

ENERGY LOGISTICS & DISTRIBUTION

Industry In-Sight™

WINTER/SPRING 2022



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

INTRODUCTION ... About This Report

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

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

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

Segments covered in this Industry In-Sight™ include:

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

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

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

Thank you for taking the time to review this Energy Logistics & Distribution Industry In-Sight™. Our goal is to provide the most comprehensive and beneficial information possible. Please forward your feedback and suggestions to any member of the Jordan Knauff & Company or Energy Equipment & 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. EEIA mobilizes and leads 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. It also works for widespread public support for energy development.

EEIA is active on all fronts: federal and state legislative, regulatory, judicial and public opinion. Its strength is based upon the supply chain's enormous fifty-state contributions to jobs, economic growth and community prosperity. EEIA conducts economic research that measures and reports the facts about the energy supply chain's tremendous contributions to the American economy.

EEIA is an organization of leading supply chain companies, trade associations and labor organizations. It is the voice of the businesses and workers of America's energy miracle.



INTRODUCTION

Who is Jordan Knauff & Company (JKC)?

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

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

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

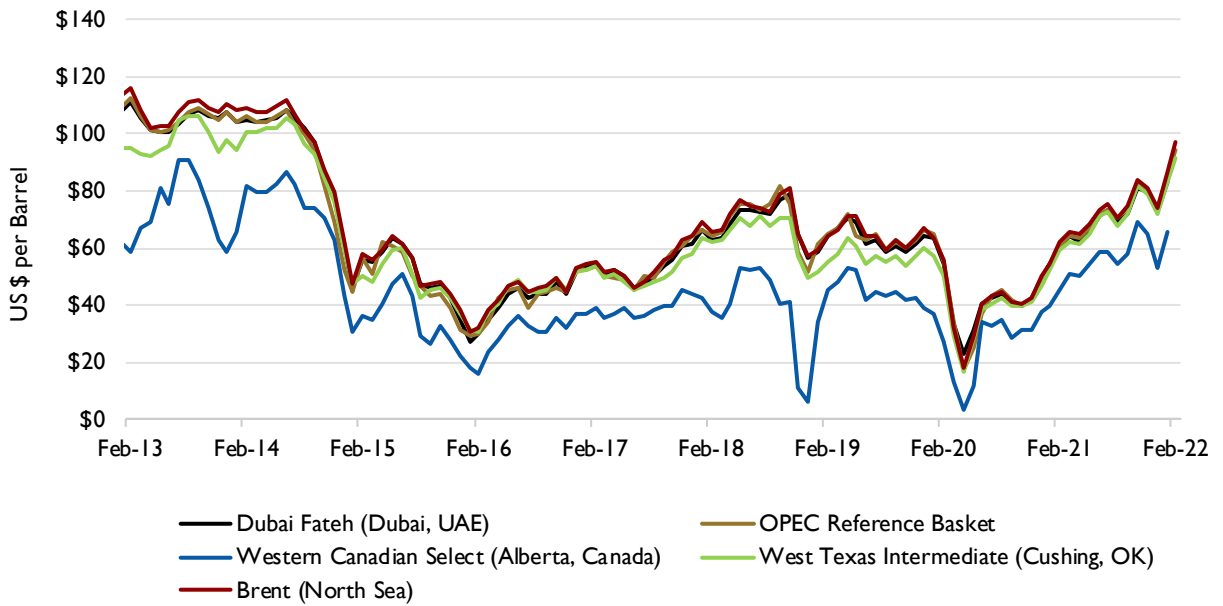
The Services We Provide

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

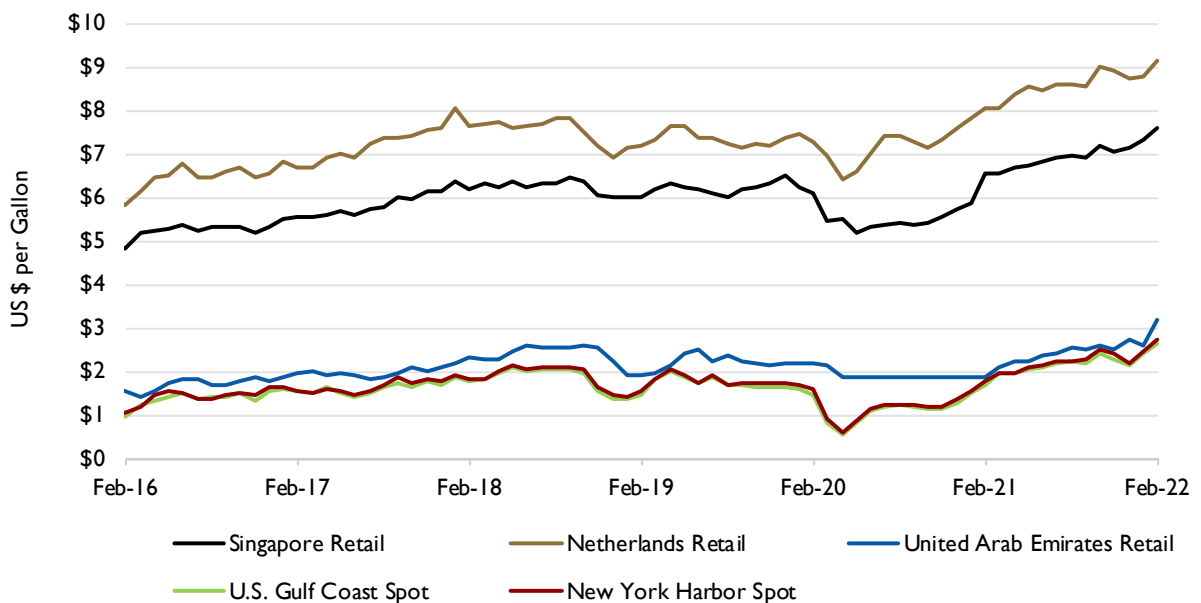
DATA CENTER

OIL

CRUDE OIL PRICES (MONTHLY AVERAGE) (1)



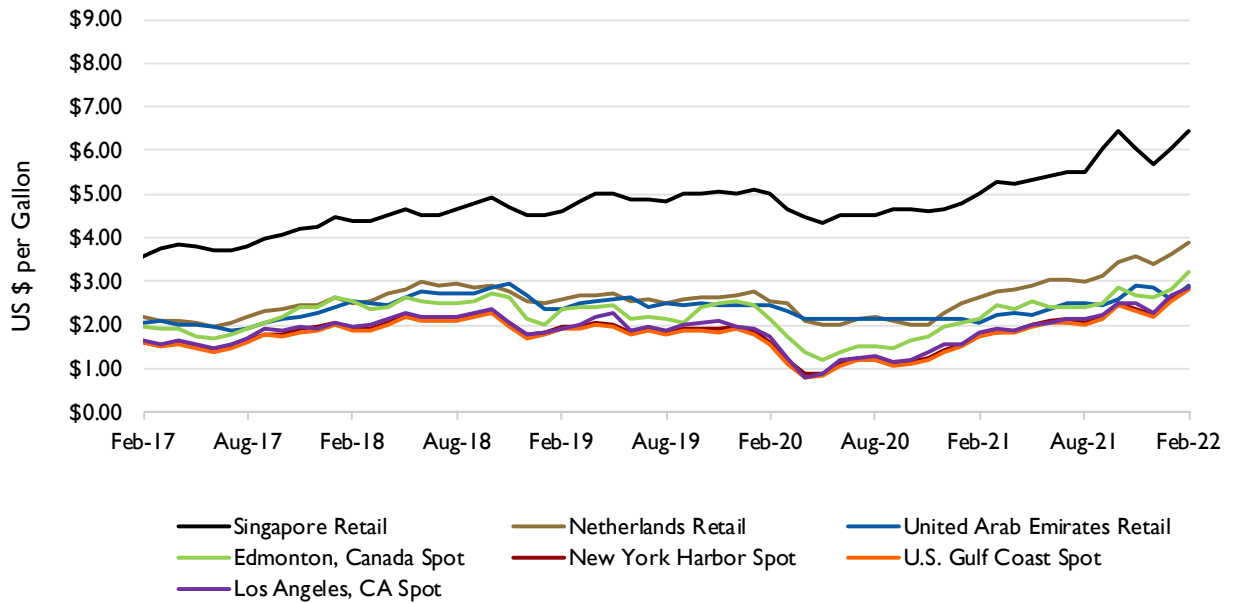
GASOLINE PRICES (MONTHLY AVERAGE) (2)



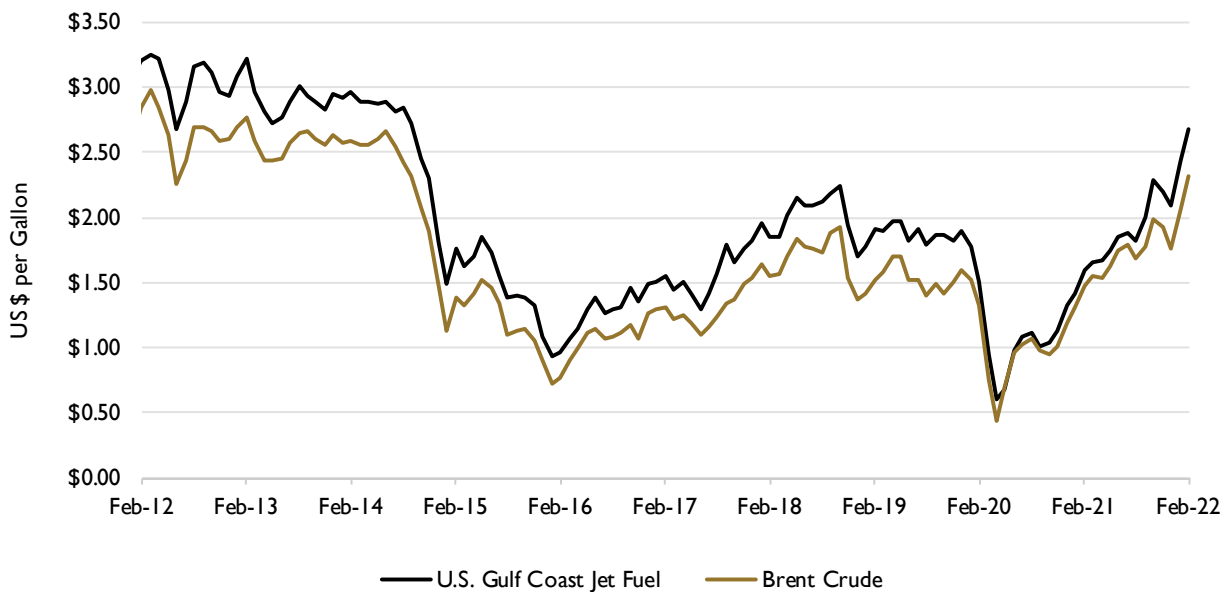
DATA CENTER

OIL

DIESEL PRICES (MONTHLY AVERAGE) (3)



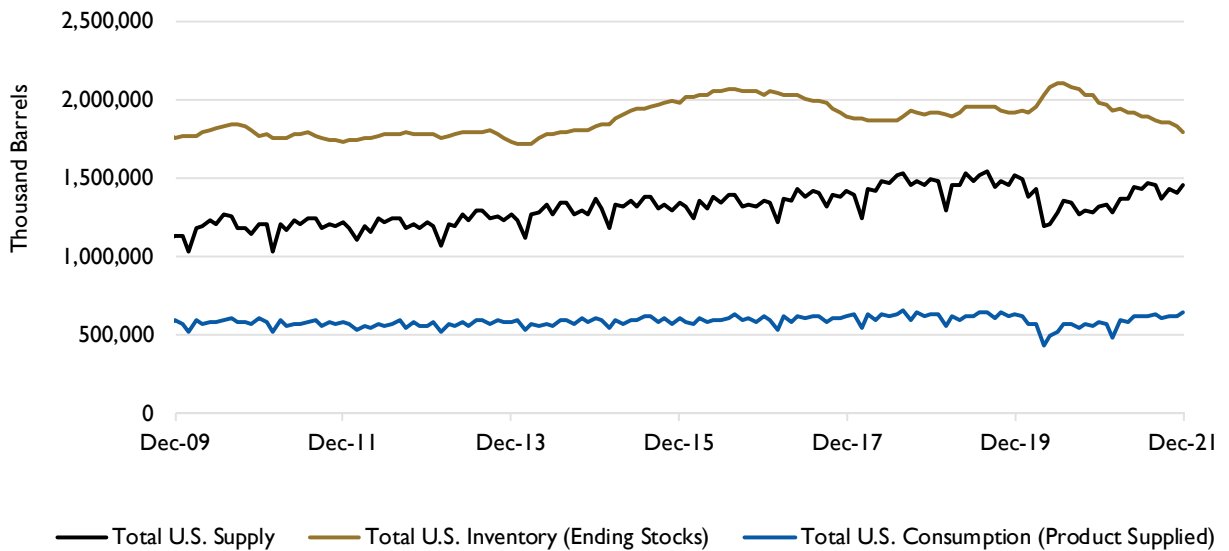
JET FUEL PRICES (MONTHLY AVERAGE) (4)



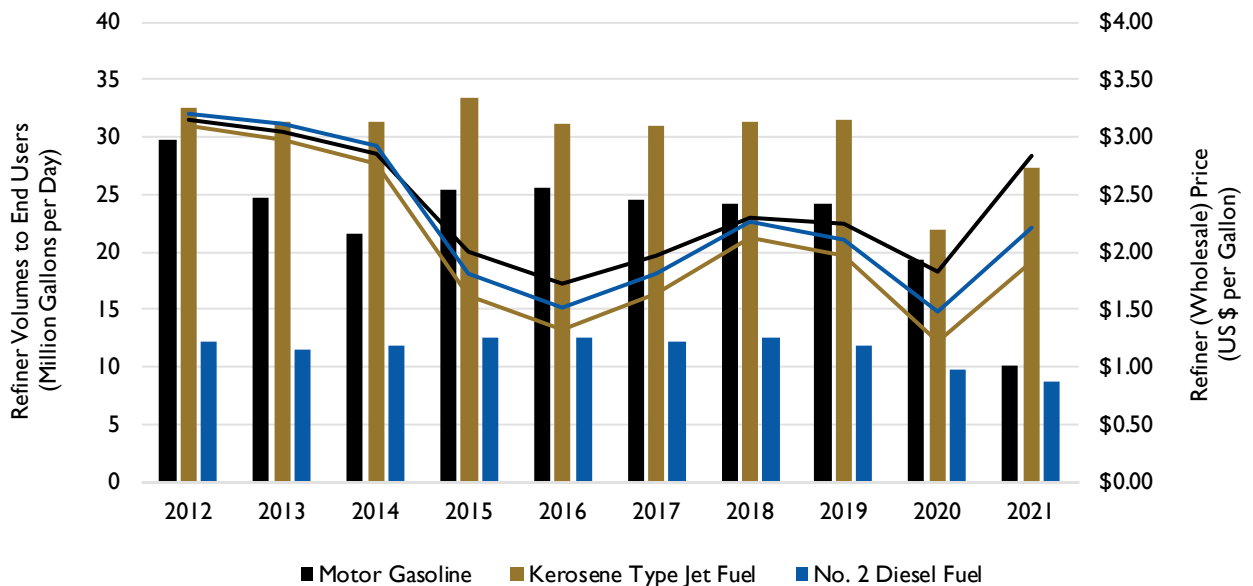
DATA CENTER

OIL

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



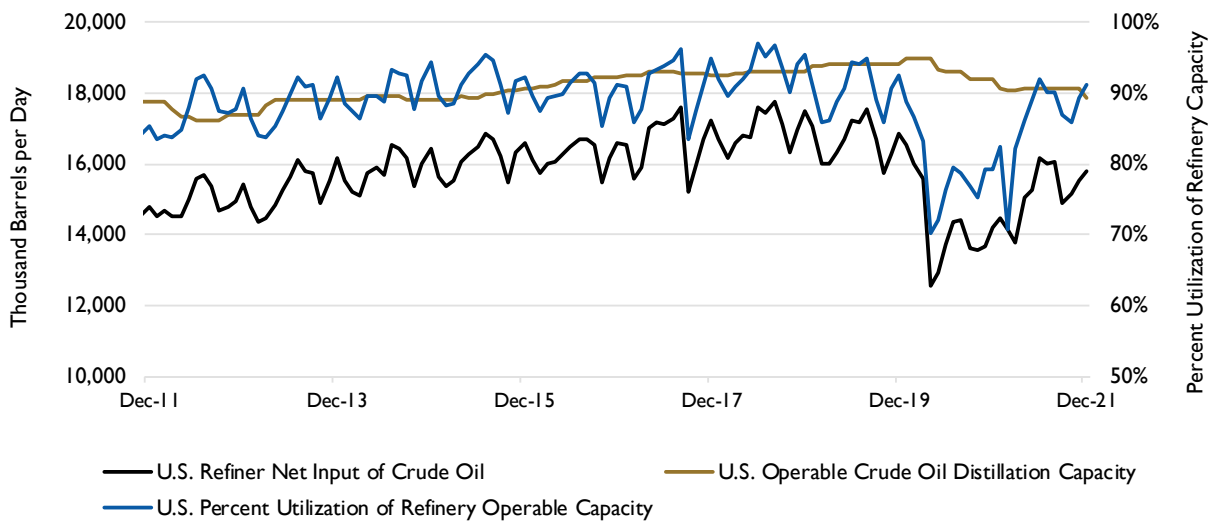
U.S. REFINERY VOLUMES AND WHOLESALE PRICES OF PETROLEUM PRODUCTS (ANNUAL AVERAGE) ⁽⁶⁾



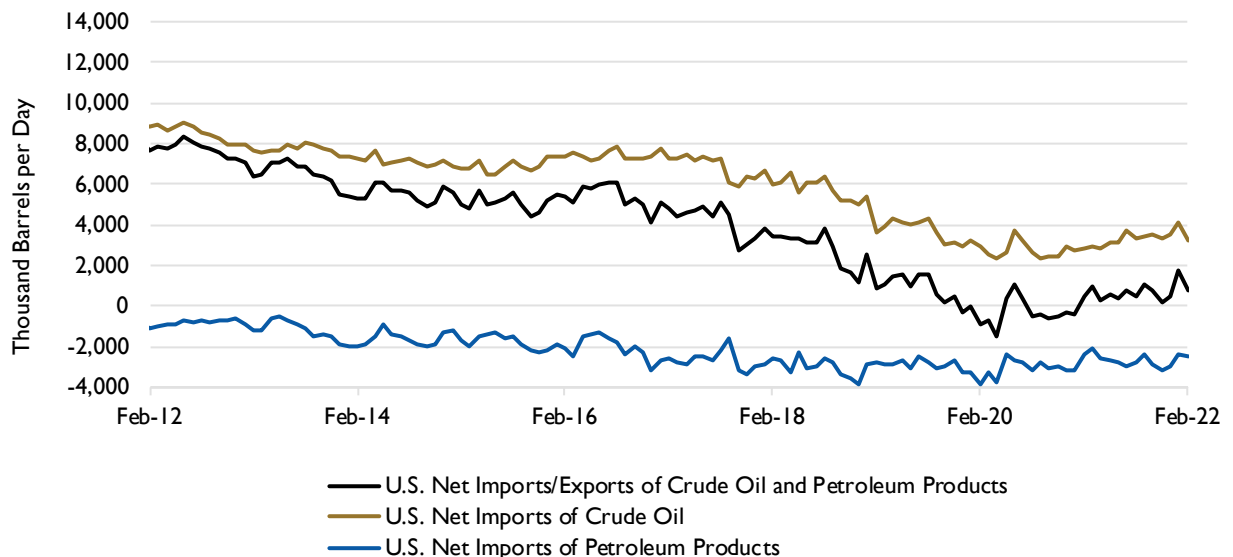
DATA CENTER

OIL

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



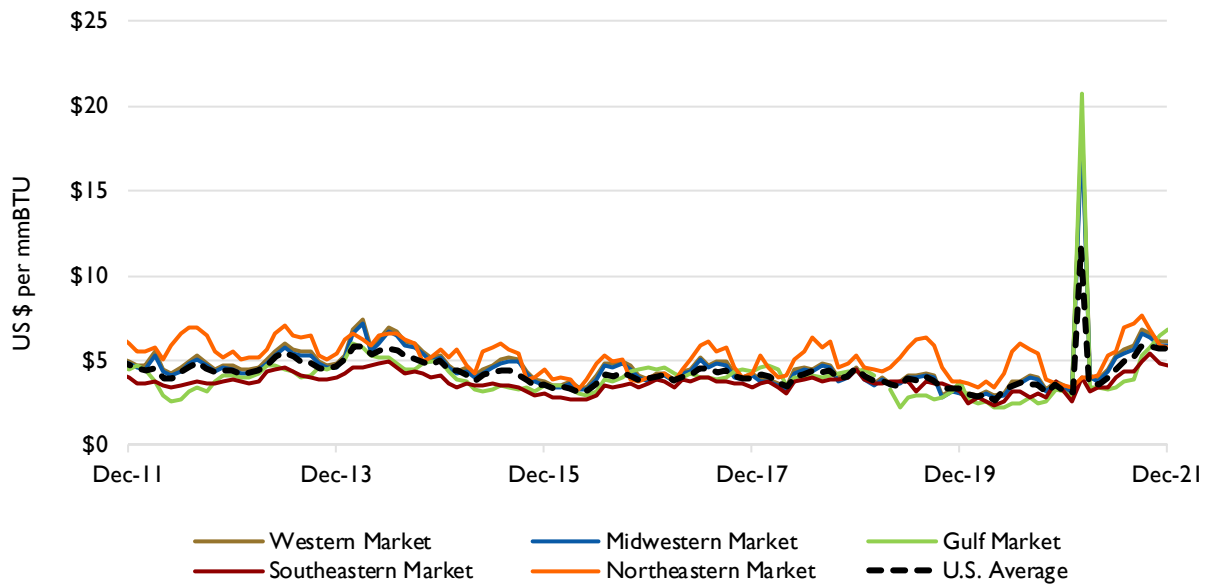
U.S. CRUDE OIL AND PETROLEUM PRODUCTS IMPORTS AND EXPORTS (MONTHLY AVERAGE) ⁽⁸⁾



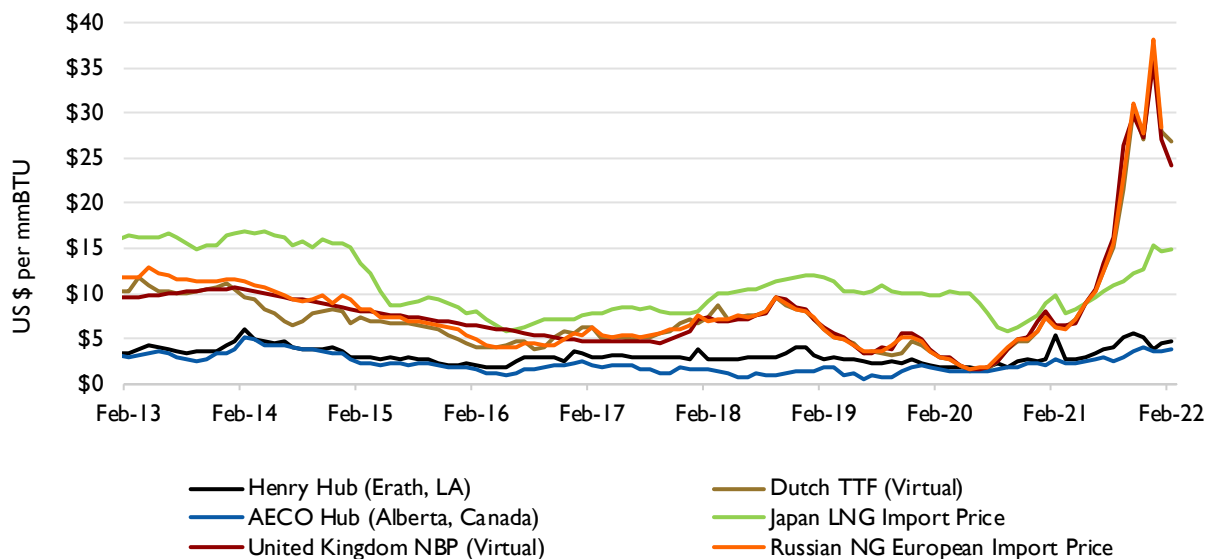
DATA CENTER

NATURAL GAS

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



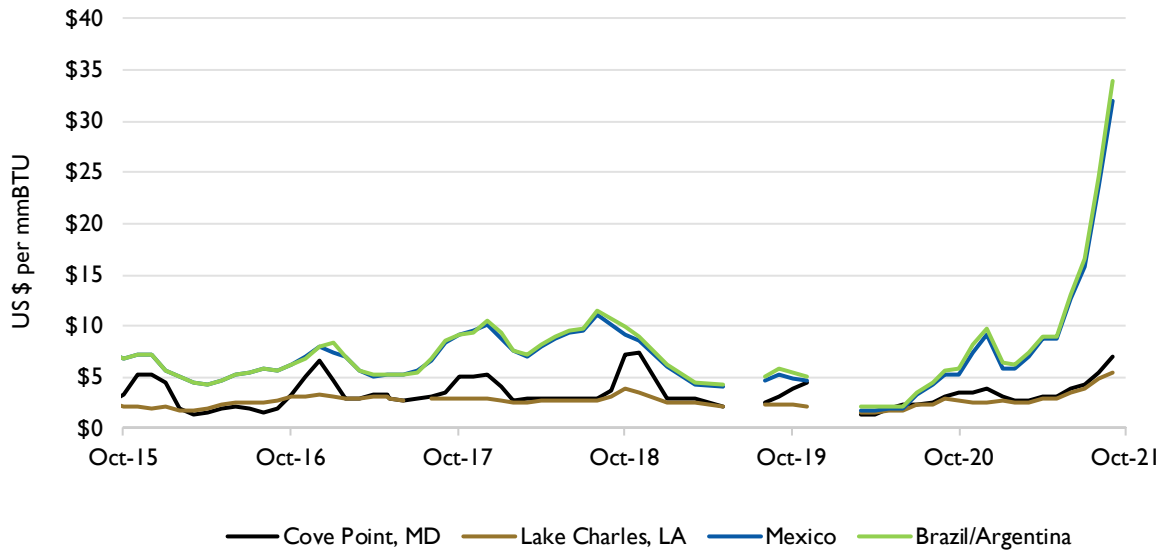
INTERNATIONAL NATURAL GAS PRICES (MONTHLY AVERAGE) ⁽¹⁰⁾



