API Industry Outlook

Fourth Quarter 2020

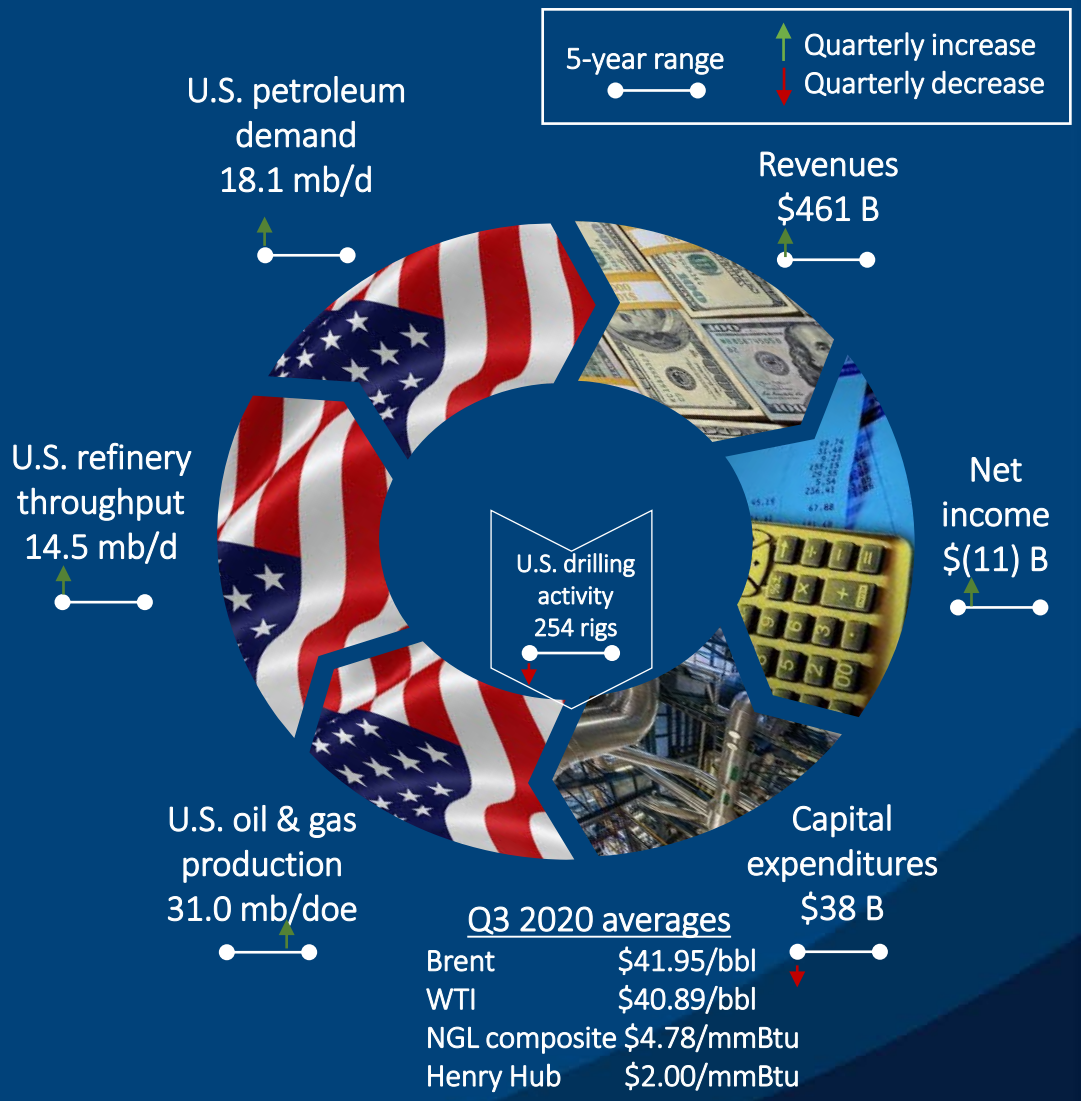
R. Dean Foreman, Ph.D.

December 17, 2020

American Petroleum Institute

Key points

- **Economy - A global rebound is broadly expected over the next two years**
  - Led by emerging markets, 3rd party consensus estimates are for global real GDP growth of 4.8% y/y in 2021 and 3.4% y/y in 2022
- **Global oil markets – Cautious optimism for demand and Permian supply**
  - Demand rebounded in Q4 2020; EIA projects 2021 growth of +5.8 mb/d
  - Every producing region could participate in 2021 supply growth (EIA)
  - Permian basin well positioned with record productivity and new pipelines
- **Natural gas – Strong productivity has driven historically low U.S. prices despite record-high gas demand in electricity generation & exports (EIA)**
  - U.S. natural exports reached a record high 16.9 billion cubic feet per day in Nov. 2020 (EIA), and U.S. LNG export capacity could more than double again by 2030
  - 2020 natural gas record 40% share in U.S. electricity generation



- Financial compilation based on *API 200* companies with shares listed on U.S. stock exchanges.

sources: EIA; API Monthly Statistical Report; Bloomberg and company reports; Baker Hughes; API Team analysis

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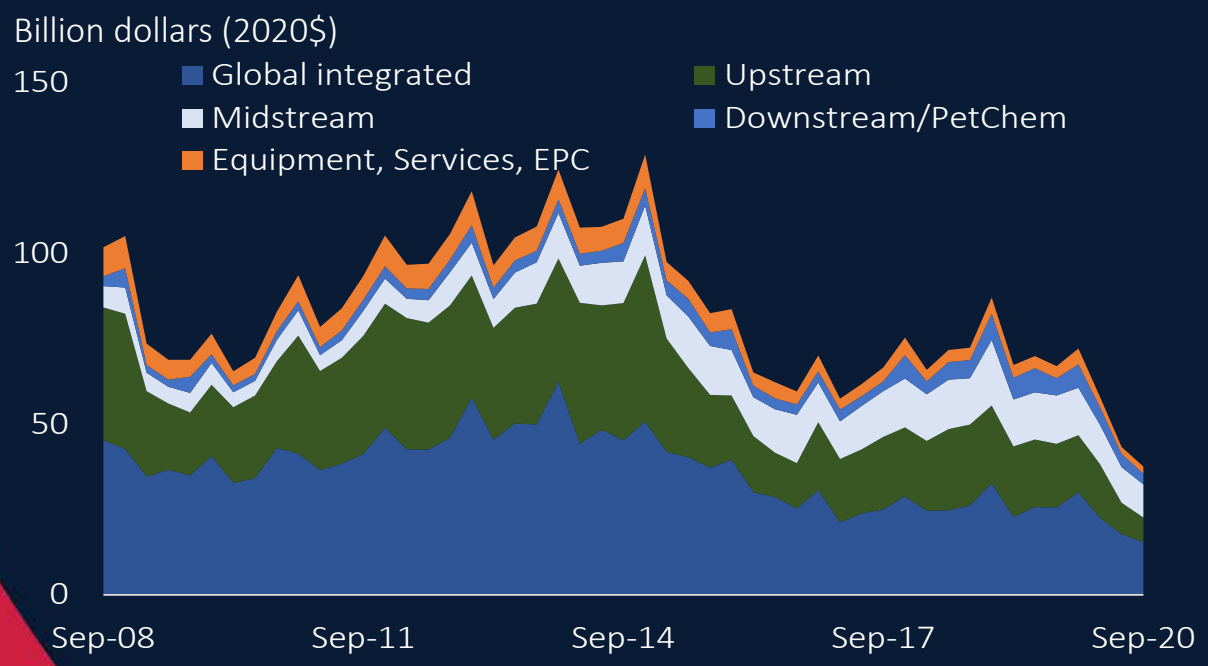
Although industry capital expenditures fell in Q3 2020 to less than half their lowest point in the Great Financial Crisis (Q2 2009), $288 billion of U.S. projects are under construction

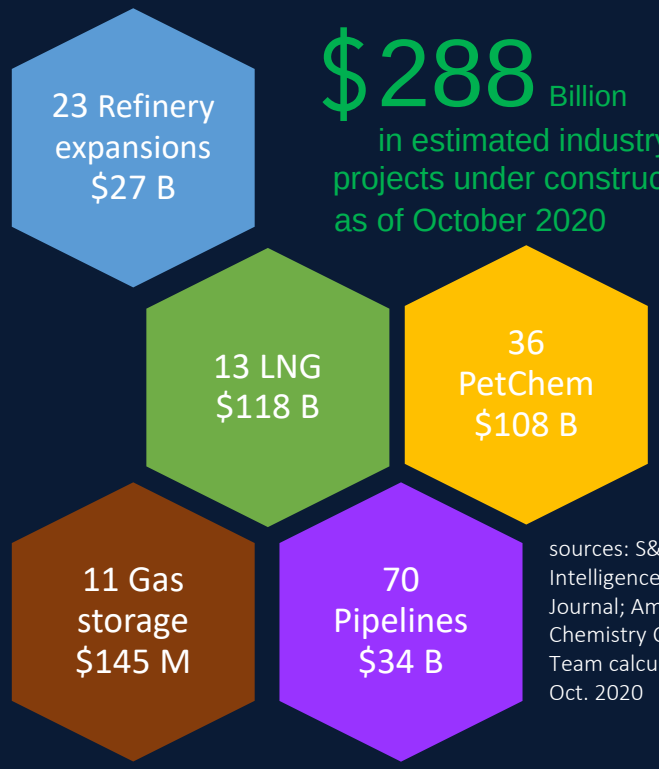
- The industry invested $37.6 billion in Q3 2020, compared with $65.7 billion in the same quarter one year ago
- Across the energy value chain, API is monitoring 153 oil & gas-related projects worth $288 billion currently under construction

Capital expenditures by industry segment



* All other oil & gas industry companies
sources: Bloomberg; publicly-available company reports; BLS

$288 billion in current U.S. energy infrastructure investments



sources: S&P Market Intelligence; Oil & Gas Journal; American Chemistry Council; API Team calculations as of Oct. 2020

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Global Economy

What we're watching now

- As the 3rd party consensus view has become increasingly bullish for 2021, we're monitoring the potential follow-on and enduring impacts of COVID-19 on the global economy and energy markets

BIS

Bankruptcies, unemployment and reallocation from COVID-19

- Unemployment typically increases three times more if a fall in GDP is accompanied by a similar-sized increase in bankruptcies.
- The natural renewal process where young, dynamic firms displace those who exited takes two to three years, leaving a protracted period of lackluster activity. This underscores the need to reallocate resources quickly and efficiently to drive growth

Banerjee R., Kharroubi E., and Lewrick U., Oct.9, 2020

THE WORLD BANK
IBRD • IDA

Who on earth can work from home? A global comparison sheds light on the importance of ICT infrastructure

- An estimated one in every five jobs globally can be done from home – but in low-income countries, it's only one in every 26 jobs
- Policies to address negative labor market impacts of COVID-19 need to be localized and targeted
- The overall labor market burden of COVID-19 is bound to be larger in poor countries, where only a small share of workers can work from home and social protection systems are weaker

World Bank Group, October 22, 2020

THE OXFORD INSTITUTE FOR ENERGY STUDIES

China's energy policies in the wake of COVID-19: Implications for the next five-year plan

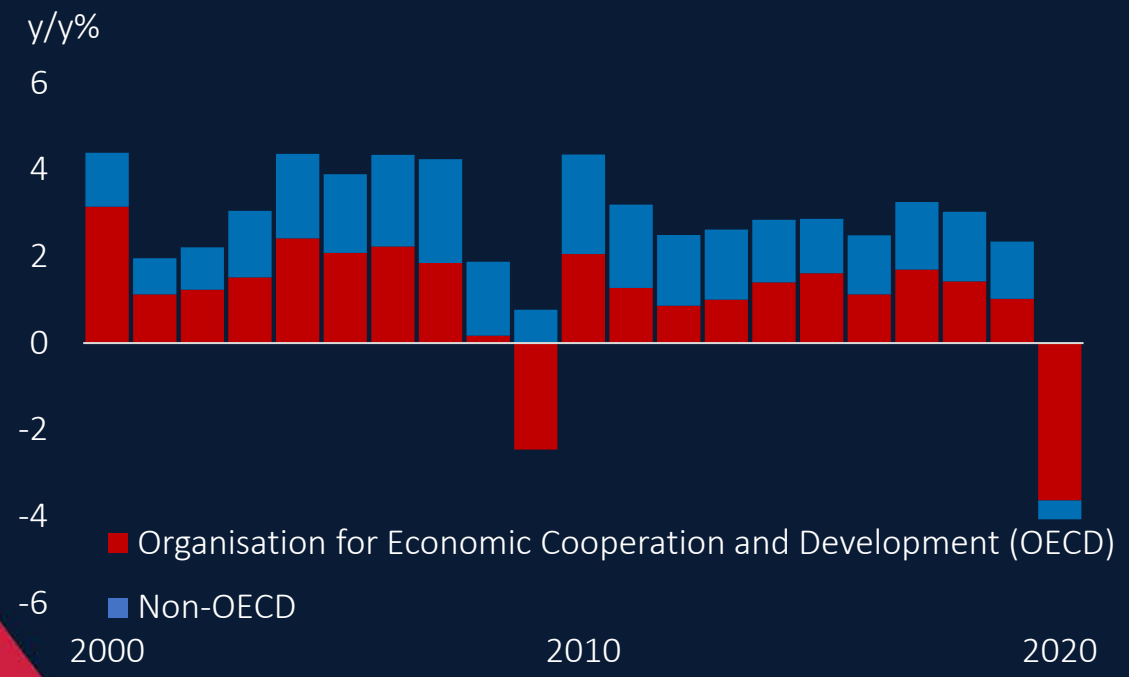
- Growing urgency to develop the domestic market as a driver of economic activity and innovation as well as to hedge against potential energy supply disruptions and the emerging technological cold war with the US
- Power market reform, gas unbundling and oil market liberalization….objectives….ensuring reliable supplies, reducing the cost of energy, greening the energy system, improving industrial competitiveness and finding a new balance of powers between state-owned incumbents and private companies

M. Meidan, Nov. 4, 2020

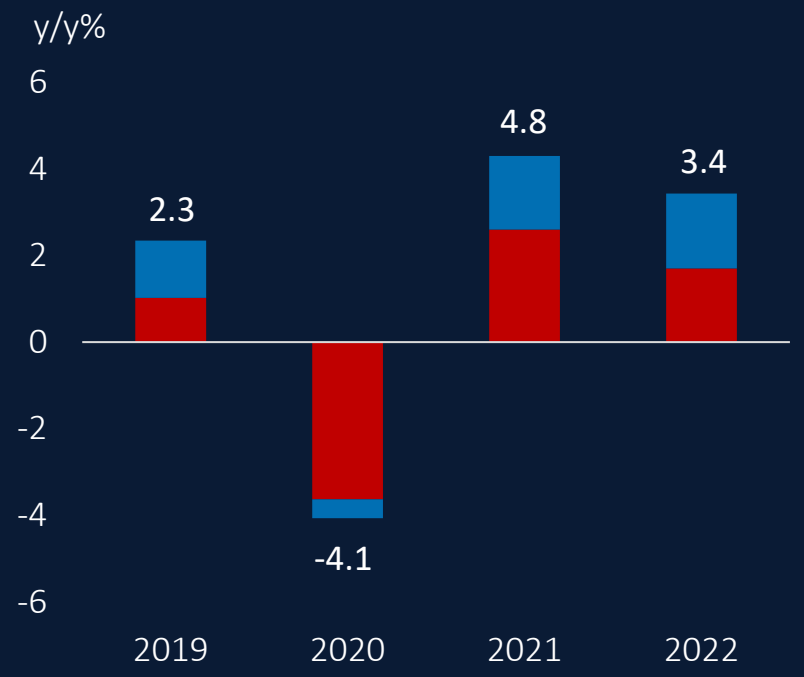
Led by emerging markets, the global economy is broadly expected to rebound over the next two years

