A large decorative graphic on the right side of the slide. It features a dark blue diamond shape with a white outline, positioned in the upper left. To its right and slightly below is a blue shape with a white outline, resembling a stylized arrow or a corner. Further to the right and slightly above is a red shape with a white outline, also resembling a stylized corner or arrow. The overall composition is abstract and geometric.

December 18, 2023



Key Points

Global, U.S. and Texas Economies

- A “soft landing” for the global economy implies growth of 2.4% year-over-year (y/y) in 2024 and 2.7% y/y in 2025, close to its long-run average on a market exchange rate basis. Oil and natural gas demand growth has historically been implied by growth at these levels
- The U.S. and Texas economies are also expected to slow in 2024 but remain at solid levels in 2025
- Economic indicators have remained steady, but delayed effects of high interest rates remain a prime economic risk

Oil Markets

- Official projections show that global oil demand has reached a new record high of 101 million barrels per day (mb/d) in 2023 and could climb to over 102 mb/d in 2024 and 103 mb/d 2025
 - There are notable differences of up to 4 mb/d in 2028 among the record oil demand levels projected by different official sources, which hold potential implications for energy policies and industry investments
- Led by Texas, remarkable U.S. productivity gains are expected to continue driving the largest contributions to global oil supply growth
- Futures prices in 2024 are currently below their historical mean, but financial markets in which oil prices are established expect higher prices in 2024

Natural Gas Markets

- Domestic natural gas prices of less than \$2.50 per million Btu have remained historically low, due to productivity and high storage levels which have remained ample to meet record-high exports plus strong consumption Q4 2023
- Financial markets also expect natural gas futures prices to rise in 2024, and confidence intervals based on past prices show the potential for greater upside than downside

- [A “soft landing” scenario with slower growth in 2024 and recovery in 2025](#)
- [Business conditions have remained conducive to U.S. GDP growth](#)
- [Delayed effects of high interest rates are a prime economic risk](#)

Oil Markets

- [Global oil demand is expected to reach record high levels in 2024 through 2028](#)
- [The U.S. stands as the single largest source of prospective global oil supply growth under EIA and IEA forecasts](#)
- [Texas’ share of U.S. oil drilling rose in 2023 to its highest since 2019](#)
- [Productivity has remained a key driver and differentiator for Texas’ oil and natural gas basins](#)
- [The Permian Basin set new production records and surpassed 10 million barrels per day of oil-equivalent energy \(mb/doe\) for the first time in Q3 2023](#)
- [Texas has set new production records and increasingly driven U.S. supply](#)
- [U.S. crude oil inventories have remained historically low](#)
- [Crude oil prices historical mean reversion analysis: futures prices have fallen below their historical mean](#)

Natural Gas Markets

- [Global natural gas production and consumption are projected to reach record levels despite the effects of Russia’s war in Ukraine](#)
- [EIA projects U.S. natural gas production to grow by a total of 1.4% between 2023 and 2030](#)
- [EIA projects that U.S. natural gas net exports to grow by over 80% between 2023 and 2030](#)
- [Texas has driven the highest share of U.S. natural gas drilling in a decade](#)
- [Texas has established new natural gas production records](#)
- [Texas’ natural gas flows: Production supported historically strong consumption and exports while keeping downward pressure on prices](#)
- [As Texas’ growth has driven natural gas consumption up by over 35% since 2011, monthly variation in its use for power generation has also risen](#)
- [With Texas’ ample storage capacity and volumes, natural gas is widely available to all consumers that secure pipeline transportation](#)
- [U.S. natural gas stocks remained near the top of their 5-year historical range and kept downward pressure on prices in Q4 2023](#)
- [Natural gas price historical mean reversion analysis: futures prices through Q3 2024 have fallen below their historical mean](#)
- [The Texas’ oil and natural gas industry’s jobs and wages rose solidly through the first half of 2023](#)

Global, U.S. and Texas Economies

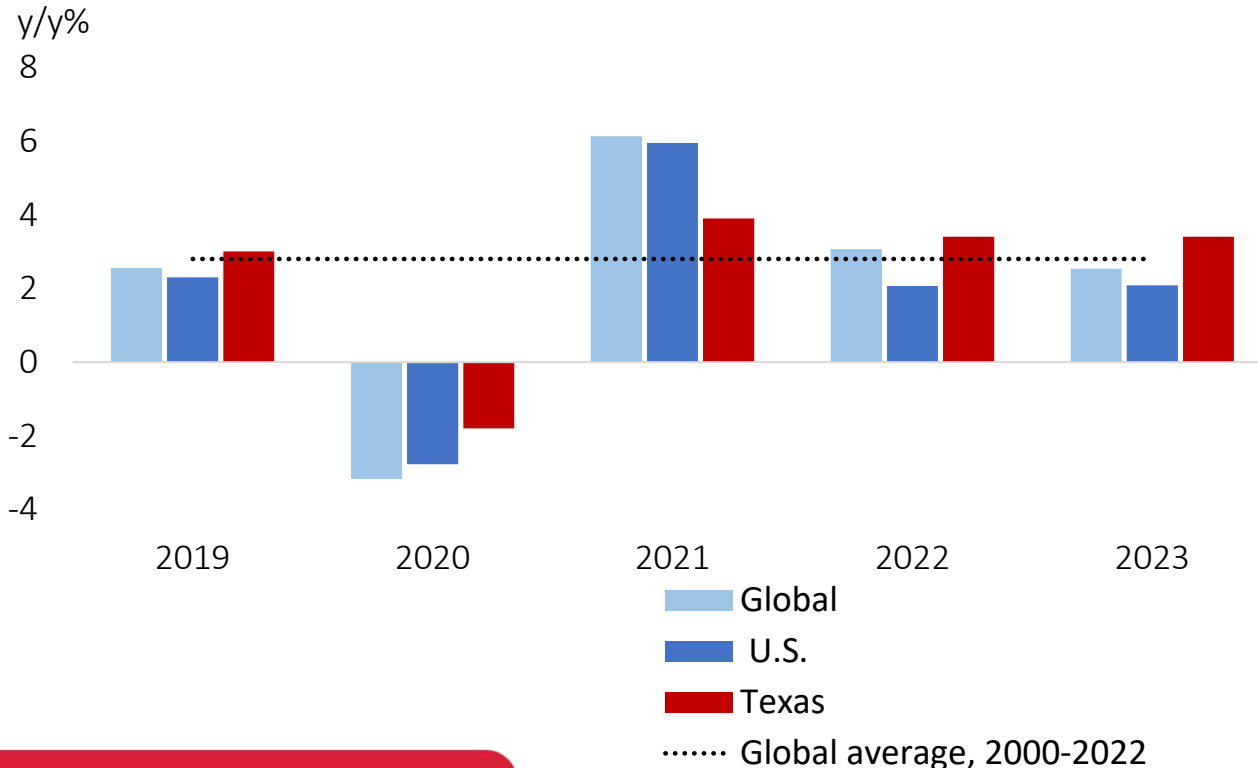


A “soft landing” scenario with slower growth in 2024 and recovery in 2025

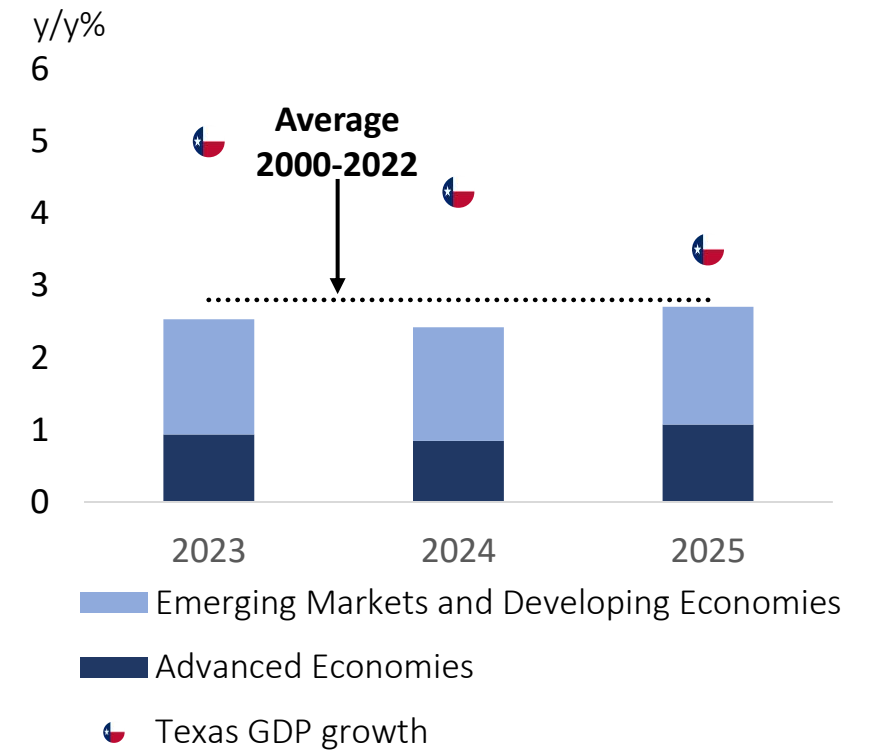


- As GDP growth of the global, U.S. and Texas economies broadly exceeded weak expectations for 2023, forecasts by the International Monetary Fund (IMF) and others have remained for slow but steady growth through 2025
- TXOGA estimates Texas’ GDP growth at 5.0% y/y in 2023, 4.3% y/y in 2024, and 3.5% y/y in 2025 – converging towards global growth