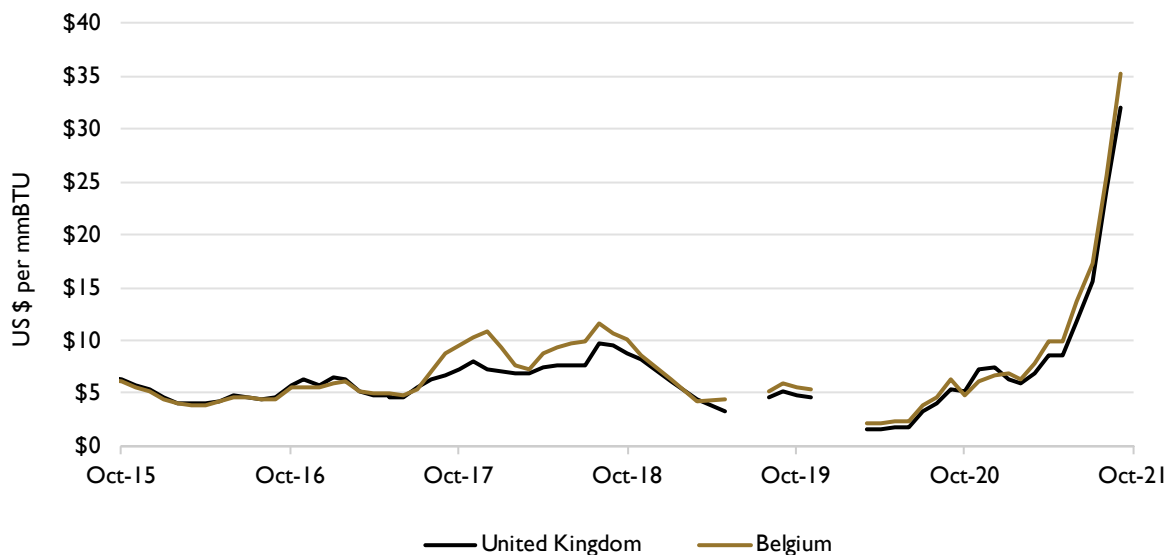
DATA CENTER

NATURAL GAS

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



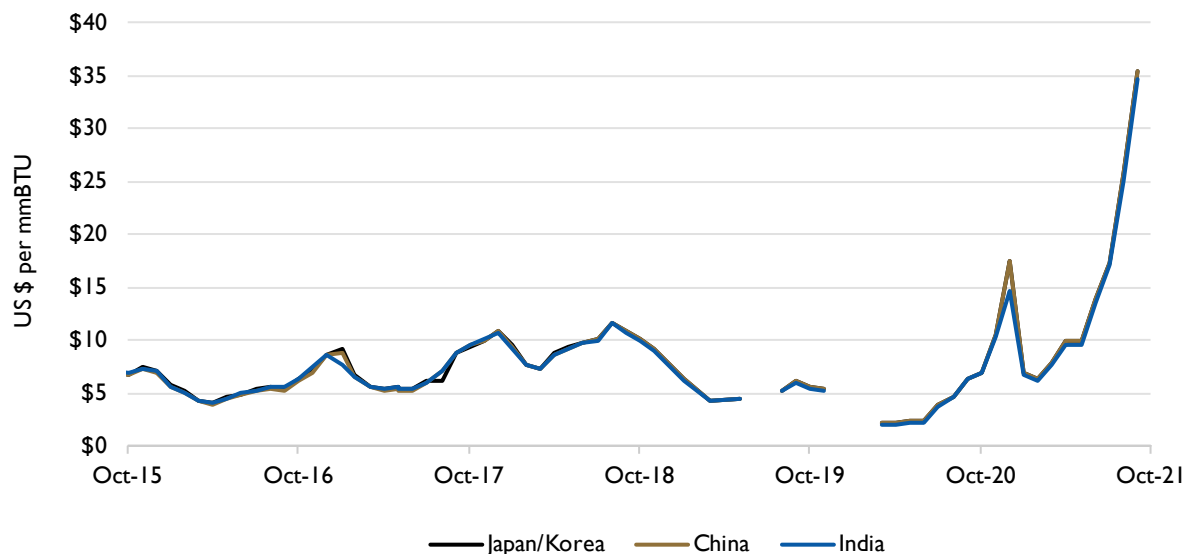
WESTERN EUROPE LIQUEFIED NATURAL GAS PRICES (MONTHLY AVERAGE) ⁽¹²⁾



DATA CENTER

NATURAL GAS

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



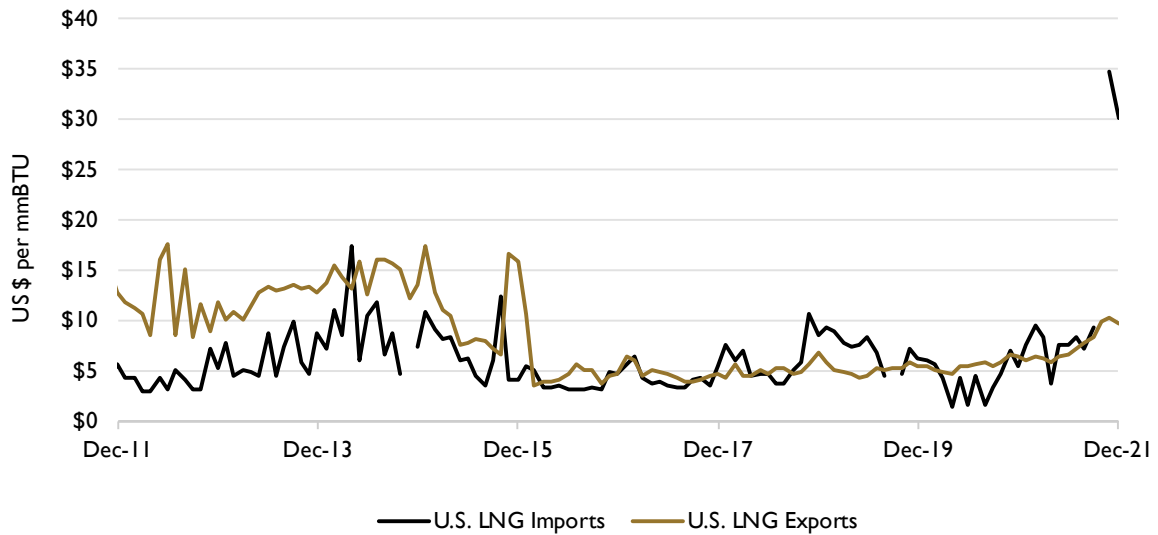
WORLD LIQUEFIED NATURAL GAS PRICES MAP (MONTHLY AVERAGE) (14)



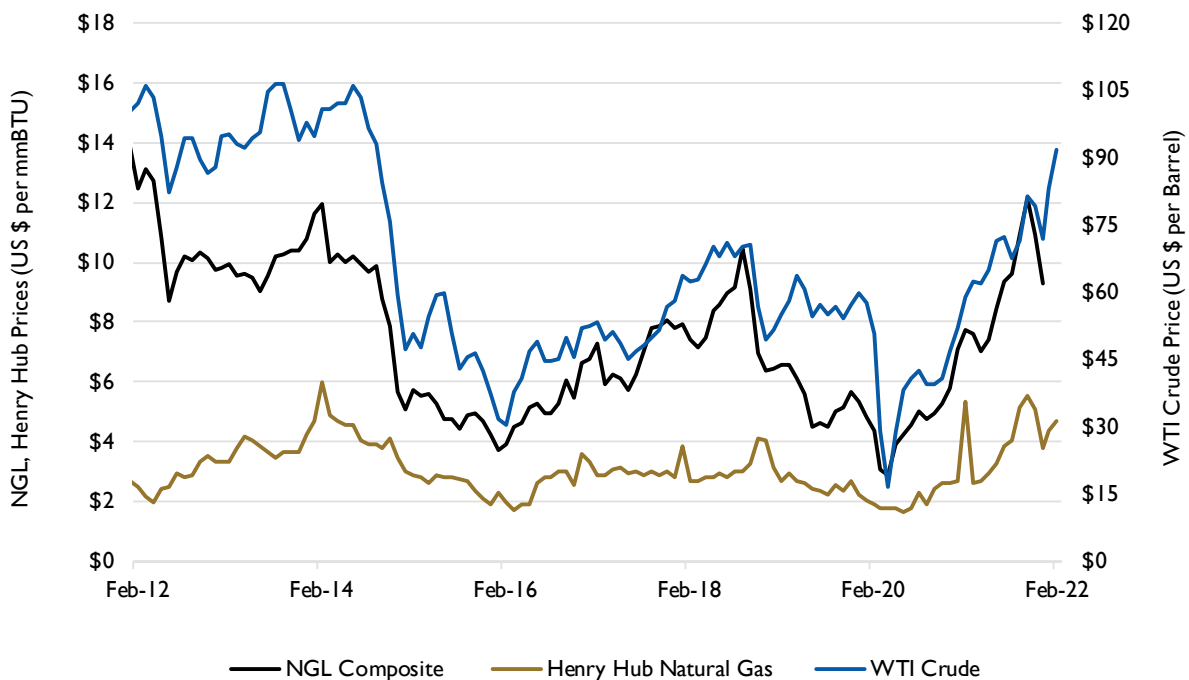
DATA CENTER

NATURAL GAS

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



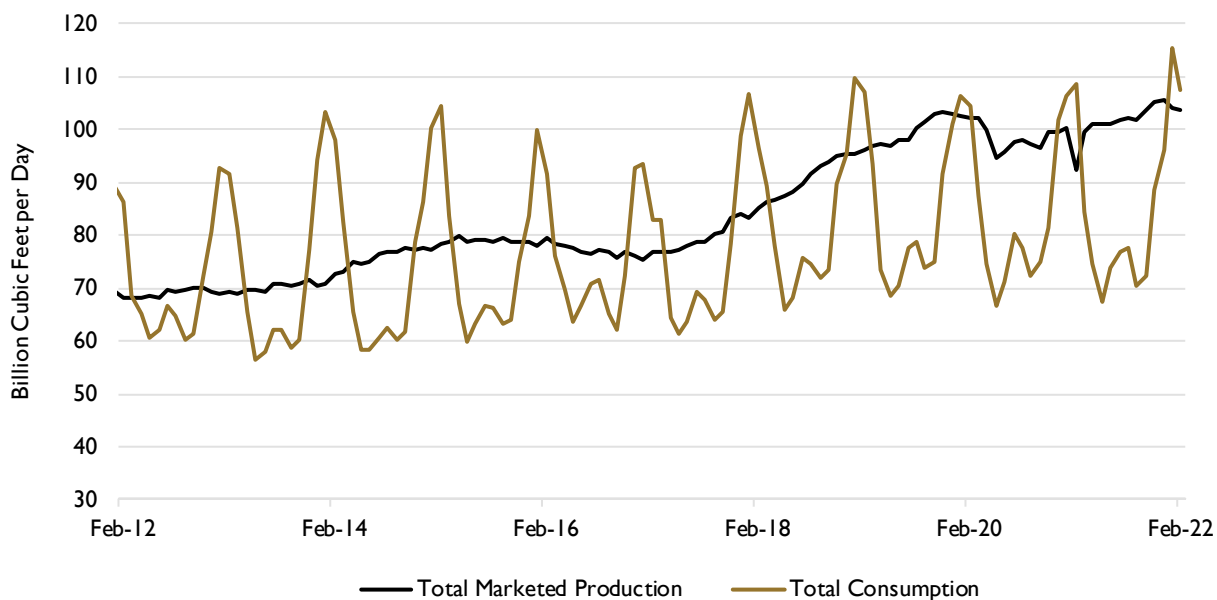
NATURAL GAS PLANT LIQUIDS PRICES (MONTHLY AVERAGE) ⁽¹⁶⁾



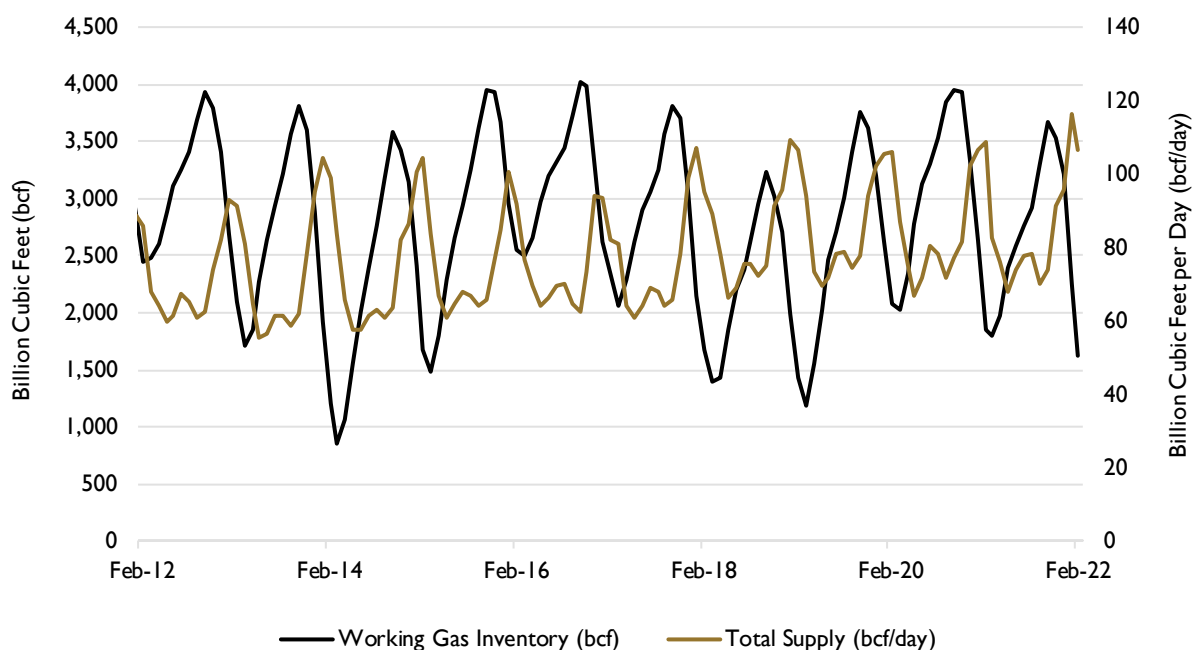
DATA CENTER

NATURAL GAS

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



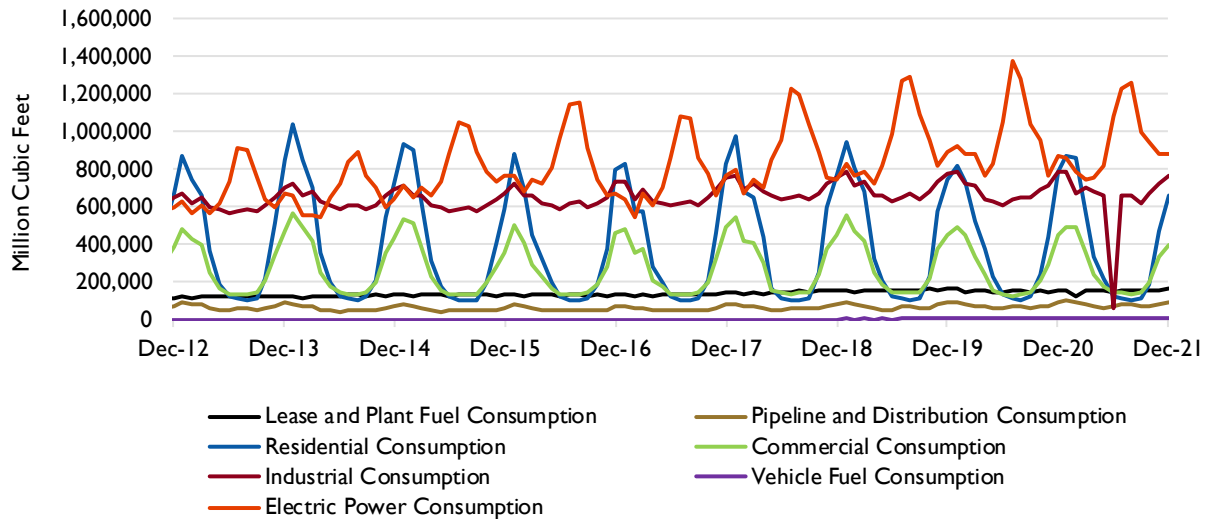
U.S. NATURAL GAS SUPPLY AND INVENTORY (MONTHLY) ⁽¹⁸⁾



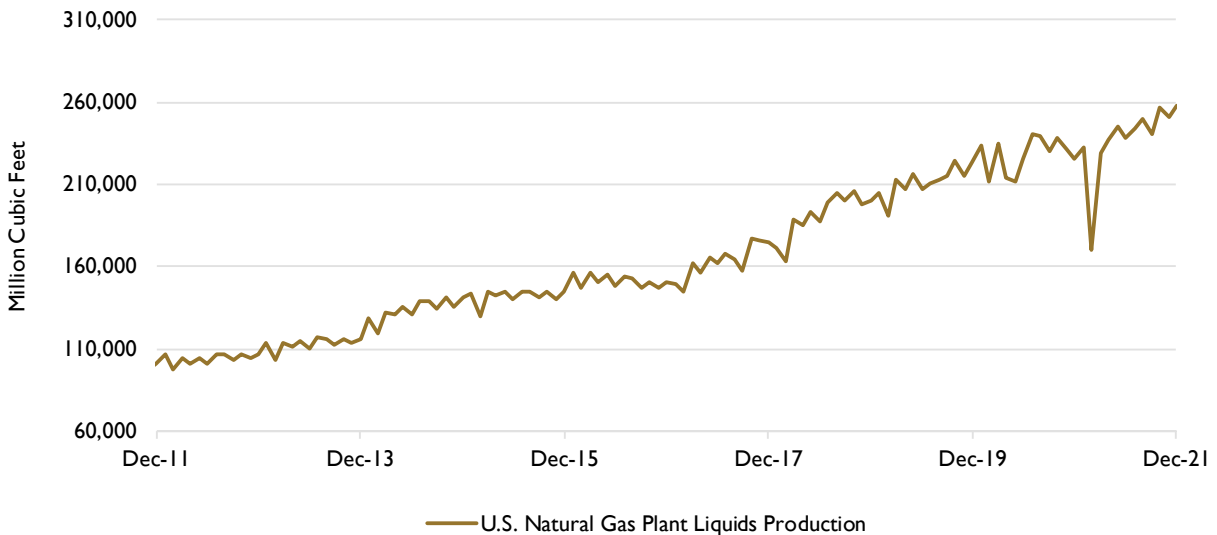
DATA CENTER

NATURAL GAS

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



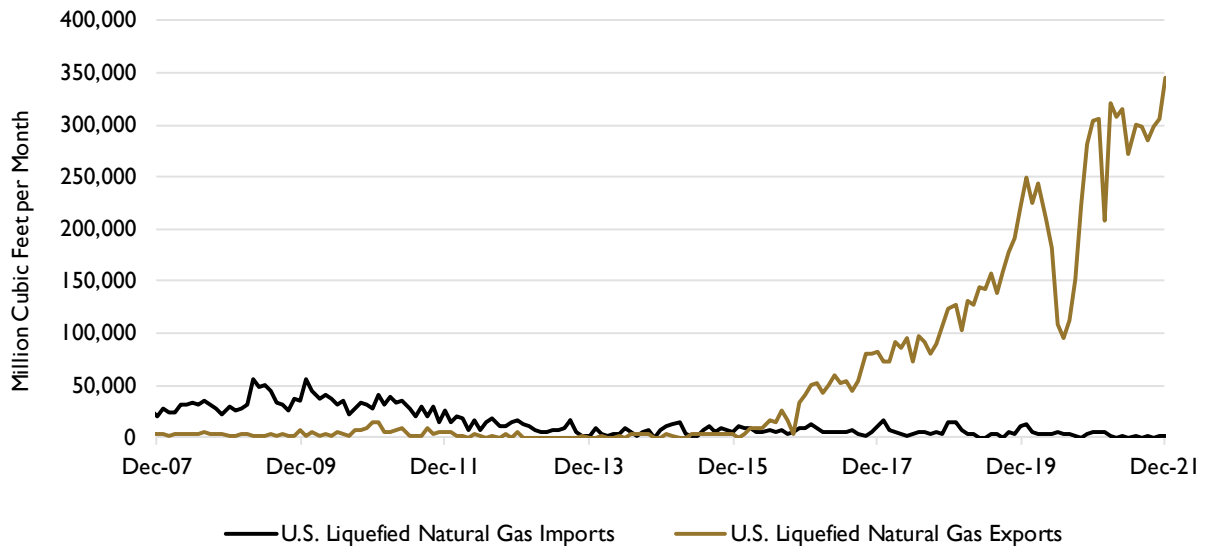
U.S. NATURAL GAS PLANT LIQUIDS PRODUCTION (MONTHLY) ⁽²⁰⁾



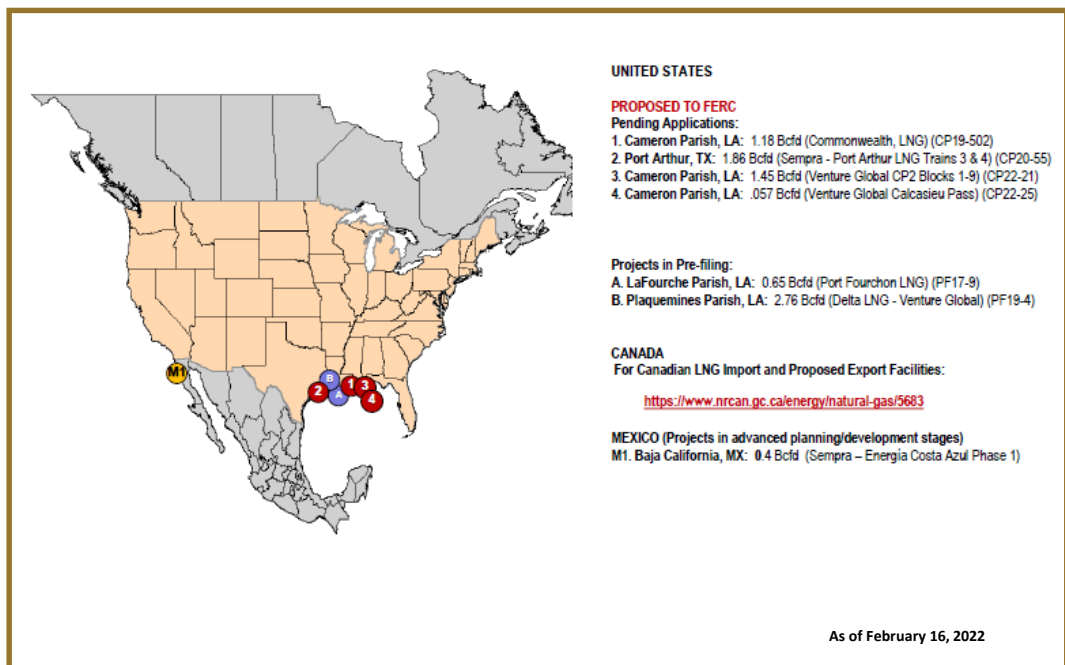
DATA CENTER

NATURAL GAS

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



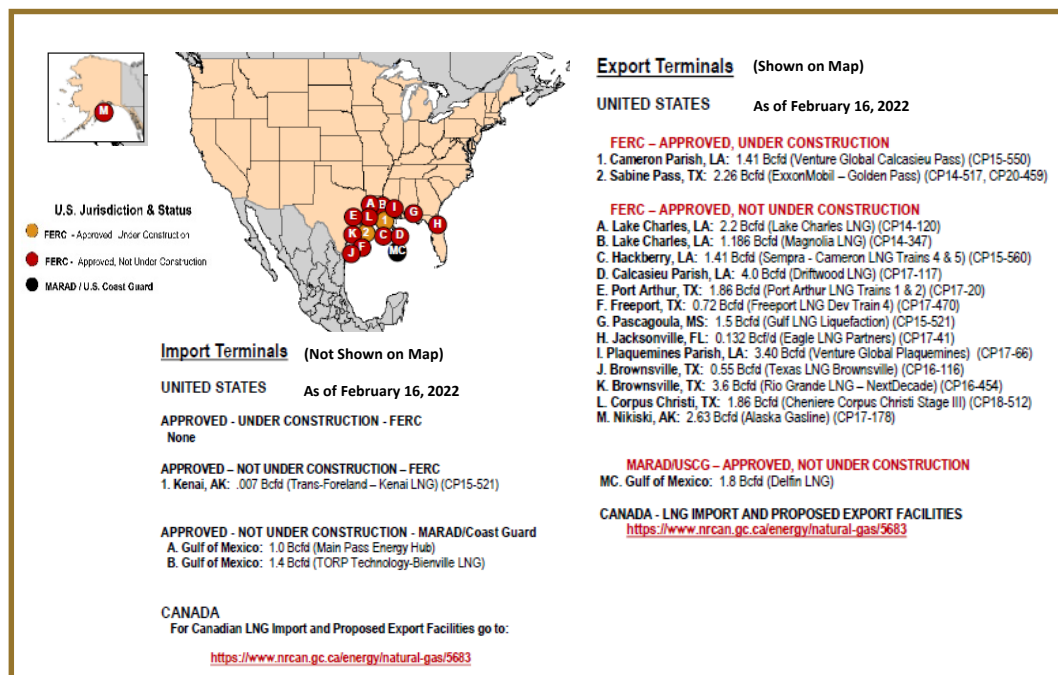
NORTH AMERICAN LNG EXPORT TERMINALS — *PROPOSED* ⁽²²⁾



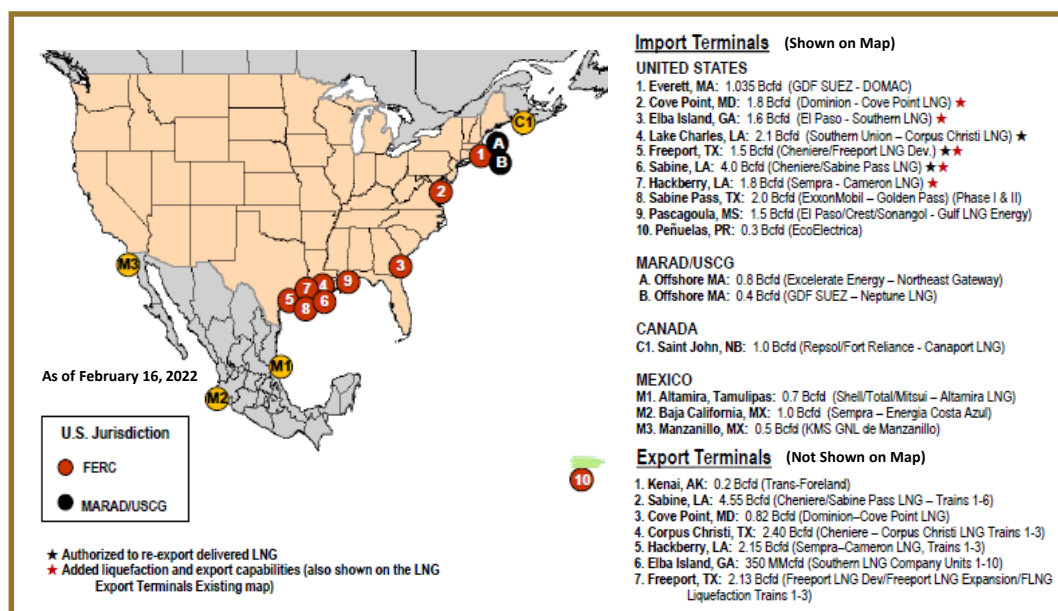
DATA CENTER

NATURAL GAS

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



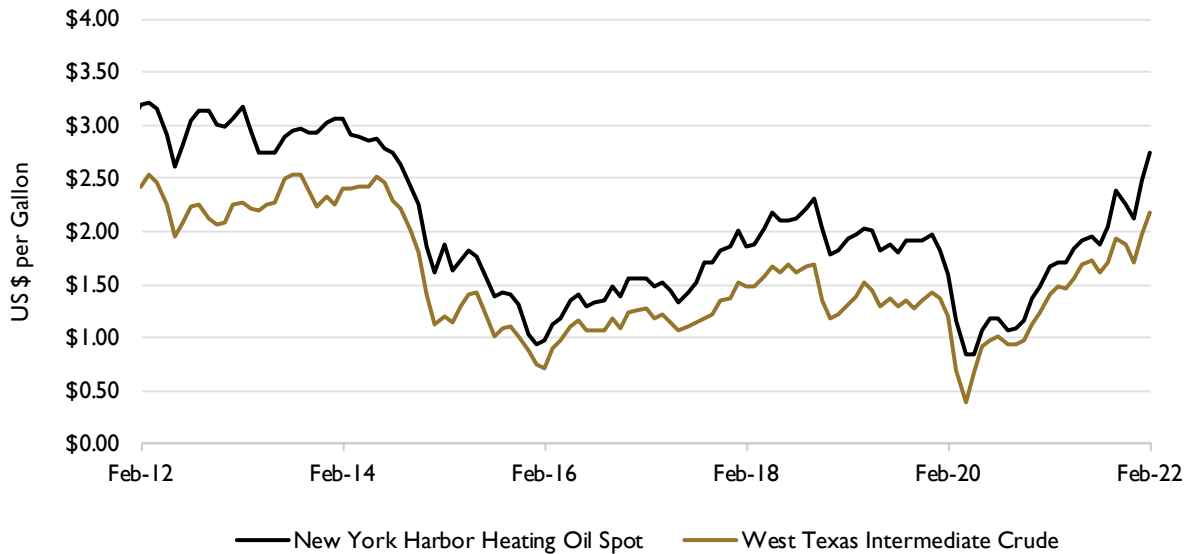
NORTH AMERICAN LNG IMPORT/EXPORT TERMINALS — *EXISTING* (24)



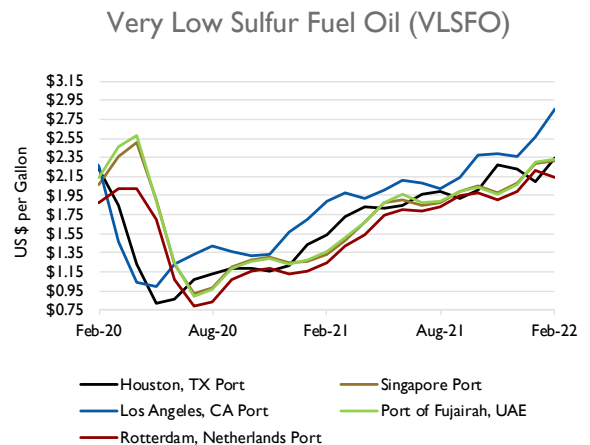
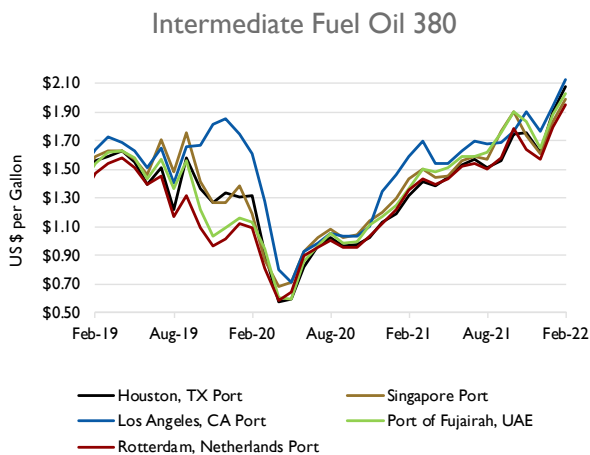
DATA CENTER