- Developed economies lost about eight times more economic value in 2020 than emerging markets, yet the third-party consensus average expect nearly half of global GDP growth over the next two years could come from emerging markets

Global GDP growth and contributions by region*



Global GDP outlook



sources: IMF; Bloomberg * Market exchange rate basis

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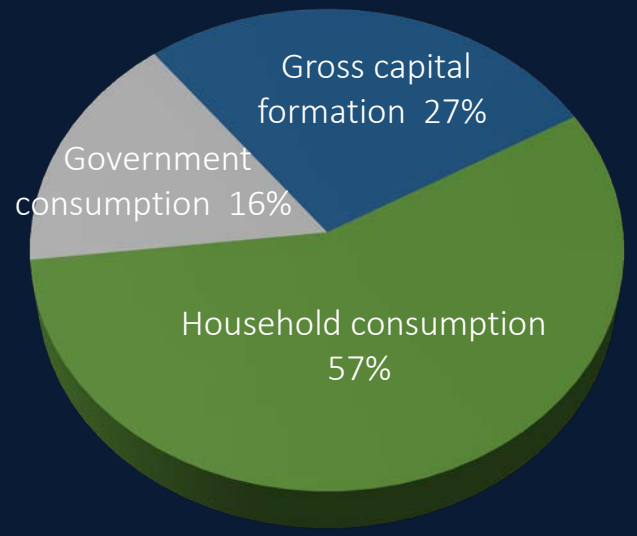
The leading drivers of global GDP growth - consumption and investment - are projected to grow by an average of 4.4% and 4.7% through 2025, respectively

- In breaking out global GDP, approximately 73% ($62 trillion in 2018) is attributed to private and public consumption expenditures, while the remainder represent capital formation/investment, where Asia, Europe, and North America have contributed in recent years
- Asia is projected to lead the COVID-19 recovery and beyond by averaging 7.5% growth in consumption expenditures and 6.5% in investment to 2025

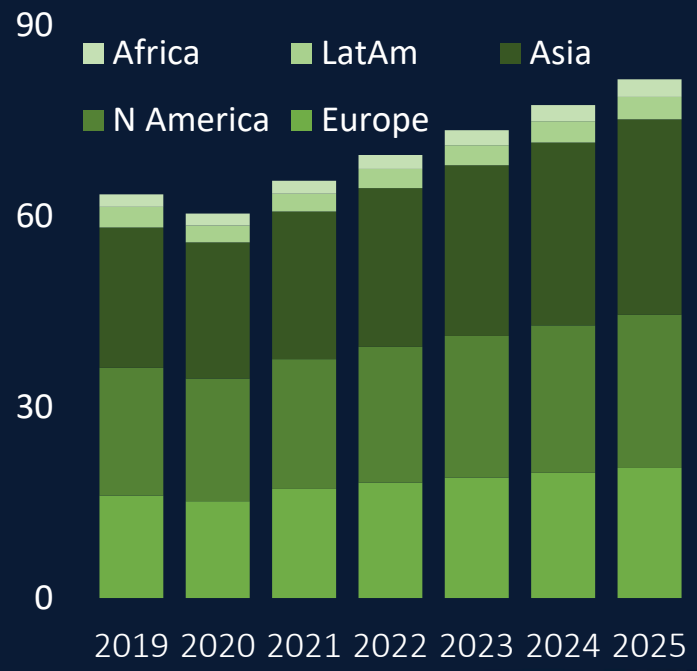
Global 2018 GDP by expenditure category

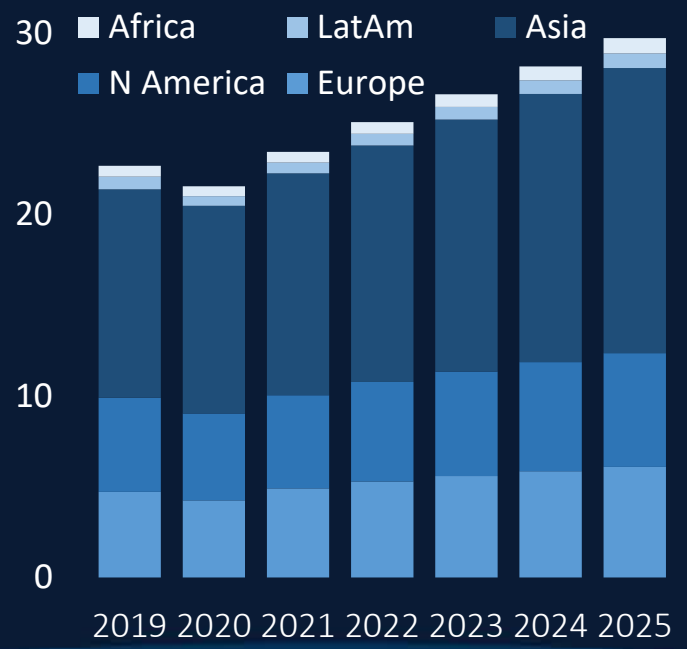
Percent share (%)



sources: UN; API Team analysis

Total consumption expenditures and investment by region, Trillion 2018$





sources: IMF World Economic Outlook October 2020; UN; API Team analysis

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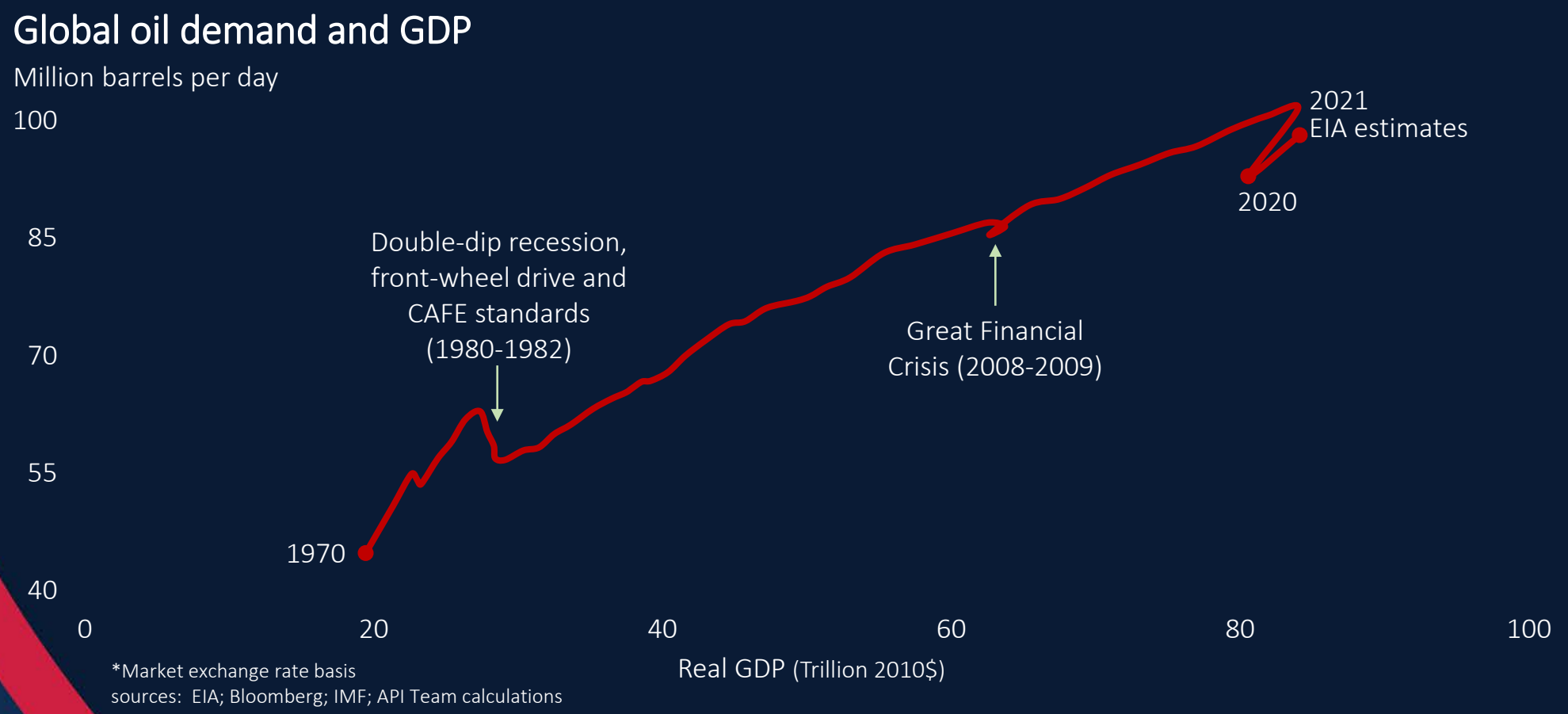
Global oil demand is expected to rebound in 2021 along with real GDP

- Global oil demand has historically changed in tandem with the economy, and this relationship remained intact through the 2020 COVID-19 recession



*Market exchange rate basis
sources: EIA; Bloomberg; IMF; API Team calculations

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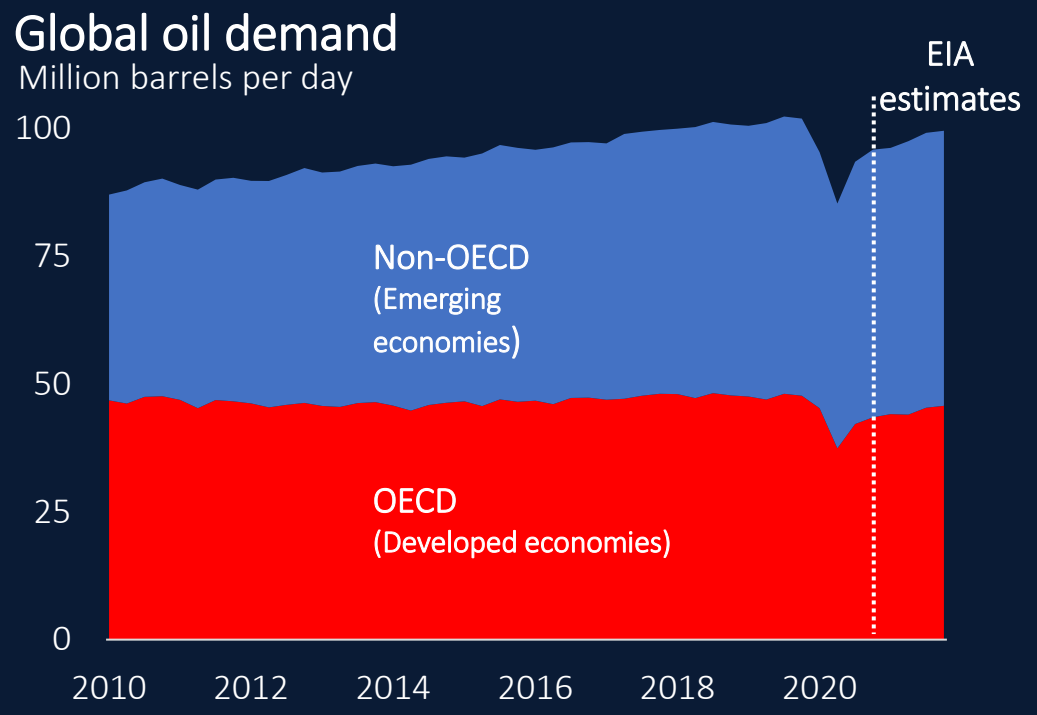
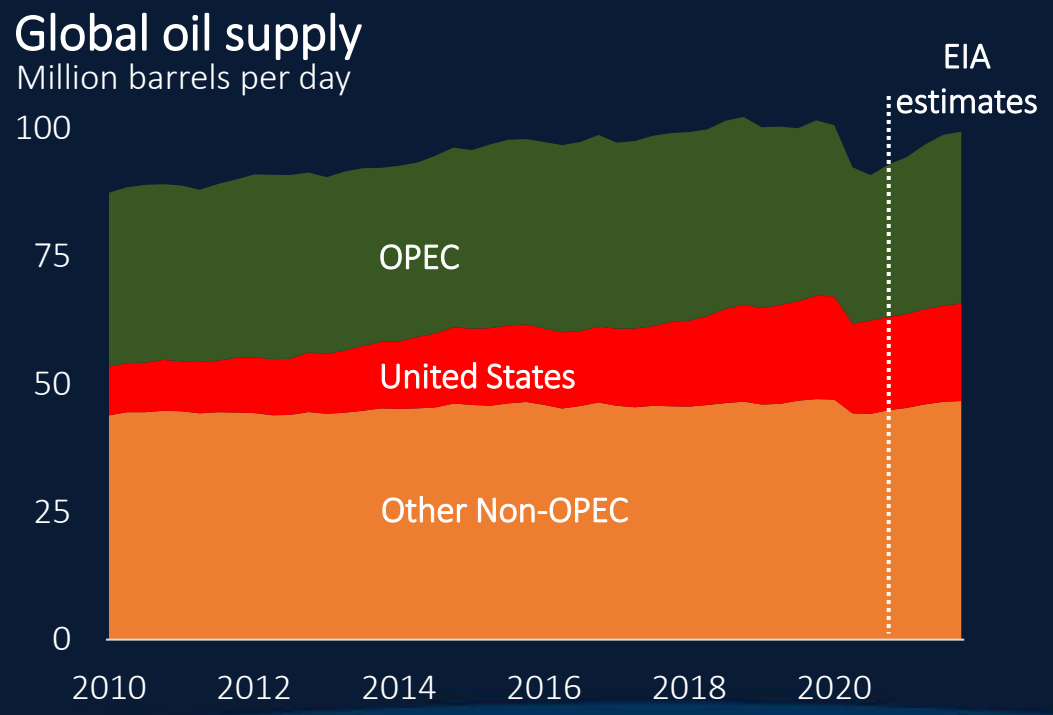
Oil Markets

Global oil demand could grow by 5.8 mb/d in 2021 and be met by production increases from each major producing region per EIA

- EIA expects global oil demand to rebound to 99.6 mb/d in Q4 2021, led by emerging economies that return to record high consumption levels
- Over the same period, EIA projects global oil supply could respond with OPEC deploying 3.8 mb/d of its spare capacity and U.S. production returning to its levels from the first half of 2019





source: EIA STEO (December 2020)