Historical global, U.S. and Texas real GDP growth*



Global GDP outlook and regional contributions

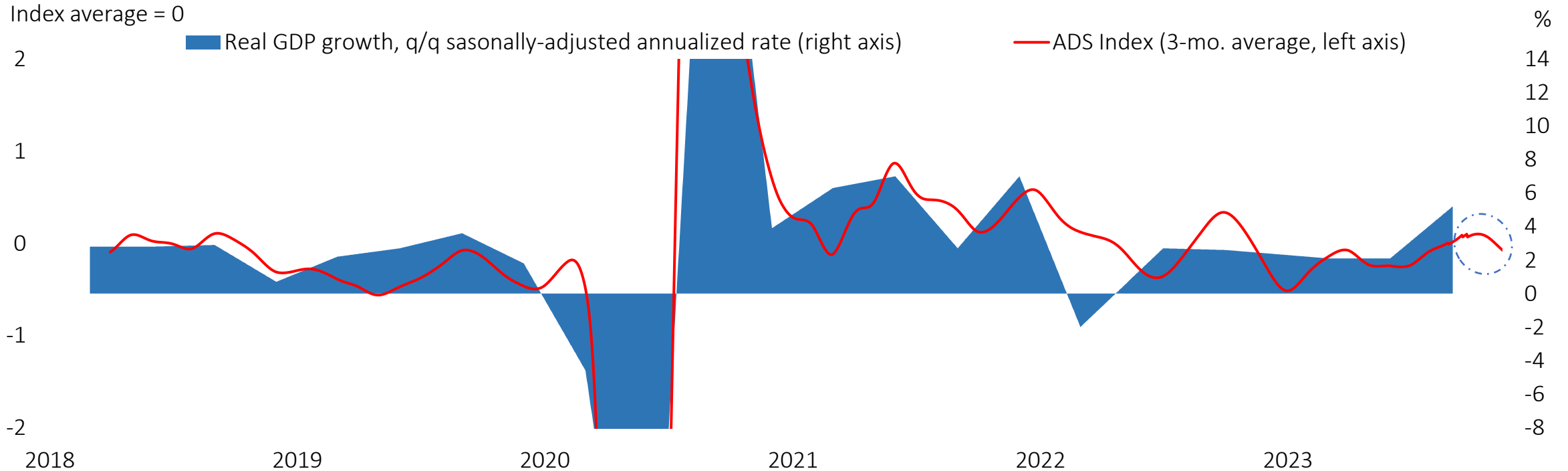


Business conditions have remained conducive to U.S. GDP growth



- ▶ The ADS business conditions index, published by the Philadelphia Federal Reserve Bank, is a leading indicator of GDP growth. A rolling 3-month average of the ADS index accurately reflected the increase in Q3 2023 real GDP and has remained consistent with continued GDP growth in Q4 2023

Aruoba-Diebold-Scotti Business Conditions Index and U.S. real GDP growth

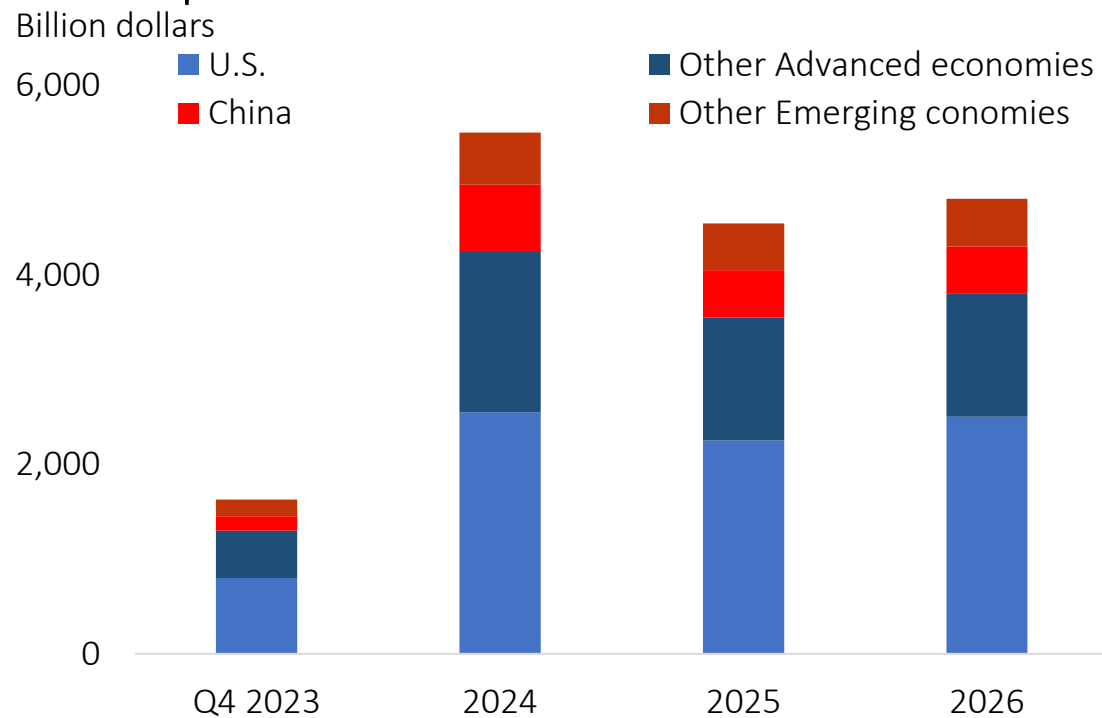


Delayed effects of high interest rates are a prime economic risk

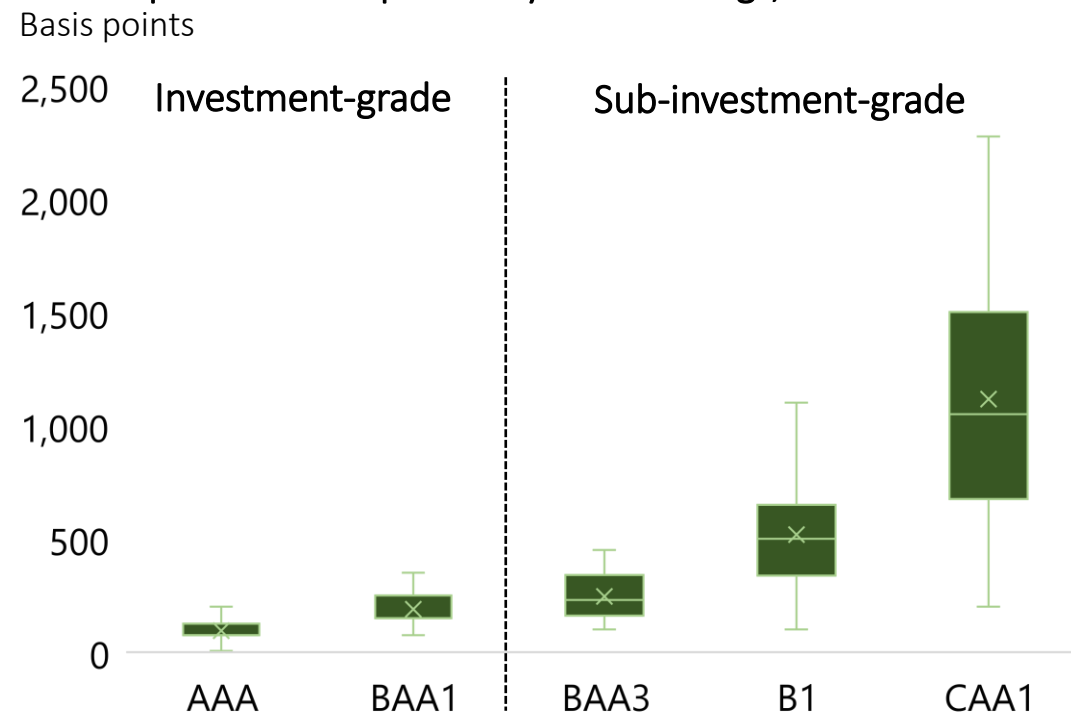


- Increased interest rates raise debt costs for floating rate debt, refinancing, and new debt, at the same time as global corporate refinancing needs stand to rise to more than \$5 trillion in 2024 with similar levels projected through 2026 per the IMF
- The premia for having weaker corporate credit quality, where BAA3 and lower ratings are sub-investment grade, rises exponentially and on average has exceeded 1000 basis points or 10% so far in Q4 2023

Global corporate bond and loan maturities



U.S. corporate bond spreads by credit ratings, Oct. 2023



Oil Markets



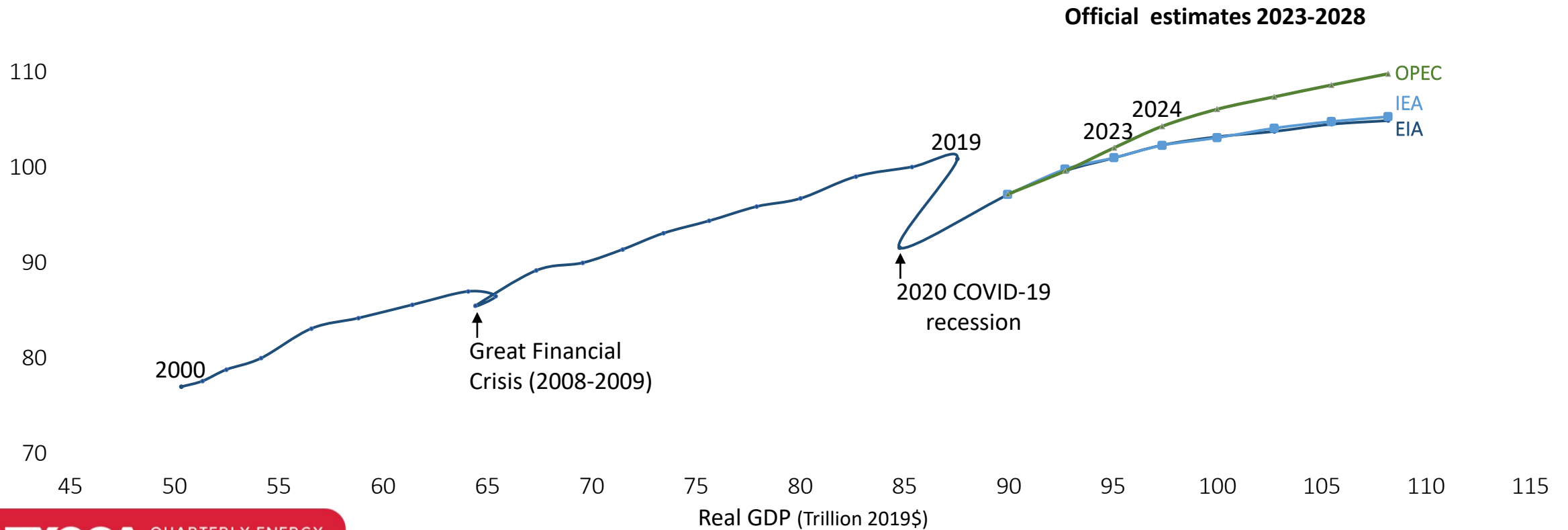
Global oil demand is expected to reach record high levels in 2024 through 2028



