



**December 11, 2023**



**TXOGA's chartbook provides a vital reference for our members as well as those who are interested in understanding data which tell the story of what's happening with the economy, oil and gas markets at the global, U.S. and Texas levels.**

## **Key points for the week of December 11, 2023**

- ▶ **Solid economic indicators.** The U.S. employment situation improved in November with non-farm payroll additions of 199,000 and a decrease in the unemployment rate to 3.7%, down by 0.2% from Oct. The yield premium for lower-grade corporate bonds fell during the week ended Dec. 8. According to the ADS Business Conditions Index from the Philadelphia Federal Reserve Bank, current business conditions suggest continued U.S. GDP growth.
- ▶ **Decreased oil prices despite oil market tightening.** Oil prices fell to \$71 per barrel despite reports by the U.S. Energy Information Administration (EIA) that 1) U.S. ending stocks of crude oil (excluding the SPR) fell by 4.6 million barrels, 2) U.S. petroleum consumption rose to 19.6 million barrels per day (mb/d) to the middle of its 5-yr. range, 3) domestic crude oil production decreased to 13.1 mb/d, down by 0.1 mb/d w/w, and 4) U.S. production could continue to fall. The main thing that spurred lower prices was OPEC+'s reiteration that they would extend their supply cuts, when the group has apparently lacked compliance. The market needs to see it to believe it.
- ▶ **U.S. natural gas stocks fell, so did prices.** U.S. natural gas prices fell below \$2.60 per million Btu for the week ended Dec. 1, despite strong exports and a 3.1% weekly drawdown in storage.

As highlighted in the [Chart of the Week](#), the futures prices of crude oil and natural gas have recently fallen below their respective historical means.

# TXOGA Chart of the Week: Analysis of oil and natural gas price mean reversion

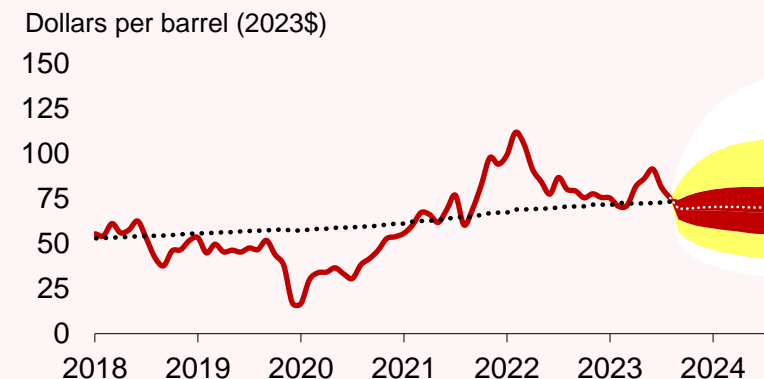
## › Defining terms

- Mean reversion analysis can be useful to assess short-term markets, and fundamentals can cause prices tend to revert to their mean, even if the timing of potential reversion is uncertain.
- These analyses are not forecasts but show how futures prices (dotted white line) compare with a mean reversion target (dotted black line) and confidence intervals, based on past data.
- Historical variation and the tendency of prices to return to their mean inform the confidence intervals (red, yellow, and white ranges).

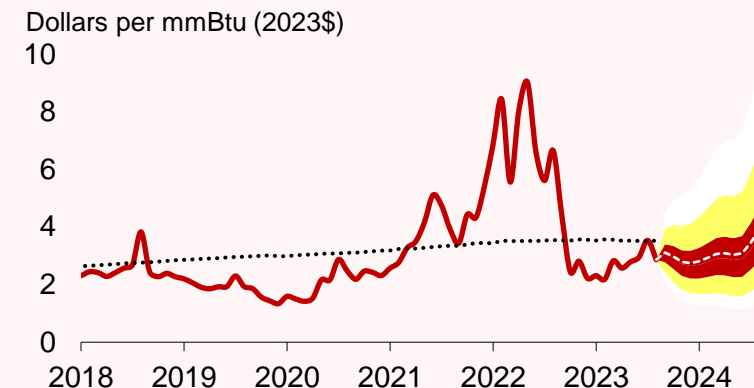
## › Current interpretations

- **The MR targets for crude oil and natural gas prices currently exceed futures prices** (that is, the black dotted lines are higher than white dotted lines), so prices would need to increase to revert to their respective historical means.
- **Futures prices typically decrease over prospective periods** (“backwardation”), meaning that a discount is needed to motivate contracts for months or years ahead; this is true of natural gas prices for delivery in Feb. to June 2024, compared with the January contract.
- **By contrast, futures prices of crude oil for delivery in Feb. to Sep. 2024 and for natural gas next winter (as high as \$3.90 per million Btu for delivery in Jan. 2025) are higher than the contract for delivery in January** (“contango”), so participants expect tighter markets. For natural gas, futures price next winter are up to 50% higher than current ones.
- For both oil and natural gas, the confidence intervals show the potential for greater upside than downside.

