



KAPSARC Oil Market Outlook (KOMO)

Q2, 2023

Summary

This quarter's demand highlights show competition between seasonality and economics in each country, with one factor limiting growth while the other enhances quarter-on-quarter (QoQ) demand to new levels. The overall forecast remains bearish, with recent energy and economic developments resulting in some declines being muted, while growth in other areas is expected to be significant. For instance, Japan is projected to witness a QoQ decline of 600-700 thousand barrels per day (Kb/d) due to seasonality as well as the fragility of its economic and financial sectors. On the other hand, China's QoQ growth is expected to reach 470 Kb/d as it seems to be leaving COVID-19 behind. The United States (U.S.) is expected to witness a QoQ decline of 20 Kb/d despite starting its driving season.

This quarter's risks are accumulating, with ongoing interest rate hikes affecting liquidity, some banks struggling to balance long and short-term investments, and the possibility of further military escalations between Russia and Ukraine as the cold weather subsides. These risks, coupled with ongoing risks in an already fragile economy, make for a challenging quarter.

Nevertheless, the QoQ growth for oil demand is expected to reach 440 Kb/d, with OECD countries witnessing a decline of 1.1 million barrels per day (MMb/d) and non-OECD growing by 1.55 MMb/d. The decline will be led by falls in OECD Asia of roughly 900 Kb/d, followed by Europe at 130 Kb/d, and OECD Americas with a decline of 40 Kb/d. These declines will be counteracted by strong QoQ growth from non-OECD countries, with the exception of Africa. Saudi Arabia, China, and India are leading the way with respective growths of 770 Kb/d, 470 Kb/d, and 160 Kb/d.

On the supply side, changes are expected due to sanctions on Russian fuels, with their crudes remaining resilient. OPEC+ has declared an additional 1.66 MMb/d cut, with both Russia and Saudi Arabia cutting 500 Kb/d each, followed by Iraq, the United Arab Emirates (UAE), Kuwait, Kazakhstan, Algeria, Oman and Gabon. However, since some members were already below their quotas, there is room for some growth. Improving fortunes for exempt members could also provide an increase in production. Brazil's biofuels are expected to play a significant role this quarter, creating a strong seasonal uplift to total liquids supply (QoQ 600 Kb/d) surpassing the U.S. growth of 410 Kb/d. As a result, a QoQ supply growth of 980 Kb/d is expected, with OPEC+ representing only 12%.

Supply/demand balances are expected to remain in a deficit this quarter of around 330 Kb/d (down from a deficit of 870 Kb/d last quarter). In Q1, prices kept falling amid a deficit, showing that sentiment was the driving factor. Now that OPEC+ has tightened the market, fundamentals may play a more significant role.

Summary continued...

The KOMO team forecasts that global oil consumption will increase year-on-year (YoY) by 1.84 MMb/d in 2023 to reach 101.90 MMb/d. This represents a slight upward revision of roughly 50 Kb/d compared to the previous quarter's estimate. In 2024, demand growth is expected to continue at a slightly higher rate of 1.91 MMb/d.

Despite negative pressures on the global economy, the KOMO team has increased its 2023 demand forecast by 50 Kb/d. While the U.S. and Europe's growth projections were revised downward, China's growth estimates were raised due to the expectation that current turbulence would subside by the second half of this year. The net demand effect is an additional 50 Kb/d. However, there is significant downside risk to the forecast if the financial sector worsens or geopolitical tensions increase, which may necessitate further revisions.

Compared to other major market forecasts, the KOMO demand forecast has only undergone minor revisions for several reasons. First, the prior KOMO forecast was already bearish, anticipating an economic slowdown. Second, the KOMO demand forecast considers several economies to be in recession, irrespective of the technical definition, and the added downward pressure of financial turmoil in the U.S. and Europe was largely accounted for via an existing recession multiplier. Lastly, assumptions for countries like the U.S., Japan, India, China, and Saudi Arabia continue to hold, with strong growth shown in aviation and road activity in Saudi Arabia and China, as anticipated. However, for China, the KOMO team is skeptical of a YoY 1 MMb/d growth as predicted by others.

The OECD is expected to see limited YoY oil demand growth of 300 Kb/d, while non-OECD countries are expected to represent 84% of the demand growth in 2023 (1.54 Kb/d). This figure falls to 73% in 2024 as OECD countries recover from the expected economic deceleration in 2023. The KOMO model indicates that OECD countries should witness an overall decline in demand growth over the first two quarters of 2023, with non-OECD countries carrying the growth. However, in the second half of 2023, it is expected that OECD countries will start recovering some of the lost demand, while non-OECD countries maintain modest growth in Q3 before declining in Q4. The current economic situation is mainly expected to impact OECD countries, with fewer implications for non-OECD nations.

Non-OECD countries generally witness demand growth in each quarter of the year, except for the first quarter, where oil demand growth declines or stagnates. However, non-OECD Q1 demand was different this year. China eased its lockdowns, and its transport indicators are showing healthy activity, surpassing the past few years, yet still below 2019 levels for aviation. If China continues on its current trajectory, transport activity could return to 2019 levels by the end of this year. This quarter (Q2 2023), China will also contribute to a significant portion of demand growth. However, given the warm winter, we are expecting an early and warm start to summer in the Middle East, and with Q2 coinciding with the Hajj period, we are expecting Saudi Arabia to carry most of the non-OECD oil demand growth this quarter, as they continue to use oil and its heavier fuels for electricity generation and cooling. The next edition is expected to be uncertain, with many opportunities for revision.

KOMO's latest survey results reveal a growing consensus for an economic slowdown and continued inflation in 2023. A full 87% of respondents believe that a global recession is likely in 2023, while 87% also believe that social unrest is probable as inflation persists. Only 53% of respondents believe that tourism levels will return to pre-pandemic levels. Although these numbers may seem negative, they can also be interpreted as an indicator that the demand growth risk for 2023

Summary continued...

and 2024 is primarily to the upside. While several factors could cap growth, such as inflation, interest rate hikes, a rising U.S. dollar, a chain reaction of defaulting banks, the re-emergence of restrictions in China due to COVID-19, further escalations between Russia and Ukraine this spring/summer, further protectionist policies, and other geopolitical crises, the possibilities of these events are already accounted for in current forecasts.

If any of those events turn out to be less severe or shorter lived than anticipated, or do not occur at all, our current demand projections would be revised upwards.

The KOMO team simulated a recession scenario using the indicators of the 2008 financial crisis, and the results indicated that a similar financial recession could reduce demand growth by half in 2023, from 1.85 MMb/d to 940 Kb/d, and constrain demand growth in 2024 to approximately 600 Kb/d - 700 Kb/d. (In 2008, demand declined by roughly 700 Kb/d, followed by a 1 MMb/d drop in 2009).

Nevertheless, economic growth expectations remain the greatest driver of KOMO's oil demand projections. The International Monetary Fund (IMF) predicts global economic growth of around 2.8% in 2023 and 3% in 2024. The OECD has increased its global growth forecast to 2.6% in 2023 and expects 2024 to witness growth of 2.9%.

Global oil supply is projected to grow by approximately 1.97 million barrels per day (MMb/d) in 2023, which is 710 Kb/d lower than our Q1 2023 forecast. Meanwhile, it is estimated to increase by 2.45 MMb/d in 2024, which is 150 Kb/d higher than our Q1 2023 forecast. OPEC+ has decided to implement its new 1.66 MMb/d cuts in May 2023 and maintain them throughout this forecast. We are expected to enter a period of oil supply/demand balance, with a surplus expected in 2024. Prior to the announcement by the Joint Ministerial Monitoring Committee (JMMC) on April 2, the surplus was projected to begin in the second half of 2023. However, given the recent financial and economic turbulence, it is safe to assume that OPEC+ expects potential trouble ahead and is taking preemptive measures. Nevertheless, this does not mean that the group will not increase production, but, rather, those members who were underproducing will gradually expand their production to reach their quotas. Furthermore, countries such as Libya, Venezuela, and Iran, which are currently exempt, will also contribute to the group's growth in 2023 and 2024. The announced OPEC+ cuts have removed some uncertainty from our model, particularly regarding Russian production and their independently proposed 500 Kb/d cut. So far, sanctions on Russian liquids have had a limited impact, with a YoY decline to an average of 200 Kb/d - 300 Kb/d for 2023. Although prices for sanctioned Russian oil remain opaque, midstream shipping costs for this oil could reach \$20 per barrel (b). As a result, some refiners/customers have not been benefiting as much, with total demand remaining steady instead of increasing.

Summary continued...

The heavy hitters this year in supply growth are non-OPEC+ countries, with the U.S. leading the way with an overall YoY growth of 760 Kb/d, of which shale represents 480 Kb/d. Norway is the runner-up, with an expected growth of 330 Kb/d, followed by both Canada and Brazil at around 225 Kb/d each. It is worth noting that shale is not expected to go much higher. Despite the recent declaration by OPEC+ of additional cuts starting in May, which would likely maintain prices at their current levels, the fall in prices since early March and the commitment of shale producers to guarantee returns to their investors makes it less likely that producers will take risks, especially given the current liquidity situation of U.S. banks. The same attitude can also apply to international oil companies (IOCs) given the fragile global economy. We expect most IOCs to continue producing based on the plans they initiated at the beginning of the year. However, future production decisions will be deferred, with a more cautious approach. The economic situation can reduce prospects for economic activity and oil demand but can also hurt oil supply. Inflation impacts production costs, and lower oil prices would reduce suppliers' returns. It remains to be seen whether environmental, social, and corporate governance (ESG) or energy security concerns will drive the actions of investors and governments as they navigate the evolving economic situation. Nevertheless, this uncertainty makes it safe to assume that strong production growth is not very likely this year.

Although spare production capacity is healthy this year, averaging approximately 3.3 MMb/d for OPEC members and 2 MMb/d for its partners (depending on whether sanctioned Russian crudes are considered part of the capacity pool or not). Despite the November cuts of 2 MMb/d to maintain this buffer, we have continued to see prices fall and the Crude Oil ETF Volatility Index (OVX) rise by more than 50% in mid-March. However, things have since calmed down, and the additional cuts declared on April 3 by OPEC+ have not significantly affected the OVX. This leads us to believe that sentiment, rather than fundamentals, is likely to drive prices in the coming period.

The supply/demand balance is expected to reach equilibrium in 2023, with a minor deficit of roughly 280 Kb/d overall. However, we expect a deficit of 300 Kb/d in Q2 due to the current risks in the financial sectors impacting economic activity, while the following quarters are expected to be in equilibrium. In 2024, there is expected to be a surplus of 260 Kb/d, but this is not enough to replenish inventories or the strategic petroleum reserves (SPRs). It is probable that other countries will follow the U.S. lead in prioritizing inflation and the financial sector over replenishing their oil inventories, as indicated by recent statements from Janet Yellen in the American Bankers Association. This situation has been complicated by the potential for a domino effect of defaulting banks outweighing the risk of low SPRs, causing prices to drop in March.

According to U.S. Energy Secretary Jennifer Granholm, the SPR crude oil replacement program will be delayed in 2023 due to plans for a drawdown to fight inflation and maintenance at two main storage facilities. Words of reassurance are needed for both the financial sectors and the oil industry, as there is a slight over-dramatization concerning high demand, the effect of sanctions on Russia varies depending on the spokesperson, and a fragile economy requires encouraging words/actions.

Summary continued...

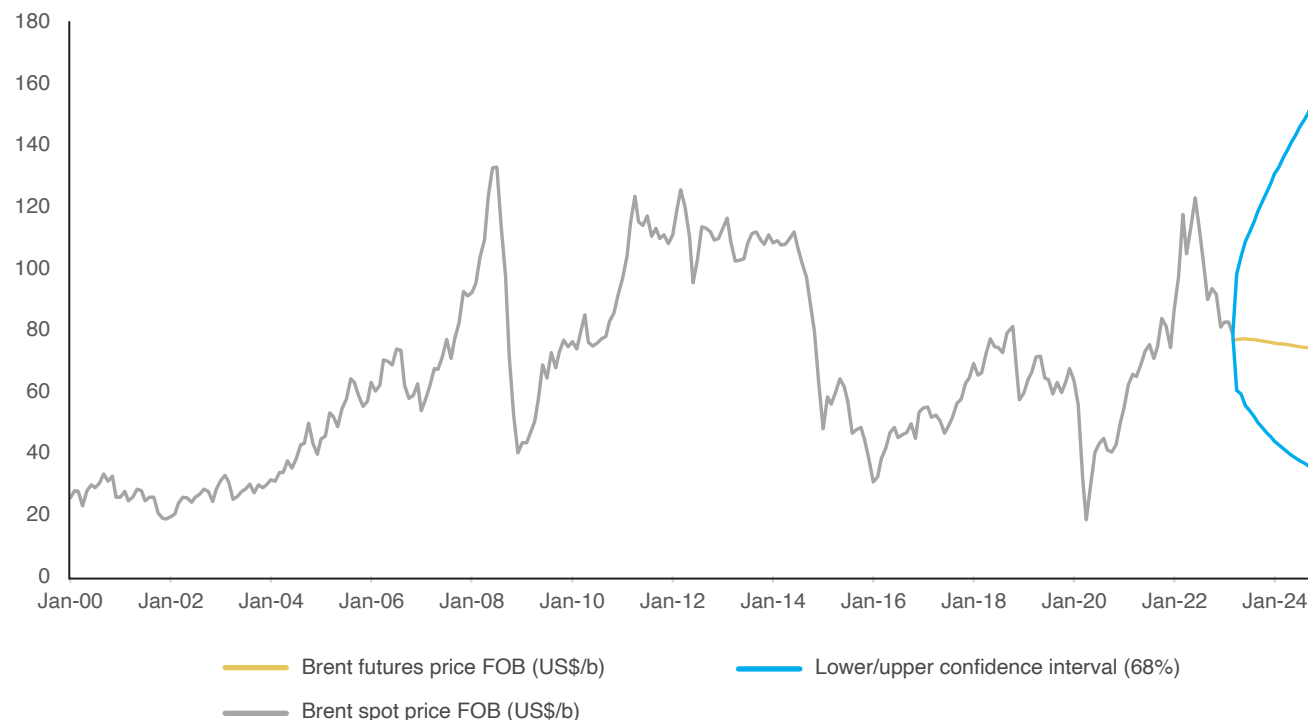
Under these assumptions, OECD target inventory levels would increase by 145 MMb to 4,149 MMb in 2023 and by an additional 187 MMb in 2024, proportionate to demand to offset rising economic and geopolitical risks. However, limited output from Russian liquids means that achieving these target levels is unlikely, and we expect the refilling of inventories to be gradual. Although global inventory levels grew by 7.8 MMb in February 2023, this may have more to do with supply chain dislocations related to Russian sanctions than strategic planning. Therefore, we expect inventories to remain below the rising target levels over the next two years, indicating that they may be insufficient to address future shocks and adding another layer of price risk to oil markets beyond the fundamentals throughout this period.

	2019	2020	Growth	2021	Growth	2022	Growth	2023	Growth	2024	Growth
Demand	101.1	92.2	(8.8)	98.1	5.9	100.1	1.9	101.9	1.8	103.8	1.9
Supply	100.2	93.9	(6.4)	95.6	1.7	99.7	4.1	101.6	2.0	104.1	2.4
Δ	(0.8)	1.6		(2.6)		(0.4)		(0.3)		0.3	

Summary (Prices)

The confidence interval is derived from options market prices and the futures curve, which represent the views of a wide array of market participants, such as producers, refiners, airlines, speculators, and others.

Brent crude oil price and 68% confidence intervals US\$/b



Source: KAPSARC calculations based on NYMEX data, CME Group, FINCAD, April 2023.