- ▶ Global oil demand and economic growth have historically corresponded closely with one another
- ▶ Yet, official views for the next five years differ markedly, mainly due to differing views on the pace of electrification and autonomy in transportation

Global oil demand and GDP*

Million barrels per day (mb/d)
120



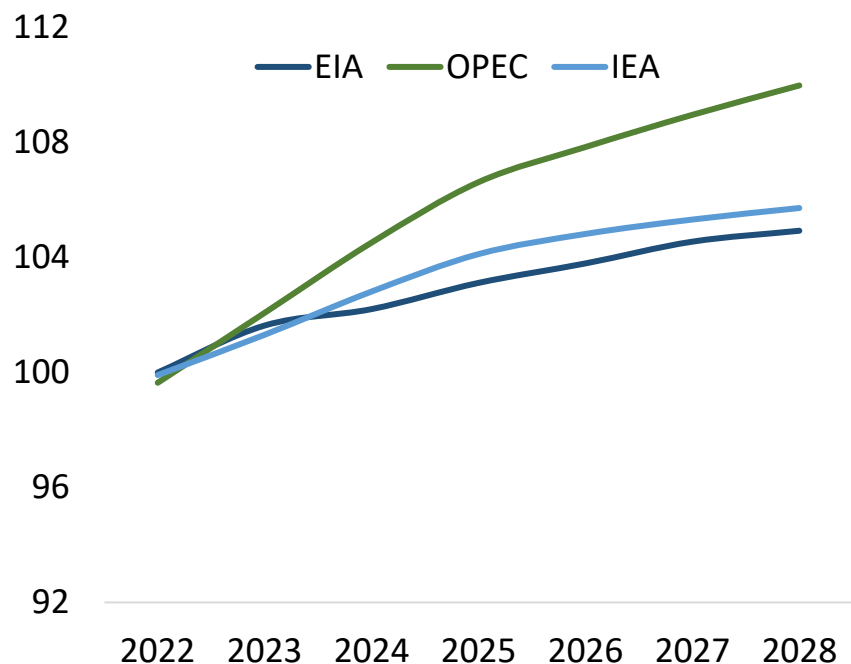


The U.S. stands as the single largest source of prospective global oil supply growth under EIA and IEA forecasts

- ▶ EIA expects an oil supply record of record 102.2 mb/d in 2024, but projections by the IEA and OPEC are even higher
- ▶ EIA, IEA, and OPEC offer divergent regional views of oil supply growth, but agree the U.S. stands as the largest source of growth

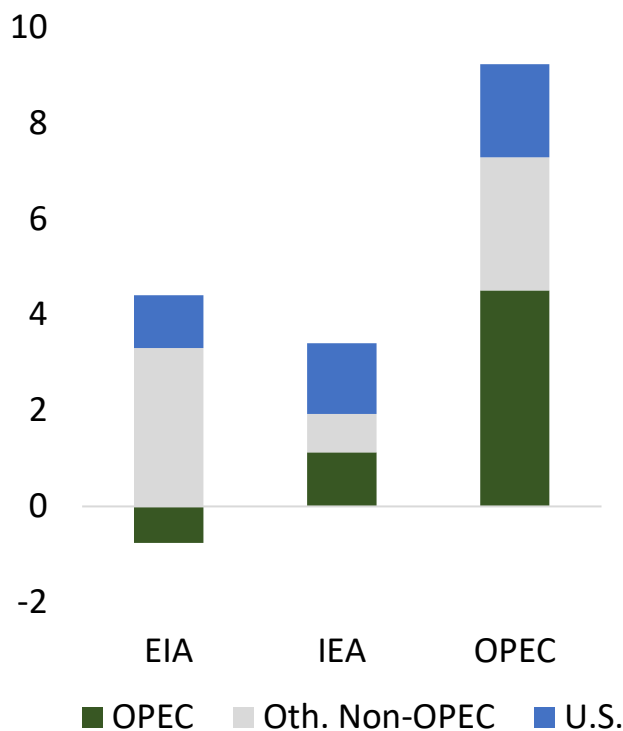
Global oil supply, 2023-2028

Million barrels per day (mb/d)



Global oil supply growth by source

Million barrels per day (mb/d)



U.S. leading potential oil production

The Big Number: 13.2 Million
New York Times, Dec. 1, 2023

Record US oil output challenges Saudi mastery
Reuters, Dec. 4, 2023

Record Permian Basin production fuels Texas oil, natural gas job growth
The Center Square, Nov. 18, 2023



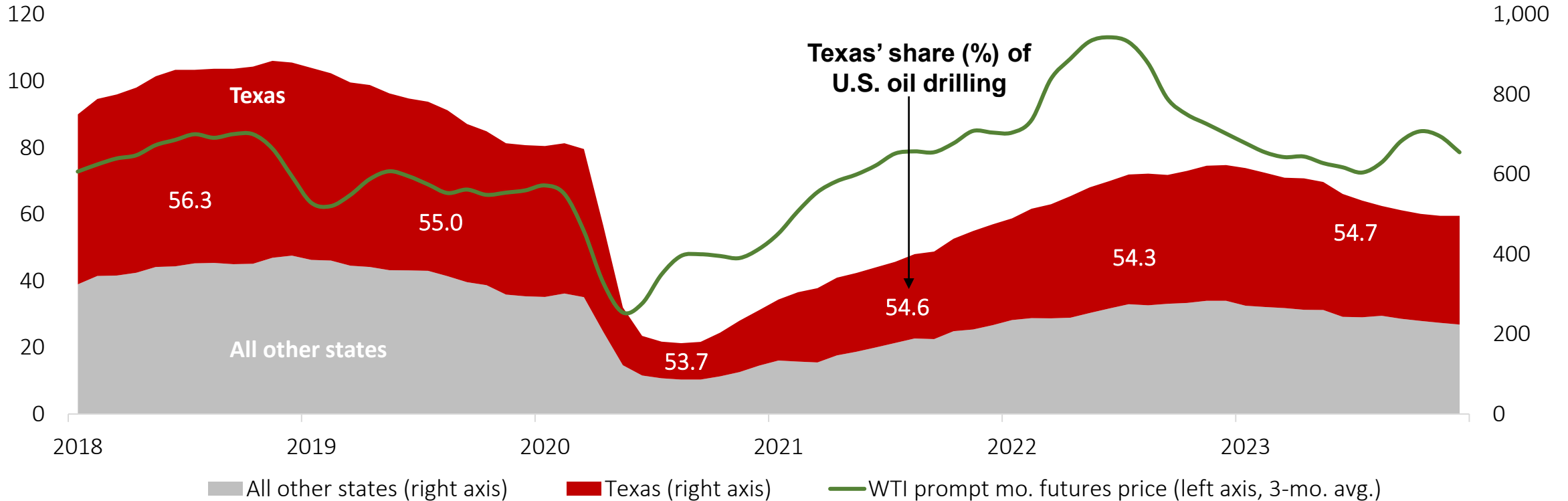
Texas' share of U.S. oil drilling rose in 2023 to its highest since 2019



- ▶ Crude oil prices have historically driven drilling activity
- ▶ Texas accounted for 54.7% of U.S. oil drilling year-to-date through mid-December, its highest since 2019

Crude oil prices and drilling activity

Dollars per barrel (2023\$)



■ All other states (right axis)

■ Texas (right axis)

— WTI prompt mo. futures price (left axis, 3-mo. avg.)

Productivity has remained a key driver and differentiator for Texas' oil and natural gas basins



- ▶ Permian rig productivity has increased by an estimated 17.8% y/y as of December 2023 per the U.S. Energy Information Administration (EIA)
- ▶ The Haynesville and Eagle Ford appear even more productive than the Permian Basin but yield relatively more natural gas and less oil

American Oil—Good to the Last Drop?