### WTI crude oil price mean reversion analysis

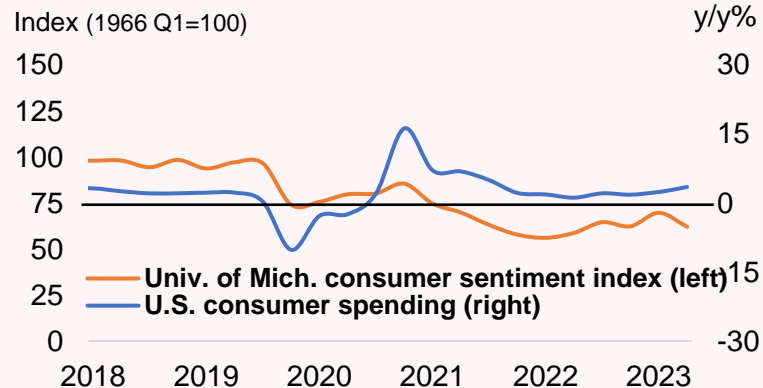


### Natural gas price mean reversion analysis



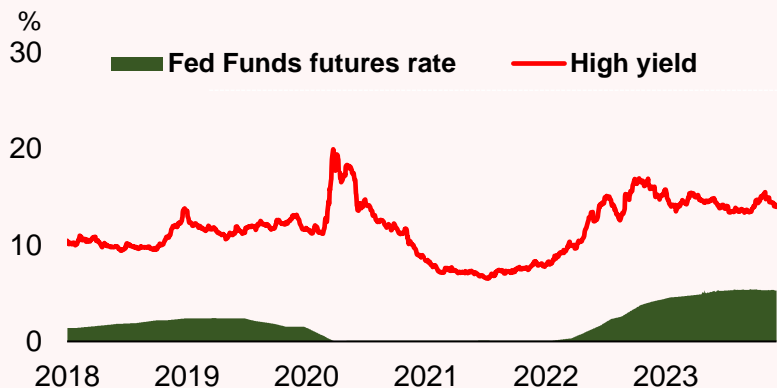
# U.S. economic indicators

## Consumer sentiment vs. spending



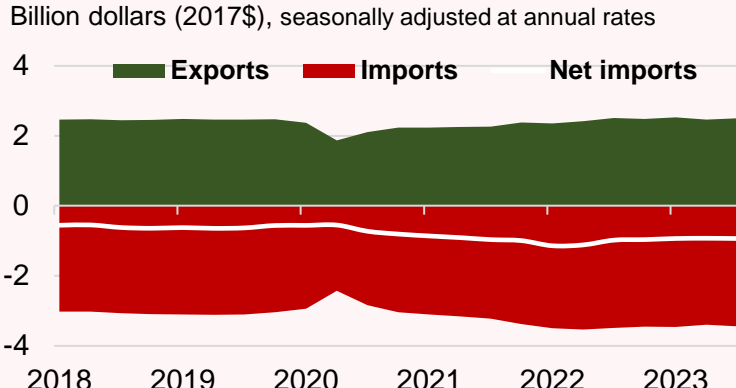
**Consumer sentiment revised upwards for November.** In its final reading for November, the Univ. of Michigan consumer sentiment index was revised upwards from the initial reading but still fell for a 4<sup>th</sup> straight month with reported deterioration in business conditions. The index has nevertheless remained consistent with slow consumer spending growth.

## Fed Funds rate and CCC and lower corporate bond yields



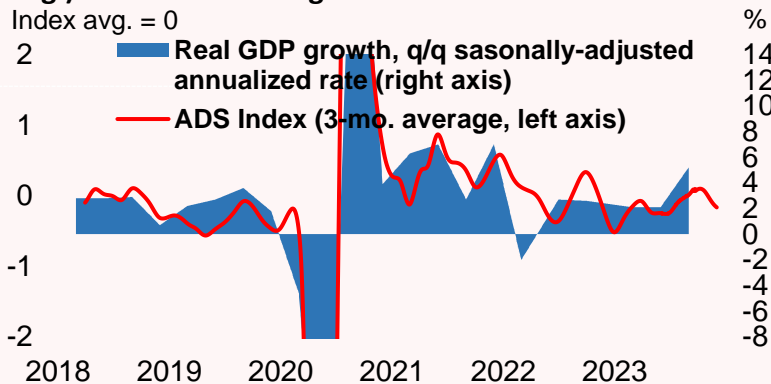
**Bond premium for low credit quality holds at its lowest since Sep.** High yield (HY) rates reflect debt costs for firms with below-investment grade credit quality. For the week ended Dec. 7, HY rates fell to 13.95%, while the Fed Funds futures held steady at 5.3%, resulting in a 7 basis-point (0.07%) w/w drop in the premium for low credit quality.

## Real net exports of goods and services



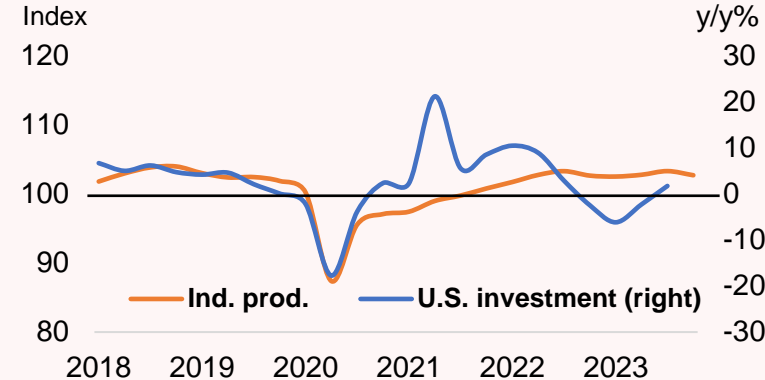
**The U.S. trade deficit widened in Q3 2023.** The U.S. real trade deficit ran at an annualized rate of \$935 billion in Q3 2023, up from \$927 billion in Q2 per the U.S. Bureau of Economic Analysis. On a nominal basis, the trade surplus for petroleum and products ran at annualized rate of \$29 billion in Q3 2023, down from \$29.5 billion in Q2 2023.

## Aruoba-Diebold-Scotti Business Conditions Index (qtr. avg.) vs. U.S. real GDP growth



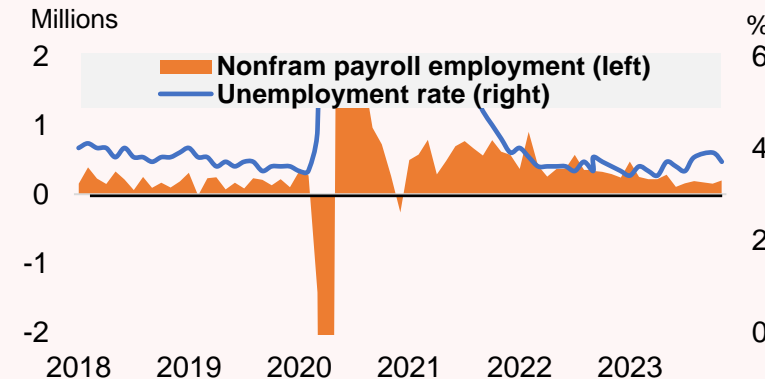
**Business conditions consistent with Q4 2023 real GDP growth.** The ADS business conditions index, published by the Philadelphia Fed. Res. Bank, is a leading indicator of GDP growth. A rolling 3-month average of the ADS index accurately reflected the increase in Q3 2023 real GDP and has remained consistent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

## Industrial production and investment growth



**Industrial production has remained consistent with investment growth of 2.25% y/y in Q3 2023,** as revised up from an initial reading of 1.8% y/y by the Bureau of Economic Analysis. Although industrial production has remained flat in recent months, in October 2023 it remained up by 1.2% year-to-date.