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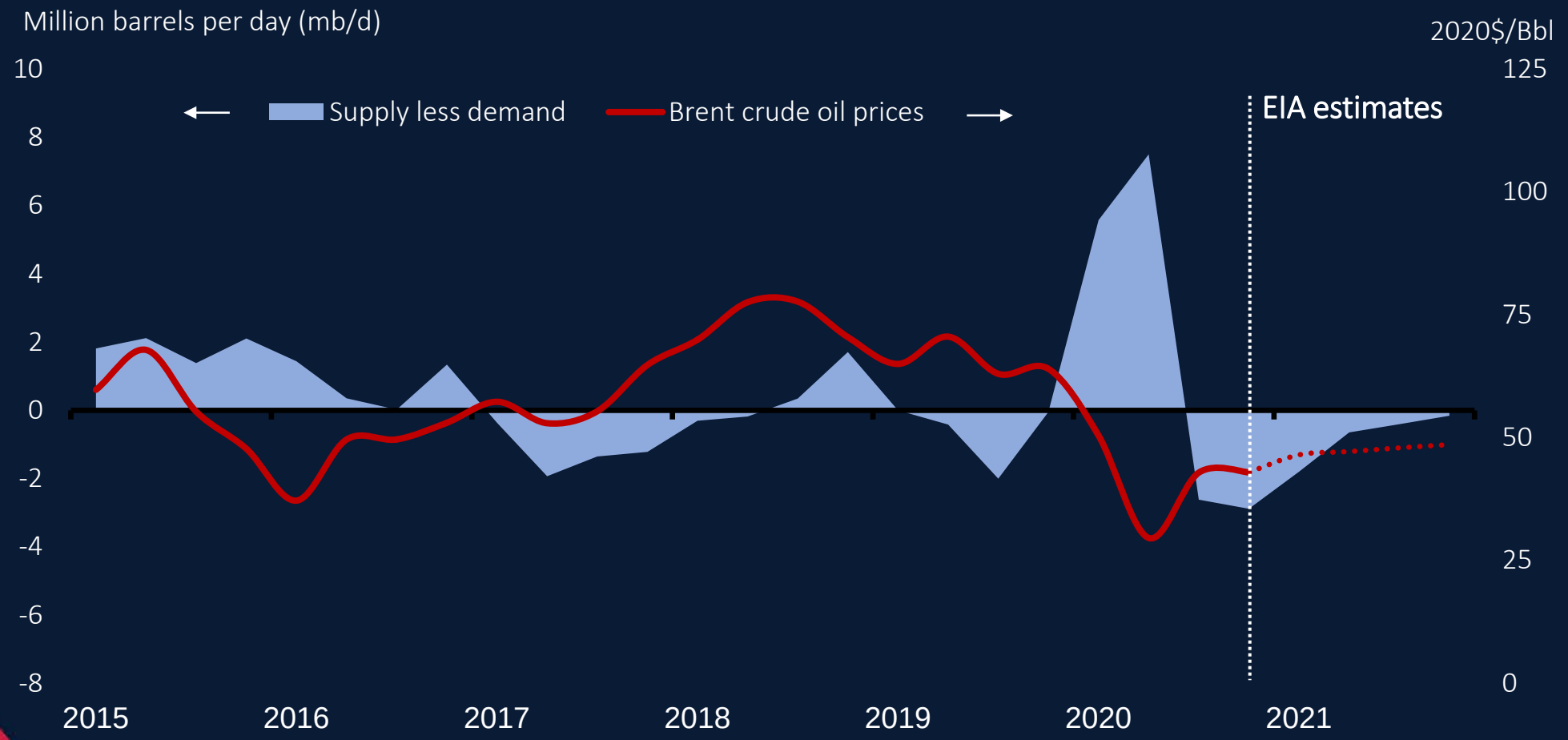
EIA projects that global oil demand exceeded supply in Q4 2020 and could support oil prices of about $50 per barrel through 2021

EIA global supply/demand and Brent price estimates as of December 2020



sources: EIA STEO (December 2020); Bloomberg

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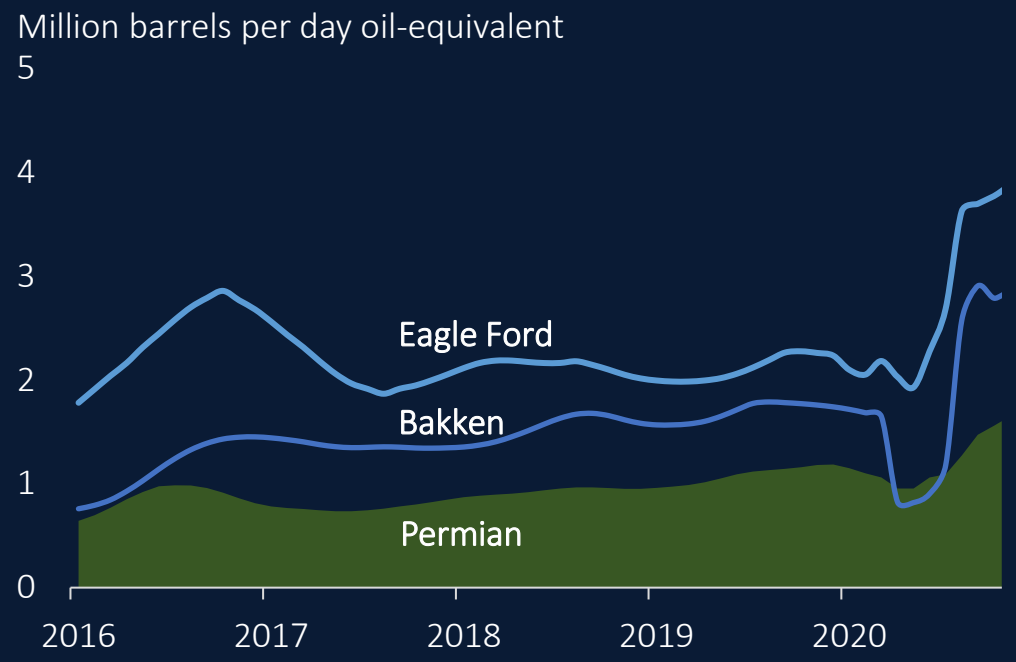
Record U.S. oil well productivity helped to lower estimated breakeven prices

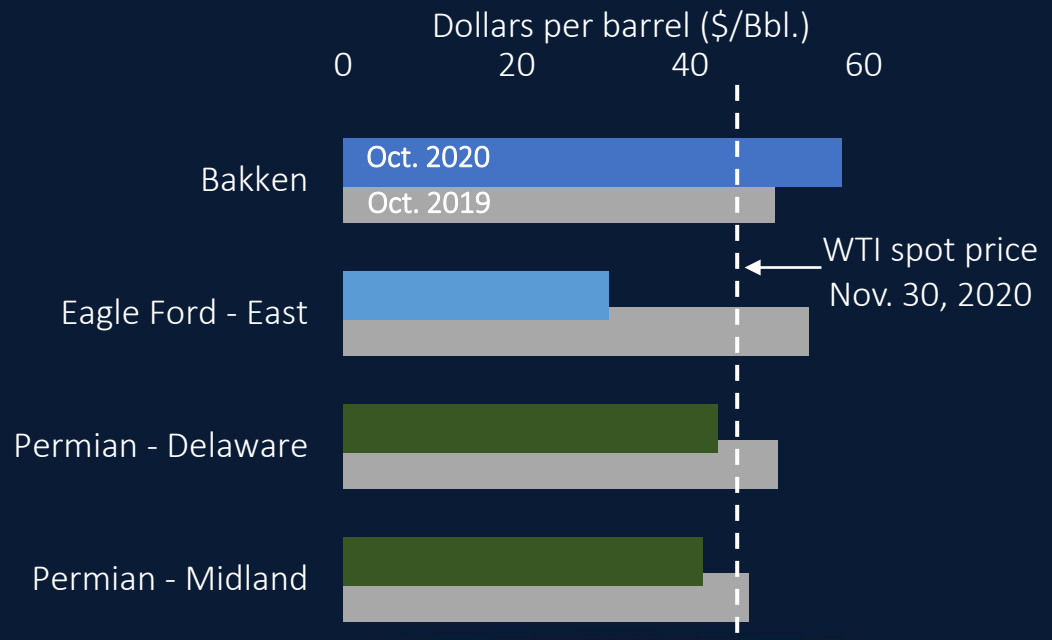
- EIA reported increased new well productivity as companies tended to drill their most prospective targets
- BTU Analytics estimated breakeven prices were near or below recent market prices among the major U.S. oil producing basins

U.S. oil well productivity – new production per rig



source: EIA Drilling Productivity Report

Oil estimated breakeven prices*



*Half cycle breakevens assuming 10% discount factor. source: BTU Analytics

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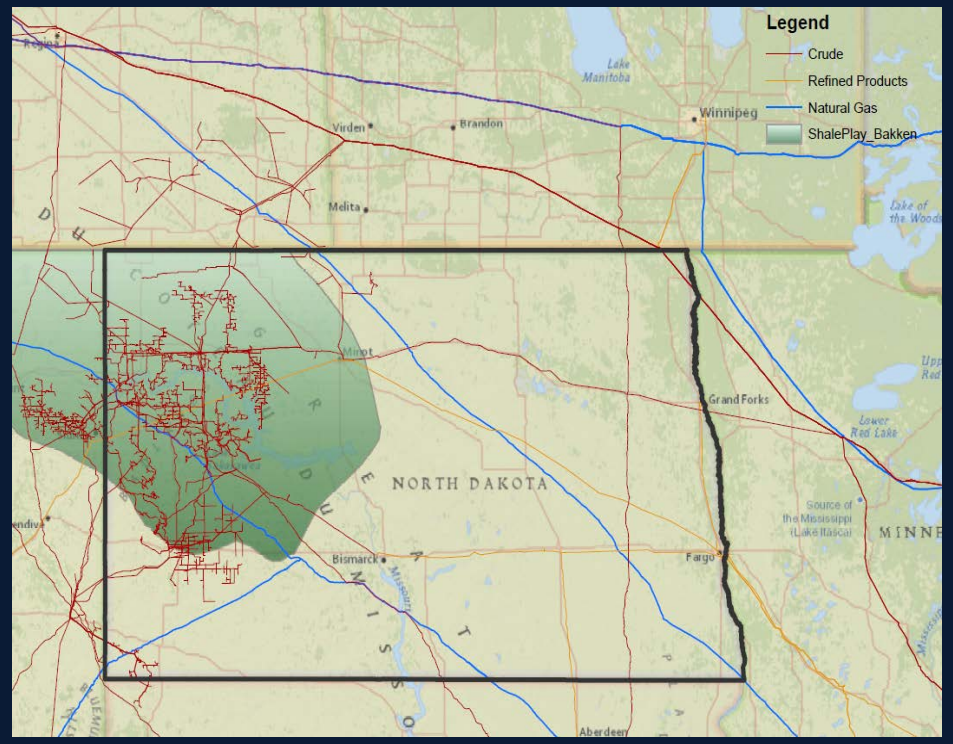
Bakken pipeline egress capacity has remained critical to the region's production and its recovery

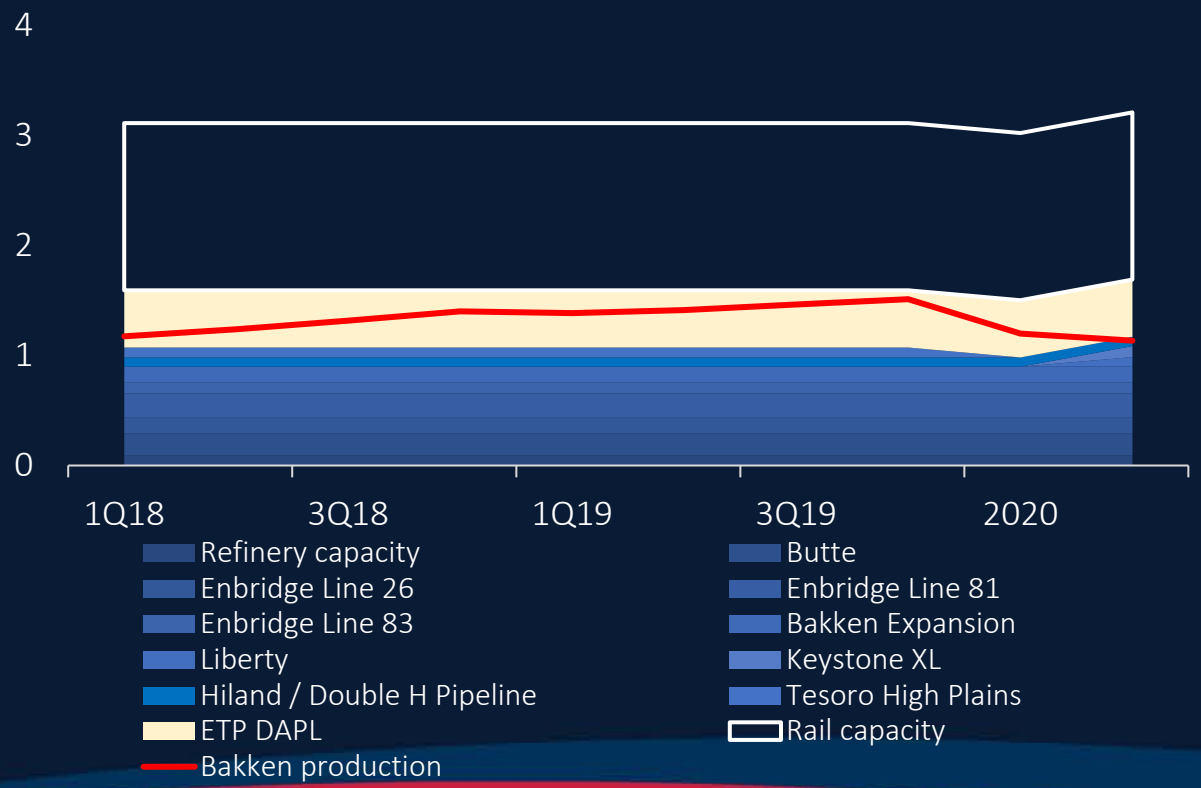
Bakken Formation pipeline infrastructure



sources: EIA, PennWell, National Geographic, ESRI, Garmin, HERE, UNEP, USGS, WCMC, NASA, ESA and API Team analysis