The Wall Street Journal, Nov. 27, 2023

How The U.S. Is Pumping More Oil With Fewer Rigs

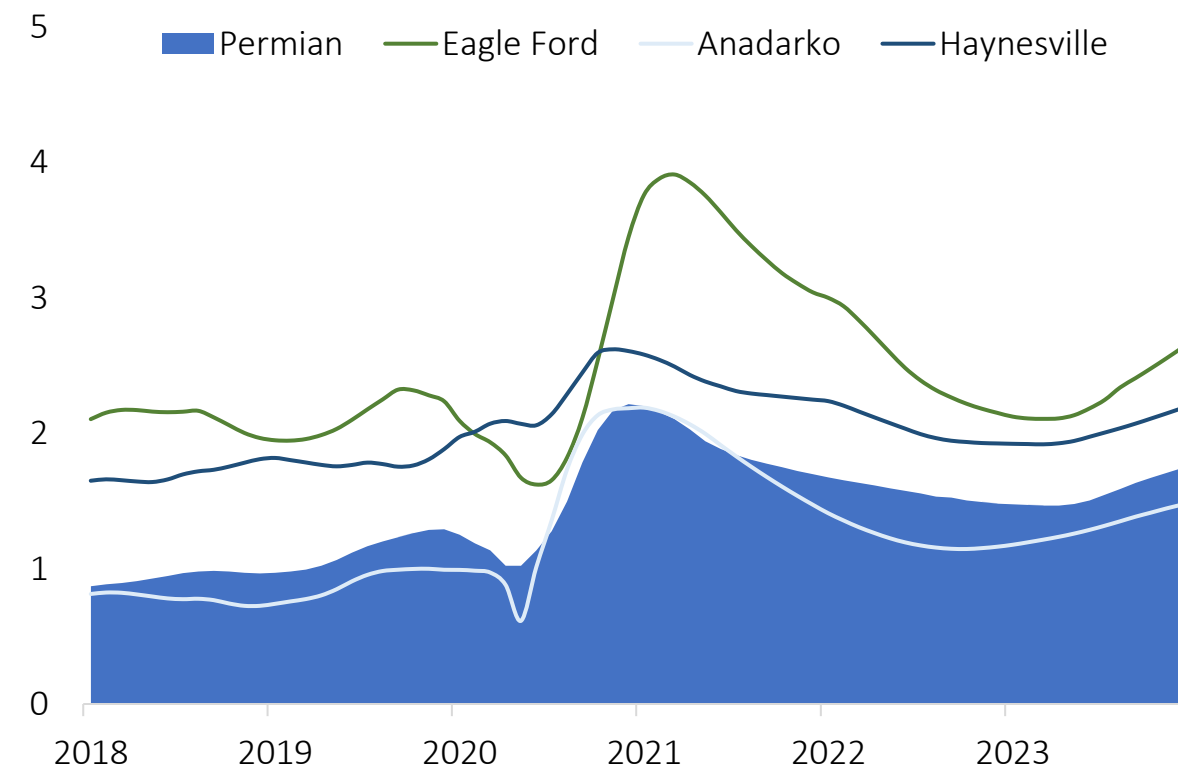
OilPrice.com, Nov. 4, 2023

Rumors of Permian Well Declines May Be Exaggerated

RBN Energy Apr. 12, 2023

Texas rig productivity by basin – new monthly prod. per rig

Thousand barrels per day oil-equivalent, kb/doe



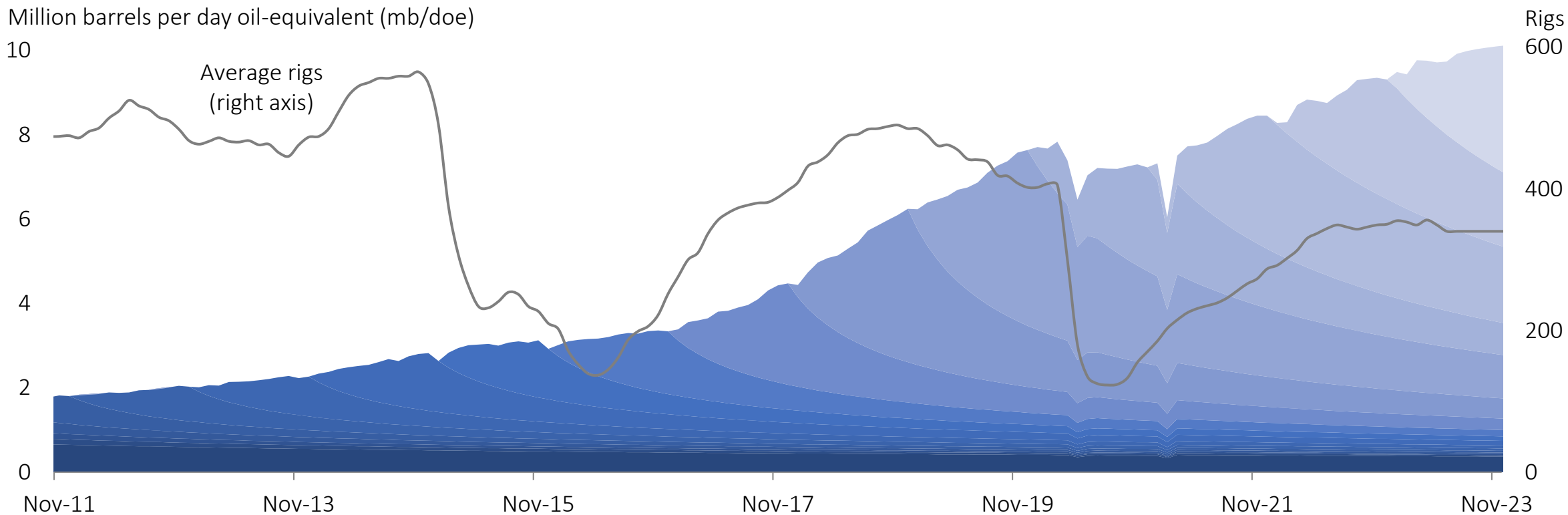
The Permian Basin set new production records and surpassed 10 million barrels of oil-equivalent energy (mb/doe) for the first time in Q3 2023



- The Permian Basin now provides more than 27% of total U.S. oil and natural gas production
- Compared with country-level production, Texas' combined oil and natural gas production of over 10 mb/doe ranks #3 in the world; only the rest of the United States and Russia are higher

Permian Basin wellhead oil and natural gas production

Million barrels per day oil-equivalent (mb/doe)



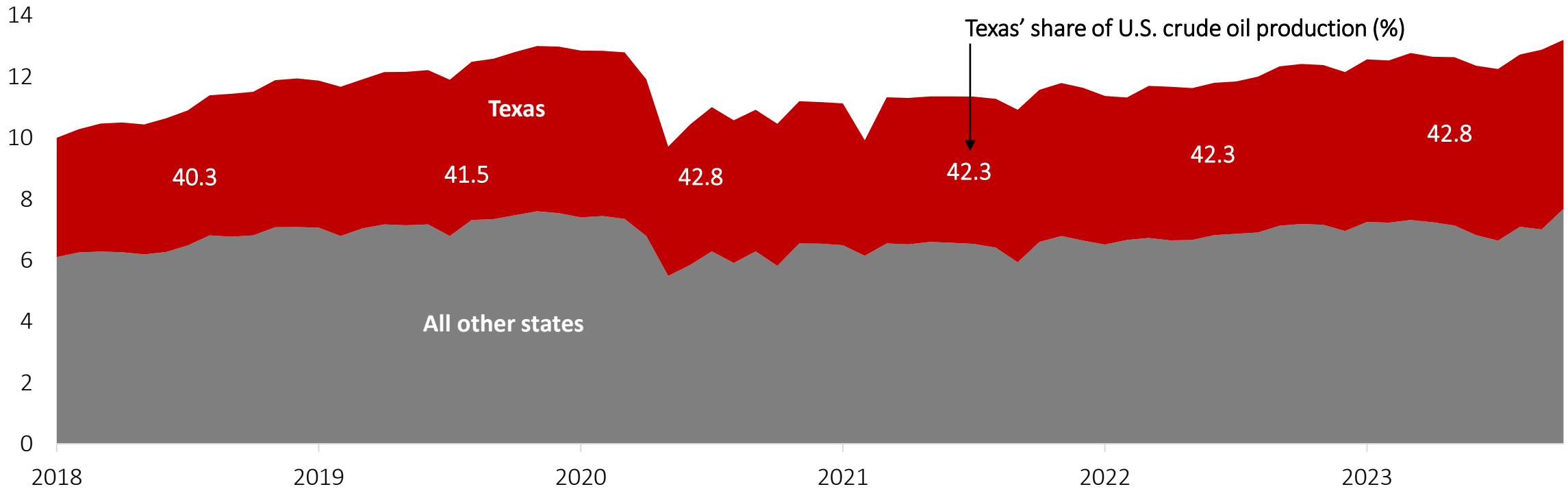
Texas has set new production records and increasingly driven U.S. supply



- ▶ New production records: TXOGA estimates that Texas produced 5.7 million barrels per day (mb/d) of crude oil in October and November 2023
- ▶ Texas drove 42.8% of U.S. oil production through the first 11 months of 2023

U.S. and Texas crude oil production

Million barrels per day (mb/d)