PROPANE AND HEATING/FUEL OIL

HEATING OIL PRICES (MONTHLY AVERAGE) ⁽²⁵⁾



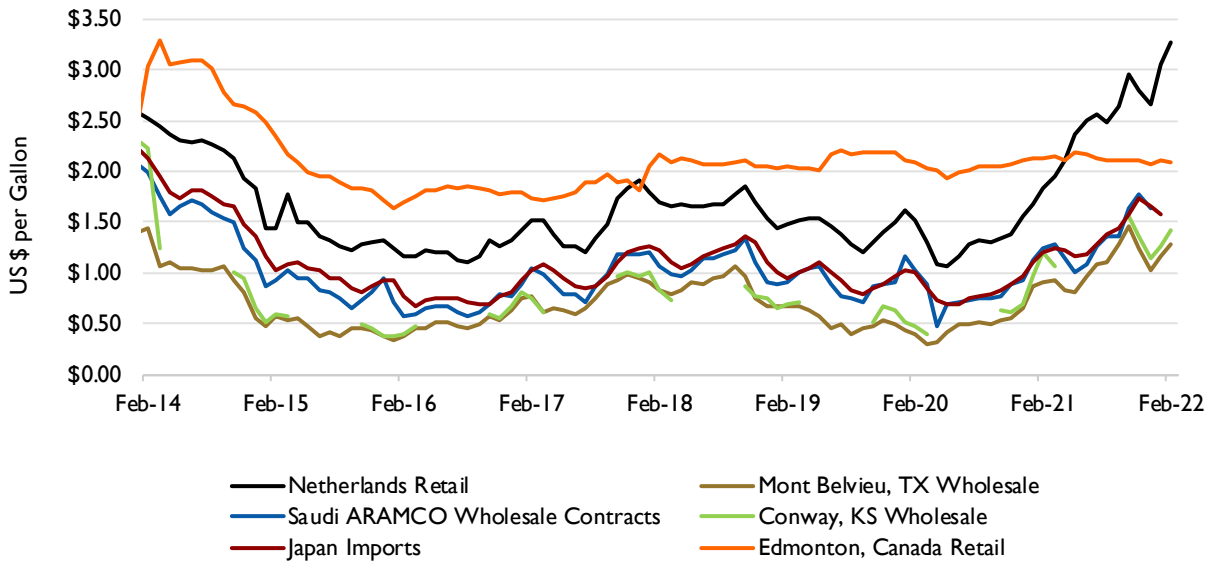
INTERMEDIATE FUEL OIL AKA “BUNKER FUEL” PRICES (MONTHLY AVERAGE) ⁽²⁶⁾



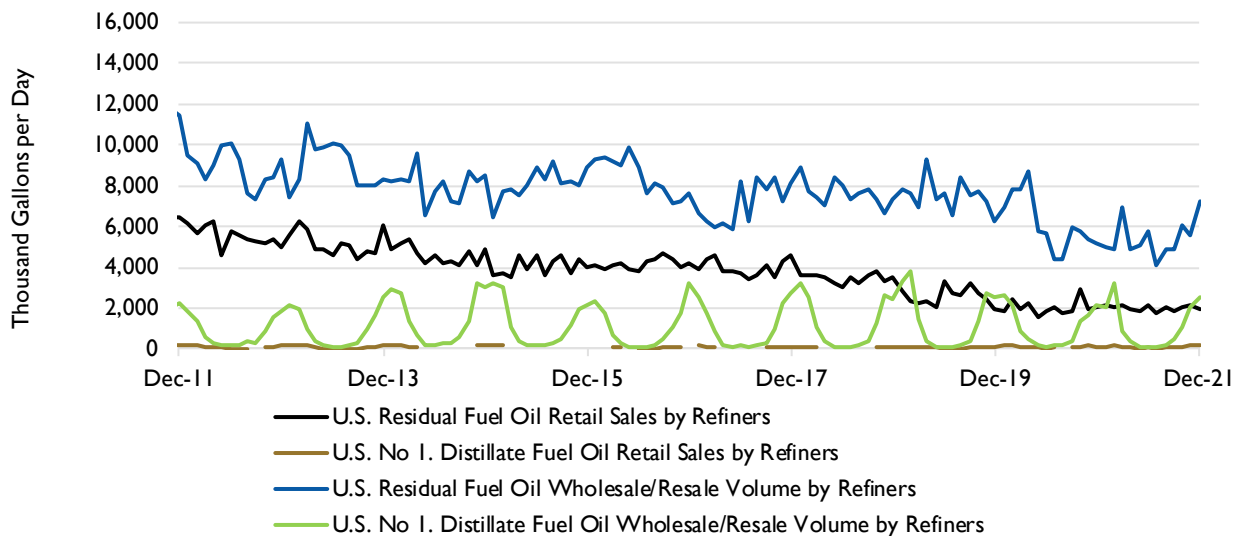
DATA CENTER

PROPANE AND HEATING/FUEL OIL

PROPANE PRICES (MONTHLY AVERAGE) (27)



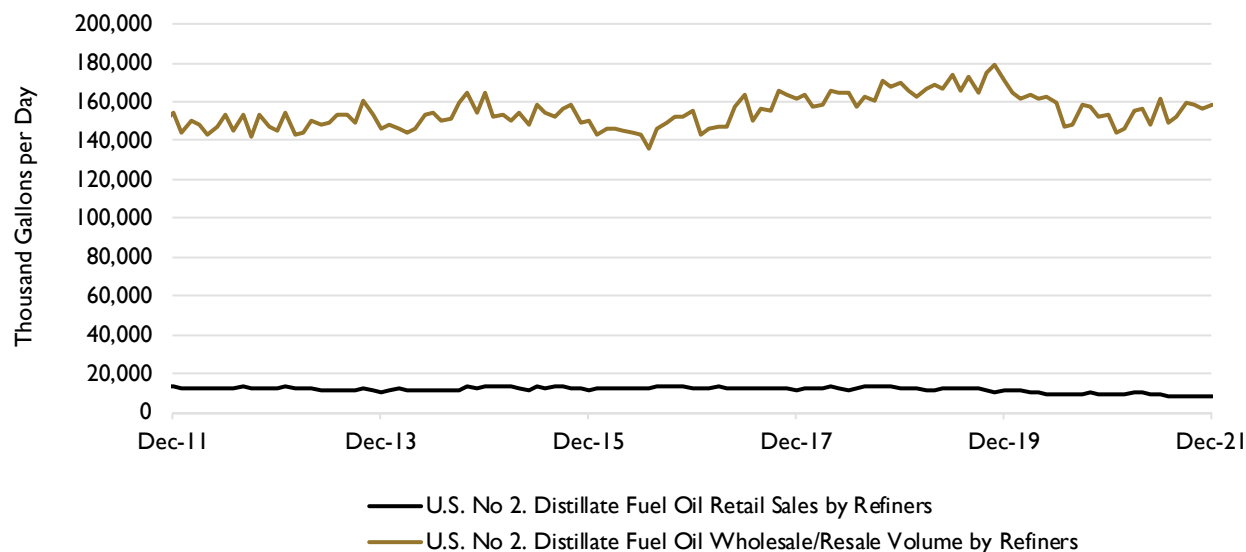
NO. 1 DISTILLATE FUEL OIL, RESIDUAL FUEL OIL WHOLESALE, RETAIL SALES VOLUME BY REFINERS (MONTHLY) (28)



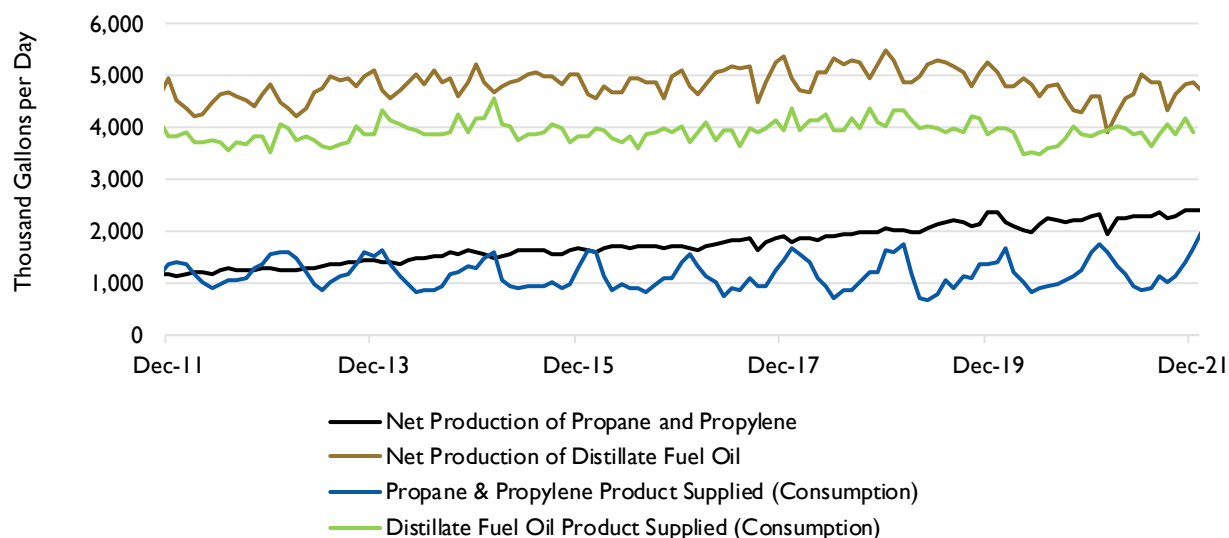
DATA CENTER

PROPANE AND HEATING/FUEL OIL

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



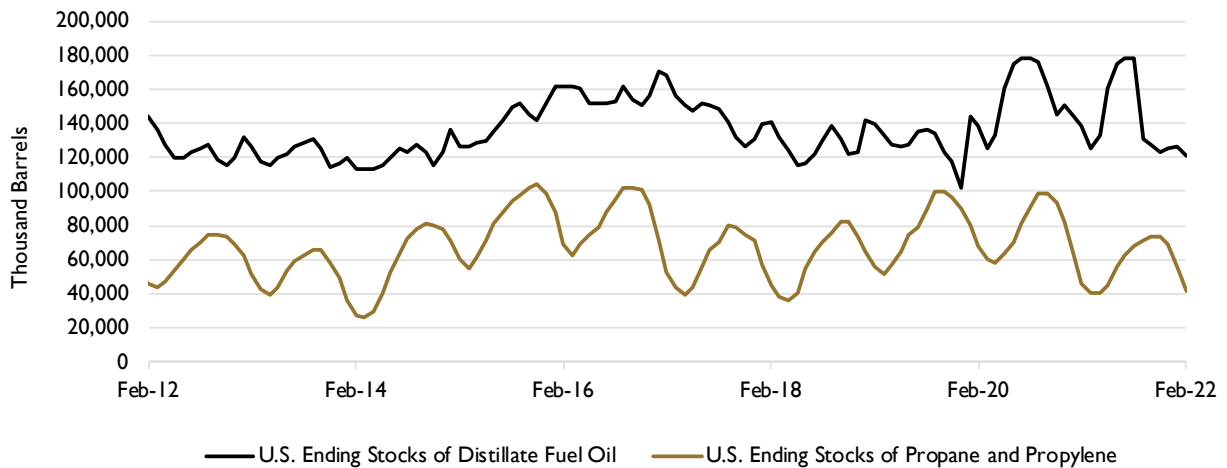
PROPANE & PROPYLENE AND DISTILLATE FUEL OIL PRODUCTION AND CONSUMPTION (MONTHLY) ⁽³⁰⁾



DATA CENTER

PROPANE AND HEATING/FUEL OIL

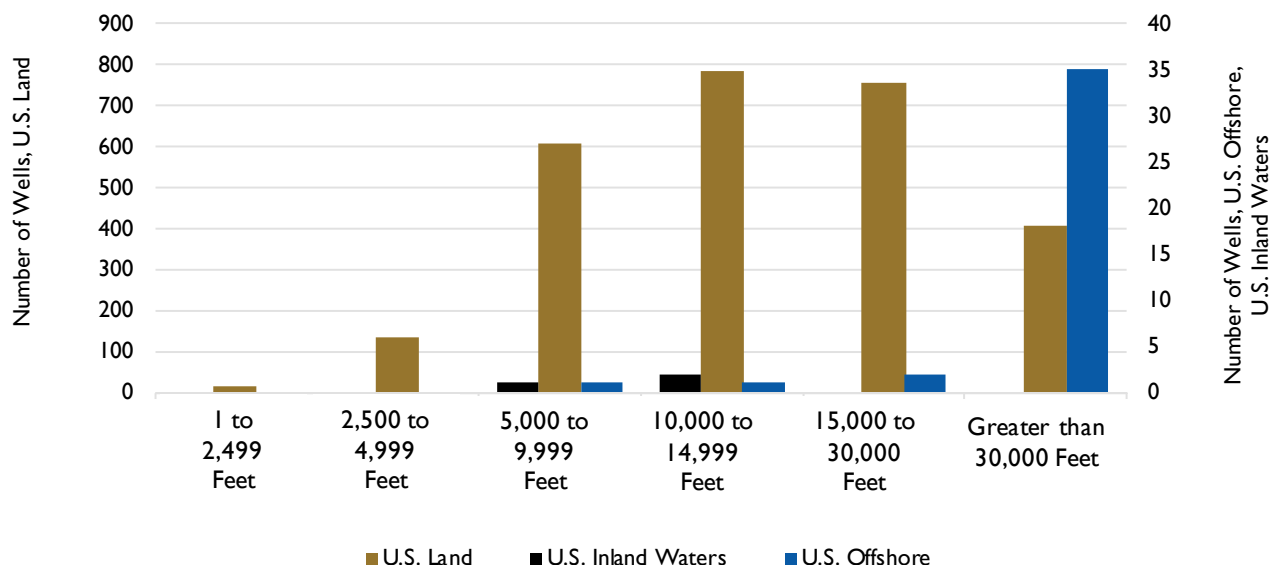
U.S. ENDING STOCKS OF PROPANE & PROPYLENE AND DISTILLATE FUEL OIL (MONTHLY AVERAGE) ⁽³¹⁾



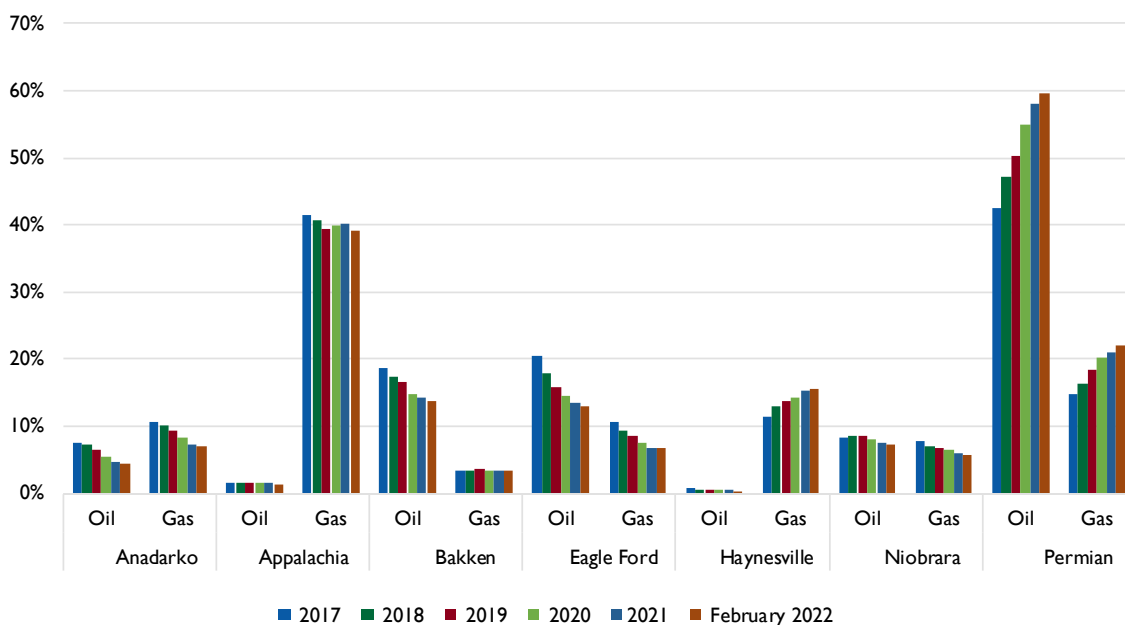
DATA CENTER

DRILLING ACTIVITY

U.S. WELL STARTS BY DEPTH (YEAR TO DATE FEBRUARY 28, 2022) ⁽³²⁾



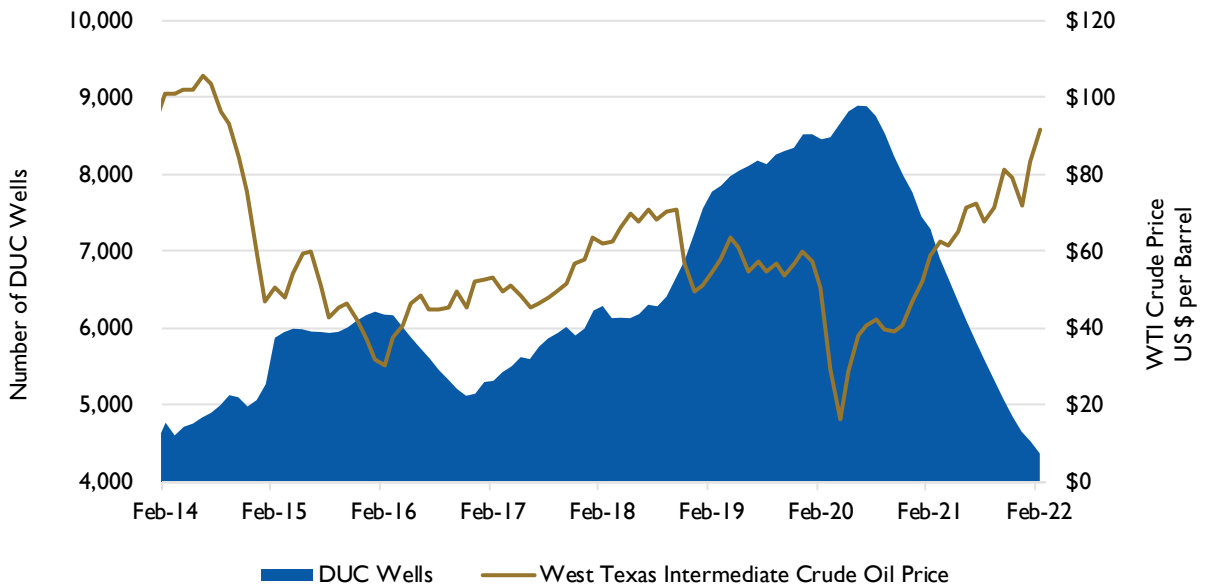
PERCENTAGE OF CRUDE OIL AND NATURAL GAS PRODUCTION PER SHALE REGION (ANNUAL) ⁽³³⁾



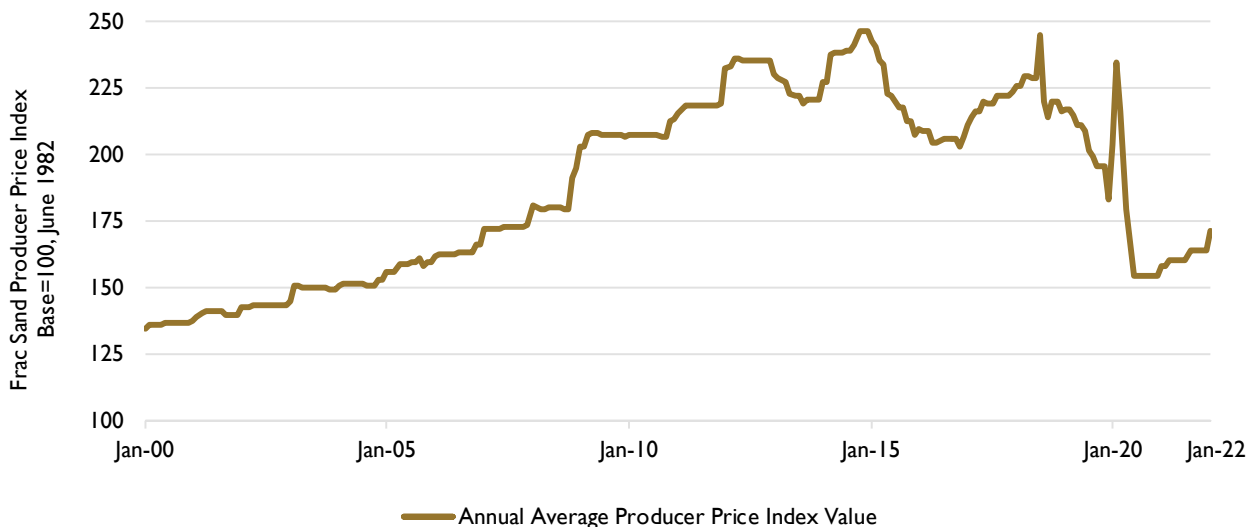
DATA CENTER

DRILLING ACTIVITY

DRILLED BUT UNCOMPLETED (DUC) WELLS VS. CRUDE OIL PRICE (MONTHLY) ⁽³⁴⁾



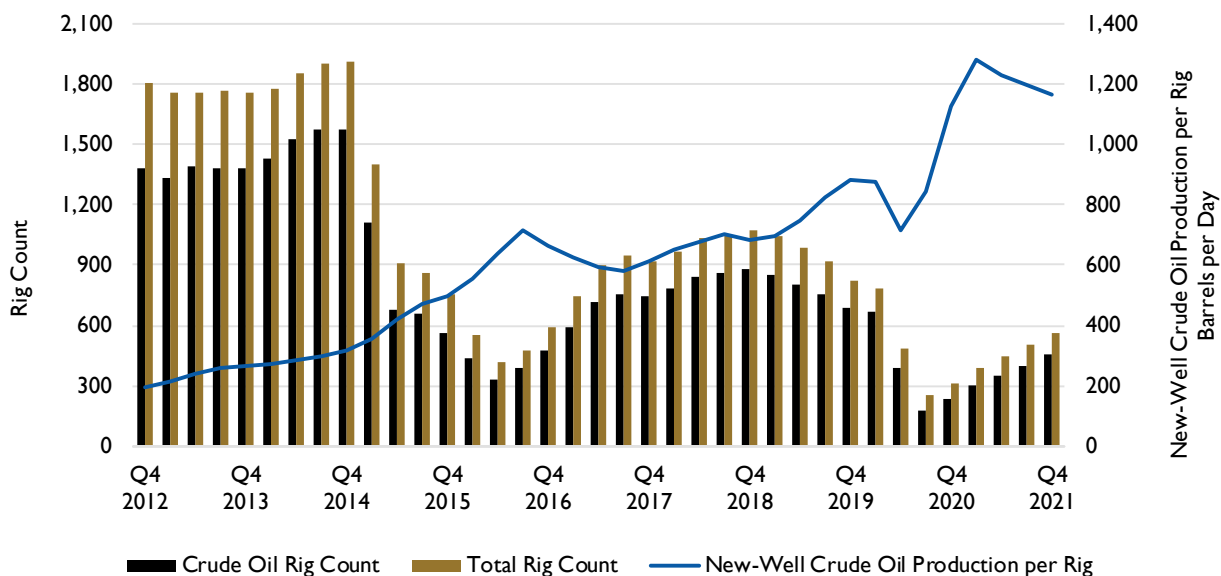
HYDRAULIC FRACTURING SAND PRODUCER PRICE INDEX (MONTHLY) ⁽³⁵⁾



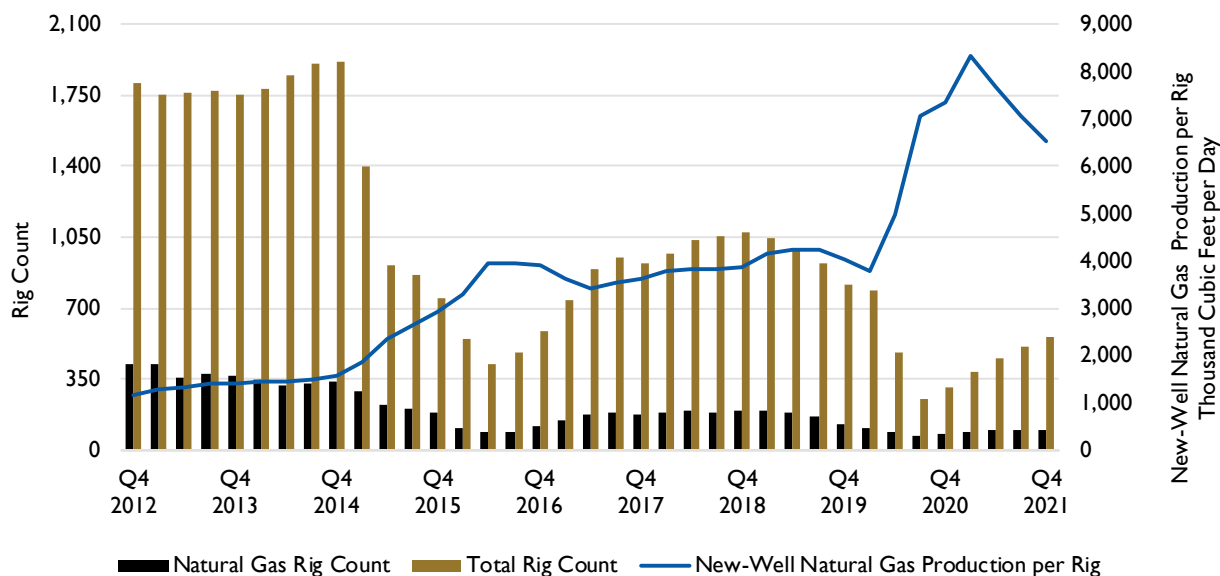
DATA CENTER

DRILLING ACTIVITY

CRUDE OIL PRODUCTION, RIG COUNT AND PRODUCTION PER RIG (QUARTERLY) ⁽³⁶⁾



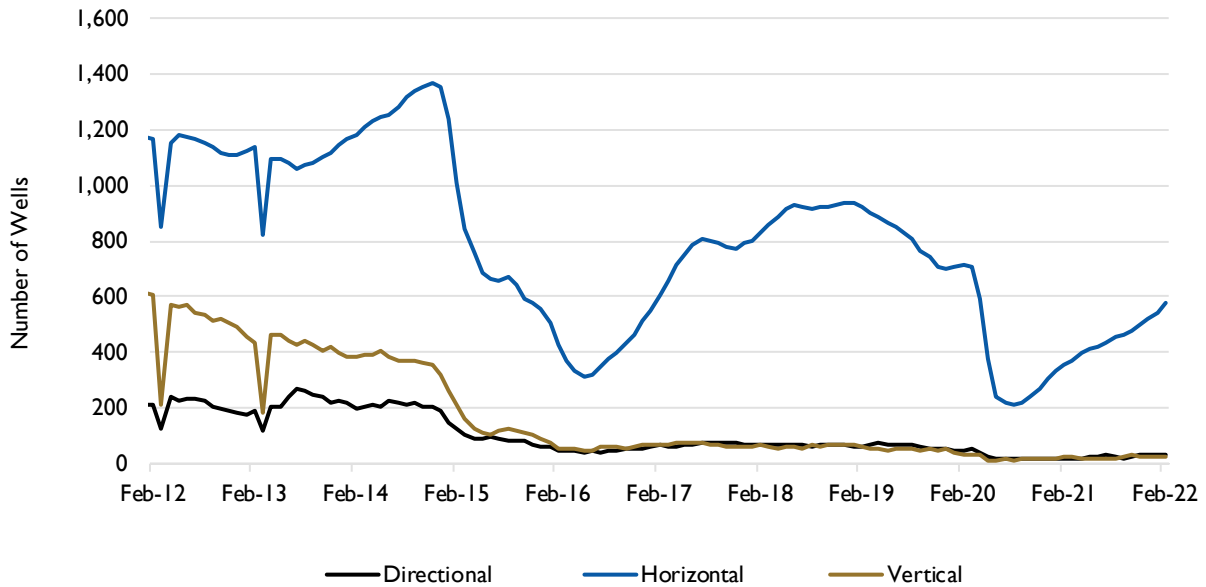
NATURAL GAS PRODUCTION, RIG COUNT AND PRODUCTION PER RIG (QUARTERLY) ⁽³⁷⁾



DATA CENTER

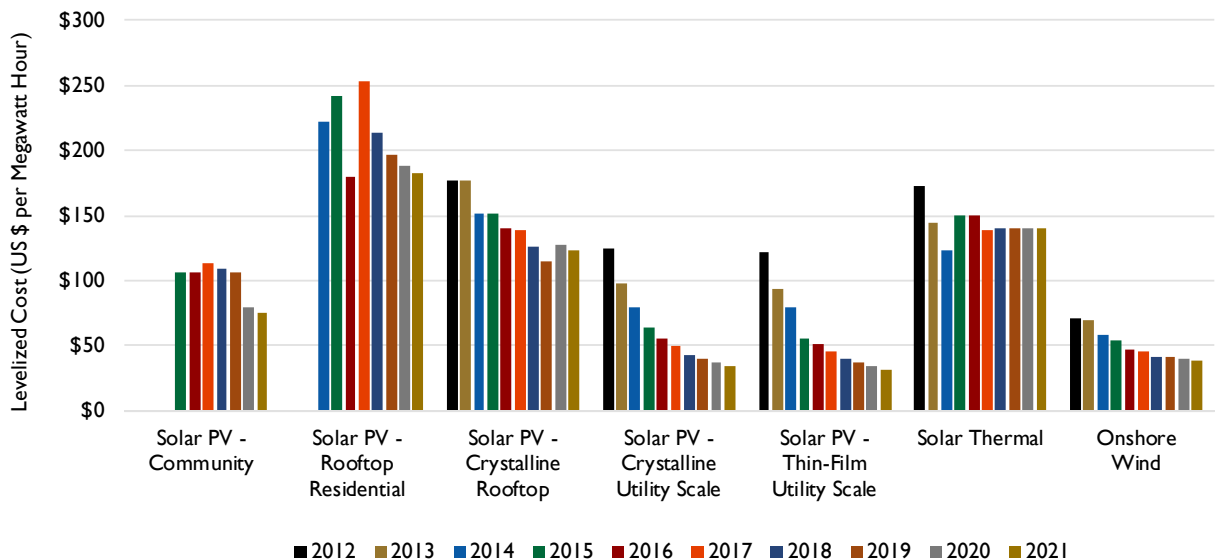
DRILLING ACTIVITY

U.S. DRILLING RIGS BY TYPE (MONTHLY) (38)



