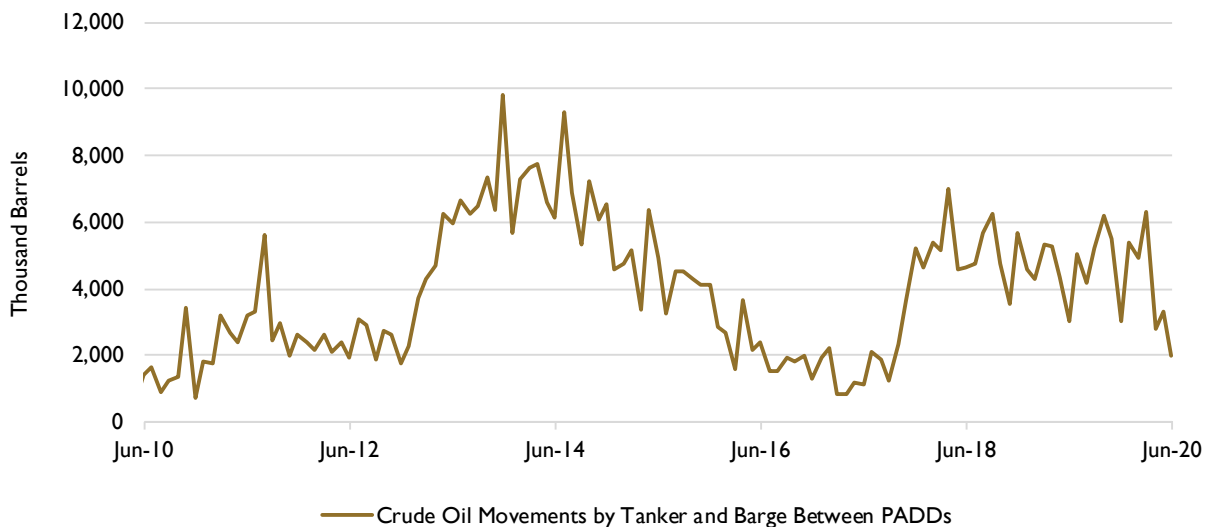
DATA CENTER

LOGISTICS - SHIPPING

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



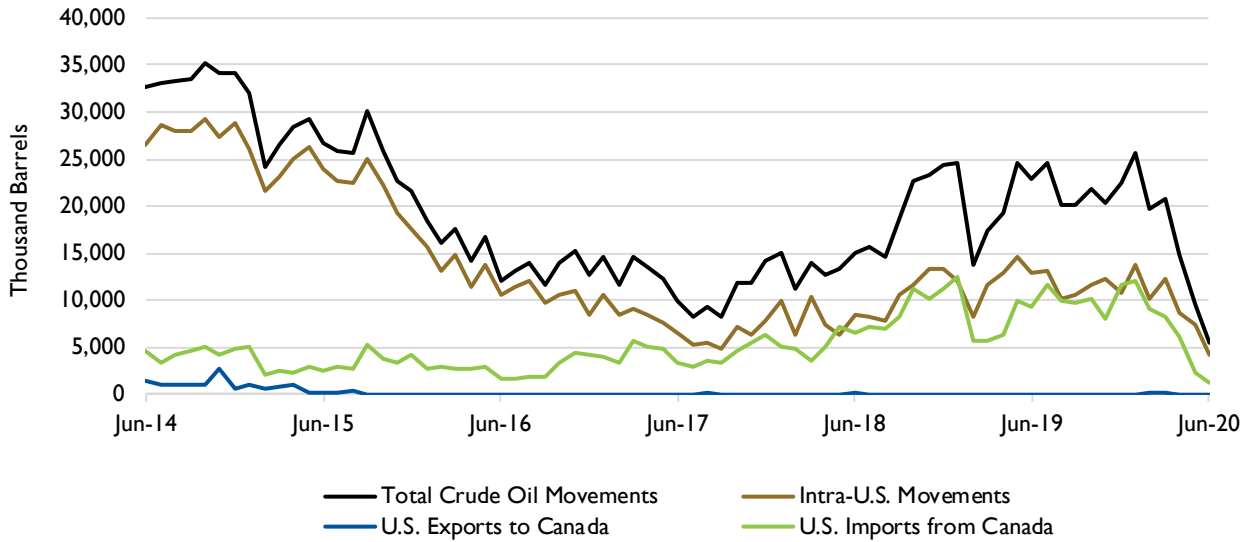
CRUDE OIL MOVEMENTS BY TANKER AND BARGE BETWEEN PETROLEUM ADMINISTRATION FOR DEFENSE DISTRICTS (PADDs) (MONTHLY) ⁽⁶⁹⁾



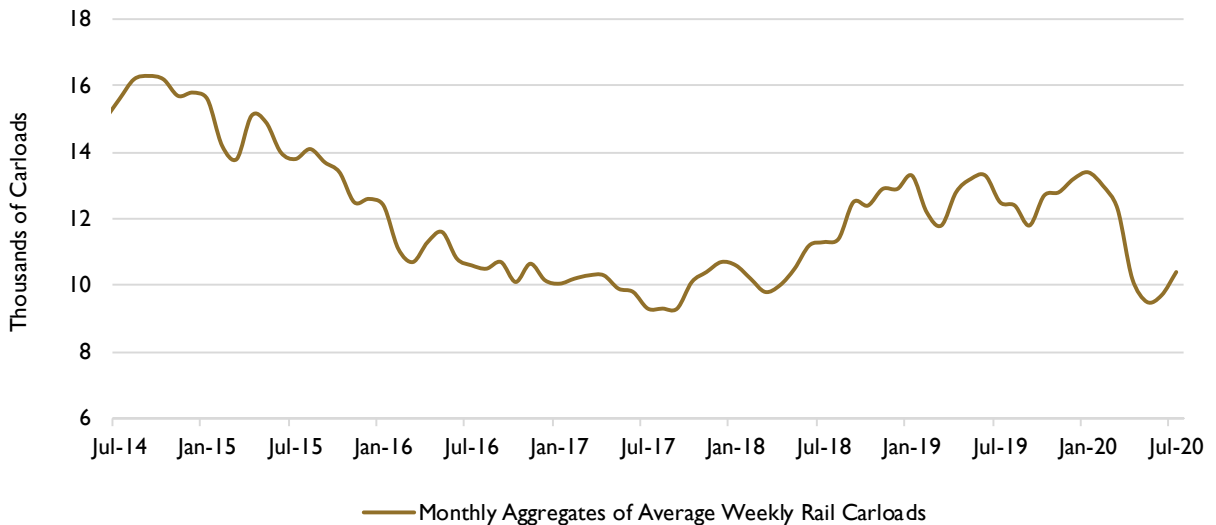
DATA CENTER

LOGISTICS - RAIL

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



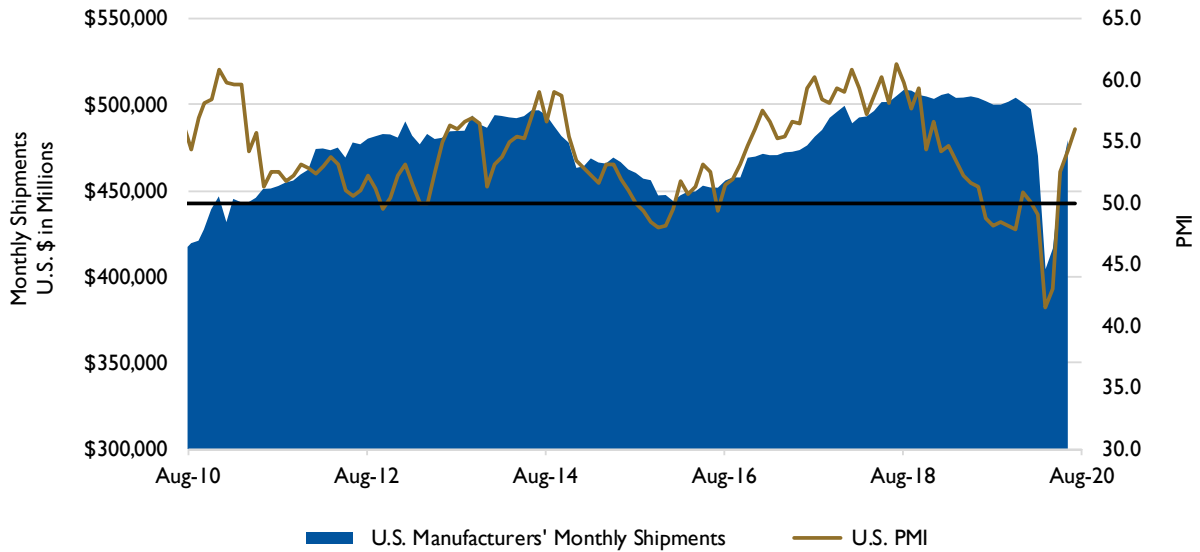
AVERAGE WEEKLY RAIL CARLOADS OF PETROLEUM AND PETROLEUM PRODUCTS (MONTHLY AGGREGATE) ⁽⁷¹⁾



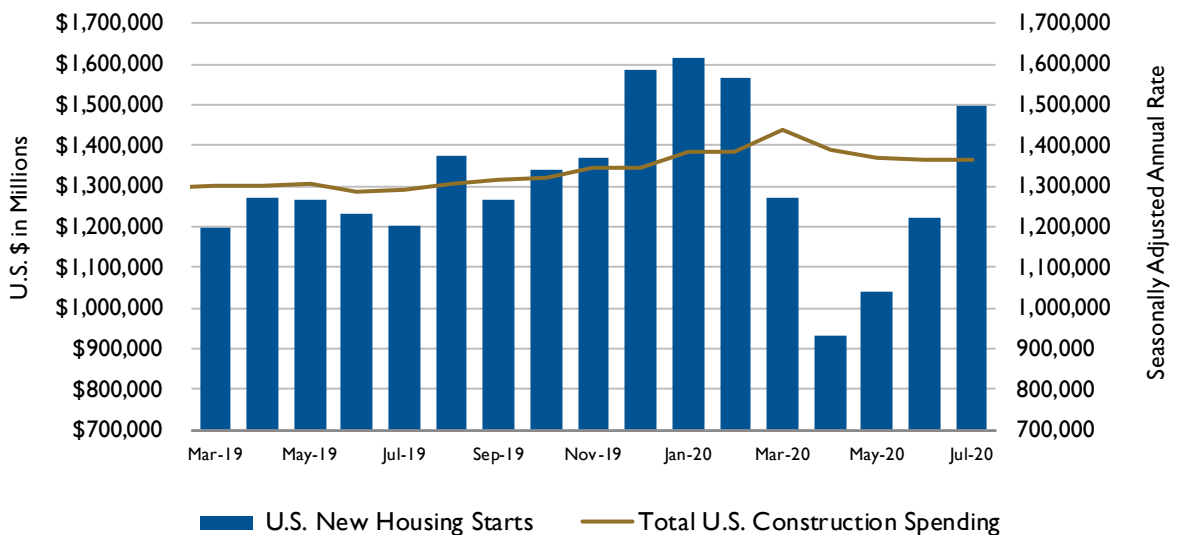
DATA CENTER

ECONOMIC / FINANCIAL

U.S. MANUFACTURERS' MONTHLY SHIPMENTS AND U.S. PURCHASING MANAGERS' INDEX (PMI) (MONTHLY) (72)