## Nonfarm payroll employment & unemployment rate



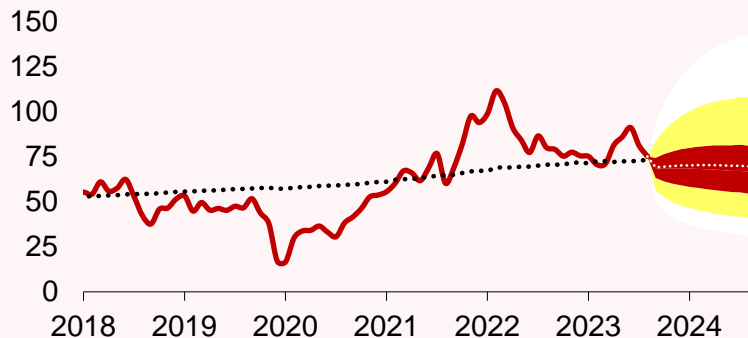
**With a rebound in payroll increases, the unemployment rate fell in November.** The employment situation is a lagging indicator of GDP growth. The U.S. unemployment rate fell by 0.2% to 3.7% in November per BLS, while non-farm payrolls rose by 199,000.



# U.S. oil market indicators

## WTI crude oil price mean reversion analysis

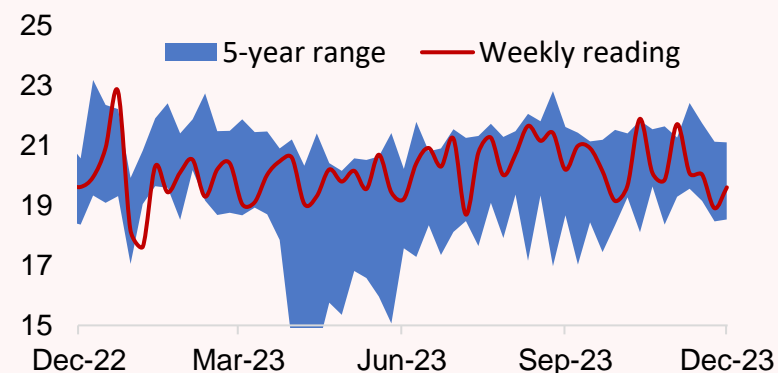
Dollars per barrel (2023\$)



**Futures prices fell below the historical mean reversion target.** Mean reversion analysis can be useful in to assess short-term market actions. As prices remained stable for the week ended Dec. 8, the best-fit curve through historical prices (MR target) exceeded the futures price strip. Confidence intervals based on past prices show the potential for greater upside than downside.

## U.S. petroleum demand

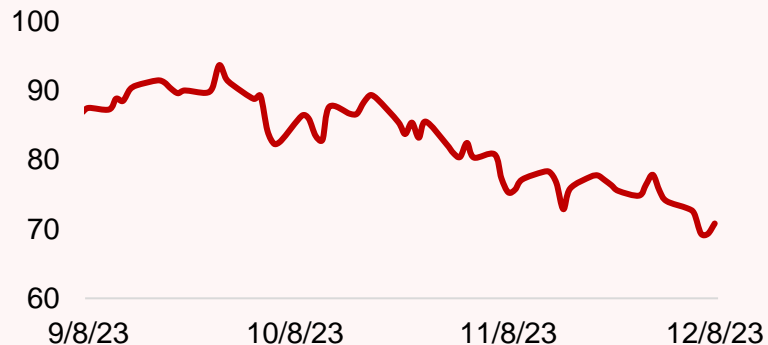
Million barrels per day (mb/d)



**Petroleum demand solid.** U.S. petroleum demand, as measured by deliveries, was 19.6 mb/d for the week ended Dec. 1 and rose to the middle of the five-year range.

## WTI crude prompt month futures prices

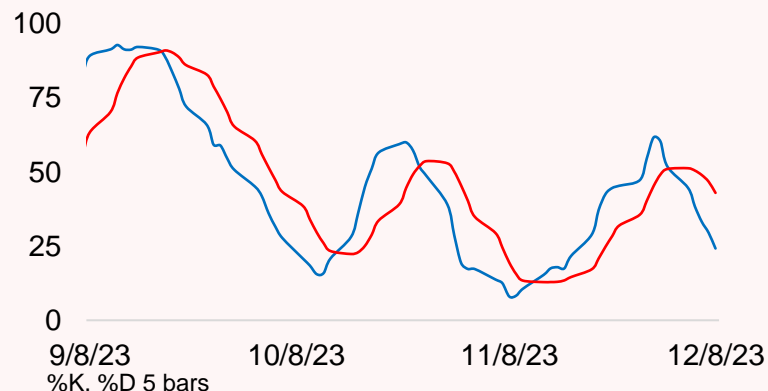
Dollars per barrel



WTI crude oil prices fell to around \$71 per barrel per barrel for the week ended Dec. 8 despite tightened market fundamentals, as the market focused on OPEC+'s credibility in extending its supply cuts.