RENEWABLES

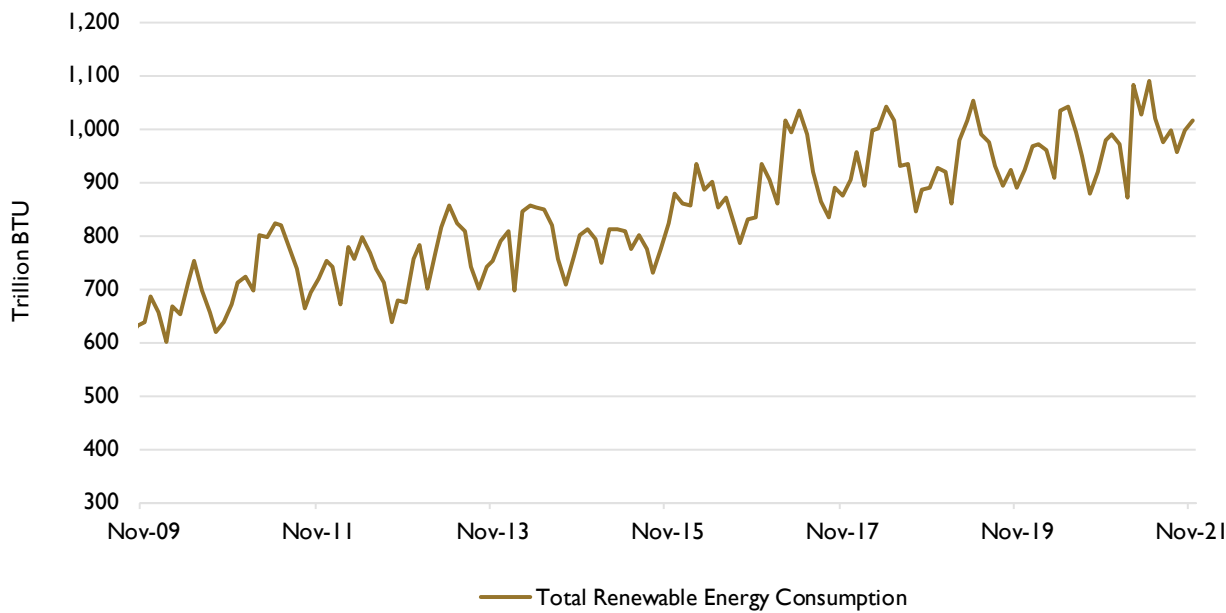
WIND AND SOLAR PRICES (ANNUAL AVERAGE) (39)



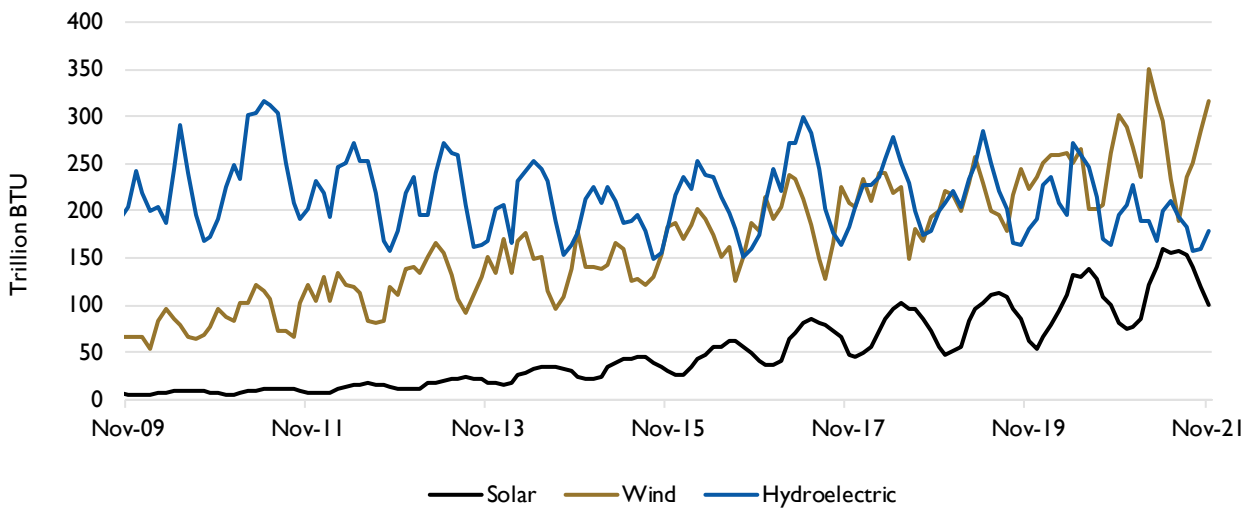
DATA CENTER

RENEWABLES

U.S. TOTAL RENEWABLE ENERGY CONSUMPTION (MONTHLY) (40)



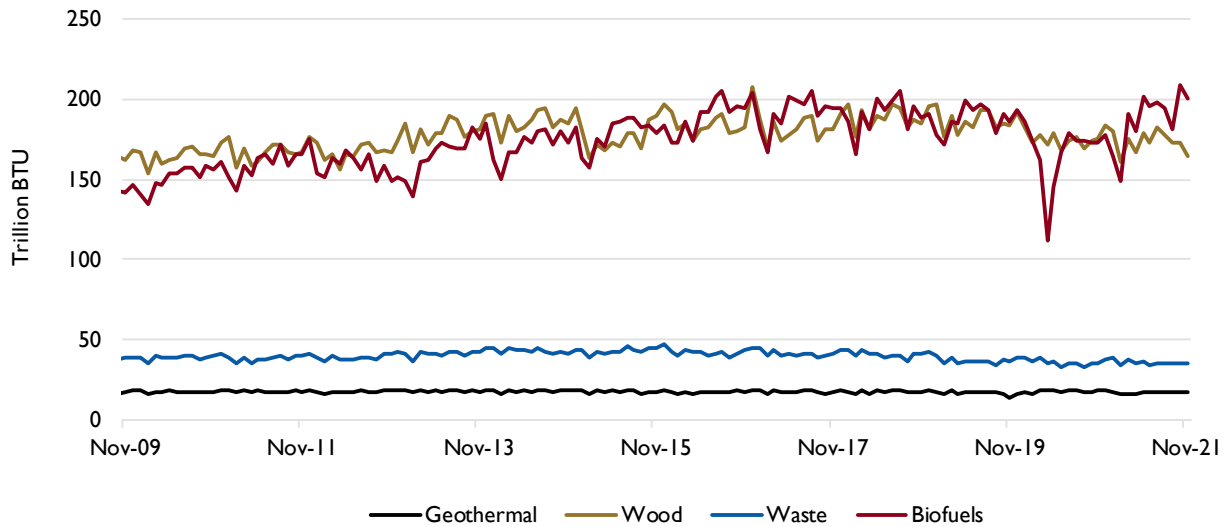
U.S. SOLAR, WIND AND HYDROELECTRIC ENERGY CONSUMPTION (MONTHLY) (41)



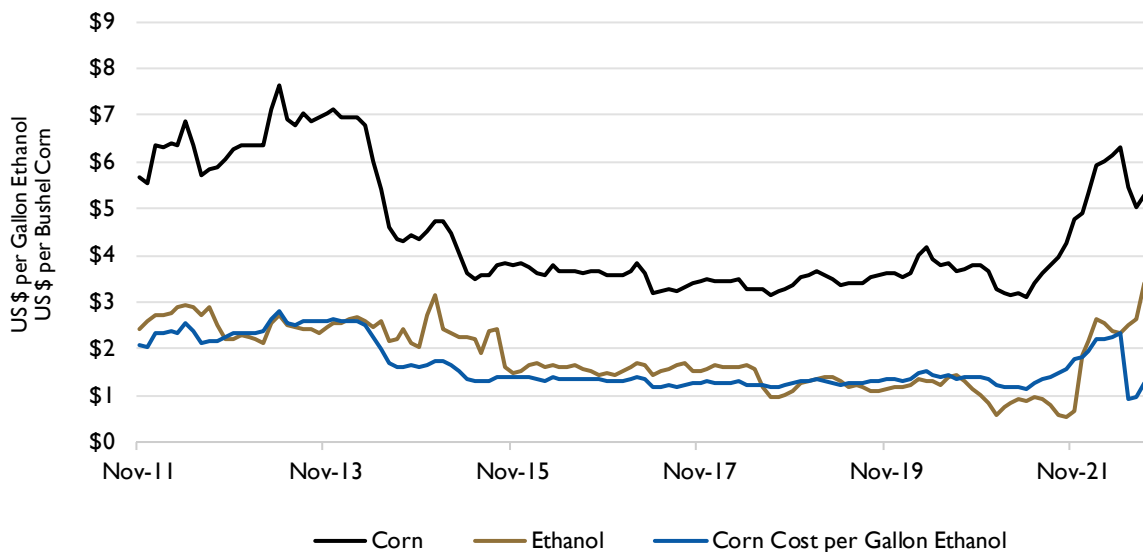
DATA CENTER

RENEWABLES

U.S. WOOD, WASTE, BIOFUELS AND GEOTHERMAL ENERGY CONSUMPTION (MONTHLY) (42)



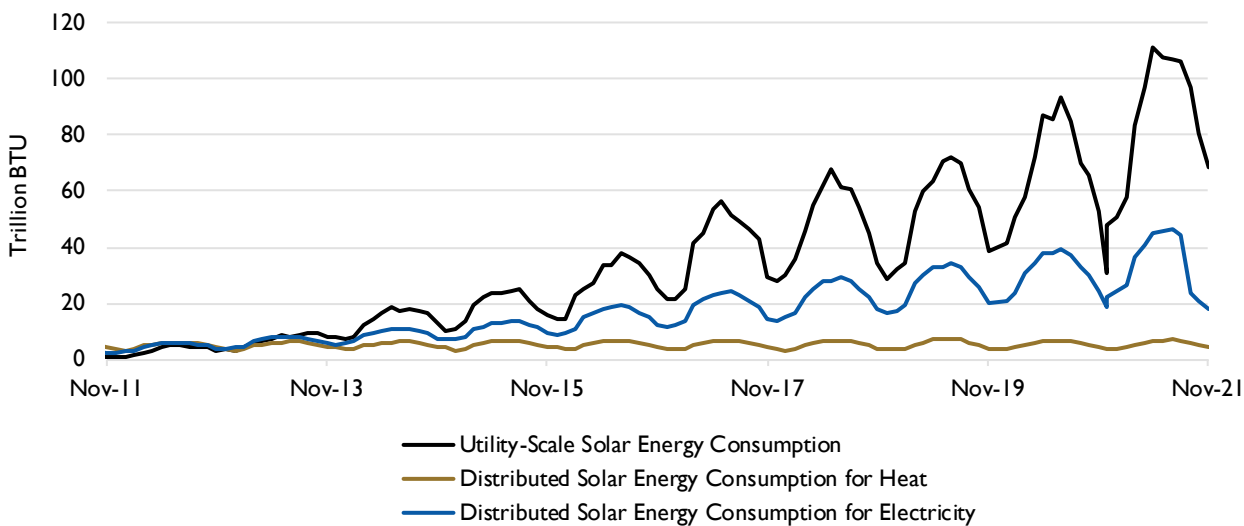
CORN AND ETHANOL PRICES AND CORN COST PER GALLON OF ETHANOL (QUARTERLY) (43)



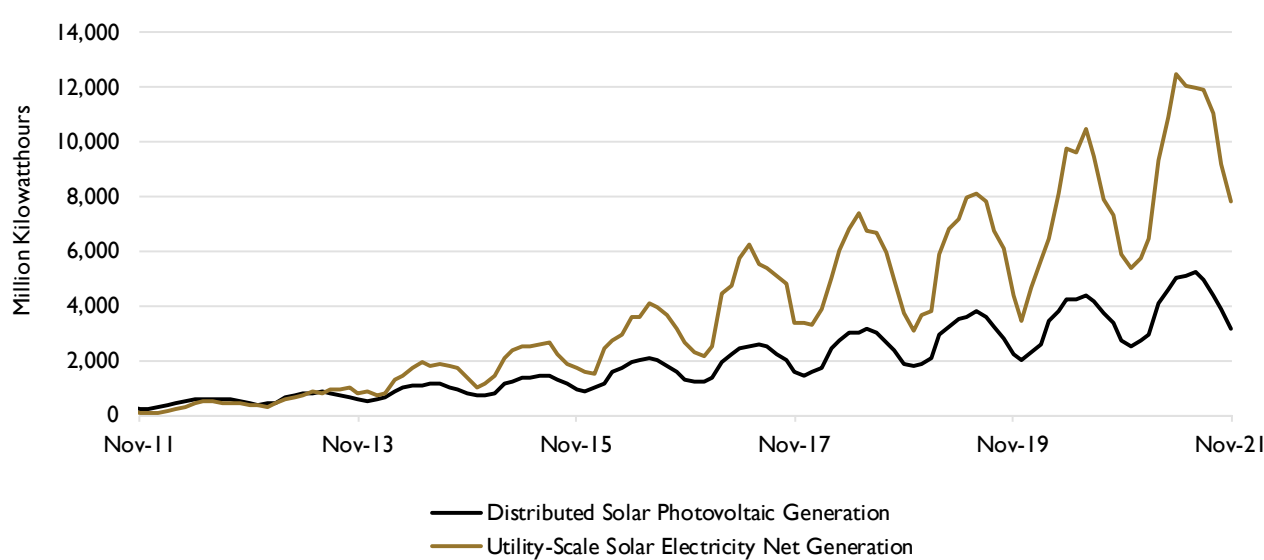
DATA CENTER

RENEWABLES

U.S. SOLAR ENERGY CONSUMPTION (MONTHLY) (44)



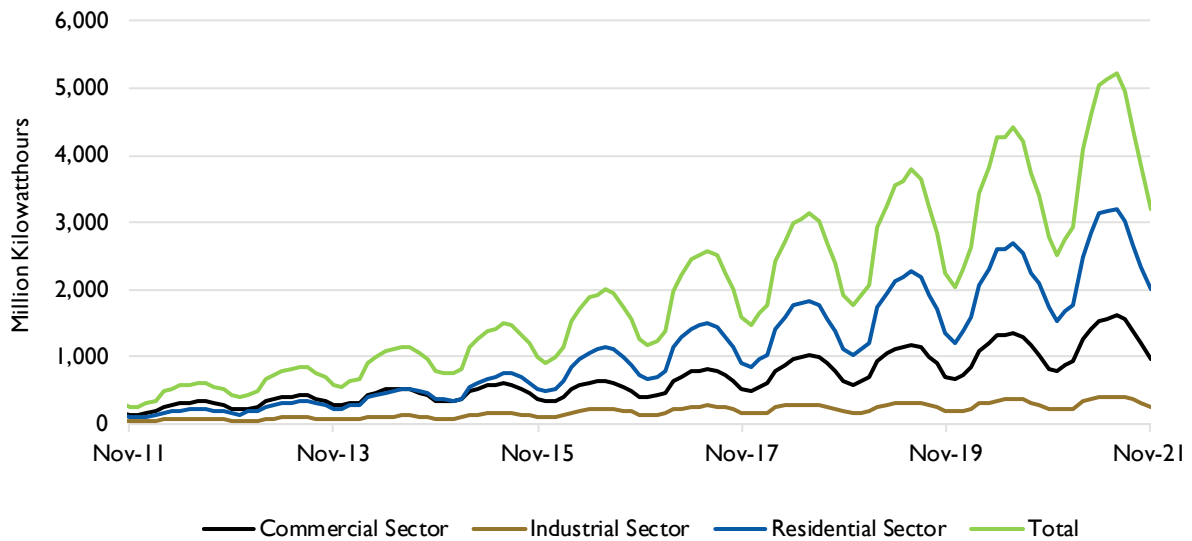
U.S. SOLAR ENERGY NET GENERATION (MONTHLY) (45)



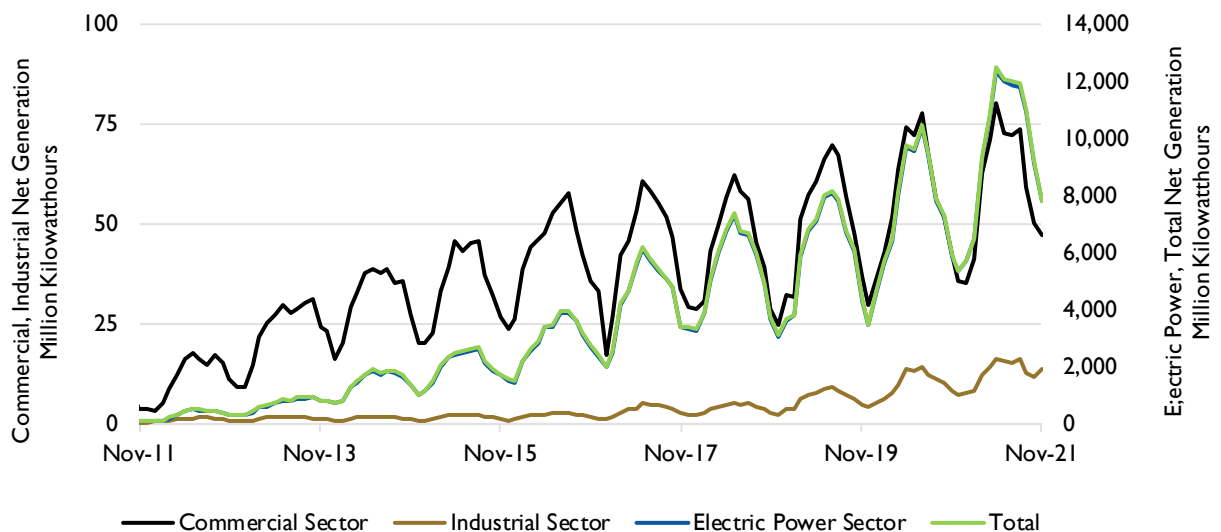
DATA CENTER

RENEWABLES

DISTRIBUTED SOLAR PHOTOVOLTAIC GENERATION BY SECTOR (MONTHLY) (46)

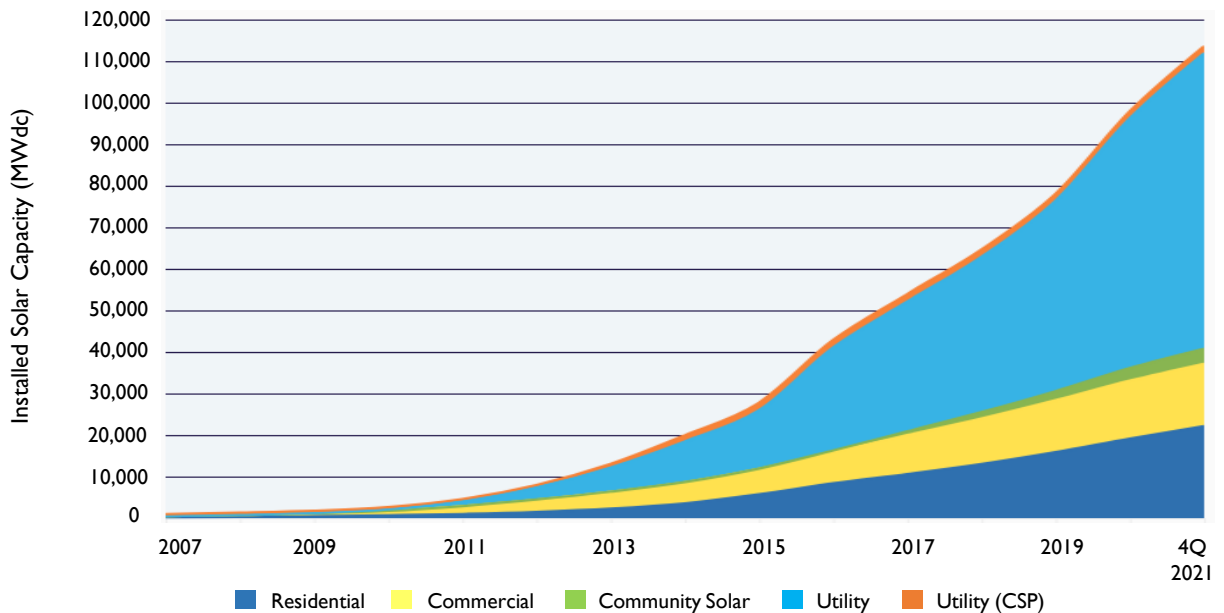


UTILITY-SCALE SOLAR ELECTRICITY NET GENERATION BY SECTOR (MONTHLY) (47)