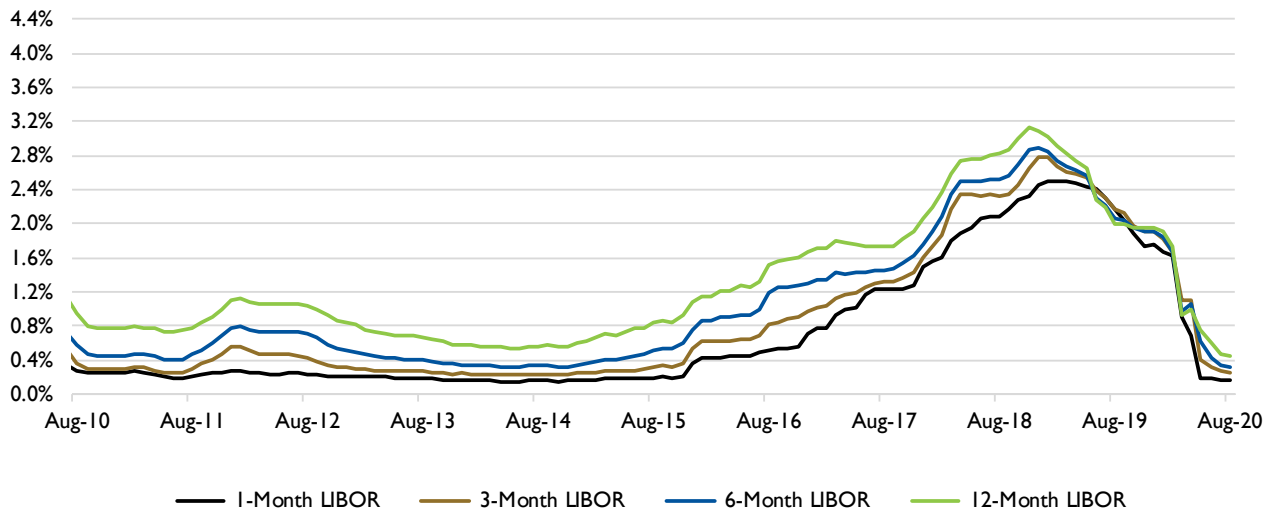
U.S. NEW HOUSING STARTS AND TOTAL U.S. CONSTRUCTION SPENDING (MONTHLY) (73)



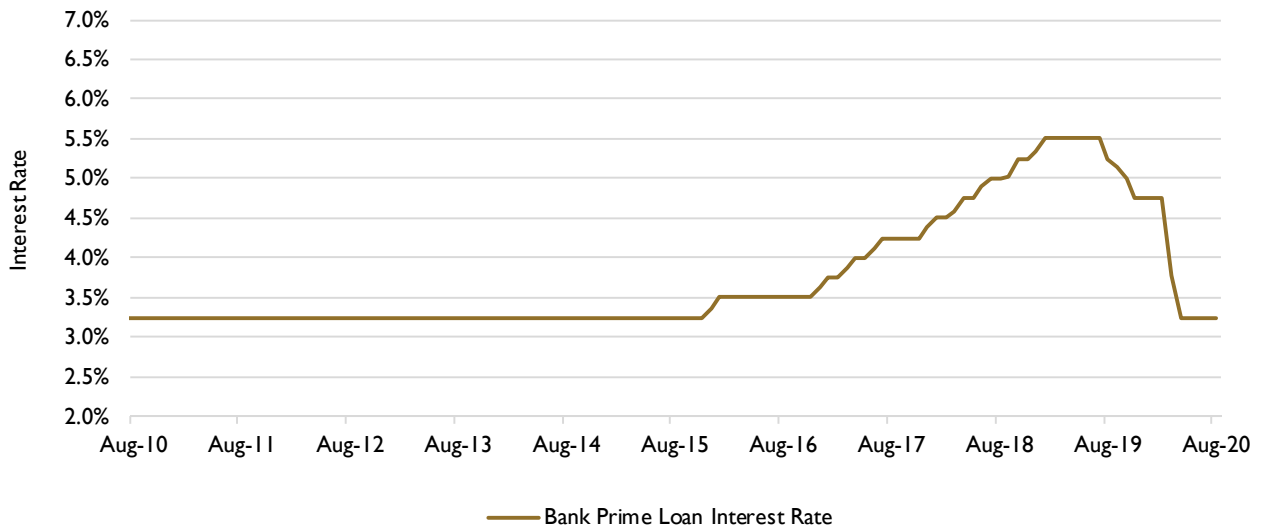
DATA CENTER

ECONOMIC / FINANCIAL

LONDON INTERBANK OFFERED RATE (LIBOR) (MONTHLY AVERAGE) BASED ON U.S. DOLLAR (74)



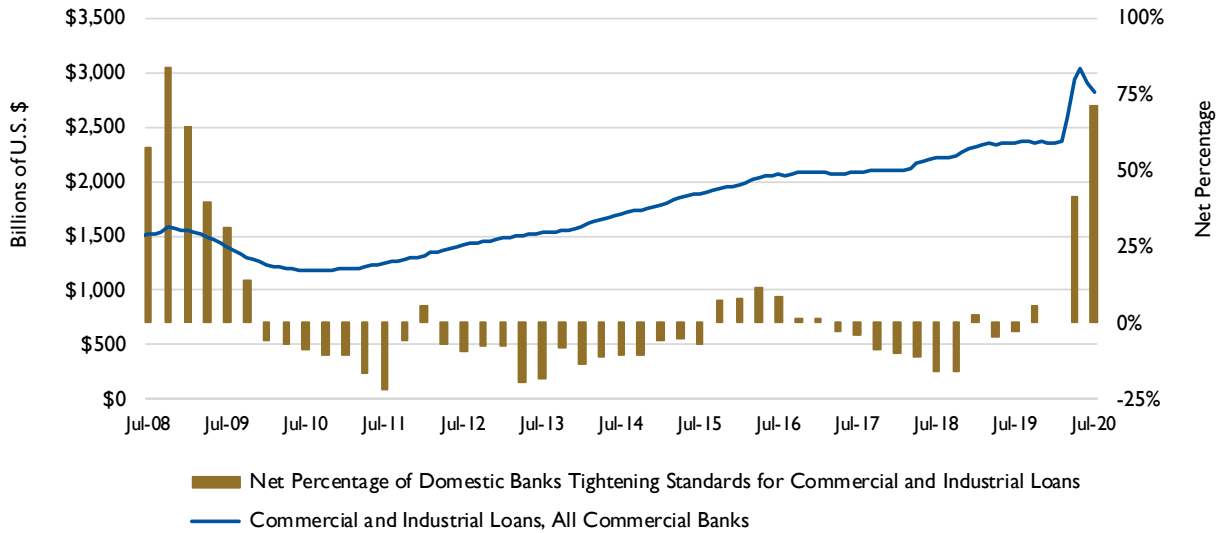
BANK PRIME LOAN INTEREST RATES (MONTHLY AVERAGE) (75)



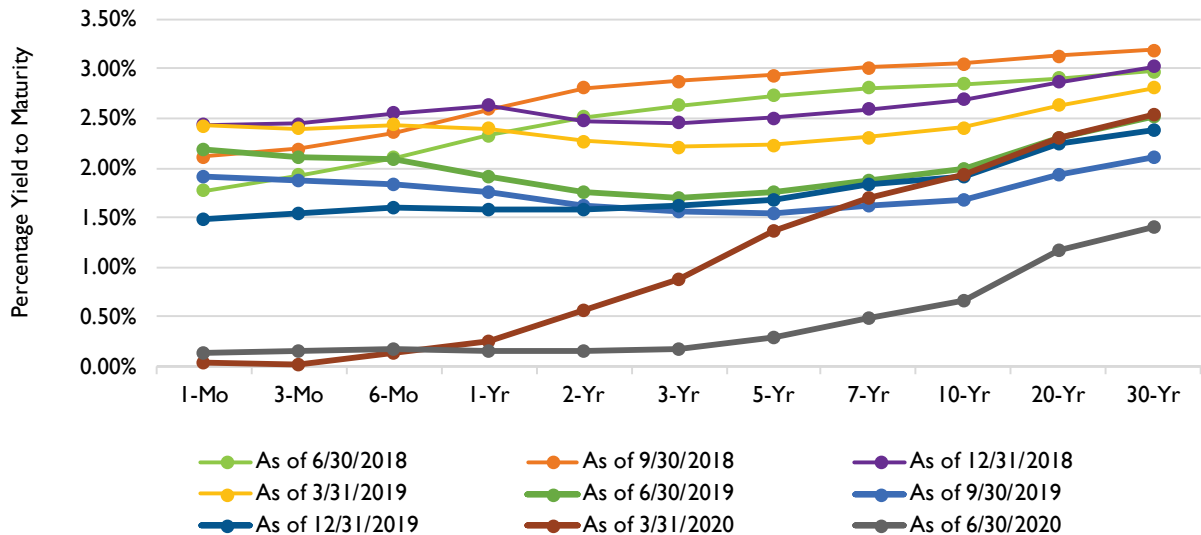
DATA CENTER

ECONOMIC / FINANCIAL

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



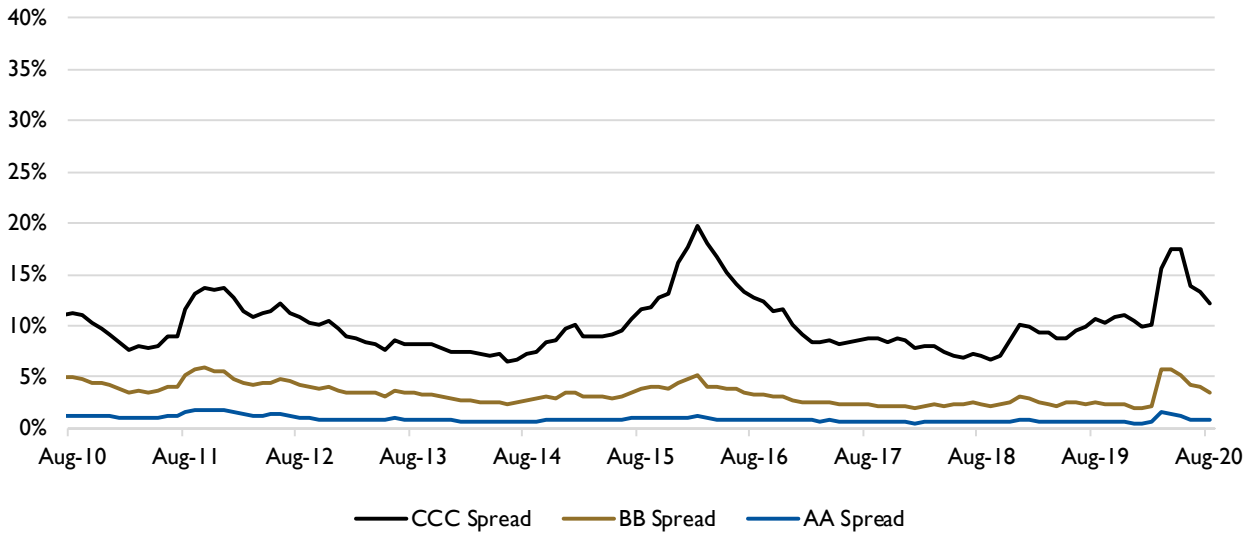
U.S. TREASURY YIELD CURVE (MONTHLY, ANNUAL) (77)



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.europa.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, naphthas, 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 repressuring, 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 and is comprised of 98% residual fuel oil and 2% distillate fuel oil. Under new regulations from the International Maritime Organization, ships must burn fuel with a sulfur content of not more than 0.5 percent or install costly emissions-cleaning scrubbers. Very Low Sulfur Fuel Oil (VLSFO) contains a maximum sulfur content of 0.5 percent.