US\$/b	Q2 2023	Q3 2023	Q4 2023	Q1 2024	Q2 2024	Q3 2024	Q4 2024	Q1 2025
Futures	\$77.57	\$77.19	\$76.24	\$75.28	\$74.48	\$73.73	\$73.09	\$73.00
50% CI	\$63.90 - \$94.23	\$58.92 - \$101.14	\$54.72 - \$106.25	\$51.19 - \$110.73	\$48.39 - \$114.65	\$45.94 - \$118.33	\$43.66 - \$122.36	\$42.17 - \$125.26
68% CI	\$58.30 - \$103.36	\$51.85 - \$114.99	\$46.75 - \$124.38	\$42.64 - \$132.98	\$39.44 - \$140.69	\$36.71 - \$148.11	\$34.20 - \$156.25	\$32.54 - \$162.20
95% CI	\$44.24 - \$136.77	\$35.25 - \$169.44	\$29.10 - \$200.18	\$24.56 - \$231.10	\$21.28 - \$260.96	\$18.66 - \$291.61	\$16.37 - \$326.86	\$14.92 - \$353.76

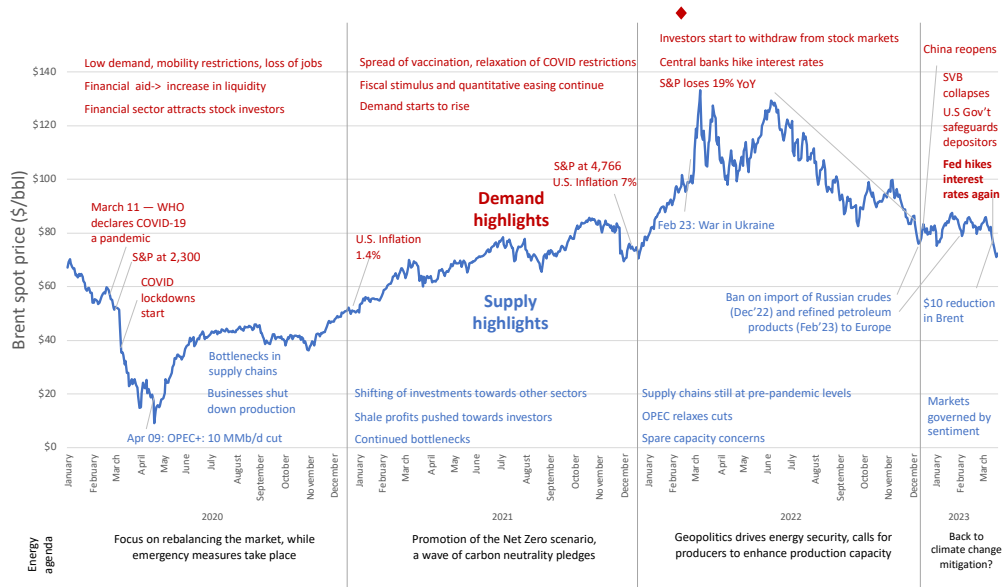
Note: CI = confidence interval.

Key Issues for the Oil Market in 2023 and 2024

The KOMO team is monitoring several factors that may impact oil demand and supply over the next two years, many of which stem from the discrepancy between short-term and long-term priorities.

It is impossible for any report to fully summarize or provide a complete account of the developments that have occurred over the past decade. Volumes of books are yet to be written to describe the current financial and economic situation. Nevertheless, the following list of key points will help to contextualize our current oil market forecast:

Figure 1. Demand and supply highlights over the past three years.



Source: KAPSARC.

A brief history: liquidity, inflation, and COVID-19...

- Due to the lockdowns in 2020, many businesses in various sectors of the economy shut down or postponed production due to low demand, mobility restrictions, government regulations, and labor shortages.
- This slowdown caused supply chain bottlenecks that limited production.
- Governments provided financial aid to businesses and individuals to avoid further unemployment growth and business failures.
- The gains in liquidity and lack of mobility in supply chains led the financial sector, among other sources, to generate revenue from investments, which were not going toward durable production but rather inflated stocks. The S&P index rose from 2,300 to 4,766 between March 2020 and December 2021 (a 77% increment), while the index stood at 3,200 before the pandemic. According to the U.S. Federal Reserve, the average U.S. personal savings rate rose from 8%-9% to 33.8% in April 2020, declining only to 26.3% by March 2021.
- As the world emerged from lockdowns at the beginning of 2021 and vaccinations became more widespread, demand for several commodities started to rise. However, economic activity and supply chains did not catch up to their pre-pandemic levels.
- Large fiscal stimulus packages in the U.S., Europe, etc., increased liquidity, exacerbating the rise in commodity prices as they responded to demand. This caused inflation to rise steadily from 1.4% in January 2021 to 7% by December. Some commodities, even those without supply constraints, became inflated due to increasing economic sentiment, with Goldman Sachs analysts calling for a new commodity supercycle.

Key Issues for the Oil Market in 2023 and 2024...

- Central banks waited for a self-correction in 2021 to address inflation, but that did not happen due to several factors, including the growing wage-price spiral, the consistent 'under-predicting' of inflation, and continued fiscal stimulus. Hence, central banks were eventually forced to hike interest rates.
- In 2022 and 2023, two new factors pushed up inflation: the Russian-Ukrainian war and China terminating its zero-COVID policy. Both limited global supplies of goods, with China increasing its demand, especially for energy.

Except for a few historical occasions, lowering interest rates and creating an environment of easy money has largely been the standard response to addressing recessions and supporting gross domestic product (GDP) growth. However, the interest rate hikes in 2022 signaled a new era of hard money and lower growth.

The financial sector: Too big not to fail!

- One of the safest options for a bank should be investing in long-term bonds, which tend to be safe but bear low returns. Banks also provide loans to individuals and companies of both short- and long-term natures. The risks and returns of these investments depend on the nature of the borrowers and the duration of the loans.
- In 2021, securities in stock markets bore significant gains, but as 2022 started and central banks started raising interest rates to address inflation, investor confidence declined, leading to significant withdrawal from stock markets and falling prices. In fact, 2022 was the most challenging year for stocks since 2008, with the S&P 500 losing 19% in the year.

Previous publications of KOMO have noted that foreign investments tend to shift from developing countries to developed countries as interest rates rise, which can impact both sets of countries' growth trajectories. While this dynamic has not received much

media coverage, we expect the equity impacts to attract increasing exposure in the coming months and years.

Here are some key points to consider:

Bonds are classified as 'hold-to-maturity' assets and are not marked-to-market. There is currently a penalty for selling them prematurely.

As interest rates continue to rise, bond prices decline.

- The duration mismatch between long-term assets such as bonds and uninsured deposits that are prone to runs have created unrecognized losses, adding another layer of low confidence for uninsured depositors and banks. This has compelled them to either withdraw money, hedge interest rate risk, or replace long-term assets such as bonds and loans with duration-matched short-term assets. For banks such as Silicon Valley Bank (SVB) and Credit Suisse, with a relatively high share of uninsured deposits, the market value of assets fell below deposits, triggering a bank run.
- Bank runs occur when significant amounts of withdrawals take place at once and can lead to banks risking default.
- Some banks tend to own equity in other banks and/or follow similar investment patterns, which is why a bank defaulting may not be an isolated event, but can trigger a chain reaction if not addressed appropriately.
- Following the 2008 financial crisis, 'too big to fail' Basel accords and stress tests have been enhanced for larger banks. However, smaller banks were not put under the same level of scrutiny. Nevertheless, a group of smaller banks defaulting en masse can have a similar impact on larger banks.

Key Issues for the Oil Market in 2023 and 2024...

- After the Silicon Valley Bank failure, the U.S. government took action to safeguard depositors, and the treasury enhanced market confidence by stating they would support depositors at smaller banks if needed.
- A similar situation occurred in China last year following the failure of its residential construction sector. The government's financial intervention in 2022 prevented any Chinese bank from defaulting. Hence, government intervention can be successful in controlling panic. However, one should ask how many more bailouts governments, financial systems, or the voting public can endure in the case of the U.S. or Europe.
- Recent events involving SVB, Credit Suisse, and Deutsche Bank have been criticized as regulatory failures and could trigger further banking regulation reforms. Regardless of the outcome, a free market means that there will always be winners and losers. However, the financial sector will continue to play a more important role in economies as countries evolve to tertiary sectors that rely on banking and other financial services. As shown by the historic \$10/b reduction in world oil prices in March 2023, when the strongest economies were vulnerable to financial or energy shocks, contagion can spread to everyone else at a moment's notice, exposing uninsured actors and vulnerable sectors.

In the short term, some businesses and sectors might be able to rely on bailouts, but one still needs to plan for the long term because the effects of these short-term issues can be felt across sectors.

Central banks: An era of hard money or easy money?

- The financial sector turbulence is occurring at a time when the U.S. Federal Reserve Bank (Fed) is implementing a hard money policy by raising interest rates. This presents a delicate balancing act for the Fed, as they must decide

between increasing interest rates to curb inflation or lowering them to shield against economic fallout from the emerging banking crisis.

- Should central banks persist in raising interest rates, the likelihood of more banks with duration risk, uninsured deposits, and debt defaulting increases.
- Although CPI indices demonstrate growth, they are also decelerating, which may result in a corresponding deceleration in interest rate hikes.
- The Fed's decision on March 22 to continue raising interest rates despite the recent challenges in the banking sector indicates that inflation remains their primary concern. However, the 25-basis point hike, which was lower than the anticipated 50 points, also suggests that they intend to provide a softer landing for banks. Fed Chair Jerome Powell acknowledged this tension when he indicated that inflation levels above 2% may persist for a few more years.

There is tension between reducing inflation over the long term and addressing the immediate banking crisis.

Oil markets: Oil prices fall with every recession.

- Since 2010, shale producers have been increasing production; one of the factors that inspired the OPEC+ alliance. However, in this journey, prices remained volatile and investor returns were modest until the losses witnessed in 2020 became the last straw that broke the camel's back.
- After the 2020 oil demand crisis, shale producers had to focus on investor returns and prioritize dividends over increasing production, which entailed limiting production capacity.

Key Issues for the Oil Market in 2023 and 2024...

- Several OPEC+ members were already struggling with low investments after 2015 before acting in 2020 by agreeing to the famous 10 MMb/d COVID cut. Since then, many members have not yet regained their production capacity to 2019 levels, with a few notable exceptions such as Saudi Arabia, the United Arab Emirates (UAE) and Iraq.
- The lack of spare capacity, combined with the war between Russia and Ukraine in 2022, caused oil prices to rise and put energy security back on the priority list for policymakers. The effects of the shortfall in spare capacity have been exacerbated by prospects of a solid post-COVID recovery in China.
- However, as we entered 2023, turbulent times in the financial sector and the troubles faced by SVB, Credit Suisse, and other banks signaled a recession, causing prices to fall by \$10/b, despite the solid fundamentals of supply and demand remaining.
- The effects of recent sanctions show that Russian crude exports have remained healthy as new midstream mechanisms (i.e., traders, insurers, tankers, etc.) have evolved.

The geopolitics and ESG messaging: Have we learned nothing?

- In 2021, various institutions, politicians, and policymakers advocated for a net-zero scenario and called for a cessation of investments in fossil fuels.
- In 2022, these same actors urged energy producers to enhance their production capacity due to the risk of losing Russian oil and gas.
- In 2023, there are signs that the message has shifted back to prioritizing climate change mitigation over energy security, suggesting a return to the 2021 stance of

avoiding fossil fuels. It remains to be seen whether the world will follow through on this message, but several IOCs have pledged to shift away from oil or pursue cleaner sources, while national oil companies (NOCs) continue to invest in securing oil supply chains.

- A positive development over the past few years is that alternative energy sources like hydrogen, technologies such as carbon capture utilization and storage (CCUS), and concepts like the circular carbon economy (CCE) are now being taken more seriously.
- However, recent decisions by G7 countries indicate that oil investments remain risky and unattractive, suggesting that in the long run, beyond the scope of this outlook, we may be headed toward an energy deficit.

ESG is a great long-term goal, but bad planning leads to efforts that achieve the goal negatively impacting energy security in the short term.

How will this year differ from 2008?

- The possibility of a recession has been discussed since 2022, and we have seen some investors selling stocks. While this has led to some banks facing liquidity issues due to the fractional reserve banking system, many investors have prepared themselves for a potential market downturn and are waiting to invest again and ride the wave. This is why we see so much volatility in the markets, but liquidity is still available. Cash is being touted as the winning strategy for 2023, as the market share of passive funds and exchange traded funds (ETFs) continues to rise.

Key Issues for the Oil Market in 2023 and 2024...

- Although some banks in China faced liquidity challenges last year, and several banks in OECD countries are facing similar challenges today, the actions taken by central banks and governments to safeguard depositors demonstrate confidence and help to curtail simultaneous withdrawal risks.
- Continued inflation requires maintaining elevated interest rates. However, according to U.S. Federal Reserve Chairman Jerome Powell, the end of interest rate hikes is in sight, with the median forecast among Federal Open Market Committee (FOMC) members calling for only one more rate hike increase this year. While the U.S. Federal Reserve will do what it takes to contain inflation, recent consumer price index (CPI) forecasts suggest that interest rate hikes will either decelerate or decline. It remains to be seen whether interest rate declines will happen this year or the next, given the past few years' tricky economic situation.

While there are several economic challenges going forward, the real risks lie in the geopolitical domain, which could have significant effects. Historically, economies have always recovered and downturns have remained simple blips. However, the appearance of concepts such as protectionism, populism, post-globalization, vertical globalization, and shifting alliances have more than doubled in the media throughout the past year. According to our in-house analysis using the Meltwater Media Monitoring Platform, the use of some of these terms more than quadrupled in 2022.

Whether geopolitical changes that solidify new alliances or enhance regional supply chains become the status quo remains to be seen. Diversification and creating new markets are healthy practices. Trade has cut the number of people living under extreme poverty by half since 1990, according to The World Bank. The basis of trade back in the 1990s was finding win-win solutions to improve the living and working conditions of all citizens. However, regionalism, or securing supply chains from politically aligned countries, seems to come with a different perspective.

There is no doubt that there has been a blip in global supply chains due to COVID-19, and economies are facing hardship, with many factors exacerbating these challenges. However, in a post-globalized world, it takes two to tango, and short-term gains need to be outweighed by long-lasting sustainability.

The world appears to be at a crossroads, where short-term needs and long-term goals diverge. With shifting needs, priorities, and alliances in the mix, it may be difficult to collaborate in the longer term when there are so many immediate problems (and opportunities) to be addressed. Hence, geopolitics versus domestic needs will likely be the main drivers for the coming 24 months.

Demand Forecast

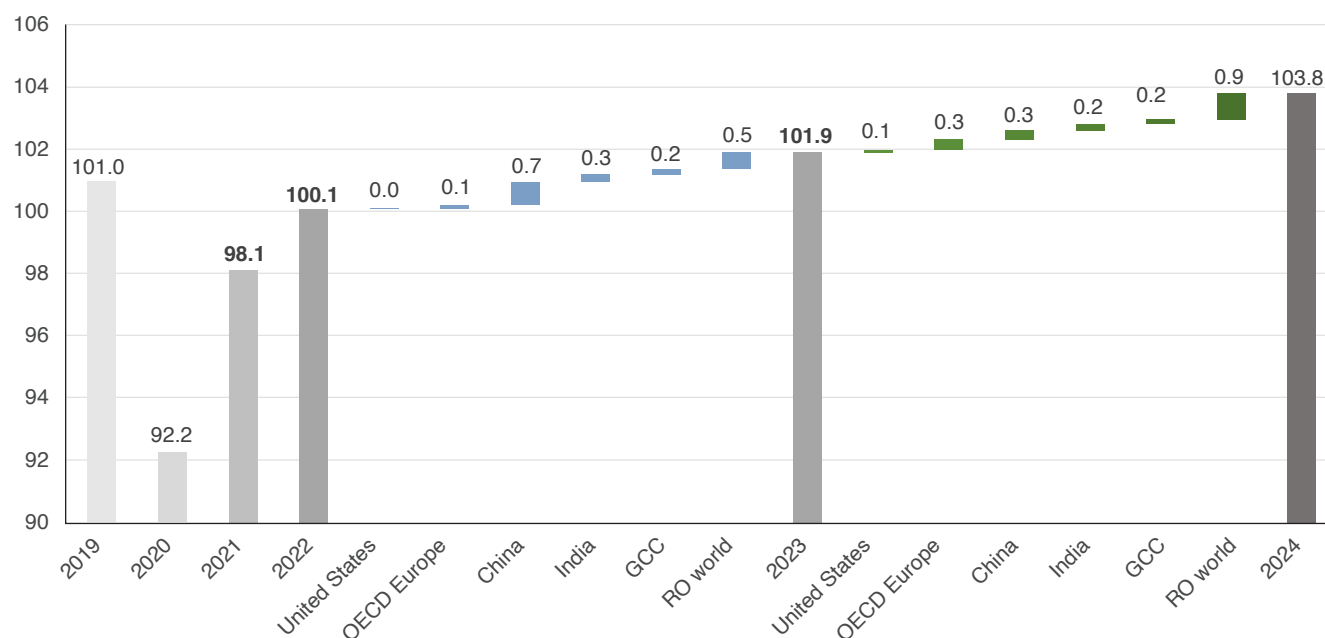
We project that global oil consumption will grow by 1.84 MMb/d in 2023 and increase by an additional 1.91 MMb/d in 2024 YoY. As the drivers of demand are similar to those in the previous report, and slower economic growth has already been factored in, we have only made minor adjustments to our previous forecast for 2023. Regionally, China's increased activity and relaxation of teapot quotas almost offset additional declines in Europe and the U.S., resulting in an overall addition of 40 Kb/d growth compared to our Q1 2023 forecast.