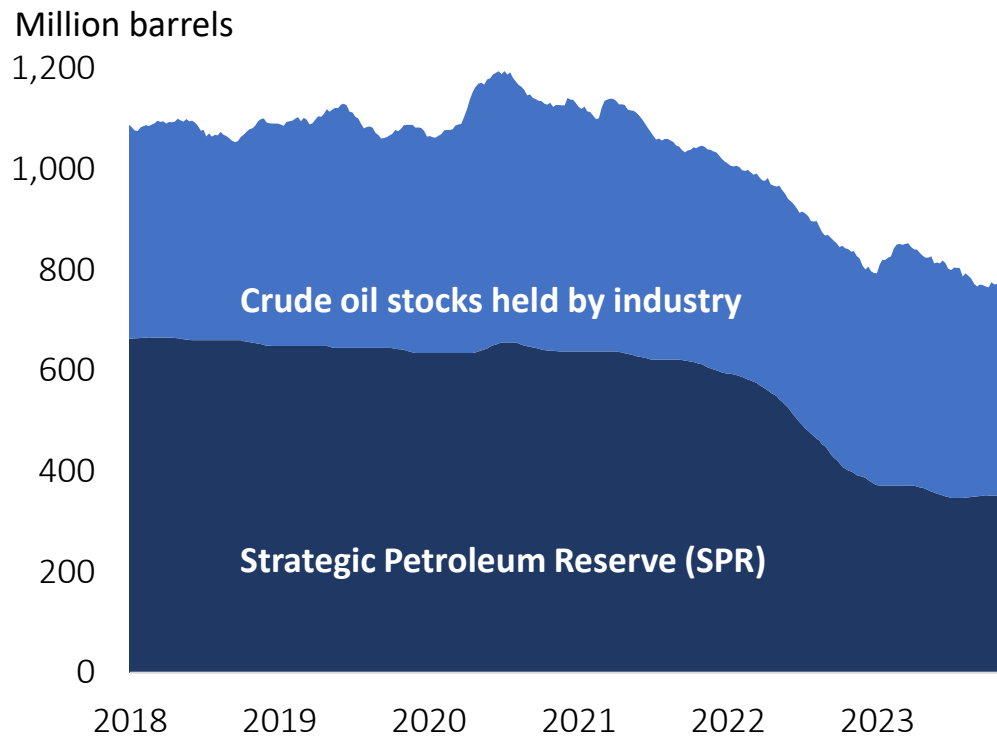


U.S. crude oil inventories have remained historically low

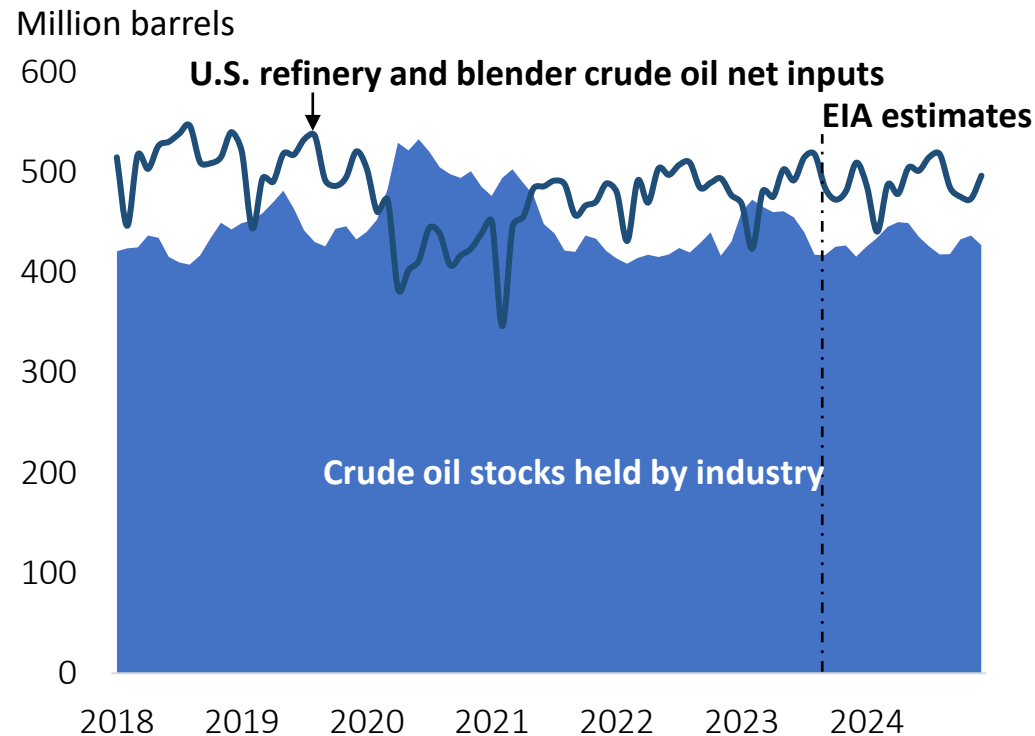


- ▶ U.S. crude oil stocks have remained near their lowest levels since April 1985
- ▶ U.S. crude oil stocks held by industry have usually been slightly less than one month's supply. In November 2023, the inventories equated 26.7 days of supply to refineries, which is below the average for November of 28.3 days of supply in 2018-2022

U.S. crude oil stocks

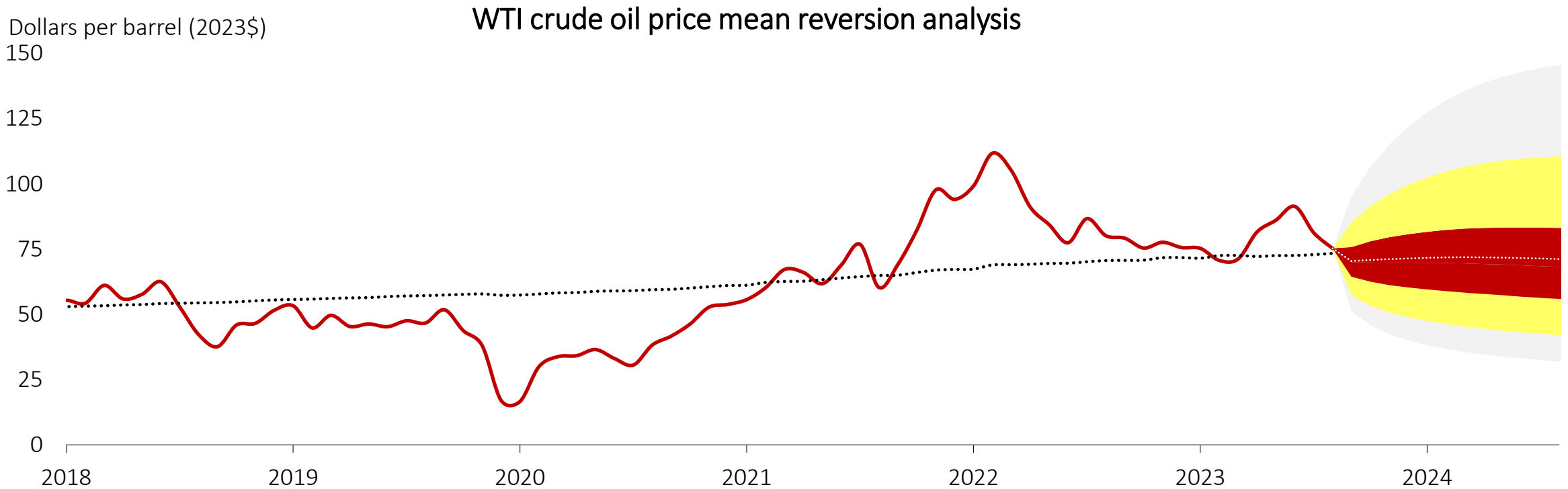


U.S. (non-SPR) crude oil stocks vs. refinery inputs



Crude oil prices historical mean reversion analysis: futures prices have fallen below their historical mean

- Mean reversion analysis can be useful to assess short-term markets. It is not a forecast but shows how futures prices (dotted white line) compare with a mean reversion target (dotted black line) and confidence intervals, based on past data
- The MR target for crude oil prices exceeds futures prices as of Dec. 14 (that is, the black dotted line is higher than the white dotted line), so prices would need to increase to revert to their historical mean
- Confidence intervals based on past prices show the potential for greater upside than downside



Natural Gas Markets

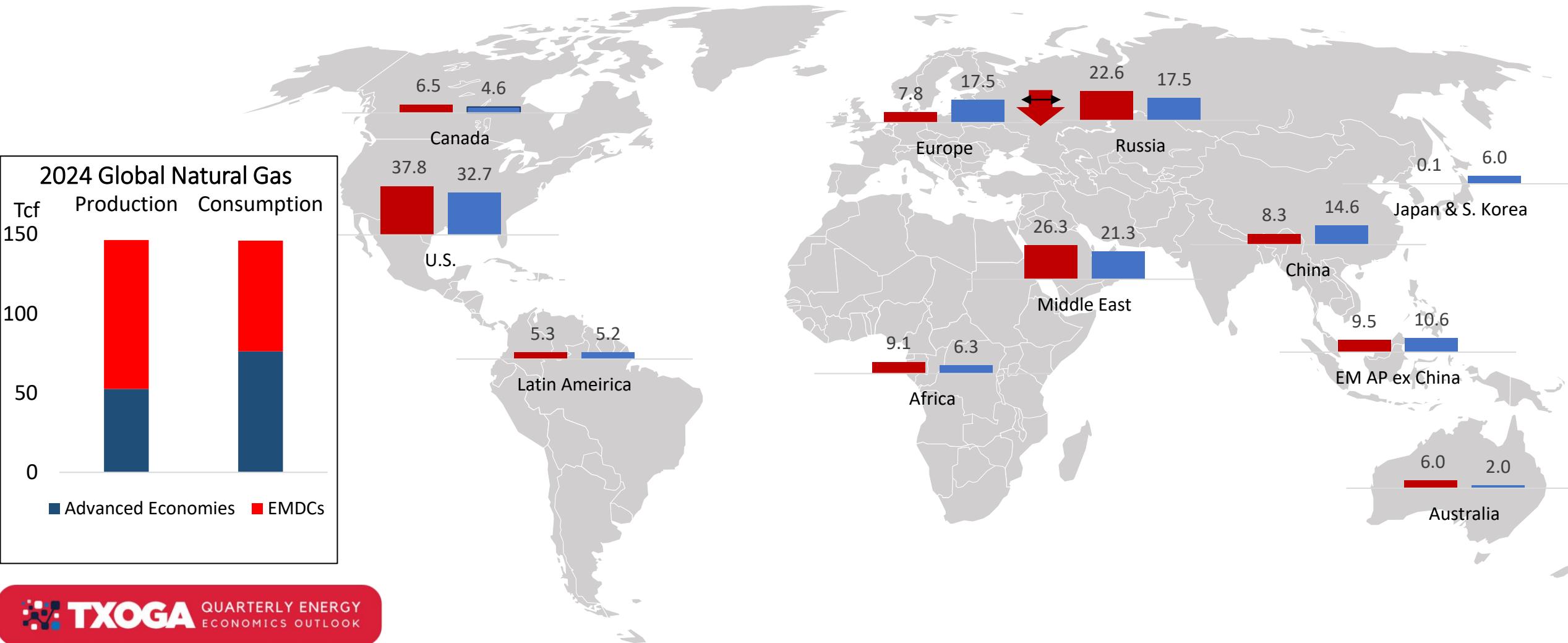




Global natural gas production and consumption are projected to reach record levels despite the effects of Russia's war in Ukraine