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.europa.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 Crude Oil and Natural Gas Production per Shale Region

- Source: U.S. Energy Information Administration Drilling Productivity Report.
- Percentage of total U.S. crude oil and natural gas 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 naphthas 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

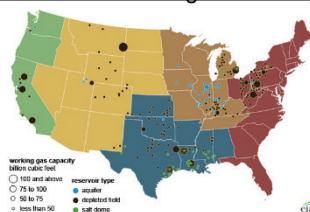
(57) Petroleum and Other Liquids Commercial Inventory (continued)

- 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 naphthas, 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 naphthas, 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

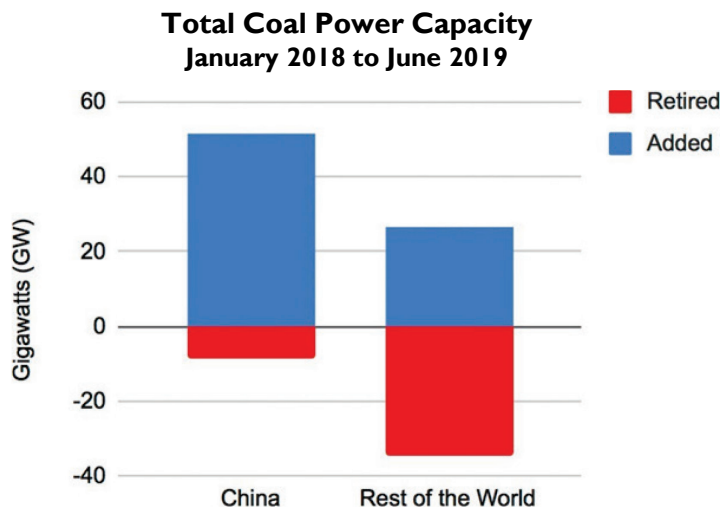
AS AMERICANS SUFFER BLACKOUTS, CHINA RAMPS UP CARBON EMISSIONS

Hearing the messages of Green New Deal politicians in this election campaign, one might think that unless America forces its way to zero-emission electricity and all electric cars and buildings by 2035, Earth's climate will heat up past the point of no return. Nothing could be further from the truth. The fact is that unless China, India and other major emitters in Asia, Africa and Latin America also take serious action now to reduce CO₂, anything we do to reduce carbon emissions here in America will do little to change the path of global climate change.

That's not to say we shouldn't do our part. In fact we already lead the world in reducing CO₂ emissions by switching from coal to natural gas and adding renewables. Those reductions continue. In the first half of 2020 compared to the first half of 2019, U.S. coal generation declined an additional 30%, while gas power rose 9% and renewables rose 5%, according to the U.S. Energy Information Administration (EIA).

California's blackouts have proved that forcing transition to wind and solar without maintaining adequate and always-available natural gas generating capacity puts people through an energy cost and availability wringer. It results in blackouts and brownouts; along with double, triple or more the household energy bills compared to other states. Such a well-intentioned but misguided quest puts enormous financial and energy availability burdens on Americans and our economy while providing very little offsetting benefit to the climate. That's because the real climate problem isn't coming from America, which is already on a clear path to lower carbon emissions thanks to natural gas, wind and solar energy.

Climate is a global, not a national phenomenon, and is driven by cumulative global emissions. China, India and other Asian countries continue to add high-emitting coal plants while America and Europe continue to decommission the shrinking number that remain. From January 2018 to June 2019, countries outside of China decreased their total coal power capacity by 8.1 GigaWatts (GW), while China increased its coal fleet by 42.9 GW.



Source: GEM, Global Coal Plant Tracker, July 2019.

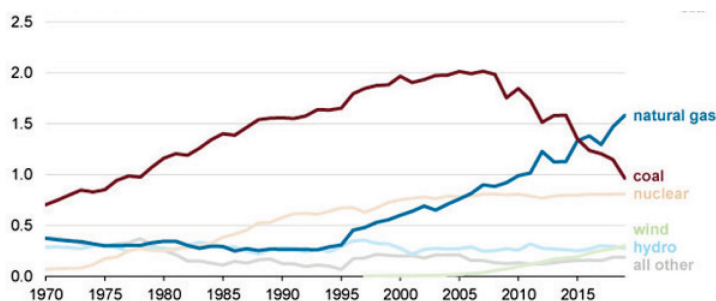


HOT TOPICS

AS AMERICANS SUFFER BLACKOUTS, CHINA RAMPS UP CARBON EMISSIONS (CONTINUED)

And that's just the tip of the iceberg. China currently has 206 GW of coal generating capacity in planning or under construction. That's more than the total number being built in the rest of the world combined, and will add to China's 1,000 GW capacity already in operation. By comparison, total U.S coal generating capacity is 229 GW and declining rapidly. Total U.S coal-fired output declined 16% in 2019 to just under 1 million GW hours, the lowest level since 1976, while natural gas generation grew 8% to 1.6 million GW hours. The U.S. hasn't built a new coal plant since 2015.

**U.S. Annual Electricity Generation by Energy Source
1970-2019 (Billion Megawatthours)**



Source: U.S. Energy Information Administration.

Meanwhile, although China doesn't publish data on electric generating output from coal, they do estimate coal capacity utilization at about 50%. That means their 1,000+ GW of coal capacity generated at least 4.4 million GW hours in 2019, over four times more than the U.S. At a rate of 2.2 pounds of CO₂ emitted per KW hour of coal generation, that means 4.9 billion tons of CO₂ were emitted from Chinese coal in 2019 versus 1.1 billion tons from the U.S. That also means 15% of all 2019 global CO₂ emissions from power generation came from Chinese coal, while only 3.2% come from U.S coal generation. And theirs is growing while ours declines.

If Green New Deal proponents want to make a real difference in climate change, they will direct their passions to driving change where it really matters and hold climate marches in Tiananmen Square. Their advocacy here ignores the real issues and relies on the naive belief that if America leads the way, China will surely be inspired to follow. So spread the word: when you hear candidates claim that America must adopt radical, expensive and difficult new energy policies to lead the world to a lower carbon future, they've got goals in mind other than actually lowering global carbon emissions - like capitalizing on climate change fears to gain the political power necessary to eliminate natural gas from America's energy mix.

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HOT TOPICS

OIL MARKET SENTIMENT SHIFTS AS DEMAND CONCERNS MOUNT

World oil demand has grown at a record pace since the bottom of the coronavirus-induced collapse in April. Global crude demand surged from May to July and now rests at 89% of prior year levels -- compared to 78% in April.⁽¹⁾

The coronavirus pandemic wiped out millions of barrels in fuel demand as countries locked down to contain the spread of the disease. Oil could see another demand shock as the International Energy Agency (IEA) sees a “treacherous” path ahead for the market. Oil consumption may never recover to pre-pandemic levels, and not just because of the pandemic itself but because of factors that have been at play before the coronavirus made itself known to the world.

Energy market participants have become increasingly anxious about a faltering economic recovery and wavering fuel demand. In their regular monthly forecasts last month, the three biggest energy authorities -- the U.S. Energy Information Administration (EIA), the IEA, and OPEC – predict that it will take at least until 2022 for oil demand to recover to pre-crisis levels. IHS Markit expects demand growth to wane and plateau at 92 to 95 million barrels per day (b/d) (or roughly 92% to 95% of prior year levels) through the first quarter of 2021.⁽¹⁾ At the same time, energy giant BP Plc said in its latest annual energy outlook report that the relentless growth of oil demand is over and that demand for oil will fall over the next 30 years.⁽²⁾

For 2020 as a whole, the IEA trimmed its outlook for worldwide oil demand growth to 91.7 million b/d. The international agency expects the recovery in oil demand to decelerate markedly in the second half of 2020. At 91.7 million b/d, demand has returned to its 2013 level. Looking ahead, the IEA said it expected worldwide oil demand to grow by around 5.5 million b/d next year, rising to an average of 97.1 million b/d in 2021.⁽³⁾

Jet fuel demand remains the major source of weakness. IEA revised data show that in April the number of aviation kilometers travelled was down nearly 80% over last year and in July the deficit was still 67%. With few signs that the picture will improve significantly soon, the IEA’s August forecast shows demand for jet fuel in 2020 will be 39% below the 2019 level.⁽⁴⁾

The IEA report came out shortly after OPEC cut its forecast for oil demand growth in 2020, citing a weaker-than-expected recovery in India and other Asian countries. OPEC said it expects the pandemic to reduce demand by 9.5 million b/d, forecasting a fall in demand of 9.5% from last year.⁽⁵⁾ The negative impact on oil demand in other Asian countries is projected to spill over into the first half of 2021.⁽⁶⁾

HOT TOPICS

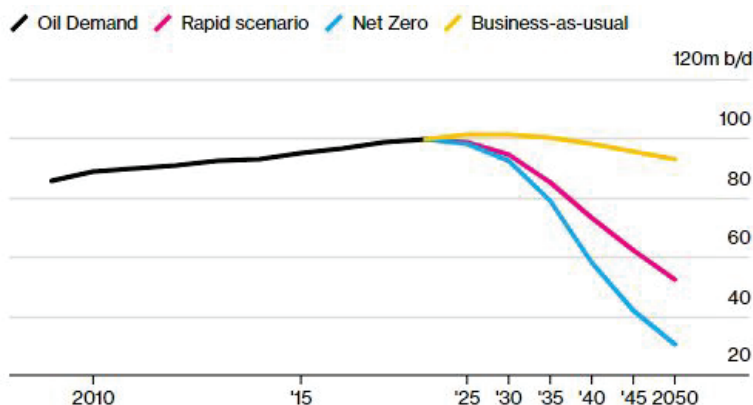
OIL MARKET SENTIMENT SHIFTS AS DEMAND CONCERNS MOUNT (CONTINUED)

In July, OPEC+ (OPEC plus other oil producing allies including Russia and Kazakhstan) put historic supply cuts of 10 million b/d in place, but agreed to ease them to 7.7 million b/d beginning in August.⁽⁷⁾ If demand doesn't come back, how long will the OPEC+ group be able to sustain cohesion and keep supply under control? In its most recent meeting in mid-September, OPEC+ did not announce additional output cuts.