Moreover, as stated in our previous report, the seasonality of demand remains a significant factor for 2023. OECD countries are expected to witness oil demand declines in the first two quarters of this year due to anticipated economic slowdowns, before rebounding positively as GDP growth increases, the summer and vacation season hits, and Europe tries to rebuild its stocks ahead of the next winter season. Non-OECD countries, on the other hand, are expected to grow in the first three quarters and then decline at the end of the year as winter sets in. While non-OECD countries usually tend to grow gradually each quarter, we expect only muted demand growth in Q3 this year, given several factors impacting the dynamics of seasonality, and with the energy transition capping peak demand, particularly in the Middle East, as demand from Asian countries, including China and India, slows during the second half of the year.

We expect oil demand in OECD countries to grow by 300 Kb/d in 2023 and climb by an additional 520 Kb/d in 2024. The U.S. and OECD Asia are expected to represent half of the total OECD demand growth this year and a large part of the group's growth next year. Furthermore, non-OECD demand is expected to grow by 1.54 MMb/d in 2023 and by an additional 1.39 MMb/d in 2024. We do not expect the anticipated economic slowdown to severely impact most of the

non-OECD countries. China and India will continue to carry a significant portion of the growth over the next two years. While Eurasia's demand is expected to decline during this period, if Russia maintains its production capacity as it did in 2022 and finds a way to continue to increase exports and reduce the pile-up of floating storage of oil and products on the water, there is a chance that its anticipated YoY oil demand decline of roughly 100 Kb/d will turn into growth.

Annual global oil demand growth, MMb/d, 2019 - 2024



Source: KAPSARC, April 2023.

Demand Levels, MMb/d

2021	Q1	Q2	Q3	Q4	2021
OECD	43.5	44.9	46.4	46.4	45.3
Non-OECD	51.5	52.7	53.5	53.6	52.8
Global demand	95.0	97.6	99.9	99.9	98.1

2022	Q1	Q2	Q3	Q4	2022
OECD	46.1	45.1	46.6	47.2	46.3
Non-OECD	53.4	53.9	54.1	53.8	53.8
Global demand	99.5	99.0	100.7	101.0	100.1

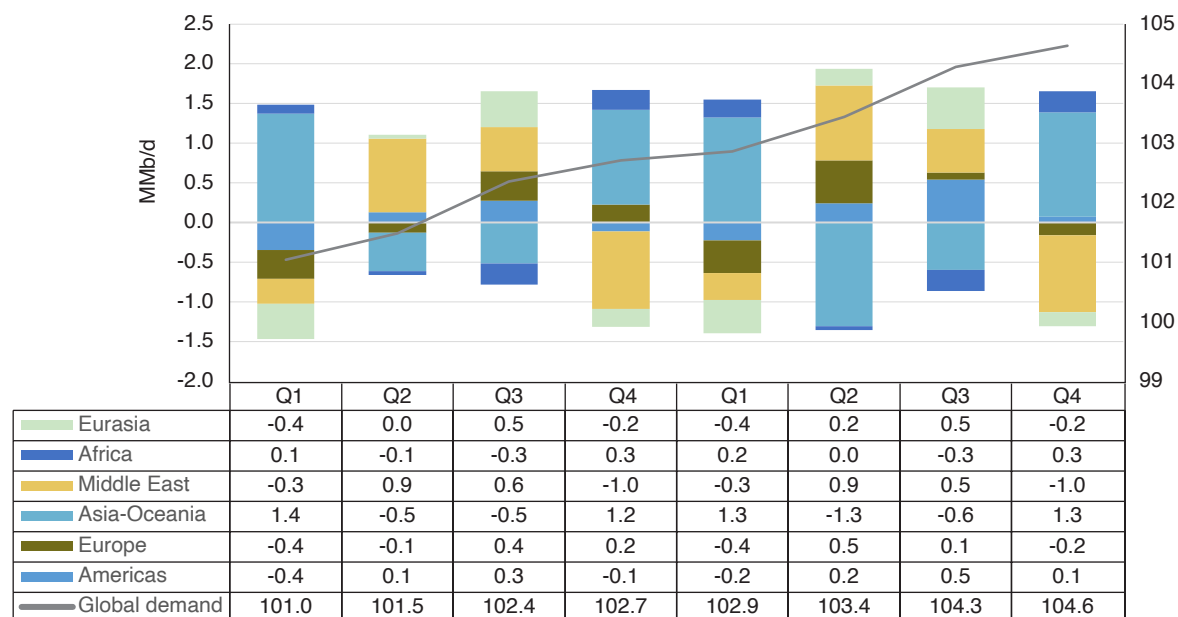
2023	Q1	Q2	Q3	Q4	2023
OECD	47.0	45.9	46.4	47.1	46.6
Non-OECD	54.1	55.6	55.9	55.7	55.3
Global demand	101.0	101.5	102.4	102.7	101.9

2024	Q1	Q2	Q3	Q4	2024
OECD	46.8	46.6	47.2	47.8	47.1
Non-OECD	56.0	56.9	57.1	56.9	56.7
Global demand	102.9	103.4	104.3	104.6	103.8

2025	Q1
OECD	47.5
Non-OECD	56.7
Global demand	104.2

Non-OECD countries are projected to maintain their share of global oil consumption at 54% in 2023, before increasing to 55% in 2024. They are also expected to contribute to 84% and 73% of global oil demand growth in 2023 and 2024, respectively. In Q2 2023, the Middle East is expected to experience the largest quarter-on-quarter (QoQ) growth of approximately 900 Kb/d, while OECD Asia is projected to drive declines in Asia-Oceania, with an average QoQ regional decline of 500 Kb/d.

Regional oil demand growth, MMb/d, Q1 2023 - Q4 2024



Source: KAPSARC, April 2023.

United States

MMb/d	2022	Q1	Q2	Q3	Q4	2023	Q1	Q2	Q3	Q4	2024	Q1
United States	20.5	20.5	20.5	20.6	20.4	20.5	20.3	20.4	20.7	20.8	20.6	20.7

2023-2024

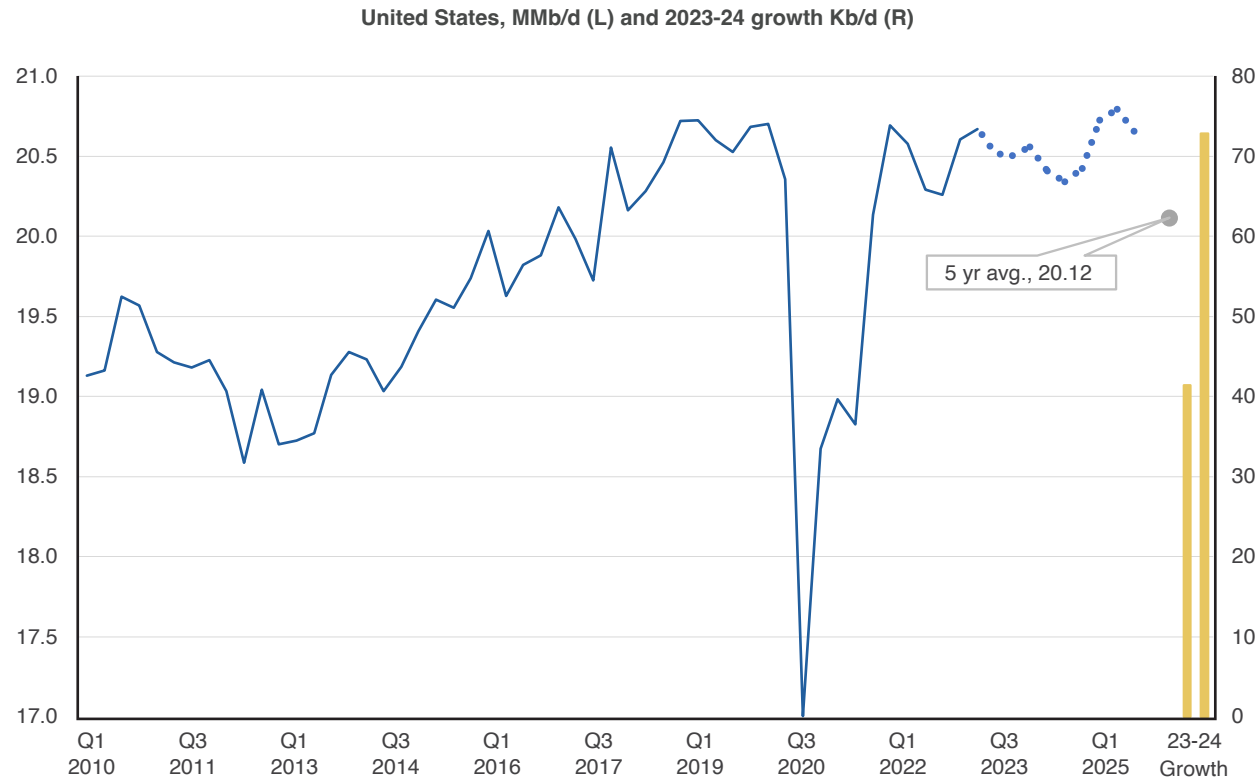
The KOMO model predicts that U.S. oil consumption will increase by approximately 40 Kb/d in 2023 and 70 Kb/d in 2024. This moderate growth is consistent with the anticipated economic slowdown in the U.S. The IMF estimates that U.S. GDP growth for 2022 was 2.1%, followed by 1.6% in 2023 and 1.1% in 2024.

As a result, we do not expect any significant changes in product demand. We anticipate very modest growth for motor gasoline and diesel, followed by liquified petroleum gas (LPG), while demand for all other products is expected to remain stagnant. The future growth of gasoline and jet fuel demand will become more evident after this quarter, as the summer driving season will reveal the extent of Americans' leisure travel demand recovery. It is also uncertain how long lasting the pandemic-era work-from-home initiatives will be, or whether efforts to bring employees back to the office will gain momentum and affect commuting patterns in the long run.

Q2 2023

Our projection indicates that U.S. demand will decrease this quarter by 20 Kb/d. Despite the expected growth of gasoline fuels by 610 Kb/d, LPG demand is likely to decrease by roughly 450 Kb/d, along with gas oil for heating by 140 Kb/d, which could be attributed to a warmer spring and the commencement of the summer driving season.

United States...



Source: KAPSARC, April 2023.

OECD Europe

MMb/d	2022	Q1	Q2	Q3	Q4	2023	Q1	Q2	Q3	Q4	2024	Q1
OECD Europe	13.7	13.7	13.6	13.9	14.2	13.8	13.7	14.3	14.4	14.2	14.1	13.9

2023-2024

Although OECD Europe is expected to have the lowest GDP growth among all regions, at around 0.8% in 2023 and 1.5% in 2024 (OECD Interim Economic Outlook forecasts, March 2023), its oil demand is expected to grow, with an additional 100 Kb/d in 2023 and 320 Kb/d in 2024.

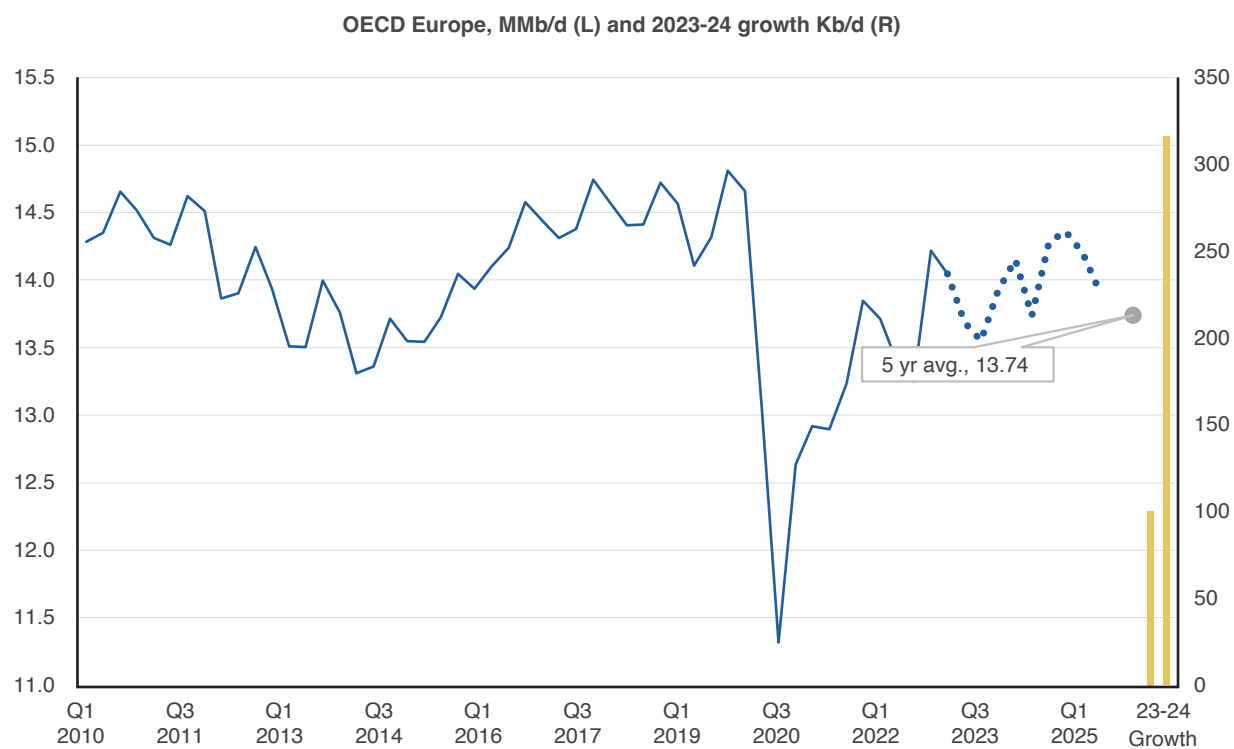
Diesel and fuel oil demand are the dominant growing fuels, with each representing roughly one third of total growth this year. This growth is related to strong maritime activity as the region secures fuel sources and other commodities throughout the year. However, we do not anticipate any significant changes in demand patterns over the next two quarters, although revisions may be necessary depending on how Europe secures its energy needs as the 2023-24 winter approaches.

During the period under analysis, it is unlikely that OECD Europe's oil demand will regain its pre-pandemic levels. The slow demand recovery in the region can be attributed, in part, to the Ukrainian conflict. Furthermore, Europe's aggressive approach to the energy transition, despite the ongoing conflict, is also likely to limit demand growth.

Q2 2023

OECD Europe is expected to witness an economic slowdown this quarter, while seasonality adds another layer of downward pressure to its oil demand. We anticipate an overall QoQ decline of 320 Kb/d. Although LPG demand is expected to increase by roughly 90 Kb/d, followed by fuel oil for maritime activity and fuel switching, demand for all other fuels is expected to decline, with both jet fuel and diesel demand falling by roughly 120 Kb/d-180 Kb/d each.

OECD Europe...



Source: KAPSARC, April 2023.

