



TEXAS

“Texas’ economy remained robust in the longest national economic expansion on record. Stable hiring in an environment of historically low unemployment pushed real income per capita upward in the third quarter. However, compositional changes in the Texas workforce pulled down average real wage growth. **Low mortgage rates and ongoing strength in the state economy supported housing sales** while residential construction activity accelerated. **Energy prices rose**, with oil much above the commonly considered break-even price of \$50 per barrel. **Export values increased as the dollar depreciated**, and steps were taken to ratify the U.S.-Mexico-Canada Agreement (USMCA) and resolve the U.S-China trade dispute. **Political and trade-related uncertainty are the greatest headwinds to Texas’ economic growth in 2020.”** – Jan 2020 - Outlook for the Texas Economy - Real Estate Center (REC) – Texas A&M University

AUSTIN

“The Austin economy continued to expand in November. The Austin Business-Cycle Index grew near its long-term average. Unemployment remained unchanged from the previous month, while job growth slowed somewhat in recent months. **Housing affordability increased in third quarter 2019**, metro home sales were robust, and median home prices decreased.”- Jan 2020 – Austin Economic Indicators – Dallas Fed



UNITED STATES

“The U.S. economy begins the year 2020 in a good place. The unemployment rate is at a 50-year low, inflation is close to our 2 percent objective, gross domestic product growth is solid, and the Federal Open Market Committee's (FOMC) baseline **outlook is for a continuation of this performance in 2020.”**

“We are not seeing any evidence to date that a strong labor market is putting excessive cost-push pressure on price inflation.” - Jan 2020 – Board of Governors – Federal Reserve System

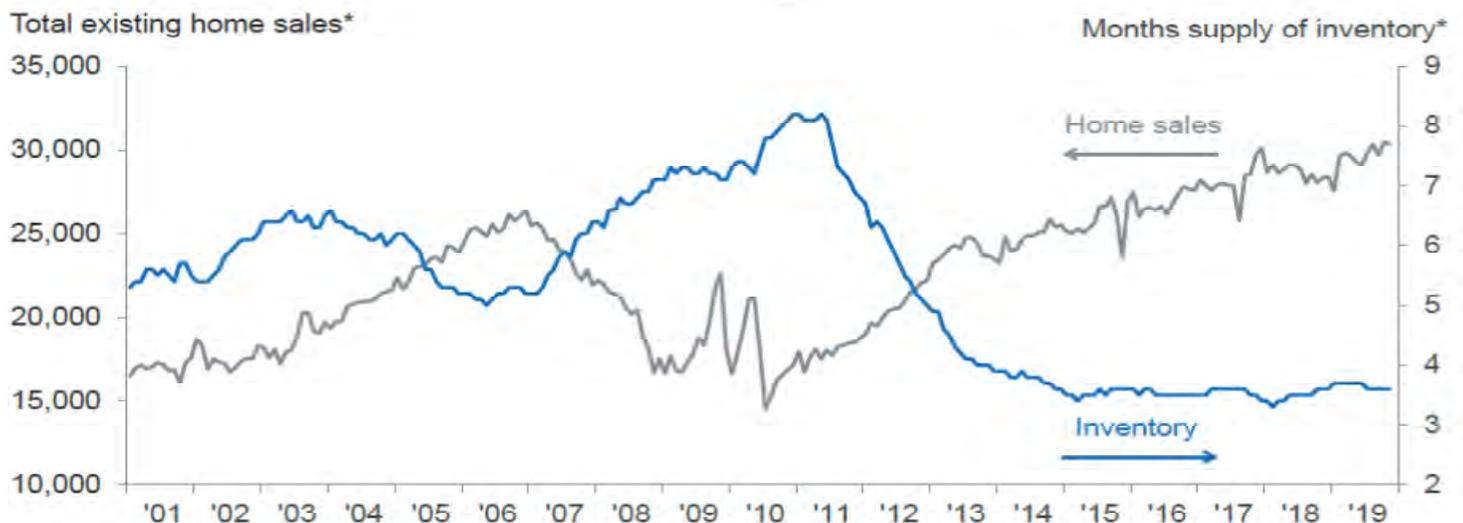
HOUSING – HOME SALES AND MONTHS OF INVENTORY

“Texas housing sales stabilized in November after reaching a record high the previous month. Steady employment growth and low mortgage interest rates continued to support housing demand, as exemplified by rising mortgage applications and a downtick in the average days on market.

As home builders continued to concentrate their efforts to provide more affordable homes, inventory for homes priced less than \$300,000 expanded for the first time since February. Additional supply at the lower end of the market pushed Austin sales to record-breaking levels while also supporting an increase in San Antonio’s sales volume.

On the other hand, November home purchases in Houston and North Texas fell due to low inventories in the same price range. Although home-price appreciation has moderated over the past few years, housing affordability remains the primary challenge to the Texas housing market.” – Dec 2019 – Texas Housing Insight – Real Estate Center

Texas Home Sales Elevated, Inventories Remain Flat



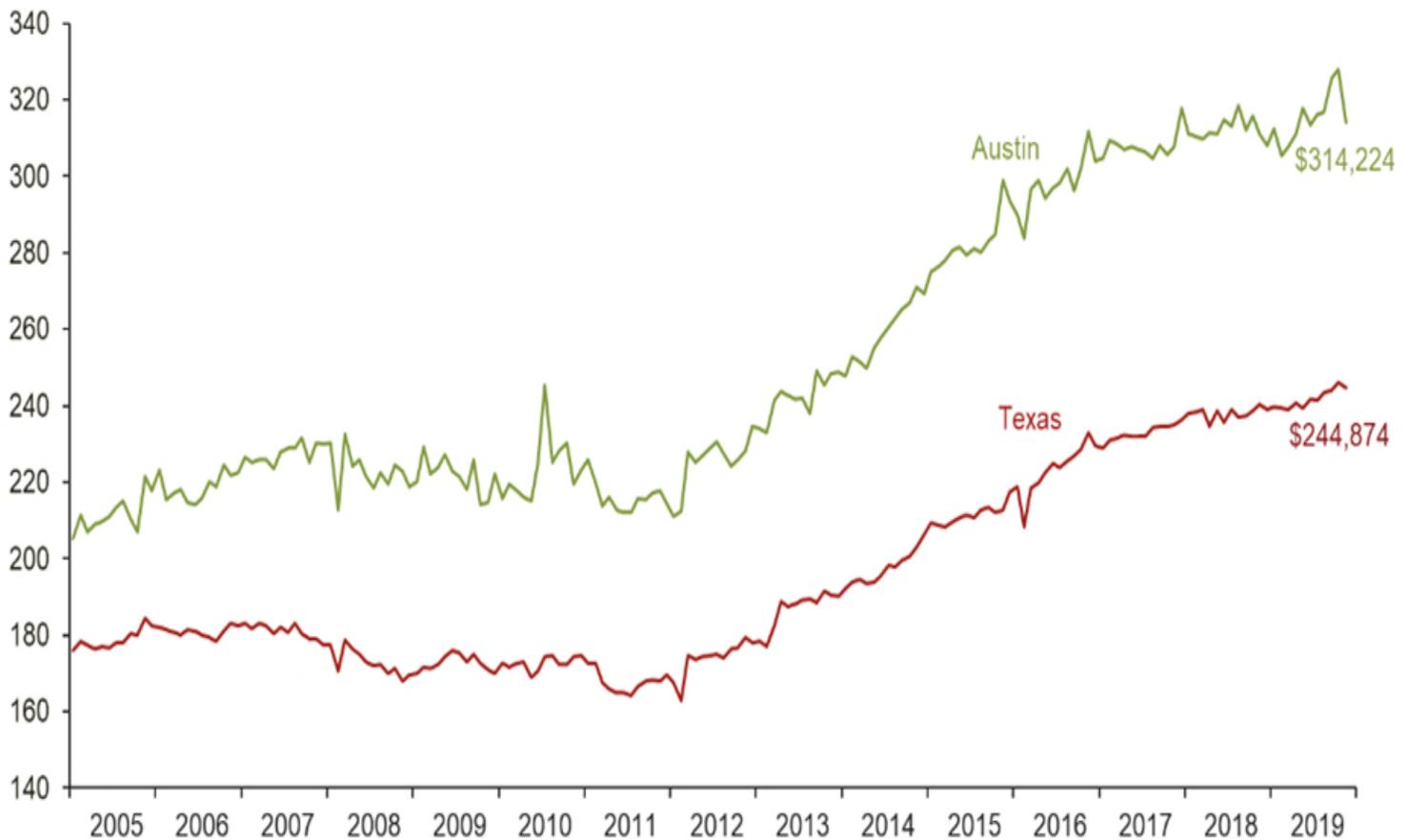
*Seasonally adjusted.
 NOTE: Data through November 2019.
 SOURCES: Multiple Listing Service; seasonal and other adjustments by FRB Dallas.

HOUSING – MEDIAN HOME PRICES

“The median home price in Austin dropped to \$314,224 in November but was up 1.0 percent year over year. The Texas median home price ticked down to \$244,874—a 1.9 percent increase year over year. Austin home inventory remained at 2.2 months, far below the six months considered a balanced market.” – Jan 2020 – Austin Economic Indicators - Dallas Fed

Median Home Prices

Thousands of dollars, real



SOURCE: Multiple Listing Service.

Provided by Federal Reserve of Dallas – Austin Economic Indicators – Jan 2020

HOUSING – HOME AFFORDABILITY

“Housing affordability, defined as the percentage of homes sold that the median-income household can afford, has steadily risen at the metro and national levels since second quarter 2018. **Austin’s affordability index ticked up from a reading of 62.4 in second quarter 2019 to 66.4 in the third quarter.** The U.S. index increased from 60.9 to 63.6 during those periods, likely due to the declining mortgage rates since October 2018.” – Jan 2020 – Austin Economic Indicators – Dallas Fed

Housing Affordability



SOURCE: National Association of Home Builders/Wells Fargo

Provided by Federal Reserve of Dallas – Austin Economic Indicators – Jan 2020

JOBS - UNEMPLOYMENT RATES – AUSTIN MSA, TEXAS, U.S.

“Austin’s unemployment rate lingered at 2.7 percent in November for the fourth consecutive month. The unemployment rate for the state held at 3.4 percent for the fifth consecutive month, while the jobless rate for the U.S. ticked down to 3.5 percent [hitting a 50-year low for the second time in three months]. During the first 11 months of 2019, the metro’s labor force grew 2.1 percent annualized, a slow rate compared with 2017 (3.6 percent) and 2018 (2.7 percent).” – Jan 2020 - Dallas Fed

Unemployment Rate

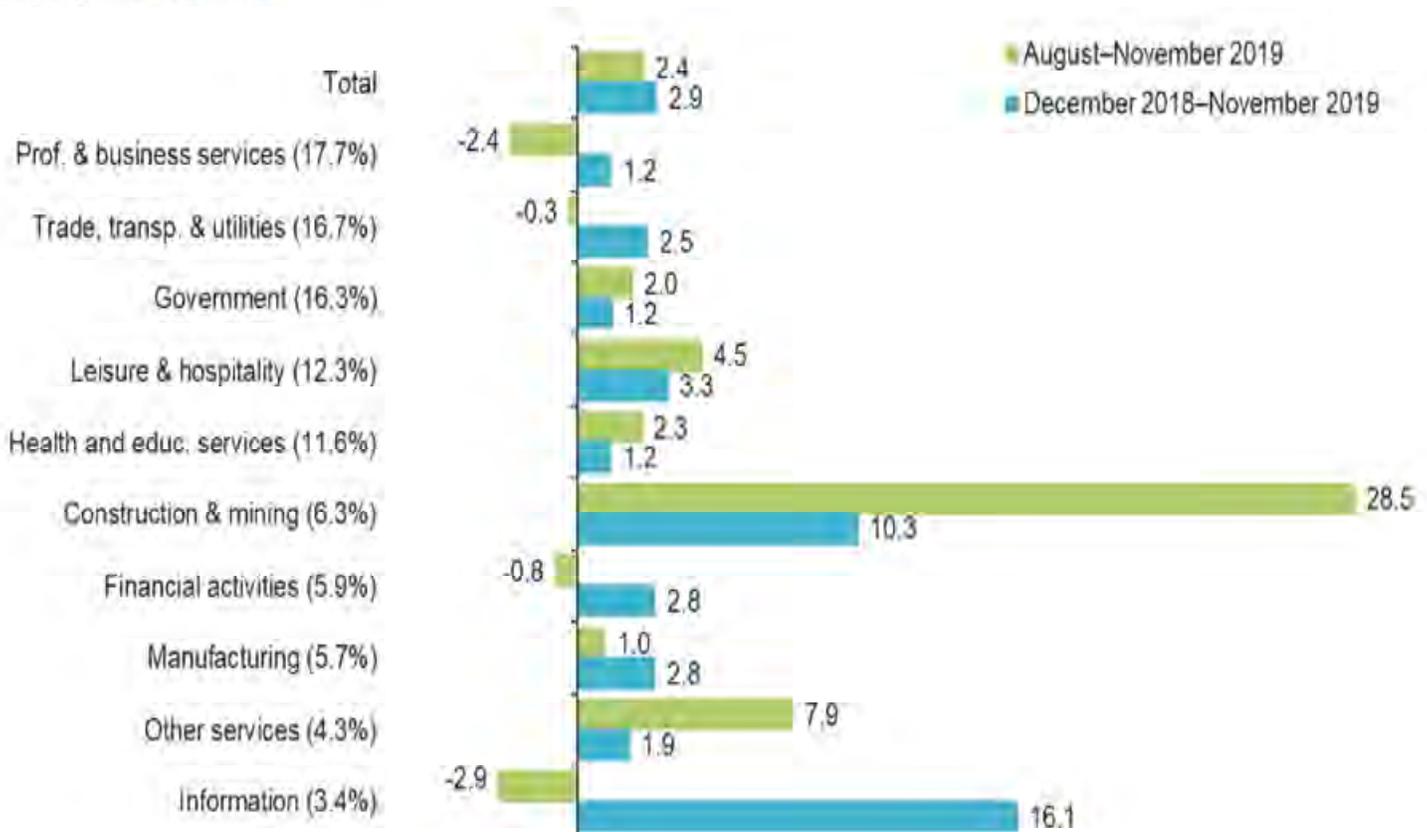


*Seasonally adjusted.
SOURCE: Bureau of Labor Statistics.