## WTI crude prompt month futures slow stochastic

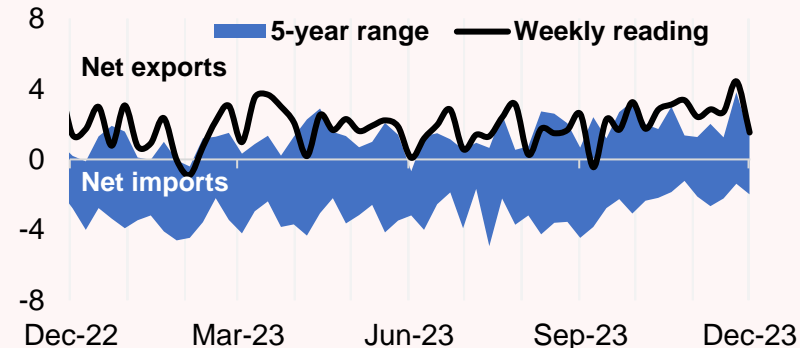
Index level



Price momentum turned negative during the week ended Dec. 8.

## U.S. petroleum net exports (imports)

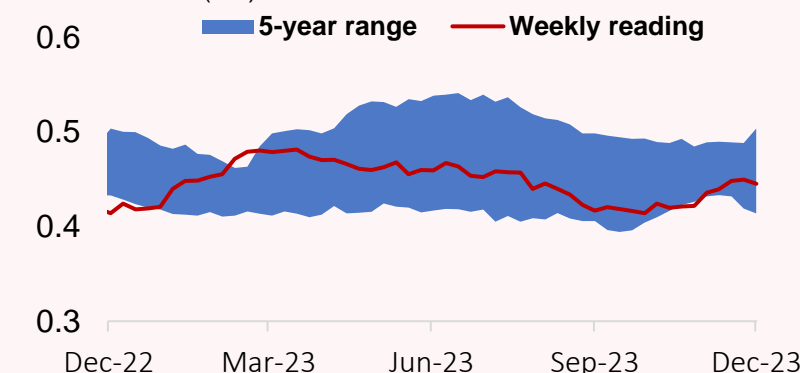
Million barrels per day, mb/d



**Petroleum net exports decreased.** The U.S. was a petroleum net exporter of 1.5 mb/d for the week ended Dec. 1, down from net exports of 4.5 mb/d in the prior week. The decrease was mainly due to a 2.1 mb/d w/w increase in crude oil net imports coupled by lower refined product exports.

## U.S. ending stocks of crude oil (excluding the SPR)

Million barrels (mb)

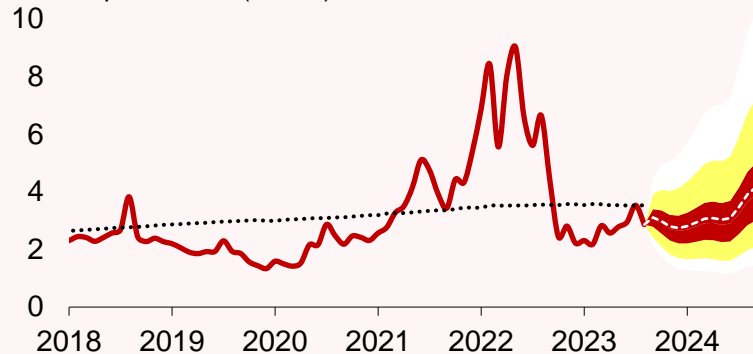


**Inventories decreased for the first time in seven weeks.** U.S. ending stocks of crude oil excluding the Strategic Petroleum Reserve (SPR) fell by 4.6 million barrels (mb) for the week ended Dec. 1 and into the bottom third of the five-year range.

# U.S. natural gas market indicators

## Natural gas price mean reversion analysis

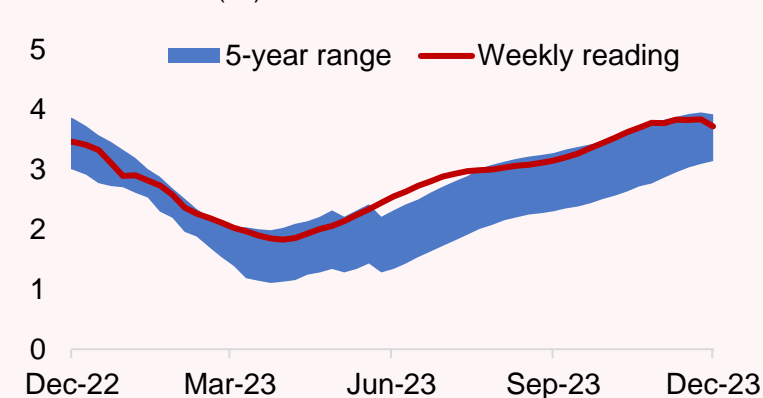
Dollars per mmBtu (2023\$)



**Futures prices fell below the historical mean reversion target.** Natural gas futures prices of \$2.56 per mmBtu for January 2024 delivery fell below their historical mean. Historical variation continued to show more potential upside than downside.

## U.S. weekly working gas storage

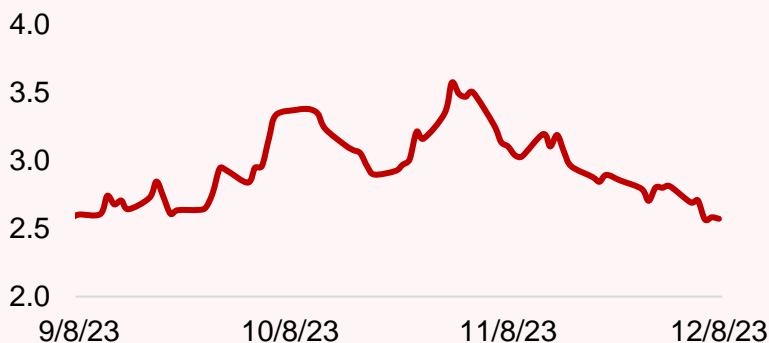
Trillion cubic feet (tcf)



**Storage fell into the top quarter of the 5-year range.** Working gas in underground storage (3.7 tcf as of Nov. 24) fell by 3.1% week-over-week as of Dec. 1 and shifted from being at the top of the 5-yr. range to within the top 25% of it.