China

MMb/d	2022	Q1	Q2	Q3	Q4	2023	Q1	Q2	Q3	Q4	2024	Q1
China	14.8	15.1	15.5	15.7	15.9	15.5	15.9	15.8	15.7	15.9	15.8	15.9

2023-2024

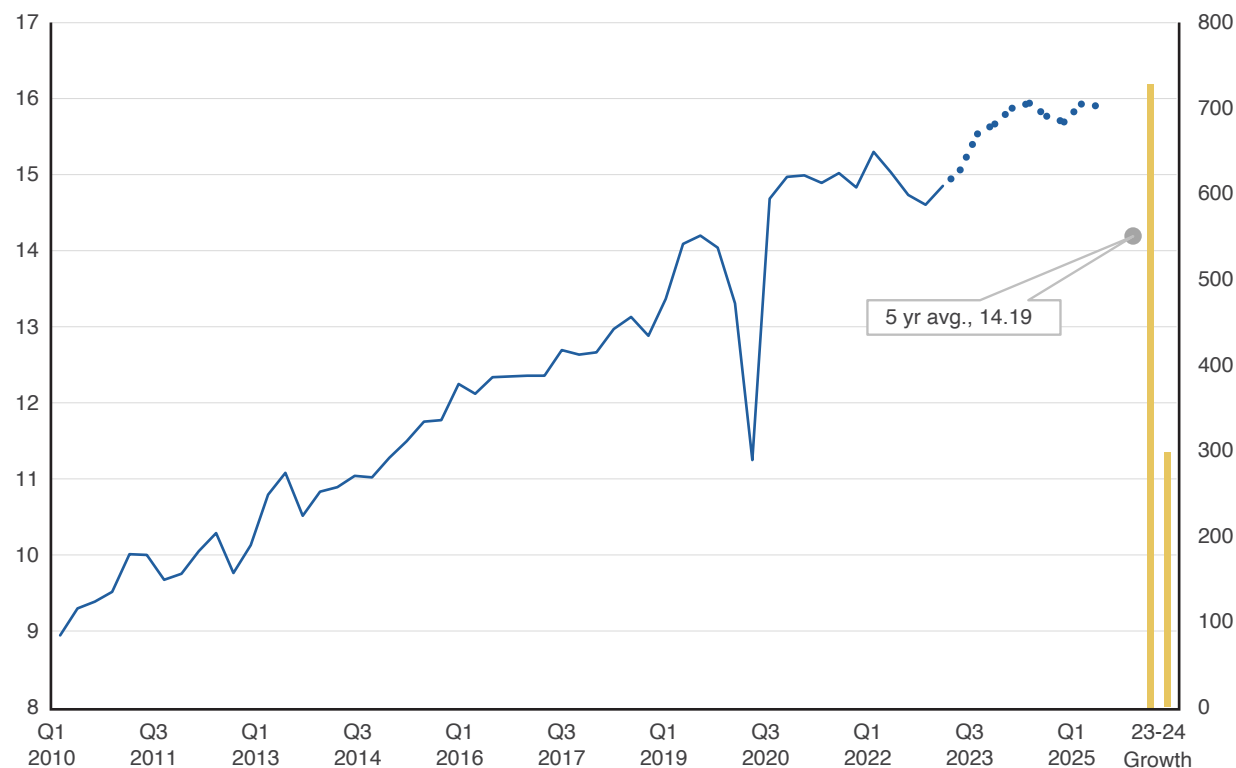
China's oil consumption is projected to increase by approximately 730 Kb/d in 2023 and 300 Kb/d in 2024. Among all regions, China's forecast has the highest level of uncertainty, according to the KOMO model. In the previous quarter, we estimated a growth ceiling of 550 Kb/d, but mobility and import indicators suggest potential for higher growth.

Diesel demand is expected to account for about 36% of China's oil demand growth. Additionally, assuming that China does not experience any further lockdowns, we anticipate an increase in aviation activity, leading to a year-on-year growth of 140 Kb/d in jet fuel.

Q2 2023

We anticipate China's oil consumption to increase by about 470 Kb/d this quarter. All fuel demand is expected to grow, except for naphtha, which we predict will remain stagnant. Heavier fuels are expected to account for over half of the demand growth, followed by LPG with an increase of approximately 100 Kb/d. However, we do not expect significant growth in vehicle fuels this quarter as mobility activity typically stagnates in Q2, with the exception of May on rare occasions.

China, MMb/d (L) and 2023-24 growth Kb/d (R)



Source: KAPSARC, April 2023.

India

MMb/d	2022	Q1	Q2	Q3	Q4	2023	Q1	Q2	Q3	Q4	2024	Q1
India	5.2	5.5	5.7	5.0	5.6	5.5	5.8	5.9	5.2	5.7	5.7	6.0

2023-2024

According to the KOMO model, India's oil consumption is projected to increase by approximately 260 Kb/d in 2023 and 210 Kb/d in 2024. Despite India's sustained economic growth and robust demand, we anticipate its oil demand growth to slow compared to last year. There are two primary reasons for this. First, a portion of the demand went into replenishing inventories, which are now at sufficient levels. Second, if India experiences an economic downturn, its need for additional energy will decrease.

Diesel demand is expected to account for 35%-38% of India's demand growth this year, followed by LPG and heavier fuels used for infrastructure development (approximately 40 Kb/d each).

The level of the price cap or sanctions imposed on Russia and its exports will have a significant impact on Europe's short-term product needs. In this context, both India and China may play essential roles in meeting the diesel demand in Europe. As a result, demand growth for these two countries may exceed our expectations.

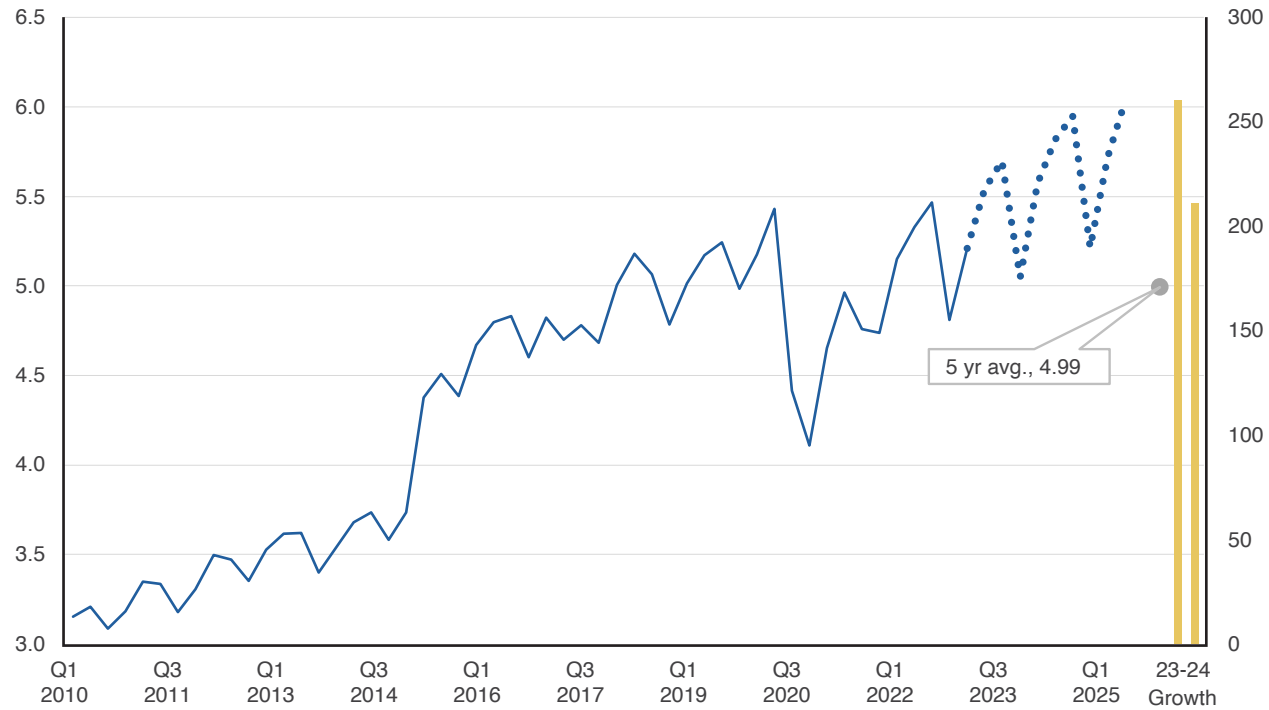
Despite some uncertainties, Indian crude oil demand growth remains strong. The Indian government has expressed its desire to meet the growing demand for refined products by expanding its refining capacity. This is in line with India's ambition to become a major fuel exporting nation, which would enable it to play a more significant role in the global oil markets in the years to come.

Q2 2023

As the new fiscal year begins and sowing crops ends before the rainy season, we anticipate a moderate growth in India of around 160 Kb/d this quarter. All fuel types are expected to experience growth, but diesel (70 Kb/d) and gasoline (50 Kb/d) are likely to account for 77% of this growth.

India...

India, MMb/d (L) and 2023-24 growth Kb/d (R)



Source: KAPSARC, April 2023.

Saudi Arabia

MMb/d	2022	Q1	Q2	Q3	Q4	2023	Q1	Q2	Q3	Q4	2024	Q1
Saudi Arabia	3.7	3.2	4.0	4.4	3.6	3.8	3.3	4.1	4.5	3.7	3.9	3.3

2023-2024

Saudi Arabia's oil consumption is expected to grow by 80 Kb/d in 2022 and 45 Kb/d in 2023.

After last year's significant GDP growth of 8.7%, a slower growth rate of around 3.1% is expected in 2023 (according to the International Monetary Fund's [IMF's] Data Mapper). We anticipate that transportation fuels will drive the growth in fuel demand, followed by heavier fuels if construction on the country's mega projects begins. These mega projects, and Saudi Arabia's target of having 50% renewable and 50% gas-fueled electricity generation, are part of Saudi Vision 2030. Although we acknowledge the increasing penetration of renewables in the Middle East's energy mix, we do not anticipate a substantial decrease in oil consumption from further gas penetration into the Saudi grid within the forecast period.

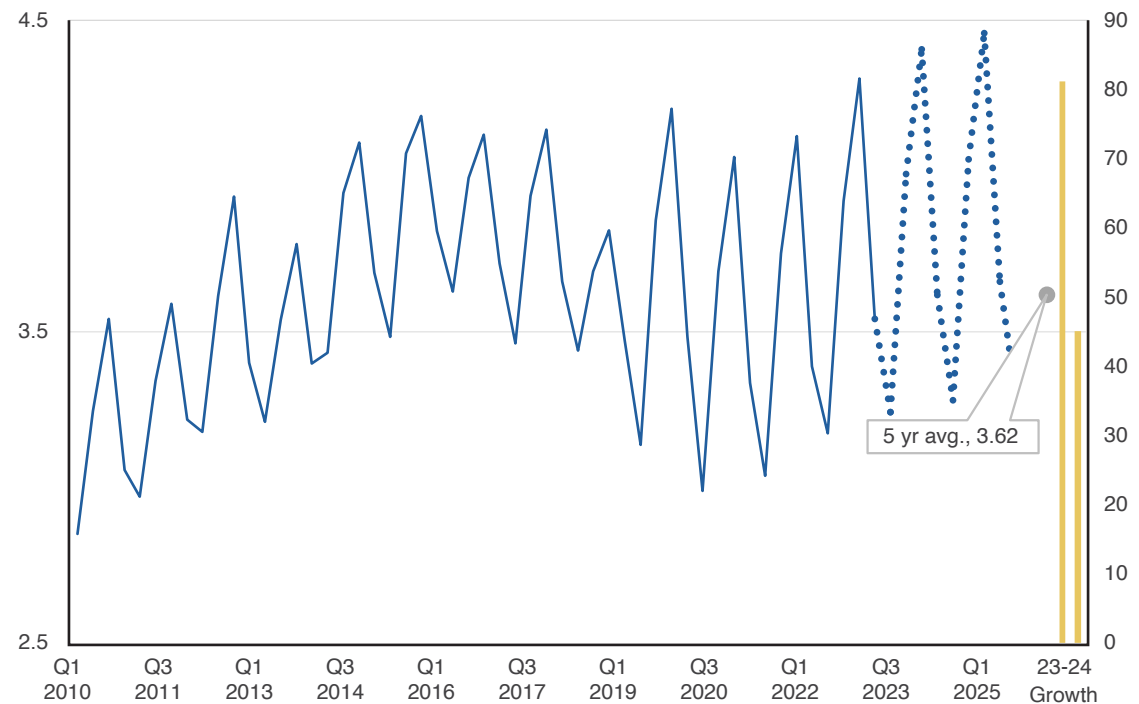
Q2 2023

It is anticipated that Saudi Arabia will experience a QoQ increase in demand of 770 Kb/d as demand for all fuels increases. Fuels utilized for electricity generation, such as fuel oil and diesel, are projected to account for half of the demand growth this quarter. Heavier fuels are

expected to follow, with an estimated growth of 270 Kb/d. Jet fuel demand and diesel may need to be revised upward later, as flight indicators have exceeded Saudi's

pre-pandemic levels since the beginning of this year, and the Hajj season typically correlates with higher demand for diesel.

Saudi Arabia, MMb/d (L) and 2023-24 growth Kb/d (R)



Discussion

“Doubt is not a pleasant condition, but certainty is absurd.” - Voltaire

After the first quarter, 2023 looks to be just as confusing as 2022. The oil market experiences turbulent times due to positive and negative news every day, resulting in knee-jerk reactions to price changes with every new development.

Although Saudi Arabia and Iran improving their relations should mean less volatility in the Middle East, recent attacks in Syria have raised regional tensions. Record profits reported by oil companies worldwide are being offset by lawsuits, windfall taxes, protests, and a surprising number of industrial accidents. Regulatory concessions, such as the Willow project in Alaska, are being balanced by Guyana and Iraq's tougher negotiations with their partners. It is a mixed bag overall, with a fragile economy and Russian supply still being the major unknowns.

In this landscape of opposing forces, with risks to the upside and downside (both short and long), one trend is becoming apparent: there is too much risk, and everyone is trying to mitigate or contain it somehow.

For the IOCs, projects are moving toward 'safer' shores, with more development in areas that are comfortable for the firms involved. American firms are leaning on the Americas, and Europeans are looking to Africa. Producing nations are selecting partners that are 'safer' for them. Guyana has shown a preference for Asian and Middle Eastern NOCs since they are less exposed to investor whims, while Iraq is looking more toward China, Russia, and the UAE and openly discussing non-dollar trade.

Other risk strategies include diversifying revenues (ExxonMobil is growing its trading business), compartmentalization (Total is spinning off the oilsands), lowering expectations (BP is backpedaling on its 2030 targets), cashing in (several Middle Eastern IPOs), and, alternately, market capture (increased upstream and refining investments).

Although the pie is not shrinking as assets change hands, it is becoming more challenging to follow these myriad strategies and proclamations. As previously discussed in the KOMO, much of this is driven by differences in basic beliefs about the long-term viability of oil as a business. Some are playing for short-term gains, while others are playing for the long term. While it will take much longer than the window of our forecast to declare a winner, it will be interesting to observe.

Highlights from this edition are:

- OPEC+ is driving the market, but where are we going?
- The future of shale is in the eye of the beholder.
- Oil sands are looking less rosy with growing transport risks.

Supply Forecast

It is expected that global liquids supply will increase by approximately 1.97 MMb/d in 2023, reaching an average of 101.6 MMb/d for the year. Furthermore, we anticipate a further 2.45 MMb/d increase in supply in 2024, with an average of 104.1 MMb/d for the year. This represents only a minor shift from the previous quarter's projection, with some growth deferred from 2023 to 2024 due to current pricing and strategy adjustments.

The impact of the price cap on Russian crude and products remains highly debated. Although volumes remain relatively high, the effect on Russian suppliers' finances is uncertain. The question of whether end users are paying above the cap and whether increased transport costs are the permissible reason for this raises the issue of who collects these elevated transport fees. From a supply modeling standpoint, the question of where the rents are captured in the supply chain is largely irrelevant, as we mainly care about the volumes, which appear to be resilient.

The original OPEC+ cut of 2 MMb/d proved prudent in an uncertain market, and the additional 1.66 MMb/d in April may also be viewed favorably over time. While these cuts are scheduled to continue until the end of 2023, the KOMO team believes that they may last longer. Due to an expected supply surplus in 2024, we have extended our outlook for cuts indefinitely (at least until the surplus disappears in 2025). This is

partly driven by improving conditions in exempt OPEC+ members (Venezuela exporting to the U.S., Iran-Saudi relations improving with a knock-on impact in Iraq, and some positive signals from Libya), Russian resilience, Nigeria cracking down on theft, and Angola raising production. Some short-term effects are evident, such as Kazakhstan banning oil product exports for Q2 to prevent the European Union (EU) from buying it all, and Azerbaijan experiencing disruptions to the market due to the earthquake in Türkiye, but these are limited in scope.