JOBS – GROWTH RATE – AUSTIN

“In the three months ending in November, Austin jobs were added at a moderate rate of 2.4 percent, or a net 6,700 jobs. Growth was led by the construction and mining sector, which added 4,200 net jobs (28.5 percent). Other services (7.9 percent; 900 jobs) and leisure and hospitality (4.5 percent; 1,500 jobs) also posted strong growth. Industries that saw net job contractions during this period were professional and business services (-1,200 jobs), information (-290 jobs), financial activities (-130 jobs) and trade, transportation and utilities (-140 jobs).” – Jan 2020 - Austin Economic Indicators - Dallas Fed

Employment Growth



NOTE: Data show seasonally adjusted and annualized percentage employment growth by industry. Numbers in parentheses represent share of total employment and may not sum to 100 due to rounding.

SOURCE: Bureau of Labor Statistics; Texas Workforce Commission; adjustments by the Dallas Fed.

JOBS – TEXAS UNEMPLOYMENT vs. OTHER STATES

In November 2019, Texas' unemployment rate ranking tied for 24th in the country.

State	November 2019 (p)	Rank	State	November 2019 (p)	Rank
Vermont	2.3	1	Texas	3.4	24
South Carolina	2.4	2	Rhode Island	3.5	28
Utah	2.4	2	Arkansas	3.6	29
North Dakota	2.5	4	Maryland	3.6	29
Colorado	2.6	5	Connecticut	3.7	31
Hawaii	2.6	5	Wyoming	3.7	31
Iowa	2.6	5	Delaware	3.8	33
New Hampshire	2.6	5	Illinois	3.8	33
Virginia	2.6	5	North Carolina	3.8	33
Alabama	2.7	10	California	3.9	36
Maine	2.8	11	Oregon	3.9	36
Idaho	2.9	12	Michigan	4.0	38
Massachusetts	2.9	12	Nevada	4.0	38
Florida	3.1	14	New York	4.0	38
Kansas	3.1	14	Ohio	4.2	41
Missouri	3.1	14	Pennsylvania	4.3	42
Nebraska	3.1	14	Kentucky	4.4	43
South Dakota	3.1	14	Washington	4.4	43
Indiana	3.2	19	Arizona	4.7	45
Georgia	3.3	20	Louisiana	4.7	45
Minnesota	3.3	20	New Mexico	4.8	47
Tennessee	3.3	20	West Virginia	4.9	48
Wisconsin	3.3	20	Mississippi	5.6	49
Montana	3.4	24	Alaska	6.1	50
New Jersey	3.4	24	Footnotes		
Oklahoma	3.4	24	(p) Preliminary		

Source of Data: Bureau of Labor Statistics

JOBS – WOMEN OVERTAKE MEN AS MAJORITY OF U.S. WORKFORCE

“Women held more U.S. jobs than men in December for the first time in nearly a decade, a development that likely reflects the future of the American workforce. The share of women on payrolls, excluding farmworkers and the self-employed, exceeded the share of men in December for the first time since mid-2010, Labor Department data released Friday showed. Women held 50.04% of jobs last month, surpassing men on payrolls by 109,000.

‘The [jobs] report strongly suggests that the labor market dynamics are tilting in the direction of women,’ Joe Brusuelas, chief economist at RSM US, said in a note to clients. ‘We all often look for tangible evidence of change. It is now here in the data and can be used as a benchmark to measure equality and inequality in the labor force and the economy.’

The gap between men and women on payrolls had been narrowing over recent years, reflecting growth in services industries that employ higher numbers of women, such as health care.



“The sectors that are growing, like education and health care, are predominantly women’s employment,’ said Ariane Hegewisch, program director of employment and earnings at the Institute for Women’s Policy Research.

‘Looking at the 21st century, it is really amazing how profound some of the [sex] segregation is in the labor market.’” – January 10, 2020 – Amara Omeokwe – The Wall Street Journal

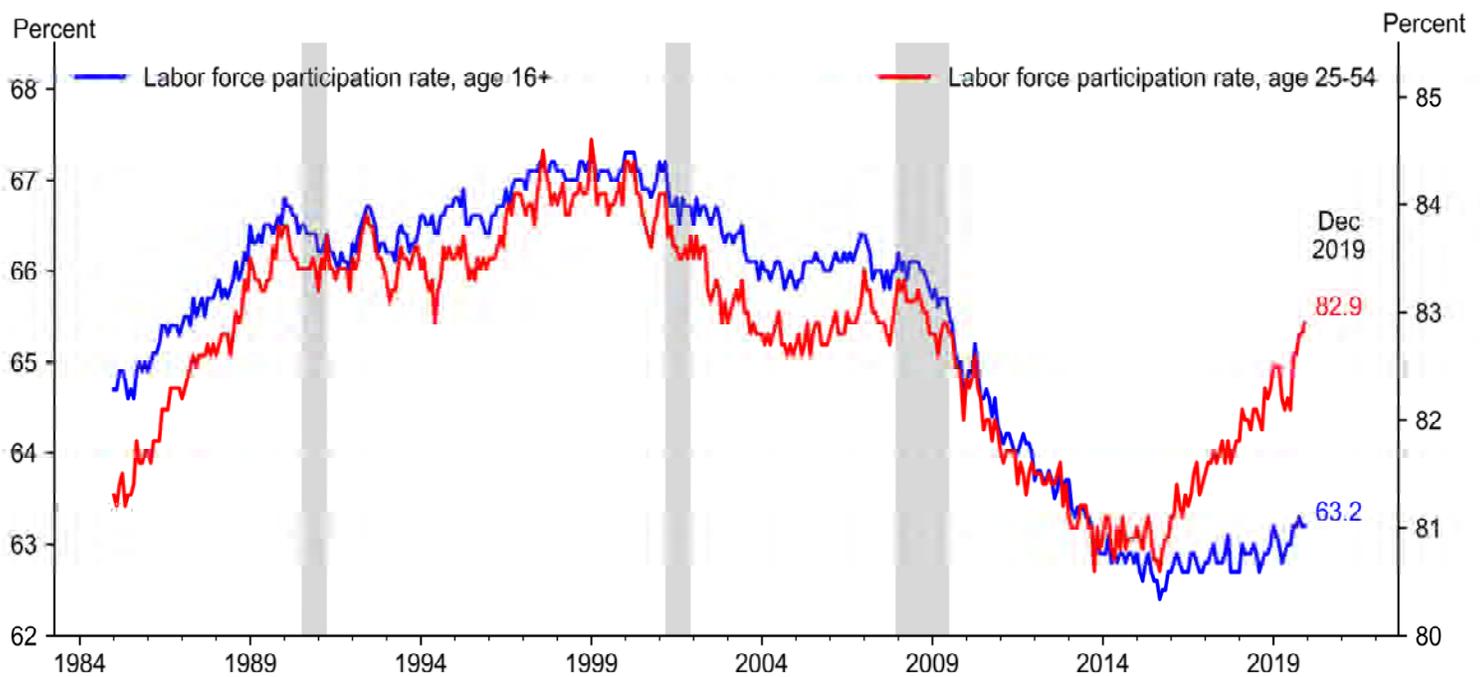
JOBS – LABOR PARTICIPATION RATE

“Year to year -- since December 2018 -- **1,858,000 more workers have been added to American payrolls.**”

“In December, the civilian non-institutional population in the United States was 260,181,000.”

“Of that civilian non-institutional population, 164,556,000 were participating in the labor force, meaning that they either had a job or were actively seeking one during the last month. This resulted in a **labor force participation rate of 63.2 percent, not significantly different than it's been for months.**”

The labor force participation rate has never been higher than 67.3 percent, a level achieved in the early months of 2000. The Trump-era high was set in October at 63.3 percent. Economists say retiring baby boomers account for some of the decline since the turn of the century.” – Jan 2020 - cnsnews



SOURCES: Bureau of Labor Statistics.

The **labor force participation rate**, as defined by the Bureau of Labor Statistics (BLS), is “the percentage of the population [16 years and older] that is either employed or unemployed [that is, either working or actively seeking work].”

CONSUMER CONFIDENCE AND SENTIMENT – U.S.

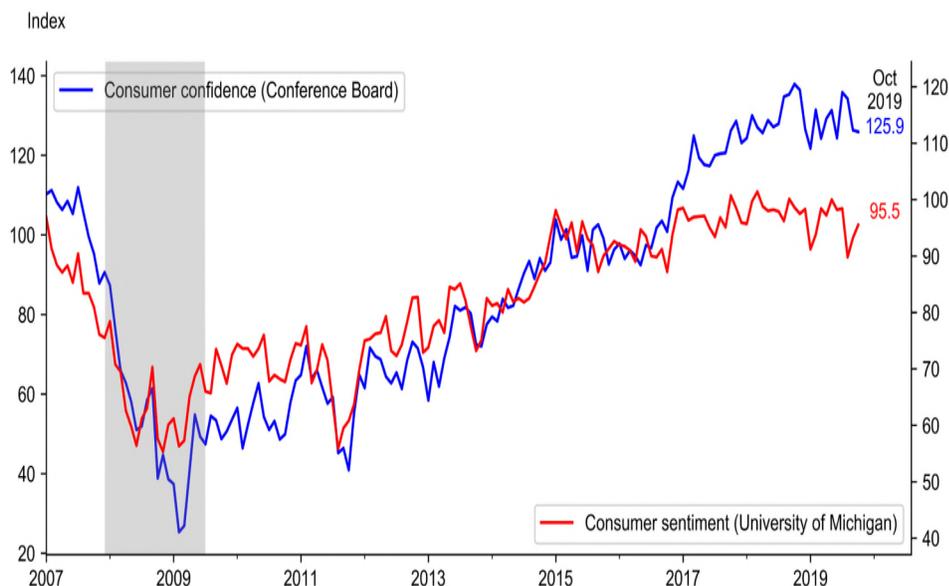
“Consumer confidence declined marginally in December, following a slight improvement in November,” said Lynn Franco, Director of Economic Indicators at The Conference Board. “While consumers’ assessment of current conditions improved, their expectations declined, driven primarily by a softening in their short-term outlook regarding jobs and financial prospects. While the economy hasn’t shown signs of further weakening, there is **little to suggest that growth, and in particular consumer spending, will gain momentum in early 2020.**” – Dec 2019 – The Confidence Board

Surveys of Consumers, Chief economist, Richard Curtin, commented “The Sentiment Index remained largely unchanged in late December at the same very favorable level recorded at mid-month. Most of the December gain was among upper income households, with those in the top third of the income distribution gaining 7.5% from last month and those in the bottom two-thirds posting a gain of just 0.8%. The recent shift favoring higher income households is in the opposite direction when compared with all-time peaks in the late 1990’s. **The impeachment hearing had a barely noticeable impact on economic expectations, as it was mentioned by just 2% of all consumers in the December survey.**

Inflation expectations declined in the December survey, with both the year-ahead and five-year expected inflation rates falling. For the year-ahead, an annual inflation rate of 2.3% was expected, the lowest since 2.2% was recorded twice, in December 2016 and September 2010 prior to the Great Recession’s lows.”

U.S. consumer **confidence** index (CCI) is defined as “**the degree of optimism on the [current] state of the economy** that consumers are expressing through their activities of savings and spending.” – Wikipedia

U.S. consumer **sentiment** is defined as “the indicator of the **future course of the national economy.**” – Investopedia



SOURCES: The Conference Board; University of Michigan.