Bakken pipeline capacity balance

Million barrels per day (mb/d)



sources: EnSys; Bloomberg; EIA; API Monthly Statistical Report

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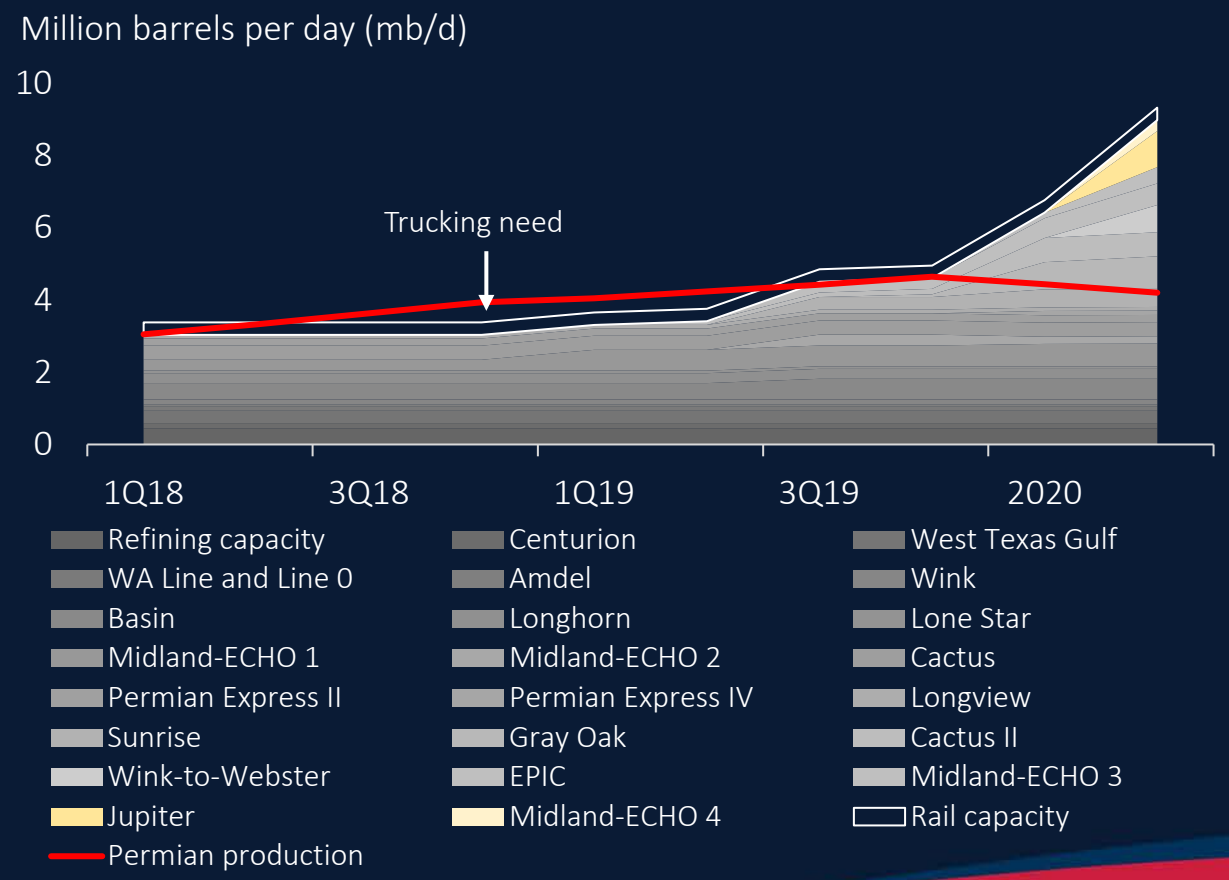
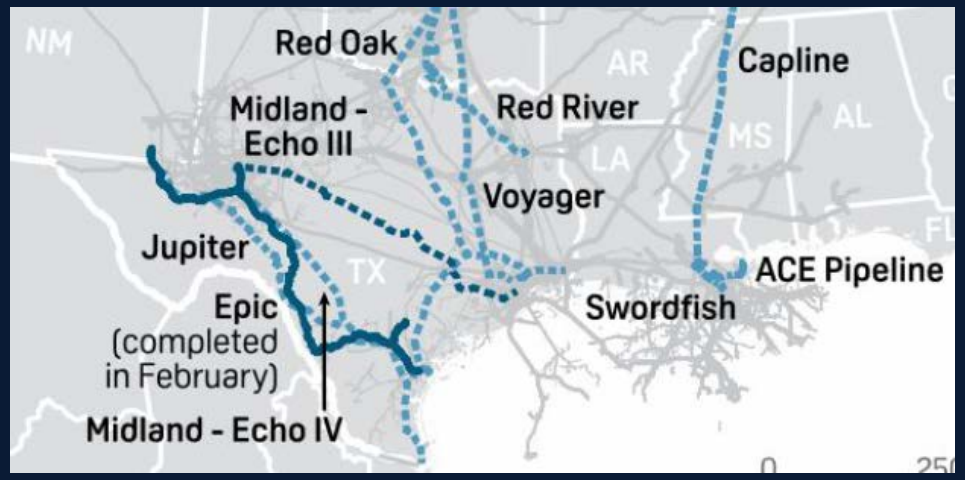
Although EIA's oil production outlook remains uncertain, recent Permian pipeline capacity additions could enable production and export growth

Permian Basin pipeline capacity balance



sources: EnSys; Bloomberg; EIA; API Monthly Statistical Report

Potential midstream project delays



sources: EnSys; S&P Global

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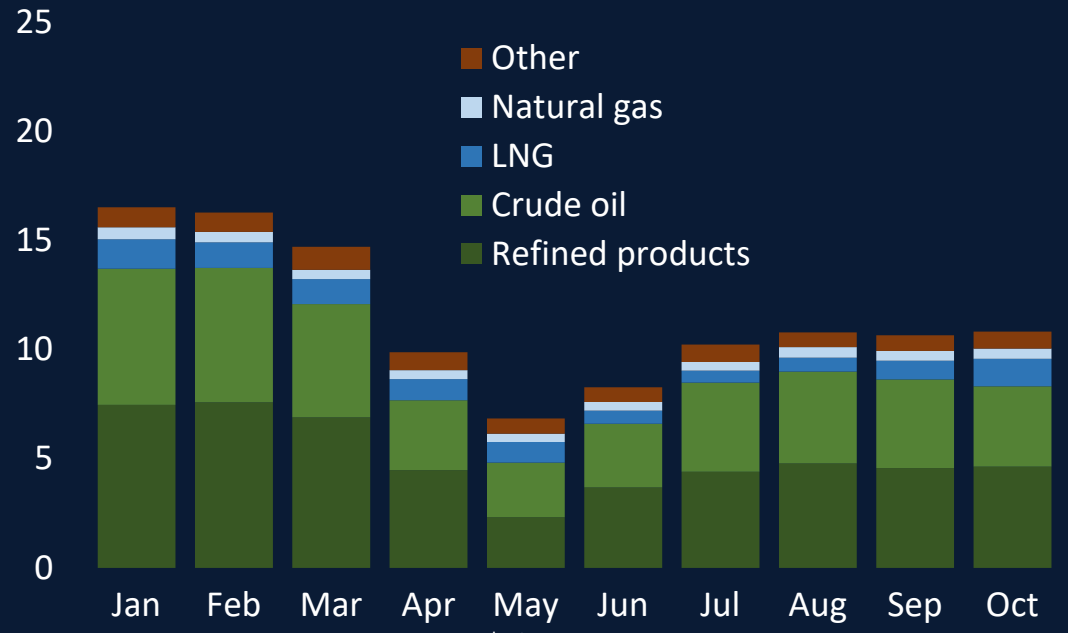
The U.S. has remained on track to be an energy net exporter in 2020

- The U.S. exported $127 billion of energy products to global markets through October of 2020
- With growing export infrastructure and lower OPEC+ and Canadian imports, the U.S. was an energy net exporter for eight months of the first nine months of 2020

2020 U.S. energy exports' value (Oct 2020 ytd)

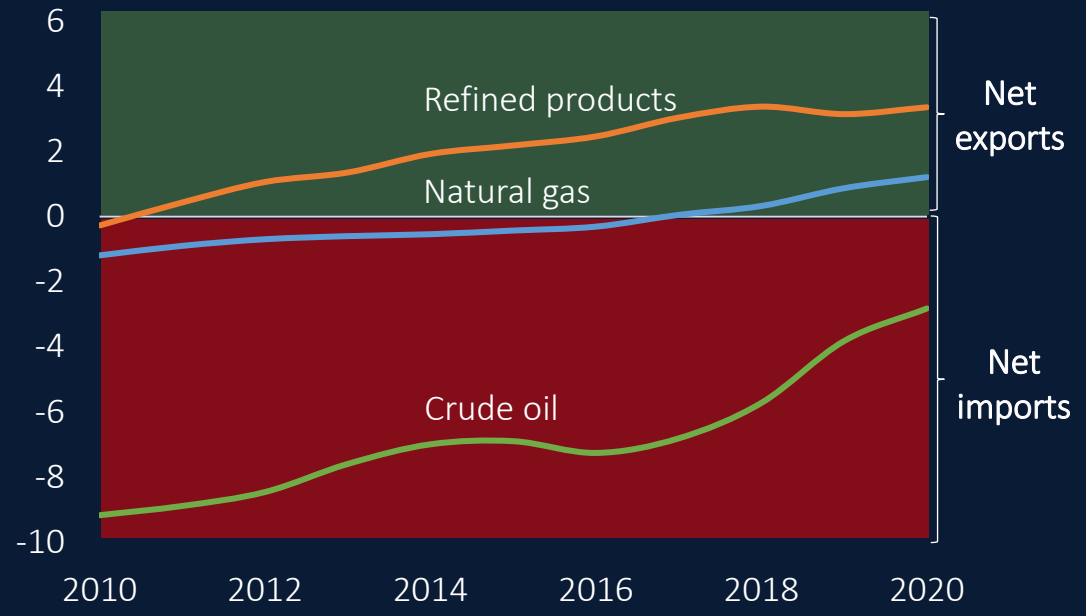
Billion dollars



sources: Census; ITC; API Team analysis

U.S. net exports/imports of key energy products

Million barrels per day, oil-equivalent



source: EIA; API Monthly Statistical Report

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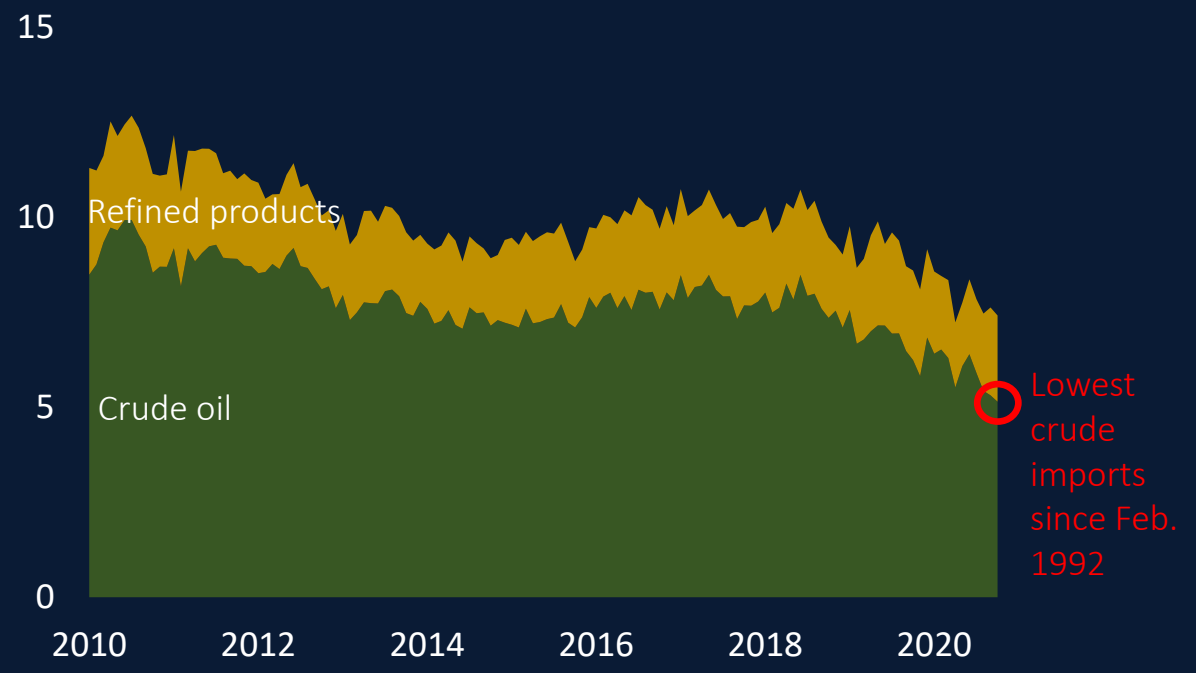
Milestones: U.S. crude oil imports – in total and from OPEC nations – have fallen to their lowest monthly levels in 28 years

- Increased production and the boost in U.S. energy exports have brought U.S. crude oil imports to their lowest levels since 1992
- With strong ongoing North American oil trade relationships, the largest import declines came from OPEC+ nations and South America

U.S. crude oil and refined product imports

Million barrels per day



sources: EIA; API Team analysis

OPEC total petroleum imports

Million barrels per day

sources: EIA; API Team analysis

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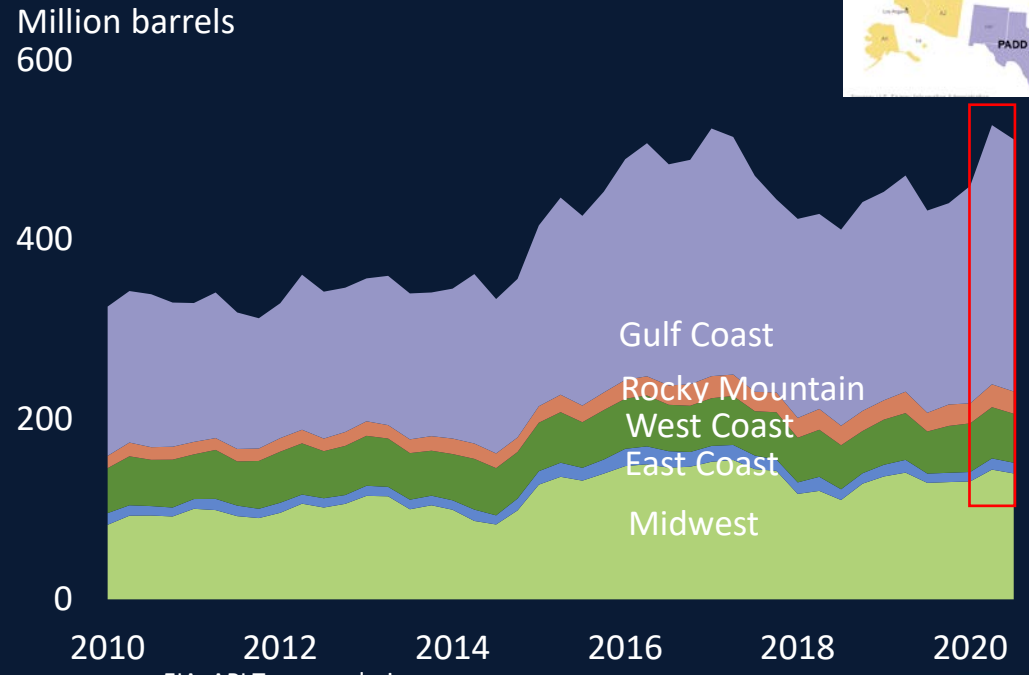
While U.S. crude oil inventories receded from record highs, refined product inventories reverted towards historically normal levels

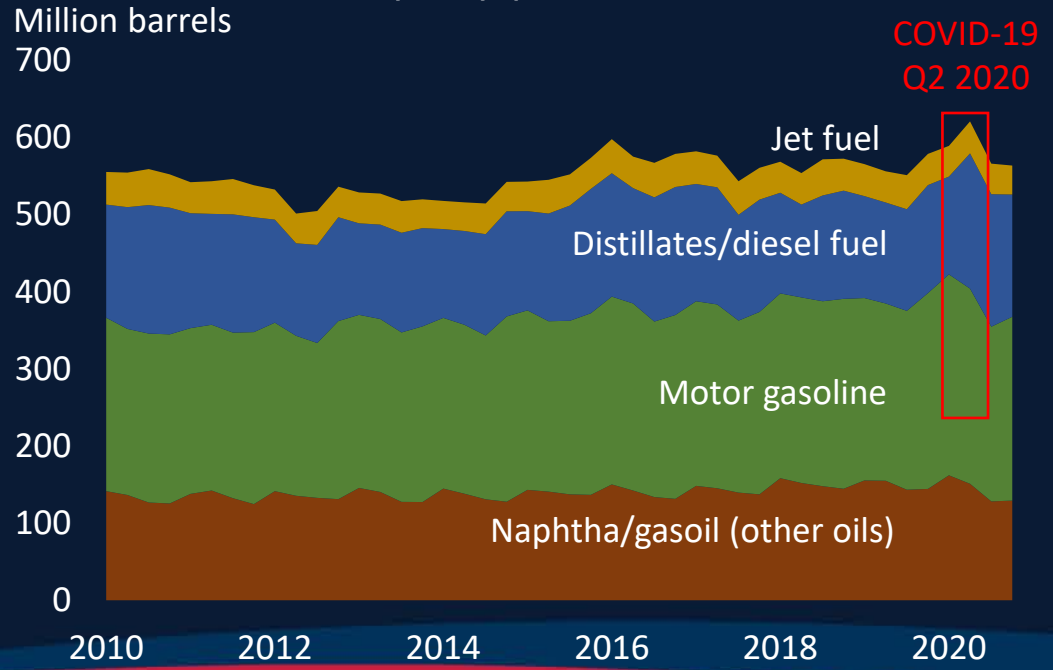
- Inventories of crude and major refined products have fallen from record highs, thanks largely to demand recovery
- For crude oil inventories at the end of Q3 2020, the Midwest (PADD 2) returned the most towards year-ago levels, while the Gulf Coast (PADD 3) remained the most-impacted region