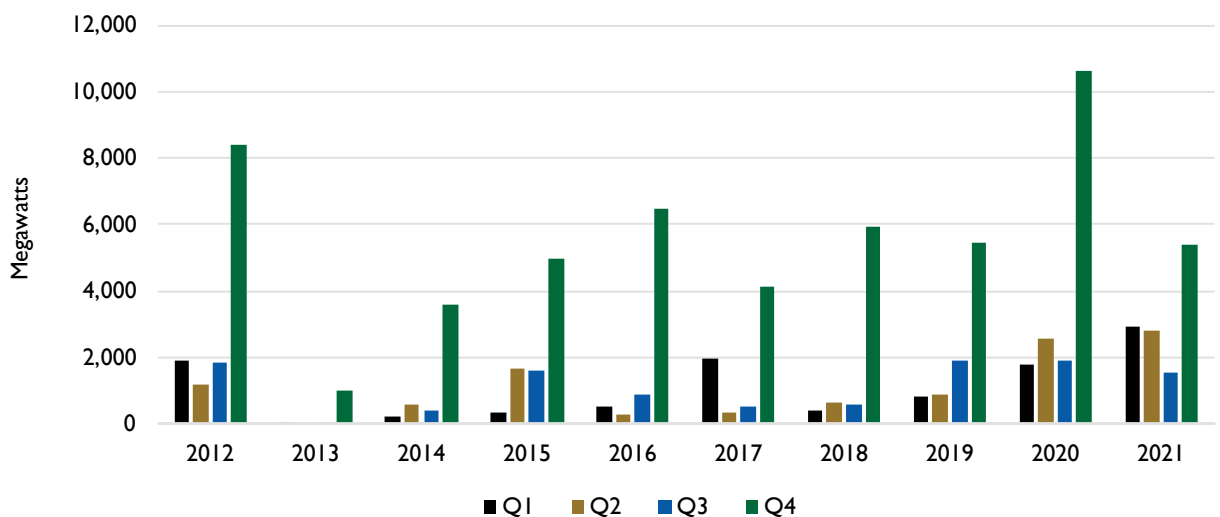


DATA CENTER RENEWABLES

U.S. CUMULATIVE SOLAR INSTALLATIONS (QUARTERLY) ⁽⁴⁸⁾

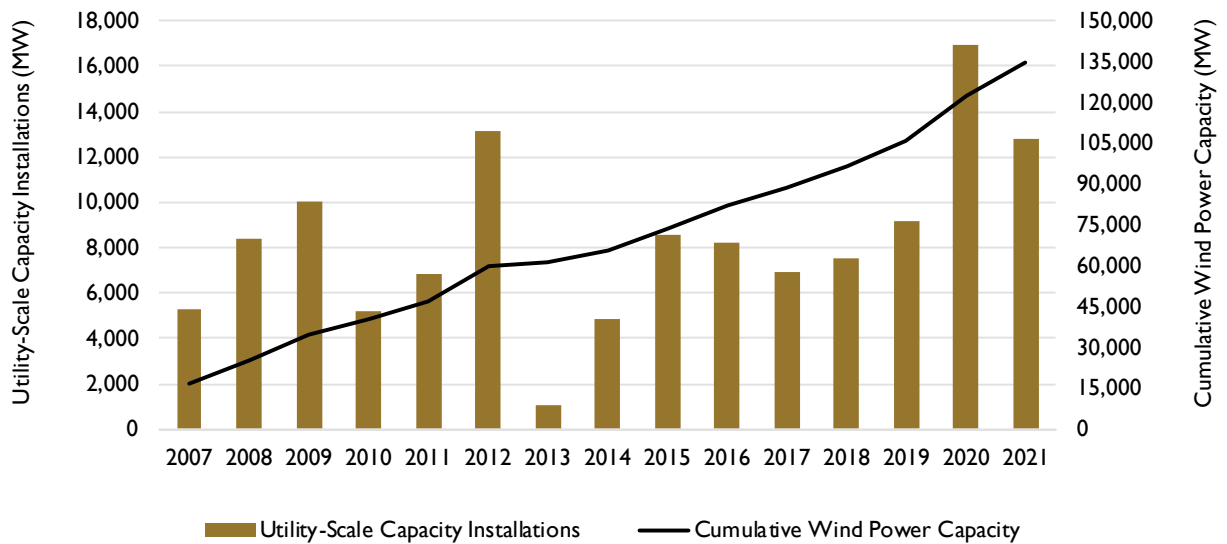


U.S. WIND POWER CAPACITY INSTALLATIONS (QUARTERLY) ⁽⁴⁹⁾

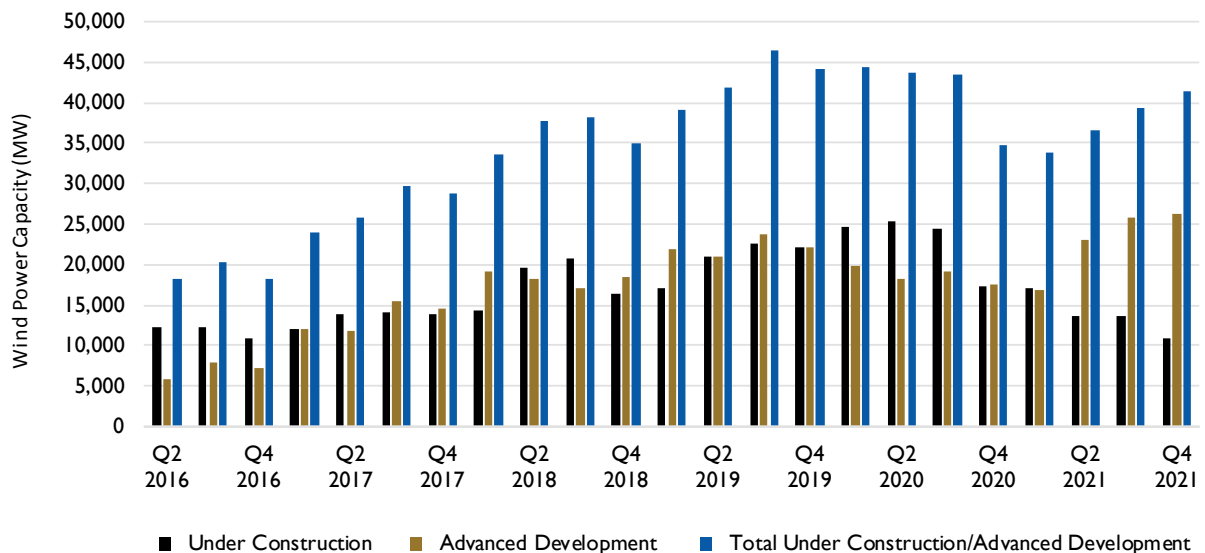


DATA CENTER RENEWABLES

UTILITY-SCALE WIND POWER CAPACITY INSTALLATIONS (ANNUAL) ⁽⁵⁰⁾



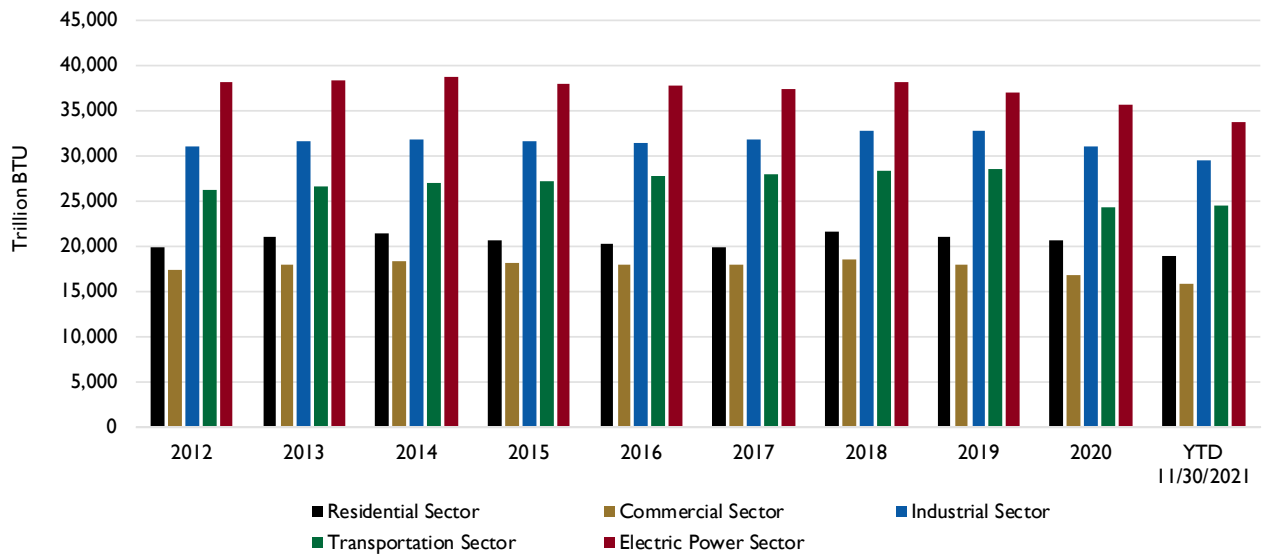
WIND POWER UNDER CONSTRUCTION OR IN ADVANCED DEVELOPMENT (QUARTERLY) ⁽⁵¹⁾



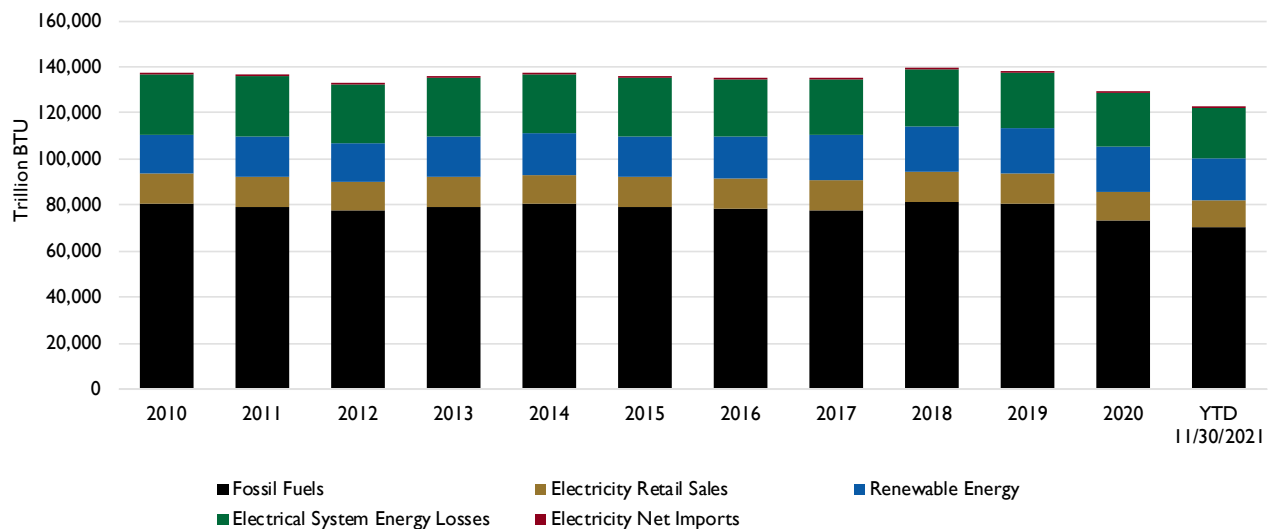
DATA CENTER

U.S. AGGREGATED ENERGY CONSUMPTION

ENERGY CONSUMPTION BY SECTOR (ANNUAL) ⁽⁵²⁾



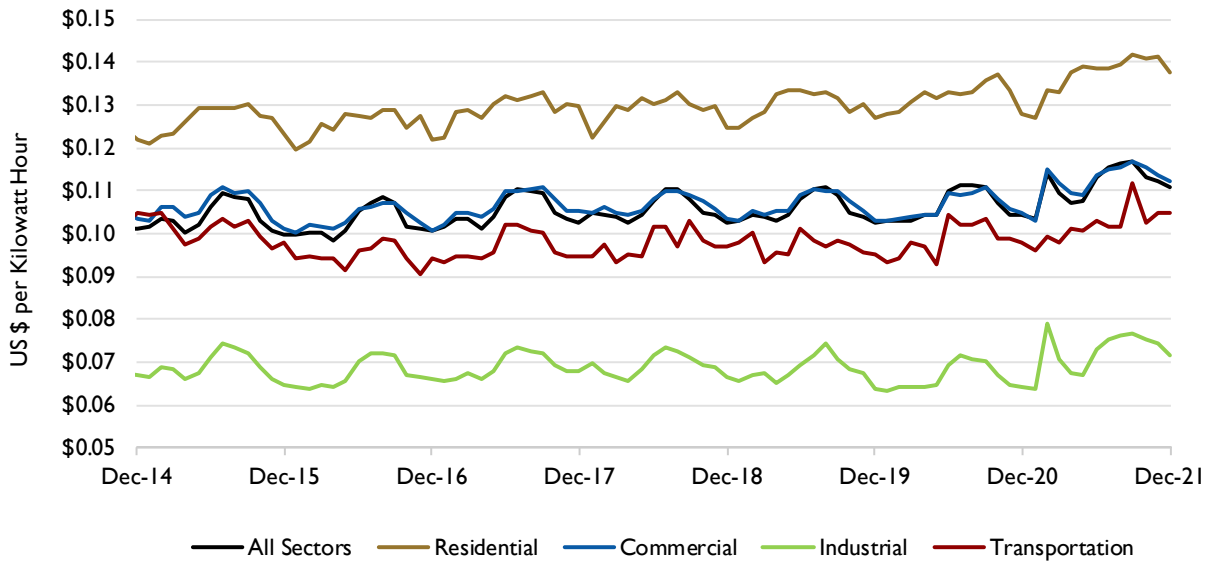
ENERGY CONSUMPTION BY SOURCE (ANNUAL) ⁽⁵³⁾



DATA CENTER

U.S. AGGREGATED ENERGY CONSUMPTION

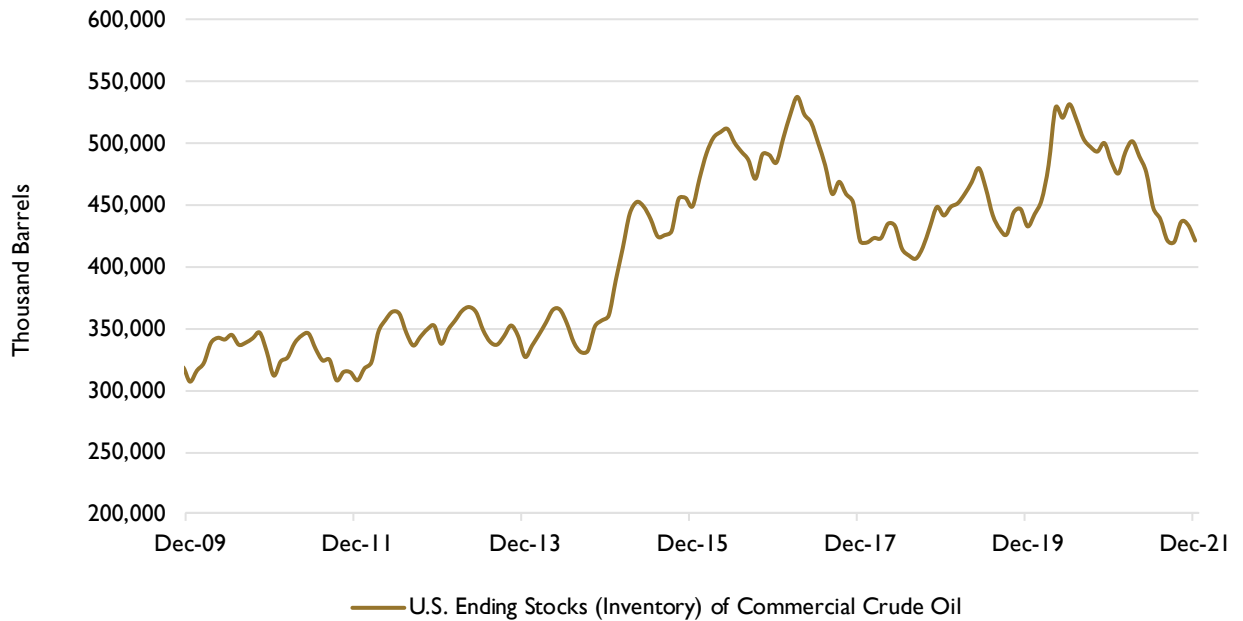
ELECTRICITY PRICES BY SECTOR (MONTHLY AVERAGE) ⁽⁵⁴⁾



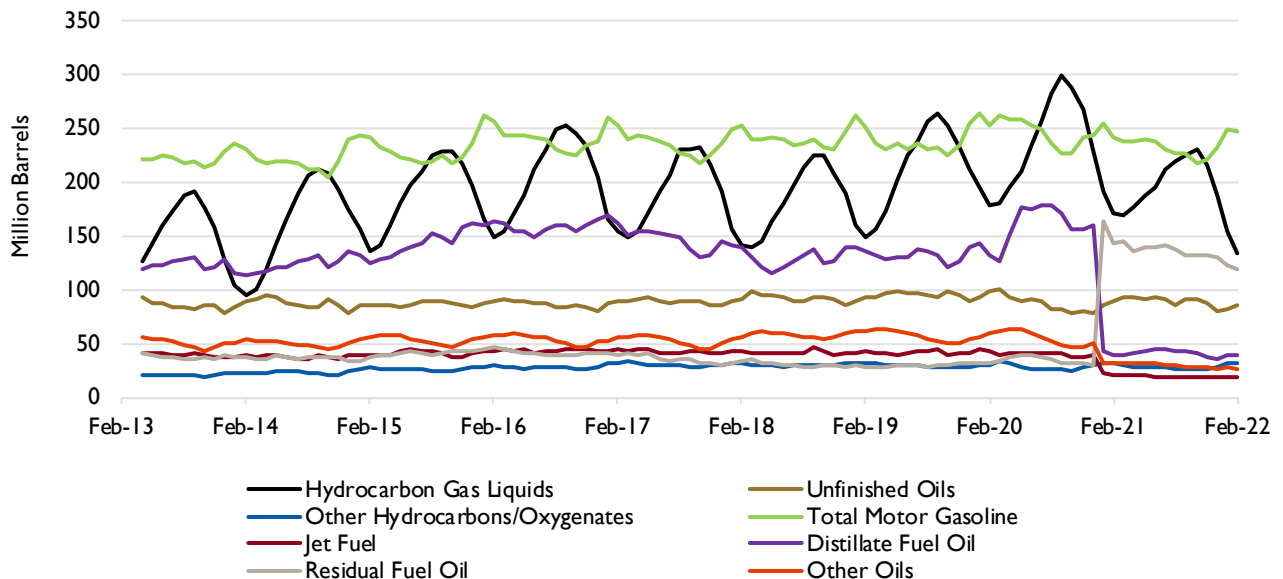
DATA CENTER

LOGISTICS - STORAGE AND TERMINALS

COMMERCIAL CRUDE OIL INVENTORY (MONTHLY) ⁽⁵⁵⁾



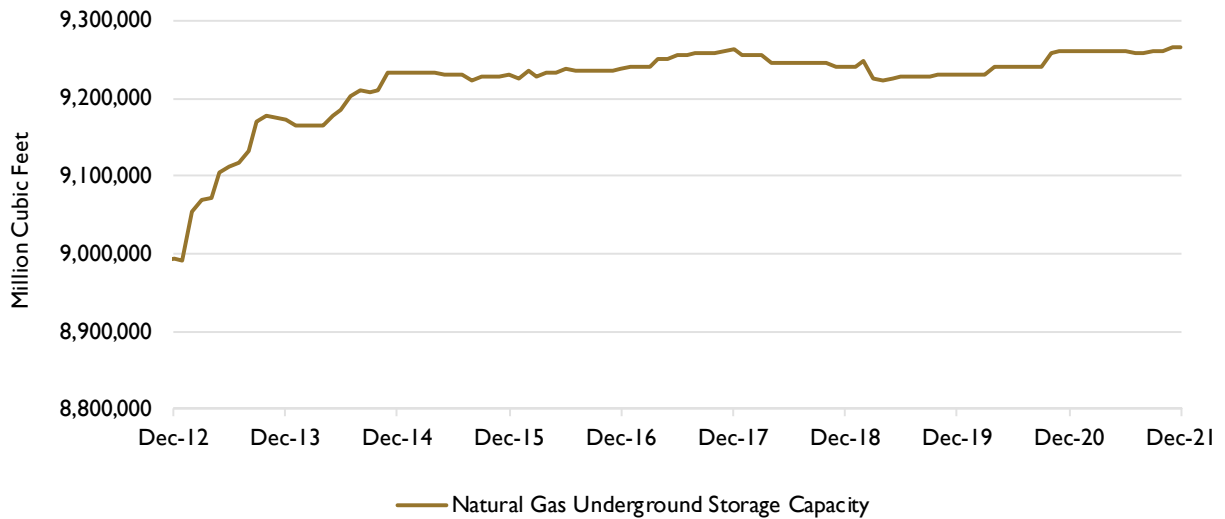
PETROLEUM AND OTHER LIQUIDS COMMERCIAL INVENTORY (MONTHLY) ⁽⁵⁶⁾



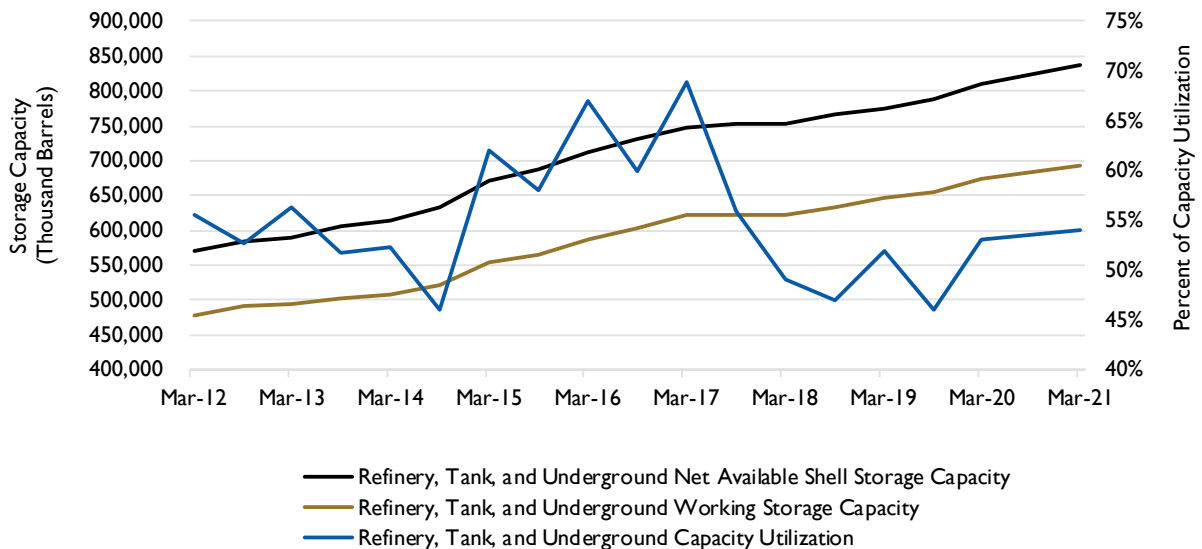
DATA CENTER

LOGISTICS - STORAGE AND TERMINALS

NATURAL GAS UNDERGROUND STORAGE CAPACITY (MONTHLY) ⁽⁵⁷⁾



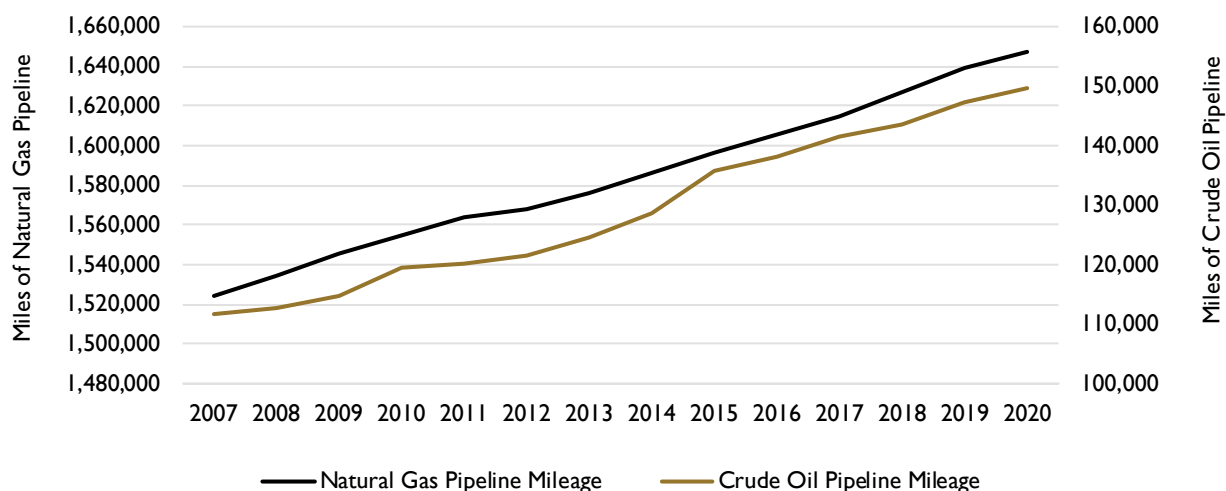
COMMERCIAL CRUDE OIL REFINERY, TANK AND UNDERGROUND STORAGE CAPACITY AND UTILIZATION (ANNUAL) ⁽⁵⁸⁾



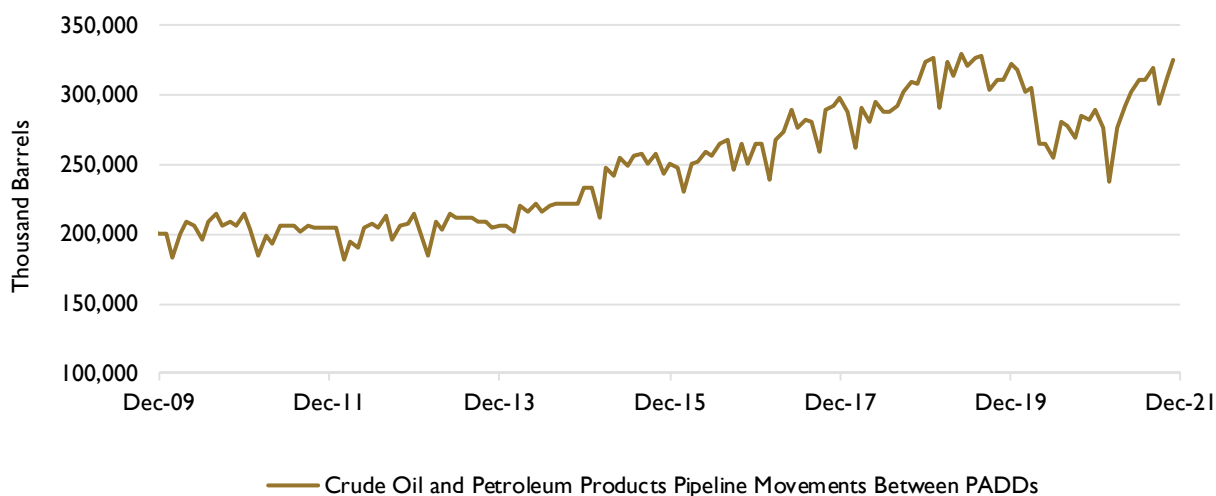
DATA CENTER

LOGISTICS - PIPELINES

CRUDE OIL AND NATURAL GAS PIPELINE MILEAGE (ANNUAL) ⁽⁵⁹⁾



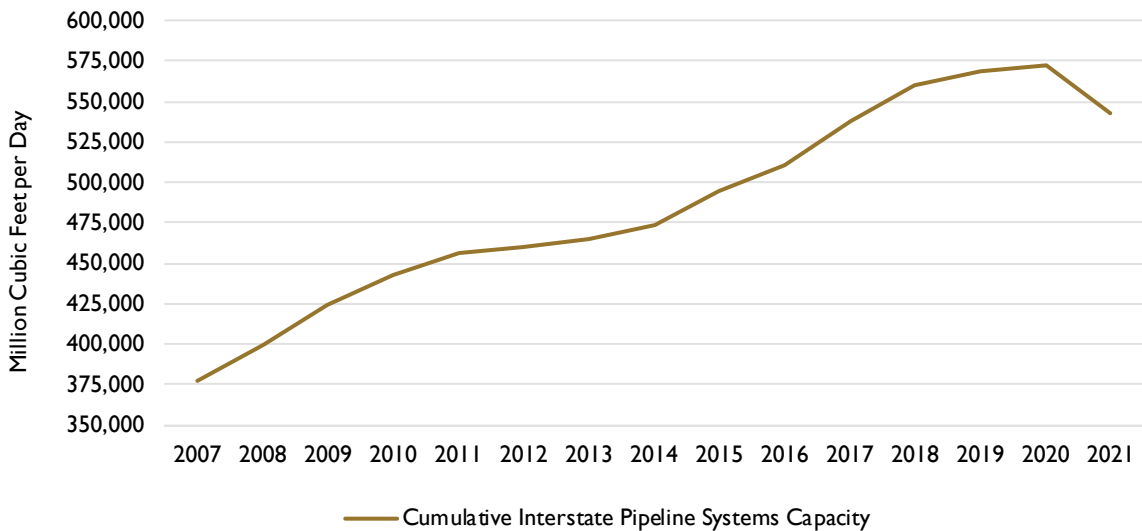
CRUDE OIL AND PETROLEUM PRODUCTS PIPELINE MOVEMENTS BETWEEN PETROLEUM ADMINISTRATION FOR DEFENSE DISTRICTS (PADDs) (MONTHLY) ⁽⁶⁰⁾



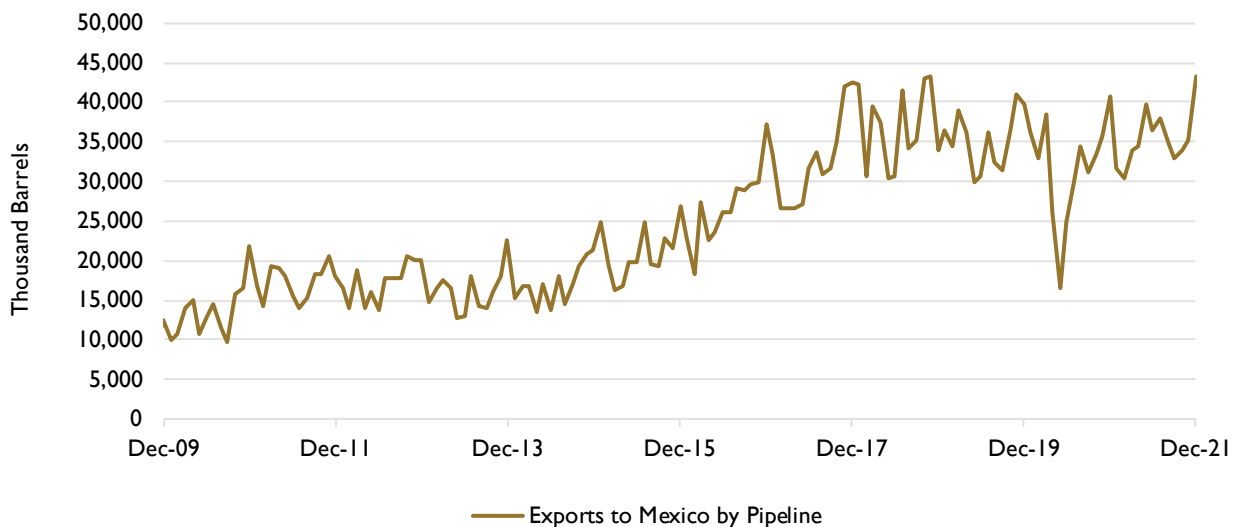
DATA CENTER

LOGISTICS - PIPELINES

NATURAL GAS CUMULATIVE INTERSTATE PIPELINE SYSTEMS CAPACITY (ANNUAL) ⁽⁶¹⁾



CRUDE OIL AND PETROLEUM PRODUCTS EXPORTS TO MEXICO (MONTHLY) ⁽⁶²⁾

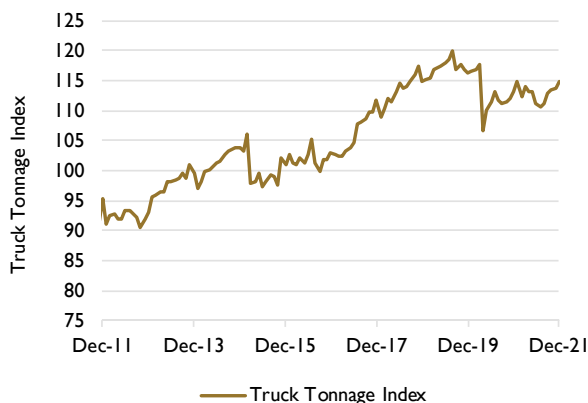


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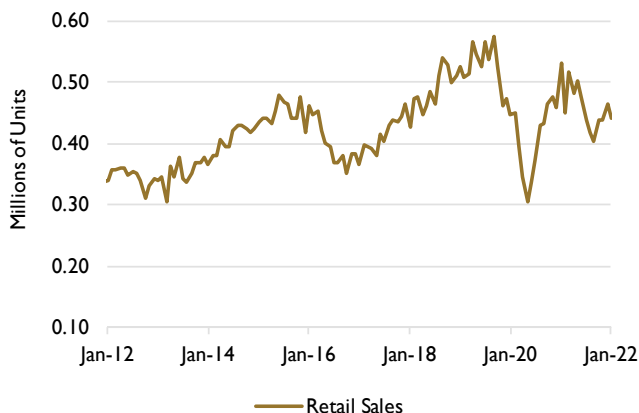
LOGISTICS - TRUCKERS

TRUCK TONNAGE INDEX (MONTHLY) (63)

MEASURES GROSS TONNAGE OF FREIGHT

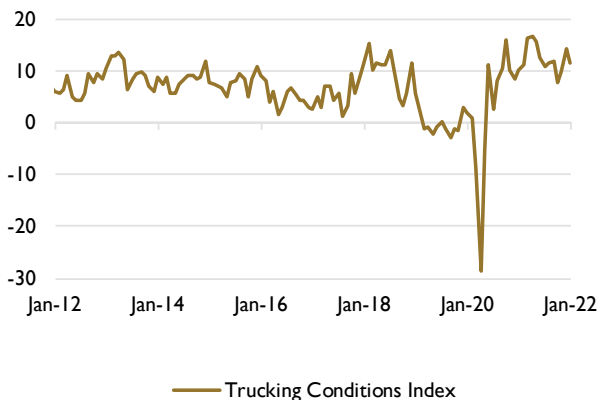


HEAVY TRUCK SALES (MONTHLY) (64)



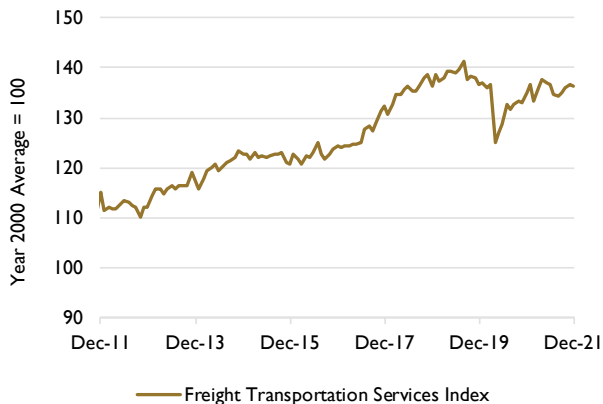
TRUCKING CONDITIONS INDEX (MONTHLY) (65)

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



FREIGHT TRANSPORTATION SERVICES INDEX (MONTHLY) (66)