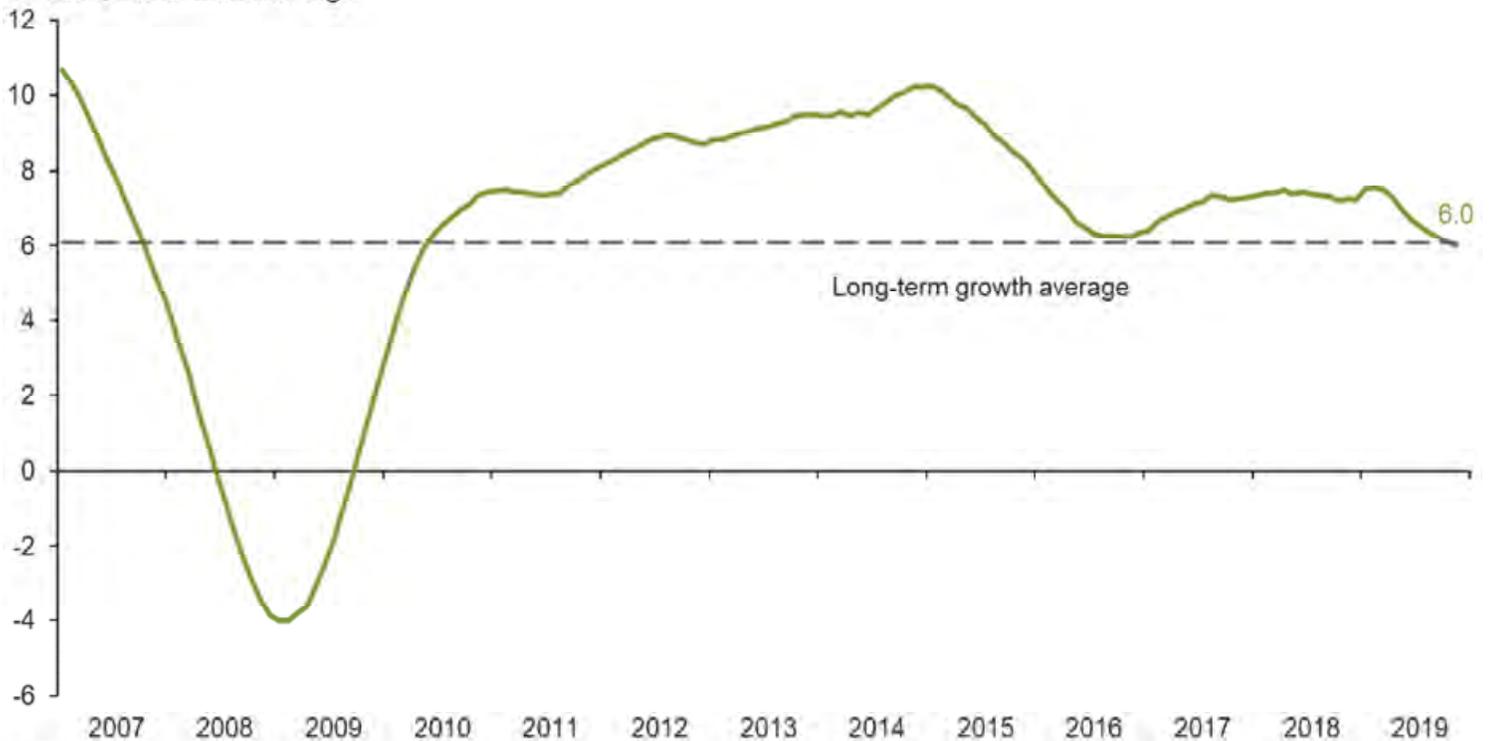
Provided by Federal Reserve of Dallas – U.S. Economy Charts – 2019

BUSINESS CYCLE INDEX – AUSTIN MSA

“The Austin Business-Cycle Index's **November growth** marked **more than 10 years of consecutive expansion**. In November, the index expanded slightly below its long-term average of 6.1 percent—the lowest rate since May 2010. **The recent moderation in growth in the index is likely due to tightness in the labor market constraining job growth.**” – Jan 2020 - Austin Economic Indicators - Dallas Fed

Austin Business-Cycle Index

Percent, month/month change*



*Seasonally adjusted, annualized rate.

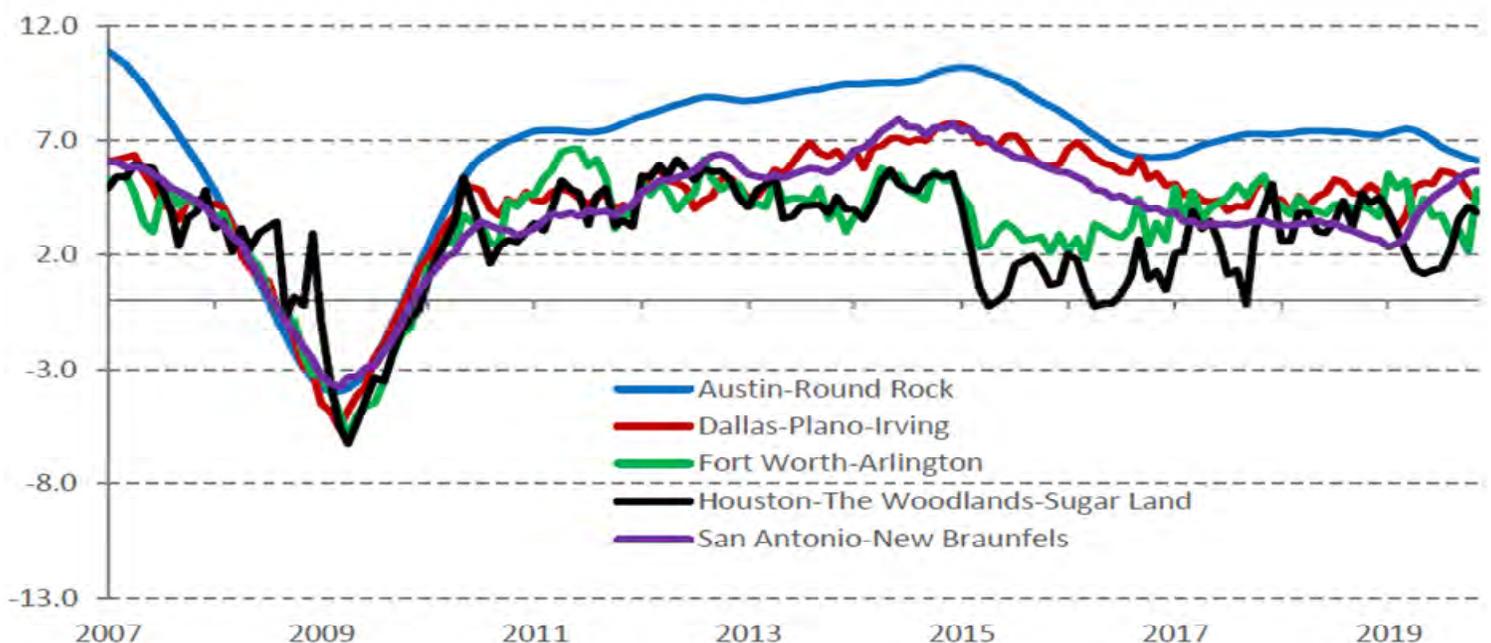
SOURCE: Dallas Fed.

Business Cycle Indexes are meant to reflect broad movements in local economic conditions. The Dallas Fed states that “the [local area] indexes are constructed based on the aggregated movements in the local area unemployment rate, nonagricultural employment, inflation-adjusted wages, and inflation-adjusted retail sales. The weights of the components are statistically optimized for each metropolitan area in order to best capture the underlying cyclical movements in the local area economy.”

BUSINESS CYCLE INDEX – MAJOR METROS

“Solid economic conditions continued into the fourth quarter, pushing the Dallas Fed’s Texas Business-Cycle Index up 4.6 percent SAAR [seasonally adjusted annualized rate] in November, the highest growth rate this year. Payroll expansions in Fort Worth raised the index 4.9 percent, while Central Texas grew 6.1 and 5.6 percent in Austin and San Antonio, respectively. Ongoing decreases in inflation-adjusted wages hampered the Dallas and Houston indices, which decelerated to 4.4 and 3.9 percent growth, respectively, but otherwise remained strong.” – Outlook for the Texas Economy – Real Estate Center

Major Metros Business Cycle Index
(Quarter-over-Quarter Percent Change)



Source: Federal Reserve Bank of Dallas – Seasonally adjusted.
Provided: Outlook for the Texas Economy – Real Estate Center

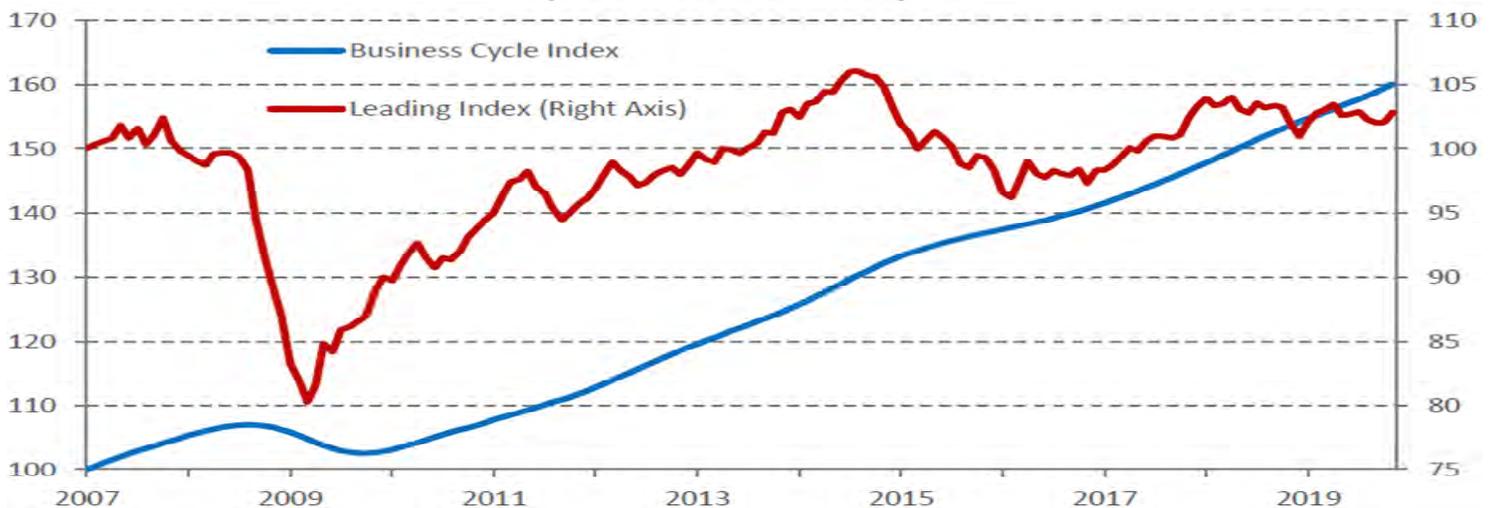
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BUSINESS CYCLE INDEX AND LEADING INDEX – TEXAS

“The **Texas Business-Cycle Index**, a composite of the unemployment rate, state payroll employment and gross state product, measures underlying economic activity in the state. This index **grew an annualized 4.8 percent in November, accelerating for the eighth straight month** after nearly a year of slowing growth from mid-2018 to early 2019.” – Dec 2019 – Texas Economic Indicators – Dallas Fed

“The **Texas Leading Economic Index** (a measure of future directional changes in the business cycle), **increased for the second straight month**, indicating healthy growth to start the new decade. A decline in the Texas value of the dollar, making domestic goods relatively less expensive, was the largest contributor pulling the index up.” – Jan 2020 - Outlook for the Texas Economy – Real Estate Center

Texas Business Cycle Index and Leading Index
(Index Jan 2007 = 100)