Oil consumption may never return to levels seen before the coronavirus crisis took place, BP said in its annual energy outlook. The company laid out three scenarios for energy demand over the next 30 years, all of which predicted a decline for oil demand through 2050 as a result of the pandemic, stricter government policies and changes in consumer behavior.⁽²⁾

Even its most bullish scenario sees demand no better than “broadly flat” for the next two decades. In a “business-as-usual” situation, demand would recover but then flat line near 100 million barrels a day for the next 20 years. The “business-as-usual” projection assumes that government policies, technology and social preferences continue to evolve as they have in the recent past. Growth in China’s energy demand slows sharply relative to past trends, reaching a peak in the early 2030s in all three scenarios.⁽⁸⁾

BP Oil Demand Scenarios



Source: BP Plc, Statistical Review of World Energy 2020.

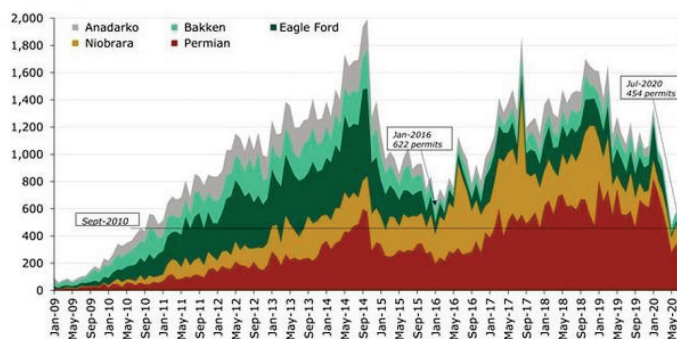
HOT TOPICS

OIL MARKET SENTIMENT SHIFTS AS DEMAND CONCERNS MOUNT (CONTINUED)

Yet the “business-as-usual” scenario may not be the most likely one. Many governments have pledged increasingly aggressive environmentalist agendas that will see policies applied much more quickly. If these circumstances play out, oil demand will never return to pre-pandemic levels, according to BP. This means demand will have peaked in 2019, at a level of about 100 million barrels daily.⁽²⁾

Additionally, horizontal drilling activity in U.S. oil basins, which plummeted due to the pandemic, is unlikely to materially recover this year. Drilling permits, increasingly reliable indicators of future activity levels, dipped to a 10-year monthly low in July, with only 454 issued. July’s drilling permits number is the lowest since September 2010.⁽⁹⁾ Baker Hughes data shows that the horizontal oil rig count in the U.S. declined by 75% from the peak of 620 rigs in early March 2020 and has hovered around 150 to 160 since early July.⁽⁹⁾

Horizontal New Drill Permits in U.S. Oil Basins (Number of Permits)



Source: Oil & Gas Journal and Rystad Energy.

Other global uncertainties remain in addition to coronavirus-related changes, including high debt levels, inflation, ongoing geopolitical risks, trade-related challenges, as well as the possibility of a hard Brexit. What is certain is that the oil market’s rebalancing remains a volatile situation and apprehension will endure so long as the world continues to deal with the coronavirus crisis.

Sources:

- (1) Oil and Gas Journal, *IHS Markit: World Oil Demand Expected to Plateau Just Below Pre-Covid Levels*, August 25, 2020.
- (2) Oilprice.com, *BP: Oil Demand Growth is Dead*, September 14, 2020.
- (3) CNBC, *IEA Cuts 2020 Oil Demand Forecast, Sees ‘Treacherous’ Path Ahead with Rising Coronavirus Cases*, September 15, 2020.
- (4) Oil & Gas Journal, *IEA Revises Down 2020 Oil Demand Forecast on High Covid-19 Cases*, August 13, 2020.
- (5) The Wall Street Journal, *OPEC Extends Forecast for Decline in Global Oil Demand*, September 14, 2020.
- (6) Oil & Gas Journal, *OPEC Revises Down 2020, 2021 Oil Demand Forecast*, September 14, 2020.
- (7) CNBC, *Oil Could See Another Demand Shock, Adding to the ‘Extraordinary’ Destruction This Year*, September 15, 2020.
- (8) Bloomberg, *BP Says the Era of Oil-Demand Growth Is Over*, September 13, 2020.
- (9) Oil & Gas Journal, *New U.S. Horizontal Drilling Permits Hit 10-year Low, 2020 Activity Rebound Unlikely*, August 11, 2020.

PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

PETROLEUM PRODUCTS EQUITY COMPARABLES (1)

Petroleum Products (United States & Canada)

Company	LTM ⁽²⁾			Stock Price 06/30/20	% of 52-Week High	Market Cap	Total Enterprise Value ⁽³⁾	TEV / LTM		Net Debt ⁽⁴⁾ / EBITDA
	Revenues	EBITDA	Margin					Revenues	EBITDA	
Calumet Specialty Products Partners, L.P.	\$2,851	\$239	8.4%	\$2.28	45.6%	\$178	\$1,621	0.6x	6.8x	5.7x
Chevron Corporation	114,984	20,357	17.7	89.23	70.3	166,591	191,384	1.7x	9.4x	1.3x
CVR Energy, Inc.	4,997	397	7.9	20.11	36.2	2,022	3,043	0.6x	7.7x	2.4x
EnLink Midstream, LLC	4,462	1,043	23.4	2.44	22.6	1,194	7,737	1.7x	7.4x	4.6x
Gibson Energy Inc.	4,347	325	7.5	15.53	74.6	2,271	3,240	0.7x	10.0x	3.0x
Exxon Mobil Corporation	213,857	23,639	11.1	44.72	57.4	189,086	243,950	1.1x	10.3x	2.4x
HollyFrontier Corporation	14,270	797	5.6	29.20	49.6	4,697	7,267	0.5x	9.1x	2.6x
Keyera Corp.	2,507	727	29.0	15.20	56.5	3,359	5,583	2.2x	7.7x	3.2x
Marathon Petroleum Corporation	102,642	5,603	5.5	37.38	53.7	24,307	64,913	0.6x	11.6x	6.0x
Parkland Corporation	12,068	654	5.4	24.78	68.5	3,676	6,929	0.6x	10.6x	4.0x
Phillips 66	88,134	3,113	3.5	71.90	60.0	31,397	45,406	0.5x	14.6x	4.0x
NuStar Energy LP.	1,510	731	48.4	14.28	47.5	1,559	6,323	4.2x	8.6x	4.7x
Valero Energy Corporation	82,620	4,470	5.4	58.82	57.7	23,981	36,039	0.4x	8.1x	2.6x
Median			7.9%		56.5%			0.6x	9.1x	3.2x
Mean			13.8%		53.9%			1.2x	9.4x	3.6x

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:ENLK)	\$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.
- (3) Total Enterprise Value is defined as market capitalization plus total debt less cash and cash equivalents.
- (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⁾			Stock Price 06/30/20	% of 52-Week High	Market Cap	Total Enterprise Value ⁽³⁾	TEV / LTM		Net Debt ⁽⁴⁾ EBITDA
	Revenues	EBITDA	Margin					Revenues	EBITDA	
Alliant Energy Corporation	\$3,549	\$1,361	38.4%	\$47.84	79.4%	\$11,936	\$18,543	5.2x	13.6x	4.8x
AltaGas Ltd.	3,934	884	22.5	11.51	68.8	3,215	9,635	2.4x	10.9x	5.9x
Atmos Energy Corporation	2,790	1,229	44.0	99.58	82.2	12,180	16,620	6.0x	13.5x	3.7x
Avista Corporation	1,317	429	32.6	36.39	68.7	2,449	4,775	3.6x	11.1x	5.5x
Baytex Energy Corp.	825	490	59.5	0.51	29.2	284	1,711	2.1x	3.5x	2.9x
Calumet Specialty Products Partners, L.P.	2,851	239	8.4	2.28	45.6	178	1,621	0.6x	6.8x	5.7x
Cenovus Energy Inc.	11,554	697	6.0	4.67	44.4	5,737	12,610	1.1x	18.1x	10.6x
Chesapeake Utilities Corporation	474	158	33.4	84.00	82.9	1,381	2,099	4.4x	13.2x	4.7x
Corning Natural Gas Holding Corporation	33	10	31.9	16.75	71.3	51	111	3.4x	10.7x	5.3x
Crestwood Equity Partners LP	2,744	442	16.1	13.11	32.8	959	4,415	1.6x	10.0x	5.9x
Dominion Energy, Inc.	16,825	8,895	52.9	81.18	89.3	68,130	112,644	6.7x	12.7x	4.5x
EnLink Midstream, LLC	4,462	1,043	23.4	2.44	22.6	1,194	7,737	1.7x	7.4x	4.6x
Enbridge Inc.	32,287	8,318	25.8	30.35	72.0	61,456	120,452	3.7x	14.5x	6.0x
Enterprise Products Partners LP.	29,203	7,382	25.3	18.17	58.9	39,716	68,982	2.4x	9.3x	3.9x
Epsilon Energy Ltd.	25	15	59.3	2.95	72.8	77	62	2.5x	4.2x	(1.1)x
Eversource Energy	8,553	2,894	33.8	83.27	83.8	28,524	44,286	5.2x	15.3x	5.3x
Genesis Energy, L.P.	2,154	512	23.8	7.22	30.3	885	5,243	2.4x	10.2x	6.7x
National Fuel Gas Company	1,552	761	49.0	41.93	76.8	3,789	6,060	3.9x	8.0x	2.7x
New Jersey Resources Corporation	2,033	280	13.8	32.65	64.5	3,126	5,267	2.6x	18.8x	8.2x
Northwest Natural Holding Company	758	225	29.7	55.79	72.2	1,703	2,816	3.7x	12.5x	5.0x
MDU Resources Group, Inc.	5,502	789	14.3	22.18	68.8	4,448	6,901	1.3x	8.7x	3.1x
OGE Energy Corp.	2,163	903	41.7	30.36	65.4	6,077	9,502	4.4x	10.5x	3.9x
ONE Gas, Inc.	1,503	480	31.9	77.05	79.5	4,073	5,823	3.9x	12.1x	3.8x
ONEOK, Inc.	8,724	2,349	26.9	33.22	42.3	14,750	28,750	3.3x	12.2x	5.8x
RGC Resources, Inc.	63	22	34.7	24.17	75.6	197	307	4.9x	14.0x	5.4x
South Jersey Industries, Inc.	1,518	391	25.8	24.99	72.5	2,305	5,552	3.7x	14.2x	8.1x
Southwest Gas Holdings, Inc.	3,167	695	21.9	69.05	74.3	3,806	6,467	2.0x	9.3x	3.8x
Summit Midstream Partners, LP	410	238	57.9	0.99	12.4	94	1,887	4.6x	7.9x	6.5x
Targa Resources Corp.	7,949	1,859	23.4	20.07	46.2	4,679	15,858	2.0x	8.5x	4.1x
TC Energy Corporation	9,486	6,058	63.9	42.64	75.7	40,076	83,483	8.8x	13.8x	5.9x
Median			30.8%		70.1%			3.5x	11.0x	5.2x
Mean			32.4%		62.0%			3.5x	11.2x	5.0x