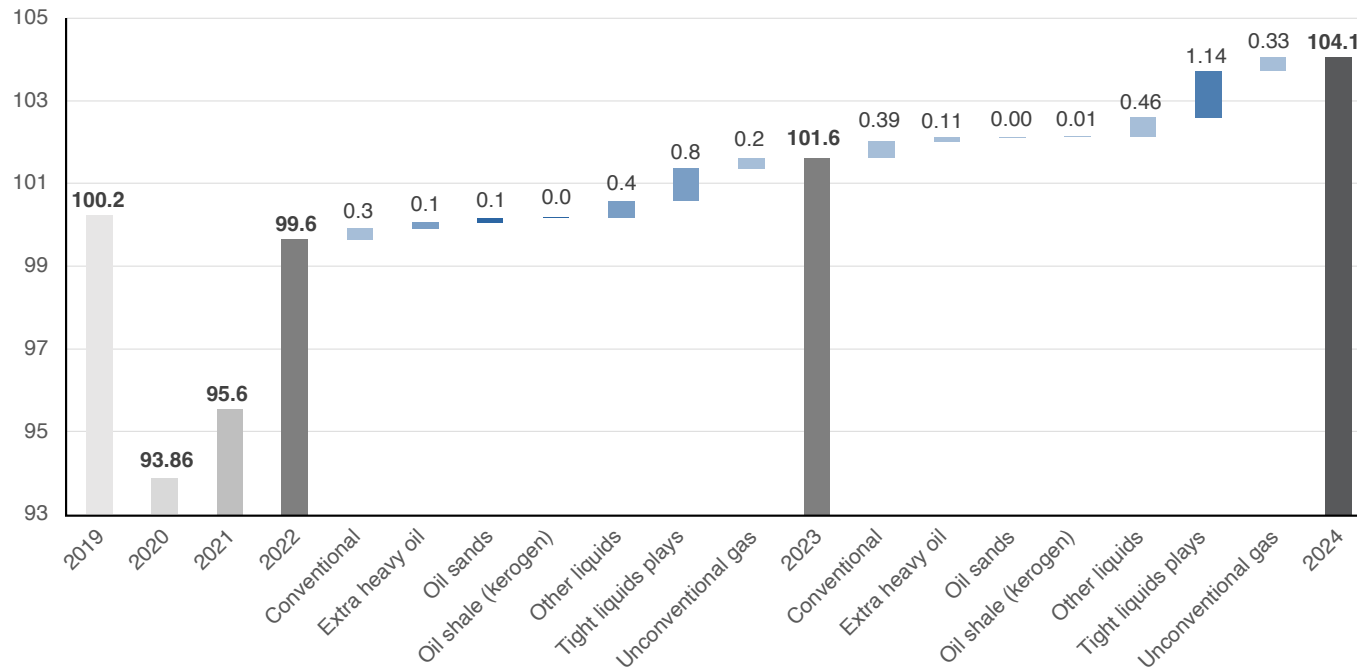
For non-OPEC+ producers, offshore is a bright spot for development. Rystad predicts that capital expenditure (capex) in 2023 and 2024 may surpass \$100 billion (bn), which has not occurred since 2013 and 2014. For example, both Guyana and Namibia are offshore plays. Offshore development is costly, but the flows tend to be larger, have less above-ground risk, and are also lower in carbon intensity compared to onshore developments.

Shale has some growth potential, reaching record highs this quarter, but the expectation of an imminent peak is dampening some of the optimism of past years. Oilsands are experiencing issues once again, with a major pipeline spill, a tailings pond breach, and potential scrutiny over crude-by-rail after the Norfolk Southern rail accident.

Overall, what is important is that producers are taking action in response to market changes. Although these actions may be confusing and contradictory at present, they indicate a nimbleness that has been lacking in recent years. Whatever the future holds, the oil market will adjust as necessary to meet it.

Supply forecast...

Annual global liquids supply, MMb/d, 2019-2024



Source: KAPSARC, April 2023.

OPEC+

While leaks and speculation from within the OPEC+ group are interesting, they are mostly just gossip or used as bargaining tools. Recently, rumors of a UAE departure came to nothing, but they raise an important question: In what scenario would members consider defection?

Previous research by KAPSARC suggests that the group generally benefits from the current arrangement more than a free-for-all (Rioux et al. 2020), and other studies have found that the market also benefits from this arrangement (Pierru, Smith and Zamrik 2018). However, individual members may decide to leave if they feel they could benefit more from doing so. It has happened before and could happen again.

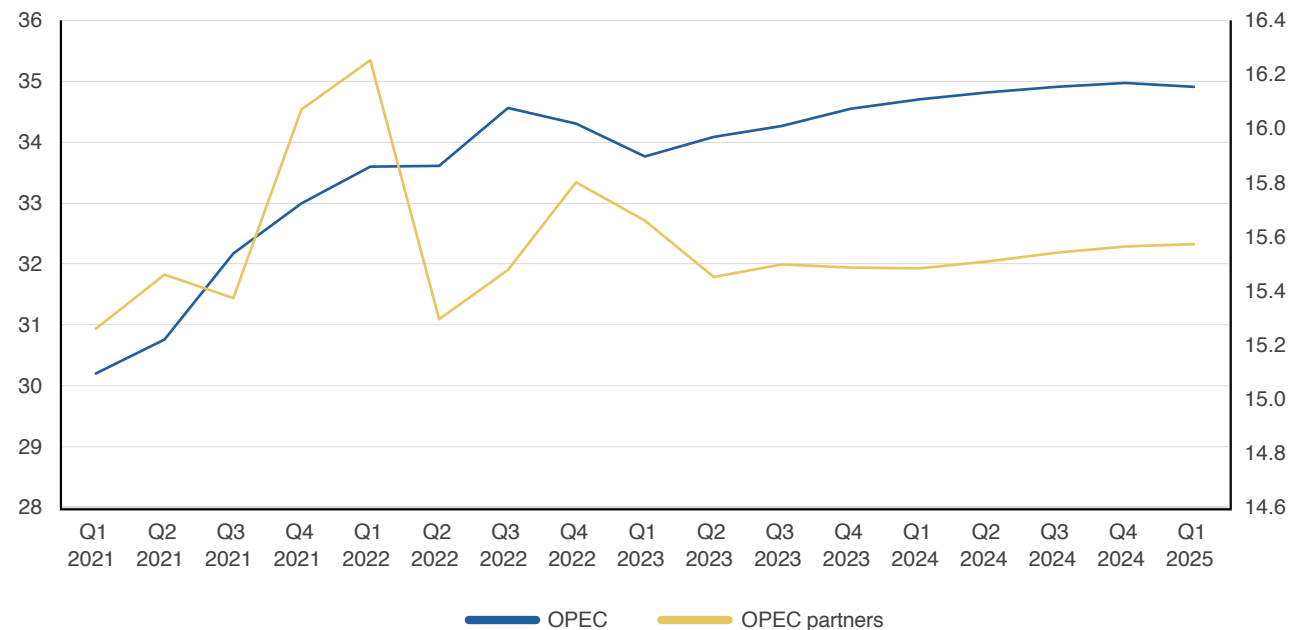
So, who might consider defection? The smallest players, particularly those in Africa, have quotas that have nothing to do with their production and thus have nothing to gain from leaving. The same applies to exempt members who are free to produce as much as they can under sanctions or other constraints. Saudi Arabia and Russia have no incentive to relinquish their influence, and several other members are too oil dependent to risk leaving.

This leaves only members with more diversified economies and higher potential for oil production. Algeria's growing gas supply to the EU could embolden them, but there is not much upside to their oil production. Malaysia and Nigeria are well diversified, but their upsides are limited. Iraq and Kuwait have

plans to expand production, but their economies are not diversified enough to take the risk. That leaves only two players: Kazakhstan and the UAE. If Kazakhstan wanted to leave, they would need better routes to market that bypassed Russian territory, which are currently under development. Thus, the only plausible defector looks like the UAE, and the rumor may have a grain of truth.

Losing the UAE from the team would be notable but not catastrophic, since the addition of Russia alone as a plus member was more than double UAE's contribution. The danger lies in cohesion, and whether its departure would destabilize the rest of the alliance. For now, though, things are holding up well, as they always have under similar minor tensions and rumors. Think nothing more of it!

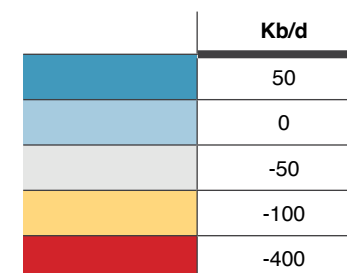
OPEC production (L) and OPEC partners production (R) MMb/d



Source: KAPSARC, April 2023.

OPEC and partners supply changes for 2023-2024, Kb/d

	2023	2024
Mexico	(10.8)	(78.8)
South Sudan	(3.4)	4.9
Equatorial Guinea	(18.4)	4.5
Sudan	(4.4)	(14.9)
Brunei	(27.0)	(9.6)
Bahrain	6.8	14.2
Gabon	(9.7)	(12.3)
Malaysia	40.6	4.2
Congo	(24.9)	(28.3)
Azerbaijan	(38.4)	(19.2)
Oman	(2.9)	37.7
Algeria	(155.9)	(309.4)
Nigeria	177.1	18.6
Kazakhstan	100.6	(65.5)
Kuwait	(7.9)	0.6
Iran	80.0	114.9
Venezuela	110.0	188.4
UAE	(20.8)	123.5
Saudi Arabia	(290.3)	438.1
Iraq	(16.1)	(51.3)
Libya	204.6	35.9
Russia	(235.5)	73.9
OPEC	12.4	472.6
OPEC partners	(174.5)	(53.3)
OPEC+ TOTAL	(162.0)	419.4



OPEC+ Spare Capacity

The question of how to use OPEC+ spare capacity is crucial in the current market. According to this quarter's KOMO report, if OPEC+ maintains their original 2 MMb cut, a supply surplus would start in Q3 2023 and persist until the end of 2024. The new cuts of 1.66 MMb/d have shifted this surplus into Q4, but this has not changed the question of how long to maintain these measures. Given the ongoing Russian exports and uncertain Chinese demand, the calls for higher production at the end of 2022 appear to be hasty, which resulted in depressed pricing in Q1.

The first option to address the surplus would be to restock the world's SPRs, but there are several issues with this approach. While releasing stocks for patriotic reasons and reducing prices is an easy sell, it also has the potential to tighten the market and indirectly support Russia's treasury, making it a difficult tactical proposition.

The second option is to put pressure on Russia by cutting their export volumes. Although there has been some success in inconveniencing Russian exports, the workarounds are becoming more sophisticated. Impeding freedom of navigation or the operation of pipelines is a high-stakes gamble that may be too risky to attempt without involving other nations in the conflict.

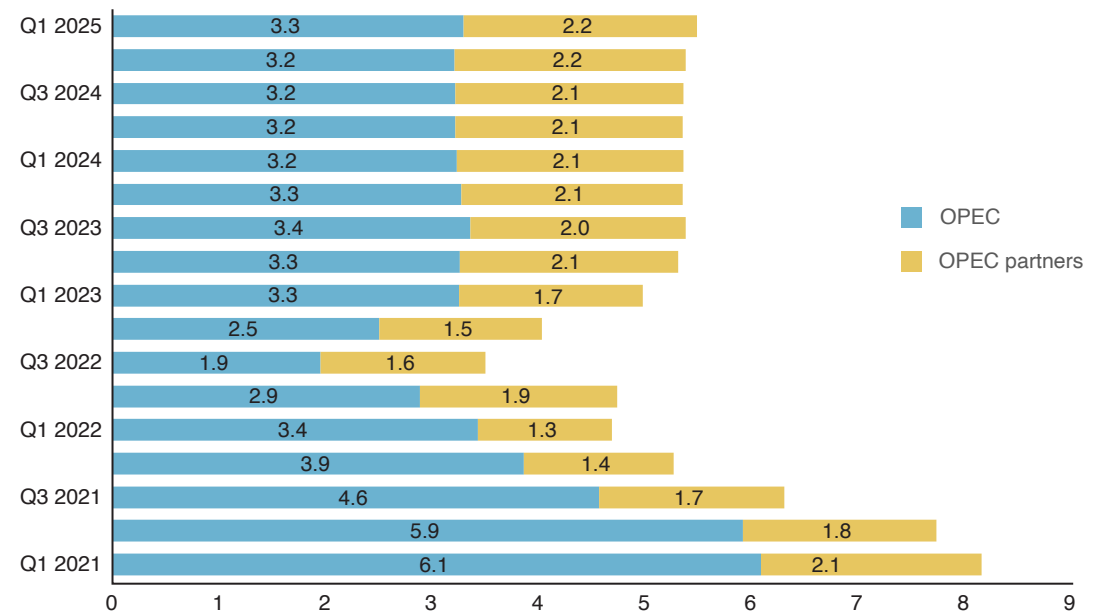
Lastly, OPEC+ could have opted for a temporarily deeper cut of about 1 MMb/d in the next two years, depending on the volatility and other factors, which is exactly what they did. This move should eliminate some

of the less desirable options mentioned earlier and keep the market functioning in a more predictable way.

Additionally, discussions regarding additional capacity from some members are starting to become relevant in today's market. HRH Abdulaziz bin Salman, Saudi Arabia's Minister of Energy, stated that the country

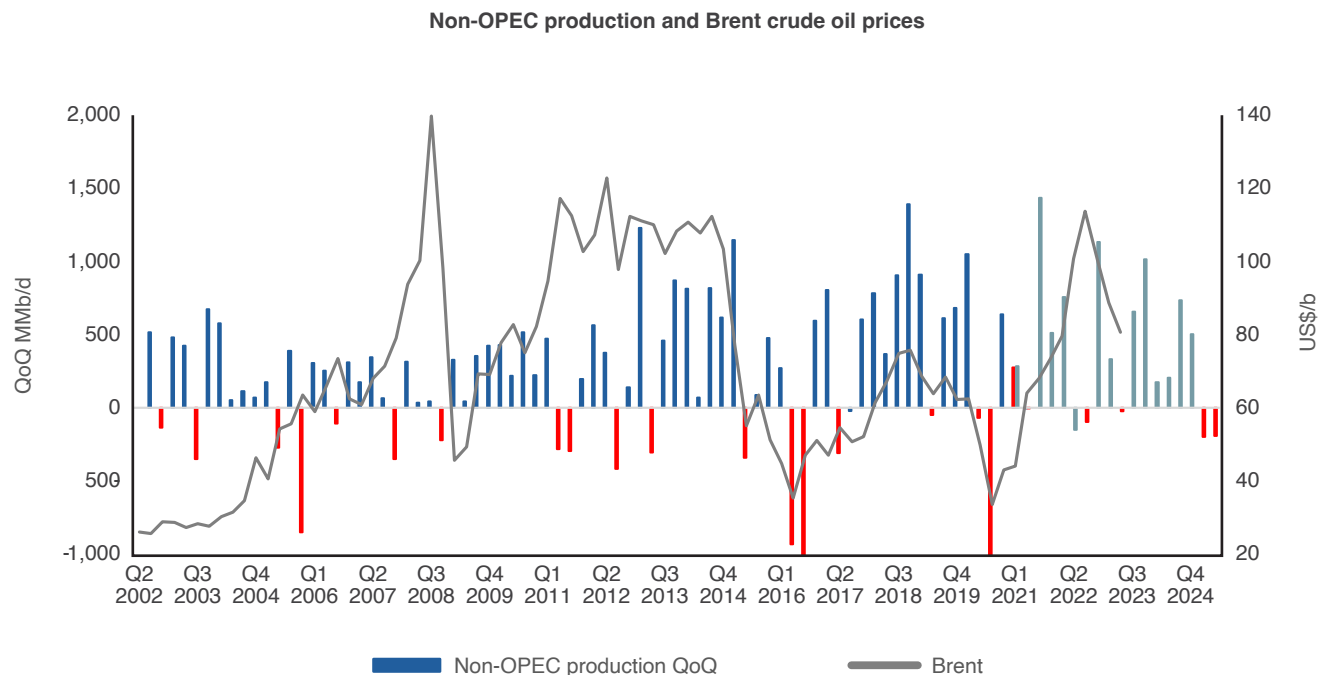
would reach 13.3 MMb/d capacity by 2027, which is a slight revision up from prior reports of 13 MMb/d with phrasing that indicates an earlier timeline. The UAE and other countries also have plans for expansion by the end of the decade, but the question remains as to how gradually this extra capacity will appear. Overall, we have an interesting couple of years ahead.

OPEC and partners spare capacity, MMb/d technical base



Source: Rystad; KAPSARC, April 2023.

Non-OPEC+



Source: International Energy Agency (IEA), March 2023; KAPSARC, April 2023.