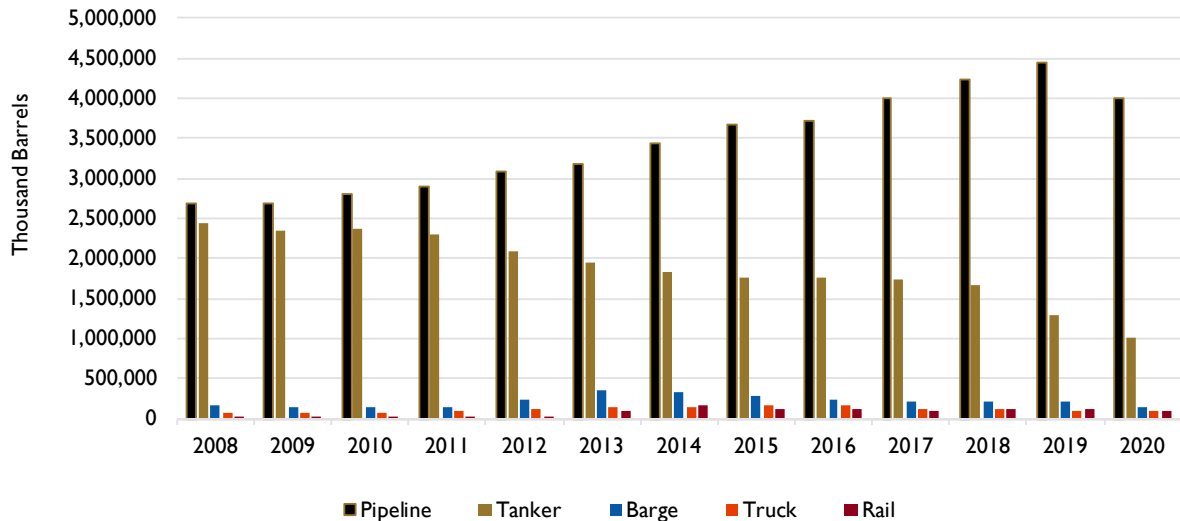
INCLUDES TRUCKING, RAIL, WATERWAYS, PIPELINES AND AIR FREIGHT



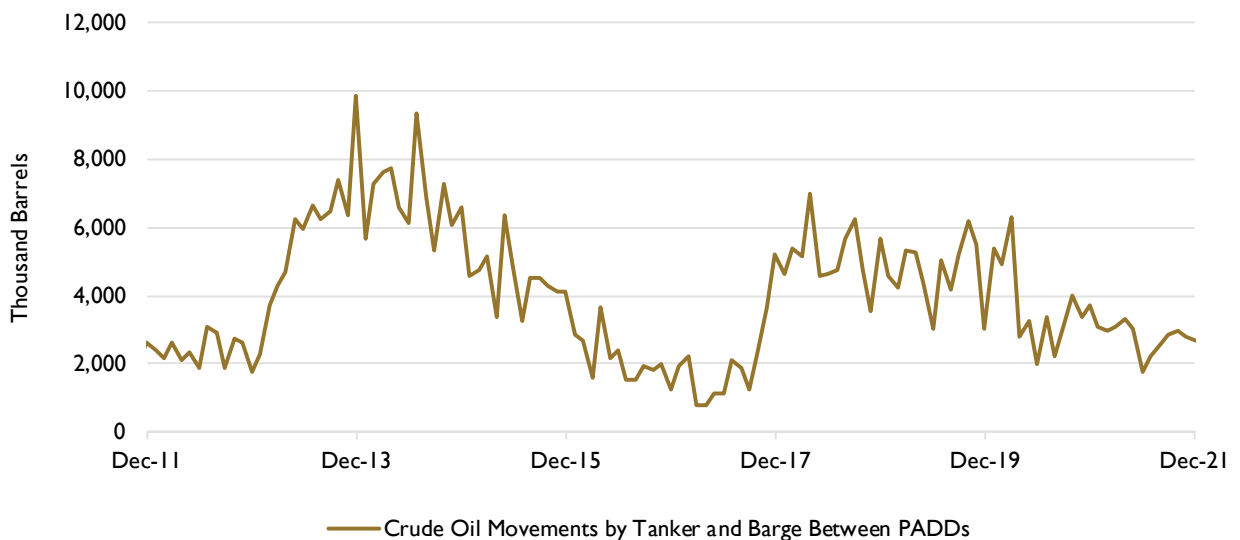
DATA CENTER

LOGISTICS - SHIPPING

CRUDE OIL REFINERY RECEIPTS BY TRANSPORTATION METHOD (ANNUAL) (67)



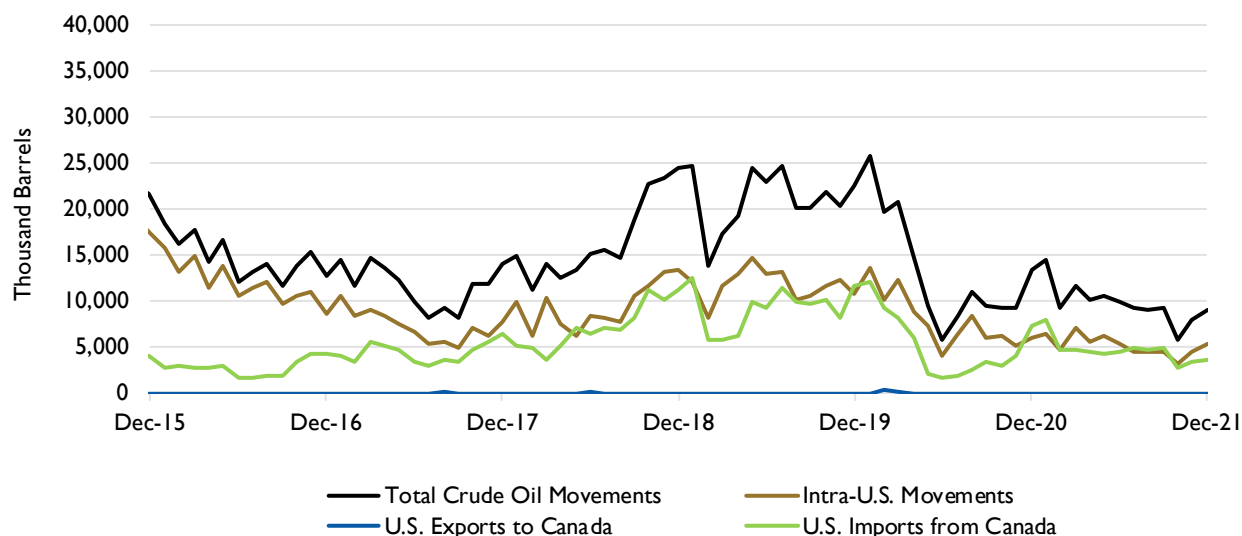
CRUDE OIL MOVEMENTS BY TANKER AND BARGE BETWEEN PETROLEUM ADMINISTRATION FOR DEFENSE DISTRICTS (PADDs) (MONTHLY) (68)



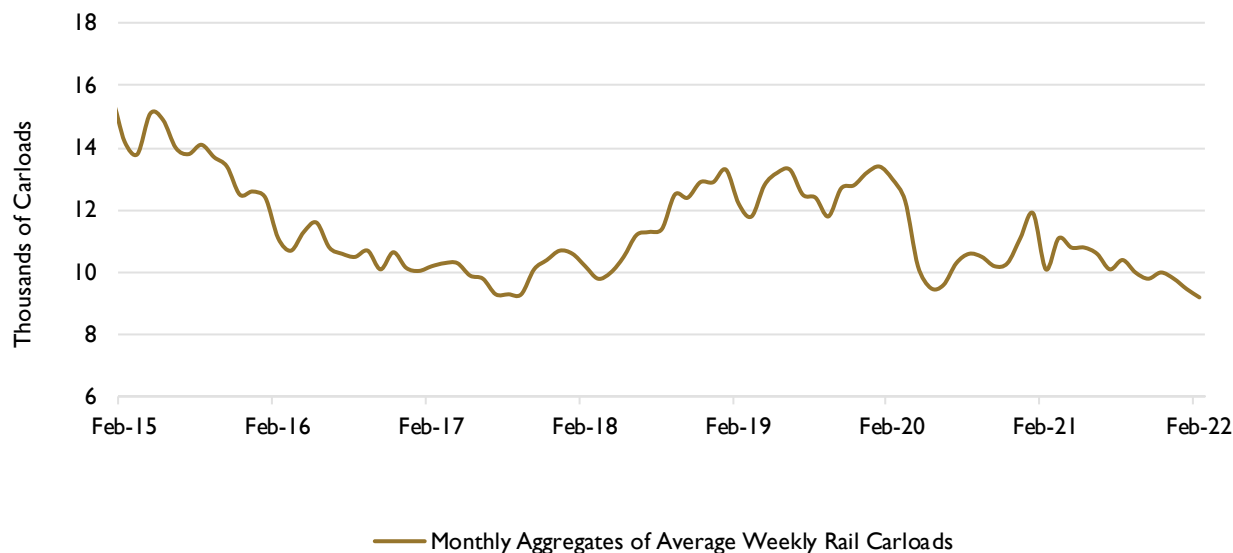
DATA CENTER

LOGISTICS - RAIL

MOVEMENTS OF CRUDE OIL BY RAIL (MONTHLY) ⁽⁶⁹⁾



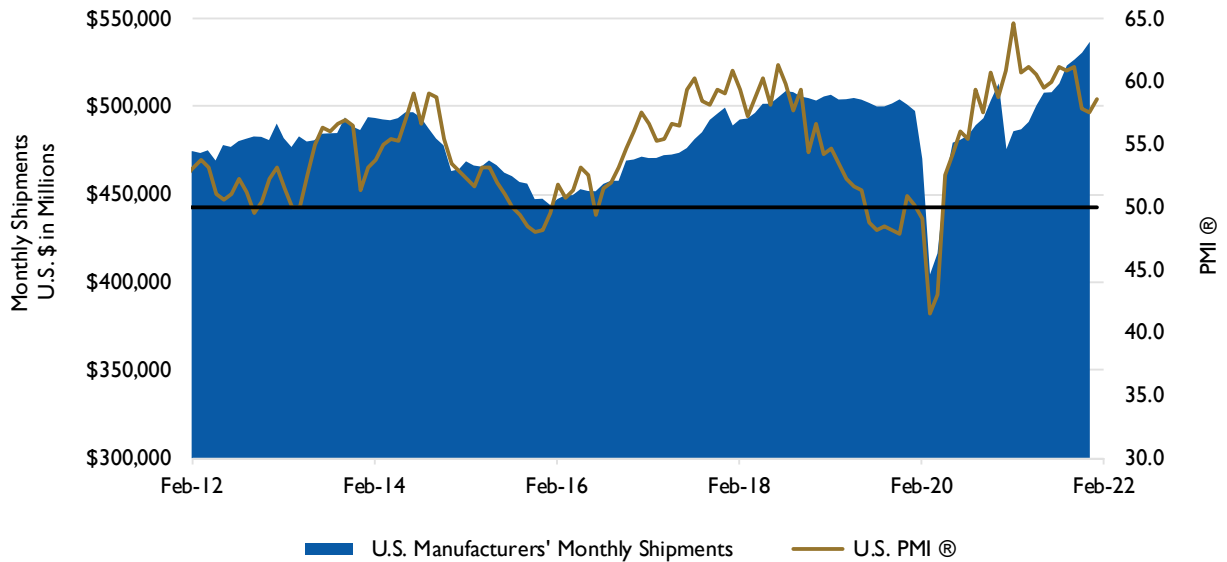
AVERAGE WEEKLY RAIL CARLOADS OF PETROLEUM AND PETROLEUM PRODUCTS (MONTHLY AGGREGATE) ⁽⁷⁰⁾



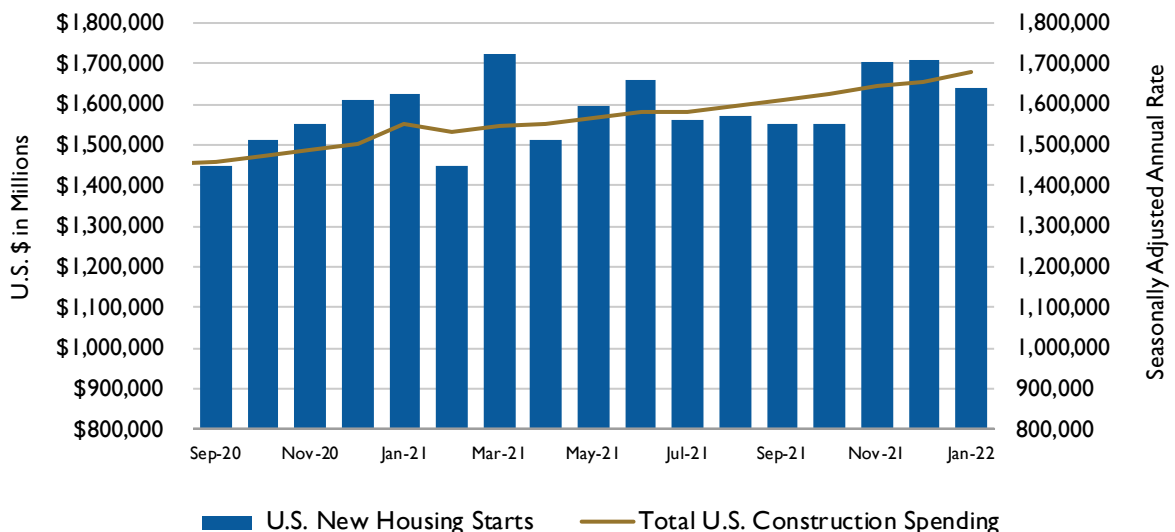
DATA CENTER

ECONOMIC / FINANCIAL

U.S. MANUFACTURERS' MONTHLY SHIPMENTS AND U.S. PURCHASING MANAGERS' INDEX (PMI®) (MONTHLY) (71)



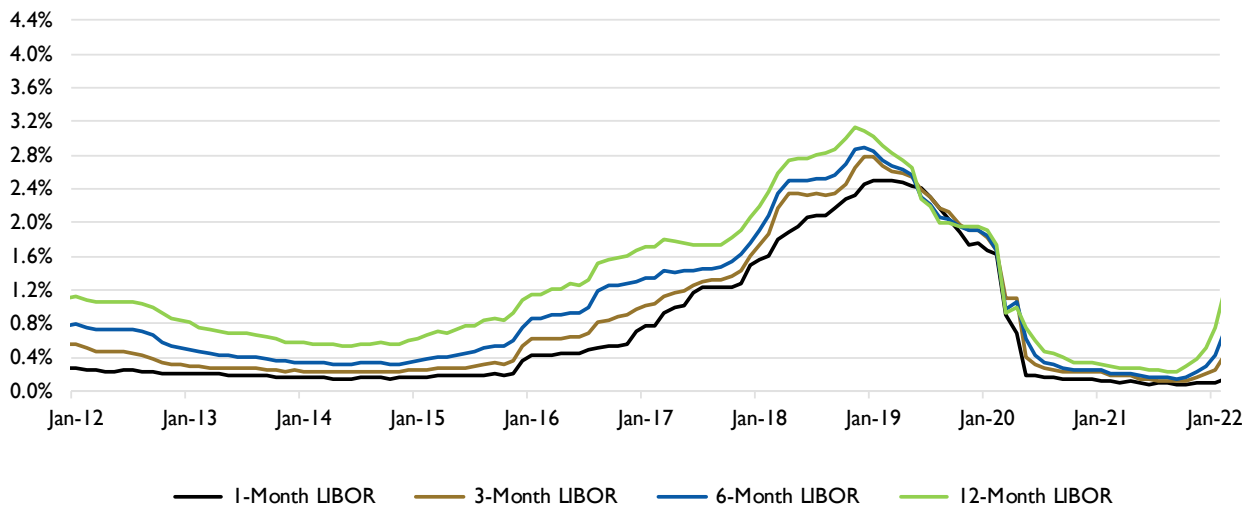
U.S. NEW HOUSING STARTS AND TOTAL U.S. CONSTRUCTION SPENDING (MONTHLY) (72)



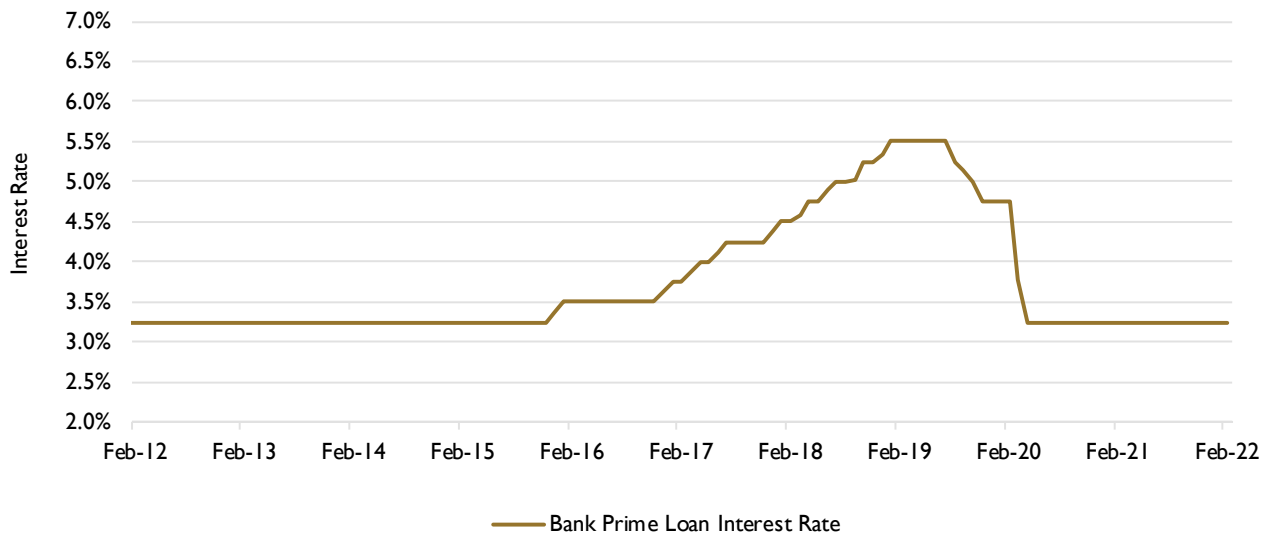
DATA CENTER

ECONOMIC / FINANCIAL

LONDON INTERBANK OFFERED RATE (LIBOR) (MONTHLY AVERAGE) BASED ON U.S. DOLLAR ⁽⁷³⁾



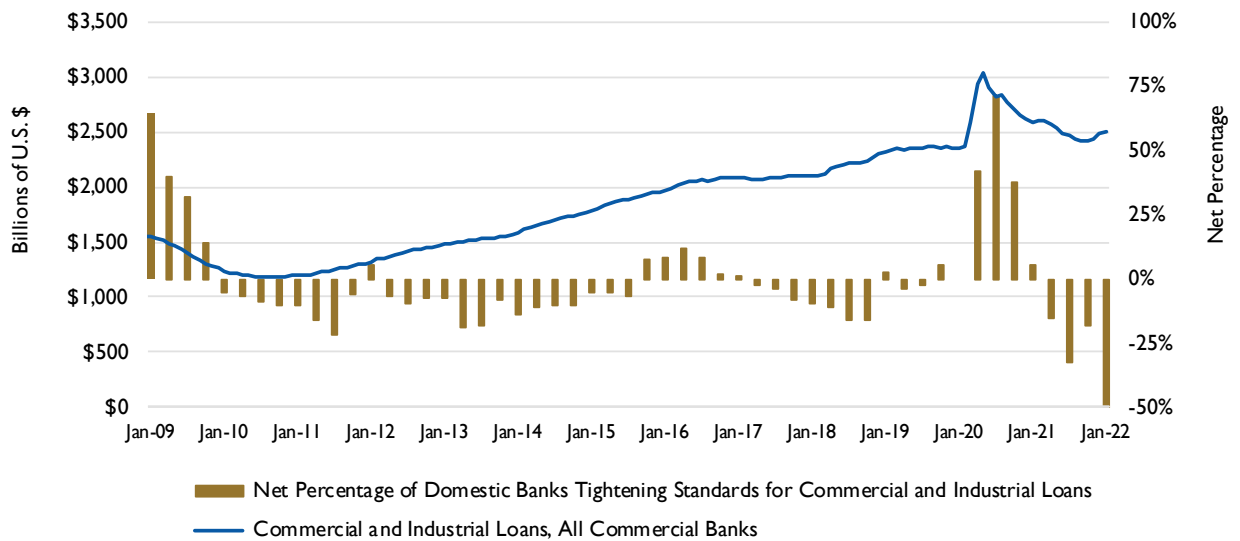
BANK PRIME LOAN INTEREST RATES (MONTHLY AVERAGE) ⁽⁷⁴⁾



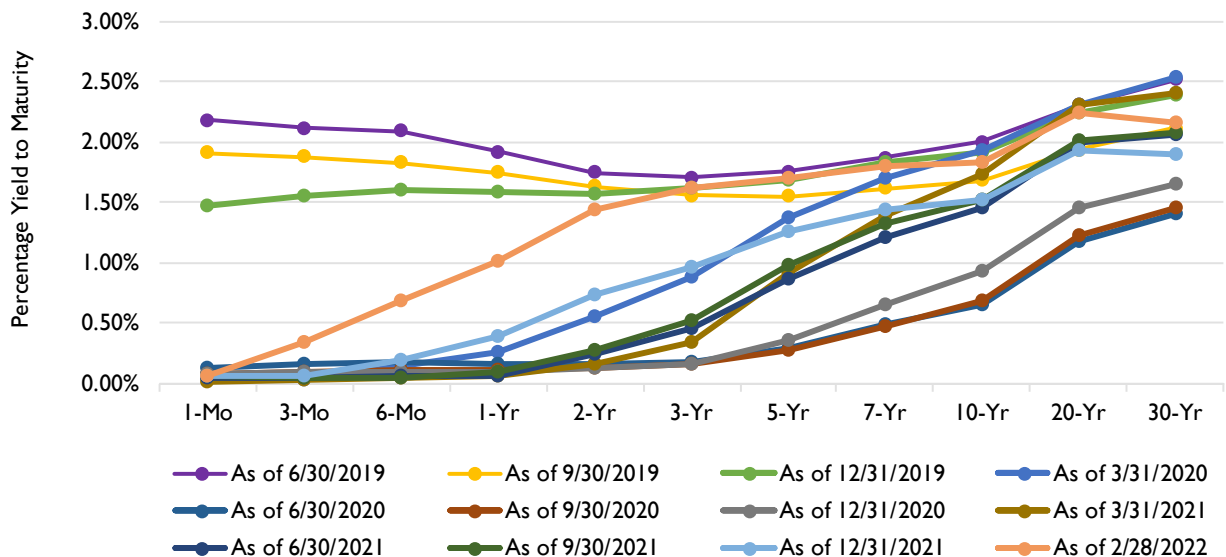
DATA CENTER

ECONOMIC / FINANCIAL

COMMERCIAL AND INDUSTRIAL LOANS VS. BANKING STANDARDS (QUARTERLY, MONTHLY) ⁽⁷⁵⁾



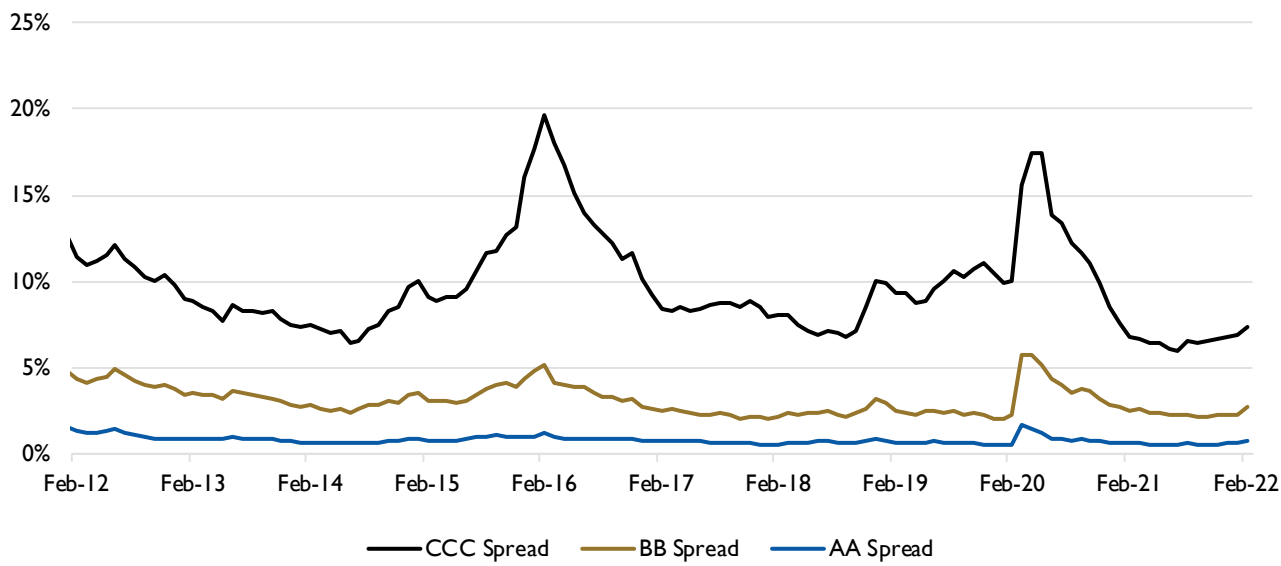
U.S. TREASURY YIELD CURVE (MONTHLY, ANNUAL) ⁽⁷⁶⁾



DATA CENTER

ECONOMIC / FINANCIAL

CORPORATE SPREADS TO TREASURIES BY QUALITY (MONTHLY AVERAGE) ⁽⁷⁷⁾



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. 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.

(33) 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.

(34) 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.

(35) Hydraulic Fracturing Sand Producer Price Index

- Source: U.S. Bureau of Labor Statistics.
- 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.
- 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.
- Hydraulic Fracturing Sand Producer Price Index Base = 100 at June 1982.
- Not seasonally adjusted.

(36) and (37) 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

(38) 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.

(39) Wind and Solar Prices

- Source: Lazard's Levelized Cost of Energy Analysis 2012-2020.
- 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.

(40) 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.

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

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

(42) 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.

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

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

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(44) 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.

(45) 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.

(46) 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.

(47) 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.

(48) 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.

(49) 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.

(50) 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.

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(51) 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.

(52) 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.

(53) 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.

(54) Electricity Prices by Sector

- Source: U.S. Energy Information Administration.

(55) 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.

(56) 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.

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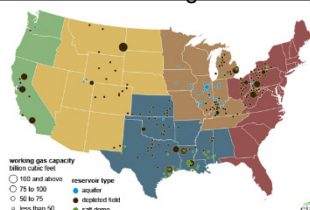
(56) Petroleum and Other Liquids Commercial Inventory (continued)

- 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.

(57) 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)



(58) 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.

(59) 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.

(60) 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.

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(61) 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.

(62) 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.

(63) 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.

(64) Heavy Truck Sales

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

(65) 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.

(66) 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.

(67) 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.

(68) 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

(69) Movements of Crude Oil by Rail

- Source: U.S. Energy Information Administration.

(70) 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.

(71) 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.

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

- Source: U.S. Census Bureau.

(73) 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.

(74) 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.

(75) 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.

(76) 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.

(77) 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

LNG EXPORTS DRIVING U.S. NATURAL GAS INFRASTRUCTURE

U.S. exports of liquefied natural gas (LNG) are a rapidly growing driver of new American infrastructure investment. The reason: global energy shortages have caused demand and prices for LNG to skyrocket. This has put U.S. LNG in an extremely favorable export position, because of our plentiful supplies and low cost of natural gas to feed our export terminals, relative to other producing and exporting countries.

The price of natural gas in Europe and Asia has tripled and quadrupled over the past several months, while U.S. prices have "only" doubled, presenting a large opportunity to U.S. producers and exporters. It seems that new foreign customers' long-term LNG supply contracts with U.S. exporters are being announced weekly, limited only by our export capacity, which is also set to expand rapidly.

Beyond the immediate bullish picture, there's an even brighter long-term outlook stemming from growing Asian demand. According to the Global Energy Monitor, Asian countries today have almost \$400 billion of natural gas infrastructure under construction or planned. About half of that is for new natural gas power plants, and the other half is split between new LNG import terminals and the pipelines needed to deliver the gas to the new plants.

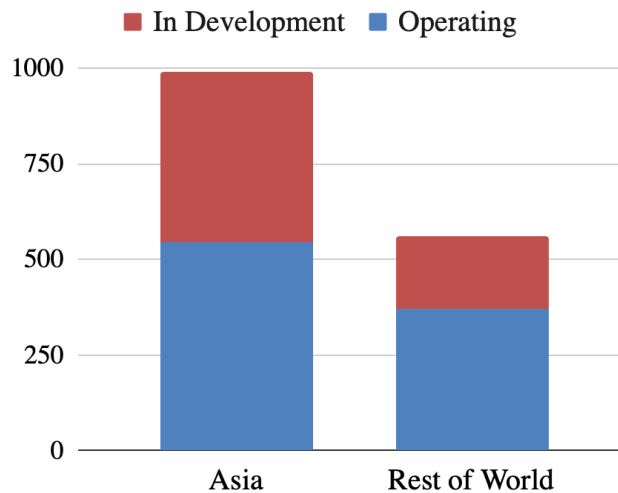
These new plants represent a doubling of current Asian gas-fired generating capacity, adding the equivalent of all current gas-fired capacity in Europe and Russia, and increasing total global gas-fired capacity by 20%.