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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
7/27/2020	CNX Midstream Partners LP (NYSE:CNXM)	CNX Resources Corporation (NYSE:CNX)	\$764.2	5.1x	6.6x
2/27/2020	EQM Midstream Partners, LP	Equitrans Midstream Corporation (NYSE:ETRN)	\$4,395.8	7.6x	8.1x
10/21/2019	AltaGas Canada Inc. (TSX:ACI)	Alberta Teachers' Retirement Fund Board; Public Sector Pension Investment	\$1,278.2	5.2x	15.2x
9/16/2019	SemGroup Corporation	Energy Transfer LP (NYSE:ET)	\$5,007.4	1.9x	11.2x
8/27/2019	Tallgrass Energy, LP (NYSE:TGE)	The Blackstone Group Inc. (NYSE:BX)	\$9,337.3	9.9x	9.9x
5/8/2019	Andeavor Logistics LP	MPLX LP (NYSE:MPLX)	\$14,804.7	5.6x	10.6x
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

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

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⁾			Stock	% of	Market Cap	Total Enterprise Value ⁽³⁾	TEV / LTM		Net Debt ⁽⁴⁾
	Revenues	EBITDA	Margin	Price 06/30/20	52-Week High			Revenues	EBITDA	EBITDA
Ferrellgas Partners, LP.	\$1,493	\$223	15.0%	\$0.37	30.6%	\$36	\$2,418	1.6x	10.8x	11.0x
NGL Energy Partners LP	6,557	532	8.1	3.90	24.8	502	4,714	0.7x	8.9x	6.5x
Spire Inc.	1,829	512	28.0	65.71	74.7	3,367	6,619	3.6x	12.9x	5.9x
Star Group, L.P.	1,520	118	7.8	8.77	87.7	396	646	0.4x	5.5x	1.4x
Suburban Propane Partners, L.P.	1,114	249	22.3	14.30	57.5	888	2,258	2.0x	9.1x	5.4x
UGI Corporation	6,585	1,477	22.4	31.80	58.8	6,623	13,254	2.0x	9.0x	4.3x
Median			18.6%		58.1%			1.8x	9.0x	5.6x
Mean			17.3%		55.7%			1.7x	9.4x	5.7x

SELECTED TRANSACTIONS

Announced / Closed Date	Target(s)	Acquirer	Total Enterprise Value (TEV)	TEV / Revenues	TEV / EBITDA
8/25/2020	Rymes Propane & Oils, Inc.	Superior Plus Corp. (TSX:SPB)	\$159.0	-	-
7/28/2020	Champagne's Energy, Inc.	Superior Plus Corp. (TSX:SPB)	\$27.3	-	-
2/6/2020	All American Propane, Inc.	ThompsonGas LLC	-	-	-
1/9/2020	Evelyn Jeanne, Inc., d/b/a Western Propane Service	Superior Plus Corp. (TSX:SPB)	-	-	-
11/13/2019	Propane Distribution Assets in New Brunswick and Quebec	Superior Plus Corp. (TSX:SPB)	\$3.7	-	-
11/13/2019	Propane Distribution Assets in North Carolina	Superior Plus Corp. (TSX:SPB)	\$1.2	-	-
5/9/2019	Sheldon Gas Company/Sheldon Oil Company	Superior Plus Corp. (TSX:SPB)	\$15.9	-	-
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	-	-

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

PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

DRILLING

EQUITY COMPARABLES (1)

Drilling (United States & Canada)

Company	LTM ⁽²⁾			Stock Price 06/30/20	% of 52-Week High	Market Cap	Total Enterprise Value ⁽³⁾	TEV / LTM		Net Debt ⁽⁴⁾ EBITDA
	Revenues	EBITDA	Margin					Revenues	EBITDA	
AKITA Drilling Ltd.	\$121	\$13	11.1%	\$0.30	14.2%	\$13	\$76	0.6x	5.7x	4.0x
Baker Hughes Company	22,390	2,571	11.5	15.39	59.2	10,081	20,081	0.9x	7.8x	1.4x
CES Energy Solutions Corp.	838	85	10.1	0.79	43.7	209	523	0.6x	6.2x	2.8x
Diamond Offshore Drilling, Inc.	907	90	10.0	0.26	2.7	35	1,969	2.2x	21.8x	23.1x
Ensign Energy Services Inc.	991	242	24.4	0.76	22.4	124	1,314	1.3x	5.4x	4.5x
Halliburton Company	18,974	2,033	10.7	12.98	51.0	11,387	20,866	1.1x	10.3x	4.4x
Helmerich & Payne, Inc.	2,215	548	24.8	19.51	36.8	2,096	2,243	1.0x	4.1x	0.1x
Independence Contract Drilling, Inc.	150	22	14.6	3.89	10.3	15	155	1.0x	7.1x	6.0x
National Oilwell Varco, Inc.	7,786	175	2.2	12.25	47.5	4,756	6,472	0.8x	37.0x	7.6x
Precision Drilling Corporation	968	255	26.3	0.76	41.0	208	1,294	1.3x	5.1x	3.9x
Secure Energy Services Inc.	1,761	90	5.1	1.23	22.7	195	577	0.3x	6.4x	4.0x
Valaris plc	1,909	(88)	(4.6)	0.65	6.7	134	6,387	3.3x	NM	NM
Median			10.9%		29.7%			1.0x	6.4x	4.0x
Mean			12.2%		29.9%			1.2x	10.6x	5.6x

SELECTED TRANSACTIONS

Announced / Closed Date	Target(s)	Acquirer	Total Enterprise Value (TEV)	TEV / Revenues	TEV / EBITDA
5/4/2020	Quintana Energy Services Inc.	KLX Energy Services Holdings, Inc. (NasdaqGS:KLXE)	\$49.6	0.1x	2.1x
10/8/2018	Rowan Companies plc (NYSE:RDC)	EnSCO plc (NYSE:ESV) / Valaris plc (NYSE:VAL)	\$3,139.1	3.8x	43.9x
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:T DG)	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⁾			Stock Price 06/30/20	% of 52-Week High	Market Cap	Total Enterprise Value ⁽³⁾	TEV / LTM		Net Debt ⁽⁴⁾ EBITDA
	Revenues	EBITDA	Margin					Revenues	EBITDA	
Albemarle Corporation	\$3,375	\$885	26.2%	\$77.21	77.7%	\$8,209	\$11,103	3.3x	12.6x	3.3x
Ashland Global Holdings Inc.	2,326	504	21.7	69.10	84.5	4,178	5,985	2.6x	11.9x	3.4x
Clean Harbors, Inc.	3,331	537	16.1	59.98	67.9	3,334	4,749	1.4x	8.8x	2.5x
CSW Industrials, Inc.	375	71	19.1	69.11	85.3	1,015	1,027	2.7x	14.4x	0.1x
FMC Corporation	4,617	1,237	26.8	99.62	91.6	12,896	16,458	3.6x	13.3x	2.7x
Ingevity Corporation	1,222	358	29.3	52.57	48.9	2,166	3,416	2.8x	9.5x	3.4x
Kraton Corporation	1,636	203	12.4	17.28	49.4	550	1,526	0.9x	7.5x	4.7x
NewMarket Corporation	2,061	403	19.6	400.48	79.3	4,381	4,999	2.4x	12.4x	1.6x
Ocean Bio-Chem, Inc.	46	9	19.1	13.95	80.1	132	131	2.9x	15.0x	0.0x
Quaker Chemical Corporation	1,381	169	12.2	185.65	90.1	3,297	4,141	3.0x	24.5x	4.9x
Stepan Company	1,807	216	11.9	97.10	91.7	2,182	2,187	1.2x	10.1x	(0.1)x
Synalloy Corporation	282	6	2.1	7.48	43.6	68	180	0.6x	30.8x	19.3x
Trecora Resources	227	21	9.4	6.27	59.5	155	233	1.0x	10.9x	3.1x
Valvoline Inc.	2,330	441	18.9	19.33	80.9	3,577	5,105	2.2x	11.6x	3.5x
Median			19.0%		79.7%			2.5x	12.1x	3.2x
Mean			17.5%		73.6%			2.2x	13.8x	3.7x

SELECTED TRANSACTIONS

Announced / Closed Date	Target(s)	Acquirer	Total Enterprise Value (TEV)	TEV / Revenues	TEV / EBITDA
7/12/2019	Milacron Holdings Corp. (NYSE:MCRN)	Hillenbrand, Inc. (NYSE:HI)	\$2,051.1	1.7x	12.9x
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 Qn 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

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PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

SOLAR

EQUITY COMPARABLES (1)

Solar (United States & Canada)

Company	LTM ⁽²⁾			Stock Price 06/30/20	% of 52-Week High	Market Cap	Total Enterprise Value ⁽³⁾	TEV / LTM		Net Debt ⁽⁴⁾ EBITDA
	Revenues	EBITDA	Margin					Revenues	EBITDA	
Boralex Inc.	\$445	\$293	66.0%	\$22.72	96.4%	\$2,191	\$4,536	10.2x	15.5x	7.9x
Capital Power Corporation	1,408	786	55.8	20.57	72.0	2,161	5,495	3.9x	7.0x	3.5x
NextEra Energy Partners, LP	923	638	69.1	51.28	82.9	3,360	13,188	14.3x	20.7x	8.2x
NRG Energy, Inc.	9,448	2,065	21.9	32.56	77.9	7,947	14,179	1.5x	6.9x	2.9x
Vivint Solar, Inc.	378	(96)	(25.5)	9.90	76.2	1,234	3,017	8.0x	NM	NM
Median			55.8%		77.9%			8.0x	11.2x	5.7x
Mean			37.5%		81.1%			7.6x	12.5x	5.6x