Non-OPEC+ growth:

- In 2023, global tight oil supply (including natural gas liquids [NGLs]) is expected to rise by 800 Kb/d, while unconventional gas liquids are predicted to increase by 250 Kb/d, and oil sands are projected to reclaim 100 Kb/d.
- In 2024, another rise of 1.14 MMb/d (including NGLs) is expected for global tight oil, with unconventional gas liquids growing by 340 Kb/d, and oil sands remaining almost flat on average.
- Non-OPEC+ producers face key challenges in overcoming historic underinvestment and navigating conflicting demands for increased production and environmental stewardship.

Non-OPEC (Tight Oil and Oil Sands)

“Safety regulations are written in blood.” – Industry folk saying

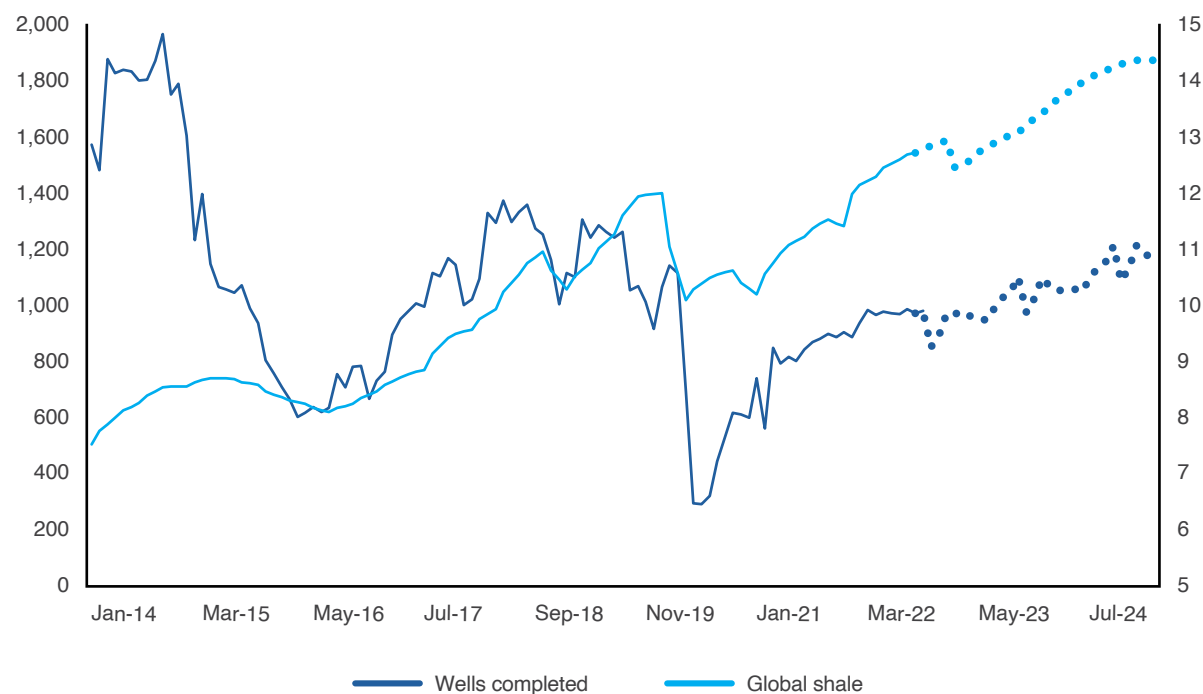
The reporting of shale activity is split into two different narratives, with some headlines claiming that “shale has hit a peak” while others highlighting “huge growth and new highs in shale.” Although both statements can be true, the tone of each narrative is markedly different. This tension between confidence and conservatism was evident at CERAWEEK in Houston, where much of the discussion focused on CCE, CCUS and hydrogen. The recent conflict in Ukraine has highlighted the importance of energy security, making the call for more investment in shale production all the more urgent.

Shale has become increasingly professionalized in recent years, and while OPEC+ remains the ‘world’s swing producer,’ this is largely due to lackluster growth in shale production since 2019. The major players in shale have made steady investments and boast the best technology, most acreage, and most efficient operations. As a result, the current price rise is less likely to have a significant upside for production. However, with fewer firms controlling a greater portion of the shale market, there is less incentive to overproduce and depress prices. Flush with cash, players like ExxonMobile are in the market for acquisitions, but that does not mean a return to boom times.

While some reports suggest that shale’s best wells are already behind it, it would be unwise to discount the drive and technical improvements of the American oil patch.

Higher prices and interesting reorganization options, such as spin-offs to divest risk and exposure, could continue to push shale production to new highs.

Monthly U.S. drilling activity (L) vs. global shale production (MMb/d) (R)



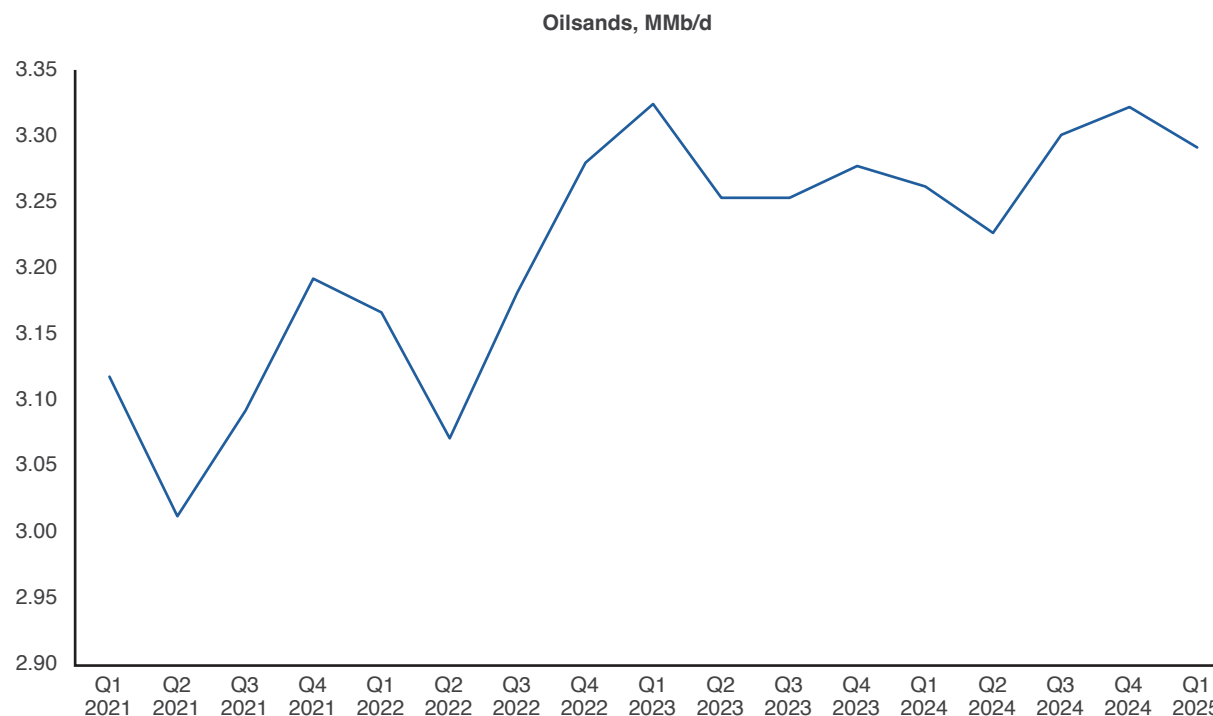
Source: KAPSARC, April 2023.

Non-OPEC (Tight Oil and Oil Sands)...

The oilsands industry has faced a series of setbacks in the past quarter. A tailings pond leak, a significant spill from the Keystone pipeline in Kansas, ongoing cost overruns and delays for the Transmountain Pipeline to the Pacific, and the derailment of a train carrying crude oil in Ohio are all taking their toll on the industry's long-term prospects. Despite their resilience, the combination of negative incidents, low prices, and increased government scrutiny could limit their viability. The ongoing conflict in Ukraine is also creating market share shifts in Asia, raising concerns about the eventual appearance of Canadian bitumen next year.

Despite these challenges, Canadian producers are anticipating a 40 billion Canadian dollar investment in the upstream oil and gas industry this year. However, uncertainty surrounding energy security and market conditions makes it difficult to be optimistic about growth in the immediate future.

One potential bright spot is a merger between two major rail providers, Canadian Pacific and Kansas City Southern, that operate the main lines used between Alberta and the Gulf. Although this merger could increase efficiency and reduce costs, it faces criticism in light of the Ohio accident and antitrust concerns raised by some U.S. regulators.



Source: KAPSARC, April 2023.

Risk Scenarios, January 2023

*The KOMO survey is conducted on a semi-annual basis in Q1 and Q3, with results holding over to the subsequent quarter.

KOMO's risk categories are based on current events impacting the oil industry.

KOMO uses the risk table below to estimate potential impacts, taking two components into account: probability and impact.

Probability: A shaded chart at the top right of the table shows the probability of a risk occurring (the darker the shade, the more likely it is to happen).

Impact: The impact is calculated as a percentage of exports (as domestic supply is often protected), or estimated into the demand model through a multiplier or a change in GDP.

For supply risks, we multiply the probability by the potential impact.

For demand risks, the model either (i) examines historical incidents as multipliers then applies a similar response to future demand, or (ii) estimates the potential impact on GDP and channels it through the model, via changes in the exogenous variables, to determine the implications for future oil demand.

Risk category	Item	Supply/demand	Impact (Kb/d)	2023	2024
Producer supply risks	EU price cap on Russia crudes	Supply	↓ 985 - 795		
	Guyana and Namibia's discoveries (YoY growth)	Supply	↑ 5% BAU		
	United States shale industry growth beyond 1 MMb/d	Supply	↑ 90 - 185		
	JCPOA restoration and sanctions lifted on Iran	Supply	↑ 10 - 180		
	Venezuela's oil production increasing	Supply	↑ 40 - 85		
	UAE, Iraq and Kuwait's total production capacity to increase	Supply	↑ 0 - 300		
Demand risks	Economic downturn	Demand	↓ 834 - 415		
	Continued U.S. interest hikes	Demand	↓ 300 - 124		
	Continued inflation	Demand	↓ 174 - 82		
	China's economic growth trajectory to pre-COVID 19 levels	Demand	↑ 187 - 590		
	Aviation in Asia and long-haul travel reaching pre-pandemic levels	Demand	↑ 64 - 124		
Resolution to Russia-Ukraine conflict	No	67%			
Global recession in 2023	Yes	87%			
U.S. to start refilling SPR in 2023 and 2024	Yes	53%			
OPEC+ cuts remain at 2 MMb/d in 2023	No	79%			
OPEC+ gradual increments in production	Yes	67%			
Brent to remain above \$90/b in 2023	No	53%			
OECD energy transition acceleration due to elevated prices	Yes	60%			
Tourism activity to resume to 2019 levels	Yes	53%			
U.S. dollar to continue strengthening	No	53%			
Euro exchange rate against U.S. dollar to weaken	Yes	93%			
Possibility of domestic unrest	Yes	87%			
Africa new hub for oil demand	No	67%			
Nigeria and Angola's production to return to pre-pandemic levels	No	80%			
Supply chain issues negatively impacting oil production	Yes	67%			
U.S. to take further measures to control elevated fuel prices	Yes	80%			

The results are based on a survey conducted biannually.

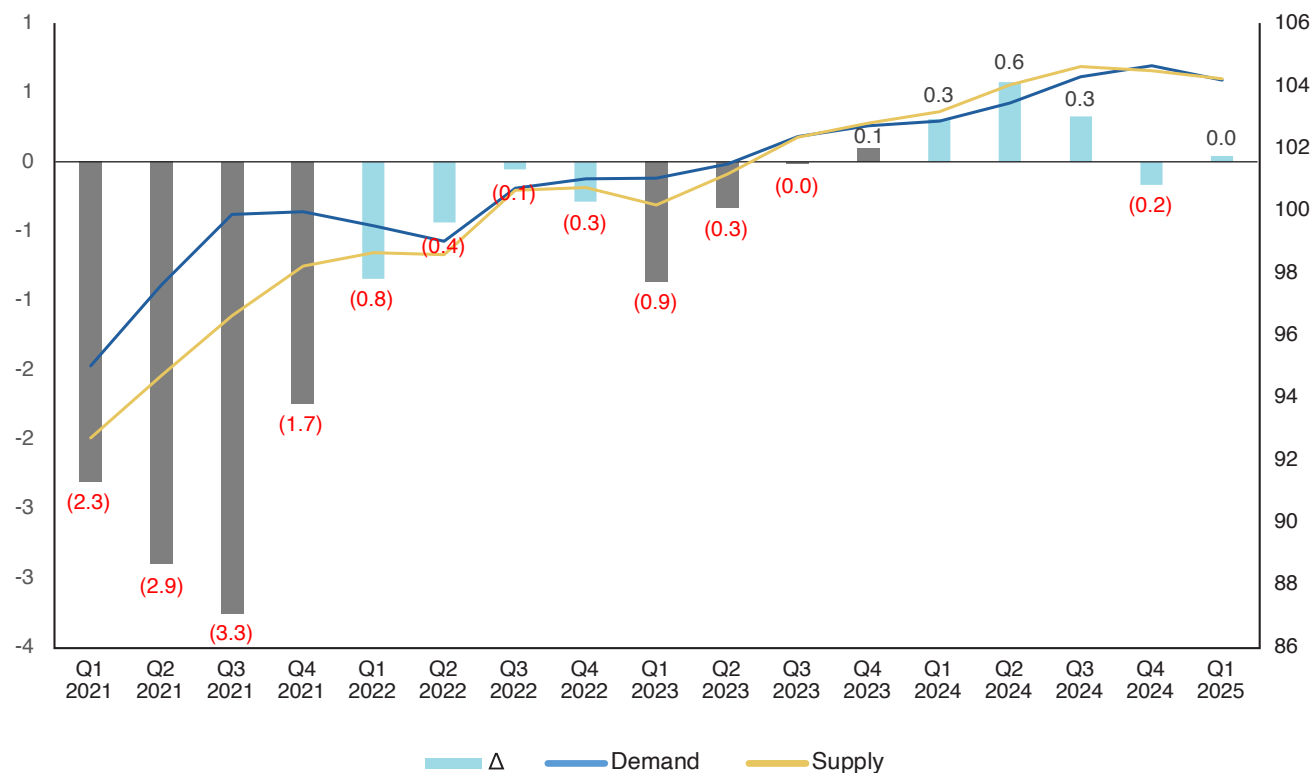
2023 and 2024 Balances

Based on KOMO’s demand forecast and the additional OPEC+ cut of 1.66 MMb/d in May, along with current price levels, we estimate that the oil markets will experience a slight deficit of 280 Kb/d, before transitioning to a slight surplus of 260 Kb/d in 2024. Prior to the new OPEC+ cuts, our projections indicated that the markets would be balanced in 2023, followed by a surplus of 770 Kb/d in 2024. We anticipated this quarter to be the last in a deficit as we shift into a surplus in the next quarter. We anticipated a surge in supply, irrespective of economic activity, which is why it is understandable why OPEC+ took pre-emptive measures in the wake of additional risks to both the economic and financial sectors.

Despite a continued growth of the surplus starting in Q4 of this year and continuing throughout the upcoming quarters, where we anticipate it to reach 600 Kb/d in Q2 2024, we do not expect prices to be impacted significantly as the surplus is required to replenish inventories. Thus, a gradual refill would be beneficial for both consumers and prices.

We maintain the assumption that OPEC+ will uphold its 1.66 MMb/d cuts, and we anticipate shale producers to maintain discipline. We expect demand to remain strong regardless of the economic or financial situation, and non-OECD countries are less likely to be affected by the fragile economy.

Quarterly supply demand balance, MMb/d, Q1 2021 - Q1 2025



Source: KAPSARC, April 2023.