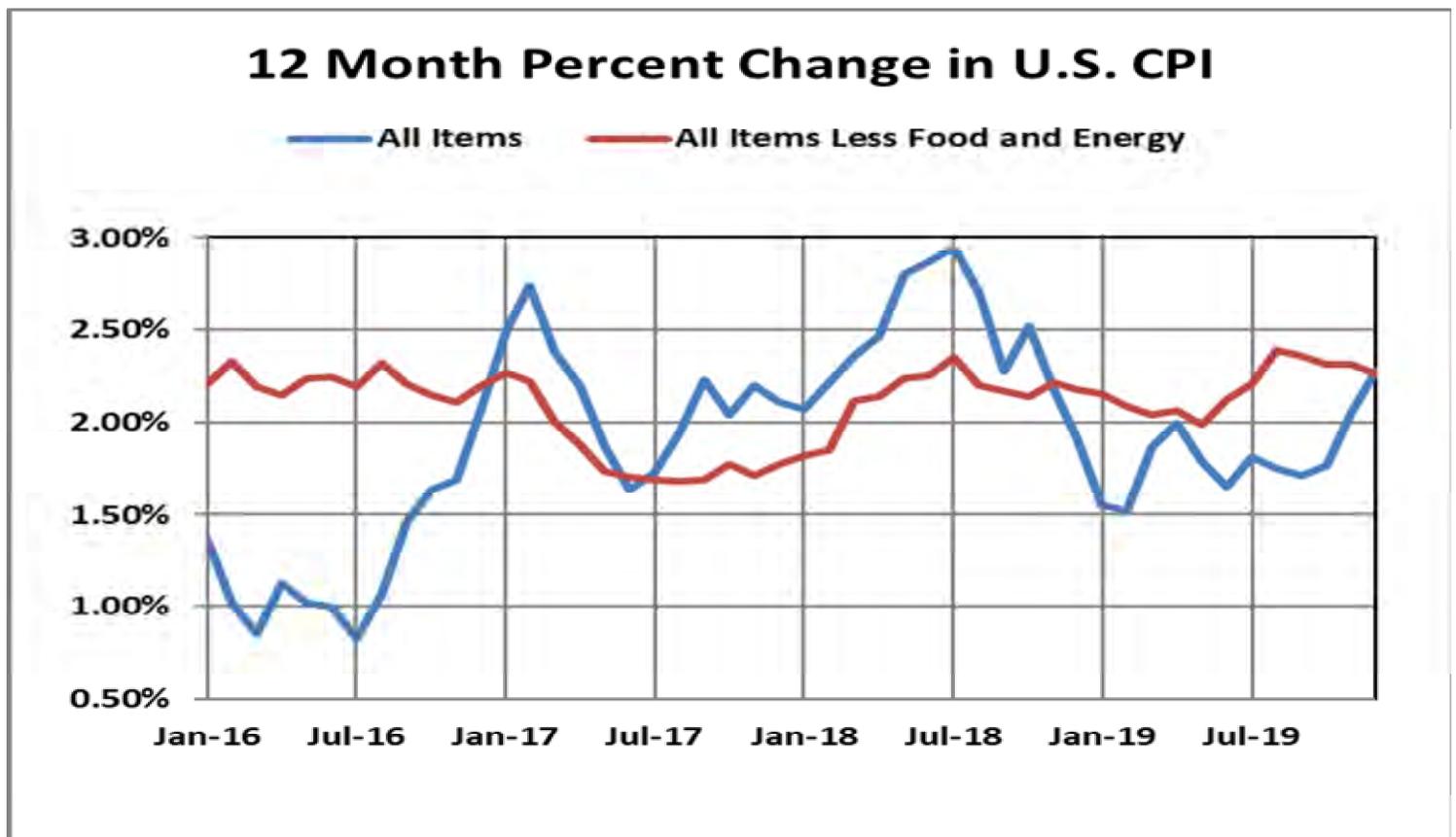
*Source: Federal Reserve Bank of Dallas – Seasonally adjusted.
Provided: Outlook for the Texas Economy – Real Estate Center*

“The **Texas Business-Cycle Index** is a single economic statistic that helps gauge the **current state** of the Texas economy. The Texas Business-Cycle Index is constructed using payroll employment, gross state product and the unemployment rate.” – Dallas Fed

Dallas Fed has defined the **Texas Leading Index** as the “single summary statistic that sheds light on **the future of the State's economy**.” The Texas Leading Index is made up of eight leading indicators that have been shown to change direction – up or down – before the overall economy. The eight indicators used by the Dallas Fed are the Texas value of the dollar, U.S. leading index, real oil price, well permits, initial claims for unemployment insurance, Texas stock index, help-wanted index and average weekly hours worked in manufacturing.

CONSUMER PRICE INDEX

“The **all items index increased 2.3 percent** for the 12 months ending December, the largest 12-month increase since the period ending October 2018. The index for **all items less food and energy also rose 2.3 percent** over the last 12 months, the same increase as the periods ending October and November. The food index rose 1.8 percent over the last 12 months, while the energy index increased 3.4 percent.” – Bureau of Labor Statistics – Jan 2020 - Economic News Release



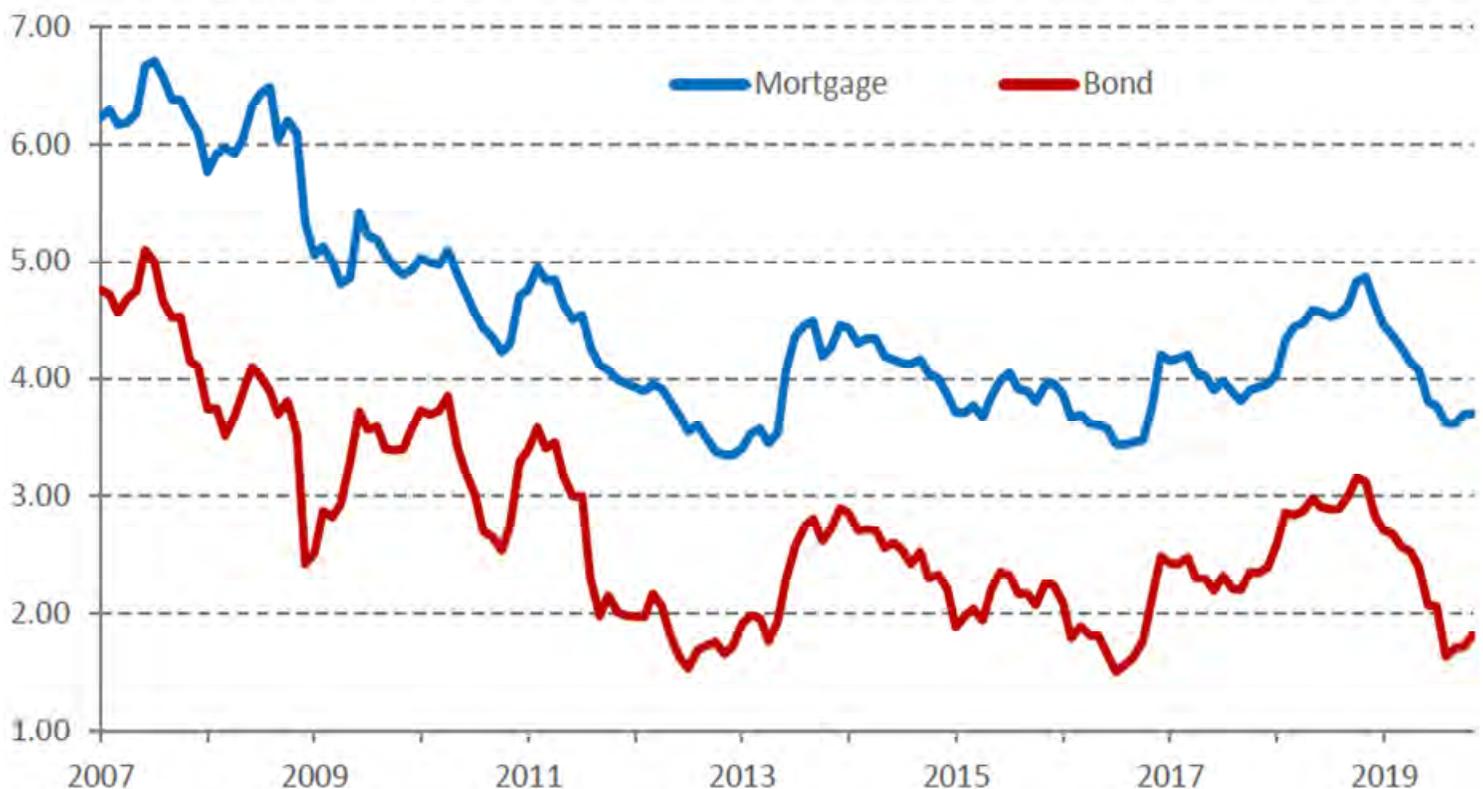
Source: Bureau of Labor Statistics, not seasonally adjusted, 1982-84=100

According to the Bureau of Labor Statistics (BLS), “There are a variety of CPI numbers generated each month. In the graph above, two numbers are compared. The first is the **Official CPI Number** that is reported to the media. It is the broadest and most comprehensive CPI and is called the **All Items CPI for All Urban Consumers**. The second one is called the **All items less food and energy**.” The BLS mentions that “Some users of CPI data use this index because food and energy prices are relatively volatile, and these users want to focus on what they perceive to be the ‘core’ or ‘underlying’ rate of inflation.”

30 YEAR MORTGAGE RATES vs. 10 YEAR BOND YIELD

“Concerns of a recession lessened as current economic fundamentals at the state and national levels remain healthy and stable. The ten-year U.S. Treasury bond yield rose above 1.8 percent, while the Federal Home Loan Mortgage Corporation’s 30-year fixed-rate balanced at 3.7 percent. After falling the previous month, mortgage applications for home purchases climbed nearly 30 percent YTD. Refinance mortgage application activity accelerated as rates were relatively low, almost tripling since year end.” – Jan 2020 - Outlook for the Texas Economy - Real Estate Center

30-Year Mortgage Rate and 10-Year Bond Yield
(Percent)



Source: Federal Reserve Bank of Dallas – Nonseasonally adjusted.
Provided: Outlook for the Texas Economy – Real Estate Center

OIL – RIG COUNT vs. PRODUCTION

“Changes in rigs counts are often seen as a leading indicator for the energy industry. The number of rigs in use determines the number of wells drilled, suggestive of the industry’s near-term outlook. Rig counts have trended down since the end of 2018 and are now at their lowest level since March 2017. Only looking at the rig count, however, doesn’t reveal the full picture. **As the Texas rig count has slipped, crude oil production in Texas has steadily climbed, suggesting that part of the rig count decline is due to increased efficiency instead of a pessimistic industry outlook.**” – Dec 2019 – Texas Economic Indicators – Dallas Fed



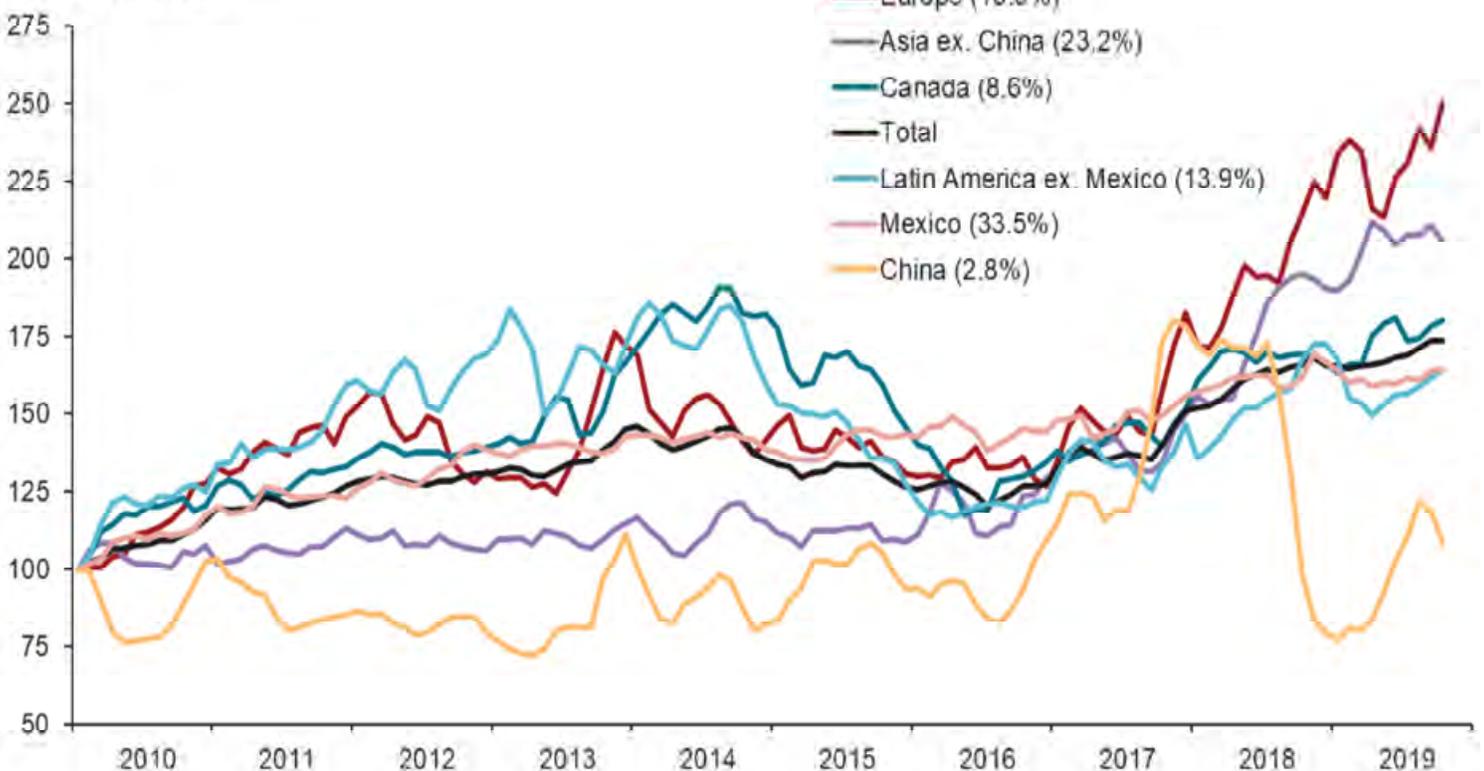
NOTE: Data are through the week ending Dec. 13, 2019.
 SOURCE: Baker Hughes; Energy Information Administration.