SELECTED TRANSACTIONS

Announced / Closed Date	Target(s)	Acquirer	Total Enterprise Value (TEV)	TEV / Revenues	TEV / EBITDA
1/13/2020	TerraForm Power, Inc. (NasdaqGS:TERP)	Brookfield Renewable Partners LP. (TSX:BEP.UN)	\$10,880.5	9.5x	13.0x
11/4/2019	Pattern Energy Group Inc. (NasdaqGS:PEGI)	Canada Pension Plan Investment Board	\$6,293.7	11.5x	16.1x
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 I 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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PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

WIND

EQUITY COMPARABLES (1)

Wind (United States & Canada)

Company	LTM ⁽²⁾			Stock Price 06/30/20	% of 52-Week High	Market Cap	Total Enterprise Value ⁽³⁾	TEV / LTM		Net Debt ⁽⁴⁾ EBITDA
	Revenues	EBITDA	Margin					Revenues	EBITDA	
Algonquin Power & Utilities Corp.	\$1,613	\$635	39.4%	\$12.90	78.4%	\$6,804	\$12,182	7.6x	19.2x	6.7x
Avangrid, Inc.	6,277	1,857	29.6	41.98	73.3	12,972	21,820	3.5x	11.8x	4.5x
Boralex Inc.	445	293	66.0	22.72	96.4	2,191	4,536	10.2x	15.5x	7.9x
Brookfield Renewable Partners LP.	2,811	1,679	59.7	38.23	85.1	11,901	31,914	11.4x	19.0x	6.3x
Innergex Renewable Energy Inc.	418	369	88.4	14.04	85.7	2,447	5,504	13.2x	14.9x	8.3x
NextEra Energy Partners, LP	923	638	69.1	51.28	82.9	3,360	13,188	14.3x	20.7x	8.2x
Northland Power Inc.	1,407	1,034	73.5	24.98	98.9	5,037	11,599	8.2x	11.2x	5.6x
TransAlta Renewables Inc.	305	188	61.7	10.73	79.9	2,855	3,477	11.4x	18.5x	3.0x
Median			63.8%		84.0%			10.8x	17.0x	6.5x
Mean			60.9%		85.1%			10.0x	16.3x	6.3x

SELECTED TRANSACTIONS

Announced / Closed Date	Target(s)	Acquirer	Total Enterprise Value (TEV)	TEV / Revenues	TEV / EBITDA
1/13/2020	TerraForm Power, Inc. (NasdaqGS:TERP)	Brookfield Renewable Partners LP. (TSX:BEP.UN)	\$10,880.5	9.5x	13.0x
11/4/2019	Pattern Energy Group Inc. (NasdaqGS:PEGI)	Canada Pension Plan Investment Board	\$6,293.7	11.5x	16.1x
10/21/2019	AltaGas Canada Inc. (TSX:ACI)	Alberta Teachers' Retirement Fund Board; Public Sector Pension Investment	\$1,278.2	5.2x	15.2x
10/30/2017	Alterra Power Corp. (TSX:AXY)	Innergex Renewable Energy Inc. (TSX:INE)	\$745.0	10.6x	31.0x
7/27/2017	Boralex Inc. (TSX:BLX)	Caisse de dépôt et placement du Québec	\$3,436.5	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 I LP	\$1,651.8	6.6x	17.2x
1/20/2016	Capstone Infrastructure Corporation	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⁾			Stock Price 06/30/20	% of 52-Week High	Market Cap	Total Enterprise Value ⁽³⁾	TEV / LTM		Net Debt ⁽⁴⁾ EBITDA
	Revenues	EBITDA	Margin					Revenues	EBITDA	
Archrock, Inc.	\$961	\$411	42.8%	\$6.49	56.8%	\$992	\$2,830	2.9x	6.9x	4.5x
Baker Hughes Company	22,390	2,571	11.5	15.39	59.2	10,081	20,081	0.9x	7.8x	1.4x
Blueknight Energy Partners, LP.	316	59	18.6	1.40	90.3	57	(39)	(0.1)x	(0.7)x	4.7x
Cathedral Energy Services Ltd.	58	(6)	(10.6)	0.13	40.4	7	22	0.4x	NM	NM
CES Energy Solutions Corp.	838	85	10.1	0.79	43.7	209	523	0.6x	6.2x	2.8x
Cypress Environmental Partners, L.P.	320	21	6.6	4.13	40.7	50	137	0.4x	6.5x	2.6x
Dawson Geophysical Company	139	17	11.9	1.44	49.1	34	18	0.1x	1.1x	(1.4)x
ENGlobal Corporation	68	2	2.6	1.03	66.5	28	25	0.4x	14.0x	(2.9)x
Enservco Corporation	23	(7)	(29.9)	0.17	34.5	10	51	2.2x	NM	NM
Ensign Energy Services Inc.	991	242	24.4	0.76	22.4	124	1,314	1.3x	5.4x	4.5x
Enterprise Group, Inc.	13	1	9.0	0.12	76.2	6	15	1.1x	12.4x	6.1x
Essential Energy Services Ltd.	87	5	5.4	0.11	31.6	16	33	0.4x	6.9x	1.5x
High Arctic Energy Services Inc	109	9	8.3	0.49	19.6	24	19	0.2x	2.1x	(1.1)x
Hyduke Energy Services Inc.	6	(5)	(83.7)	0.01	40.0	1	0	0.0x	NM	NM
Innospec Inc.	1,380	168	12.2	77.25	71.6	1,897	1,921	1.4x	11.4x	0.1x
Matrix Service Company	1,101	36	3.3	9.72	39.9	254	207	0.2x	5.7x	(1.8)x
Mullen Group Ltd.	894	142	15.9	5.34	68.5	540	952	1.1x	6.7x	2.7x
Newpark Resources, Inc.	659	23	3.4	2.23	27.6	200	341	0.5x	15.1x	5.3x
North American Construction Group Ltd.	460	124	27.0	6.26	47.5	182	518	1.1x	4.2x	2.5x
Parkland Corporation	12,068	654	5.4	24.78	68.5	3,676	6,929	0.6x	10.6x	4.0x
Precision Drilling Corporation	968	255	26.3	0.76	41.0	208	1,294	1.3x	5.1x	3.9x
Profire Energy, Inc.	30	(0)	(0.4)	0.84	41.5	40	29	1.0x	NM	NM
ProPetro Holding Corp.	1,478	333	22.5	5.14	24.4	518	486	0.3x	1.5x	(0.1)x
Secure Energy Services Inc.	1,761	90	5.1	1.23	22.7	195	577	0.3x	6.4x	4.0x
Select Energy Services, Inc.	976	82	8.5	4.90	41.5	426	527	0.5x	6.4x	(1.0)x
Shawcor Ltd.	965	26	2.7	1.99	14.3	140	466	0.5x	17.7x	11.8x
Smart Sand, Inc.	187	65	35.0	1.05	31.7	44	96	0.5x	1.5x	0.6x
STEP Energy Services Ltd.	397	25	6.2	0.36	25.0	24	206	0.5x	8.3x	6.1x
USA Compression Partners, LP	702	417	59.4	10.86	57.2	1,050	3,466	4.9x	8.3x	4.6x
Median			8.5%		41.0%			0.5x	6.5x	2.7x
Mean			8.9%		44.6%			0.9x	7.1x	2.6x

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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⁾			Stock Price 06/30/20	% of 52-Week High	Market Cap	Total Enterprise Value ⁽³⁾	TEV / LTM			Net Debt ⁽⁴⁾ EBITDA
	Revenues	EBITDA	Margin					Revenues	EBITDA	EBITDA	
AKITA Drilling Ltd.	\$121	\$13	11.1%	\$0.30	14.2%	\$13	\$76	0.6x	5.7x	4.0x	
CSI Comprocco LP	424	108	25.5	0.76	19.0	36	708	1.7x	6.5x	6.2x	
Enerflex Ltd.	1,229	214	17.4	3.78	29.8	339	686	0.6x	3.2x	1.5x	
Exterran Corporation	957	155	16.2	5.39	36.2	179	655	0.7x	4.2x	3.2x	
Forum Energy Technologies, Inc.	735	(15)	(2.1)	0.53	15.9	59	442	0.6x	NM	NM	
Geospace Technologies Corporation	95	12	12.1	7.52	42.6	103	84	0.9x	7.3x	(2.3)x	
Gulf Island Fabrication, Inc.	294	(24)	(8.1)	3.07	41.4	47	(19)	(0.1)x	NM	NM	
Halliburton Company	18,974	2,033	10.7	12.98	51.0	11,387	20,866	1.1x	10.3x	4.4x	
Hanwei Energy Services Corp.	7	(1)	(15.8)	0.01	80.0	3	5	0.7x	NM	NM	
Helix Energy Solutions Group, Inc.	764	153	20.1	3.47	34.7	521	949	1.2x	6.2x	2.5x	
ION Geophysical Corporation	175	51	29.3	2.34	21.8	35	193	1.1x	3.8x	2.5x	
Key Energy Services, Inc.	302	(20)	(6.5)	13.00	7.3	179	208	0.7x	NM	NM	
McCoy Global Inc.	36	4	9.8	0.39	76.8	11	13	0.4x	3.6x	1.0x	
MIND Technology, Inc.	40	(8)	(19.7)	1.60	36.2	19	39	1.0x	NM	NM	
Nabors Industries Ltd.	2,725	751	27.6	37.02	22.1	270	3,695	1.4x	4.9x	3.7x	
National Oilwell Varco, Inc.	7,786	175	2.2	12.25	47.5	4,756	6,472	0.8x	37.0x	7.6x	
Natural Gas Services Group, Inc.	76	24	31.4	6.27	37.7	84	72	1.0x	3.0x	(0.6)x	
Parker Drilling Company	630	129	20.4	5.75	24.7	87	188	0.3x	1.5x	0.8x	
PHX Energy Services Corp.	248	33	13.2	0.96	42.9	51	94	0.4x	2.9x	0.6x	
RigNet, Inc.	237	28	11.8	2.15	19.0	43	152	0.6x	5.4x	3.8x	
RPC, Inc.	862	44	5.1	3.08	42.5	654	609	0.7x	13.9x	(2.6)x	
Schlumberger Limited	29,579	5,489	18.6	18.39	44.4	25,522	39,242	1.3x	7.1x	2.5x	
SEACOR Holdings Inc.	758	88	11.6	28.32	55.1	576	927	1.2x	10.5x	3.2x	
Solaris Oilfield Infrastructure, Inc.	180	79	43.9	7.42	48.9	218	307	1.7x	3.9x	(0.7)x	
Superior Drilling Products, Inc.	17	1	8.9	0.74	70.9	19	23	1.4x	15.6x	3.1x	
TechnipFMC plc	13,351	1,439	10.8	6.84	23.9	3,066	3,345	0.3x	2.3x	0.4x	
TerraVest Industries Inc.	233	37	15.9	11.14	87.8	209	303	1.3x	8.2x	2.5x	
TETRA Technologies, Inc.	921	161	17.5	0.53	24.5	67	1,080	1.2x	6.7x	5.4x	
Weatherford International plc	4,596	137	3.0	1.97	5.3	138	1,962	0.4x	14.3x	12.9x	
Median			11.8%		36.2%			0.8x	5.9x	2.5x	
Mean			11.8%		38.1%			0.9x	7.8x	2.7x	