Crude oil inventories by location



source: EIA, API Team analysis

U.S. inventories by key product



source: EIA

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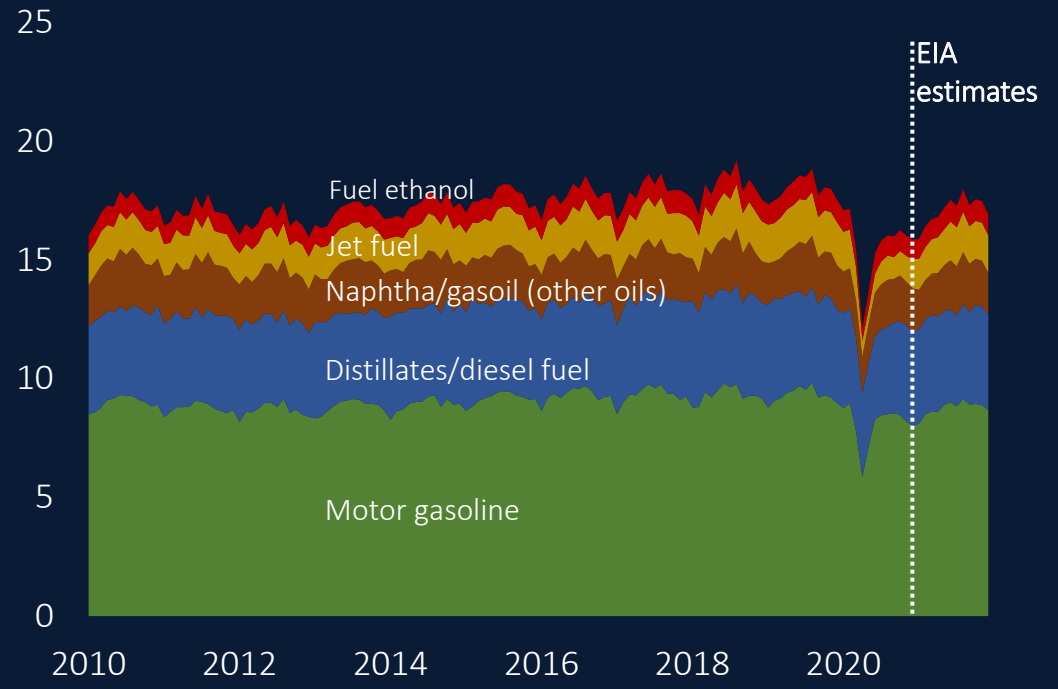
EIA projects U.S. liquid fuels consumption could return to its 2019 levels by the second half of 2021 with relatively steady motor fuels prices

- EIA projects positive year-on-year growth for every major refined product by April 2021, with the strongest recoveries in gasoline and jet fuel while distillates/diesel fuel being the weakest
- Motor gasoline and diesel fuel prices have generally moved with crude oil

U.S. liquid fuel consumption by fuel

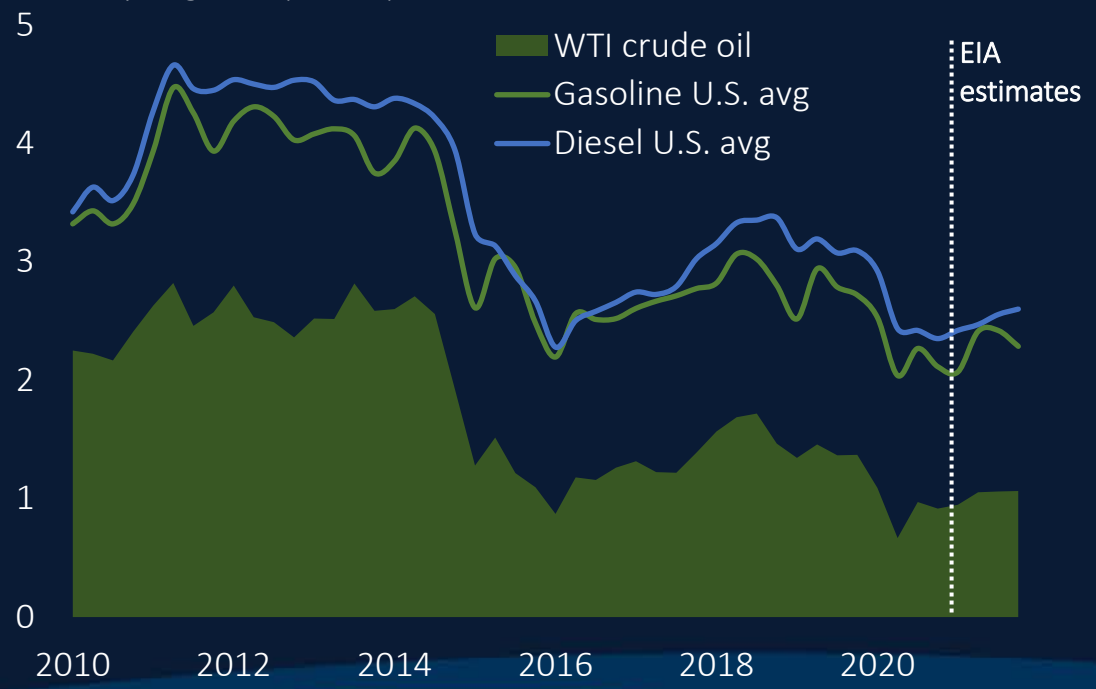
Million barrels per day



source: EIA

Crude oil, retail gasoline and diesel fuel prices

Dollars per gallon (2020$)



sources: EIA; AAA; Bloomberg; BLS

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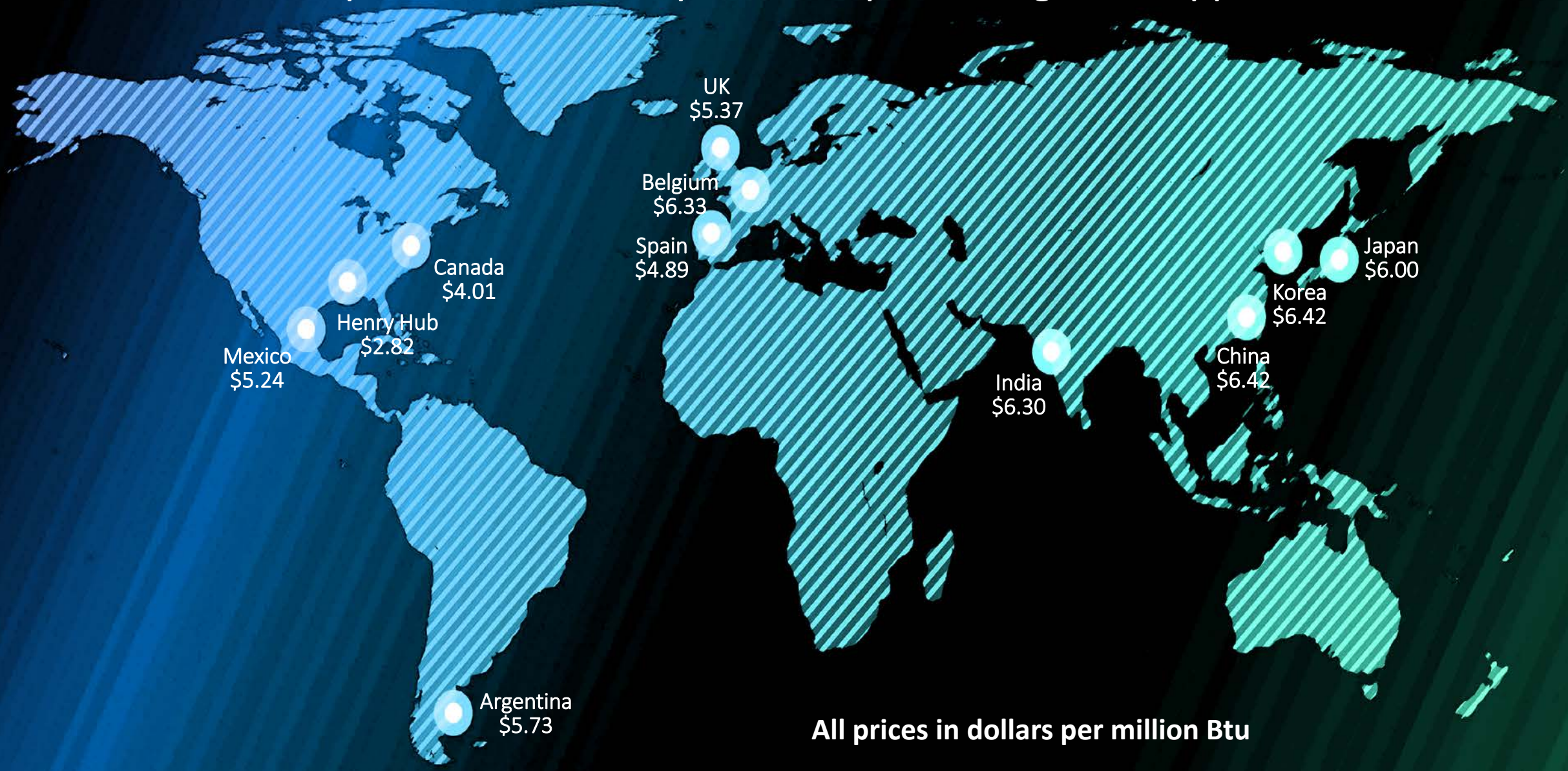
Natural Gas

As of October 2020, global landed natural gas prices generally recovered to around $6.00 per mmBtu in many markets, presenting trade opportunities



All prices in dollars per million Btu

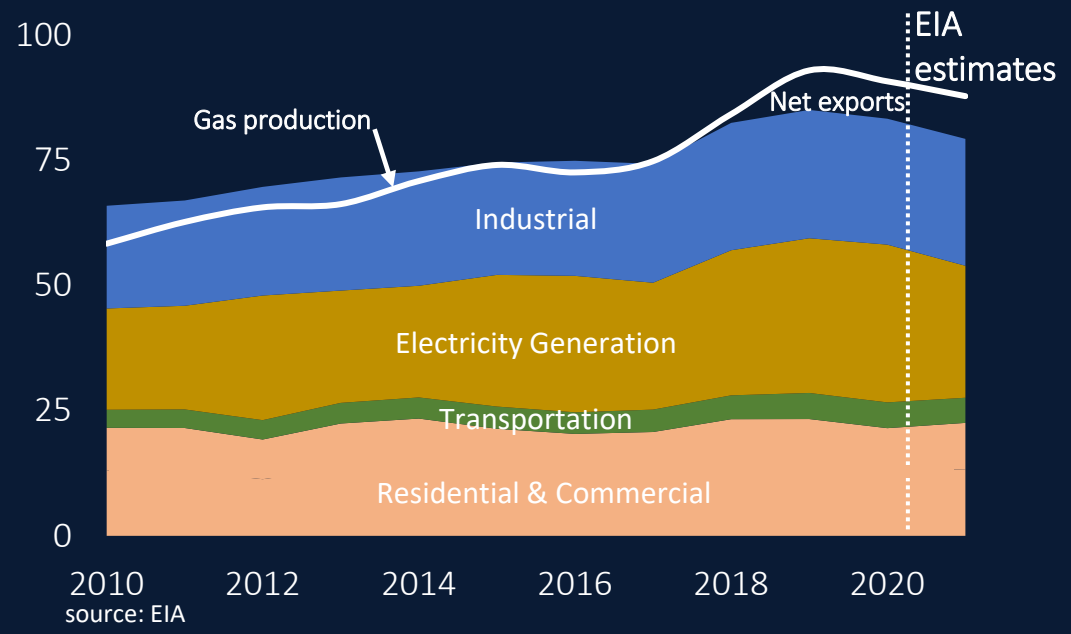
sources: U.S. FERC; METI; Bloomberg

Prolific and cost-effective U.S. natural gas production has enabled stronger demand across sectors and trade opportunities

- Natural gas has held up relatively well through the COVID-19 pandemic with low prices, resilient demand in the industrial and power sectors, and export growth
- U.S. gas market dynamics in the past decade have lowered natural gas liquids pricing which has been advantageous for domestic home heating, industrial production, as well as emerging market demand centers

U.S. gas production and consumption

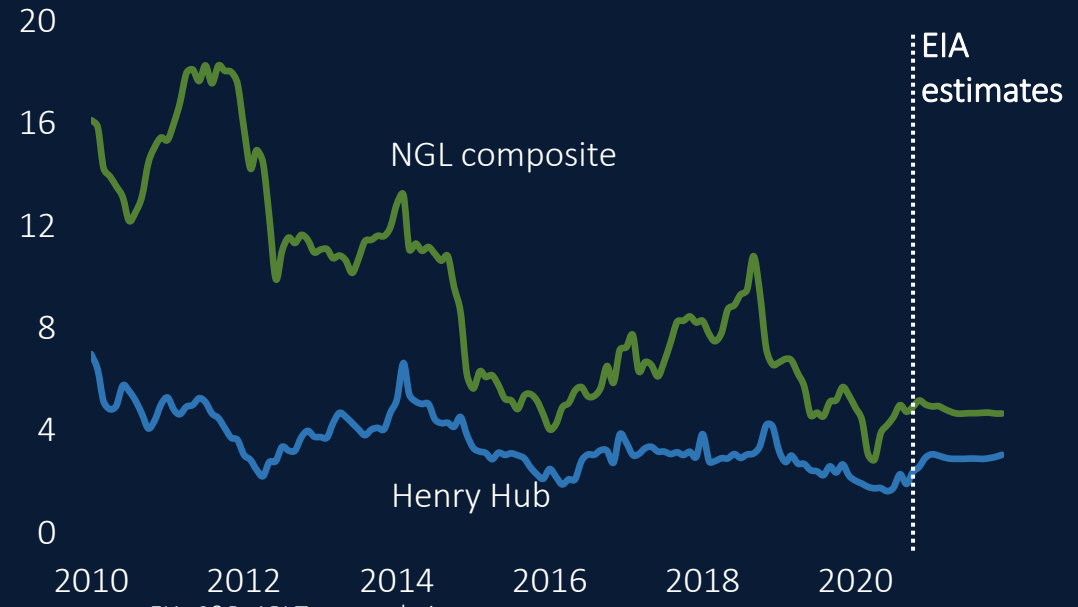
Billion cubic feet per day (Bcf/d)



source: EIA

Henry hub vs. natural gas liquid composite price

$2020 per million Btu (mmBtu)



sources: EIA; S&P; API Team analysis

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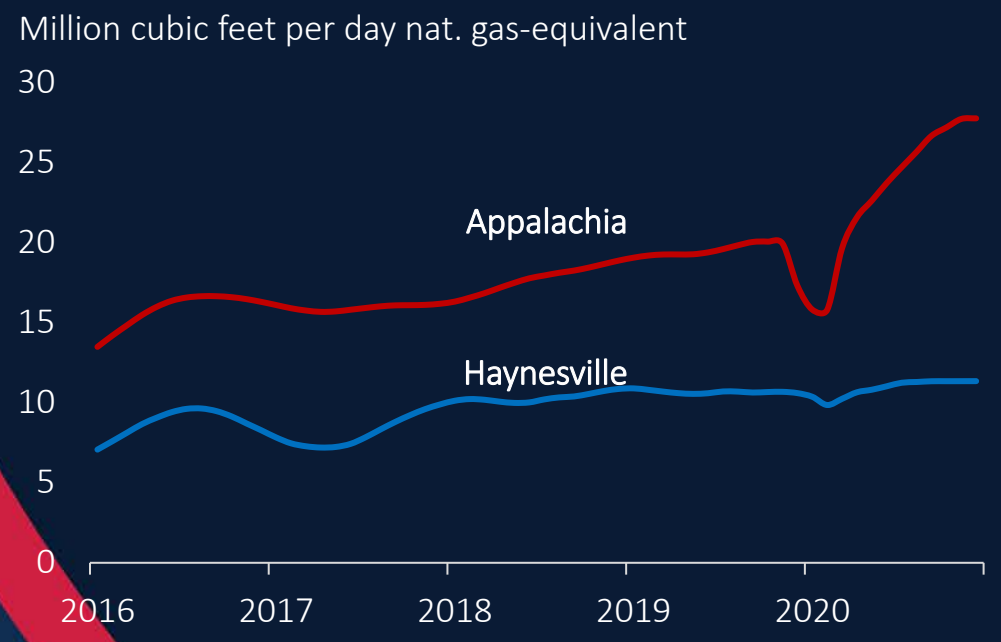
Natural gas drilling productivity gains appeared to lower estimated breakeven prices