TEXAS EXPORTS – BY REGION

“Texas exports fell 1.6 percent in October, marking the second month in a row they have declined. **Exports to China in particular fell, dropping 28.0 percent in September and 25.7 percent in October.** This happened amid several developments in the trade negotiations between the U.S. and China—for example, the Chinese implementation of tariffs on more than \$75 billion of U.S. goods at the end of August. Exports to the rest of Asia held steady in October. **Texas exports to Europe surged in 2019, jumping 27.2 percent so far this year.**” – Dec 2019 – Texas Economic Indicators – Dallas Fed

Texas Exports by Region

Index, 2010 = 100*



*Three-month moving average, real dollars, seasonally adjusted.

NOTE: Numbers in parentheses refer to share of October 2019 Texas exports.

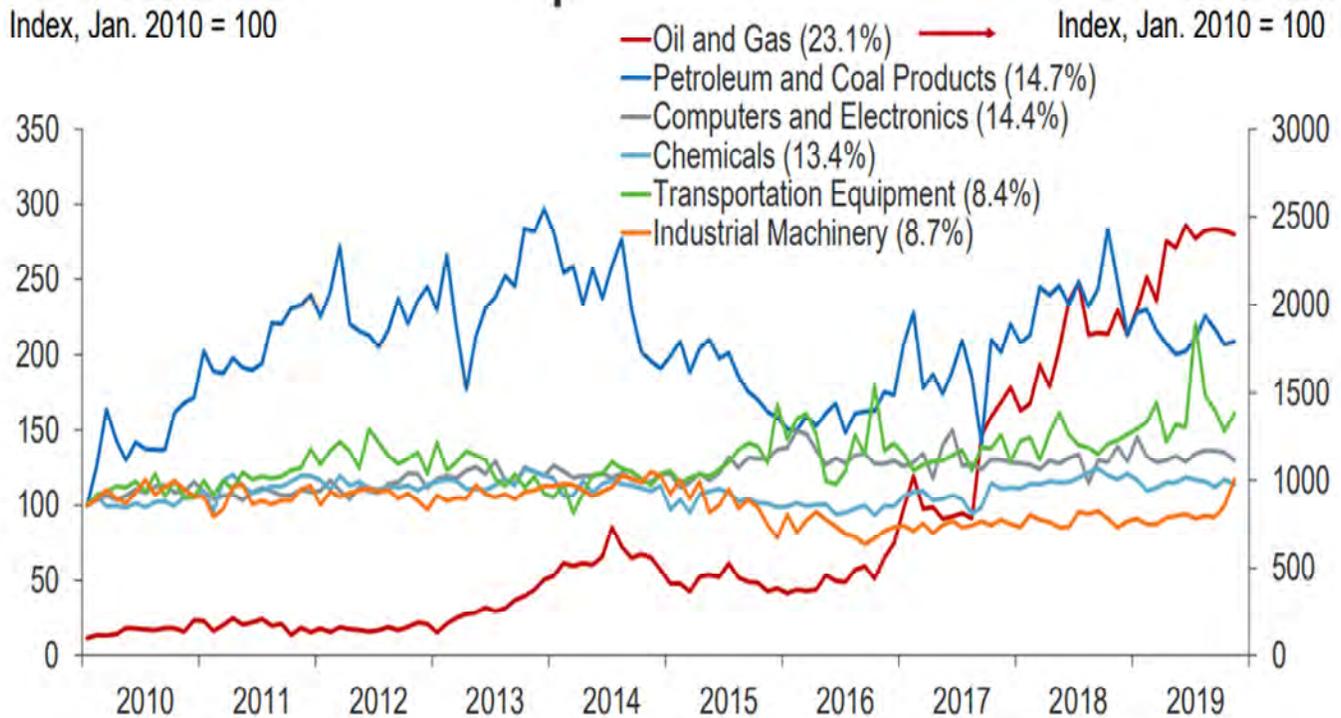
SOURCE: Census Bureau; Bureau of Labor Statistics.

Provided by Federal Reserve of Dallas – Texas Economic Indicators

TEXAS EXPORTS – BY PRODUCT

“Texas is #1 producer of oil and natural gas in nation. Approximately 30% of U.S. refinery capacity and 75% of U.S. petrochemical production is in Texas. Texas is the top exporting state and accounts for 20% of U.S. exports. Gulf coast ports are major exporters of oil and gas, oil products and petrochemicals.” – Your Texas Economy – Federal Reserve of Dallas – Jan 2020

Texas Oil and Gas Exports Surged Following Removal of the Oil Export Ban in 2015



*Seasonally adjusted, real dollars.

NOTE: Data through November 2019. Share of Texas' exports in parentheses.

SOURCES: U.S. Census Bureau; Bureau of Labor Statistics; seasonal and other adjustments by FRB Dallas.

Provided by Federal Reserve of Dallas – Your Texas Economy

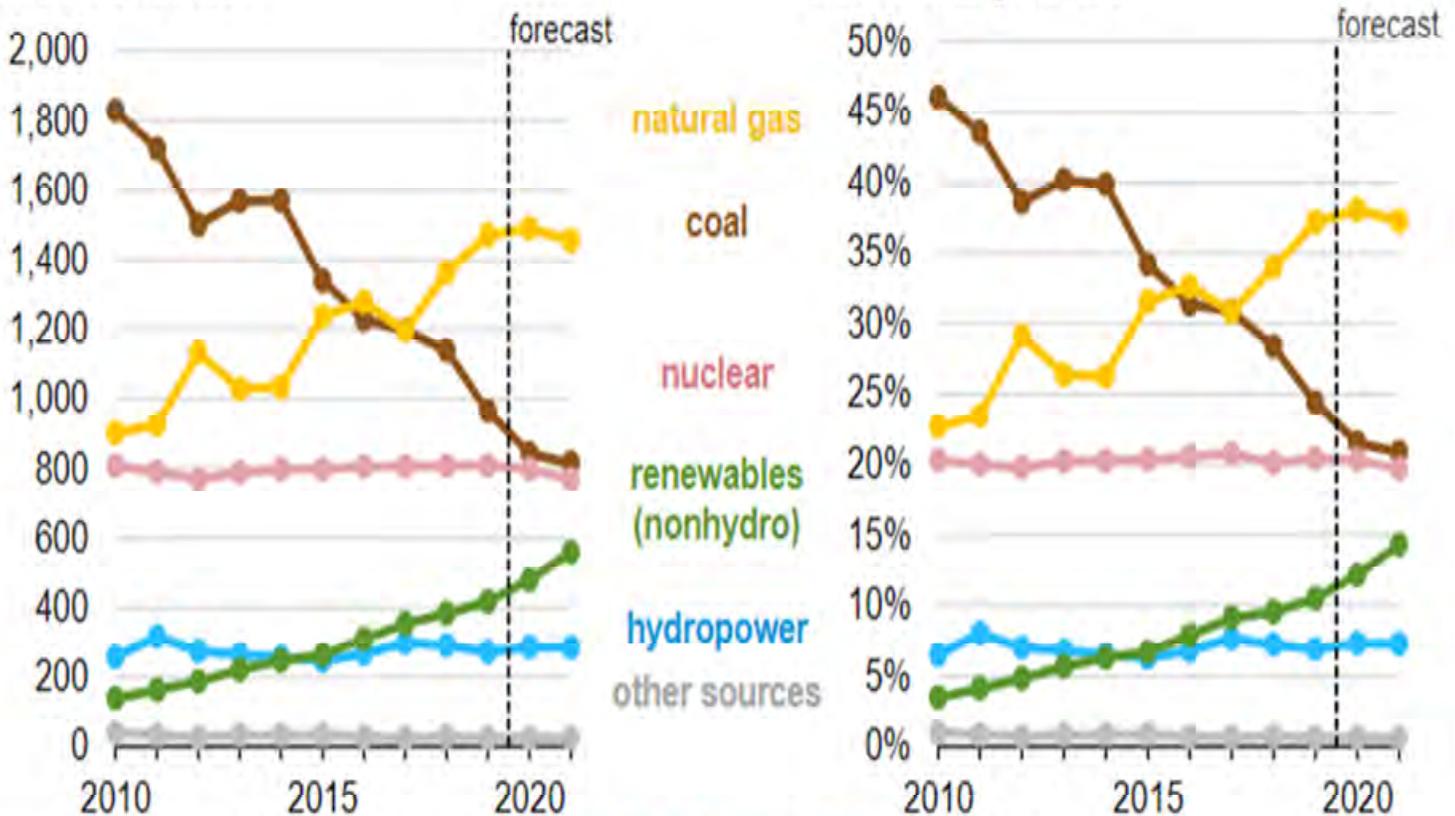
U.S. ENERGY GENERATION BY SOURCE (2010-2021)

“In its latest Short-Term Energy Outlook (STEO), released on January 14, [2020] the U.S. Energy Information Administration (EIA) forecasts that generation from natural gas-fired power plants in the electric power sector will grow by 1.3% in 2020. This growth rate would be the slowest growth rate in natural gas generation since 2017. EIA forecasts that generation from non-hydropower renewable energy sources, such as solar and wind, will grow by 15% in 2020—the fastest rate in four years. Forecast generation from coal-fired power plants declines by 13% in 2020.” – Jan 2020 – U.S. Energy Information Administration

Annual U.S. electric power sector generation by energy source (2010-2021)

billion kilowatthours

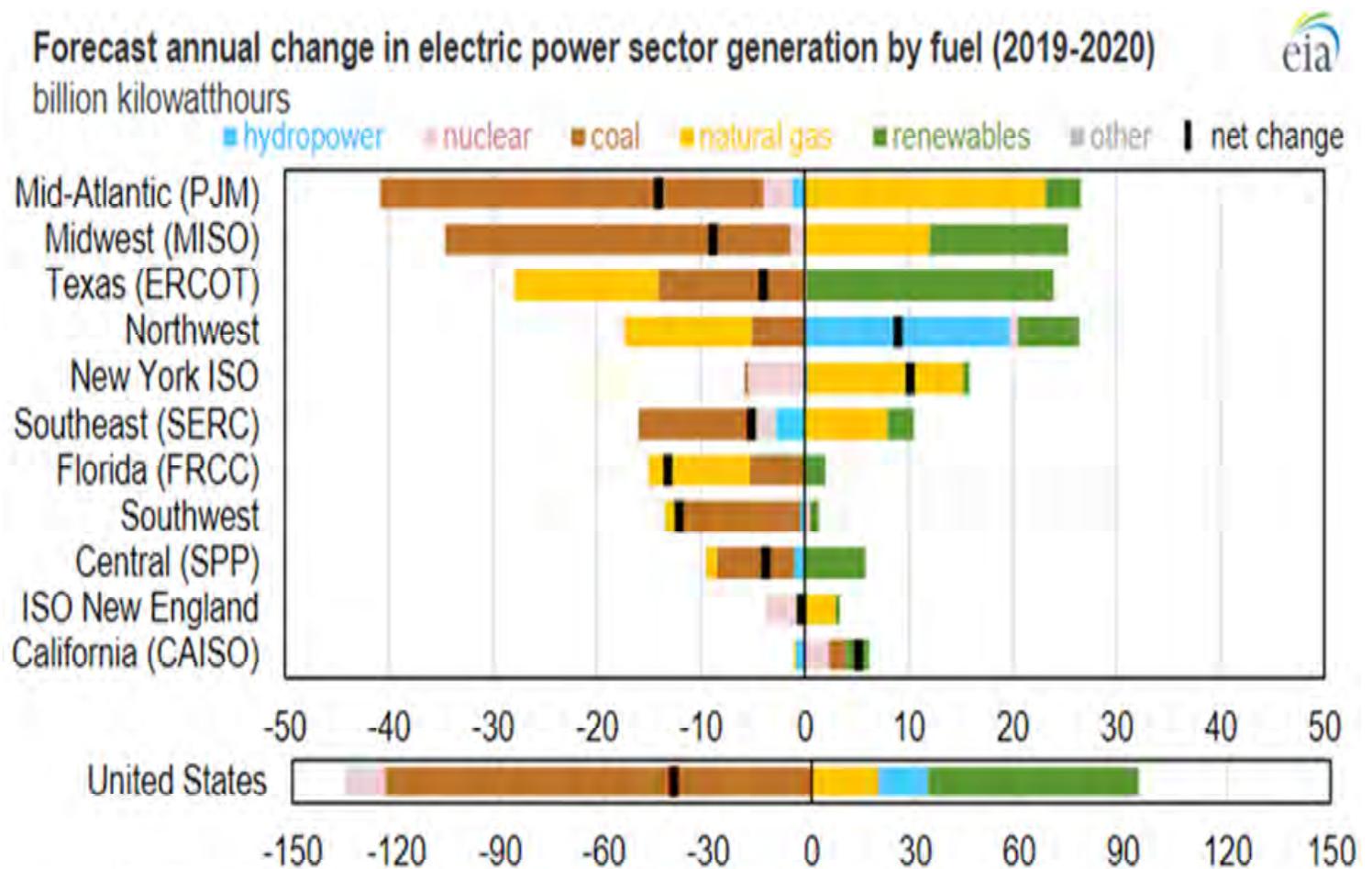
share of total generation



Source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, January 2020

U.S. ENERGY GENERATION - FORECASTED CHANGE BY FUEL (2019-2020)