- (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

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
9/1/2020	OneStim Business	Liberty Oilfield Services Inc. (NYSE:LBRT)	\$427.8	0.1x	1.5x
9/1/2020	Calfrac Well Services Ltd. (TSX:CFW)	THRC Holdings, LP	\$675.7	0.8x	34.9x
5/3/2020	Quintana Energy Services Inc. (NYSE:QES)	KLX Energy Services Holdings, Inc. (NasdaqGS:KLXE)	\$49.6	0.1x	2.1x
2/23/2020	Strad Inc. (TSX:SDY)	Management	\$116.6	1.1x	3.5x
11/20/2019	W&W Energy Services, Inc.	Petrofac Limited (LSE:PFC)	\$24.8	-	-
6/17/2019	C&j Energy Services, Inc. (NYSE:CJ)	Keane Group, Inc. (NYSE:FRAC)	\$699.2	0.3x	2.9x
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:AMFV)	John Wood Group PLC (LSE:WV.G.)	\$4,032.4	0.6x	10.6x

(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⁾			Stock Price 06/30/20	% of 52-Week High	Market Cap	Total Enterprise Value ⁽³⁾	TEV / LTM		Net Debt ⁽⁴⁾ / EBITDA
	Revenues	EBITDA	Margin					Revenues	EBITDA	
Alliant Energy Corporation	\$3,549	\$1,361	38.4%	\$47.84	79.4%	\$11,936	\$18,543	5.2x	13.6x	4.8x
AltaGas Ltd.	3,934	884	22.5	11.51	68.8	3,215	9,635	2.4x	10.9x	5.9x
Blueknight Energy Partners, L.P.	316	59	18.6	1.40	90.3	57	(39)	(0.1)x	(0.7)x	4.7x
Chart Industries, Inc.	1,332	224	16.8	48.49	61.5	1,743	2,445	1.8x	10.9x	2.9x
EnLink Midstream, LLC	4,462	1,043	23.4	2.44	22.6	1,194	7,737	1.7x	7.4x	4.6x
Equitrans Midstream Corporation	1,628	1,341	82.4	8.31	42.6	3,593	14,708	9.0x	11.0x	5.2x
Gibson Energy Inc.	4,347	325	7.5	15.53	74.6	2,271	3,240	0.7x	10.0x	3.0x
Green Plains Partners LP	81	52	64.4	6.68	45.1	155	321	4.0x	6.2x	3.0x
Magellan Midstream Partners, L.P.	2,640	1,242	47.0	43.17	63.7	9,716	14,461	5.5x	11.6x	4.0x
MPLX LP	8,628	4,588	53.2	17.28	52.9	18,293	41,102	4.8x	9.0x	4.6x
NuStar Energy L.P.	1,510	731	48.4	14.28	47.5	1,559	6,323	4.2x	8.6x	4.7x
Median			38.4%		61.5%			4.0x	10.0x	4.6x
Mean			38.4%		59.0%			3.6x	9.0x	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
7/27/2020	CNX Midstream Partners LP (NYSE:CNXM)	CNX Resources Corporation (NYSE:CNX)	\$764.2	5.1x	6.6x
2/27/2020	EQM Midstream Partners, LP	Equitrans Midstream Corporation (NYSE:ETRN)	\$4,395.8	7.6x	8.1x
9/16/2019	SemGroup Corporation (NYSE:SEMG)	Energy Transfer LP (NYSE:ET)	\$4,991.7	2.1x	13.5x
8/27/2019	Tallgrass Energy, LP (NYSE:TGE)	The Blackstone Group Inc. (NYSE:BX)	\$9,337.3	8.9x	11.2x
8/21/2019	Kinder Morgan Canada Limited (TSX:KML)	Pembina Pipeline Corporation (TSX:PPL)	\$2,294.7	4.4x	16.3x
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

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

PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

PIPELINES

EQUITY COMPARABLES (1)

Oil and Gas Pipelines (United States & Canada)

Company	LTM ⁽²⁾			Stock Price 06/30/20	% of 52-Week High	Market Cap	Total Enterprise Value ⁽³⁾	TEV / LTM		Net Debt ⁽⁴⁾ EBITDA
	Revenues	EBITDA	Margin					Revenues	EBITDA	
Antero Midstream Corporation	\$1,028	\$708	68.9%	\$5.10	40.9%	\$2,430	\$5,534	5.4x	7.8x	4.4x
ATCO Ltd.	3,141	1,293	41.2	29.60	73.3	3,373	12,374	3.9x	9.6x	4.8x
Blueknight Energy Partners, L.P.	316	59	18.6	1.40	90.3	57	(39)	(0.1)x	(0.7)x	4.7x
Crestwood Equity Partners LP	2,744	442	16.1	13.11	32.8	959	4,415	1.6x	10.0x	5.9x
Enable Midstream Partners, LP	2,593	1,024	39.5	4.68	32.3	2,038	6,846	2.6x	6.7x	4.3x
Enbridge Inc.	32,287	8,318	25.8	30.35	72.0	61,456	120,452	3.7x	14.5x	6.0x
Energy Transfer LP	46,180	9,733	21.1	7.12	46.7	19,183	84,016	1.8x	8.6x	5.4x
Enterprise Products Partners L.P.	29,203	7,382	25.3	18.17	58.9	39,716	68,982	2.4x	9.3x	3.9x
Equitrans Midstream Corporation	1,628	1,341	82.4	8.31	42.6	3,593	14,708	9.0x	11.0x	5.2x
Genesis Energy, L.P.	2,154	512	23.8	7.22	30.3	885	5,243	2.4x	10.2x	6.7x
Gibson Energy Inc.	4,347	325	7.5	15.53	74.6	2,271	3,240	0.7x	10.0x	3.0x
Inter Pipeline Ltd.	1,748	724	41.4	9.29	49.7	3,988	9,137	5.2x	12.6x	7.3x
Kinder Morgan Canada Limited	313	141	45.0	10.96	98.9	383	1,307	4.2x	9.3x	2.6x
Kinder Morgan, Inc.	12,232	5,948	48.6	15.17	67.2	34,307	69,932	5.7x	11.8x	5.7x
ONEOK, Inc.	8,724	2,349	26.9	33.22	42.3	14,750	28,750	3.3x	12.2x	5.8x
Plains All American Pipeline, L.P.	28,535	2,083	7.3	8.84	35.0	6,436	19,468	0.7x	9.3x	5.2x
Sanchez Midstream Partners LP	69	33	47.8	0.38	16.3	7	447	6.4x	13.5x	13.6x
Summit Midstream Partners, LP	410	238	57.9	0.99	12.4	94	1,887	4.6x	7.9x	6.5x
Targa Resources Corp.	7,949	1,859	23.4	20.07	46.2	4,679	15,858	2.0x	8.5x	4.1x
TC PipeLines, LP	553	450	81.4	31.06	69.6	2,215	4,212	7.6x	9.4x	4.2x
The Williams Companies, Inc.	7,800	4,209	54.0	19.02	65.5	23,075	48,091	6.2x	11.4x	5.2x
TC Energy Corporation	9,486	6,058	63.9	42.64	75.7	40,076	83,483	8.8x	13.8x	5.9x
Western Midstream Partners, LP	2,835	1,658	58.5	10.04	31.4	4,457	12,513	4.4x	7.5x	4.8x
Median			41.2%		46.7%			3.9x	9.6x	5.2x
Mean			40.3%		52.4%			4.0x	9.8x	5.4x

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PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

PIPELINES

SELECTED TRANSACTIONS (1)

Announced / Closed Date	Target(s)	Acquirer	Total Enterprise Value (TEV)	TEV / Revenues	TEV / EBITDA
7/27/2020	CNX Midstream Partners LP (NYSE:CNXM)	CNX Resources Corporation (NYSE:CNX)	\$764.2	5.1x	6.6x
2/27/2020	EQM Midstream Partners, LP	Equitrans Midstream Corporation (NYSE:ETRN)	\$4,395.8	7.6x	8.1x
9/16/2019	SemGroup Corporation (NYSE:SEMG)	Energy Transfer LP (NYSE:ET)	\$4,991.7	2.1x	13.5x
8/27/2019	Tallgrass Energy, LP (NYSE:TGE)	The Blackstone Group Inc. (NYSE:BX)	\$9,337.3	8.9x	11.2x
8/21/2019	Kinder Morgan Canada Limited (TSX:KML)	Pembina Pipeline Corporation (TSX:PPL)	\$2,294.7	4.4x	16.3x
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

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PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

TRUCKERS

EQUITY COMPARABLES (1)

Truckers (United States & Canada)