## Natural gas prompt month futures prices

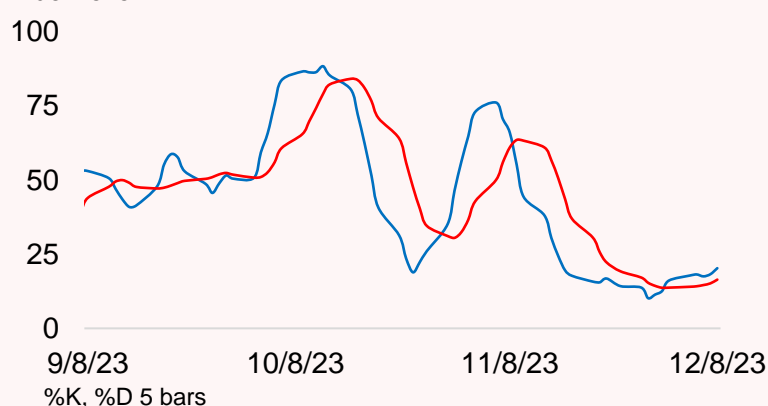
Dollars per million Btu



Natural gas prices at Henry Hub fell below \$2.60 per million Btu for the week ended Dec. 8 to their lowest for this time of year since the 2020 pandemic.

## Natural gas futures slow stochastic

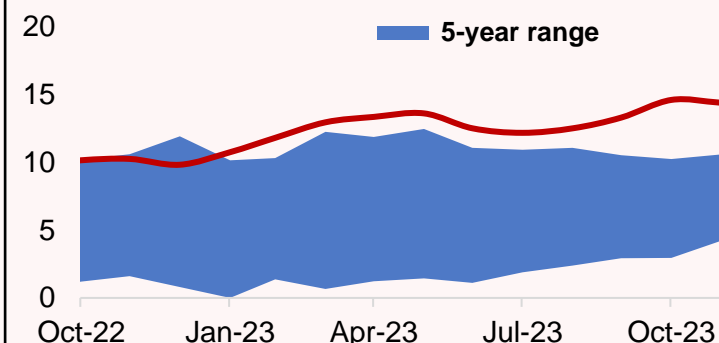
Index level



Natural gas price momentum slowed during the week ended Dec. 1.

## U.S. natural gas net exports

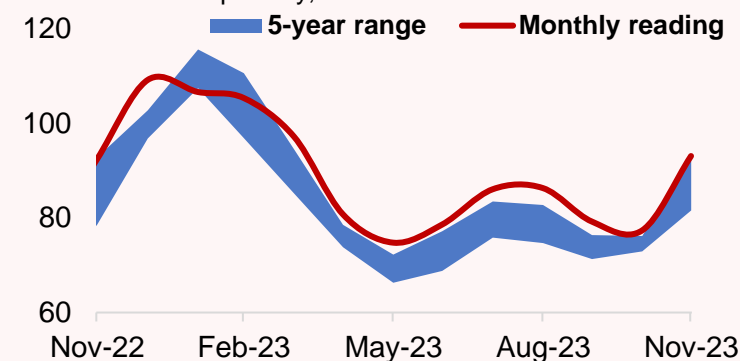
Billion cubic feet per day, bcf/d



**Record high net exports.** U.S. natural gas net exports are estimated to have averaged 14.4 bcf/d in November per EIA.

## U.S. natural gas consumption

Billion cubic feet per day, bcf/d

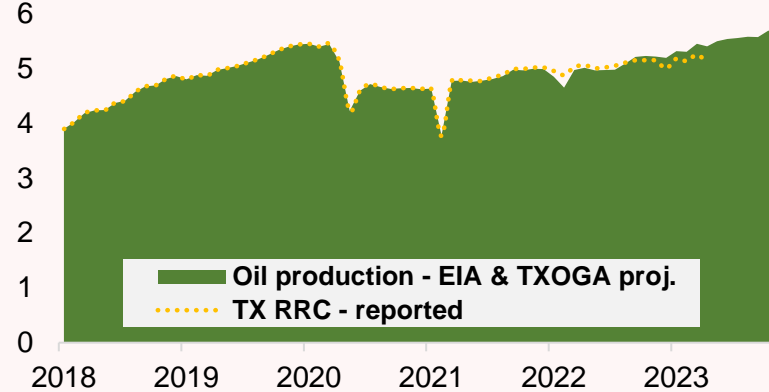


**Strong consumption continued.** Natural gas total consumption through November 2023 remained at the top of its five-year historical range.

# Texas' oil and natural gas production

Texas crude oil production, Jan. 2018 – Nov. 2023

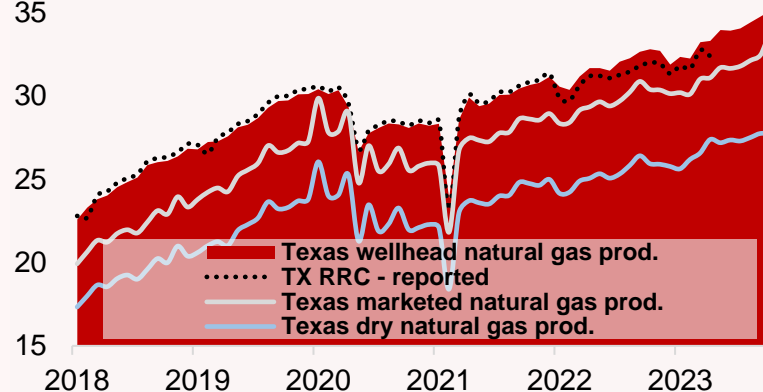
Million barrels per day (mb/d)



Texas' oil production of 5.6 mb/d held steady in September per EIA. TXOGA estimates that Texas crude oil production rose to 5.7 mb/d in October and remained steady in November.