“The electric power sector in the area of Texas managed by the Electric Reliability Council of Texas (ERCOT) is planning to see large increases in generating capacity from both wind and solar. EIA expects this new capacity will increase generation from non-hydropower renewable energy sources by 24 billion kWh this year. **EIA expects the increased ERCOT renewable generation will lead to a regional decline of natural gas-fired generation and coal generation of 14 billion kWh for each fuel source in 2020.**” – Jan 2020 – U.S. Energy Information Administration



Source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, January 2020

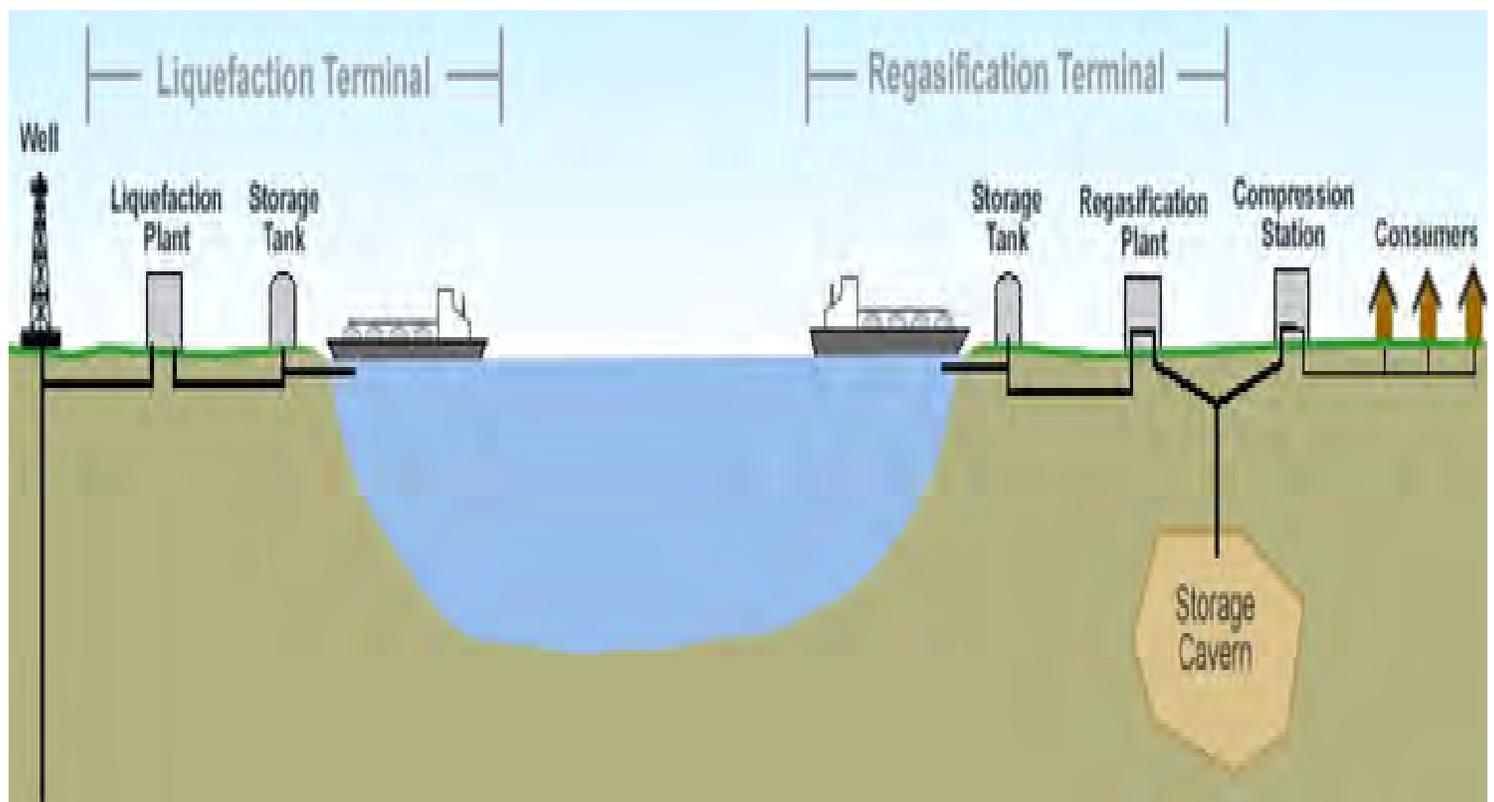
IN-DEPTH – U.S. 3RD LARGEST EXPORTER OF LIQUEFIED NATURAL GAS

WHAT IS LIQUEFIED NATURAL GAS (LNG) AND HOW IS IT EXPORTED?

Liquefied natural gas (LNG) is natural gas “cooled to minus 260° Fahrenheit, the temperature required to change it to a liquid state. This makes natural gas 600 times smaller in volume, so it can be easily shipped.”

“LNG is transported overseas in specialized LNG carrier ships that have super-cooled cryogenic tanks to keep the LNG stable.

After the LNG ships arrive at import terminals, the LNG is warmed and returned to a gaseous state and injected into natural gas pipelines, where it can then be distributed to power plants to generate electricity or directly to homes and businesses for space heating. LNG can also be used to fuel natural gas-powered vehicles and ships.” – May 2019 – Department of Energy



Provided by Geology.com

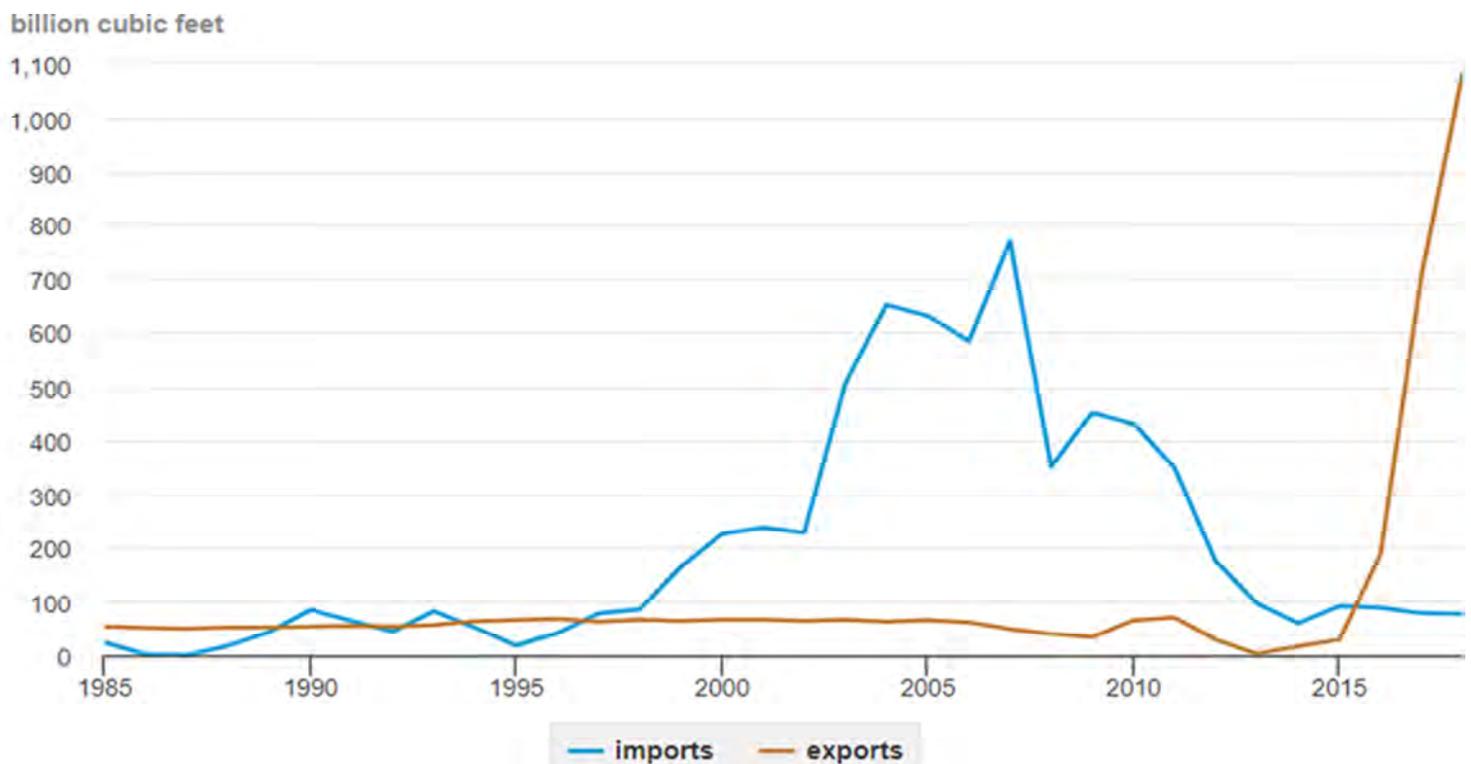
IN-DEPTH – U.S. 3RD LARGEST EXPORTER OF LIQUEFIED NATURAL GAS

HOW DID THE U.S. TRANSITION FROM AN IMPORTER TO EXPORTER?

“In recent years, the United States has become a net exporter of LNG, largely because of **increasing U.S. natural gas production**; declining natural gas imports by pipeline, primarily from Canada; declining LNG imports; and **expansion of LNG-export terminal capacity**.”

“The United States imported very small amounts of LNG until 1995, and then LNG imports generally increased each year until peaking in 2007 at about 771 billion cubic feet (Bcf). Increases in U.S. natural gas production and **expansion of the natural gas pipeline network** have reduced the need to import natural gas. LNG imports declined in most years since 2007.”
 - Jun 2019 – U.S. Energy Information Administration (EIA)

U.S. LNG imports and exports, 1985-2018



eia Source: U.S. Energy Information Administration, *Natural Gas Monthly*, May 2019

IN-DEPTH – U.S. 3RD LARGEST EXPORTER OF LIQUEFIED NATURAL GAS

INCREASED NATURAL GAS PRODUCTION RESULTED IN EXCESS FOR EXPORT

“By the mid-2000s, technological innovations, such as horizontal drilling, helped American natural gas producers unlock previously unreachable natural gas deposits, kicking off a ‘shale revolution’ that has allowed the U.S. to surpass Russia and Iran to become the world’s top producer of oil and natural gas.”- Center for Liquefied Natural Gas

Estimated petroleum and natural gas production in selected countries
quadrillion British thermal units



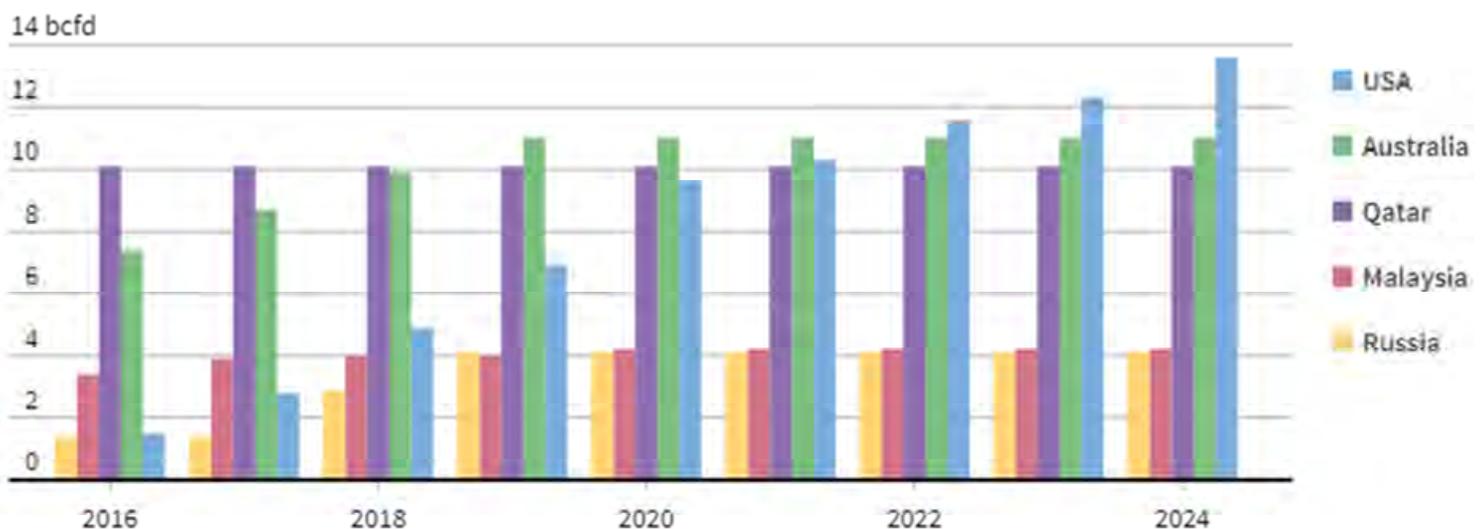
“U.S. petroleum and natural gas production increased by 16% and by 12%, respectively, in 2018, and these totals combined established a new production record. **The United States surpassed Russia in 2011 to become the world's largest producer of natural gas and surpassed Saudi Arabia in 2018 to become the world's largest producer of petroleum.** Last year’s increase in the United States was one of the largest absolute petroleum and natural gas production increases from a single country in history.” – Aug 2019 – EIA

IN-DEPTH – U.S. 3RD LARGEST EXPORTER OF LIQUEFIED NATURAL GAS

INCREASED CAPACITY TO PRODUCE LNG ALLOWED GROWTH IN SALES

U.S. LNG export capacity rises to record high

U.S. liquefied natural gas export capacity to become biggest in world in 2022.