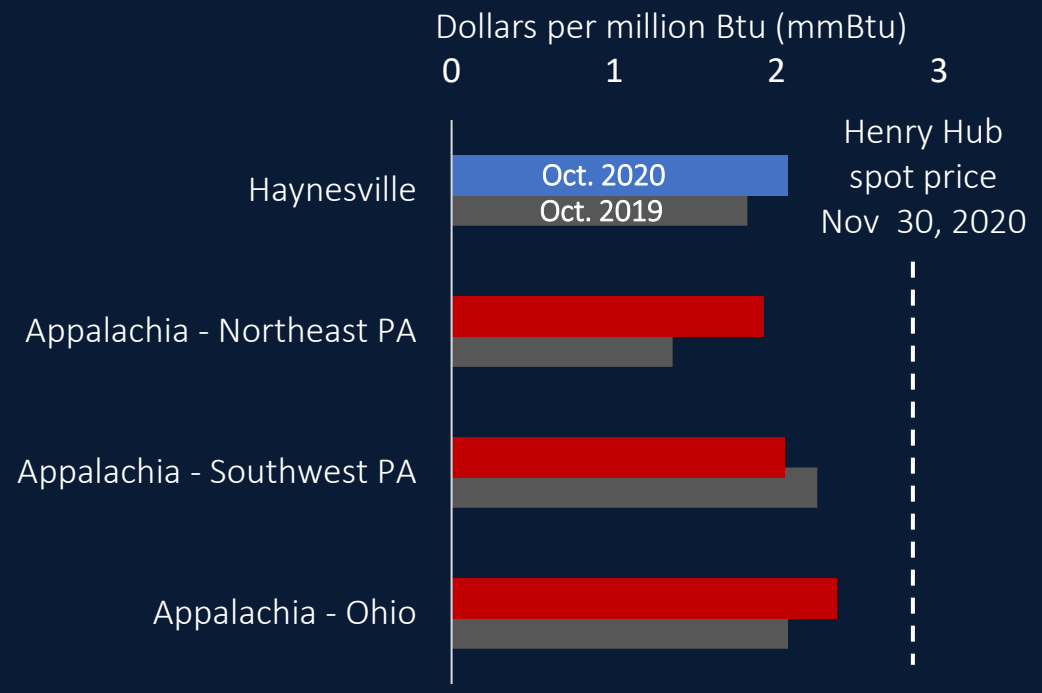
- As drillers became even more selective through the 2020 COVID-19 recession, dry natural gas well productivity rose per EIA
- Estimated breakeven prices were below recent prices for major U.S. dry gas production regions per BTU Analytics

Natural gas well productivity –production per rig



source: EIA Drilling Productivity Report

Natural gas estimated breakeven prices



*Half cycle breakevens assuming 10% discount factor and play-specific costs
source: BTU Analytics

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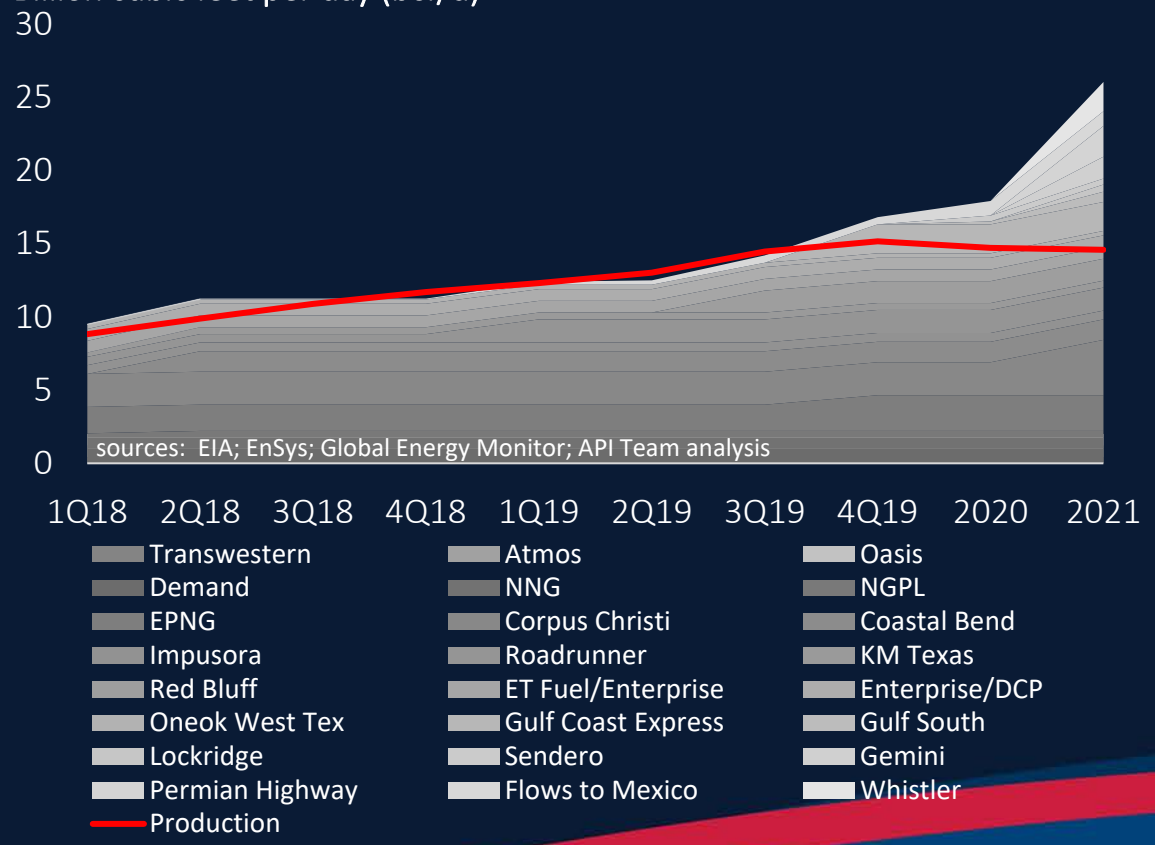
With Permian natural gas pipeline completions, pipeline capacity could readily enable production growth and LNG export opportunities

- With an estimated 6.1 bcf/d of Permian gas pipeline capacity by end of 2021, lines stand to benefit post-COVID from increased demand, dry exports to Mexico, and LNG exports via the Gulf to emerging markets

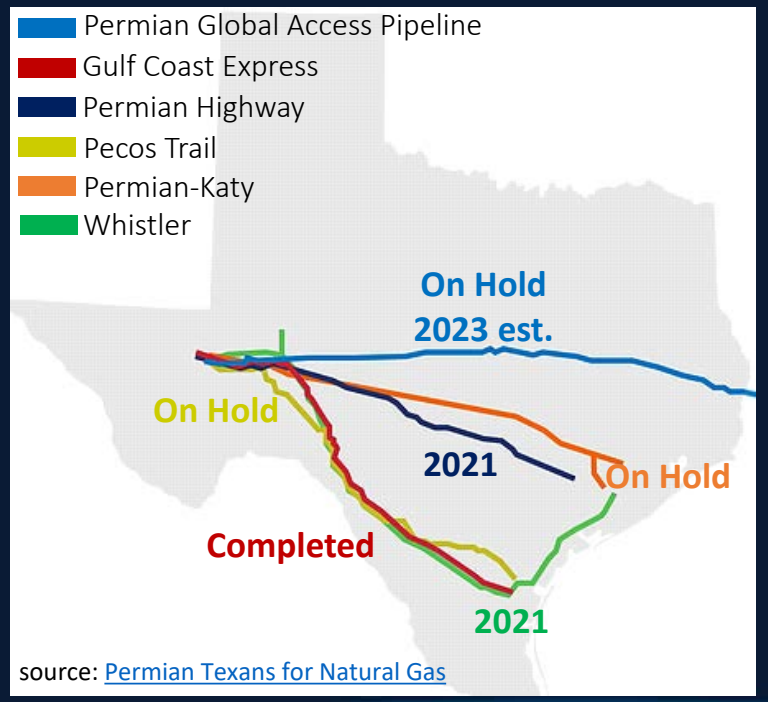
Permian Basin gas pipeline capacity utilization

Billion cubic feet per day (bcf/d)



Key Permian gas pipeline updates

As of Q4 2020



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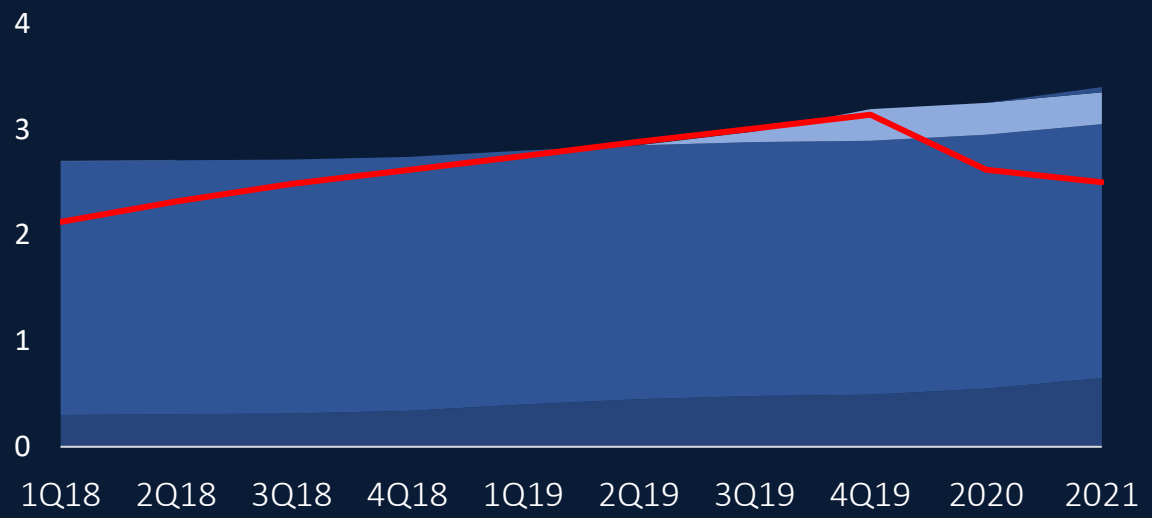
Bakken natural gas pipeline capacity has historically matched well with production and appeared ample relative to recent changes

Bakken gas pipeline capacity utilization

Billion cubic feet per day (bcf/d)



- North Bakken Expansion
- Demicks Lake to Northern Border Pipeline
- Current Bakken egress on Northern Border and Alliance pipelines
- Demand
- Production

sources: EIA; EnSys; Global Energy Monitor; API Team analysis

Key Bakken gas pipelines

As of Q4 2020

source: RBN Energy

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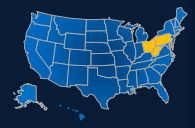
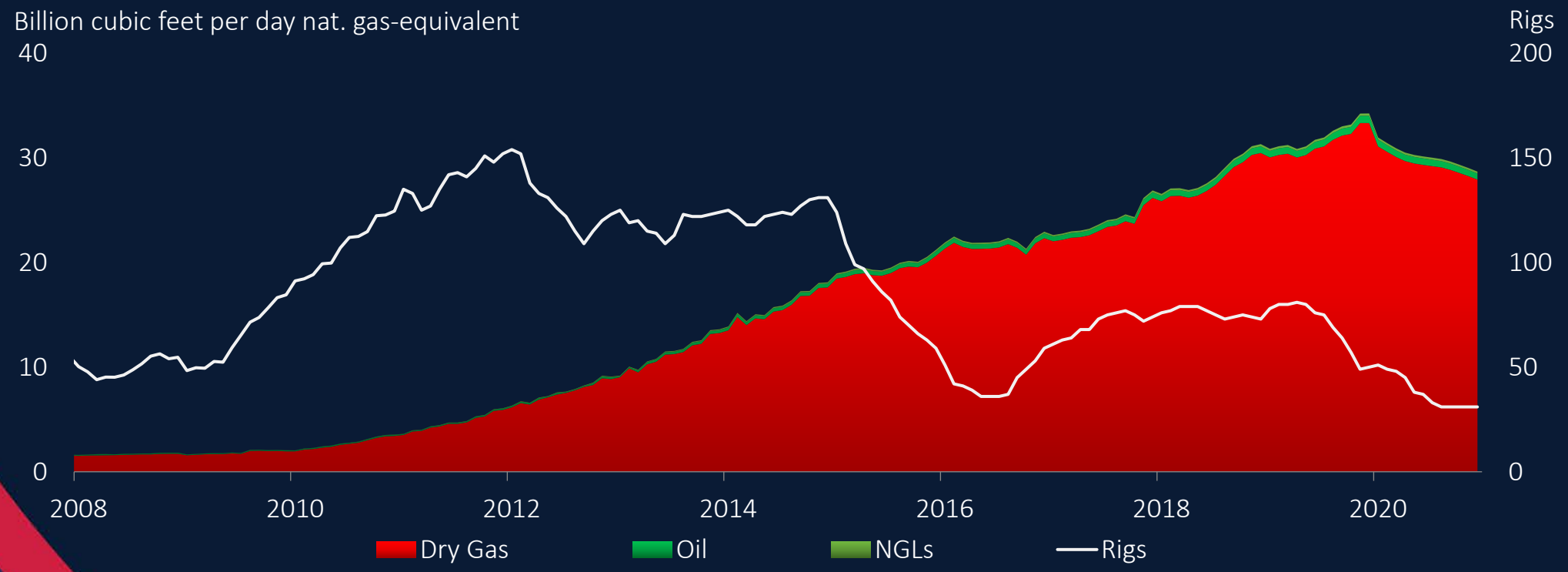
Appalachia has grown into the largest source of natural gas as well as a substantial producer of natural gas liquids for regional manufacturing



- Appalachia has become the largest U.S. producer of natural gas (34.1 bcf/d in Q3 2020) despite lower recent production along with less drilling activity through the 2020 COVID-19 recession per EIA
- Although Appalachian natural gas liquids production appears small in comparison with the region's gas production, it represents about 150,000 barrels per day of products that have generated their own markets and infrastructure