▶ The U.S. is projected to continue to lead the world in natural gas production, consumption, and exports

2024 Global natural gas production and consumption – Trillion cubic feet (Tcf)



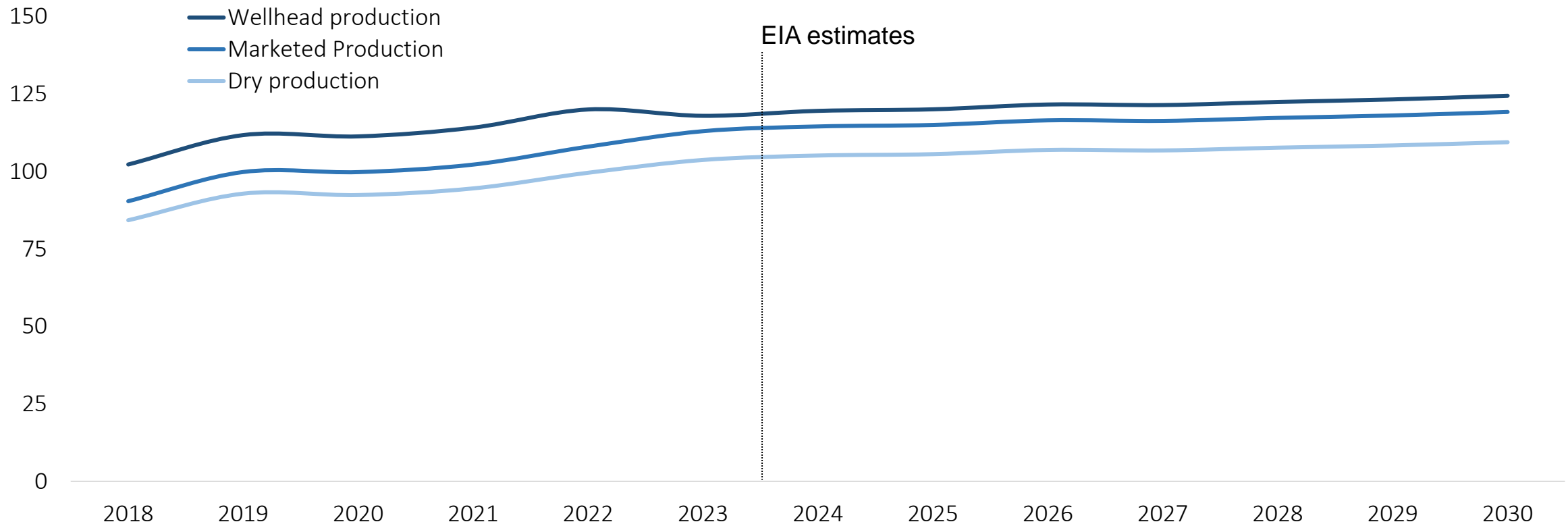
EIA projects U.S. natural gas production to grow by a total of 1.4% between 2023 and 2030



- ▶ Although EIA's short-term and long-term projections differ for 2023, they imply little U.S. natural gas production growth to occur between 2023 and 2030

U.S. natural gas production, 2018 – 2030

Billion cubic feet per day (bcf/d)



EIA projects that U.S. natural gas net exports to grow by over 80% between 2023 and 2030



- ▶ In 2017, the U.S. shifted to being a net exporter of natural gas, and in 2023 has supplied 13.0 bcf/d to international markets
- ▶ EIA projects U.S. natural gas net exports to increase by +2.4 bcf/d in 2023 and then average growth of +1.5 bcf/d per year through 2030

U.S. natural gas net exports (imports)

Billion cubic feet per day (bcf/d)

30

20

10

0

-10

2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030

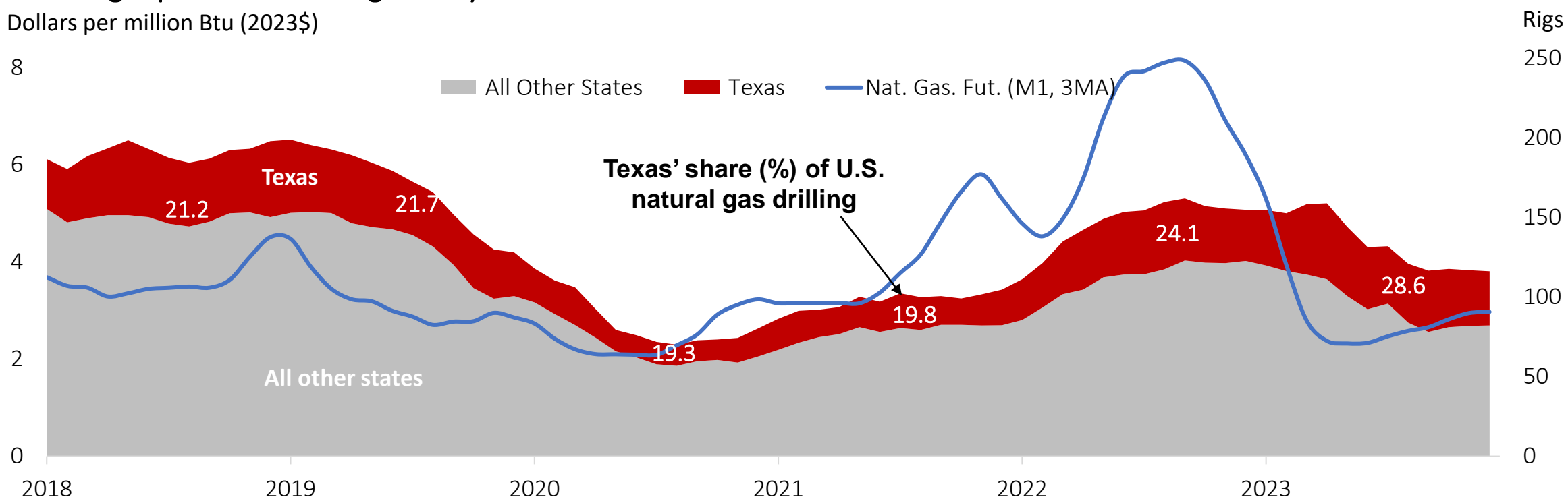
Texas has driven the highest share of U.S. natural gas drilling in a decade



- Natural gas drilling and production in Texas has historically responded to the prices of natural gas and natural gas liquids
- Texas contributed 28.6% of U.S. natural gas drilling in 2023, which was its highest annual average since 2013

Natural gas prices and drilling activity

Dollars per million Btu (2023\$)



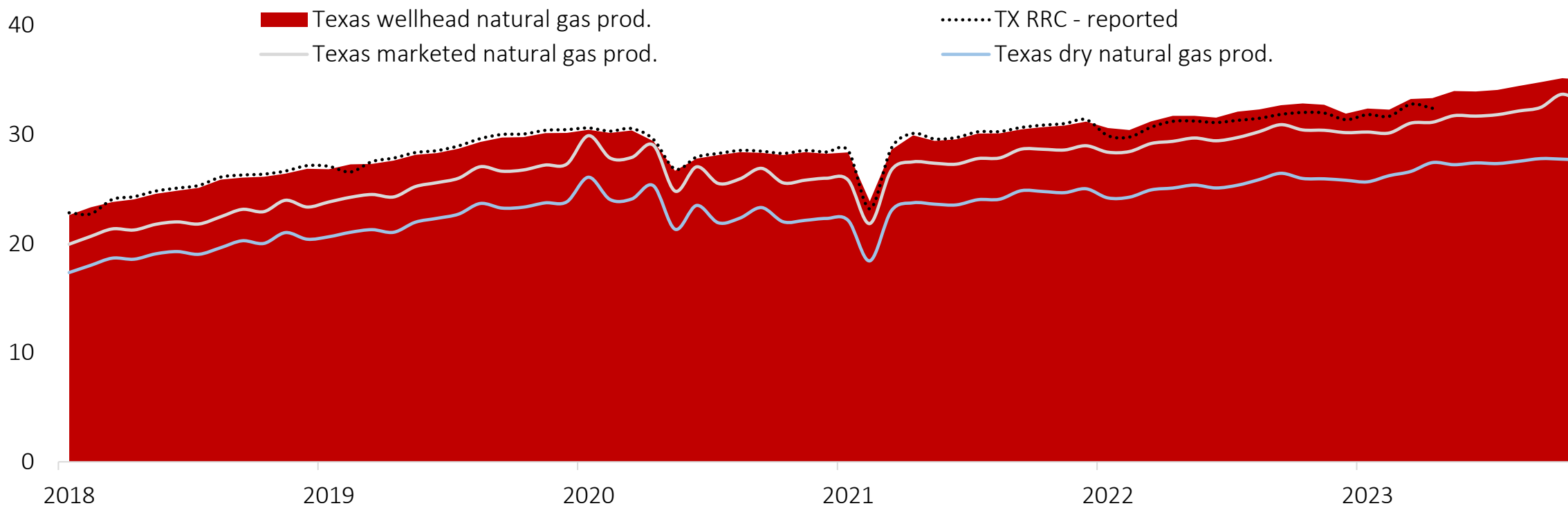
Texas has established new natural gas production records



- New Texas production records: TXOGA estimates that Texas produced natural gas gross withdrawals of 35 bcf/d in October and November, including marketed production as high as 33.6 bcf/d in October