Note: Actuals through 2018, Estimate 2019-2024 from IGU and Reuters

Source: International Gas Union (IGU) and Reuters

Stephanie Kelly | REUTERS GRAPHICS

“Four new liquefaction trains - the common term for a shipping facility - entered service this year in the United States. The U.S. is on track to become the biggest global LNG exporter by 2024.

Despite low prices, U.S. LNG developers in 2019 decided to build a record amount of capacity, and 10 different developers could decide to go ahead with projects in this coming year. However, the headwinds are making it difficult for some developers to sign enough long-term customer agreements needed to finance export projects.

Several LNG developers put off making final investment decisions (FIDs) for new facilities until 2020 as a result.” – Dec 2019 - Reuters

IN-DEPTH – U.S. 3RD LARGEST EXPORTER OF LIQUEFIED NATURAL GAS

ENVIRONMENTAL CONCERNS OF NATURAL GAS PRODUCTION

“Natural gas is mainly methane—a strong greenhouse gas. Some natural gas leaks into the atmosphere from oil and natural gas wells, storage tanks, pipelines, and processing plants. The U.S. Environmental Protection Agency estimates that in 2017, methane emissions from natural gas and petroleum systems and from abandoned oil and natural gas wells were the **source of about 32% of total U.S. methane emissions and about 4% of total U.S. greenhouse gas emissions.**”

“Natural gas exploration, drilling, and production affects the environment.” “Drilling a natural gas well on land may require clearing and leveling an area around the well site. **Well drilling activities produce air pollution and may disturb people, wildlife, and water resources.** Laying pipelines that transport natural gas from wells usually requires clearing land to bury the pipe. Natural gas production can also produce large volumes of contaminated water. Natural gas wells and pipelines often have engines to run equipment and compressors, which produce air pollutants and noise.

In areas where natural gas is produced at oil wells but is not economical to transport for sale or contains high concentrations of hydrogen sulfide (a toxic gas), it is burned (flared) at well sites. **Natural gas flaring produces CO₂, carbon monoxide, sulfur dioxide, nitrogen oxides, and many other compounds,** depending on the chemical composition of the natural gas and on how well the natural gas burns in the flare.”

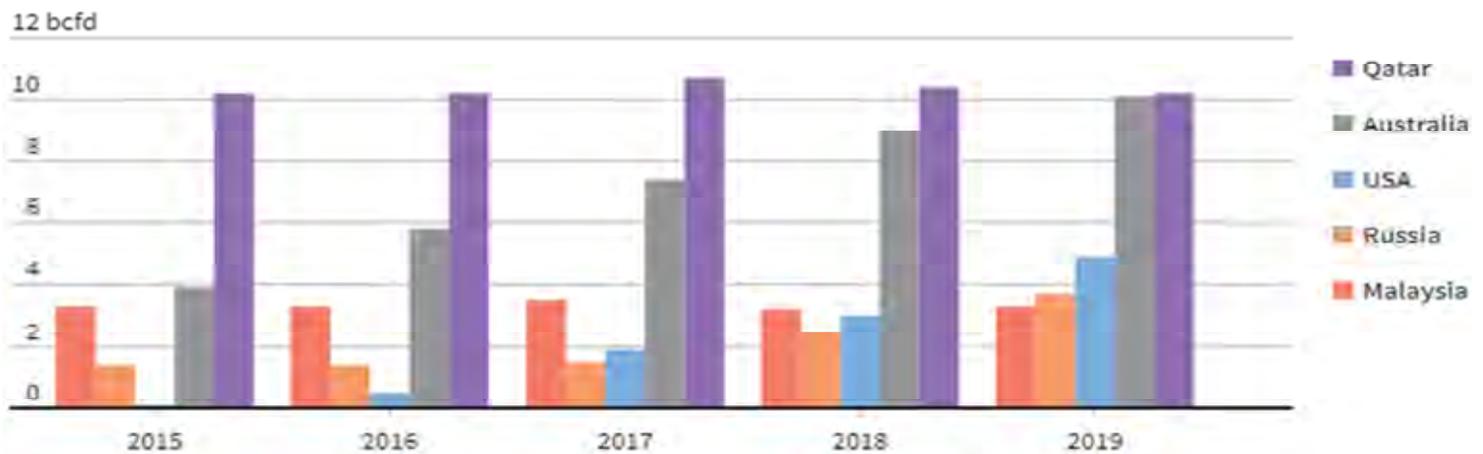
Hydraulic fracturing requires large amounts of water. Hydraulic fracturing fluid—“which may contain potentially hazardous chemicals—could be released through spills, leaks, faulty well construction, or other exposure pathways.” “In addition to natural gas, fracking fluids and formation waters are returned to the surface. These wastewaters are frequently disposed of by injection into deep wells. The injection of wastewater into the subsurface can cause earthquakes that are large enough to be felt and may cause damage.”– Sep 2019 – EIA

IN-DEPTH – U.S. 3RD LARGEST EXPORTER OF LIQUEFIED NATURAL GAS

U.S. LNG EXPORTS ARE AT RECORD LEVELS

U.S. LNG exports rise to record high

U.S. becomes world's third biggest liquefied natural gas exporter in 2019 behind Qatar and Australia.



Note: Actuals through 2018. Estimate in 2019 based on 11 months of data from Refinitiv

Source: U.S. Energy Information Administration; International Gas Union; Australia Department of Industry, Innovation and Science (DIIS); and Refinitiv

Stephanie Kelly | REUTERS GRAPHICS

“U.S. exporters of liquefied natural gas (LNG) head into 2020 after a record year that saw exports soar by more than 60%, but growing concerns about weakened demand and heavy competition could act as headwinds in the coming year.” – Dec 2019 - Reuters

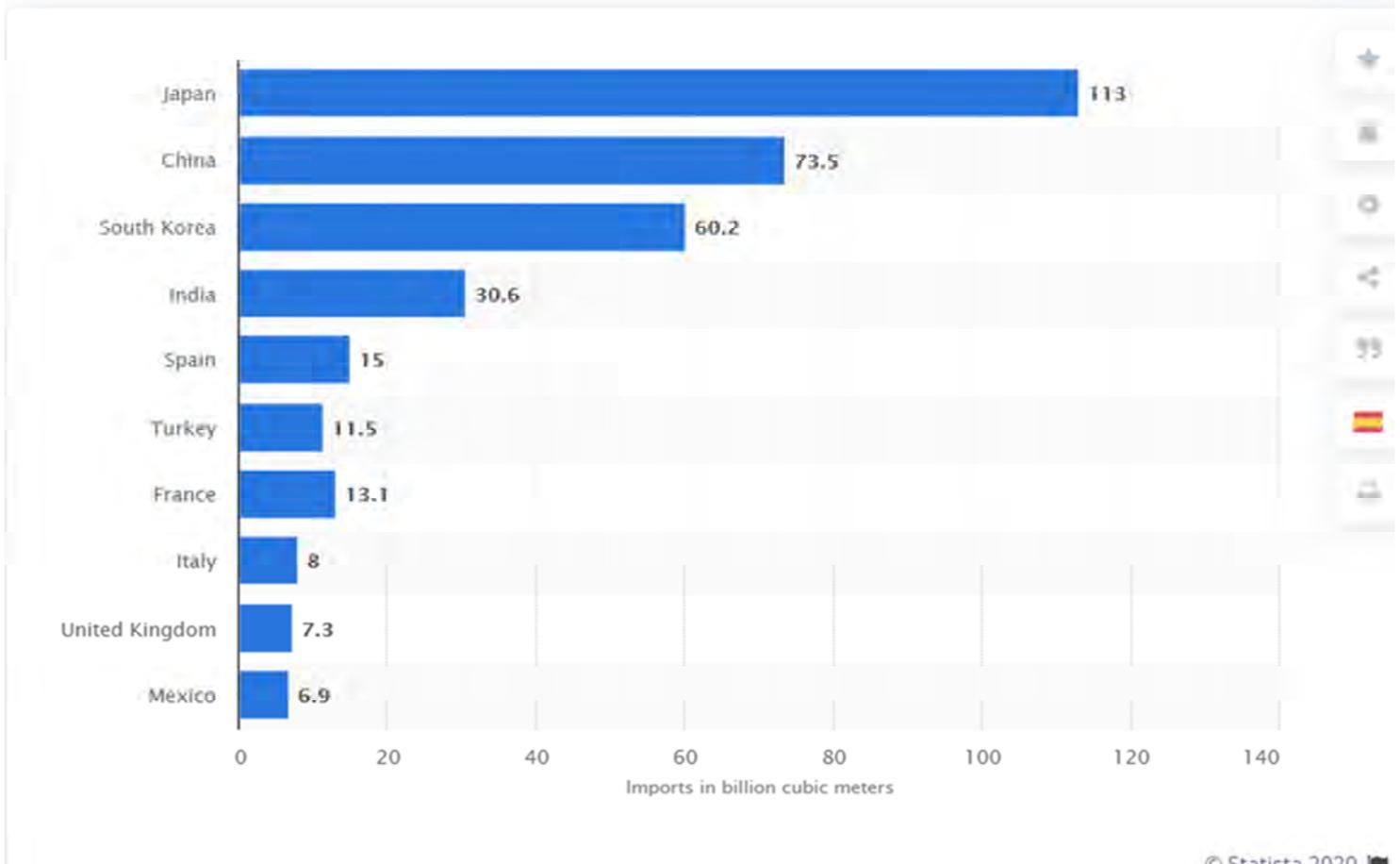
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WHY WOULD A COUNTRY IMPORT LNG?

“Where natural gas pipelines are not feasible or do not exist, liquefying natural gas is a way to move natural gas from producing regions to markets, such as to and from the United States and countries in Asia or Europe.” - EIA

Major importing countries of liquefied natural gas in 2018

(in billion cubic meters)

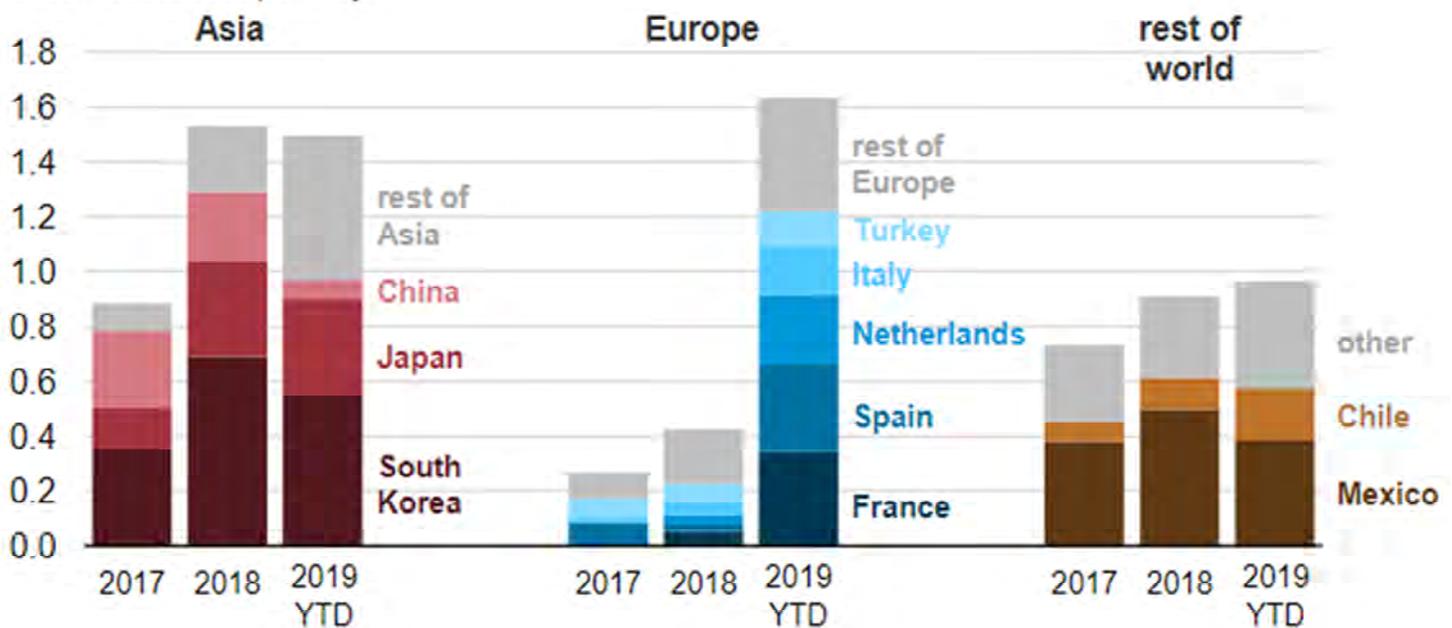


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MARKETS FOR U.S. LIQUEFIED NATURAL GAS

U.S. exports of liquefied natural gas (Jan 2017-May 2019)

billion cubic feet per day



Source: U.S. Energy Information Administration, based on U.S. Department of Energy, Office of Fossil Energy
 Note: The 2019 values reflect averages from January through May.