Appalachian natural gas and oil production



sources: EIA Drilling Productivity Report; API Team analysis

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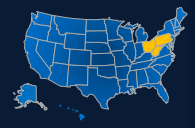
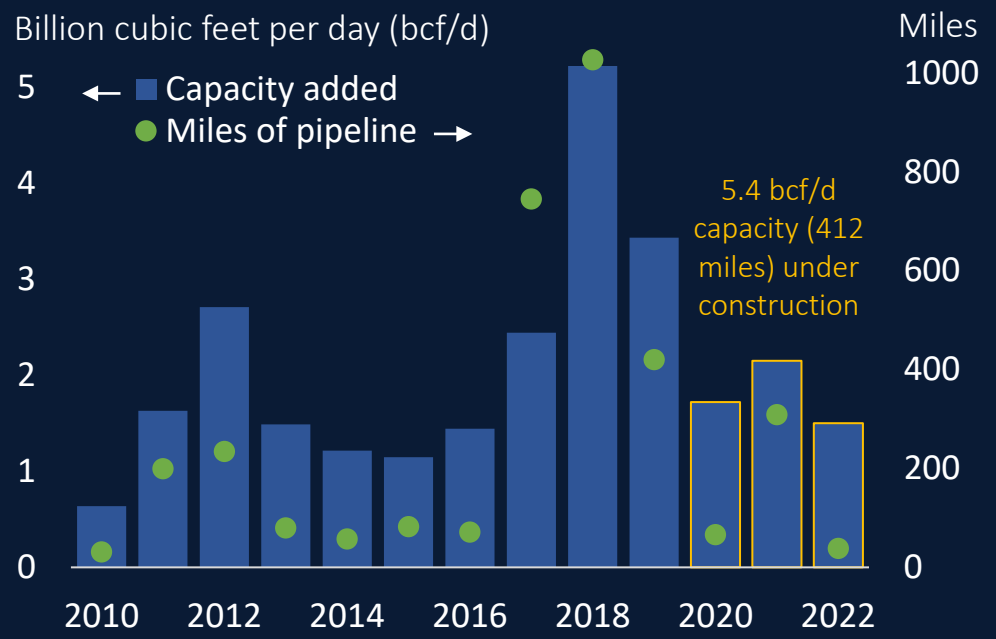
New Appalachian natural gas pipelines have enhanced market connectivity



- Appalachian natural gas prices were typically at or above those at Henry Hub prior to 2014, but as production growth outpaced demand and approached limits of pipeline egress, regional prices were generally lower than Henry Hub in 2014-2018
- New regional pipeline capacity – more than 11 bcf/d between 2017 and 2019 – enabled Appalachian gas to reach diverse markets, placed downward pressure on nationwide prices, and strengthened Appalachia's relative prices to Henry Hub

Appalachian natural gas pipeline build-outs



sources: EIA; S&P; Oil & Gas Journal; API Team analysis of new pipelines, expansions, and upgrades

Appalachian hubs and Henry Hub price differentials*

sources: S&P; Bloomberg; EIA

* Price range and averages based on Dominion N/S, TCO Pool, and Leidy

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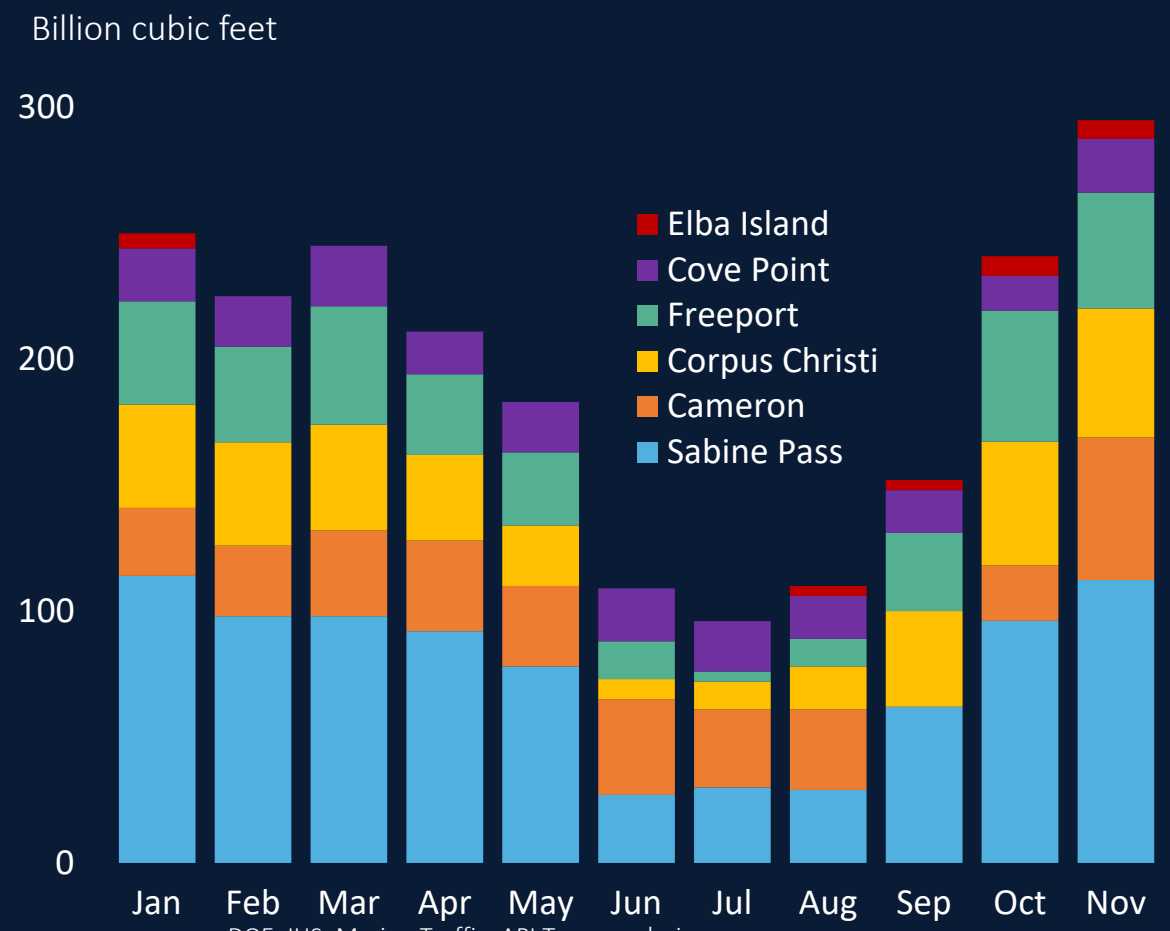
U.S. LNG has proven resilient through COVID-19, and Q4 export volumes are on pace to set new U.S. records

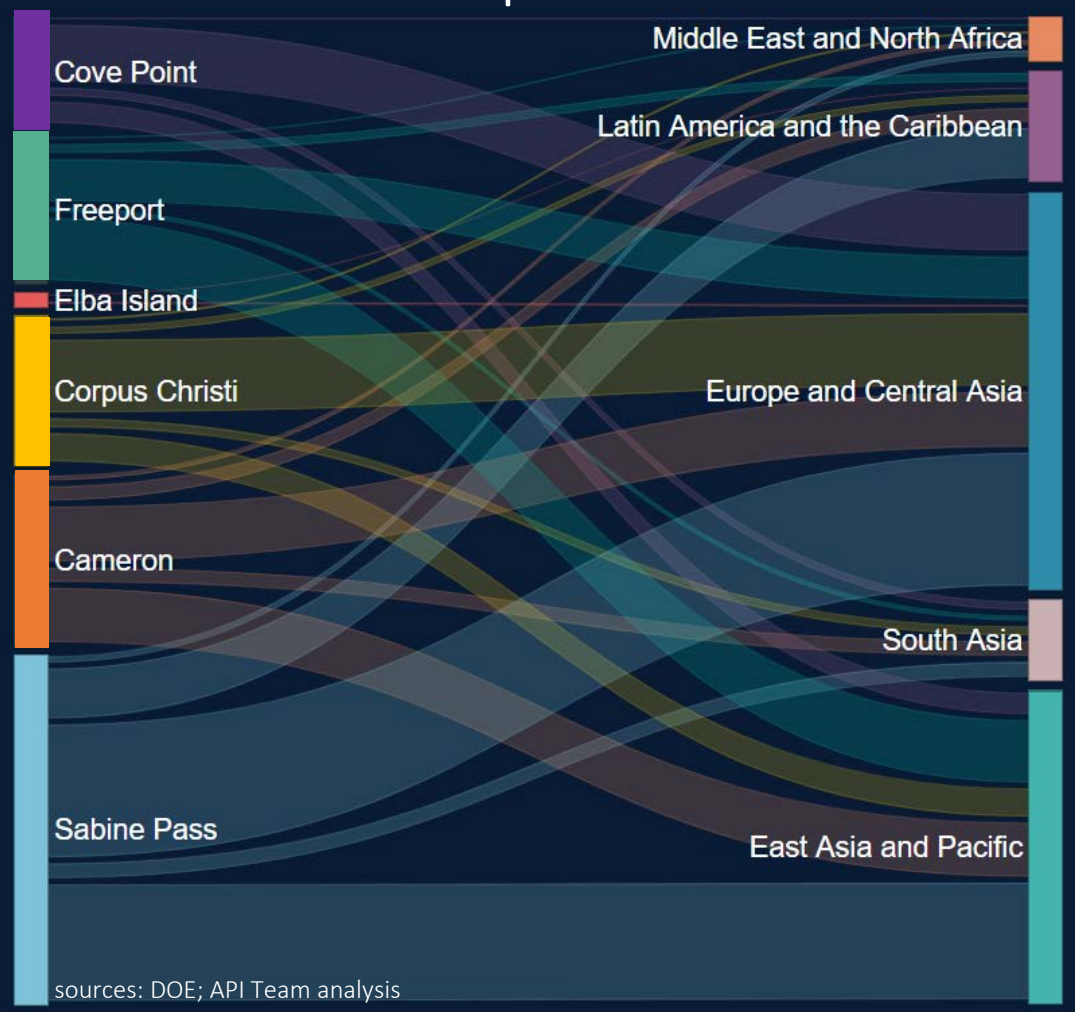
- Depressed global gas demand at the height of the pandemic as well as a prolonged hurricane season initially hampered LNG recovery
- With widening global gas price differentials and demand recovery in 2H 2020, U.S. LNG exports are on track to hit export records in Q4

U.S. LNG export volume by terminal



sources: DOE; IHS; Marine Traffic; API Team analysis

U.S. LNG export destinations



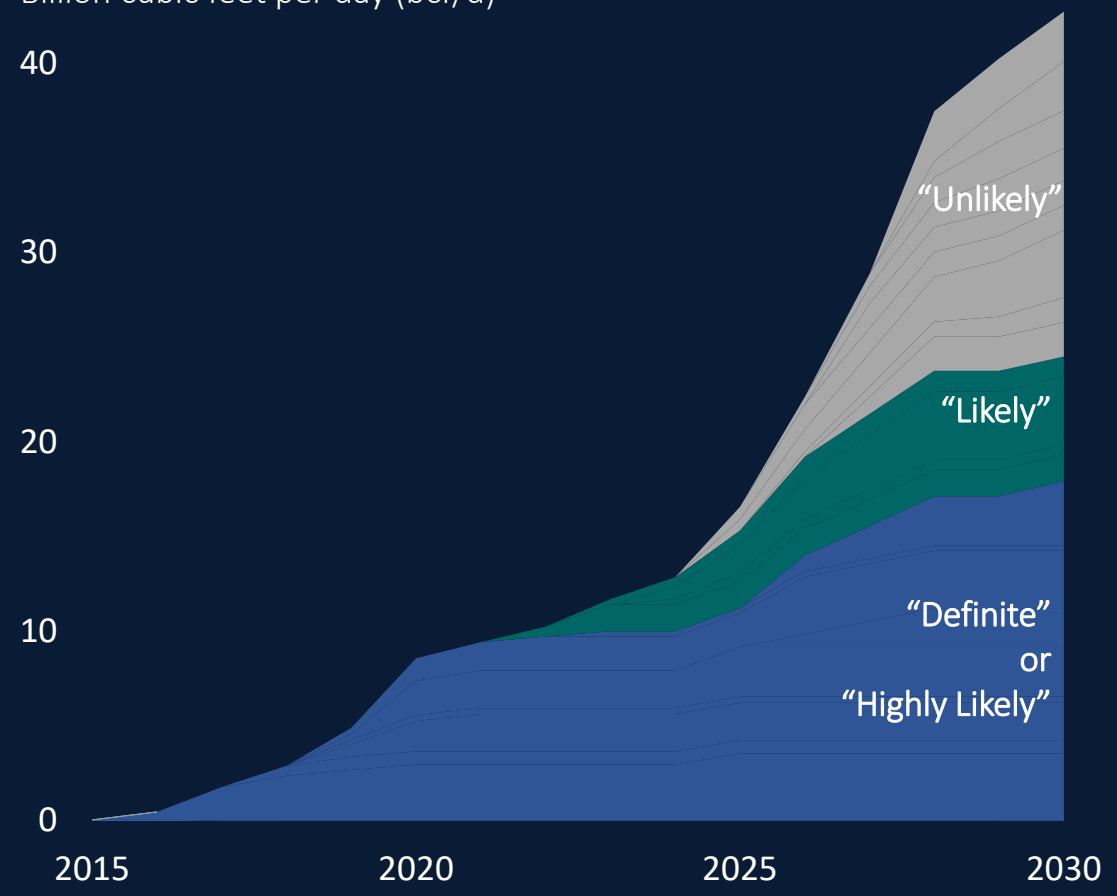
sources: DOE; API Team analysis

As U.S. LNG exports neared a record 10 bcf/d in Q4 2020, the next wave of projects could more than double export capacity by 2030

- With more than 10 bcf/d of U.S. LNG export capacity constructed since 2015, future projects must compete for new global markets
- Despite some delays in final investment decisions and construction, U.S. LNG export capacity could exceed 25 bcf/d by 2030

North American LNG projects

Billion cubic feet per day (bcf/d)