To feed these new generating plants, Asian LNG importers are now developing new import terminals that would nearly double their current import capacity of 550 million metric tons per annum (mtpa) to about 1,000 mtpa. That's the equivalent of adding about 60 billion cubic feet per day (bcf/d) of Asian natural gas consumption. How much of that could show up on American natural gas producers and exporters' order books? The answer depends on how much, and how fast, U.S. export capacity can be built.

HOT TOPICS

LNG EXPORTS DRIVING U.S. NATURAL GAS INFRASTRUCTURE (CONTINUED)

Import Capacity, Million Metric Tons Per Year of LNG



Source: Global Energy Monitor

To put it in context, thanks to shale, U.S. natural gas production has grown to over 93 billion cubic feet per day (bcf/d). Of that total, we are now exporting about 12 bcf/d as LNG, which is currently 100% of our LNG export capacity. For perspective, as recently as six years ago that number was zero.

Roughly another 10 bcf/d of U.S. capacity is now under construction or soon will be, most which should come online by 2025. While nearly all of this will be located on the Gulf Coast, it will be fed by natural gas pipelines still to be built, as well as by feed gas from the existing interstate pipeline network. Much of this prospective new LNG output has already been contracted for either by commodity traders or by major foreign energy companies.

Beyond this next wave of new capacity, there's a large number of proposed projects that have already been fully permitted by both FERC and the Department of Energy, but that have not yet secured the customer commitments to enable construction. In this tranche there is about another 25 bcf/d of capacity. If even one-third of that, or 8 bcf/d, is eventually built, we will still be exporting more than 30 bcf/d by the end of this decade. That means American natural gas would be able to fill up to one-half of the 60 bcf/d of new Asian demand.

HOT TOPICS

LNG EXPORTS DRIVING U.S. NATURAL GAS INFRASTRUCTURE (CONTINUED)

To relate this to construction opportunity, it requires roughly about \$4.5 billion of capital investment to build one billion cubic feet per day of LNG export capacity, a majority of which goes into construction. So 18 bcf/d of additional capacity represents \$80 billion of investment.

Not only is there a huge construction market opportunity in building both the new export terminals and their connecting pipelines, but also in the supply chain opportunities that support the shale production complexes that will be needed to drill for that much more natural gas. That's along with the gathering lines, compression, storage, and processing and all the rest of the upstream infrastructure needed for production.

So we're optimistic about the future of natural gas infrastructure far into the future. Even if U.S. domestic consumption levels off, substantial production growth will be driven by new global demand, not only from the developed and developing economies of the world, but also from the vast potential coming from places like Africa and South Asia that are trying to escape from energy poverty and/or shift away from coal in favor of cleaner burning fuels.

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HOT TOPICS

THE GLOBAL ECONOMIC IMPACT OF RUSSIAN INVASION OF UKRAINE IS FAR REACHING

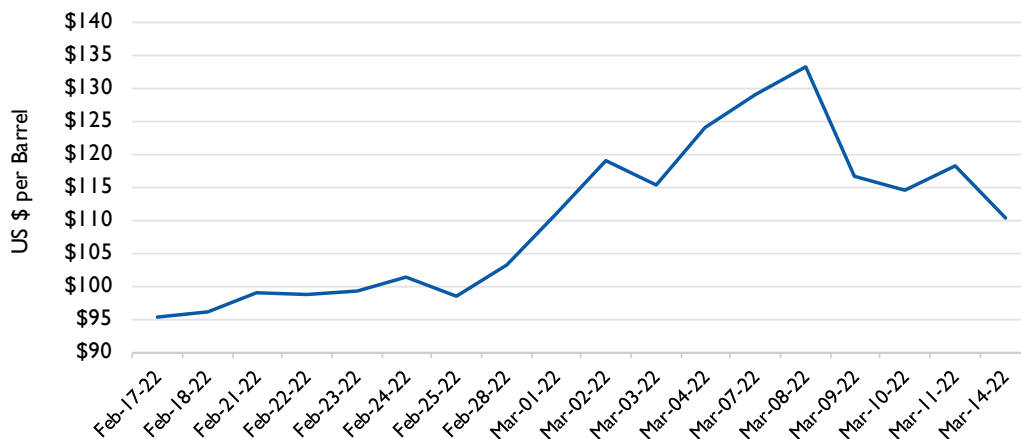
The Russian invasion of Ukraine and the unprecedented sanctions imposed in response by the U.S. and western allies have rattled the global economy and financial markets. The economic impact of the war comes against the backdrop of rapid inflation and energy prices that have been rising for months.

Russia's invasion of Ukraine threatens to further disrupt global supply chains just as shipping delays were starting to decline. The invasion has upended supply chains for food, energy and industrial products, derailed global travel and driven volatility into world markets. The Ukraine crisis both magnified each threat and complicated the potential solutions.

Russia is a significant supplier of oil, natural gas and metals, and higher prices for these commodities are expected to inflict economic damage around the world. Europe relies on Russia for nearly 40% of its natural gas and 25% of its oil. Natural gas prices rose 20% after the war started, on top of earlier increases, and now are roughly six times higher than the beginning of 2021.¹

Russia is the world's third-largest oil supplier, producing around 10 million barrels per day (bpd) of crude, about half of which is exported.² The Russian oil embargo ramps up pressure on the Organization of the Petroleum Exporting Countries (OPEC) to increase production, as such alternative suppliers could help balance the market. OPEC+ (the expanded version of the organization) has about 4 million bpd of spare capacity coming from Saudi Arabia, Iraq, Iran and the United Arab Emirates (UAE).² However, increasing production would go against Russia, currently a co-chair of OPEC+.

Brent Crude Oil Prices³



HOT TOPICS

THE GLOBAL ECONOMIC IMPACT OF RUSSIAN INVASION OF UKRAINE IS FAR REACHING (CONTINUED)

The UAE recently said it would push OPEC to produce more oil. The move marks a departure for the Persian Gulf producer after months of standing with Saudi Arabia and Russia. The UAE reversed its stance under pressure from the U.S., a key security partner and weapons supplier for the federation of Gulf emirates. Saudi Arabia and the UAE are the only two oil producers that produce well below their capacity, giving them the ability to increase their output. The UAE has about 1 million bpd of spare capacity while the Saudis have about 2 million bpd.⁴ U.K. Prime Minister Boris Johnson traveled to the Gulf to meet with Saudi Arabia and UAE leaders to try to convince them to increase their oil output.

U.S. shale production also could be profitably increased at prices far below current levels, but that would be a longer-term answer. OPEC could increase production much more quickly. Also, differences in oil composition can make it difficult for customers to directly substitute one crude for another. OPEC members have an uncomfortable choice to make.

The global supply chain has also been affected. The world's unexpectedly robust recovery from the pandemic recession left companies scrambling to find enough raw materials and components to produce goods to meet surging customer demand. Overwhelmed factories, ports and freight yards have meant shortages, shipping delays and higher prices. Disruptions to Russian and Ukrainian industries could further delay any return to normal conditions.

Russia and Ukraine together produce 70% of the world's neon, a critical raw material of semiconductors; 13% of the world's titanium, which is used to make passenger jets; and 30% of palladium, which is utilized in cars, cellphones and dental fillings.¹ Russia also is a major producer of nickel, used to produce electric car batteries and steel.

The agricultural supply chain coped well during the pandemic, as the world's food system produced its usual 11 billion tons of food per year.⁵ However, international food markets will probably face shortages due to the conflict. Russia and Ukraine together supply almost one-third of the world's wheat, a quarter of its barley and nearly three-quarters of its sunflower oil, according to the International Food Policy Research Institute.⁵ The United Nations estimates that the crisis in Ukraine could push international food prices up another 22% in its worst-case scenario.⁵

Food prices are high, which incentivizes production, but so are fuel and fertilizer costs, which squeeze agricultural profit margins. Farmers in the U.S. are bracing for a hike in the price of fertilizer, which was already at a record-high before the conflict. Russia, which is a low-cost, high-volume global producer of fertilizers, is the world's second-largest producer of potash, a key nutrient used on major commodity crops and produce.⁶ Norwegian fertilizer maker Yara International said its European ammonia and urea production is running at less than half of normal capacity because of record-high natural gas prices further limiting supply.⁵

HOT TOPICS

THE GLOBAL ECONOMIC IMPACT OF RUSSIAN INVASION OF UKRAINE IS FAR REACHING (CONTINUED)

Even before the Ukraine crisis, the Iowa Capital Dispatch reported that farmers in the United States are likely to plant less corn and use less nitrogen fertilizer on their fields for next year's growing season due to sky-high fertilizer prices and short supplies.⁶

Russia's invasion of Ukraine is straining the global air freight industry as well. Up until recently, demand for goods shipped by air was robust, while the sluggish recovery in commercial air travel kept jet fuel prices low. Jet fuel costs have jumped along with crude oil and other petroleum products. Average jet fuel prices spiked from about \$2.30 per gallon before the invasion to \$4.00 per gallon.⁷

In addition, the conflict has complicated some key air freight routes, as Russia and its adversaries close their respective airspaces to each other's planes. The skies over Europe and much of North America are closed to Russian flights, while most European and American planes can no longer fly over Russia, forcing carriers to seek alternative routes. Some routes, such as Helsinki to Tokyo, can't be flown now. Per one estimate, 20% to 25% of the air freight capacity between Europe and Asia has been taken off the market, further raising costs.⁷ This results in higher prices for everything from smartphones to video games, and any other product shipped by air.

The Ukraine war coincides with a high-risk moment for the Federal Reserve and other central banks. Banks were caught off guard by the surge in inflation over the past year. Rising energy, food and services prices pushed already elevated U.S. inflation to a 7.9% annual rate in February.⁸ Surging energy costs related to the Russian invasion of Ukraine are pushing prices higher. Higher energy and food prices and deeper supply chain bottlenecks could put more pressure on inflation and force the Federal Reserve to accelerate its pending series of rate hikes.

In Europe inflation accelerated to a record 5.8% in February compared with a year earlier for the European Union.¹ The fighting and sanctions that have disrupted Russia trade with the global economy threaten to send prices ever higher.

Beyond Russia and Ukraine, the biggest economic hit from the war is likely to be felt in Europe, which is closest to the conflict and heavily reliant on Russian energy. In addition, the European Union doesn't have the counterbalance of a large domestic commodity sector to benefit from the current higher prices.

Sources:

- 1) AP News, Economic dangers from Russia's invasion ripple across globe, March 2, 2022.
- 2) The Wall Street Journal, Russian Oil Embargo Pushes OPEC to Take Sides, March 8, 2022.
- 3) U.S. Energy Information Administration.
- 4) The Wall Street Journal, U.A.E. Pushes for Increased OPEC Oil Production Amid Russian War on Ukraine, March 9, 2022.
- 5) The Wall Street Journal, Ukraine War Stokes Insecurity in the World's Food Supply, March 15, 2022.
- 6) The Hill, Five ways the Russian invasion of Ukraine could impact the US economy, February 28, 2022.
- 7) Kiplinger, The Kiplinger Letter, March 17, 2022.
- 8) The Wall Street Journal, Inflation Reached 7.9% in February; Consumer Prices Are the Highest in 40 Years, March 10, 2022.

PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

PETROLEUM PRODUCTS

EQUITY COMPARABLES ⁽¹⁾

Petroleum Products (United States & Canada)

Company	LTM ⁽²⁾			Stock Price 12/31/21	% 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.	\$3,148	(\$50)	(1.6)%	\$13.20	75.7%	\$1,039	\$2,510	0.8x	NM	NM
Chevron Corporation	155,606	33,405	21.5	117.35	98.3	226,214	258,389	1.7x	7.7x	0.9x
CVR Energy, Inc.	7,242	369	5.1	16.81	62.2	1,690	3,032	0.4x	8.2x	3.2x
EnLink Midstream, LLC	6,845	1,025	15.0	6.89	79.8	3,362	9,548	1.4x	9.3x	4.3x
Gibson Energy Inc.	5,698	306	5.4	17.72	83.1	2,596	3,857	0.7x	12.6x	4.3x
Exxon Mobil Corporation	278,981	46,187	16.6	61.19	92.2	259,052	317,806	1.1x	6.9x	1.0x
HF Sinclair Corporation	18,389	1,138	6.2	32.78	77.3	5,267	7,919	0.4x	7.0x	3.0x
Keyera Corp.	3,939	710	18.0	22.54	79.8	4,983	7,755	2.0x	10.9x	4.1x
Marathon Petroleum Corporation	120,451	7,121	5.9	63.99	93.0	39,391	62,611	0.5x	8.8x	2.3x
Parkland Corporation	16,964	911	5.4	27.48	77.1	4,224	8,034	0.5x	8.8x	4.6x
Phillips 66	111,476	2,168	1.9	72.46	76.8	31,752	47,452	0.4x	21.9x	5.7x
NuStar Energy LP.	1,619	702	43.4	15.88	76.6	1,740	6,505	4.0x	9.3x	4.6x
Valero Energy Corporation	108,332	4,592	4.2	75.11	88.4	30,708	42,556	0.4x	9.3x	2.4x
Median			5.9%		79.8%			0.7x	9.0x	3.7x
Mean			11.3%		81.6%			1.1x	10.1x	3.4x

SELECTED TRANSACTIONS

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

(1) Matching public companies to middle-market companies is an imperfect comparable analysis due to the variables of size, equipment, markets, etc. Nonetheless JKC's research has yielded this list as the closest available.

(2) LTM is defined as last twelve months.

(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 12/31/21	% of 52-Week High	Market Cap	Total Enterprise Value ⁽³⁾	TEV / LTM		Net Debt ⁽⁴⁾ EBITDA
	Revenues	EBITDA	Margin					Revenues	EBITDA	
Alliant Energy Corporation	\$3,669	\$1,443	39.3%	\$61.47	98.6%	\$15,390	\$22,961	6.3x	15.9x	5.5x
AltaGas Ltd.	8,355	1,159	13.9	21.58	99.5	6,046	13,838	1.7x	11.9x	5.9x
Atmos Energy Corporation	3,506	1,359	38.8	104.77	99.5	13,904	21,350	6.1x	15.7x	5.6x
Avista Corporation	1,439	459	31.9	42.49	86.5	3,007	5,541	3.9x	12.1x	5.7x
Baytex Energy Corp.	1,208	620	51.3	3.09	89.1	1,743	2,961	2.5x	4.8x	1.8x
Calumet Specialty Products Partners, L.P.	3,148	(50)	(1.6)	13.20	75.7	1,039	2,510	0.8x	NM	NM
Cenovus Energy Inc.	36,632	6,401	17.5	12.26	92.5	24,729	36,213	1.0x	5.7x	1.5x
Chesapeake Utilities Corporation	570	203	35.6	145.81	99.8	2,567	3,285	5.8x	16.2x	3.9x
Corning Natural Gas Holding Corporation	37	9	24.6	24.34	98.7	75	156	4.2x	16.9x	8.6x
Crestwood Equity Partners LP	4,569	509	11.1	27.59	81.3	1,735	4,832	1.1x	9.5x	4.1x
Dominion Energy, Inc.	13,964	7,195	51.5	78.56	96.9	63,626	107,721	7.7x	15.0x	5.7x
EnLink Midstream, LLC	6,845	1,025	15.0	6.89	79.8	3,362	9,548	1.4x	9.3x	4.3x
Enbridge Inc.	37,196	9,340	25.1	39.04	91.5	79,107	143,096	3.8x	15.3x	6.4x
Enterprise Products Partners L.P.	40,807	7,878	19.3	21.96	85.5	47,920	76,730	1.9x	9.7x	3.4x
Epsilon Energy Ltd.	42	22	52.9	5.68	83.5	133	113	2.7x	5.0x	(1.2)x
Eversource Energy	9,863	3,181	32.2	90.98	98.2	31,279	50,774	5.1x	16.0x	6.4x
Genesis Energy, L.P.	2,125	385	18.1	10.71	79.5	1,313	5,787	2.7x	15.0x	8.0x
National Fuel Gas Company	1,848	1,026	55.5	63.94	98.8	5,831	8,610	4.7x	8.4x	2.7x
New Jersey Resources Corporation	2,378	453	19.0	41.06	92.5	3,940	6,693	2.8x	14.8x	6.6x
Northwest Natural Holding Company	860	288	33.5	48.78	86.0	1,499	2,876	3.3x	10.0x	5.2x
MDU Resources Group, Inc.	5,681	840	14.8	30.84	88.1	6,271	8,702	1.5x	10.4x	3.3x
OGE Energy Corp.	3,654	936	25.6	38.38	99.5	7,683	12,560	3.4x	13.4x	5.4x
ONE Gas, Inc.	1,809	514	28.4	77.59	94.7	4,158	8,171	4.5x	15.9x	8.2x
ONEOK, Inc.	16,540	3,193	19.3	58.76	88.0	26,203	40,394	2.4x	12.7x	4.3x
RGC Resources, Inc.	79	24	30.4	23.01	88.4	193	333	4.2x	13.9x	6.4x
South Jersey Industries, Inc.	1,992	564	28.3	26.12	89.3	2,679	6,074	3.0x	10.8x	6.4x
Southwest Gas Holdings, Inc.	3,680	759	20.6	70.05	95.3	4,230	8,370	2.3x	11.0x	8.2x
Summit Midstream Partners, LP	402	188	46.9	22.20	47.6	159	1,739	4.3x	9.2x	7.2x
Targa Resources Corp.	16,950	2,204	13.0	52.24	89.8	11,961	22,484	1.3x	10.2x	2.9x
TC Energy Corporation	10,579	7,014	66.3	46.49	86.3	45,524	89,147	8.4x	12.7x	5.9x
Median			27.0%		89.6%			3.2x	12.1x	5.6x
Mean			29.3%		89.3%			3.5x	12.0x	5.1x

(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

SELECTED TRANSACTIONS ⁽¹⁾

Announced / Closed Date	Target(s)	Acquirer	Total Enterprise Value (TEV)	TEV / Revenues	TEV / EBITDA
2/24/2022	South Jersey Industries, Inc. (NYSE:SJI)	J.P. Morgan Asset Management, Inc. ; JPMorgan Infrastructure Investments, L.P.	\$7,846.1	3.9x	16.6x
10/26/2021	Oasis Midstream Partners LP (NasdaqGS:OMP)	Crestwood Equity Partners LP (NYSE:CEQP)	\$1,807.8	4.8x	8.1x
10/14/2021	Southwest Gas Holdings, Inc. (NYSE:SWX)	Icahn Enterprises L.P. (NasdaqGS:IIEP)	\$8,571.9	2.3x	10.6x
2/17/2021	Enable Midstream Partners, LP (NYSE:ENBL)	Energy Transfer LP (NYSE:ET)	\$7,329.7	3.1x	9.5x
1/13/2021	Corning Natural Gas Holding Corporation (OTCPK:CNIG)	Argo Infrastructure Partners LP	\$172.0	4.6x	17.2x
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 Board	\$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

(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 Price 12/31/21	% of 52-Week High	Market Cap	Total Enterprise Value ⁽³⁾	TEV / LTM		Net Debt ⁽⁴⁾ EBITDA
	Revenues	EBITDA	Margin					Revenues	EBITDA	
Ferrellgas Partners, L.P.	\$1,979	\$321	16.2%	\$14.69	58.0%	\$71	\$2,067	1.0x	6.4x	6.5x
NGL Energy Partners LP	7,167	450	6.3	1.82	44.5	236	4,650	0.6x	10.3x	7.8x
Spire Inc.	2,278	628	27.6	65.22	83.7	3,375	7,339	3.2x	11.7x	6.5x
Star Group, L.P.	1,612	129	8.0	10.77	89.5	416	627	0.4x	4.9x	2.4x
Suburban Propane Partners, L.P.	1,359	286	21.0	14.65	89.1	922	2,164	1.6x	7.6x	4.5x
UGI Corporation	8,188	2,370	28.9	45.91	94.6	9,606	16,188	2.0x	6.8x	2.9x
Median			18.6%		86.4%			1.3x	7.2x	5.5x
Mean			18.0%		76.5%			1.5x	8.0x	5.1x

SELECTED TRANSACTIONS

Announced / Closed Date	Target(s)	Acquirer	Total Enterprise Value (TEV)	TEV / Revenues	TEV / EBITDA
3/28/22	Retail Propane Distribution and Refined Fuels Assets of Quarles Petroleum Inc.	Superior Plus Corp. (TSX:SPB)	\$145.0	-	-
7/14/2021	Kamps Propane, Inc.	Superior Plus Corp. (TSX:SPB)	\$240.0	-	8.9x
4/22/2021	Assets of Freeman Gas, Inc.	Superior Plus Corp. (TSX:SPB)	\$170.0	-	-
2/11/2021	Assets of Highlands Propane Inc.	Superior Plus Corp. (TSX:SPB)	\$10.9	-	-
2/11/2021	Miller Propane Inc.	Superior Plus Corp. (TSX:SPB)	\$5.9	-	-
1/26/2021	All of the Assets of Holden Oil, Inc.	Superior Plus Corp. (TSX:SPB)	\$17.8	-	-
11/11/2020	Assets of Petroleum Heat and Power Co., Inc.	Superior Plus Corp. (TSX:SPB)	\$6.1	-	-
10/15/2020	Central Coast Propane, Inc.	Superior Plus Corp. (TSX:SPB)	\$12.9	-	-
9/1/2020	Simmons Energy Solutions Inc.	MFA Oil Company	-	-	-
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	-	-

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PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

DRILLING

EQUITY COMPARABLES ⁽¹⁾

Drilling (United States & Canada)

Company	LTM ⁽²⁾			Stock Price 12/31/21	% of 52-Week High	Market Cap	Total Enterprise Value ⁽³⁾	TEV / LTM		Net Debt ⁽⁴⁾
	Revenues	EBITDA	Margin					Revenues	EBITDA	
AKITA Drilling Ltd.	\$87	\$5	5.9%	\$0.74	61.0%	\$31	\$91	1.0x	17.8x	13.4x
Baker Hughes Company	20,502	2,707	13.2	24.06	87.0	20,931	26,260	1.3x	9.7x	1.0x
CES Energy Solutions Corp.	945	96	10.2	1.60	90.6	409	702	0.7x	7.3x	3.6x
Ensign Energy Services Inc.	787	146	18.6	1.33	67.2	217	1,351	1.7x	9.2x	7.8x
Halliburton Company	15,295	2,645	17.3	22.87	85.5	20,471	28,152	1.8x	10.6x	2.8x
Helmerich & Payne, Inc.	1,382	124	9.0	23.70	65.4	2,560	2,519	1.8x	20.3x	0.8x
Independence Contract Drilling, Inc.	88	(4)	(4.1)	3.00	37.6	29	167	1.9x	NM	NM
NOV Inc.	5,524	198	3.6	13.55	75.2	5,294	6,093	1.1x	30.8x	4.0x
Precision Drilling Corporation	780	125	16.1	35.31	71.8	470	1,391	1.8x	11.1x	7.1x
Secure Energy Services Inc.	2,976	194	6.5	4.16	79.9	1,281	2,311	0.8x	11.9x	5.3x
Valaris Limited	1,232	83	6.7	36.00	92.0	2,700	2,639	2.1x	31.9x	(0.6)x
Median			9.0%		75.2%			1.7x	11.5x	3.8x
Mean			9.3%		73.9%			1.5x	16.1x	4.5x

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:TDG)	Ensign Energy Services Inc. (TSX:ESI)	\$714.0	1.5x	5.1x
6/5/2018	Xtreme Drilling Corp.	AKITA Drilling Ltd. (TSX:AKT.A)	\$155.0	2.8x	162.4x
2/15/2018	Layne Christensen Company (NasdaqGS:LAYN)	Granite Construction Incorporated (NYSE:GVA)	\$491.9	1.0x	16.5x
5/30/2017	Atwood Oceanics, Inc. (NYSE:ATW)	Ensco plc (NYSE:ESV)	\$1,759.6	2.2x	4.7x
5/19/2017	Savanna Energy Services Corp.	Total Energy Services Inc. (TSX:TOT)	\$458.2	1.4x	16.6x

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PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

LUBRICANTS AND GREASES

EQUITY COMPARABLES ⁽¹⁾

Lubricants and Greases (United States & Canada)

Company	LTM ⁽²⁾			Stock Price 12/31/21	% of 52-Week High	Market Cap	Total Enterprise Value ⁽³⁾	TEV / LTM		Net Debt ⁽⁴⁾ EBITDA
	Revenues	EBITDA	Margin					Revenues	EBITDA	
Albemarle Corporation	\$3,328	\$849	25.5%	\$233.77	80.2%	\$27,346	\$29,144	8.8x	34.3x	2.4x
Ashland Global Holdings Inc.	2,155	444	20.6	107.66	97.2	6,127	8,020	3.7x	18.1x	4.3x
Clean Harbors, Inc.	3,806	628	16.5	99.77	83.9	5,429	6,433	1.7x	10.2x	3.6x
CSW Industrials, Inc.	587	135	23.0	120.86	83.1	1,912	2,191	3.7x	16.2x	2.1x
FMC Corporation	5,045	1,324	26.2	109.89	88.9	13,929	17,171	3.4x	13.0x	2.1x
HF Sinclair Corporation	18,389	1,138	6.2	32.78	77.3	5,267	7,919	0.4x	7.0x	3.0x
Ingevity Corporation	1,392	417	30.0	71.70	80.1	2,817	3,881	2.8x	9.3x	2.5x
NewMarket Corporation	2,356	368	15.6	342.72	79.2	3,587	4,208	1.8x	11.4x	2.1x
Ocean Bio-Chem, Inc.	64	12	19.2	8.70	57.2	83	81	1.3x	6.5x	(0.3)x
Quaker Chemical Corporation	1,761	264	15.0	230.78	76.4	4,130	4,918	2.8x	18.6x	2.9x
Stepan Company	2,346	267	11.4	124.29	89.2	2,786	3,034	1.3x	11.4x	1.0x
Synalloy Corporation	335	41	12.2	16.43	99.9	167	248	0.7x	6.1x	2.5x
Trecora Resources	273	19	6.9	8.08	86.1	191	202	0.7x	10.7x	1.0x
Valvoline Inc.	3,186	727	22.8	37.29	99.4	6,711	8,675	2.7x	11.9x	2.5x
Median			17.9%		83.5%			2.3x	11.4x	2.5x
Mean			17.9%		84.2%			2.6x	13.2x	2.3x

SELECTED TRANSACTIONS

Announced / Closed Date	Target(s)	Acquirer	Total Enterprise Value (TEV)	TEV / Revenues	TEV / EBITDA
9/27/2021	Kraton Corporation (NYSE:KRA)	DL Chemical Co., Ltd.	\$2,568.0	1.4x	8.3x
12/7/2020	Gabriel Performance Products, LLC	Huntsman Corporation (NYSE:HUN)	\$250.0	2.4x	11.0x
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 QnC Corporation (KOSDAQ:A074600)	\$2,664.9	1.0x	7.4x
8/15/2018	KMG Chemicals, Inc.	Cabot Microelectronics Corporation (NasdaqGS:CCMP)	\$1,606.5	3.5x	13.5x

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PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

SOLAR

EQUITY COMPARABLES ⁽¹⁾

Solar (United States & Canada)

Company	LTM ⁽²⁾			Stock Price 12/31/21	% of 52-Week High	Market Cap	Total Enterprise Value ⁽³⁾	TEV / LTM		Net Debt ⁽⁴⁾ EBITDA
	Revenues	EBITDA	Margin					Revenues	EBITDA	
Boralex Inc.	\$546	\$362	66.3%	\$27.40	61.2%	\$2,812	\$5,937	10.9x	16.4x	8.0x
Capital Power Corporation	1,388	669	48.2	31.18	87.6	3,622	6,674	4.8x	10.0x	3.8x
NextEra Energy Partners, LP	982	651	66.3	84.40	95.0	7,079	17,565	17.9x	27.0x	9.0x
NRG Energy, Inc.	26,989	4,703	17.4	43.08	93.4	10,548	19,086	0.7x	4.1x	1.7x
Sunrun Inc.	1,610	(283)	(17.6)	34.30	34.0	7,100	14,388	8.9x	NM	NM
Median			48.2%		87.6%			8.9x	13.2x	5.9x
Mean			36.1%		74.2%			8.6x	14.4x	5.6x

SELECTED TRANSACTIONS

Announced / Closed Date	Target(s)	Acquirer	Total Enterprise Value (TEV)	TEV / Revenues	TEV / EBITDA
3/2/2022	New Energy Equity, LLC	ALLETE, Inc. (NYSE:ALE)	\$165.5	-	8.3x
6/16/2021	Solarpack Corporacion Tecnologica, S.A. (BME:SPK)	EQT Infrastructure V; EQT Partners AB	\$1,543.1	9.5x	20.7x
1/13/2020	TerraForm Power, Inc. (NasdaqGS:TERP)	Brookfield Renewable Partners L.P. (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 12/31/21	% 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.	\$2,285	\$765	33.5%	\$14.44	80.6%	\$9,700	\$18,437	8.1x	24.1x	8.1x
Avangrid, Inc.	6,974	1,924	27.6	49.88	89.8	19,314	26,686	3.8x	13.9x	3.8x
Boralex Inc.	546	362	66.3	27.40	61.2	2,812	5,937	10.9x	16.4x	8.0x
Brookfield Renewable Partners L.P.	4,104	2,531	61.7	35.80	71.5	16,952	49,074	12.0x	19.4x	8.4x
Innervex Renewable Energy Inc.	590	410	69.5	14.70	57.3	2,834	6,678	11.3x	16.3x	9.5x
NextEra Energy Partners, LP	982	651	66.3	84.40	95.0	7,079	17,565	17.9x	27.0x	9.0x
Northland Power Inc.	1,654	1,112	67.2	29.99	73.8	6,797	13,339	8.1x	12.0x	5.4x
TransAlta Renewables Inc.	371	188	50.6	14.82	76.6	3,954	4,478	12.1x	23.8x	3.1x
Median			64.0%		75.2%			11.1x	17.9x	8.1x
Mean			55.3%		75.7%			10.5x	19.1x	6.9x