Company	LTM ⁽²⁾			Stock Price 06/30/20	% of 52-Week High	Market Cap	Total Enterprise Value ⁽³⁾	TEV / LTM			Net Debt ⁽⁴⁾
	Revenues	EBITDA	Margin					Revenues	EBITDA	EBITDA	
Adams Resources & Energy, Inc.	\$1,387	\$4	0.3%	\$26.77	67.4%	\$113	\$41	0.0x	10.3x	(13.6)x	
ArcBest Corporation	2,834	178	6.3	26.51	81.7	670	752	0.3x	4.2x	0.3x	
Covenant Logistics Group, Inc.	863	79	9.2	14.43	77.5	253	589	0.7x	7.5x	3.6x	
Daseke, Inc.	1,596	140	8.7	3.93	88.8	254	1,014	0.6x	7.3x	4.6x	
Heartland Express, Inc.	642	174	27.1	20.82	91.7	1,694	1,630	2.5x	9.4x	(0.5)x	
Hess Corporation	5,293	1,951	36.9	51.81	69.9	15,809	23,637	4.5x	12.1x	3.7x	
J.B. Hunt Transport Services, Inc.	9,240	1,234	13.4	120.34	98.3	12,691	14,075	1.5x	11.4x	1.0x	
Knight-Swift Transportation Holdings Inc.	4,583	897	19.6	41.71	96.9	7,083	8,038	1.8x	9.0x	1.0x	
Landstar System, Inc.	3,762	269	7.2	112.31	93.6	4,309	4,239	1.1x	15.7x	(0.5)x	
Marten Transport, Ltd.	863	173	20.0	16.77	94.6	1,380	1,345	1.6x	7.8x	(0.4)x	
Old Dominion Freight Line, Inc.	3,941	1,047	26.6	169.59	98.7	20,003	19,691	5.0x	18.8x	(0.4)x	
P.A.M. Transportation Services, Inc.	475	55	11.6	30.75	43.0	177	414	0.9x	7.5x	4.0x	
Patriot Transportation Holding, Inc.	93	8	8.3	8.33	39.2	28	21	0.2x	2.7x	(1.3)x	
Parkland Corporation	12,068	654	5.4	24.78	68.5	3,676	6,929	0.6x	10.6x	4.0x	
Roadrunner Transportation Systems, Inc.	1,848	(68)	(3.7)	2.31	18.1	88	498	0.3x	NM	NM	
Ryder System, Inc.	8,557	2,184	25.5	37.51	61.9	2,016	10,021	1.2x	4.6x	3.5x	
Saia, Inc.	1,776	275	15.5	111.18	93.2	2,869	3,182	1.8x	11.6x	0.9x	
Schneider National, Inc.	4,492	614	13.7	24.67	99.7	4,372	4,059	0.9x	6.6x	(0.7)x	
TFI International Inc.	3,644	547	15.0	35.43	99.3	3,087	4,457	1.2x	8.1x	2.4x	
Titanium Transportation Group Inc.	124	9	7.1	0.96	74.7	35	86	0.7x	9.7x	4.9x	
Universal Logistics Holdings, Inc.	1,392	146	10.5	17.38	63.2	468	1,022	0.7x	7.0x	3.8x	
USA Truck, Inc.	506	35	7.0	7.75	74.0	64	260	0.5x	7.4x	5.4x	
Werner Enterprises, Inc.	2,402	452	18.8	43.53	92.7	3,008	3,197	1.3x	7.1x	0.3x	
YRC Worldwide Inc.	4,582	147	3.2	1.85	38.6	69	1,152	0.3x	7.8x	6.4x	
Median			11.0%		79.6%			0.9x	7.8x	1.0x	
Mean			13.0%		76.1%			1.3x	8.9x	1.4x	

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PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

TRUCKERS

SELECTED TRANSACTIONS (1)

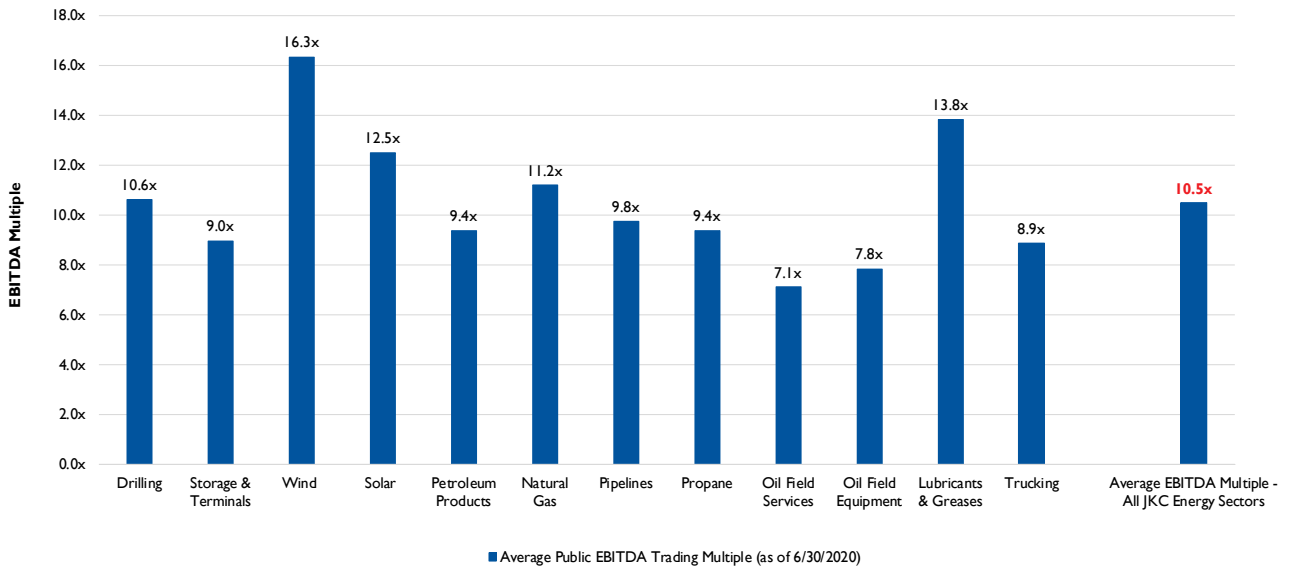
Announced / Closed Date	Target(s)	Acquirer	Total Enterprise Value (TEV)	TEV / Revenues	TEV / EBITDA
2/19/2020	Performance Team LLC	A.P. Møller - Mærsk A/S (CPSE:MAERSK B)	\$545.0	1.0x	6.1x
11/5/2018	CaseStack, Inc.	Hub Group, Inc. (NasdaqGS:HUBG)	\$255.0	1.1x	11.6x
8/31/2018	Mode Transportation, LLC	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 6/30/2020)



FACTOIDS: LITTLE-KNOWN FACTS AND STATS

PETROLEUM PRODUCTS (1)

- U.S. petroleum consumption fell from 20.1 million barrels per day (b/d) in April 2019 to 14.7 million b/d in April 2020, a 27% decrease and the lowest monthly petroleum consumption in the United States since May 1983.
- Production of crude oil decreased in the United States in May 2020 by 1.99 million barrels per day, the largest monthly decrease since at least January 1980.
- Texas had the largest decrease (14.8%) in crude oil production from April to May 2020 among states and producing regions. Texas accounted for 41% of the national total in 2019.

NATURAL GAS (2)

- Between 2011 and 2019, 121 U.S. coal-fired power plants were repurposed to burn other types of fuels, 103 of which were converted to or replaced by natural gas-fired plants.
- Natural gas is one of the main sources of energy in the United States. In 2019, U.S. production of dry natural gas increased to almost 34 trillion cubic feet (Tcf) and consumption increased to 31 Tcf—both record values.

PROPANE AND HEATING/FUEL OIL (3)

- Department of Energy (DOE) research funding totaled more than \$9 million for vehicle technologies utilizing propane for fiscal year 2020. The amount awarded for propane-related projects nearly doubled the \$5 million the industry received in appropriations funding for propane engine technology in 2016.
- Six propane-related projects were part of DOE's July pledge of \$139 million for 55 projects selected to advance innovative vehicle technologies.
- In 2018, about 3 billion gallons of heating oil were sold to residential consumers in the Northeast, equal to about 85% of total U.S. residential heating oil sales.

(1) U.S. Energy Information Administration.

(2) U.S. Energy Information Administration.

(3) LPGas Magazine and U.S. Energy Information Administration.

FACTOIDS: LITTLE-KNOWN FACTS AND STATS

LUBRICANTS AND GREASES (1)

- Global demand for lubricants in wind energy reached about 40,000 to 50,000 metric tons in 2019, valued at \$400 million to \$500 million, as total installed wind energy capacity topped 650 gigawatts.
- With a marked increase in ventilator manufacturing since the onset of the Covid-19 pandemic, there is an increased demand for the specialized lubricants that allow these life-saving machines to operate safely. These ventilators require an oxygen-compatible lubricant/grease. Oxygen-compatible greases can also be used in other high-oxygen applications such as scuba diving equipment.

SOLAR (2)

- In the last decade, solar installations have experienced an average annual growth rate of 49%.
- As of fall 2019, nearly 250,000 Americans worked in solar - more than double the number in 2012 - at more than 10,000 companies in every U.S. state.

WIND (3)

- In 2019, the wind industry supported 120,000 jobs across all 50 states and Puerto Rico.
- Wind energy supports a thriving domestic manufacturing sector with over 530 factories across 43 states producing components for the wind energy industry.

(1) Lubes N Grease Magazine.

(2) Solar Energy Industries Association.

(3) Clean Power for America.

FACTOIDS: LITTLE-KNOWN FACTS AND STATS

OIL AND GAS FIELD SERVICES (1)

- A Rystad Energy analysis shows the number of drilled wells globally is expected to reach around 55,350 this year, the lowest since at least the beginning of the century. The decline is a staggering 23% fall from 2019's number of 71,946 wells.
- Drilled wells are expected to partly recover to just above 61,000 in 2021. Then numbers will rise further to just above 65,000 in 2022 and remain just below 69,000 until the end of 2025.

EQUIPMENT AND PHYSICAL TECHNOLOGY (2)

- BP's has invested \$5 million in Satelytics – a cloud-based geospatial analytics software company that uses advanced spectral imagery and machine learning to monitor environmental changes, including methane emissions.
- A growing number of oil and gas companies are looking to measure and reduce their carbon emissions under increased pressure from shareholders to join the fight against climate change. As a result a growing number of technology companies are now launching carbon emissions tracking and accounting software. In June, Germany's SAP launched a carbon emissions accounting system to help firms manage and reduce their carbon footprint and accelerate the move to sustainable business practices.

STORAGE AND TERMINALS (3)

- The UK bulk liquid storage industry generated \$3.8 billion in revenue in 2019. In the UK and Ireland, the sector employs 3,790 people across 291 terminals. Most of the storage capacity is for oil and its derivatives, with chemicals having the second largest storage capacity.
- Asia is expected to lead the global liquids storage capacity growth, contributing about 49% of the total global capacity growth by 2024. The region is likely to add 56.8 million m³ of liquids storage capacity by 2024.

(1) Oilandgaspeople.com.

(2) Tank Storage Magazine and Oilprice.com.

(3) GlobalData, "Global Liquids Storage Industry Outlook to 2024."

FACTOIDS: LITTLE-KNOWN FACTS AND STATS

PIPELINES (1)

- Five pipeline projects that carry petroleum products were completed in 2019, and the Plantation Pipeline Roanoke expansion became operational in 2020. Petroleum products include gasoline, diesel, jet fuel, and other refinery products.
- In 2019, 14 crude oil pipeline projects were completed, compared with 11 in 2018. An additional three projects were completed as of the end of April 2020. Nine of the crude oil projects completed in 2019 and all three of the 2020 projects were new pipeline projects.

TRUCKERS (2)

- According to the U.S. Department of Transportation, as of May 2019, the number of for-hire carriers on file with the Federal Motor Carrier Safety Administration totaled 892,078, private carriers totaled 772,011 and other interstate motor carriers totaled 84,930.
- Trucks transported 67.4% of the value of surface trade between the U.S. and Canada and 83.5% of the value of surface trade between the U.S. and Mexico in 2018.

(1) U.S. Energy Information Administration.

(2) U.S. Department of Transportation.

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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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