As seen above, **exports to China dropped off considerably.** “The country was once a top destination for U.S. LNG exports, with about 65 cargoes shipped there since 2016, when exports started.

But **China has retaliated with tariffs [10% in Sept 2018, raising it to 25% in June 2019]**, including those on oil and LNG, since the trade war began two years ago when Trump followed through on a plan to counter what he saw as unfair trade practices.

The trade clash has hindered U.S. exports, particularly LNG. Just two U.S. cargoes have departed for China since early last year.” – Jan 2020 – Natural Gas Intel

There are three broad markets outside the U.S. for liquefied natural gas. Asia, Europe and the rest of the world. The fastest growing market is China.

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MARKETS OVERVIEW – ASIA

This is a picture taken during the construction of the recently opened China-Russian pipeline that sends natural gas from a Siberian gas field to a city in northeast China.



Visual China Group via Getty Images.

CHINA

China is the largest oil and natural gas importer and the world's second largest LNG importer behind Japan.

Turkmenistan supplied 70% of China's piped gas imports in 2018, and Russian and China just launched a new China-Russian natural gas pipeline in northeastern China.

"China is seeing significant growth in demand for natural gas as the **government encourages the switch away from coal to cleaner energy**. In order to achieve this goal, the government is encouraging the generation sector to switch from using coal to natural gas, particularly for domestic heating, with the aim of having the natural gas account for 10 percent of energy consumption by 2020." - Jan 2020 – Emerging Market Views

This goal of 10% is "well below the 30% gas holds in the fully developed nations like the U.S. Simply put, China has really just started using natural gas, which is why the trade war has U.S. LNG sellers so concerned." - Oct 2019 - Forbes

IN-DEPTH – U.S. 3RD LARGEST EXPORTER OF LIQUEFIED NATURAL GAS

MARKETS OVERVIEW – ASIA (cont'd)

JAPAN

“The arrival of the cargo on Nov. 4, 1969 helped transform Japan’s energy system, which had relied on oil, coal and gas from coal in an era of high growth, before nuclear power was developed.

But Japan’s energy situation is undergoing huge changes in the wake of the **Fukushima nuclear disaster in 2011, which pushed LNG imports to record highs** as reactors were closed and the government liberalized the gas and power markets.



Polar Alaska arrives at Negishi LNG terminal, November 4, 1969, in this handout photo released by Tokyo Gas.

LNG demand is forecast to decline steadily as more reactors are switched on and renewables backed by government-mandated high prices are developed. Coal has also seen an increase since Fukushima but social pressure on emissions means its use is being questioned.

‘Japan has been leading the way to grow the LNG market, but we now have to think from a global viewpoint as Japan’s domestic demand will fall due to an ageing population and declining birthrate,’ Michiaki Hirose, chairman of the Japan Gas Association, told reporters on Tuesday.” – Nov 2019 - Reuters

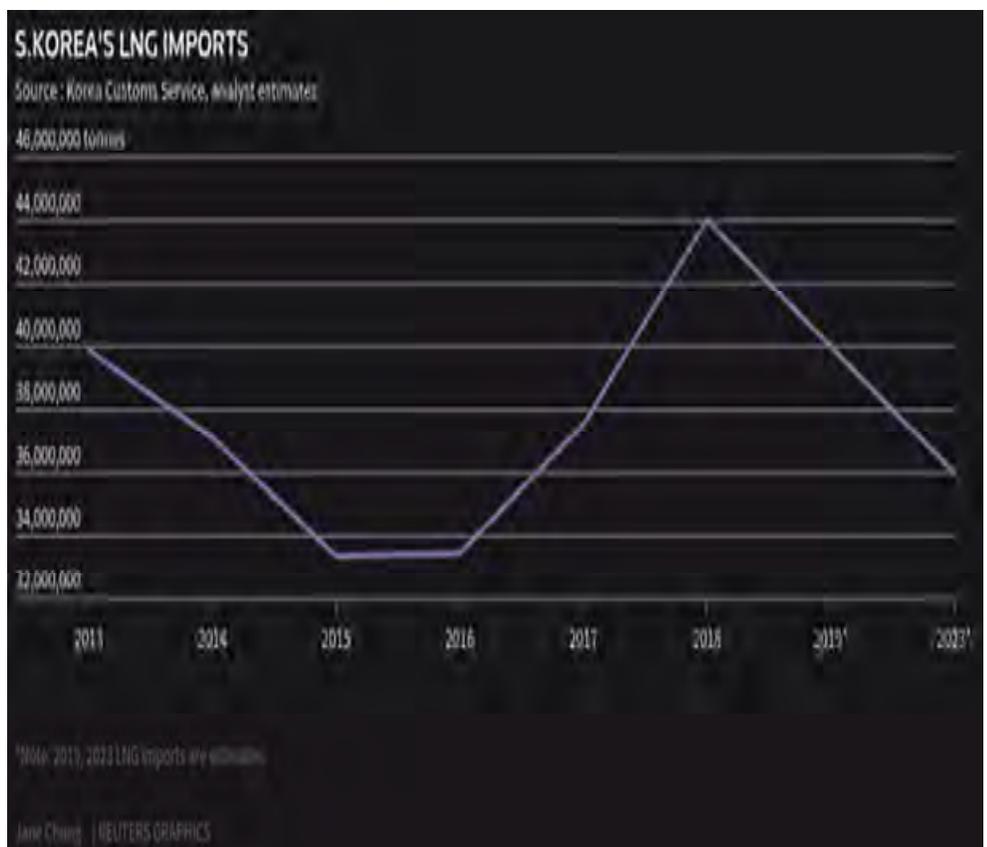
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MARKETS OVERVIEW – ASIA (cont'd)

SOUTH KOREA

“South Korea’s imports of liquefied natural gas (LNG) are set to fall over the next five years after reaching record volumes in 2018, squeezed by the start-up of new long-planned nuclear and coal power plants.”

“South Korea, the world’s third-biggest LNG importer, has increased its purchases of the super-chilled fuel since 2015, reaching a record 44 million tonnes last year.



However, already this year nuclear power generation has rebounded as some plants have come back on line, while a new plant began operations in August and another will start up at year-end.

Further out, three more large nuclear reactors are due to come online by 2024, while seven large coal-fired power plants are set to start operations by 2022, according to data from Korea Power Exchange.

South Korea’s 2019 LNG imports are expected to fall around 9% year-on-year, according to energy consultancy Wood Mackenzie and remain low for some years.” – Oct 2019 - Reuters

IN-DEPTH – U.S. 3RD LARGEST EXPORTER OF LIQUEFIED NATURAL GAS

MARKET OVERVIEW – EUROPE

EUROPE

“Although Asian countries have continued to account for a large share of U.S. LNG exports, **shipments to Europe have increased significantly since October 2018 and accounted for almost 40% of U.S. LNG exports** in the first five months of 2019. LNG exports to Europe surpassed exports to Asia for the first time in January 2019.” – Jul 2019 – EIA

“**U.S. LNG exports to the EU still represent only a fraction of the bloc’s energy needs.** Since 2016, Europe imported just over 10 billion cubic meters of American gas, compared with about 160 billion cubic meters from Russia last year alone, according to EU data. While the U.S. LNG shipments accounted for about 2% of total EU imports in 2018, Russian pipelines delivered 40% of European purchases.” – May 2019 - WSJ

Regardless, “With 28 countries and a **combined population of around 512 million people, the European Union is something of a prized market** — and political battleground — for the world’s largest energy exporters, particularly when it comes to natural gas.” – Jan 2019 – CNBC

“Rising American gas exports could address some outstanding issues—such as the widening U.S. trade deficit with the EU—and forestall a White House decision to slap duties on U.S. auto imports. Mr. Trump has repeatedly said that without a deal to rebalance EU-U.S. trade, he would impose car tariffs. ‘I don’t think LNG exports will solve the problem in its entirety,’ said Gordon Sondland, the U.S. ambassador to the EU. “It will solve some aspects of the problem.” - May 2019 - WSJ

“As **[European] nations phase out reliance on coal and nuclear power** – due to a combination of economic and environmental factors – the use of natural gas in European electricity generation climbed nearly 30 percent between 2015 and 2017. European natural gas demand is growing at the same time production from European suppliers like Norway and the Netherlands is declining.” – Sep 2019 – The Hill

IN-DEPTH – U.S. 3RD LARGEST EXPORTER OF LIQUEFIED NATURAL GAS

MARKET OVERVIEW – REST OF THE WORLD

MEXICO

“U.S. natural gas production has been booming for years, far beyond the point needed for domestic use, and in 2017 the country became a net gas exporter for the first time in decades. One key export market has been Mexico, especially since that country agreed to open itself up to energy imports earlier this decade.” – Jun 2019 - Bloomberg

“Mexico imports more than 70% of its gas needs from abroad, and more than 90% of those purchases come from the United States. ‘For U.S. producers, Mexico is an important outlet for exports, especially given the current oversupply we are seeing particularly in states such as Texas,’ said James Fowler, senior energy analyst for the Americas at global commodity market intelligence provider ICIS.” – Jan 2020 - Reuters



Source: Bureau of Land Management (public domain)

“The massive supply produced has cut into prices, which is another reason that countries have found imports enticing. For Mexico, liquefied natural gas (LNG) has been a significant import, with the super-cooled fuel delivered by tanker.

However, the new Sur de Texas pipeline to Mexico is set to become operational. Even though it’s only expected to reach 58% of its capacity of 2.6 billion cubic feet per day this year, it’s still expected to boost the flow of U.S. exports of traditional natural gas to Mexico by about 20%. This could well undercut — or eliminate — Mexico’s need for imports of LNG.” – Jun 2019 - Bloomberg

IN-DEPTH – U.S. 3RD LARGEST EXPORTER OF LIQUEFIED NATURAL GAS

FUTURE

The world is awash in natural gas. To reach distant markets the U.S. and Australia continue to expand their capacity to produce LNG. If capacity is growing faster than demand it will put downward pressure on pricing.



The Cheniere Energy Inc. liquefied natural gas (LNG) export terminal stands under construction in Corpus Christi, Texas, U.S., on Wednesday, Oct. 3, 2018. Bloomberg / Getty Images

The major growth in demand for LNG for the next 10 years is China. Unfortunately, tariffs may limit the U.S. LNG producers from effectively competing in that market.

Japan, currently the biggest importer of LNG, is reactivating nuclear plants that were taken off-line after the Fukushima disaster. Their LNG imports will decline.

Likewise, South Korea's imports will decline as new nuclear plants are activated. While the rest of the world switches away from coal to natural gas, South Korea is opening more coal power plants. Further reducing the need for liquefied natural gas.

Europe continues to increase natural gas consumption as part of their de-carbonization initiative. However, a new natural gas pipeline from Russia will limit the growth of U.S. LNG sales to Europe. Most likely, U.S. LNG will continue to be used in sufficient quantities to ensure Russia pricing remains low and to reduce the trade deficit with the U.S.

As the U.S. and Mexico's natural gas pipeline infrastructure is further developed, Mexico's need for liquefied natural gas from the U.S. will decline.

Based on the world market, the U.S. liquefied natural gas industry will face an uphill battle in its efforts to sell its growing supply of LNG.

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