

API Industry Outlook

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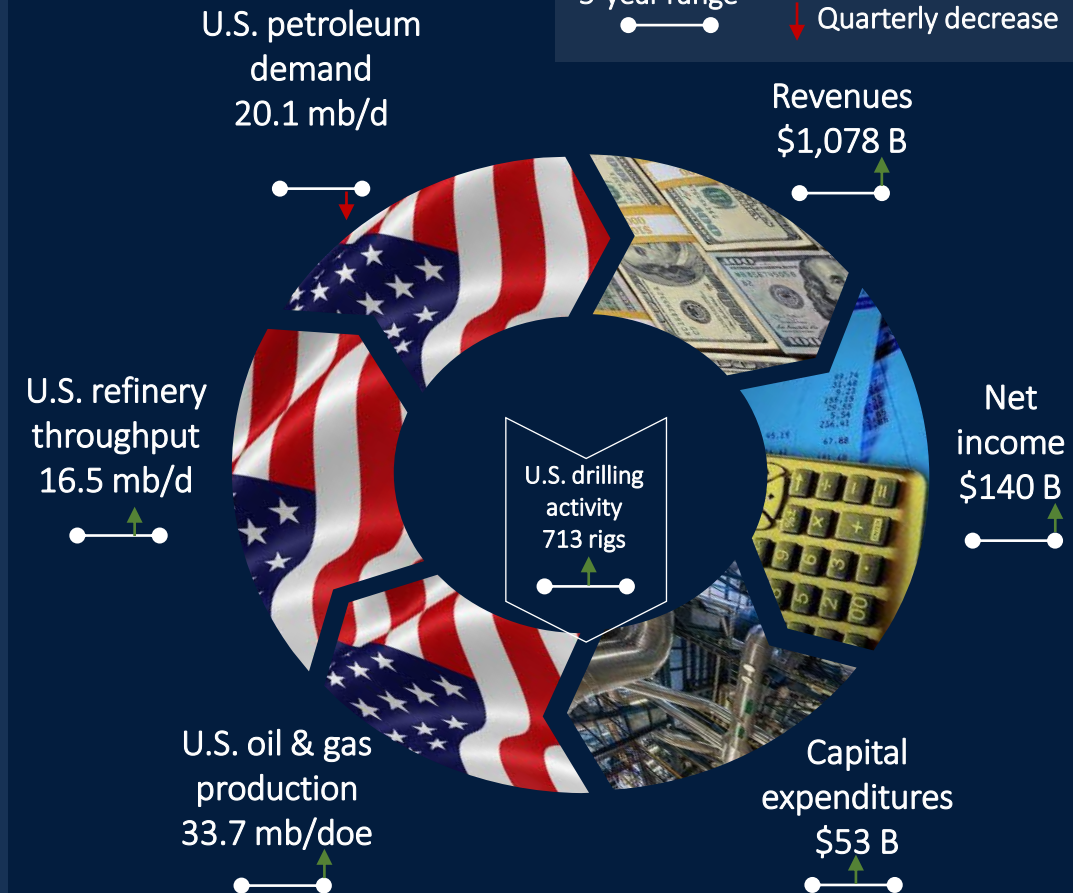
Key points

Second Quarter 2022 by the numbers

Benchmark price averages

Brent crude oil: \$112.85 per barrel WTI crude oil: \$108.77 per barrel
NGL composite: \$11.95 per mmBtu Nat. gas (Henry Hub): \$7.47 per mmBtu

5-year range ↑ Quarterly increase
 ↓ Quarterly decrease



➤ Economy. The IMF and Bloomberg consensus expects sustained global economic growth near its long-term average rate, despite slowing in the U.S. and Europe

- U.S. interest rate hikes intended to slow price inflation and demand are in contrast with continued supply-side constraints
- U.S. dollar appreciation to record-highs presents global financial risks and opportunities
- Amid myriad uncertainties, even weak global growth has historically required more energy over time

➤ Oil. Recurrent themes from previous quarters have remained germane

- Global oil demand expected to reach a record-high 101.5 mb/d in 2023 per EIA
- Global oil & gas drilling activity was down by 21.5% in August 2022 compared with August 2019 per Baker Hughes
- Work force, supply chain, financial, and policy headwinds continued to hamper investment, drilling, production, and inventories
- Global investment and spare capacity could struggle to meet demand in 2023 per IEA, the KSA, and OPEC
- U.S. rig productivity slipped, and there was lower production from leveraging the inventories of previously drilled but uncompleted wells (DUCs)
- Inventories historically low in the U.S. and OECD

➤ Natural gas. Global natural gas prices set new record highs, and U.S. spot prices at Henry Hub rose to their highest since 2008

- U.S. LNG exports could reach new record levels in 2023 per EIA

With the lowest SPR crude oil inventories since 1984 – and global inventories below their 5-year range – U.S. economic and energy security requires policies to support production, pipeline infrastructure, and trade

• 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



Global energy needs have grown with economic activity in Q3 2022

► In Q3 2022, the world will have consumed approximately **154,800,000,000,000,000** British thermal units of primary energy, nearly **85%** of which was oil, natural gas and coal per EIA, including

2,089,104,080 tons of coal

8,995,500,000 barrels of oil

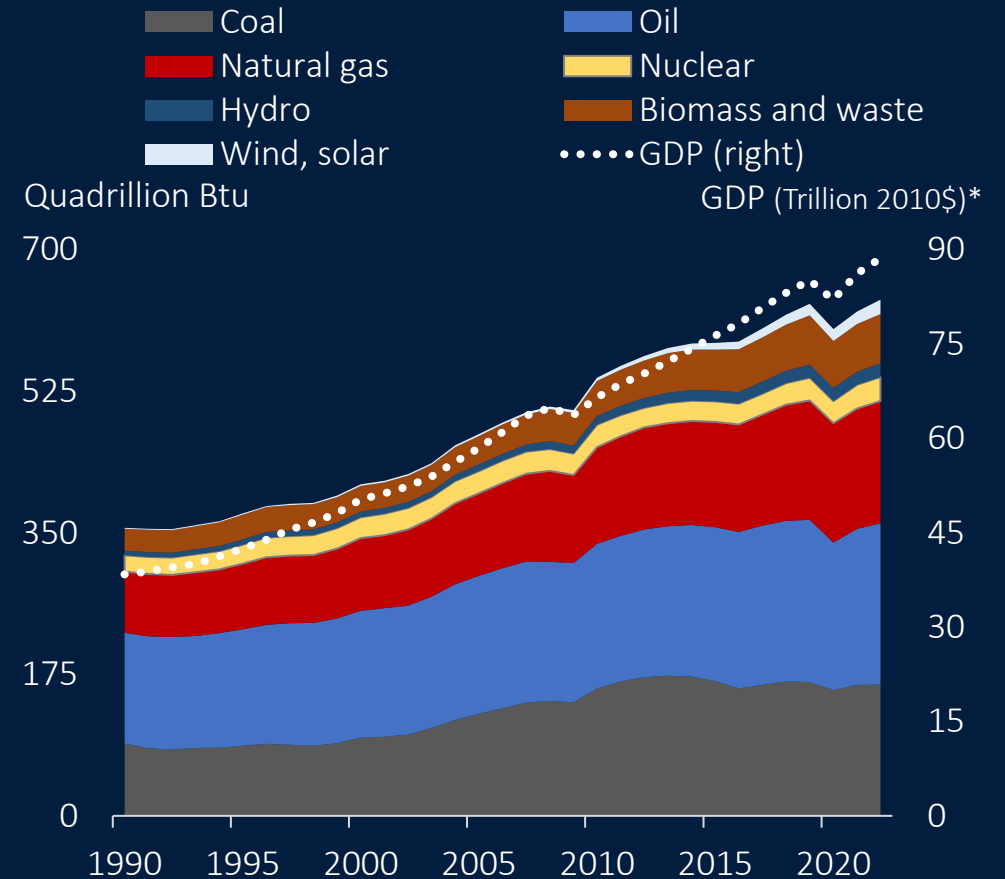
36,730,668,068 thousand cubic feet of natural gas

In Q3 2022, the world consumed the equivalent of cumulative central Appalachia coal production since 1970 (*The Atlantic*)

Nearly 5X Russia's natural gas production in 2021 per IEA

The U.S. Strategic Petroleum Reserve held the equivalents of 4.3 days of global oil consumption and 22 days of U.S. oil consumption as of Sep. 9 per EIA

Global primary energy consumption vs. GDP, annual by energy source



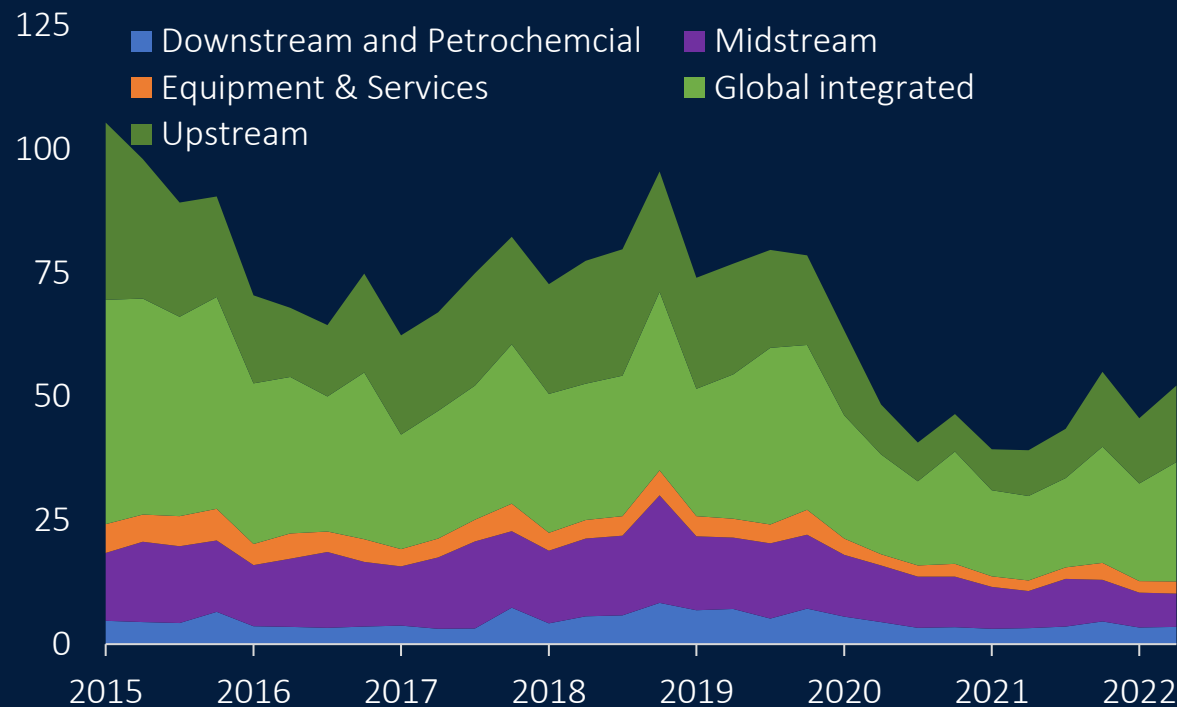
sources: EIA; IEA; IMF; Bloomberg; API Team calculations
* Market exchange rate basis

In Q2 2022, the natural gas and oil industry invested \$51.6 billion, and the backlog of U.S. projects under construction increased

- ▶ The industry invested \$51.6 billion in Q2 2022, compared with \$44.6 billion in Q2 2021
- ▶ Across the energy value chain, API is monitoring 130 oil & gas-related projects currently under construction worth \$158 billion

Capital expenditures by industry segment

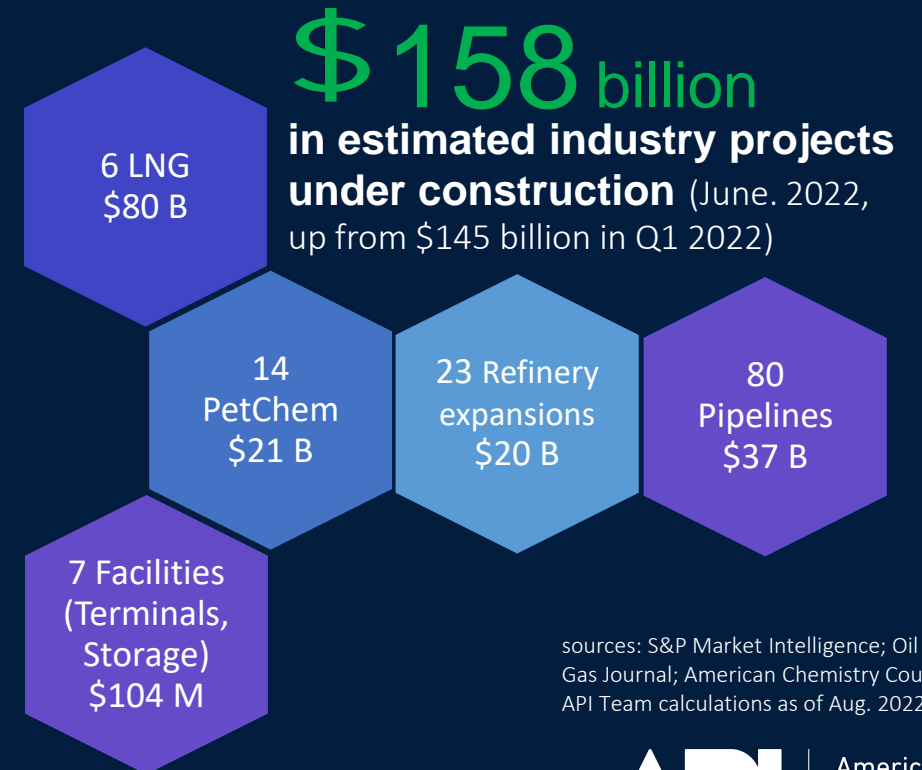
Billion dollars (2022\$)