Texas natural gas production, Jan. 2018 – Nov. 2023

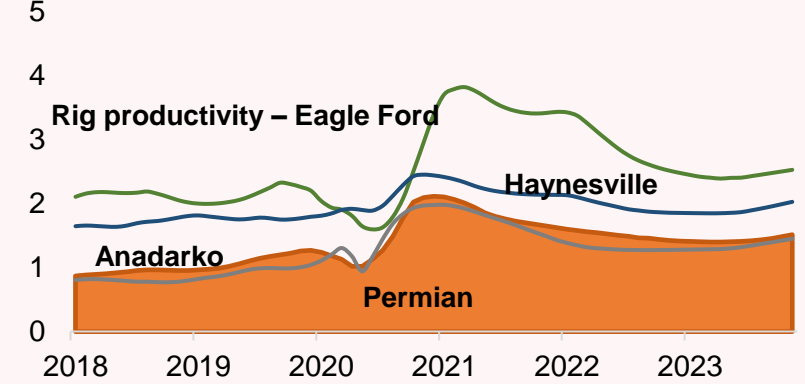
Billion cubic feet per day (bcf/d)



Texas' natural gas production set records in September with 34.8 bcf/d of gross withdrawals and 32.4 bcf/d of marketed production. TXOGA estimates further records that gross withdrawals eclipsed 35 bcf/d in both October and November, and marketed production hit 33.6 bcf/d in October.

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

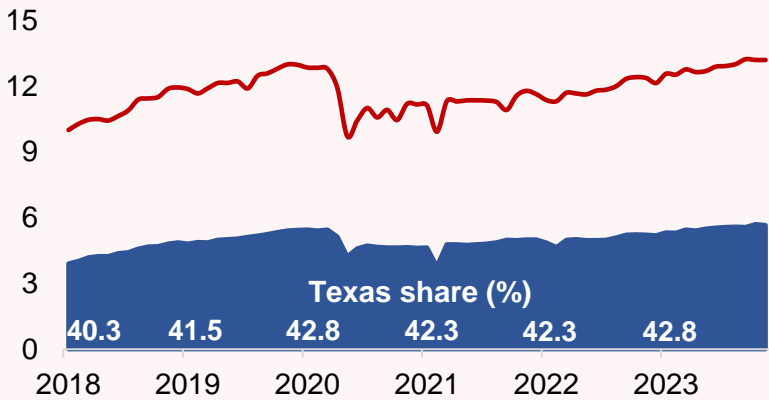
Thousand barrels per day oil-equivalent, kb/dae



EIA estimates of rig productivity for November 2023 show increases year-over-year across all of the major Texas basins, but the strongest productivity gains in the Anadarko (+13.5% y/y), Haynesville (+9.2% y/y), and Permian Basin (+6.2% y/y).

U.S. and Texas crude oil production, Jan. 2018 – Nov. 2023

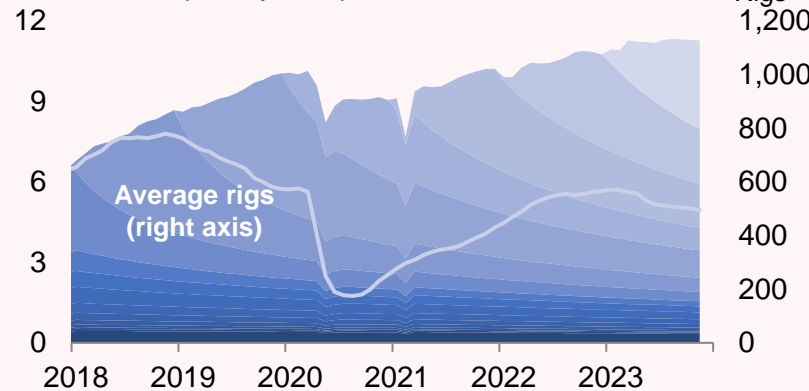
Million barrels per day (mb/d)



Through the first 11 months of the year, Texas accounted for 42.8% of U.S. crude oil production by EIA and TXOGA's estimates.

Texas shale basin wellhead oil & natural gas production

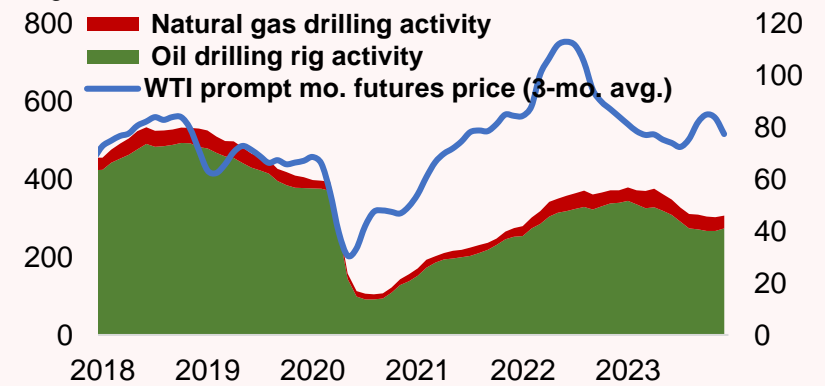
Million barrels per day oil-equivalent



EIA estimates Nov. 2023 production growth across Texas shale basins has been mixed, with strong increases year-over-year in the Permian and Eagle Ford, flat Haynesville production, and decreases in the Anadarko.