Texas natural gas production, January 2018 – November 2023

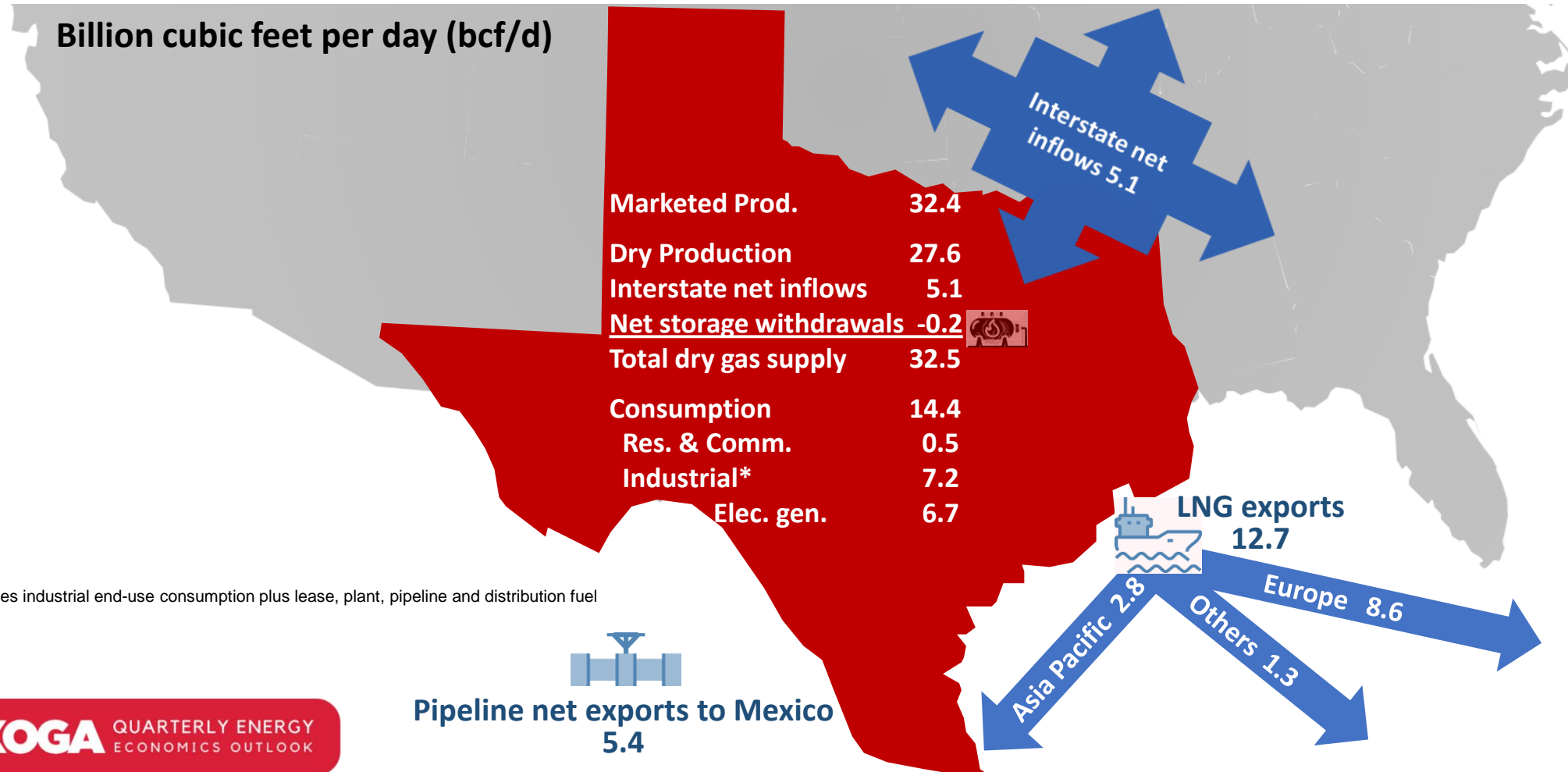
Billion cubic feet per day (bcf/d)





Texas' natural gas flows in September 2023: Production supported historically strong consumption and exports while keeping downward pressure on prices

- Based on the EIA's most recent data, Texas produced 27.6 billion cubic feet per day (bcf/d) of dry natural gas in September, supplemented by 5.1 bcf/d of interstate net inflows, per TXOGA's estimates
- Texas consumers required 14.4 bcf/d, mainly for electricity generation and industry, and 18.1 bcf/d was exported (LNG of 12.7 bcf/d and pipeline gas of 5.4 bcf/d)



*Includes industrial end-use consumption plus lease, plant, pipeline and distribution fuel

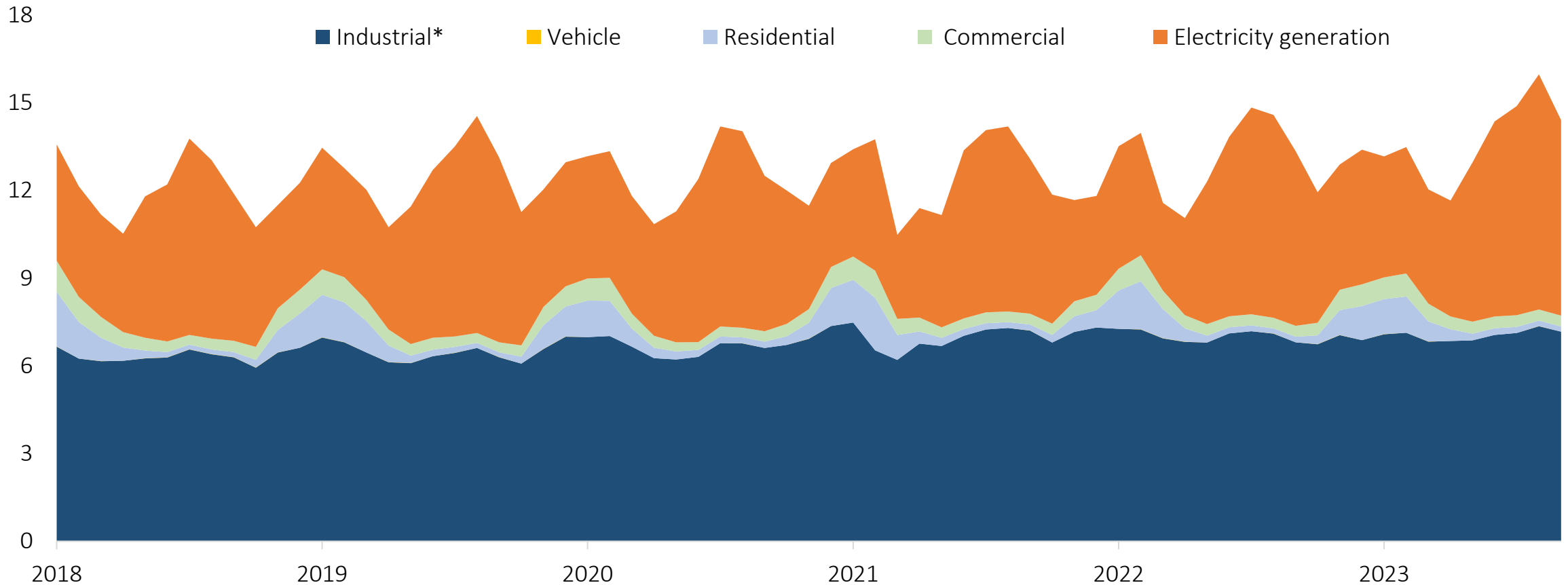
Texas' growth has driven natural gas consumption up by 13% since 2018 and increased monthly variation in its use for power generation



- ▶ Texas' natural gas consumption monthly variation across a year has exceeded 4 bcf/d, underscoring market complexity and the increased need for storage

Texas natural gas consumption by end-use sector

Billion cubic feet per day, bcf/d





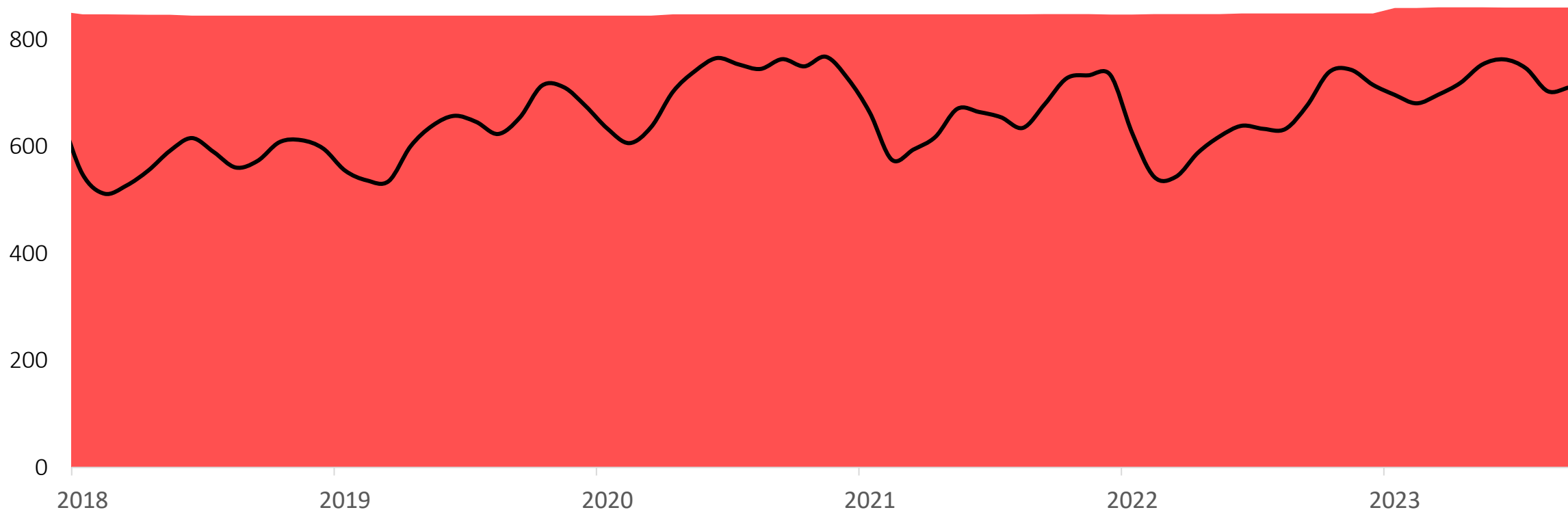
With Texas' ample storage capacity and volumes, natural gas is widely available to all consumers that secure pipeline transportation