* All other oil & gas industry companies

sources: Bloomberg; publicly-available company reports; BLS

\$158 billion in current U.S. energy infrastructure investments



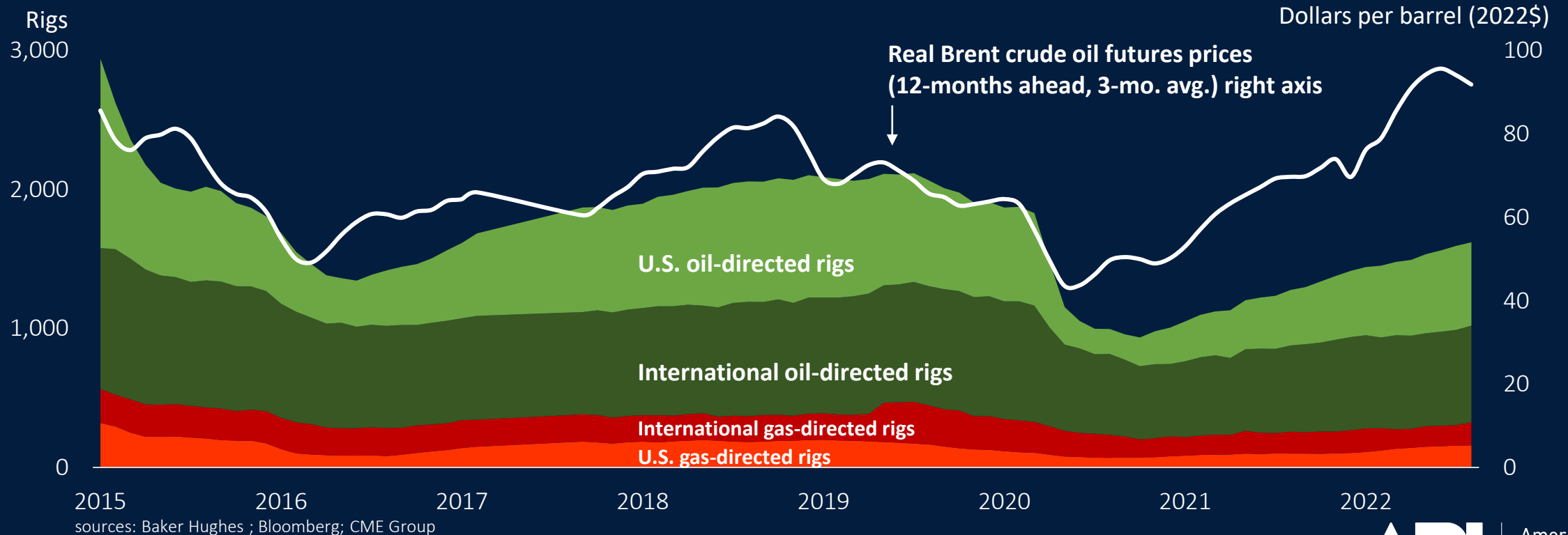
sources: S&P Market Intelligence; Oil & Gas Journal; American Chemistry Council; API Team calculations as of Aug. 2022

Global drilling activity has continued to lag its 2019 levels and historical response to prices



- ▶ In August 2022, global oil & gas drilling activity was down by 21.5% compared with Aug. 2019. Changes vs. 2019 by segment:
 - U.S. oil drilling (-21.0%)
 - U.S. natural gas drilling (-3.6%)
 - International oil drilling (-19.2%)
 - International natural gas drilling (-40.4%)

Global oil drilling activity and Brent crude oil prices, monthly



Global Economy



What we're watching now: Could above-average global growth be recessionary? Oil and natural gas demand have grown



- Key themes this quarter are: 1) ongoing macroeconomic risks despite historically strong growth; 2) natural gas in high demand, requiring policy clarity for investment; and 3) upgrades to estimated global oil demand, amid low inventories

World Economic Outlook

- Global growth could slow to 3.2% y/y in 2022 and 2.9% y/y in 2023 – above its historical average rate despite prevalent downside risks
- China growth in 2022 3.3% y/y, 2023 4.6% y/y
- “Rising food and energy prices cause widespread hardship, famine, and unrest”
- “Tighter financial conditions could trigger debt distress in emerging and developing economies”
- “Global trade growth in 2022 and 2023 will likely slow” due to weakened demand, supply chain problems, and a strong U.S. dollar foreign exchange rate

International Monetary Fund, July 2022

Global Voice of Gas

- Austria, France, Germany and Italy indicated they will boost coal-fired power generation to mitigate risks of winter energy shortages. High gas prices are having similar effects in Asia
- Diesel generators account for more than 40% of total electricity consumed in West Africa.... businesses in countries like Nigeria are struggling to stay afloat. The rising cost of natural gas also makes utility-scale electricity generation much more expensive in markets like Ghana, Cote d’Ivoire, and Nigeria
- “EU policymakers need to avoid making contradictory and unreasonable [low] forecasts on the future role of natural gas...This mixed messaging risks deterring investment in needed natural gas supply and infrastructure”

International Gas Union, July 2022

Oil Market Report, August 2022

- Upgraded 2022 world oil demand growth to 2.1 mb/d from 1.7 mb/d to an average of 99.7 mb/d, plus another 2.1 mb/d in 2023 to 101.8 mb/d
- “Soaring oil use for power generation and gas-to-oil switching are boosting demand”
- Revised up their forecast for Russian oil output but lowered that for North America
- Global observed inventories fell by 5 mb in June, with a drawdown in both OECD and non-OECD stocks, partially offset by an increase in oil on water

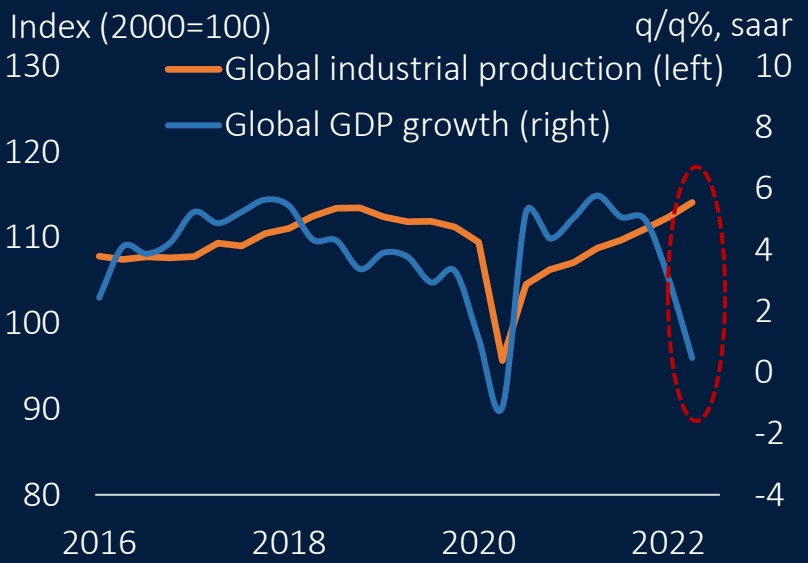
International Energy Agency, August 2022



The economic consensus expects sustained global economic growth near its long-term average rate, despite notable slowing in the U.S. and Europe

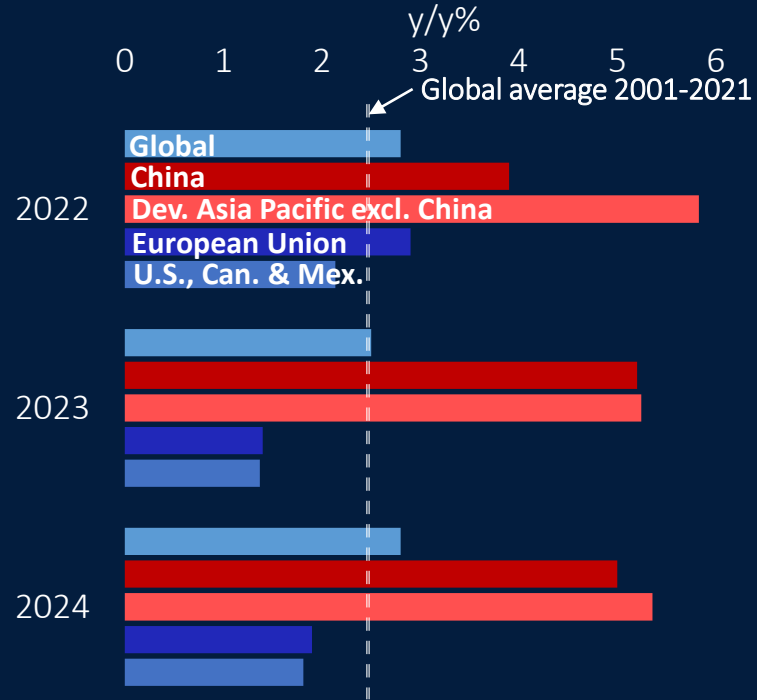
- Global industrial production continued to improve through June 2022
- Global GDP growth expectations to 2024 have remained over long-run historical averages and could be driven predominantly by China/developing Asia Pacific, N. America, and the European Union per the IMF and Bloomberg economic consensus

Global industrial production vs. GDP growth



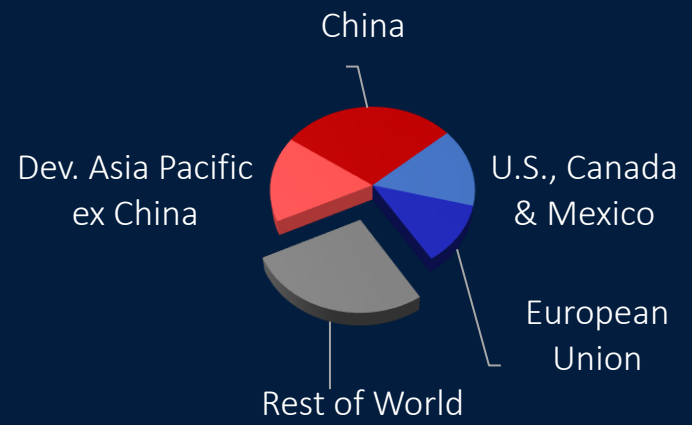
sources: Bloomberg Economics; CPB Netherlands Bureau for Econ. Policy Analysis

Real GDP growth*



* Market exchange rate basis aggregated for 204 countries, compiled Aug. 2022
sources: IMF; Bloomberg; API Team calculations

Bloomberg consensus' contributions to GDP growth, 2022 to 2024*



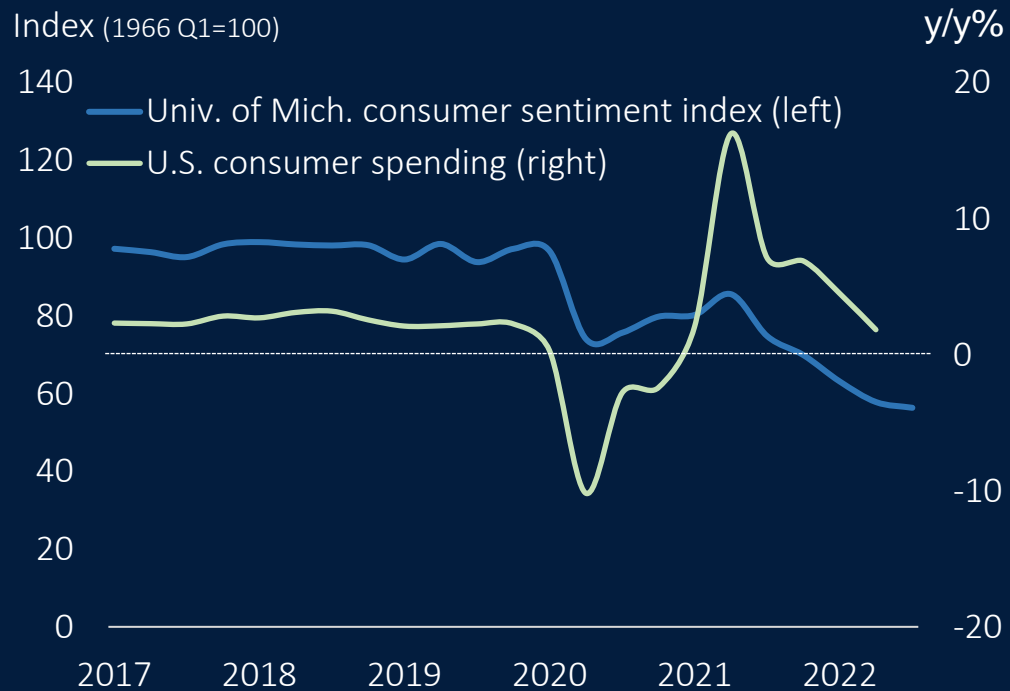
Leading economic indicators showed relative U.S. weakness but China rebound