Texas drilling activity and WTI crude oil futures prices

Rigs (left axis), Dollars per barrel (2023\$) (right axis)



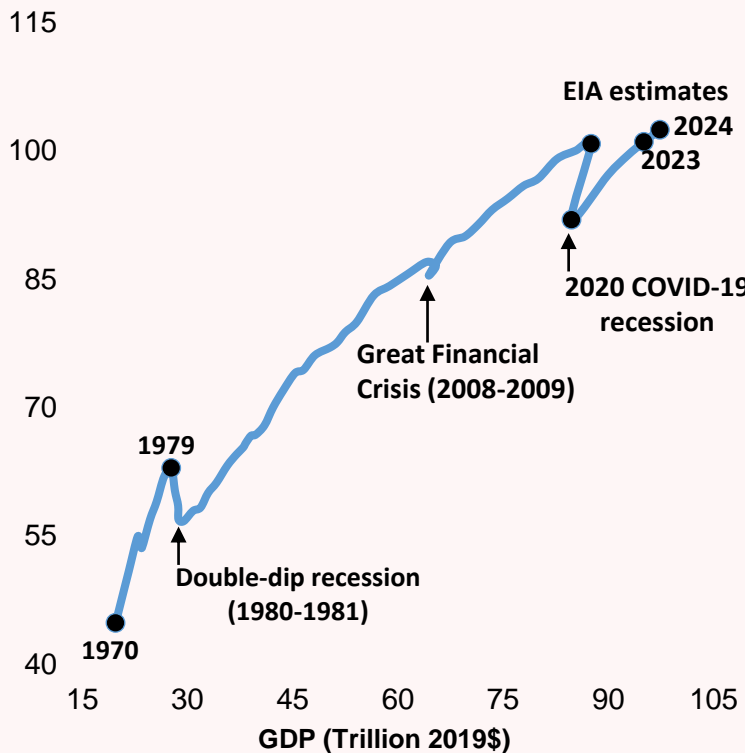
Texas' drilling rig activity rose for the week ended Dec. 8 per Baker Hughes. Texas had 276 oil-directed rigs (up by 4 rigs w/w) and 32 natural gas-directed rigs (down by 2 rigs w/w).

# Global oil market balance at-a-glance: EIA estimates for November 2023 show a tight oil market and project Brent at \$93 per barrel in 2024

- **October demand projections for 2023 and 2024 slipped but remain at record levels.** Global oil demand is expected by EIA to reach a record 101.0 mb/d in 2023 and 102.4 mb/d in 2024.
- **EIA raised its 2024 oil production growth** projections by 0.2 mb/d in November. These are volumes needed to balance global markets in their view. The U.S. is assumed to be largest single contributor this year
- **For oil inventories, EIA shows U.S. stock withdrawals through year-end 2023,** corresponding with Brent crude oil prices of \$87 per barrel in Q4 and averaging \$93 per barrel in 2024

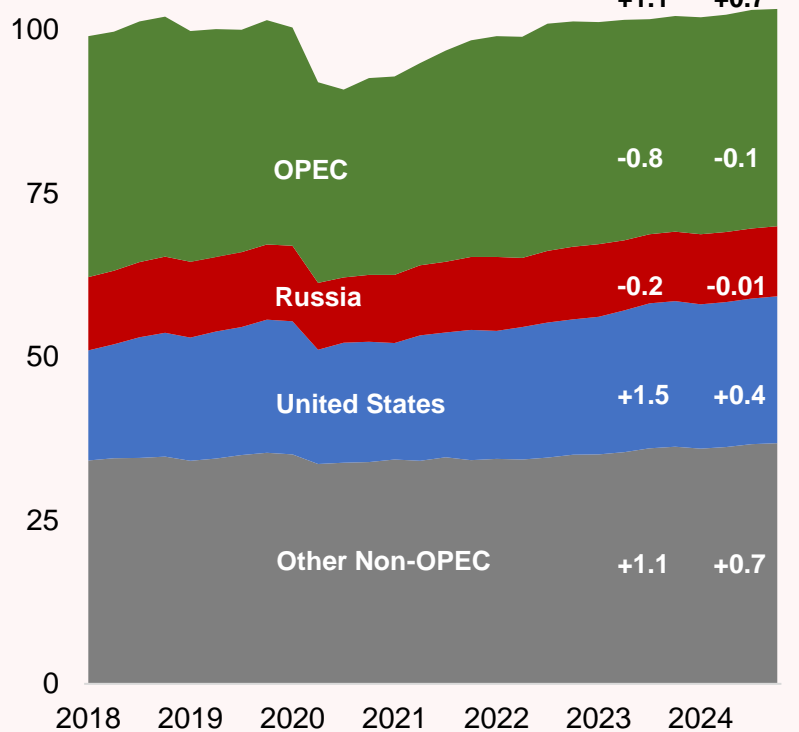
## Global oil demand and GDP

Million barrels per day (mb/d)



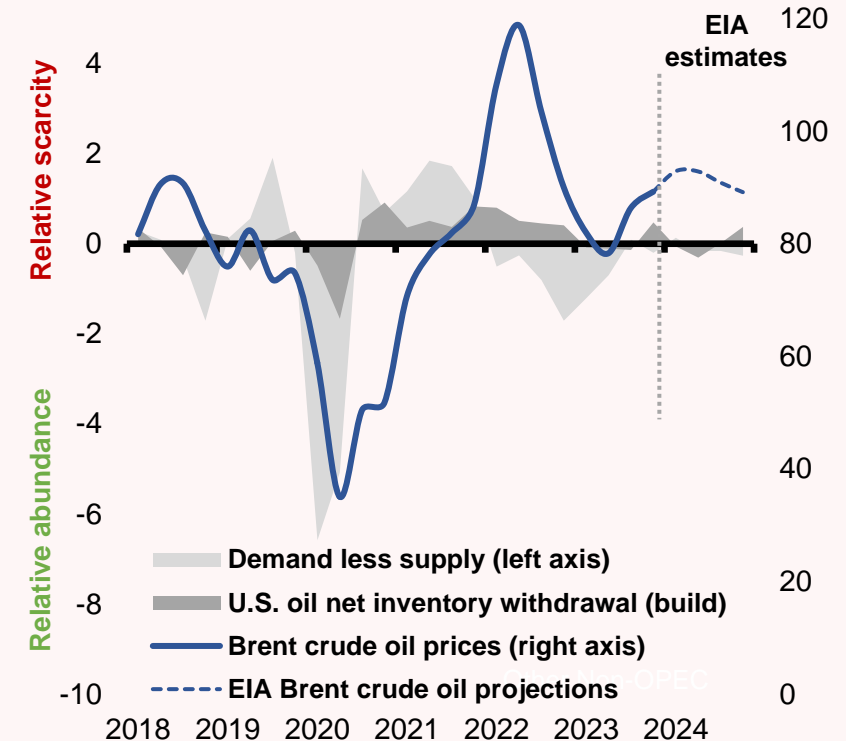
## Oil production by country/region

Million barrels per day, mb/d



## Global demand/supply & Brent prices

Million barrels per day (mb/d)