Price Fundamentals (Inventories)

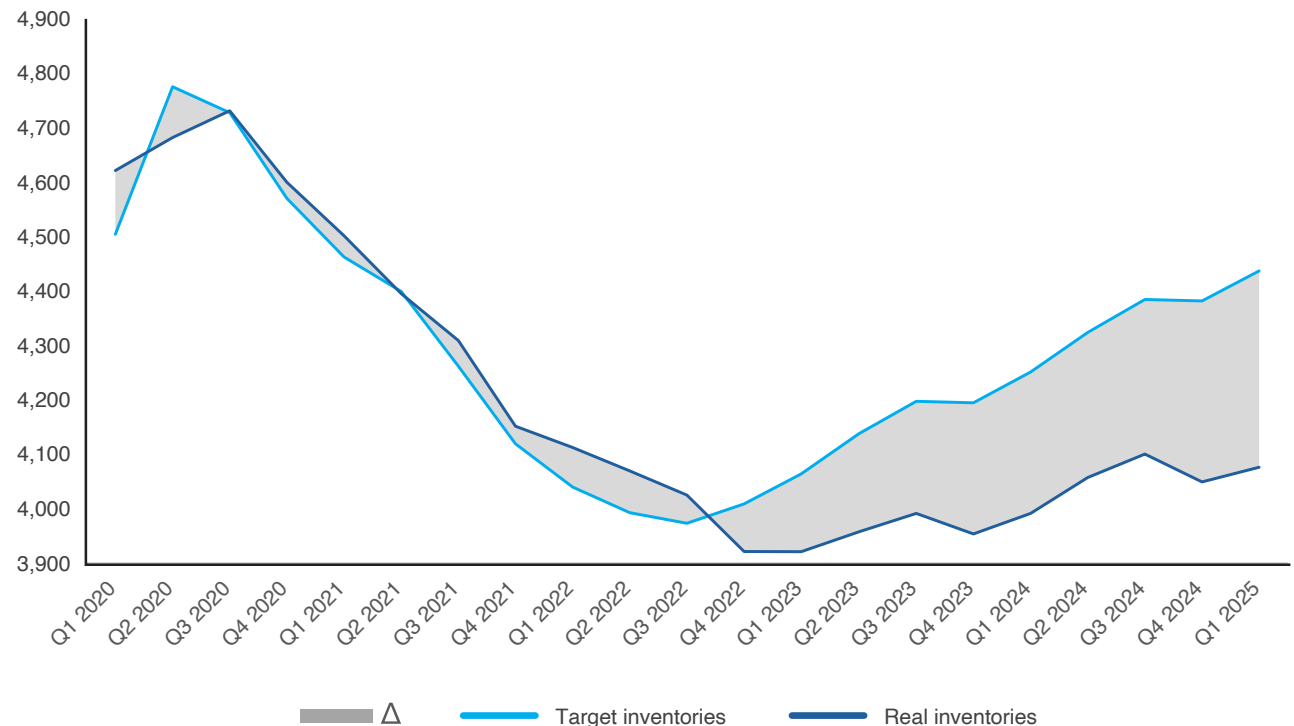
Speculation regarding the economic and financial situation will continue to be the main driver of price movements in the foreseeable future. Despite expectations of an oil deficit last quarter and this quarter, Brent prices fell by \$10/b in March as some banks faced instability, while futures remained in backwardation. However, the recent announcement by OPEC+ to cut an additional 1.66 MMb/d in April countered this sharp fall, and prices are expected to experience upward pressure moving forward. We expect to head into a surplus next year due to inventory requirements.

The SPR releases in 2022 have rendered several OECD economies vulnerable to oil supply shocks, and refilling them is expected to accelerate, thereby maintaining healthy demand. However, we acknowledge that the refilling process will be gradual post-2023 and may extend beyond the forecast period of this report.

We anticipate a surplus of 100 Kb/d per day starting in the fourth quarter of 2023. However, refilling the SPR and other inventories poses a challenge as 100 Kb/d per day is insignificant, but this factor will also contribute to price stability.

In this regard, the target inventory levels for the OECD are projected to increase by 145 MMb to 4,149 MMb in 2023, and then again by 187 MMb in 2024. Real inventory levels are expected to decrease by 76 MMb in 2023 and then increase by 94 MMb/d in 2024 to reach 4,050 MMb.

Target inventories vs. real inventories (L) and Brent prices (R), MMb



Source: EIA; KAPSARC, April 2023.

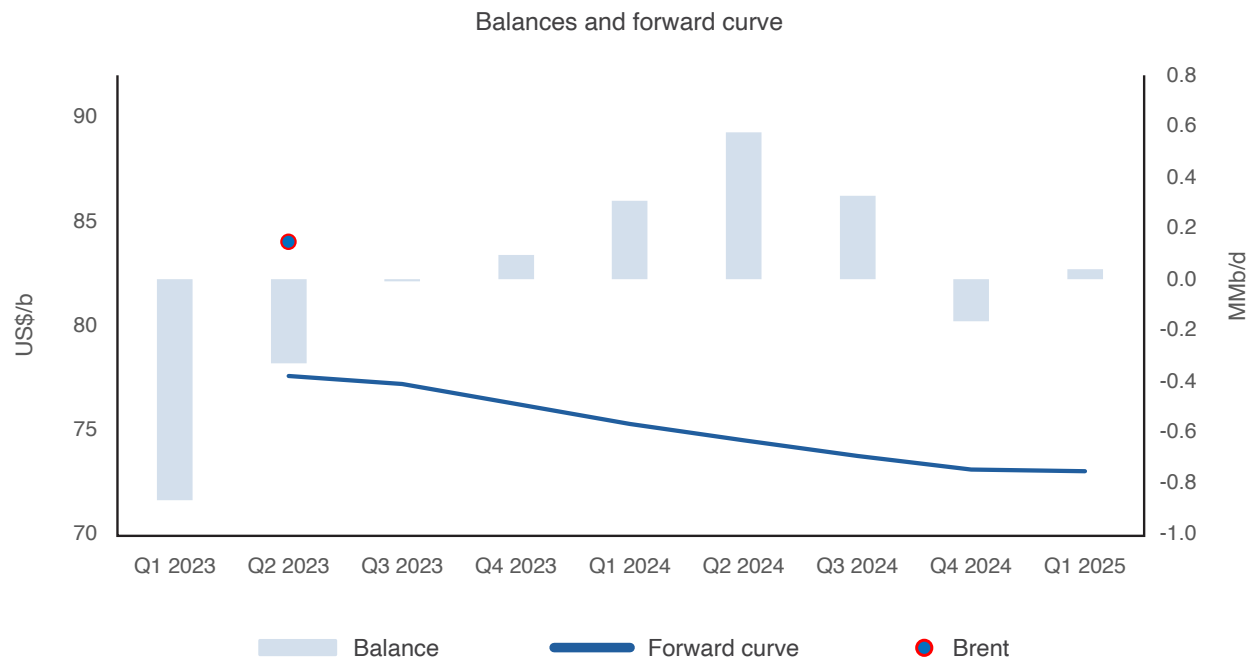
Price Fundamentals (Brent)

	Q1 2023	Q2 2023	Q3 2023	Q4 2023	Q1 2024	Q2 2024
Bloomberg	86.13	87.95	90.18	91.01	94.30	94.55
Market sentiment	93.53	91.49	91.42	92.50	95.00	92.00

	2023	2024
Bloomberg	88.82	88.17
Market sentiment	92.20	91.80

Source: Bloomberg, April 2023.

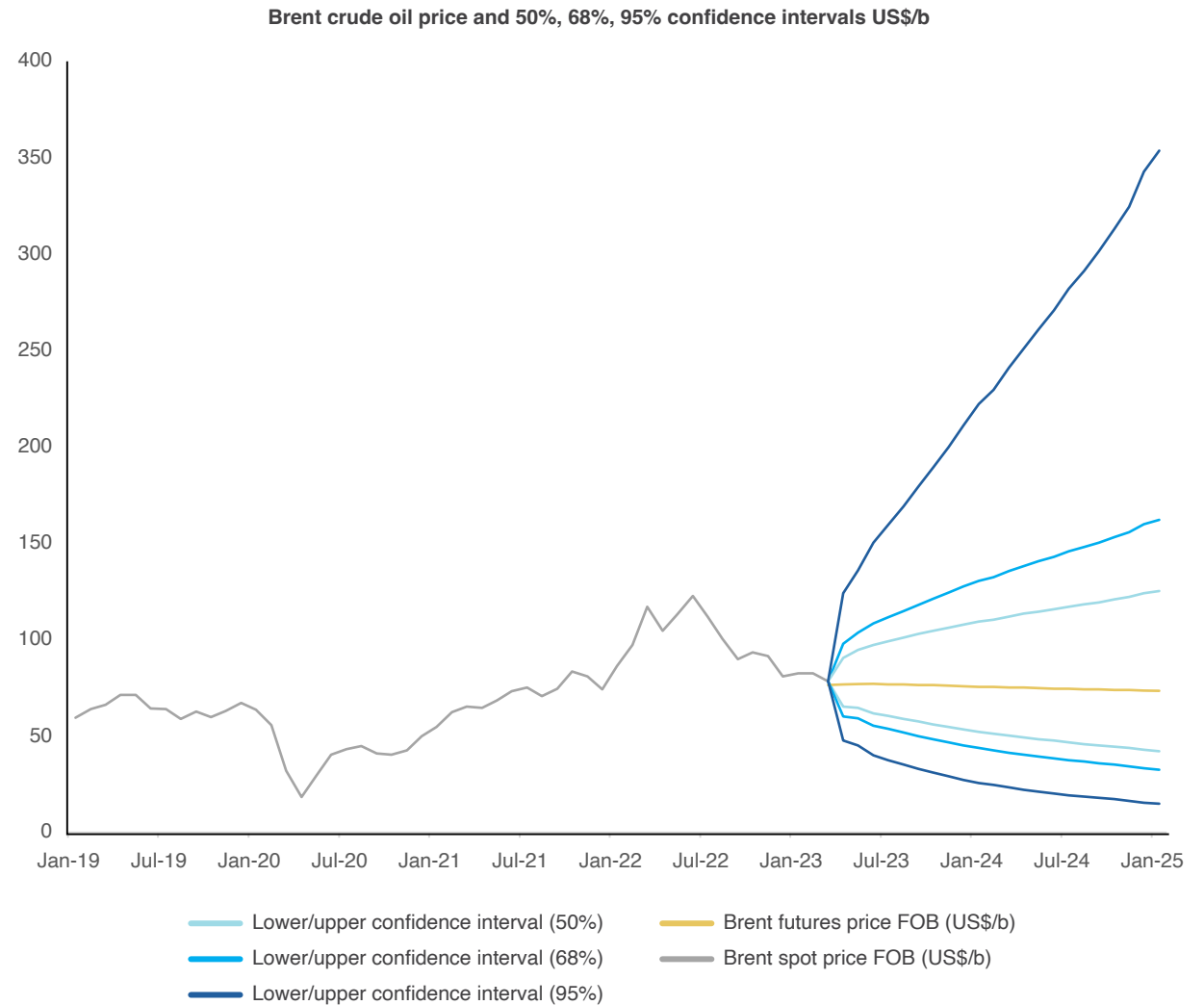
*Market sentiment is based on publicly available forecast data that is conducted biannually.



Source: CME Group , KAPSARC, April 2023.

Price Fundamentals (Forward and Future Curves)

The graph below depicts confidence intervals at the 50%, 68%, and 95% levels derived from options market information for at-the-money options contracts.



Source: KAPSARC calculations based on NYMEX data, CME Group, FINCAD, April 2023.

Note: As seen from this illustration, the bulk of the price risk appears to be squarely to the upside.

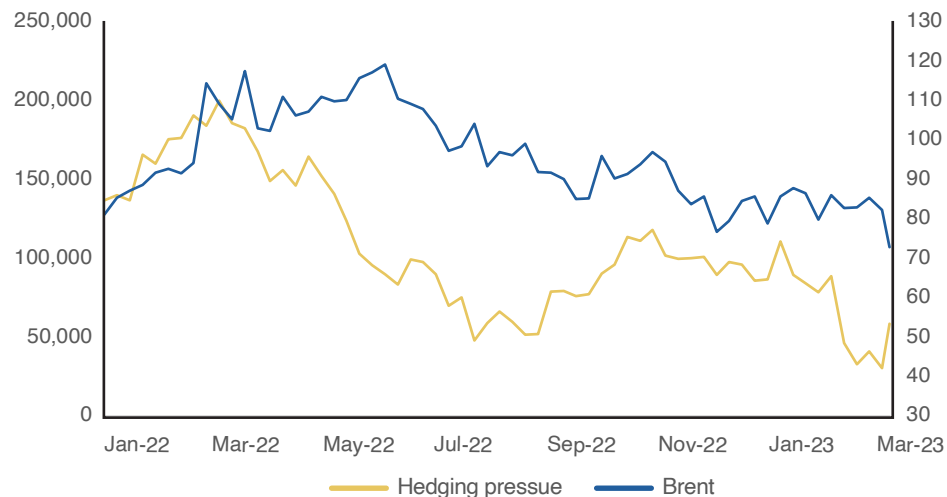
Price Fundamentals (Markets)

Hedging pressure (HP): The graph below displays the settlement price for Brent against hedging pressure, a measure of physical commercial net-short positions relative to net managed money long positions. A negative relationship exists between Brent prices and market hedgers.

The rising hedging pressure resulted from the turmoil in financial markets in March, which led to a price drop. The recent instability in Signature Bank, SVB, and Credit Suisse, combined with the March 22 Fed decision to raise interest rates by an additional 25 basis points, suggests that pressure on banks will persist, and the sentiment regarding failing banks is prominent.

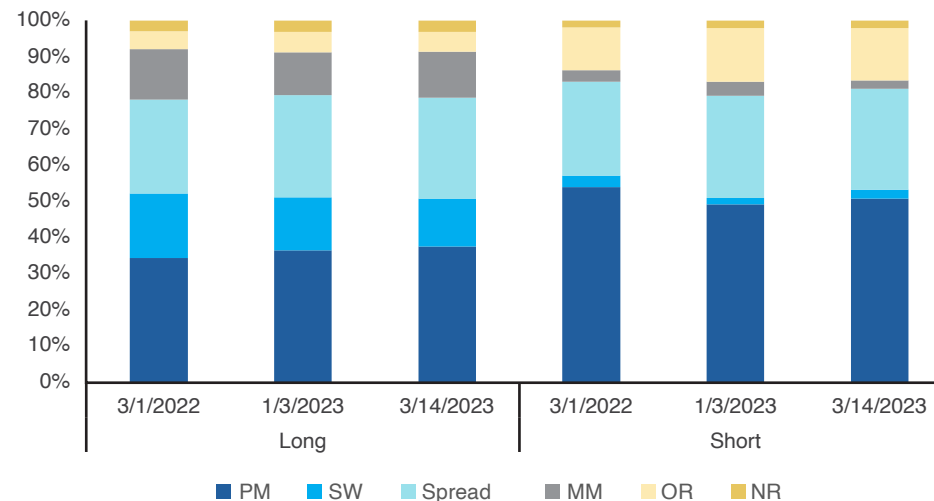
Trader class shares: Money manager long positions have been gaining momentum since the start of the year. However, due to the recent banking system failures in March, it is natural for long positions to decrease. This does not necessarily imply a lack of liquidity for investors. Instead, it appears that long oil positions will likely remain stagnant as investors hold off and wait to enter the markets when they hit their lowest point or seek refuge in other commodities.

Weekly - hedging pressure (L) vs. ICE Brent price (R)



Source: Bloomberg, March 23, 2023.
Note: ICE = Intercontinental Exchange.