Plant name	Consensus view of likelihood	Final Investment Decision (FID) Status	2030 capacity (Bcf/d)
Corpus Christi Mod. 1-7	Unlikely	Under regulatory review	3.0
Alaska LNG	Unlikely	Planning FID	2.6
Lake Charles	Unlikely	Planning FID	2.0
Delfin FLNG	Unlikely	Planning FID	1.7
Kitimat LNG	Unlikely	Planning FID	1.3
Goldboro LNG	Unlikely	Planning FID	1.3
Rio Grande LNG Tr. 1-2	Unlikely	Under regulatory review	1.2
Monkey Island (SCT&E)	Unlikely	Under regulatory review	1.6
Texas LNG	Unlikely	Under regulatory review	0.5
Magnolia LNG	Unlikely	Construction delayed	1.1
Plaquemines Mod. 1-20	Unlikely	Planning FID	2.6
Port Arthur LNG	Unlikely	Planning FID	1.8
Costa Azul	Likely	FID Taken - Nov 2020	0.4
Freeport LNG Train 4	Likely	FID Planned - Delayed	0.7
Driftwood	Likely	FID Planned - Delayed	3.6
Woodfibre LNG	Likely	Construction delayed	0.3
LNG Canada Tr. 1-2	Likely	Under construction	1.6
Calcasieu Pass	Highly Likely	Under construction	1.4
Golden Pass	Highly Likely	Under construction	2.4
Corpus Christi Tr. 3	Highly Likely	Under construction	0.8
Sabine Pass Tr. 6	Highly Likely	Under construction	0.6
Corpus Christi	Definite	Operational (T 1-2)	1.6
Elba Island	Definite	Operational	0.3
Freeport LNG	Definite	Operational (T 1-3)	2.0
Cameron LNG	Definite	Operational (T 1-3)	2.0
Cove Point	Definite	Operational	0.7
Sabine Pass	Definite	Operational (T 1-5)	3.6

sources: API Team analysis; FERC; Bloomberg NEF; S&P Global Platts; O&G Journal

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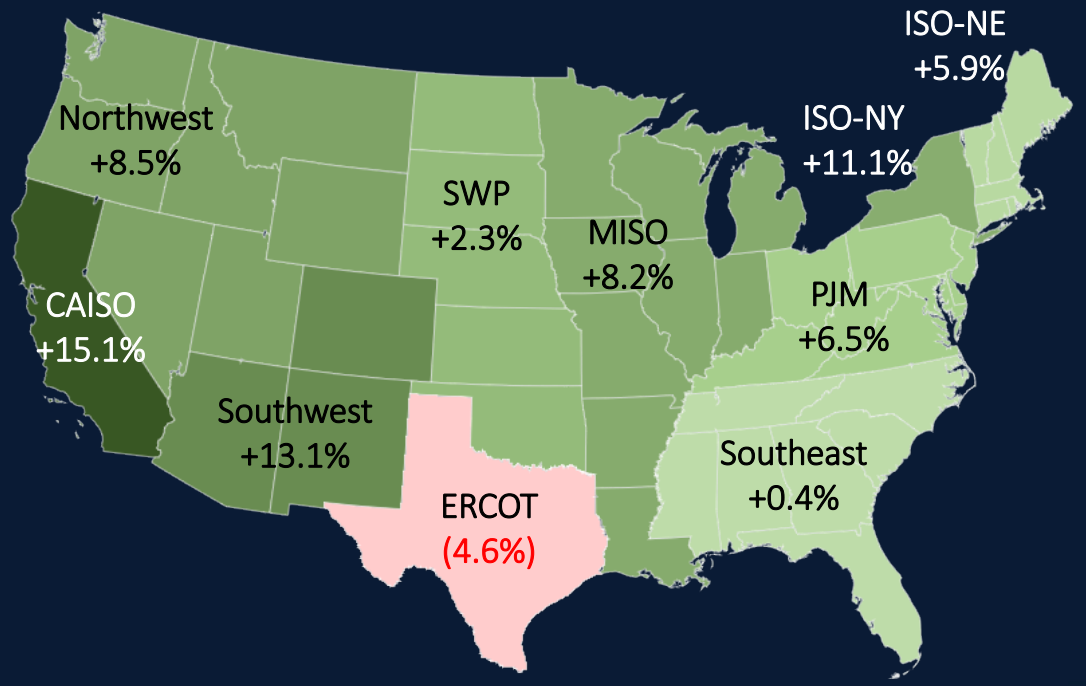
With increased utilization across most every U.S. region, natural gas reached a record 40% share of net electricity generation

- Despite lower electricity demand due to COVID-19, U.S. natural gas power sector market share reached 40% in 2H 2020
- Through Q4 year-to-date, natural gas consumption in electricity generation has increased in almost every RTO region

U.S. natural gas consumption for electricity generation

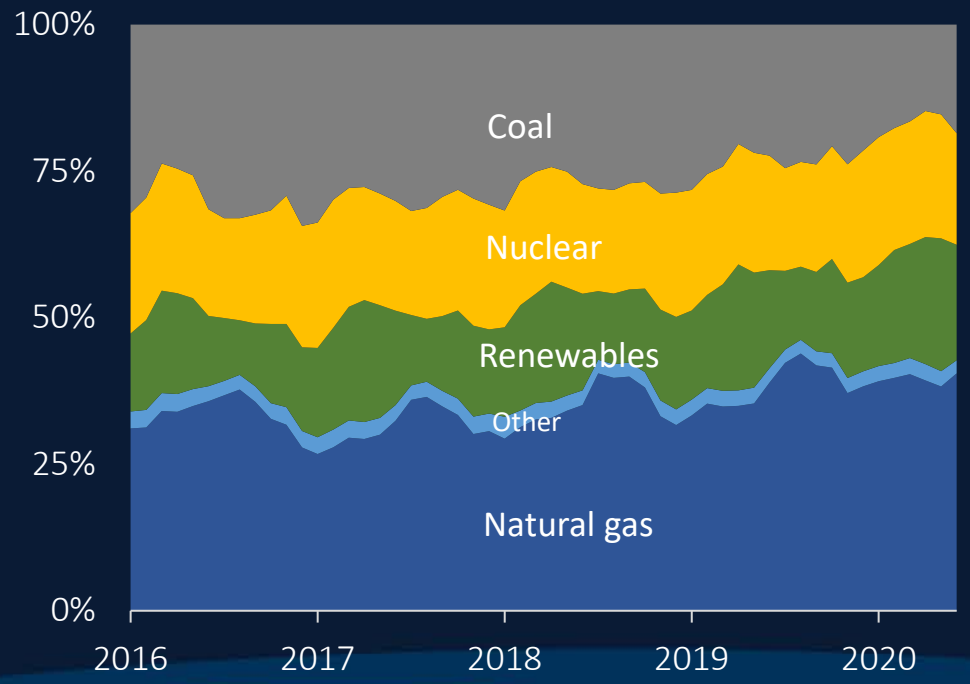
2020 year-to-date through November, y/y%



sources: EIA; FERC

U.S. electricity net generation by source

Market share



source: EIA Electric Power Monthly

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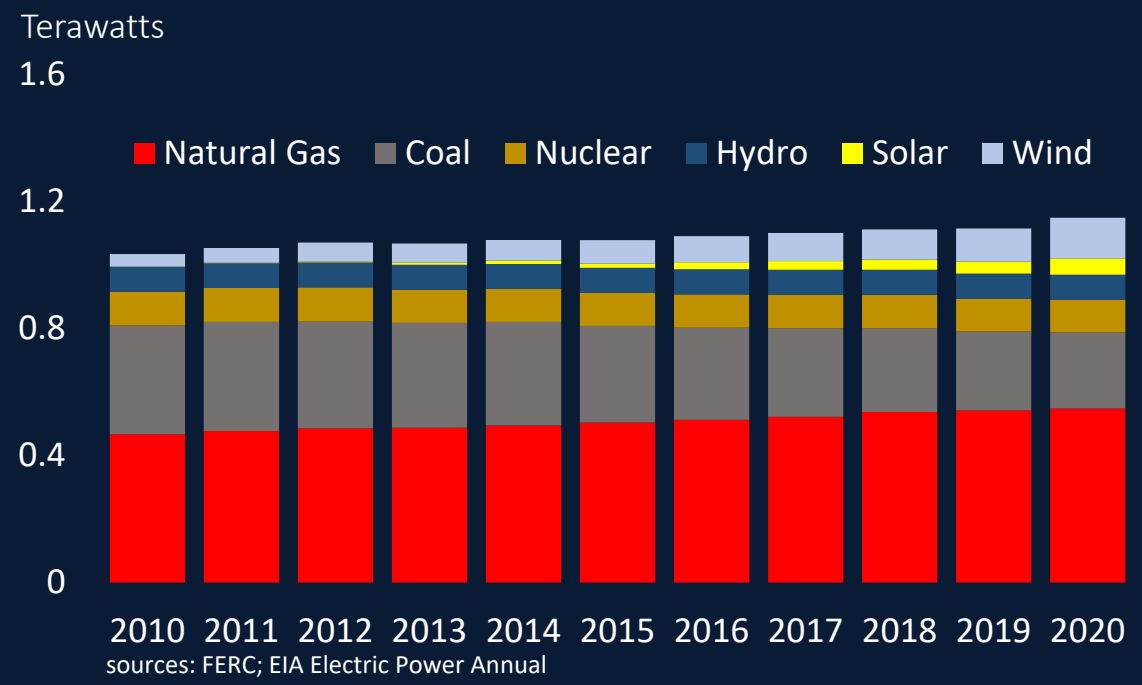
Natural gas has remained competitive among U.S. electricity capacity additions…

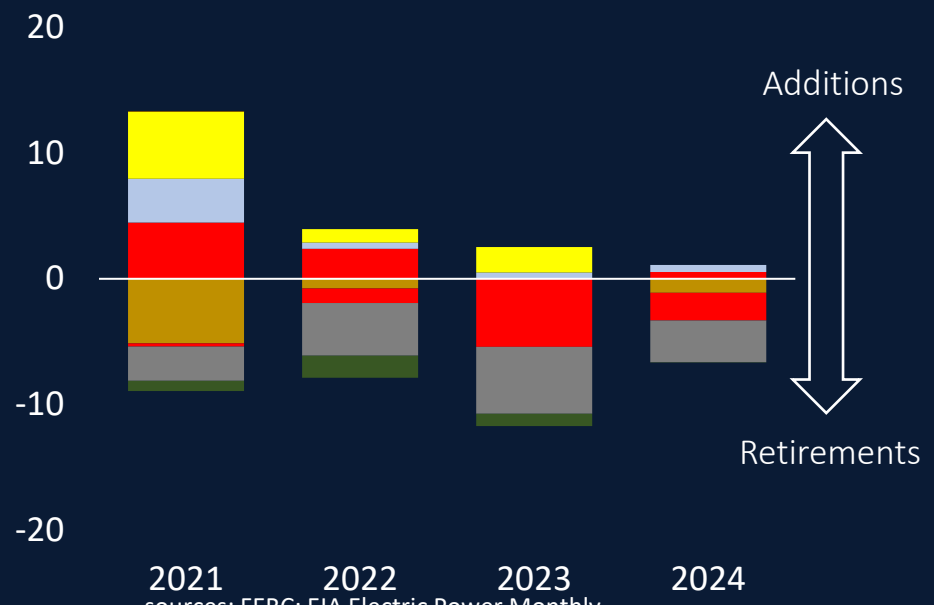
- As U.S. electricity generation capacity grew by 1.2% per year over the past decade, natural gas represented more than 40% of the increases
- Natural gas could maintain about 40% of capacity additions through 2022 per FERC and EIA data, with fewer additions announced thereafter

U.S. electricity generation capacity by source



sources: FERC; EIA Electric Power Annual

Planned retirements and additions*



sources: FERC; EIA Electric Power Monthly

*projects under construction

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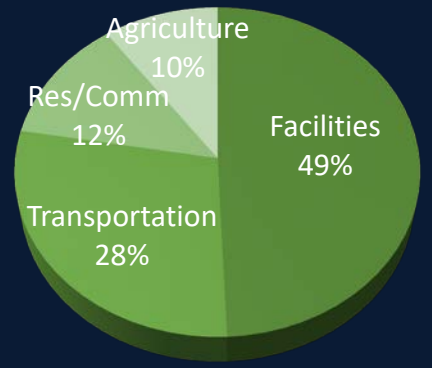
...Consequently, U.S. facility-level GHG emissions have fallen, thanks to reductions in the power sector

- EPA's recent release of 2019 total reported facility-level GHG emissions data showed U.S. GHG emissions fell by 14.1% between 2011 and 2019
- Led by reduced power sector emissions, the majority of states experienced double-digit percentage decreases over the same period

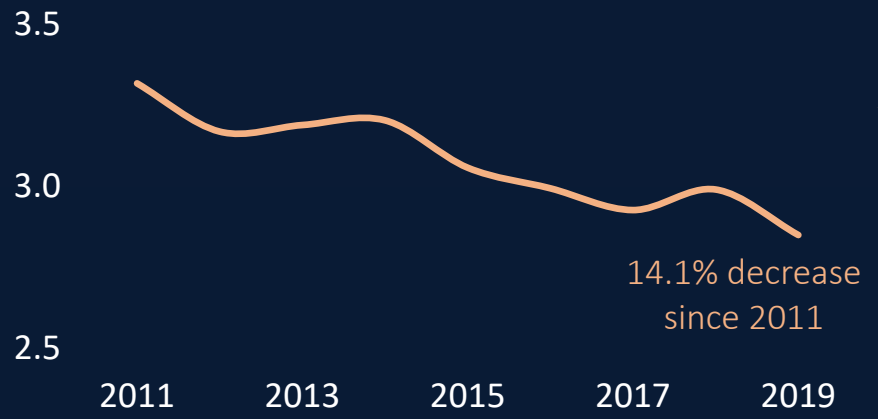
Total estimated U.S. GHG emissions, % share



source: EPA GHG Emissions Inventory Report 2020, where facility-level is electricity generation and industry

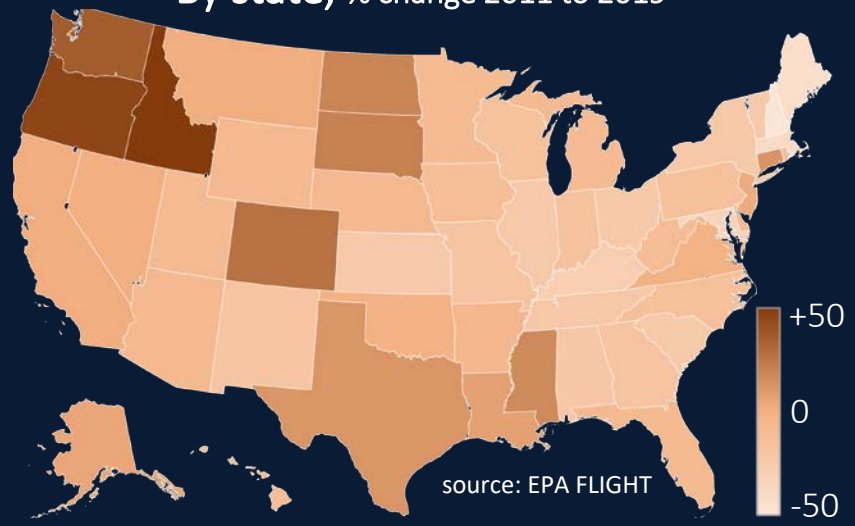
Reported facility-level U.S. GHG emissions

Billion metric tons CO_2e



source: EPA Facility Level Information on GHG Tool (FLIGHT)

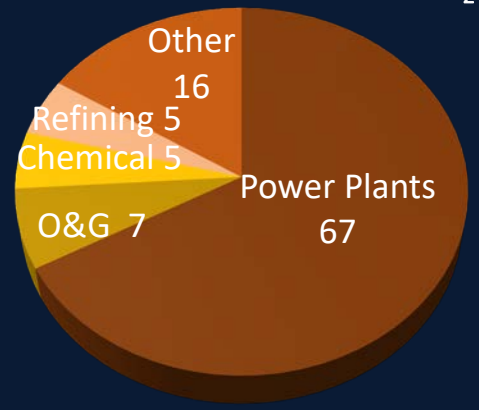
By state, % change 2011 to 2019



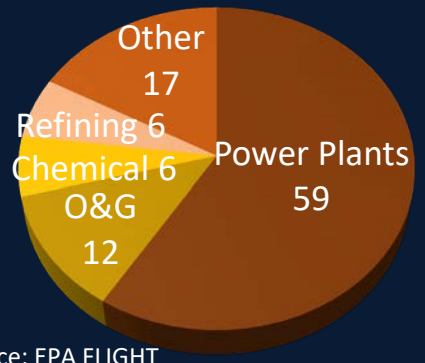
source: EPA FLIGHT

By sector, % share

2011: 3.32 Billion metric tons CO_2e



2019: 2.85 Billion metric tons CO_2e



source: EPA FLIGHT

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Dean Foreman (left) and podcast hosts

The API Industry Outlook, developed by API's Chief Economist, Dr. R. Dean Foreman, is a quarterly report that provides an overview of the natural gas and oil industry as it relates to the U.S. and global economies.