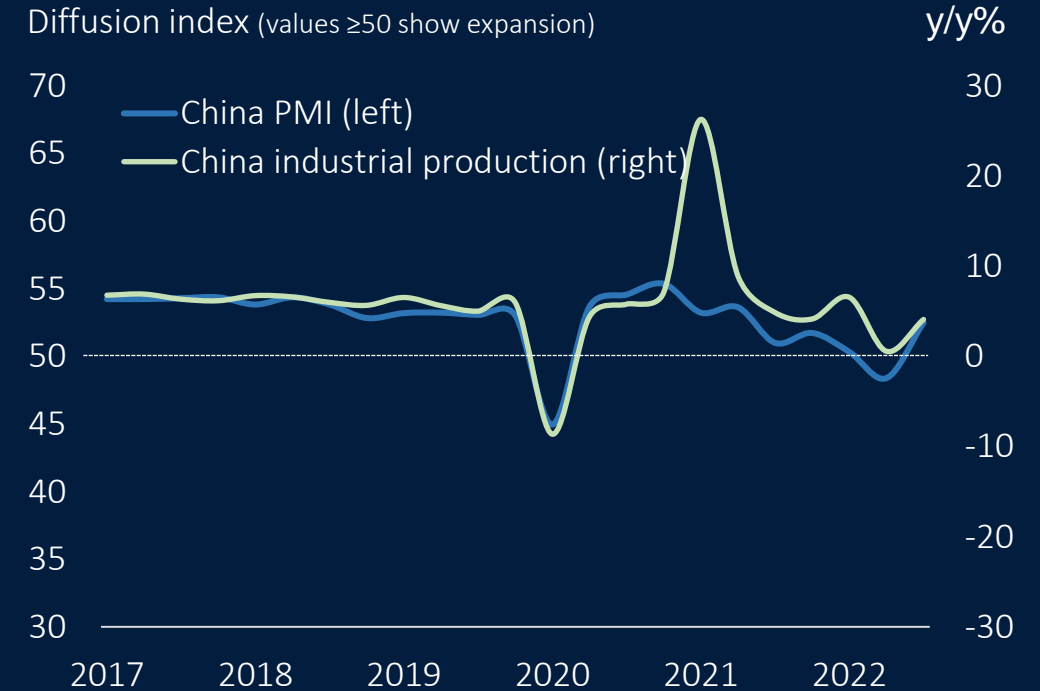
- ▶ U.S. consumer sentiment recently fell to historic lows, which indicated potential weakness in consumer spending, per the Univ. of Michigan's survey
- ▶ China's GDP growth historically been driven by industrial production (and exports), and an indicator of production – the composite purchasing managers' index – recently improved

Key leading indicators, GDP drivers, and real growth in the U.S. and China

United States: Consumer sentiment vs. spending



China: Purchasing Managers' Index vs. industrial production



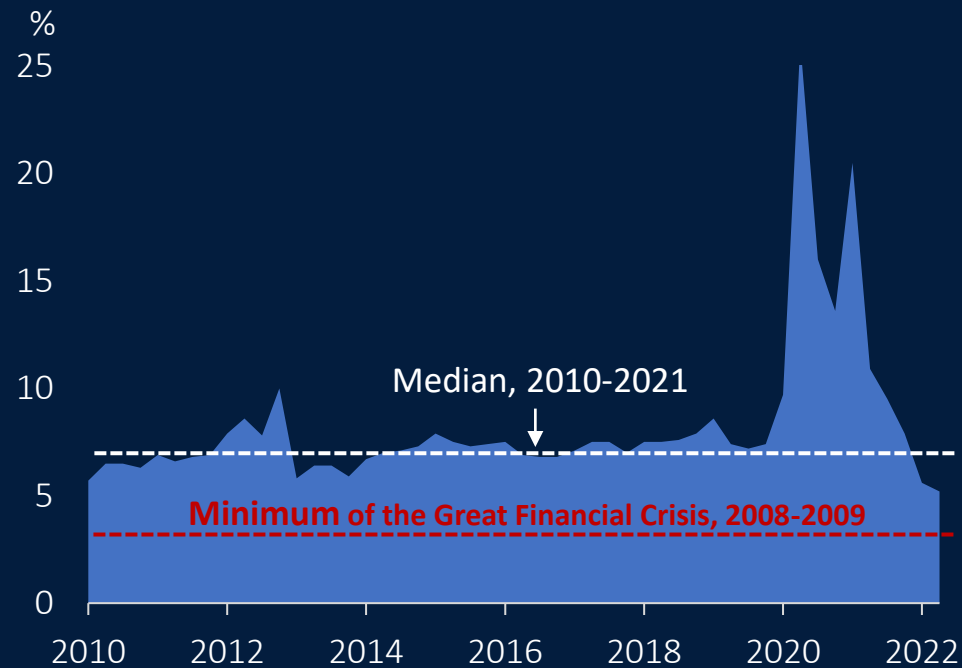
sources: BEA; OECD; Univ. of Michigan; China Federation of Logistics and Purchasing; Bloomberg

U.S. consumer health: diminished savings have not resulted in marked debt problems so far in 2022



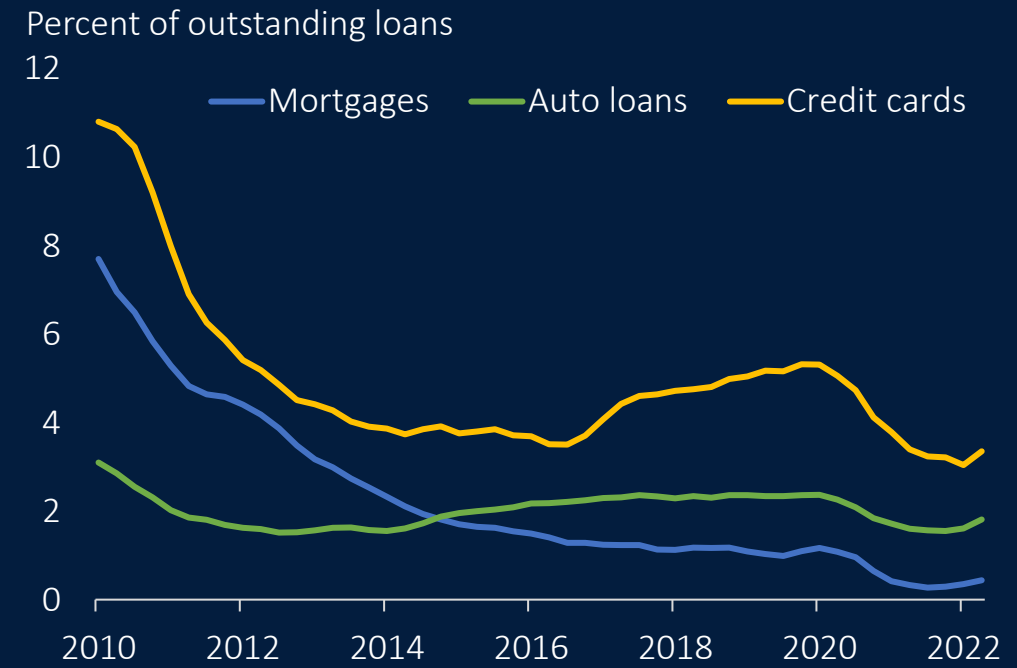
- ▶ The personal savings rate has fallen to its lowest since 2010 from its extraordinary levels through the pandemic, but has remained above its minimum of the 2008-2009 Great Financial Crisis despite high recent price inflation
- ▶ Loan delinquencies have remained historically low

Personal saving as a percent of personal income



source: BEA

Loan delinquencies of 90+ days, by type



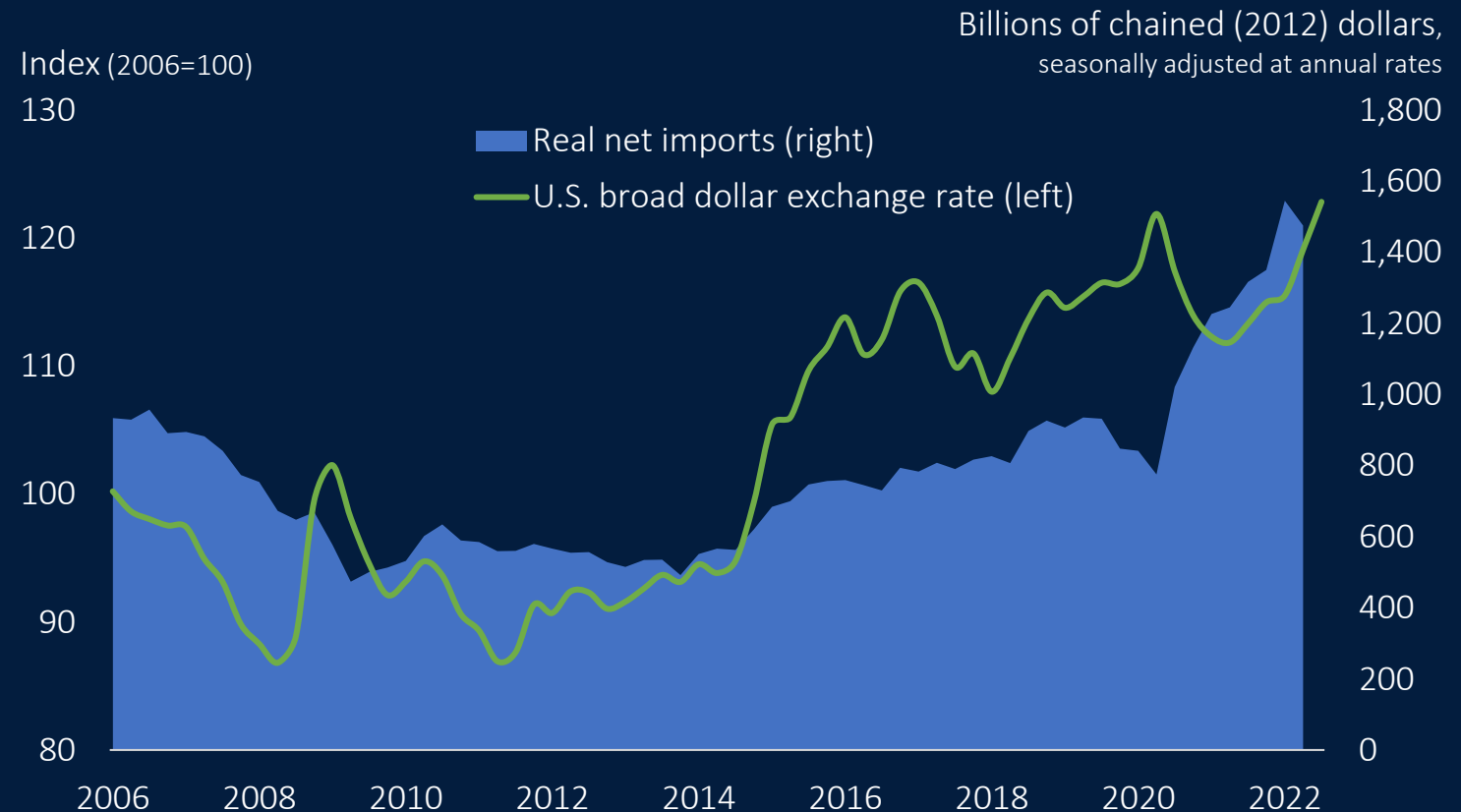
sources: New York Fed Consumer Credit Panel/Equifax

Strong U.S. dollar appreciation has fueled a record trade imbalance



- ▶ U.S. dollar appreciation makes U.S. goods and services imports less expensive and exports less competitive, which have historically corresponded with higher net imports
- ▶ U.S. trade was at a record imbalance – an annual rate of over \$1.5 trillion of net imports – in Q1 2022
- ▶ With global uncertainties and Fed Funds rate increases since March 2022, the U.S. dollar appreciated to record-high levels despite the U.S. having been a petroleum net exporter through the first seven months of 2022

U.S. broad dollar exchange rate vs. net imports, Jan. 2006- Jul. 2022



sources: Federal Reserve Board; Bureau of Economic Analysis

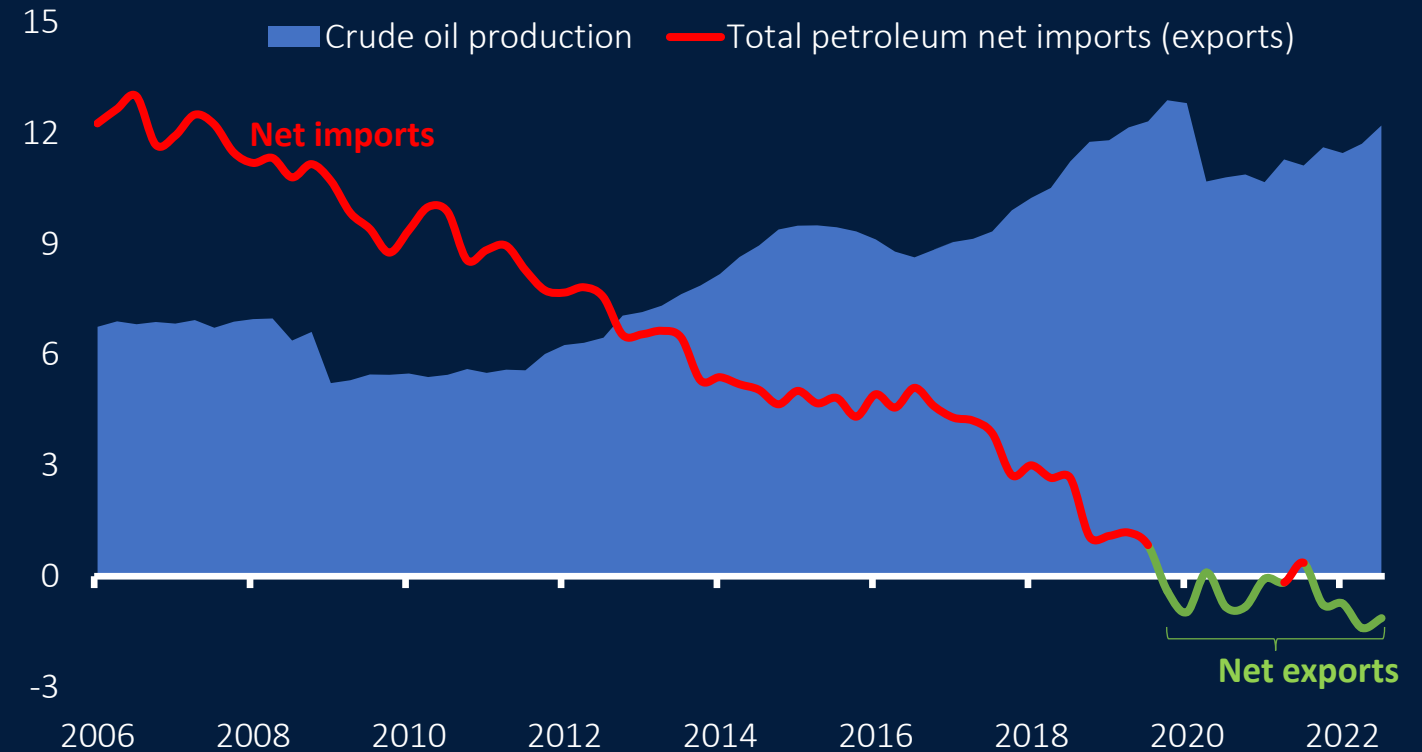
Historically U.S. crude oil production growth has reduced imports and increased exports of crude oil and refined products