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 L.P. (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)	Innervex 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 12/31/21	% of 52-Week High	Market Cap	Total Enterprise Value ⁽³⁾	TEV / LTM		Net Debt ⁽⁴⁾ EBITDA
	Revenues	EBITDA	Margin					Revenues	EBITDA	
Archrock, Inc.	\$781	\$315	40.4%	\$7.48	69.3%	\$1,152	\$2,684	3.4x	8.5x	4.9x
Baker Hughes Company	20,502	2,707	13.2	24.06	87.0	20,931	26,260	1.3x	9.7x	1.0x
Blueknight Energy Partners, LP.	115	50	43.3	3.30	77.5	137	(138)	(1.2)x	(2.8)x	2.1x
Cathedral Energy Services Ltd.	49	(1)	(1.9)	0.30	69.1	24	39	0.8x	NM	NM
CES Energy Solutions Corp.	945	96	10.2	1.60	90.6	409	702	0.7x	7.3x	3.6x
Cypress Environmental Partners, L.P.	142	4	3.1	1.12	30.9	14	89	0.6x	20.0x	11.9x
Dawson Geophysical Company	25	(16)	(66.3)	2.32	51.9	55	24	1.0x	NM	NM
ENGGlobal Corporation	36	(13)	(35.5)	1.32	14.0	46	27	0.7x	NM	NM
Enservco Corporation	14	(5)	(39.0)	0.85	26.2	10	25	1.9x	NM	NM
Ensign Energy Services Inc.	787	146	18.6	1.33	67.2	217	1,351	1.7x	9.2x	7.8x
Enterprise Group, Inc.	15	5	31.3	0.24	83.6	12	21	1.4x	4.6x	2.3x
Essential Energy Services Ltd.	96	3	2.9	0.31	84.8	44	45	0.5x	16.1x	1.4x
High Arctic Energy Services Inc	60	1	2.1	1.18	74.5	57	48	0.8x	37.4x	2.8x
Innospec Inc.	1,483	178	12.0	90.34	83.9	2,227	2,172	1.5x	12.2x	(0.6)x
Matrix Service Company	653	(48)	(7.4)	7.52	46.1	201	192	0.3x	NM	NM
Mullen Group Ltd.	1,167	159	13.6	9.19	80.3	872	1,453	1.2x	9.2x	3.7x
Newpark Resources, Inc.	615	30	4.9	2.94	72.1	271	356	0.6x	11.9x	4.0x
North American Construction Group Ltd.	517	119	22.9	15.10	84.9	431	763	1.5x	6.4x	2.5x
Parkland Corporation	16,964	911	5.4	27.48	77.1	4,224	8,034	0.5x	8.8x	4.6x
Precision Drilling Corporation	780	125	16.1	35.31	71.8	470	1,391	1.8x	11.1x	7.1x
Profire Energy, Inc.	26	(1)	(2.9)	1.06	60.9	51	40	1.5x	NM	NM
ProPetro Holding Corp.	875	123	14.0	8.10	57.9	837	753	0.9x	6.1x	(0.9)x
Secure Energy Services Inc.	2,976	194	6.5	4.16	79.9	1,281	2,311	0.8x	11.9x	5.3x
Select Energy Services, Inc.	765	31	4.1	6.23	82.2	587	647	0.8x	20.9x	(0.6)x
Shawcor Ltd.	903	67	7.4	3.88	63.5	273	487	0.5x	7.2x	2.6x
Smart Sand, Inc.	127	(19)	(14.7)	1.78	42.8	78	97	0.8x	NM	NM
STEP Energy Services Ltd.	424	34	8.0	1.27	72.2	87	263	0.6x	7.7x	4.7x
USA Compression Partners, LP	633	383	60.5	17.45	97.9	1,694	4,152	6.6x	10.9x	5.2x
Median			7.0%		72.1%			0.8x	9.2x	3.6x
Mean			6.2%		67.9%			1.2x	11.2x	3.6x

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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 12/31/21	% of 52-Week High	Market Cap	Total Enterprise Value ⁽³⁾	TEV / LTM		Net Debt ⁽⁴⁾ EBITDA
	Revenues	EBITDA	Margin					Revenues	EBITDA	
AKITA Drilling Ltd.	\$87	\$5	5.9%	\$0.74	61.0%	\$31	\$91	1.0x	17.8x	13.4x
CSI Compresso LP	304	92	30.3	1.19	50.6	167	813	2.7x	8.8x	7.1x
Enerflex Ltd.	759	99	13.0	6.05	68.9	543	782	1.0x	7.9x	1.7x
Exterran Corporation	630	144	22.8	2.98	49.9	99	647	1.0x	4.5x	3.8x
Forum Energy Technologies, Inc.	541	(3)	(0.6)	16.05	56.3	91	310	0.6x	NM	NM
Geospace Technologies Corporation	84	(7)	(8.0)	6.69	54.0	86	64	0.8x	NM	NM
Gulf Island Fabrication, Inc.	93	(4)	(4.7)	4.01	75.7	62	(8)	(0.1)x	NM	NM
Halliburton Company	15,295	2,645	17.3	22.87	85.5	20,471	28,152	1.8x	10.6x	2.8x
Hanwei Energy Services Corp.	6	4	76.1	0.01	42.8	2	6	1.1x	1.4x	0.2x
Helix Energy Solutions Group, Inc.	675	79	11.7	3.12	46.2	471	657	1.0x	8.3x	2.0x
ION Geophysical Corporation	105	19	18.3	0.88	16.4	26	178	1.7x	9.2x	7.8x
Key Energy Services, Inc.	238	(15)	(6.5)	1.01	13.9	14	69	0.3x	NM	NM
McCoy Global Inc.	26	2	7.4	0.52	73.3	15	14	0.5x	7.1x	(1.4)x
MIND Technology, Inc.	26	(11)	(40.8)	1.69	55.4	23	52	2.0x	NM	NM
Nabors Industries Ltd.	2,018	482	23.9	81.09	60.7	668	3,503	1.7x	7.3x	4.8x
NOV Inc.	5,524	198	3.6	13.55	75.2	5,294	6,093	1.1x	30.8x	4.0x
Natural Gas Services Group, Inc.	72	16	22.3	10.47	80.7	137	112	1.6x	7.0x	(1.4)x
PHX Energy Services Corp.	277	31	11.2	3.52	78.2	173	182	0.7x	5.9x	0.3x
RPC, Inc.	865	78	9.0	4.54	61.1	967	931	1.1x	11.9x	(0.5)x
Schlumberger Limited	22,929	4,469	19.5	29.95	81.2	42,009	54,765	2.4x	12.3x	2.7x
Solaris Oilfield Infrastructure, Inc.	159	27	16.9	6.55	43.4	209	270	1.7x	10.0x	(1.1)x
Superior Drilling Products, Inc.	13	2	11.4	0.73	30.7	21	25	1.9x	16.4x	2.5x
TechnipFMC plc	6,404	486	7.6	5.92	45.4	2,668	4,189	0.7x	8.6x	2.4x
TerraVest Industries Inc.	282	49	17.4	21.71	91.4	389	533	1.9x	10.9x	3.4x
TETRA Technologies, Inc.	388	18	4.7	2.84	63.3	361	515	1.3x	28.1x	8.7x
Weatherford International plc	3,645	556	15.3	27.72	79.3	1,945	3,520	1.0x	6.3x	3.0x
Median			11.5%		60.9%			1.1x	8.8x	2.7x
Mean			11.7%		59.3%			1.2x	11.0x	3.1x

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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
2/25/2022	Cordy Oilfield Services Inc. (TSXV:CKK)	Vertex Resource Group Ltd. (TSXV:VTX)	\$21.3	1.0x	5.2x
2/14/2022	Macro Enterprises Inc. (TSXV:MCR)	-	\$111.9	0.4x	3.4x
1/24/2022	Exterran Corporation (NYSE:EXTN)	Enerflex Ltd. (TSX:EFX)	\$758.5	1.2x	5.0x
12/13/2021	Nuverra Environmental Solutions, Inc. (NYSEAM:NES)	Select Energy Services, Inc. (NYSE:WTTR)	\$51.9	0.5x	20.2x
10/22/2021	FTS International, Inc. (NYSEAM:FTSI)	ProFrac Holding Corp.	\$305.1	0.7x	4.0x
8/4/2021	Alamo Pressure Pumping, LLC	NexTier Completion Solutions, Inc.	\$238.0	-	3.4x
3/9/2021	Tervita Corporation (TSX:TEV)	Secure Energy Services Inc. (TSX:SES)	\$1,022.9	0.9x	6.7x
12/21/2020	RigNet, Inc. (NasdaqGS:RNET)	Viasat, Inc. (NasdaqGS:VSAT)	\$235.7	1.0x	8.6x
12/7/2020	SEACOR Holdings Inc. (NYSE:CKH)	American Industrial Partners	\$845.5	1.5x	11.1x
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

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PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

STORAGE AND TERMINALS

EQUITY COMPARABLES ⁽¹⁾

Storage and Terminals (United States & Canada)

Company	LTM ⁽²⁾			Stock Price 12/31/21	% of 52-Week High	Market Cap	Total Enterprise Value ⁽³⁾	TEV / LTM		Net Debt ⁽⁴⁾ EBITDA
	Revenues	EBITDA	Margin					Revenues	EBITDA	
Alliant Energy Corporation	\$3,669	\$1,443	39.3%	\$61.47	98.6%	\$15,390	\$22,961	6.3x	15.9x	5.5x
AltaGas Ltd.	8,355	1,159	13.9	21.58	99.5	6,046	13,838	1.7x	11.9x	5.9x
Blueknight Energy Partners, L.P.	115	50	43.3	3.30	77.5	137	(138)	(1.2)x	(2.8)x	2.1x
Chart Industries, Inc.	1,318	179	13.6	159.49	77.3	5,803	6,530	5.0x	36.5x	4.3x
EnLink Midstream, LLC	6,845	1,025	15.0	6.89	79.8	3,362	9,548	1.4x	9.3x	4.3x
Equitrans Midstream Corporation	1,317	1,025	77.8	10.34	89.8	4,472	12,516	9.5x	12.2x	6.7x
Gibson Energy Inc.	5,698	306	5.4	17.72	83.1	2,596	3,857	0.7x	12.6x	4.3x
Green Plains Partners LP	78	51	64.8	14.20	88.6	330	418	5.3x	8.2x	1.6x
Magellan Midstream Partners, L.P.	2,733	1,172	42.9	46.44	86.2	9,912	15,180	5.6x	13.0x	4.5x
MPLX LP	9,706	5,000	51.5	29.59	91.7	30,178	50,733	5.2x	10.1x	4.1x
NuStar Energy L.P.	1,619	702	43.4	15.88	76.6	1,740	6,505	4.0x	9.3x	4.6x
Median			42.9%		86.2%			5.0x	11.9x	4.3x
Mean			37.3%		86.2%			3.9x	12.4x	4.4x

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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
10/26/2021	Oasis Midstream Partners LP (NasdaqGS:OMP)	Crestwood Equity Partners LP (NYSE:CEQP)	\$1,807.8	4.8x	8.1x
8/5/2021	BP Midstream Partners LP (NYSE:BPMP)	BP Midstream Partners Holdings LLC	\$1,826.9	14.5x	9.3x
6/1/2021	Stagecoach Gas Services LLC	Kinder Morgan, Inc. (NYSE:KMI)	\$1,225.0	-	10.0x
2/17/2021	Enable Midstream Partners, LP (NYSE:ENBL)	Energy Transfer LP (NYSE:ET)	\$7,329.7	3.1x	9.5x
2/10/2021	Inter Pipeline Ltd. (TSX:IPL)	Brookfield Infrastructure Partners L.P. (NYSE:BIP)	\$13,857.6	6.5x	17.2x
8/24/2020	Cheniere Energy Partners, LP (AMEX:CQP)	Brookfield Infrastructure Partners LP (NYSE:BIP) and Blackstone Infrastructure Partners, LP	\$17,027.5	5.1x	11.3x
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:WVES)	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

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PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

PIPELINES

EQUITY COMPARABLES ⁽¹⁾

Oil and Gas Pipelines (United States & Canada)

Company	LTM ⁽²⁾			Stock Price 12/31/21	% of 52-Week High	Market Cap	Total Enterprise Value ⁽³⁾	TEV / LTM		Net Debt ⁽⁴⁾ EBITDA
	Revenues	EBITDA	Margin					Revenues	EBITDA	
Antero Midstream Corporation	\$969	\$744	76.8%	\$9.68	82.7%	\$4,622	\$7,718	8.0x	10.4x	4.2x
ATCO Ltd.	3,389	1,279	37.7	33.74	92.4	3,854	14,028	4.1x	11.0x	5.6x
Blueknight Energy Partners, L.P.	115	50	43.3	3.30	77.5	137	(138)	(1.2)x	(2.8)x	2.1x
Crestwood Equity Partners LP	4,569	509	11.1	27.59	81.3	1,735	4,832	1.1x	9.5x	4.1x
Enbridge Inc.	37,196	9,340	25.1	39.04	91.5	79,107	143,096	3.8x	15.3x	6.4x
Energy Transfer LP	67,417	12,630	18.7	8.23	71.3	25,361	85,751	1.3x	6.8x	4.0x
Enterprise Products Partners L.P.	40,807	7,878	19.3	21.96	85.5	47,920	76,730	1.9x	9.7x	3.4x
Equitrans Midstream Corporation	1,317	1,025	77.8	10.34	89.8	4,472	12,516	9.5x	12.2x	6.7x
Evolve Transition Infrastructure LP	51	32	63.0	0.59	30.5	66	501	9.7x	15.5x	13.7x
Genesis Energy, L.P.	2,125	385	18.1	10.71	79.5	1,313	5,787	2.7x	15.0x	8.0x
Gibson Energy Inc.	5,698	306	5.4	17.72	83.1	2,596	3,857	0.7x	12.6x	4.3x
Kinder Morgan, Inc.	16,610	6,628	39.9	15.86	82.2	35,961	69,676	4.2x	10.5x	4.9x
ONEOK, Inc.	16,540	3,193	19.3	58.76	88.0	26,203	40,394	2.4x	12.7x	4.3x
Plains All American Pipeline, L.P.	42,078	2,217	5.3	9.34	75.4	6,642	18,439	0.4x	8.3x	4.1x
Summit Midstream Partners, LP	402	188	46.9	22.20	47.6	159	1,739	4.3x	9.2x	7.2x
Targa Resources Corp.	16,950	2,204	13.0	52.24	89.8	11,961	22,484	1.3x	10.2x	2.9x
The Williams Companies, Inc.	10,775	4,483	41.6	26.04	87.1	31,639	56,543	5.2x	12.6x	4.9x
TC Energy Corporation	10,579	7,014	66.3	46.49	86.3	45,524	89,147	8.4x	12.7x	5.9x
Western Midstream Partners, LP	2,877	1,726	60.0	22.27	93.6	9,095	16,252	5.6x	9.4x	3.9x
Median			37.7%		83.1%			3.8x	10.5x	4.3x
Mean			36.2%		79.7%			3.9x	10.6x	5.3x

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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
2/11/2022	Shell Midstream Partners, LP. (NYSE:SHLX)	Shell Pipeline Company L.P.	\$6,370.5	11.5x	10.0x
8/5/2021	BP Midstream Partners LP (NYSE:BPMP)	BP Midstream Partners Holdings LLC	\$1,826.9	14.5x	9.3x
6/1/2021	Stagecoach Gas Services LLC	Kinder Morgan, Inc. (NYSE:KMI)	\$1,225.0	-	10.0x
2/17/2021	Enable Midstream Partners, LP (NYSE:ENBL)	Energy Transfer LP (NYSE:ET)	\$7,329.7	3.1x	9.5x
2/10/2021	Inter Pipeline Ltd. (TSX:IPL)	Brookfield Infrastructure Partners L.P. (NYSE:BIP)	\$13,857.6	6.5x	17.2x
10/5/2020	TC PipeLines, LP (NYSE:TCP)	TC Energy Corporation (TSX:TRP)	\$2,213.6	7.4x	9.0x
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

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PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

TRUCKERS

EQUITY COMPARABLES ⁽¹⁾

Truckers (United States & Canada)

Company	LTM ⁽²⁾			Stock Price 12/31/21	% of 52-Week High	Market Cap	Total Enterprise Value ⁽³⁾	TEV / LTM		Net Debt ⁽⁴⁾ EBITDA
	Revenues	EBITDA	Margin					Revenues	EBITDA	
Adams Resources & Energy, Inc.	\$2,025	\$36	1.8%	\$27.81	73.8%	\$121	\$55	0.0x	1.5x	(2.2)x
ArcBest Corporation	3,980	396	9.9	119.85	95.9	3,064	2,951	0.7x	7.5x	0.5x
Covenant Logistics Group, Inc.	1,046	117	11.2	26.43	76.1	442	505	0.5x	4.3x	0.6x
Daseke, Inc.	1,557	184	11.8	10.04	93.7	627	1,262	0.8x	6.9x	3.0x
Heartland Express, Inc.	607	172	28.4	16.82	83.1	1,327	1,147	1.9x	6.7x	(0.9)x
Hess Corporation	7,301	3,635	49.8	74.03	79.8	22,787	30,225	4.1x	8.3x	1.8x
J.B. Hunt Transport Services, Inc.	12,168	1,603	13.2	204.40	98.8	21,465	22,429	1.8x	14.0x	0.7x
Knight-Swift Transportation Holdings Inc.	5,998	1,471	24.5	60.94	97.8	10,113	12,065	2.0x	8.2x	1.3x
Landstar System, Inc.	6,540	553	8.5	179.02	94.9	6,822	6,743	1.0x	12.2x	(0.0)x
Marten Transport, Ltd.	974	204	21.0	17.16	93.7	1,423	1,340	1.4x	6.6x	(0.3)x
Old Dominion Freight Line, Inc.	5,256	1,652	31.4	358.38	95.9	41,218	40,753	7.8x	24.7x	(0.3)x
P.A.M. Transportation Services, Inc.	707	154	21.7	35.51	86.8	793	980	1.4x	6.4x	1.1x
Patriot Transportation Holding, Inc.	82	7	9.1	8.07	49.5	28	19	0.2x	2.5x	(0.7)x
Parkland Corporation	16,964	911	5.4	27.48	77.1	4,224	8,034	0.5x	8.8x	4.6x
Ryder System, Inc.	9,663	2,668	27.6	82.43	88.6	4,426	10,484	1.1x	3.9x	2.5x
Saia, Inc.	2,289	473	20.7	337.03	92.2	8,844	8,885	3.9x	18.8x	0.1x
Schneider National, Inc.	5,609	808	14.4	26.91	98.5	4,781	4,539	0.8x	5.6x	0.1x
TFI International Inc.	7,220	930	12.9	112.11	95.5	10,431	12,331	1.7x	13.3x	2.2x
Titanium Transportation Group Inc.	316	17	5.5	2.41	70.3	106	181	0.6x	10.4x	3.9x
Universal Logistics Holdings, Inc.	1,751	170	9.7	18.86	67.5	508	1,046	0.6x	6.1x	3.0x
USA Truck, Inc.	710	72	10.2	19.88	84.4	167	321	0.5x	4.4x	2.3x
Werner Enterprises, Inc.	2,734	523	19.1	47.66	95.8	3,188	3,543	1.3x	6.8x	0.8x
Yellow Corporation	5,122	189	3.7	12.59	82.6	646	2,039	0.4x	10.8x	7.6x
Median			12.9%		88.6%			1.0x	6.9x	0.8x
Mean			16.2%		85.8%			1.5x	8.6x	1.4x

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PUBLIC AND TRANSACTION COMPARABLES BY SEGMENT

TRUCKERS

SELECTED TRANSACTIONS ⁽¹⁾

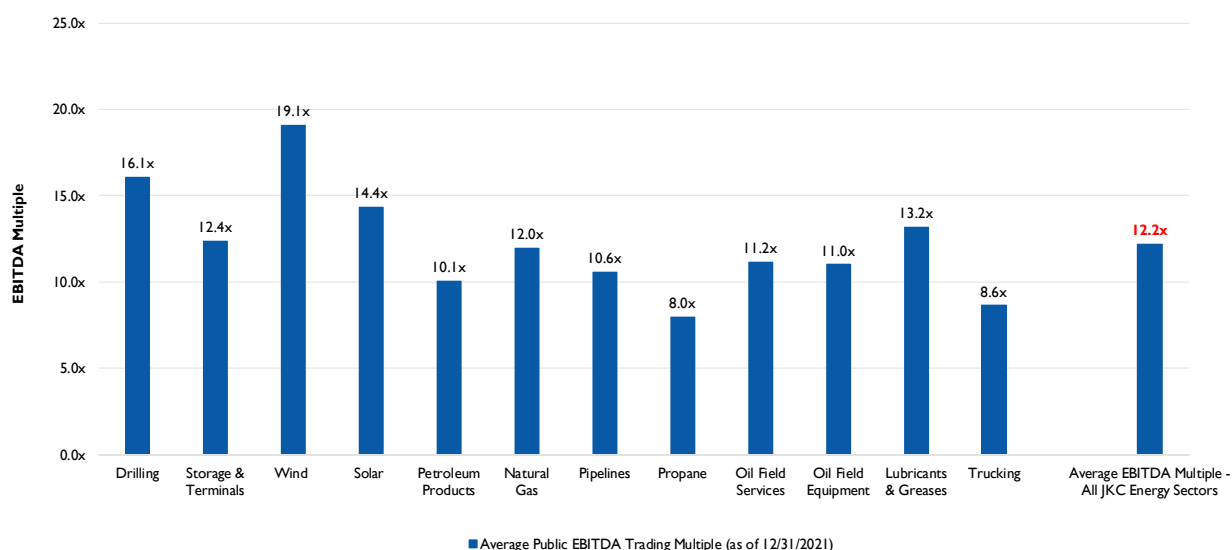
Announced / Closed Date	Target(s)	Acquirer	Total Enterprise Value (TEV)	TEV / Revenues	TEV / EBITDA
2/9/2022	Pilot Freight Services, Inc.	A.P. Møller - Mærsk A/S (CPSE:MAERSK B)	\$168.0	-	-
2/9/2022	AAT Carriers, Inc.	Covenant Logistics Group, Inc. (NasdaqGS:CVLG)	\$55.0	2.2x	-
1/4/2022	Midwest Logistics Systems Ltd.	Schneider National, Inc. (NYSE:SNDR)	\$262.6	1.3x	-
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
10/1/2014	Barr-Nunn Transportation, Inc.	Knight Transportation, Inc. (NYSE:KNX)	\$115.9	-	4.5x
7/24/2014	Contrans Group Inc.	TFI International Inc. (TSX:TFII)	\$528.2	-	6.8x

(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 12/31/2021)



FACTOIDS: LITTLE-KNOWN FACTS AND STATS

PETROLEUM PRODUCTS ⁽¹⁾

- Upstream oil investments are projected to rise to \$307 billion this year from \$287 billion in 2021, a 7% increase.
- Global shale investments are forecasted to rise 18% in 2022, reaching \$102 billion in 2022, compared with \$86 billion in 2021.
- Offshore investments are set to increase 7%, to \$155 billion from \$145 billion, while conventional onshore will rise 8%, to \$290 billion from \$261 billion.

NATURAL GAS ⁽²⁾

- Overall oil and gas investments will grow 4% to \$628 billion this year from \$602 billion in 2021.
- A significant contributor is a 14% increase in upstream gas and LNG investments. The segments will be the fastest growing this year, with an investment jump to around \$149 billion in 2022 from \$131 billion in 2021.
- While short of pre-pandemic totals, investments in the sector are expected to surpass 2019 levels of \$168 billion in just 2 years, reaching \$171 billion in 2024.

PROPANE AND HEATING/FUEL OIL ⁽³⁾

- The supply of propane cannot easily be adjusted to meet increased demand because of the by-product nature of propane production.
- About 90% of U.S. propane is domestically produced. The United States imports about 10% of the propane consumed each year, with about 70% of that coming from Canada via pipeline and rail.
- The remaining 30% of imported propane comes to the United States from other sources via ocean transport.

(1) Oil & Gas Journal.

(2) Oil & Gas Journal.

(3) Wikipedia.

FACTOIDS: LITTLE-KNOWN FACTS AND STATS

LUBRICANTS AND GREASES ⁽¹⁾

- China overtook the United States in 2021 as the country with the most base oil refining capacity. Since 2010 its capacity has tripled from 4.6 million tons per year.
- State-owned Sinopec, PetroChina and China National Offshore Oil Co. operate 19 base oil plants, while independent and semi-independent refiners have opened 15 others. Two-thirds of capacity is Group II or III.
- China is the only nation with a large base oil supply base that does not export significant volumes to other markets.

SOLAR ⁽²⁾

- Almost half of the planned 2022 capacity additions of new utility-scale electric generating capacity are solar, followed by natural gas at 21% and wind at 17%.
- U.S. utility-scale solar generating capacity will grow by 21.5 GW in 2022. This planned new capacity would surpass last year's 15.5 GW of solar capacity additions.
- Most planned solar additions in 2022 will be in Texas (6.1 GW or 28% of the national total), followed by California (4.0 GW).

WIND ⁽³⁾

- In 2021, a record-high 17.1 GW of wind capacity came online in the United States.
- Another 7.6 GW of wind capacity is scheduled to come online in 2022.
- About half (51%) of the 2022 wind capacity additions were located in Texas. The 999 MW Traverse Wind Energy Center in Oklahoma, the largest wind project expected to come online in 2022, is scheduled to begin commercial operations in April.

(1) Lubricants Greases Magazine.
(2) U.S. Energy Information Administration.
(3) U.S. Energy Information Administration.

FACTOIDS: LITTLE-KNOWN FACTS AND STATS

OIL AND GAS FIELD SERVICES ⁽¹⁾

- The market size of the oil and gas field services industry measured by revenue is expected to be \$89.3 billion in 2022.
- The market size of the oil and gas field services industry is expected to increase 4.5% in 2022.
- There are 29,115 oil and gas field services businesses in the U.S. as of 2022, a decline of 1.1% from 2021.
- There are 276,897 people employed in the oil and gas field services industry in the U.S. as of 2022.
- The average business in the oil and gas field services industry in the U.S. now employs more workers than it did five years ago.

EQUIPMENT AND PHYSICAL TECHNOLOGY ⁽²⁾

- Terminal automation is a key emerging trend in liquid bulk terminals.
- It helps operators transport different grades of bulk liquids, manage high-risk settings, deliver accurate amounts of bulk liquids in small vessels and maintain an optimum level of safety and security.
- Automation integrates software and mechanical equipment that work on command and offers automatic scheduling, inventory management, safety features and recordkeeping.

STORAGE AND TERMINALS ⁽³⁾

- The global oil storage terminal market is projected to grow from \$30.16 billion in 2021 to \$41.50 billion by 2028 at a compound annual growth rate of 4.7% in the 2021 to 2028 period.
- The increasing oil trade will increase the demand for commercial terminals vs. strategic reserve terminals.
- Oil storage terminals witnessed a positive demand shock across all regions due to the pandemic, with the global market showing a growth of 7.0% in 2020.

(1) IbisWorld.

(2) Gordon Brothers.

(3) Fortune Business Insights.

FACTOIDS: LITTLE-KNOWN FACTS AND STATS

PIPELINES (1)

- In 2021, pipeline companies completed 14 petroleum liquids pipelines projects in the United States.
- This total includes seven crude oil pipeline projects and seven hydrocarbon gas liquids pipeline projects. No petroleum product pipeline projects were completed last year.
- During 2021, 11 new pipeline projects were announced and 2 projects were listed as under construction. An additional 10 projects were permanently canceled and 5 projects were put on temporary hold as of the end of 2021.

TRUCKERS (2)

- In 2020, trucks moved 10.23 billion tons of freight – down from 11.84 billion tons the previous year.
- Trucking employed 7.65 million people in industry-related jobs, including 3.36 million professional truck drivers.
- Women made up 7.8% of the nation's drivers – an all-time high – and minorities accounted for 42.3% of truck drivers in 2020.
- Trucking remains a small business industry: 91.5% of fleets operate six or fewer trucks and 97.4% operate less than 20.

(1) U.S. Energy Information Administration.

(2) American Trucking Association.

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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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ABOUT THE ENERGY EQUIPMENT & INFRASTRUCTURE ALLIANCE

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



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