- ▶ Texas' underground natural gas storage capacity is among the largest in the U.S., capable of holding 860.4 billion cubic feet
- ▶ In-state natural gas storage levels so far in 2023 have remained strong and rose by 32% y/y as of July per EIA

Texas natural gas underground storage capacity and volume

Billion cubic feet
1,000

■ Texas natural gas underground storage capacity — Texas natural gas underground storage volume

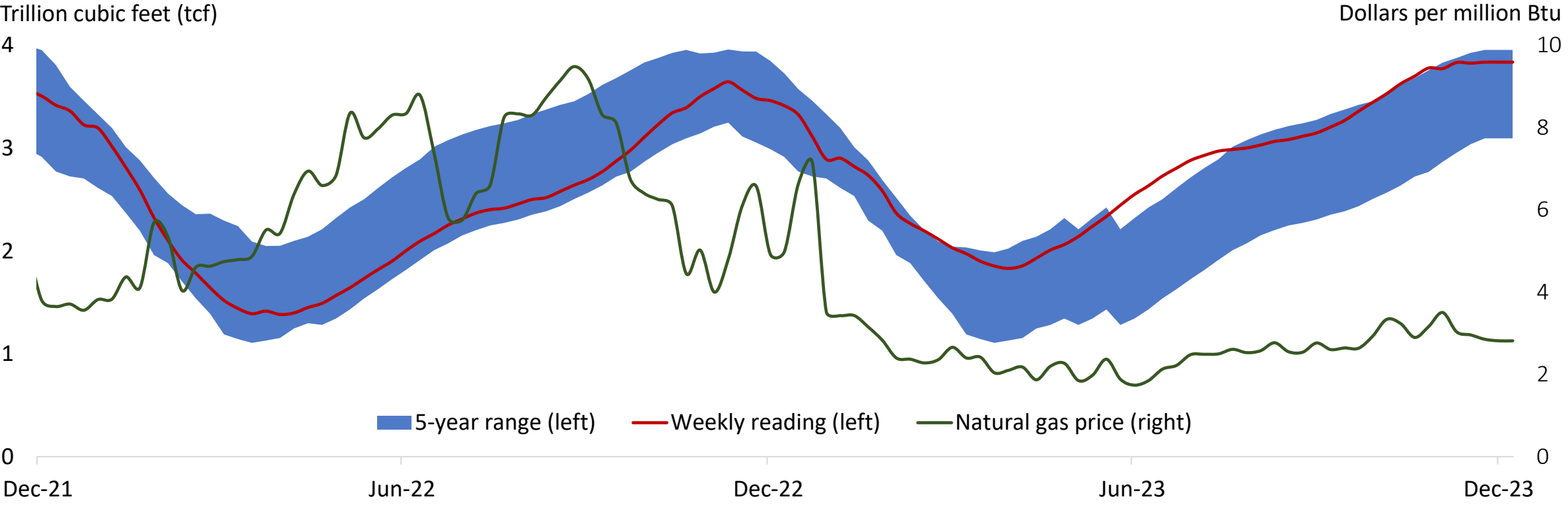




U.S. natural gas stocks remained near the top of their 5-year historical range and kept downward pressure on prices in Q4 2023

- Financial markets in which natural gas prices are established have historically responded to market fundamentals including natural gas storage levels, which have recently been near the top of their five-year range

U.S. working gas in underground storage



Natural gas price historical mean reversion analysis: futures prices through Q3 2024 have fallen below their historical mean

- ▶ The MR target for natural gas prices exceeds futures prices as of Dec. 14 (that is, the black dotted line is higher than the white dotted line), so prices would need to increase to revert to their historical mean
- ▶ Confidence intervals based on past prices show the potential for greater upside than downside

Natural gas price mean reversion analysis

Dollars per million Btu (2023\$)

10

8

6

4

2

0

2018

2019

2020

2021

2022

2023

2024

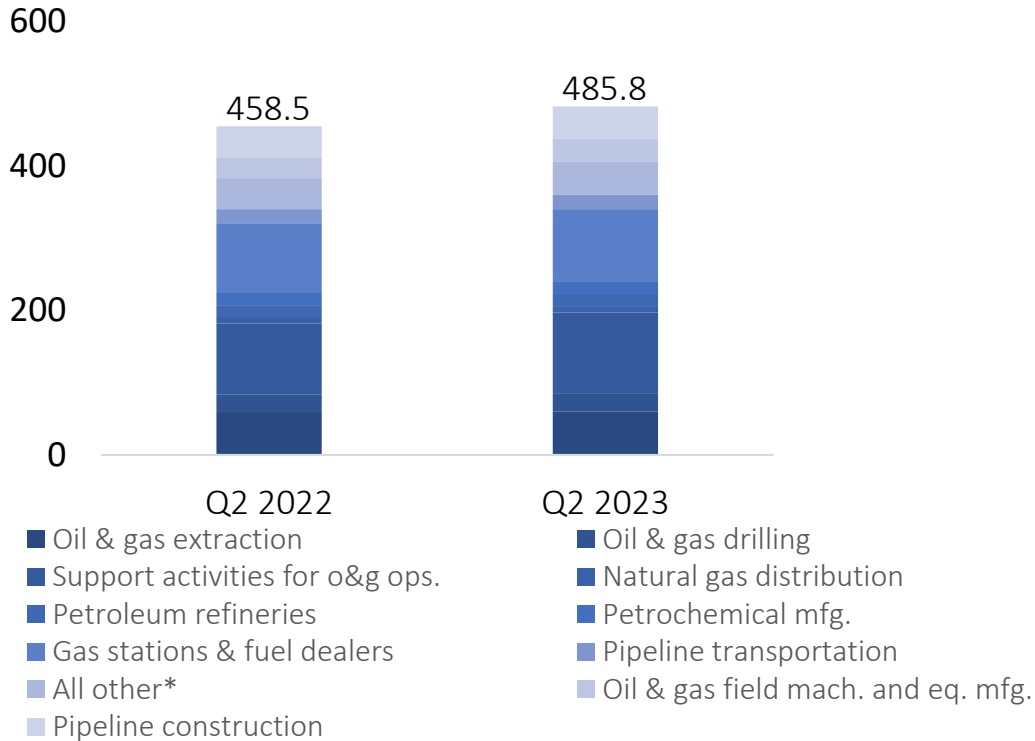
The Texas' oil and natural gas industry's jobs and wages rose solidly through the first half of 2023



- ▶ Texas' oil and natural gas industry employment rose by 6.0% y/y in Q2 2023 with over half of the job growth in upstream drilling, extraction and support services, per data from the U.S. Census Bureau and Texas Workforce Commission
- ▶ Industry wage growth of 9.3% y/y outpaced job growth of 6.0% y/y, which reflected wage escalation

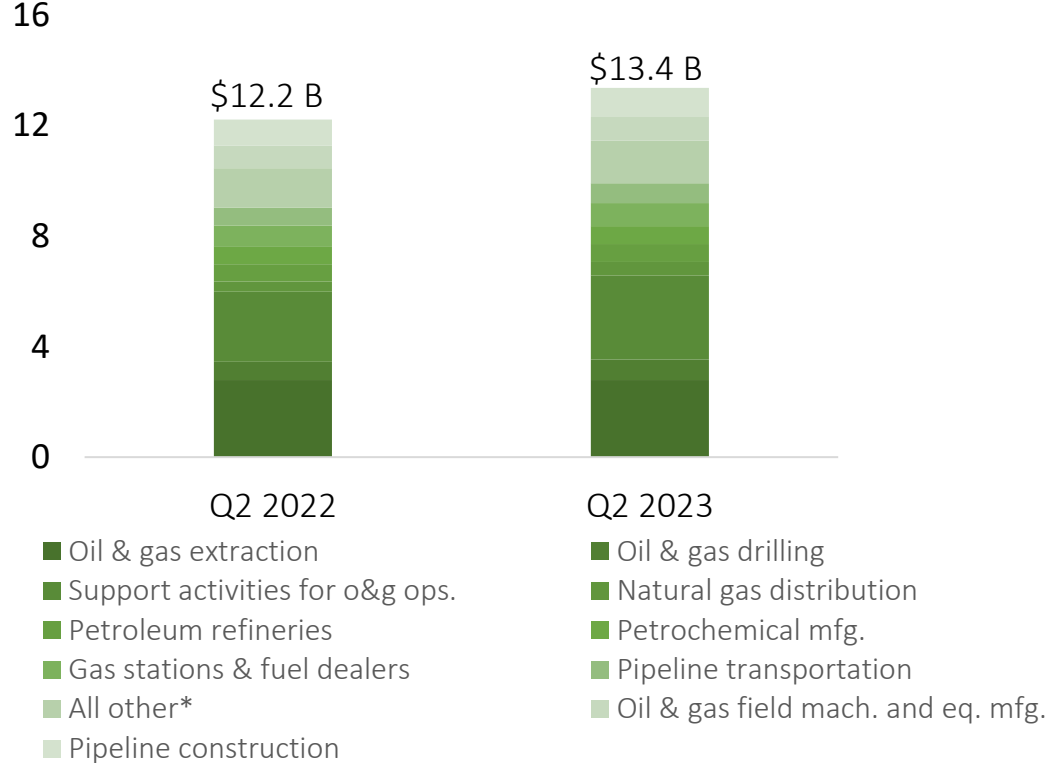
Texas Oil & Gas Industry Employment Rose by +6.0% y/y in Q2 2023

Thousand Jobs



Texas Oil & Gas Industry Quarterly Wages Rose by +9.3% y/y in Q2 2023

Billion dollars



* Other industry segments include petroleum and pet. product wholesalers, lubricant mfg., asphalt mfg., industrial sand mining, nitrogenous fertilizer mfg., basic organic chem. mfg., plastics and resin mfg.

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