- ▶ As U.S. crude oil production has grown, net imports of total petroleum (crude oil and refined products) have historically fallen
- ▶ The U.S. became a petroleum net exporter in 2020 for the first time since 1958 – and with Russia’s war in Ukraine has seen record-high exports occur so far in 2022
- ▶ U.S. crude oil production returned to over 12.0 mb/d in Q3 2022, but has remained below its highest level of 13.0 mb/d in Nov. 2019

U.S. crude oil production vs. the total petroleum trade balance

Million barrels per day



sources: EIA, API MSR™

Oil Markets



Global oil demand could achieve a record high in 2023 per EIA



▶ EIA expects record-high global oil demand 101.5 mb/d in 2023, exiting the year at 102.9 mb/d in Dec. 2023

Global oil demand and GDP

Million barrels per day

110

100

90

80

70

40

50

60

70

80

90

100

2000

↑
Great Financial
Crisis (2008-2009)

↑
2020 COVID-
19 recession

2021

2022

2023

— EIA estimates

Real GDP (Trillion 2010\$)

*Market exchange rate basis

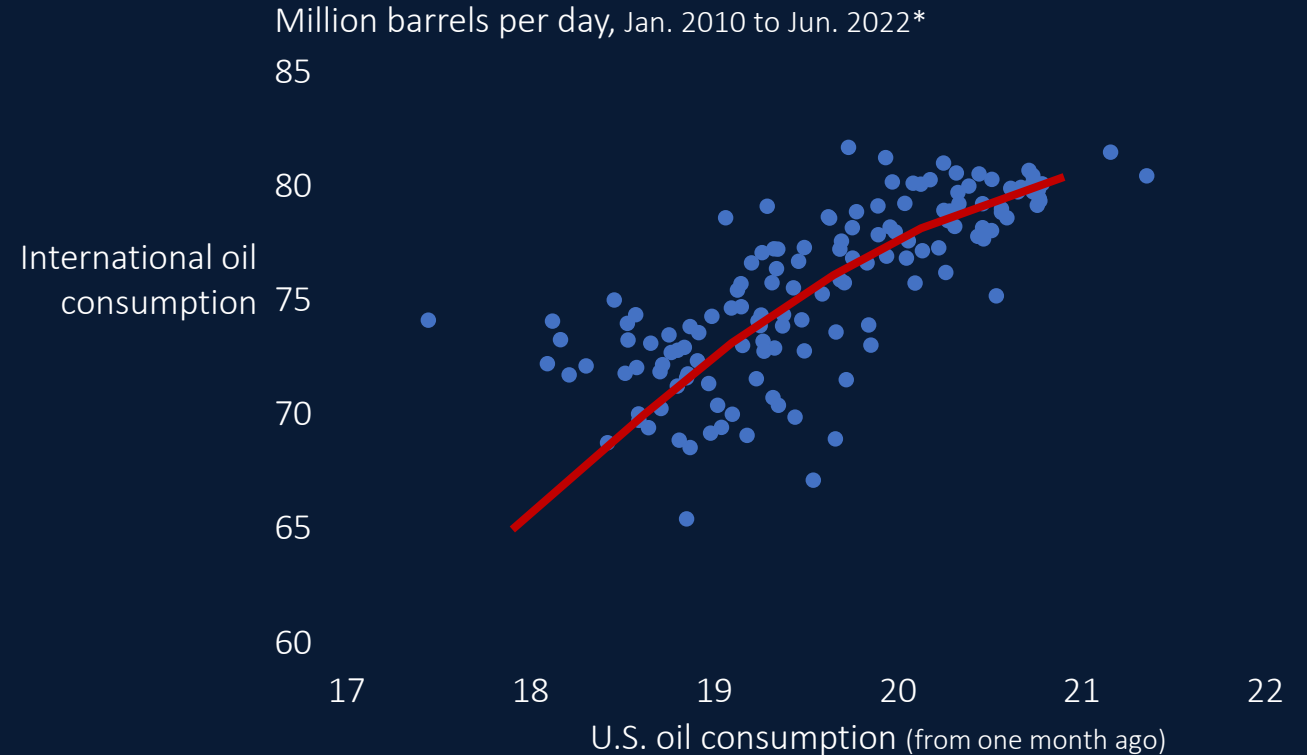
sources: EIA; Bloomberg; IMF; API Team calculations

U.S. oil consumption has historically been an indicator of global oil consumption



- ▶ Although U.S. oil consumption has generally been about one-fifth of global consumption, intertwined economic and trade relationships are such that U.S. oil consumption has historically correlated with that of the world
- ▶ Excluding the 2020 COVID-19 pandemic, a 1.0% change in U.S. oil consumption last month has historically correlated with a 0.93% change in oil consumption by the rest of the world in the following month since 2010

International oil consumption vs. U.S. oil consumption in the prior month





U.S. liquid fuels consumption could reach record levels in 2023 per EIA

- High-frequency indicators of transportation and industrial activity have remained solid
- EIA projects U.S. annual oil consumption growth 2.6% (0.5 mb/d) y/y in 2022 and 1.7% y/y (0.4 mb/d) in 2023

U.S. demand indicators, y/y%



Total flights
Aug. 2022 vs. Aug. 2021

+14%



Plastics & rubber
Aug. 2022 vs. Aug. 2021

+5.8%



Manufacturing
Aug. 2022 vs. Aug. 2021

+3.7%



Traffic volume
June 2022 vs. June 2021

+2.8%



DAT spot Truck posts
Aug. 2022 vs. Aug. 2021

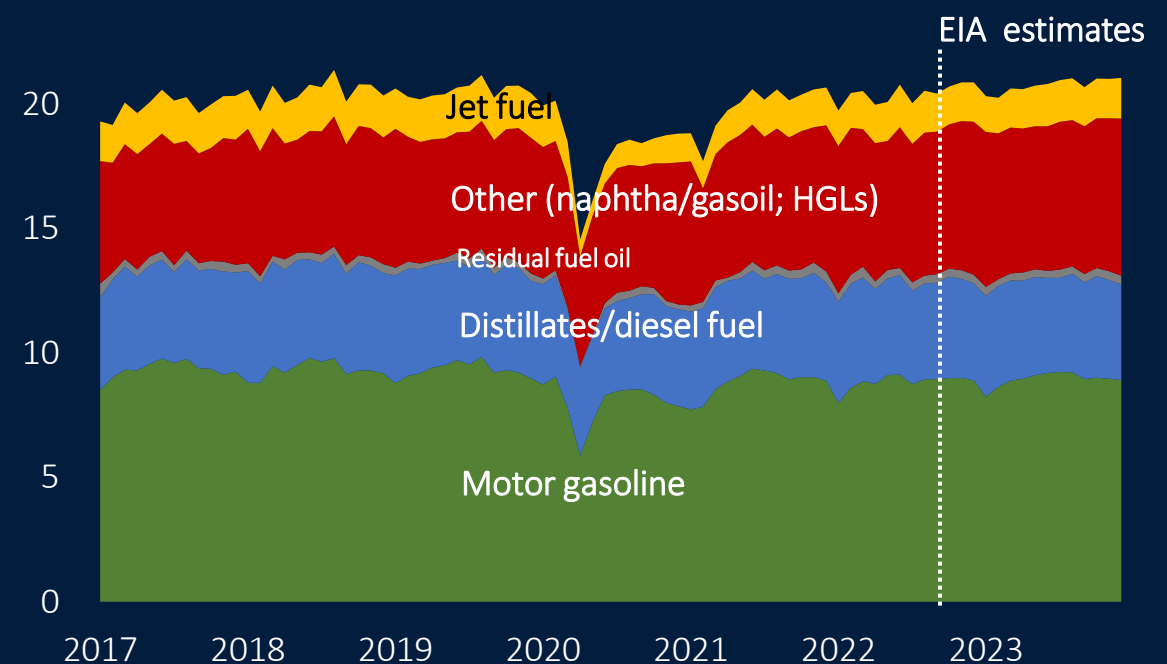
+20.4%

sources: [FlightRadar24](#); [FRB](#); [FHA](#); [DAT Trendlines](#)

U.S. liquid fuel consumption by fuel

Million barrels per day

25



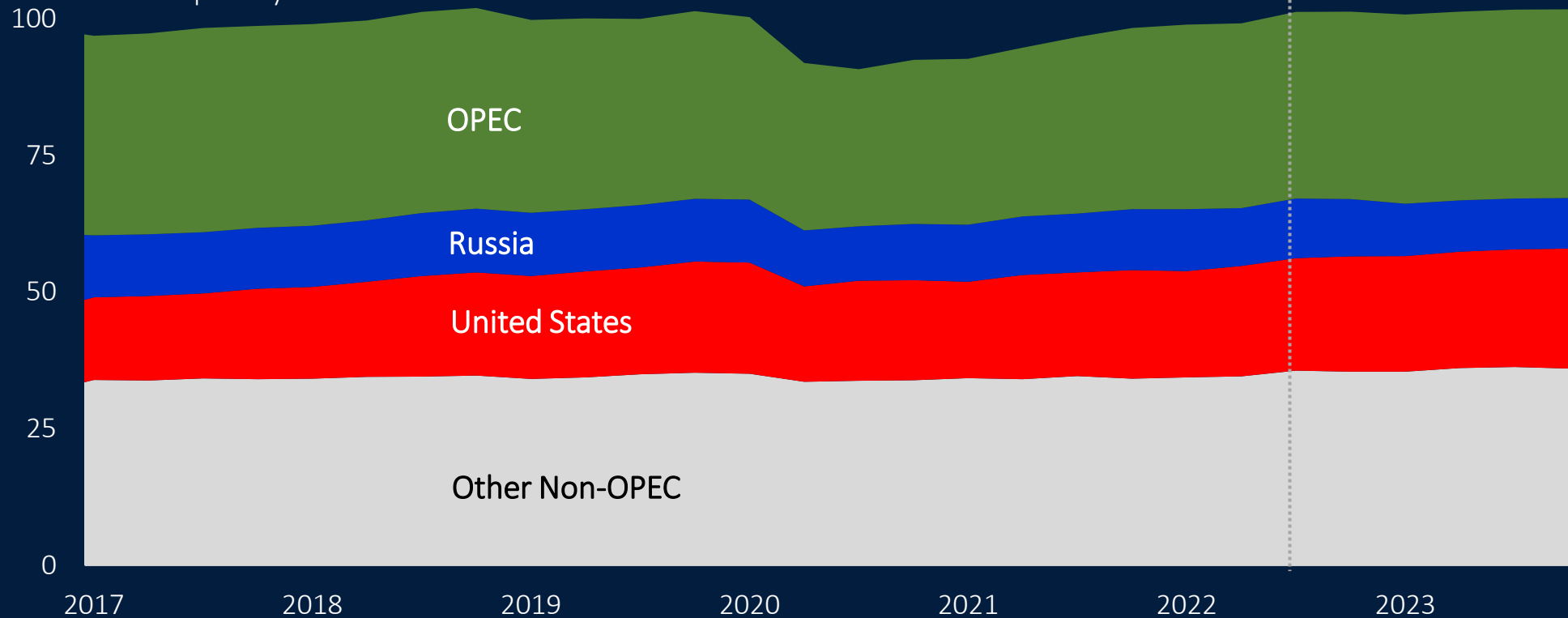
sources: EIA; API



EIA projects that the U.S. and OPEC could need to raise production further this year and in 2023 to meet global demand growth

Global oil production

Million barrels per day



Annual changes, mb/d

2022 2023

+4.4 **+1.2**

+2.3 +0.5

+0.1 -1.4

+1.4 +1.2

+0.8 +0.9

source: EIA

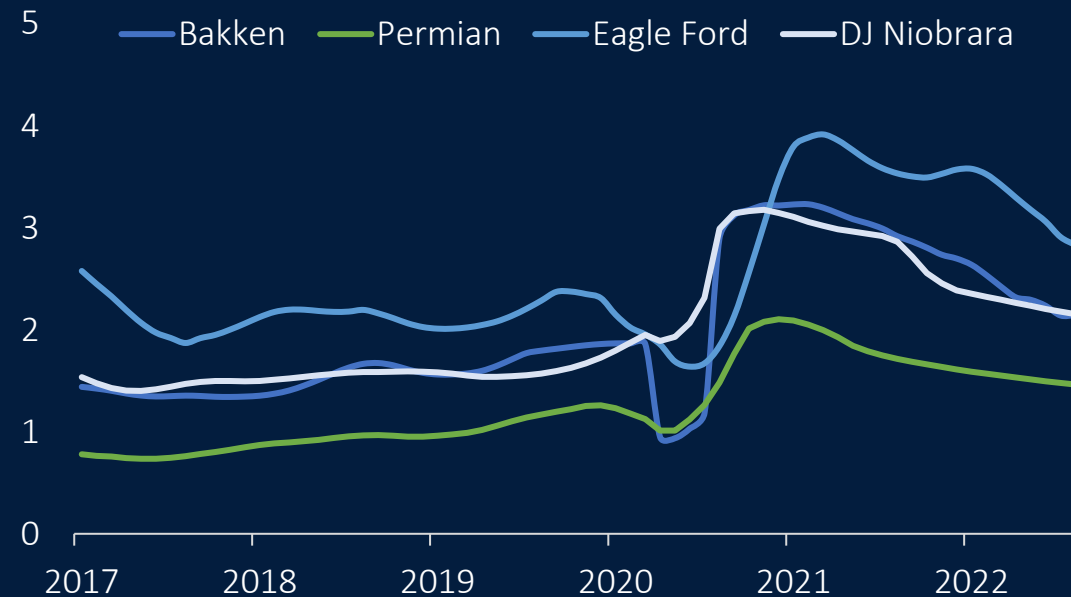
Oil and natural gas rig productivity has decreased by EIA estimates