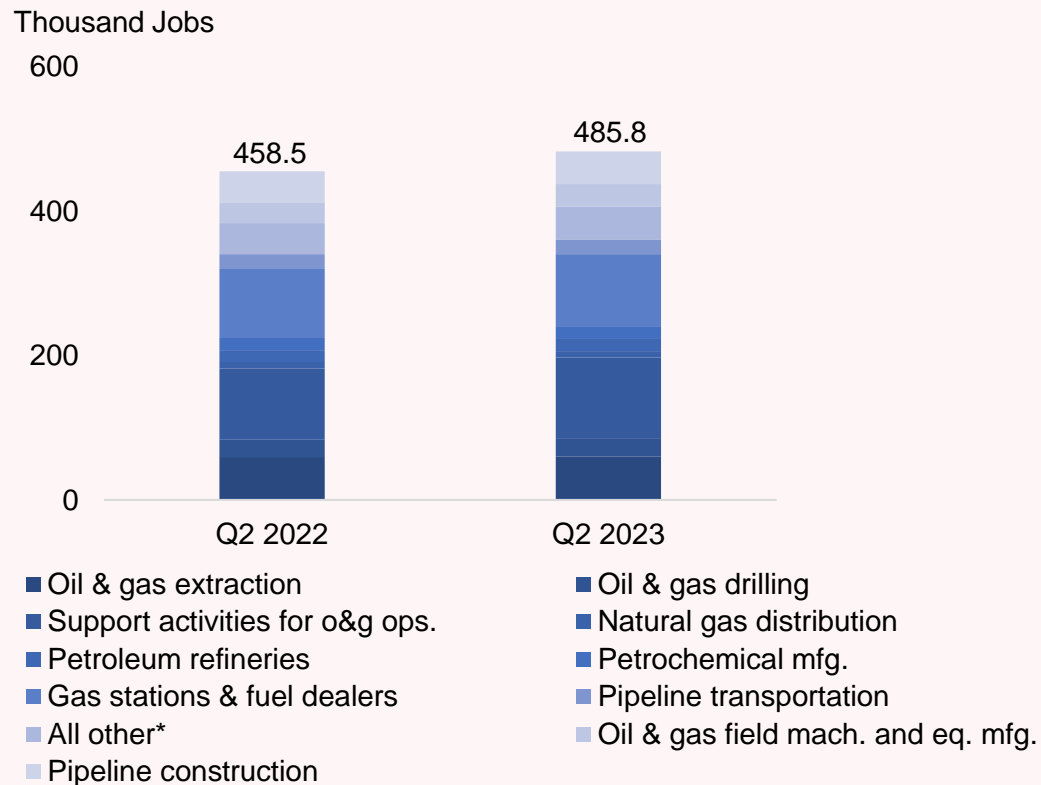




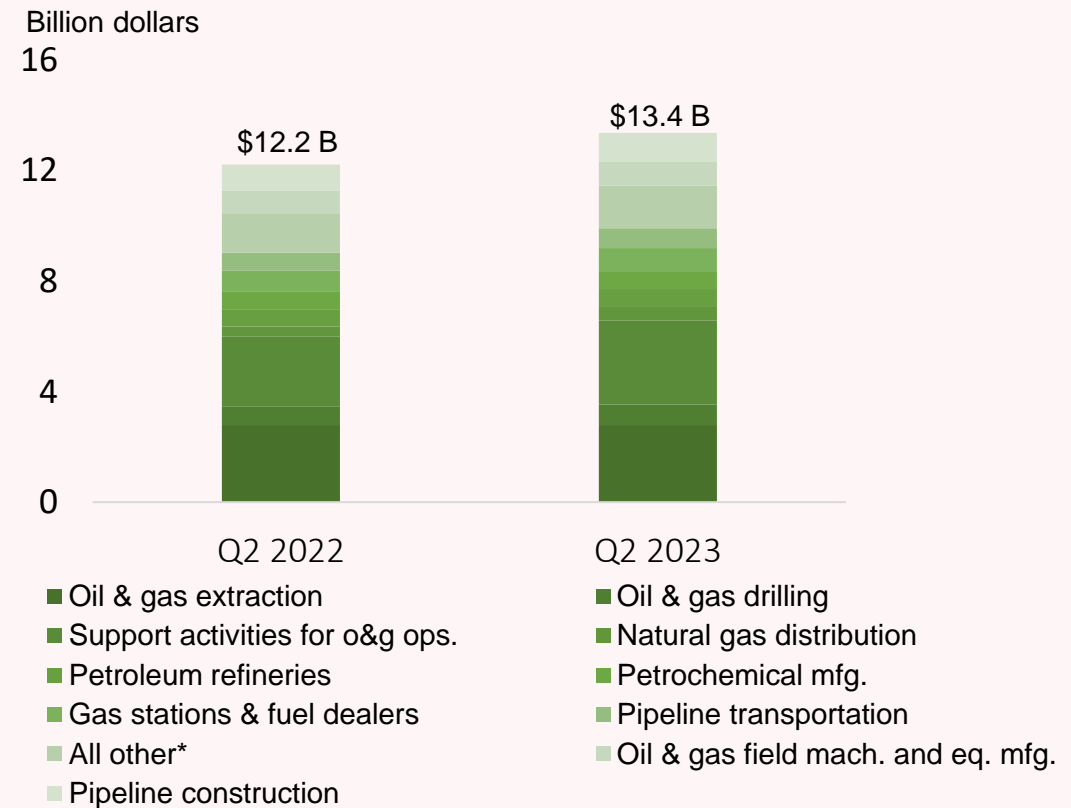
# Texas' oil and natural gas industry's jobs and wages rose solidly

- › 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



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



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

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