- ▶ EIA estimated oil well productivity fell in the Permian (-15% y/y), Bakken (-27% y/y) and DJ Niobrara (-25% y/y) as of August 2022
- ▶ For dedicated dry gas drilling, rig productivity slipped 13.3% y/y in August 2022 as drilling activity expanded per EIA

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

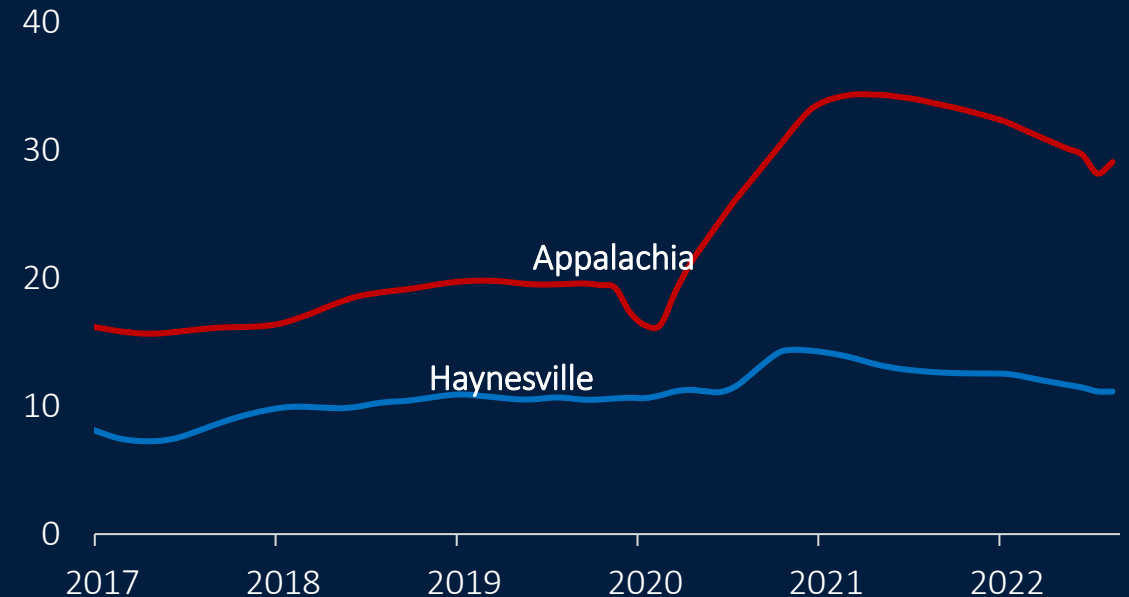
Thousand barrels per day oil-equivalent



source: EIA Drilling Productivity Report (July 2022)

Natural gas well productivity – production per rig

Million cubic feet per day nat. gas-equivalent



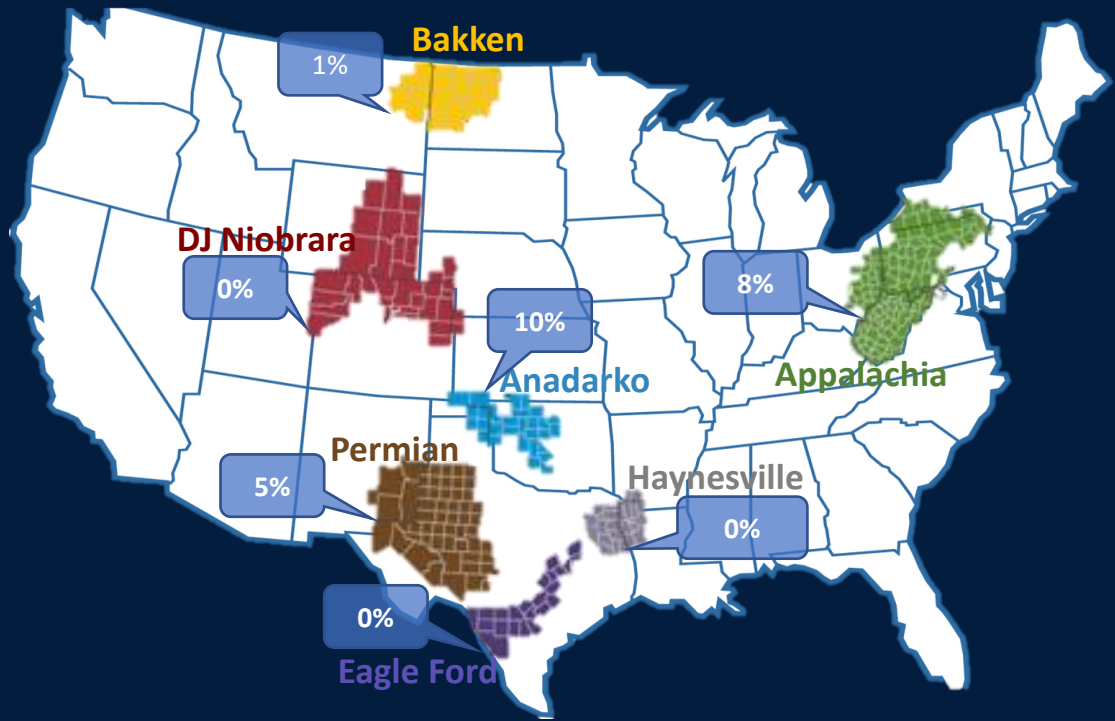
source: EIA Drilling Productivity Report (July 2022)



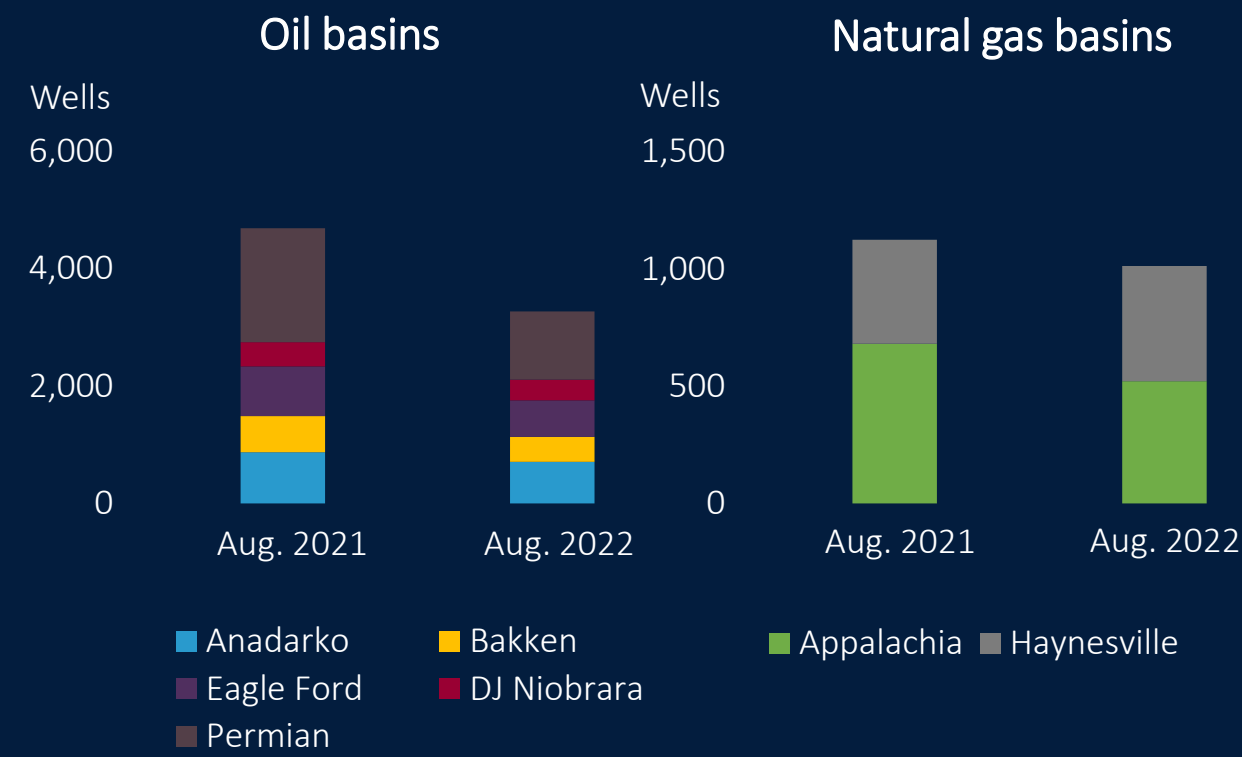
The inventory of drilled but uncompleted wells (DUCs) contributed to 2% U.S. well completions in August 2022, compared with over 19% in August 2021

- ▶ Annually in 2021, 30% of U.S. well completions were from wells that were previously drilled but uncompleted (EIA)
- ▶ By contrast, only 2% of U.S. well completions relied on DUCs in August 2022 per EIA

U.S. oil and natural gas well completions from DUCs, by basin in August 2022



Drilled by uncompleted wells, by basin



source: EIA

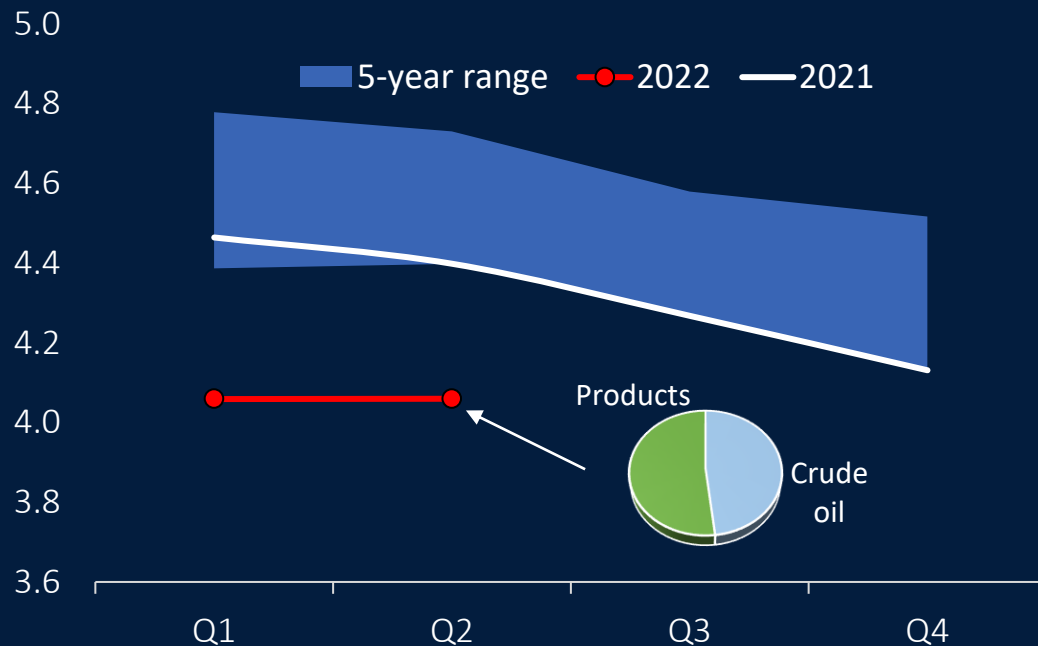
Historically low oil inventories have persisted since 2021



- ▶ OECD and U.S. petroleum inventories – that is, combined crude oil and refined products, commercial and government-controlled – have remained below their respective five-year historical averages
- ▶ Building of commercial inventories was more than offset by drawdowns of government-controlled inventories

OECD petroleum oil inventories, combined crude and products, commercial and government-controlled

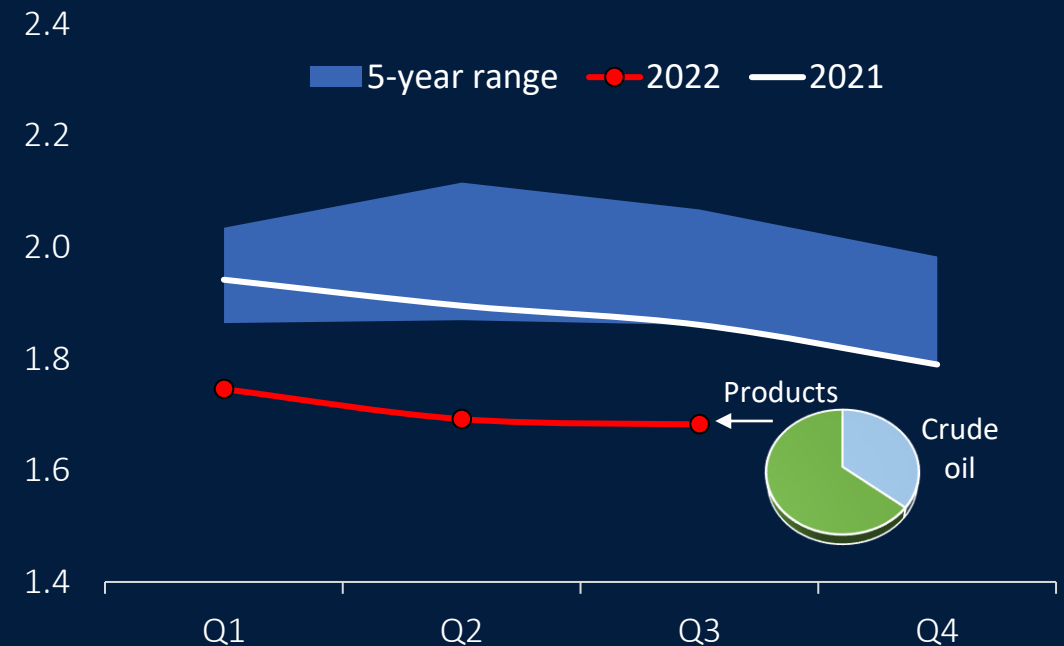
Billion barrels



sources: Bloomberg; OPEC Argus; EIA; Euroilstock; IEA; METI

U.S. petroleum inventories, combined crude and products, commercial and government-controlled

Billion barrels



sources: EIA; API

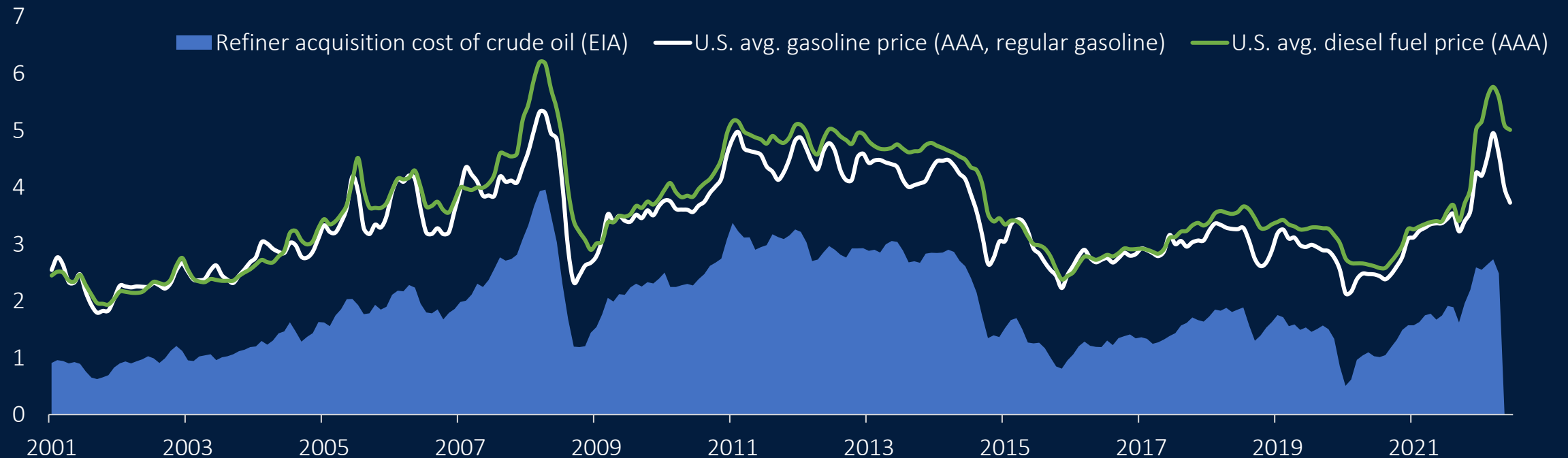
Gasoline prices have historically reflected those of oil, which accounted for the majority of changes in gasoline and diesel fuel prices through the first seven months of 2022



- ▶ Crude oil has continued to represent upwards of 60% of the retail price at the gasoline pump in 2022 per EIA, but contributed 77% of the year-on-year increase in gasoline prices at the pump between January and July

Refiner acquisition cost of crude oil prices versus U.S. average gasoline prices, adjusted for price inflation

Dollars per gallon (2022\$)



sources: Bloomberg; EIA; AAA; Bureau of Labor Statistics; API Team analysis

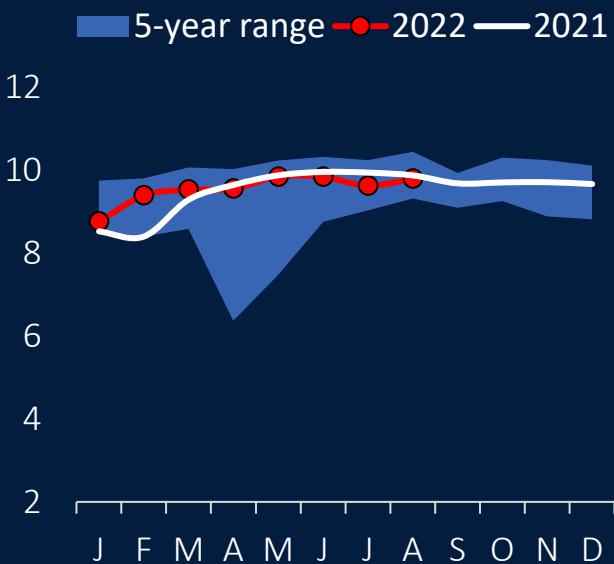
Motor gasoline fundamentals have similarly tightened so far in 2022



- ▶ In the first eight months of 2022, U.S. refinery motor gasoline production remained strong within its five-year range, and motor gasoline demand remained within the historical range
- ▶ Motor gasoline exports rose markedly since January, and inventories fell to the bottom of their five-year range

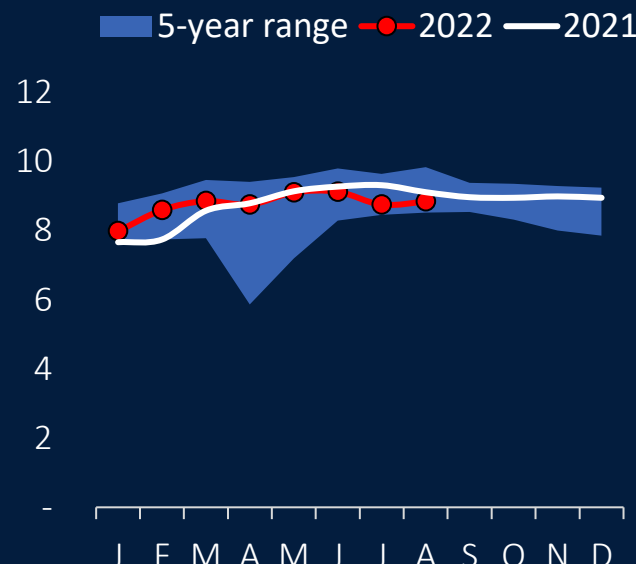
Motor gasoline production

Million barrels per day



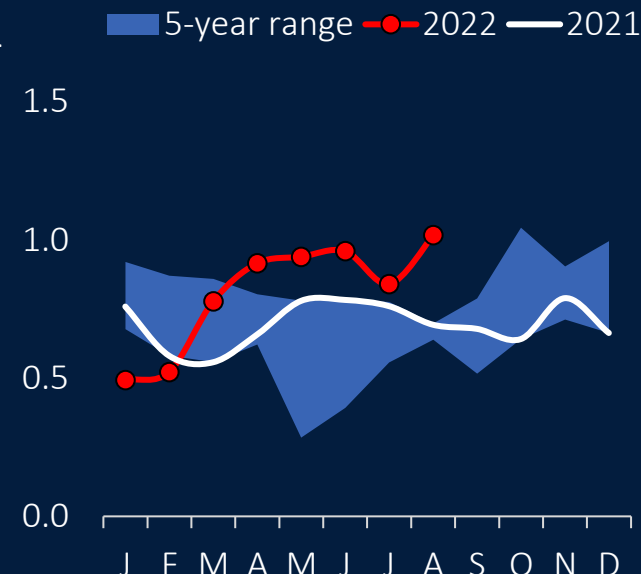
Motor gasoline demand

Million barrels per day



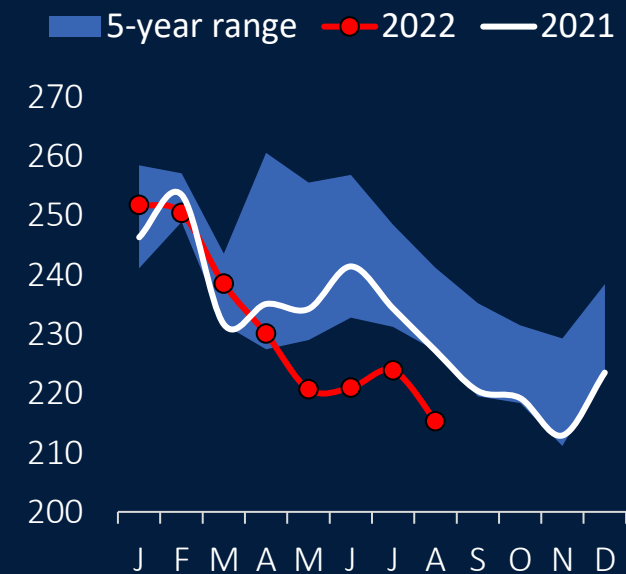
Motor gasoline exports

Million barrels per day



Motor gasoline inventories

Million barrels



sources: EIA; API MSR™

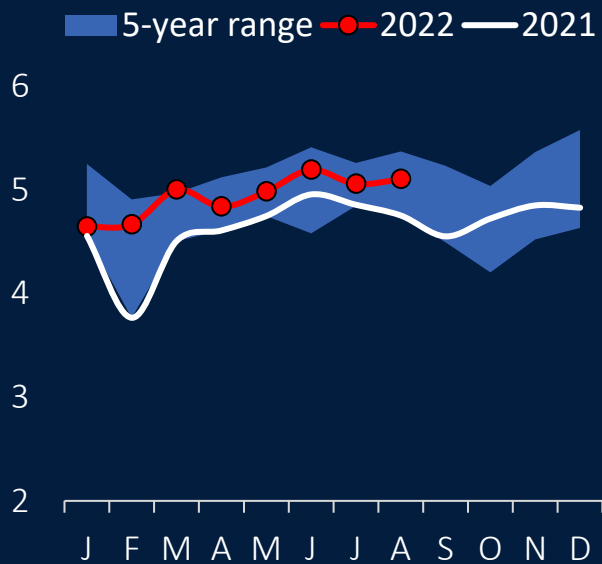
Distillates/diesel fuel fundamentals have generally tightened so far in 2022



- ▶ In the first eight months of 2022, U.S. refinery distillates' production and consumption were solid within their five-year ranges
- ▶ Distillate exports more than doubled between January and August, and inventories remained below their five-year range

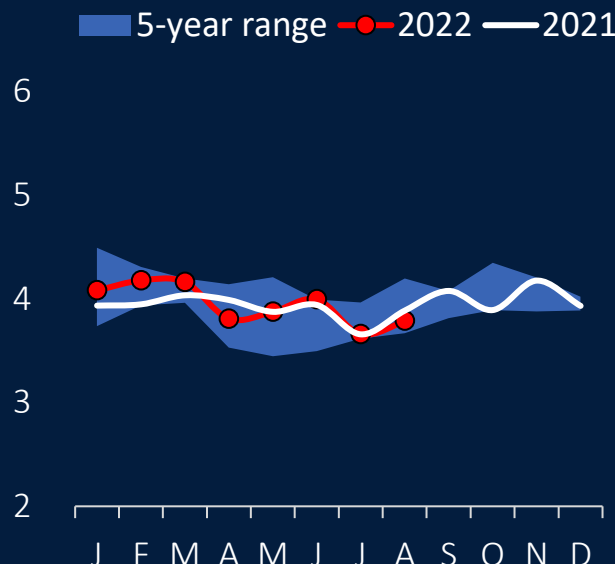
Distillates production

Million barrels per day



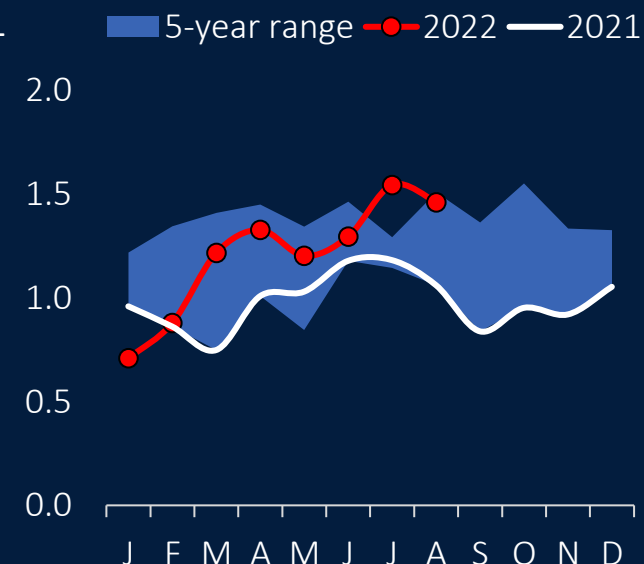
Distillates demand

Million barrels per day



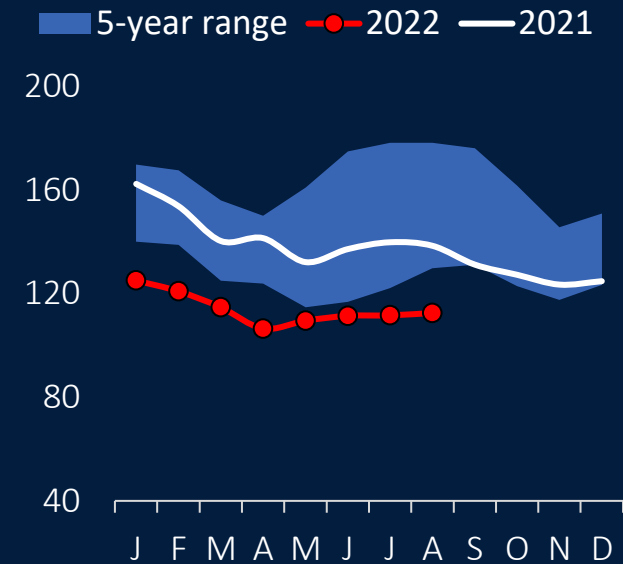
Distillates exports

Million barrels per day



Distillates inventories

Million barrels

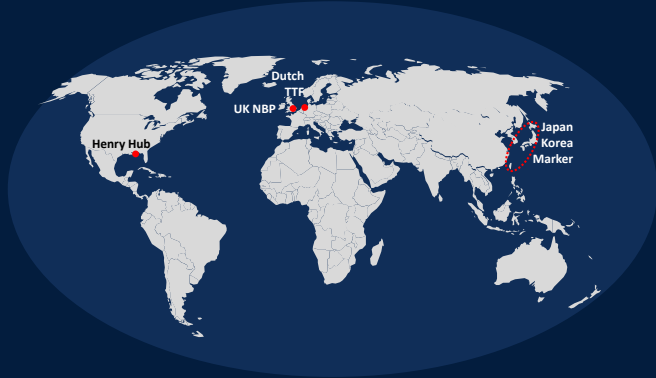


sources: EIA; API MSR™

Natural Gas



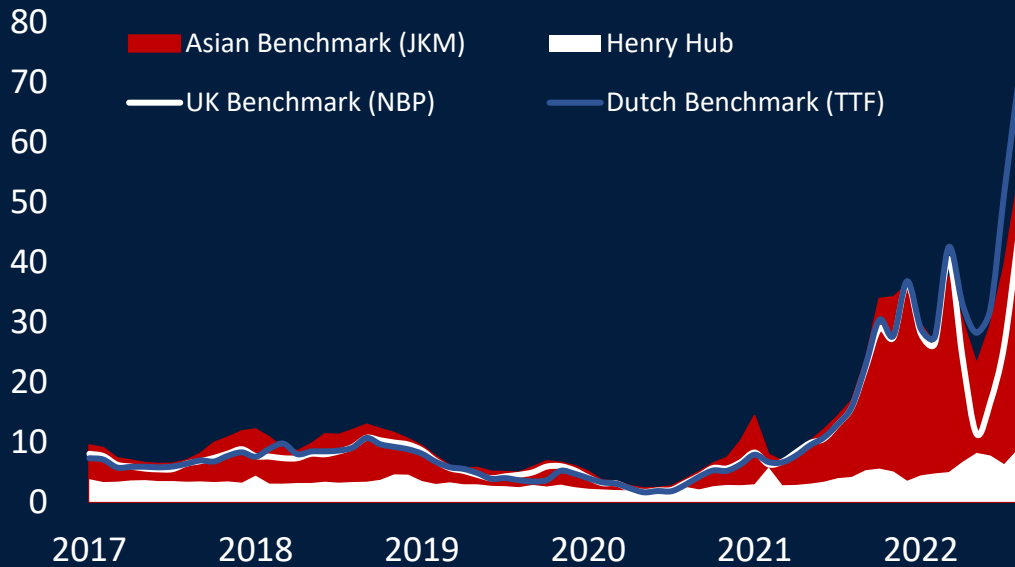
Historically strong global natural gas prices have spurred U.S. natural gas exports



As natural gas prices in Europe and Asia rose to unprecedented levels, including nearly \$100 per million Btu for Netherlands TTF as of Aug. 26, U.S. natural gas exports via liquefied natural gas (LNG) and pipeline have achieved record levels

Global natural gas prices

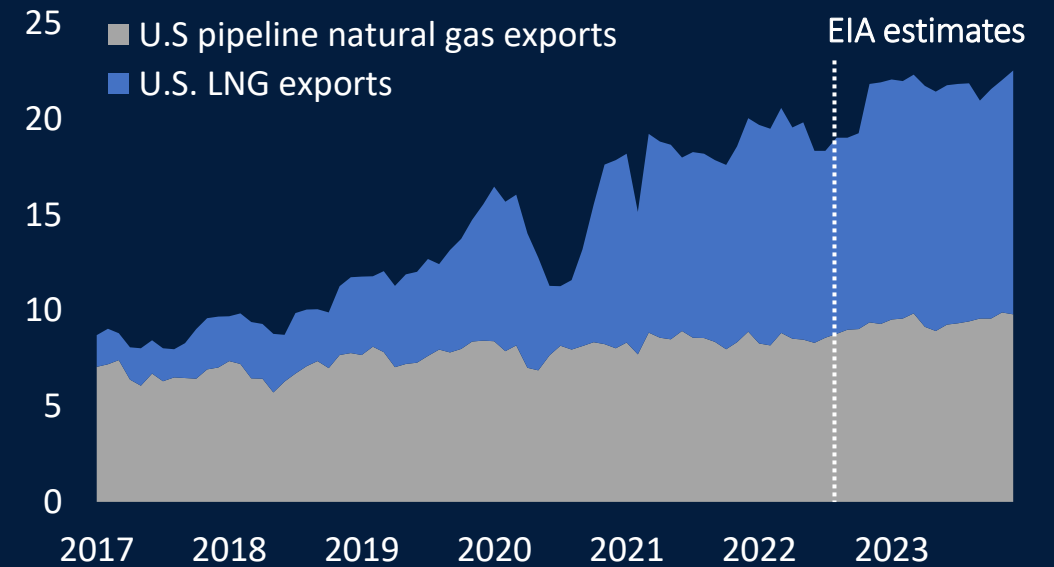
\$2022 per mmBtu



source: Bloomberg

U.S. natural gas exports

Billion cubic feet per day



source: EIA

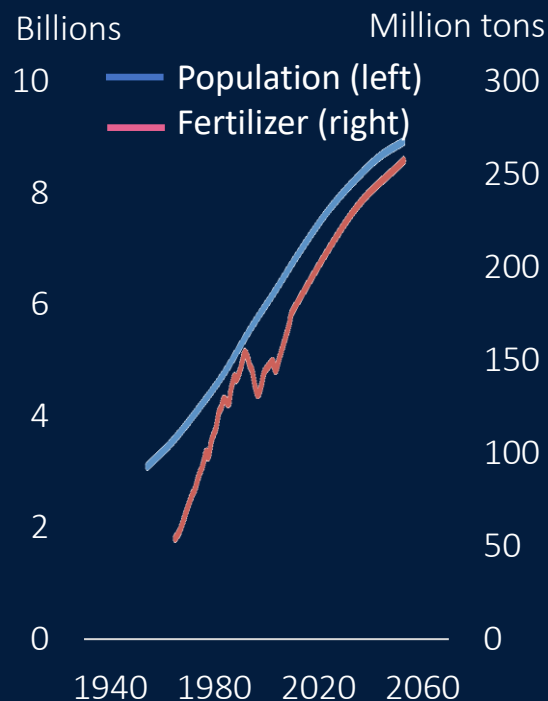
Global natural gas shortages, furthered by Russia's war in Ukraine, have affected fertilizer production and food security



“The short-term impact of reduced fertilizer consumption is the threat of a significant reduction in crop yields in the next harvest, prompting lower food production and ultimately increasing the number of people at risk of hunger and starvation”

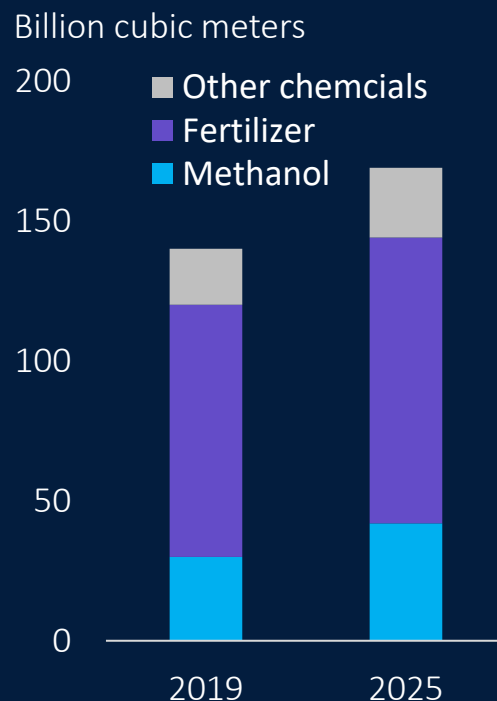
International Fertilizer Association, July 2022

Global population and fertilizer use



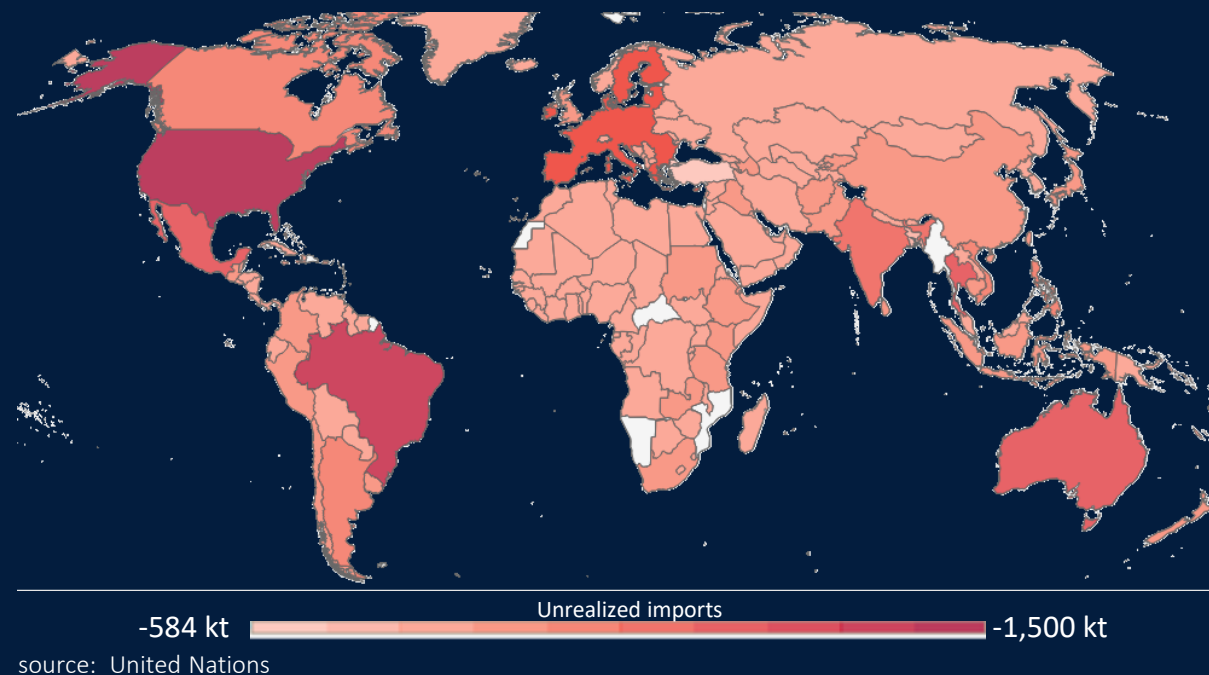
source: United Nations

IEA global natural gas consumption for non-energy use



source: IEA

2022 Unrealized imports of nitrogen-based fertilizers for the 2021-2022 crop year ended June 30, 2022



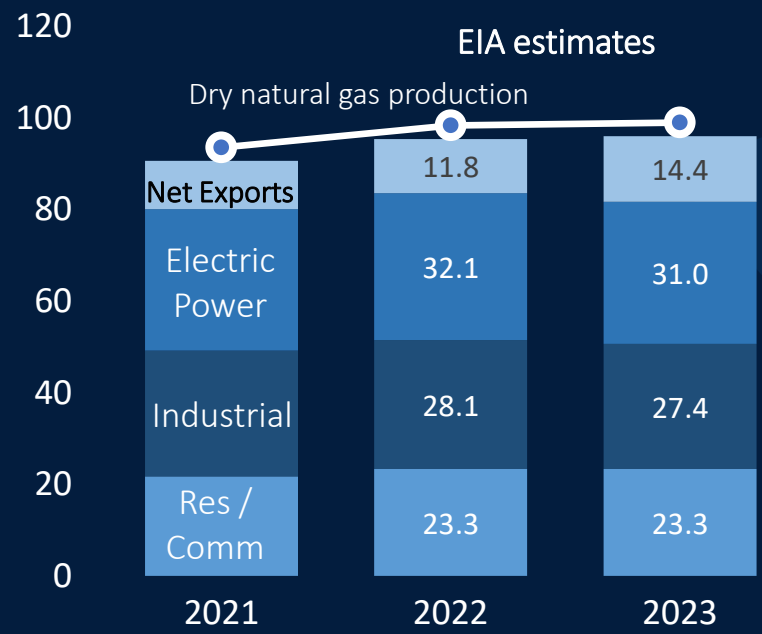


EIA expects natural gas production annual growth of 3.7 bcf/d in 2022 and 2023 could support more than 31% of U.S. electricity net generation and higher exports

- ▶ EIA expects natural gas to represent more than 31% of U.S. net electricity generation despite increases by other sources
- ▶ With committed capacity expansions, EIA expects U.S. LNG exports to grow by 2.4 bcf/d in 2023

Natural gas consumption and production, by sector

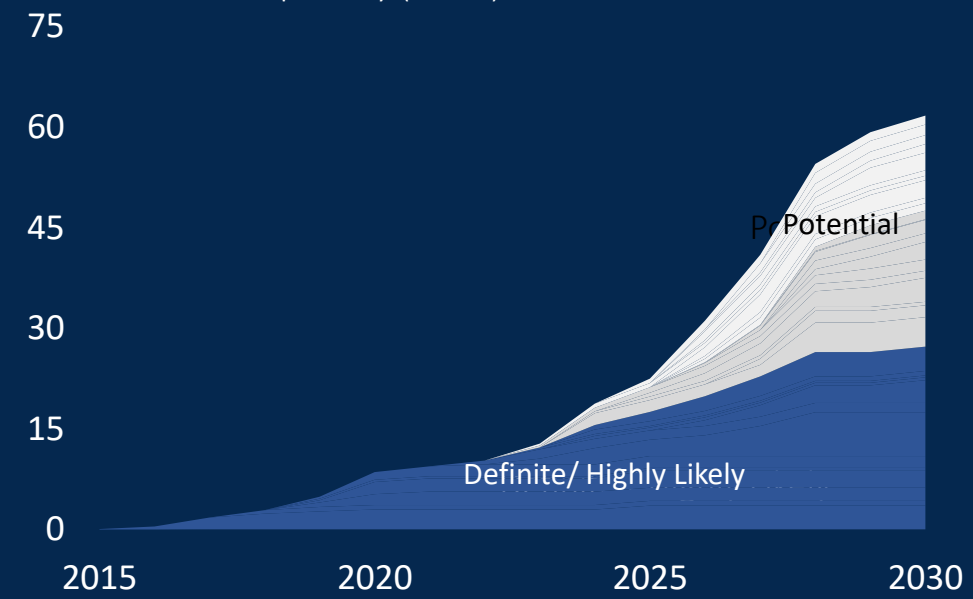
Billion cubic feet per day



source: EIA (August 2022)

North American LNG projects

Billion cubic feet per day (bcf/d)



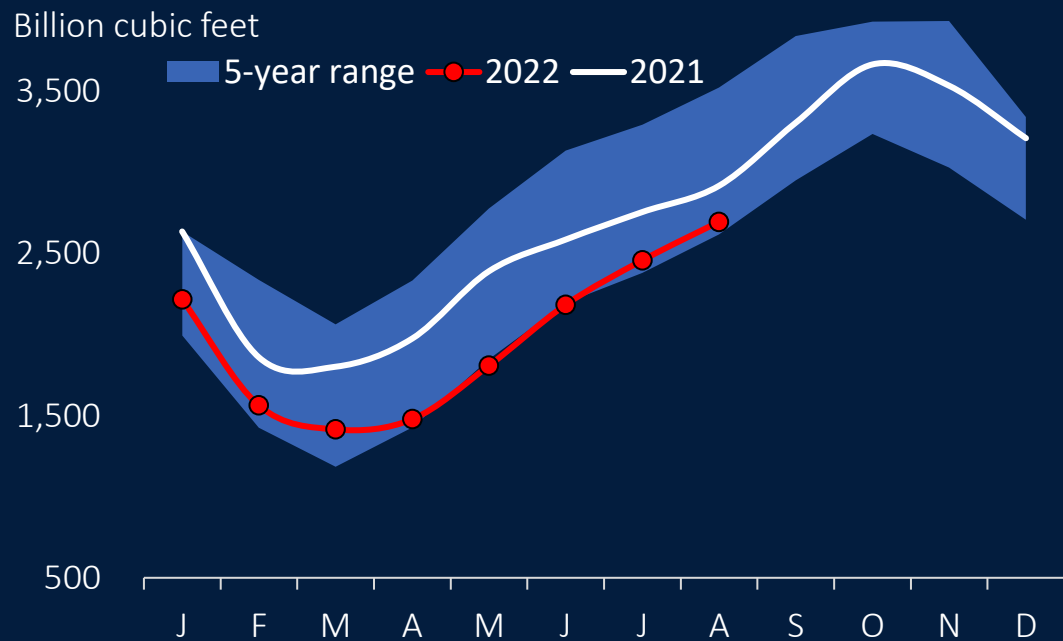
sources: API Team analysis; FERC; Bloomberg NEF; S&P Global Platts; O&G Journal



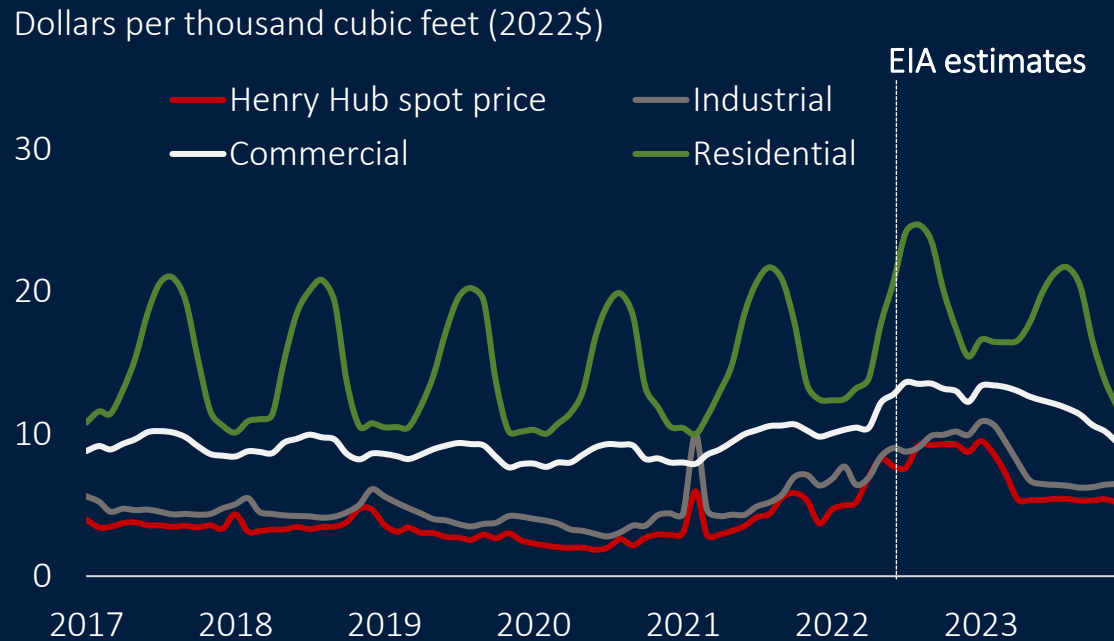
Historically low natural gas inventories have spurred higher prices that EIA expect could persist through the 2022-2023 winter

- Natural gas net injections into underground storage were 3.8% above those last year as of early September per EIA, yet storage sits at the bottom of its five-year range and recent price increases
- Natural gas prices through the value chain have risen so far through 2022, and EIA expects these changes to persist in 2023

U.S. working gas in underground storage



EIA natural gas prices by end-use sector



sources: EIA; EIA STEO (August 2022)

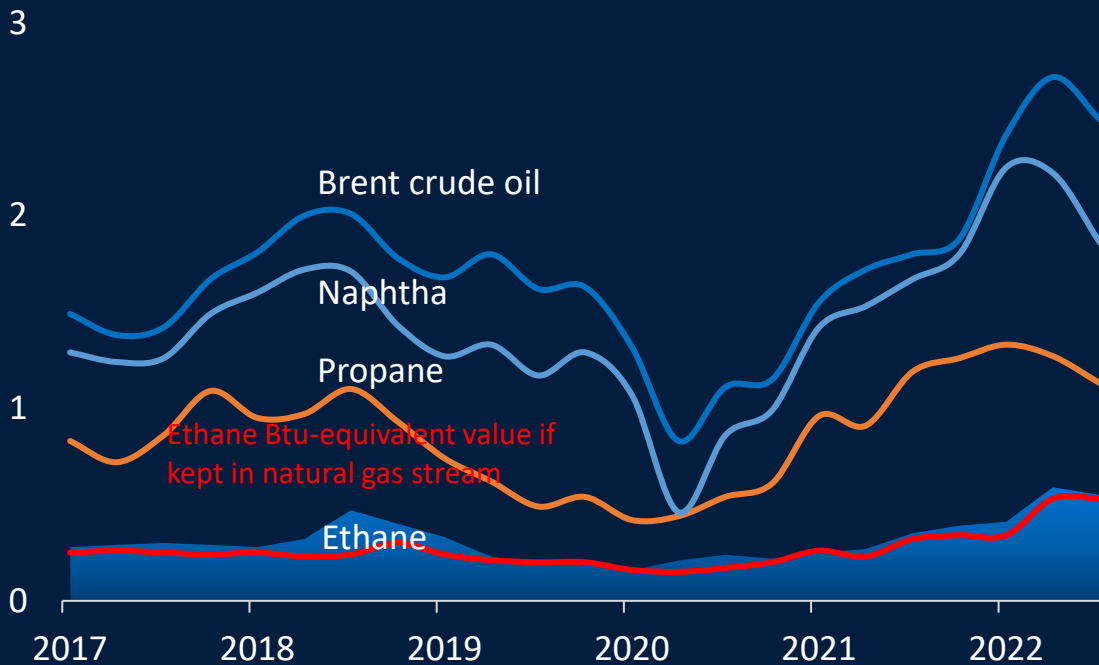
U.S. energy revolution challenge: ethylene spot margins turned negative for the first time since 2018 despite record-high ethane production in 2022 per Bloomberg



- Global naphtha, crude oil and petrochemical prices have historically moved together, while those of ethane and propane have depended on both global petrochemical prices and regional market conditions
- In Q3 to date, lower ethylene prices and historically high ethane costs together resulted in negative margins per Bloomberg

U.S. ethane, propane, naphtha vs. Brent crude oil prices

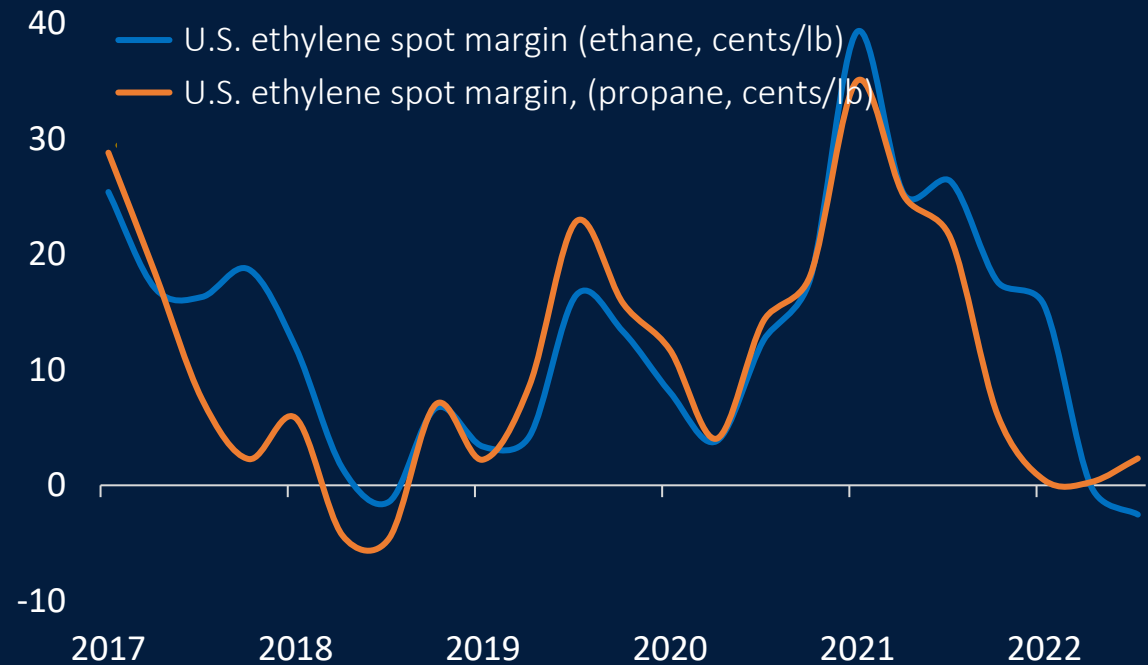
Dollars per gallon (2022\$)



sources: Bloomberg and API Team calculations

U.S. ethylene spot margins

Dollars per gallon (2022\$)



source: Bloomberg

API economics resources available at www.api.org

The image shows a screenshot of the American Petroleum Institute (API) website. At the top, the API logo and name are on the left, and a navigation menu is on the right. The 'Chief Economist' link in the navigation menu is circled in red, with a red arrow pointing to it from the top right. Below the navigation menu is a secondary menu with categories like 'Natural Gas & Oil', 'Products & Services', 'Policy & Issues', 'Climate Action', and 'Blog, News & Media'. A search icon is on the far right. The main content area features a large banner for 'API's Economic Industry Outlook' with a background image of two workers in hard hats. Below the banner is a vertical sidebar menu with options: 'Reports & Surveys', 'Weekly Statistical Bulletin', 'Monthly Statistical Report', 'Economic Outlook' (highlighted in blue), and 'Data Visualization'. A red arrow points from the bottom left towards the 'Economic Outlook' menu item. To the right of the sidebar, there is a section for 'API's Economic Industry Outlook' with a photo of three people in a meeting and a text description. Further right, there are sections for 'Read The Blog:', 'Read The News Releases:', and 'Downloads'. On the far right, there is a 'Data Visualization' sidebar with several cards, each featuring a chart and a title: 'Tracking U.S. Oil Demand', 'U.S. Consumer Expenditure Summary', 'API's Distillate Economic Indicator™', 'U.S. Consumer Expenditure Flows By Income Level', and 'U.S. Consumer Expenditure Burden By Income Level'. Each card includes a brief description and a link to 'Explore Visualization .url'. A red arrow points from the bottom left towards the 'U.S. Consumer Expenditure Burden By Income Level' card.

API American Petroleum Institute

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API's Economic Industry Outlook

The API Industry Outlook, developed by API's Dean Foreman, is a quarterly report that provides natural gas and oil industry as it relates to the economies.

Read The Blog:
[Chief Economist's Posts on the Energy Tomorrow blog](#)

Read The News Releases:
[Chief Economist's News Releases, 2017](#)
[Chief Economist's News Releases, 2018](#)
[Chief Economist's News Releases, 2019](#)
[Chief Economist's News Releases, 2020](#)

Downloads
[Monthly Statistical Report](#) (File Size: .4 MB)
[Q2 2020 Quarterly Outlook \(Jun 2020\)](#) (File Size: 1.9 MB)
[Q3 2020 Quarterly Outlook \(Sep 2020\)](#) (File Size: 1.9 MB)
[Q4 2020 Quarterly Outlook \(Dec 2020\)](#) (File Size: 2.4 MB)
[Q1 2021 Quarterly Outlook \(Mar 2021\)](#)

Data Visualization

Tracking U.S. Oil Demand
Primary monthly API data tracking refined product consumption
[Explore Visualization .url](#)

U.S. Consumer Expenditure Summary
Summarizing leading U.S. consumer expenditure categories over time
[Explore Visualization .url](#)

API's Distillate Economic Indicator™
API's proprietary Distillate Economic Indicator™ leverages refined product demand estimates to broadly track economic activity
[Explore Visualization .url](#)

U.S. Consumer Expenditure Flows By Income Level
Mapping U.S. consumer expenditure flows by income level and spending category
[Explore Visualization .url](#)

U.S. Consumer Expenditure Burden By Income Level
Measuring U.S. consumer expenditure burden by spending category and income level
[Explore Visualization .url](#)