Traders class shares of longs and shorts

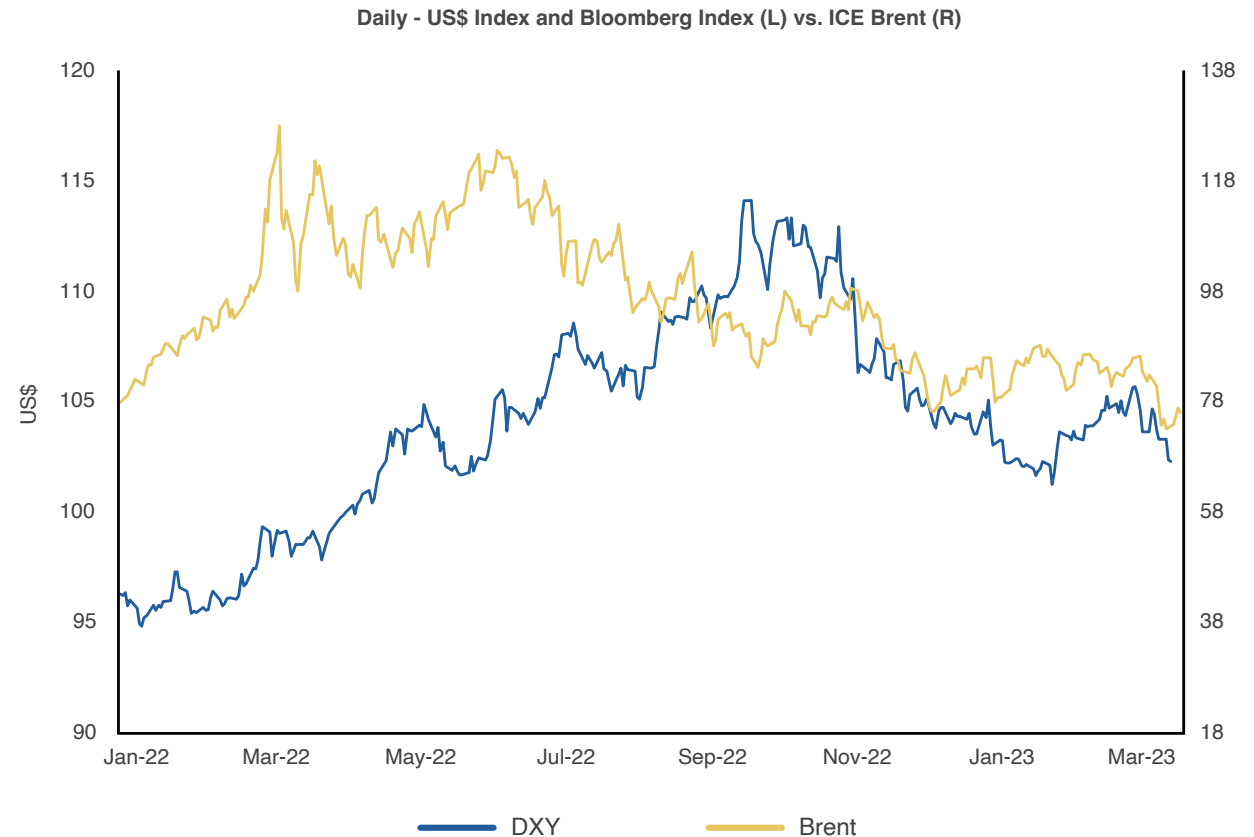


Note: Refer to the glossary for abbreviations.
Source: Bloomberg, March 23, 2023.

Price Fundamentals (Markets)

U.S. Dollar Index: Brent and the DXY have been trending down since November, fueled by the global economic slowdown that has shifted the outlook for oil, currencies, and interest rates. Despite the expectation that the U.S. Federal Reserve will maintain elevated interest rates to combat inflation, the latter has greatly impacted commodities since the beginning of 2022. In 2023, a potential economic slowdown is expected to have a greater impact on inflation.

Notably, there is a negative relationship between Brent and the dollar, as seen at the end of March. As the financial sector continues to face challenges, investors may choose to hold on to more secure currencies, leading to an increase in the DXY. Additionally, the rise in interest rates will support the DXY, which will increase the price of oil for foreign purchasers, further exacerbating the downward pressure on oil demand.



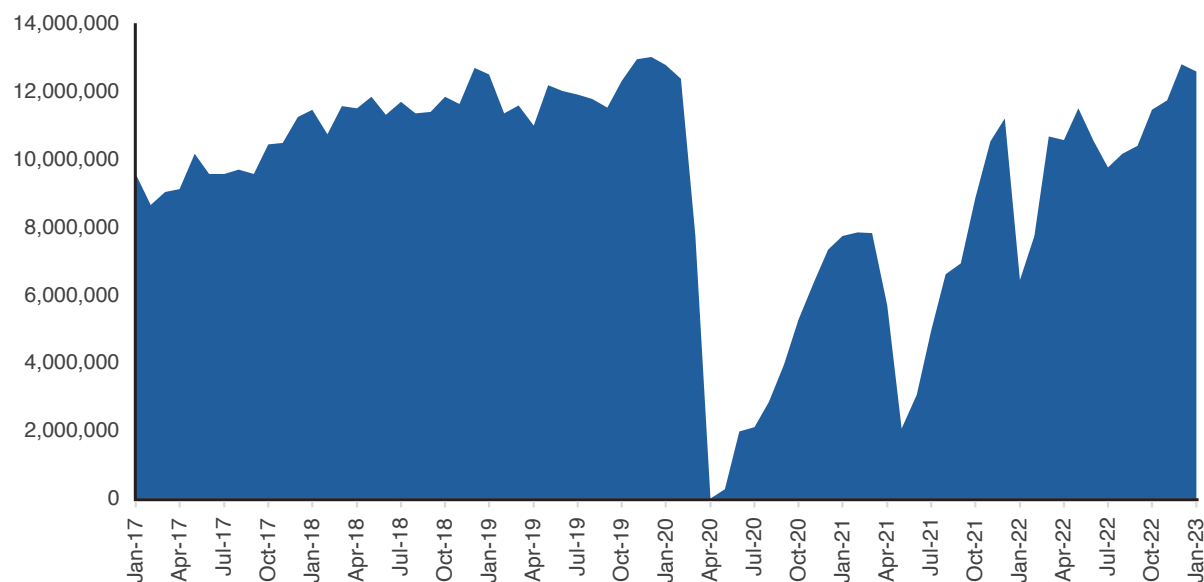
Source: Bloomberg, March 23, 2023.

Editorial: Indian Aviation Sector and Impact on Oil Demand

Contributed by Jitendra Roychoudhury, KAPSARC

The Indian aviation industry, which is currently the third-largest domestic aviation market globally, has been making headlines recently. Air India has announced that it will be procuring a total of 470 new jets, with an option for an additional 370 jets, while Indigo is reportedly seeking to order over 500 aircraft in the near future. The Indian aviation sector has experienced robust growth after a pandemic-induced lull that caused a significant drop in passenger demand. As shown in the graph below, domestic passenger volume is almost back to pre-pandemic levels, and solid growth is expected to continue over the next year. According to the Indian rating agency ICRA, domestic traffic is expected to grow by 8%-13% during the coming fiscal year 2023-24 due to a rebound in passenger traffic. International traffic from India has also been growing strongly since the resumption of international flights post-pandemic, and this trend is expected to continue as travel sentiment improves.

Figure 2. Indian domestic passenger volume growth.



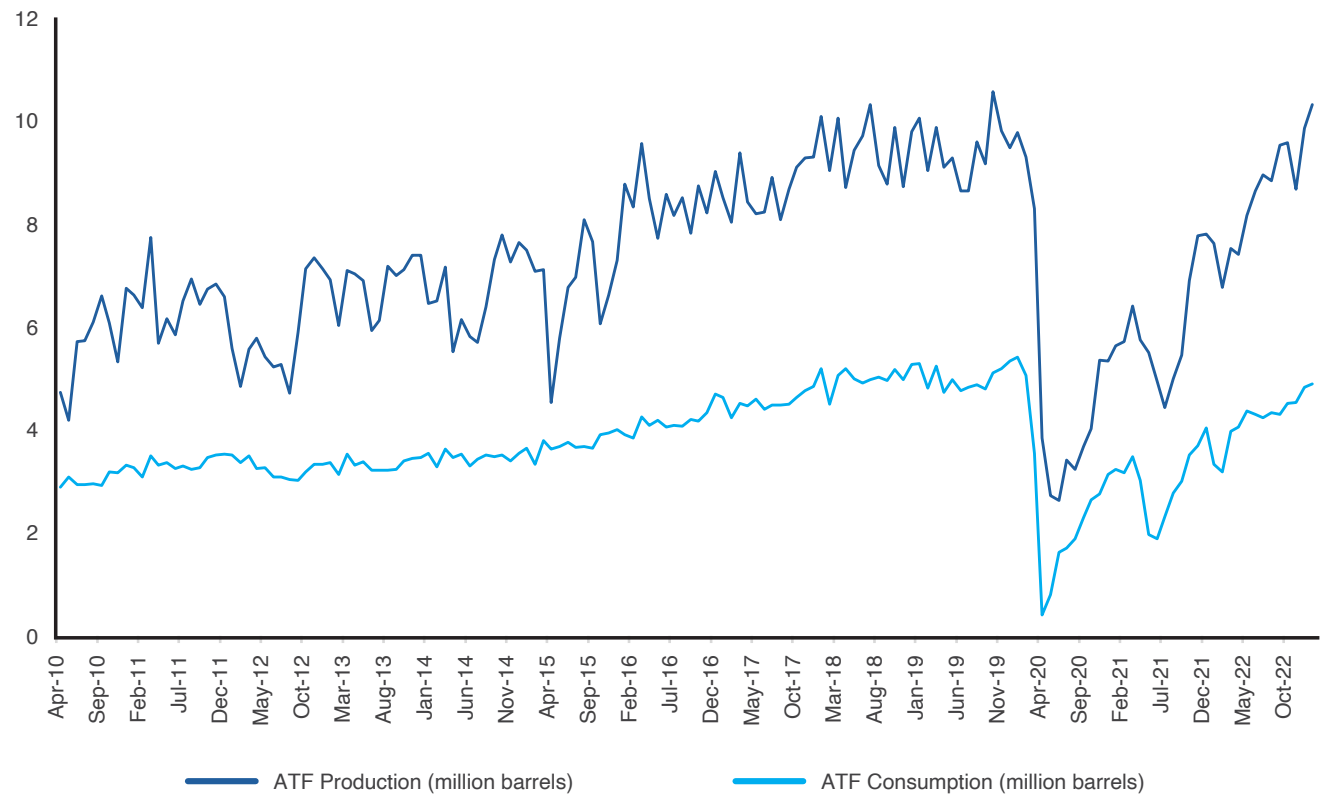
Source: Directorate General of Civil Aviation, India.

Editorial: Indian Aviation Sector and Impact on Oil Demand...

The recent surge in passenger traffic, both domestic and international, can be attributed to the revival of tourism demand, the resumption of corporate travel, and an optimistic business outlook as the Indian economy continues to exhibit strong growth. The Reserve Bank of India has projected a growth rate of 6.4% for the fiscal year 2023-24, with the current fiscal year expected to see a robust GDP growth of 6.8% (Livemint 2023). The Indian government recognizes the domestic aviation sector as a significant employment generator and a crucial contributor to economic growth, with plans to increase the number of airports from 140 to 220 by 2025 (IBEF 2023). The entry of low-cost carriers and higher household incomes are expected to further boost air travel demand. Despite the significant growth potential, only 4% of the Indian population has ever flown (Spaeth 2023).

The growth in the aviation sector is expected to result in increased demand for aviation turbine fuel (ATF) in India. India is a crucial refining hub and a net exporter of refined petroleum products, with the fourth largest refining capacity worldwide of 248.9 million metric tonnes per annum (MMTPA), behind the U.S., China, and Russia (IEA 2020). Private sector refineries, mainly Reliance Industries and Nayara Energy, carry out the majority of ATF exports from India. As India relies heavily on crude imports for almost all of its energy requirements, increased ATF domestic consumption and the reopening of international travel indicate a potential uptick in Indian crude imports.

Figure 3. Monthly ATF production and consumption.



Source: Petroleum Planning & Analysis Cell (PPAC), Ministry of Petroleum and Natural Gas, India.

Editorial: Indian Aviation Sector and Impact on Oil Demand...

The launch of Riyadh Air to promote Saudi Arabia as a new passenger and logistics hub, combined with recent flight activity surpassing pre-pandemic levels, suggests an increase in oil demand for Saudi Arabia. The 2022 OPEC World Oil Outlook estimates that global aviation sector-driven oil demand was 5.4 MMb/d in 2021 and projects it to reach 9.5 MMb/d by 2045 (OPEC 2022). The investments in new Asian airlines and the development of greenfield airports, as well as the capacity expansion of existing airports in Asia, indicate that aviation may continue to be a key driver of future oil demand.

Editorial: Indian Aviation Sector and Impact on Oil Demand...

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Editorial: Interesting Papers From the 44th IAEE Conference

Contributed by Fahad Al Yahya, KAPSARC

From February 4-9, 2023, the International Association of Energy Economics and the Saudi Association for Energy Economics hosted a first-of-its-kind conference in the Middle East, organized by KAPSARC. Numerous papers were presented, and we have chosen to highlight some of the most intriguing ones that caught our attention.

THE CONTRIBUTION OF NATIONAL OIL COMPANIES (NOCs) TO THE ENERGY TRANSITION

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Summary

Oil companies are frequently criticized for failing to do enough to minimize their carbon footprint and control the harm to the environment. The aim of this paper is to evaluate NOCs' technological and strategic approaches to make the move to low-carbon energy sources easier. This analysis will emphasize the essential role of Saudi Aramco in this transition, with its research and development initiatives, its carbon capture technology, and its heavy investments in the green-hydrogen Neom city.

A PANEL VAR ANALYSIS OF OIL SUPPLY AND DEMAND SHOCKS AND MACROECONOMIC PERFORMANCE: THE CASE OF GULF COOPERATION COUNCIL COUNTRIES

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Summary

This research paper looks at the symmetric and asymmetric effects of oil price shocks on the economic performance of the GCC nations (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates). This study uses the panel vector auto-regression (P-VAR) framework to investigate the causal links between real oil crude prices, real gross domestic product (GDP) of GCC countries, real GDP of GCC trading partners, real fiscal balance, inflation and real interest rate from 1980 to 2019. Through its alternative approach of the P-VAR framework, the paper shows the varying results of demand and supply driven oil shocks on GCC countries and other oil-producing countries. Its policy recommendation is that fiscal policy should be tailored to the cause of the oil price shock, to reduce its negative effects on GCC countries' economies.

Editorial: Interesting Papers From the 44th IAEE Conference...

CARBON-NEUTRAL LNG AND OIL: THE FUTURE OF HYDROCARBONS IN THE WORLD OF ENERGY TRANSITION?

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Summary

Climate policies and various barriers to carbon-intensive products, such as the Carbon Border Adjustment Mechanism in the EU, have been developed in traditional energy-importing countries, making the carbon footprint of hydrocarbon products increasingly important and influencing the competitiveness of the key energy exporters. The research has uncovered multiple obstacles existing in the carbon-neutral hydrocarbon markets - like the absence of standards on what is 'carbon neutrality,' how to acquire it (what emissions and from which elements of the value chain need to be monitored, who - the buyer or the seller - is liable for it). These hindrances impede the market's growth, which reduces its attractiveness to investors and customers. Nations and businesses still have global emissions reduction objectives, and solutions to reduce emissions will be a priority, especially following a poor showing in 2022. When natural gas prices stabilize, importers will likely refocus on their climate commitments, portraying the advantages of carbon-neutral hydrocarbons.

THE NEW GEOPOLITICS OF ENERGY TRANSITION IN THE MIDDLE EAST

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Summary

According to BP's 2022 report, the Middle East contains close to half of the earth's proven oil reserves and over 40% of proven gas reserves. The region has become more essential as the dispute in Ukraine has presented the realistic possibility of Russian oil and gas supplies being hindered either by long-term sanctions or potential physical interference. This paper attempts to analyze the contribution of the Middle East to global energy transition strategies, particularly regarding ongoing global geopolitical developments. It covers several key occurrences, such as the shale oil revolution, the COVID-19 pandemic, and the Ukraine conflict. An important source of energy for the world will be the Middle East. The leading producing countries in the Middle East are broadening their production capacity, instead of the reduced investment in hydrocarbon production in other regions caused by ESG pressures. The primary Middle Eastern oil-producing countries are well-positioned to offer the world low-carbon energy and are committed to doing so. This goal can be accomplished by hastening carbon capture and sequestration technologies and the production and distribution of hydrogen.

Editorial: Interesting Papers From the 44th IAEE Conference...

COMPARATIVE ASSESSMENT OF LCA FOR PEM FUEL CELL BUS WITH DIESEL AND ELECTRIC BUS: A CASE STUDY IN SAUDI ARABIA

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Summary

Hydrogen proton-exchange membrane (PEM) fuel cell vehicles (FCVs) is a promising novel solution for decarbonizing the transport sector. There are three primary forms of hydrogen to power the PEM fuel cell vehicle: 'gray,' 'blue,' and 'green.' Grey hydrogen is produced from natural gas, blue hydrogen is also from natural gas that captures carbon dioxide (CO₂) emissions using carbon capture and storage (CCS), whereas green hydrogen is made from water electrolysis powered by zero/ low carbon energy sources. Gray and blue hydrogen get the spotlight in this study because they are more cost-effective and have more technological access than green hydrogen. Fossil fuels like crude oil and natural gas are heavily used in Saudi Arabia as an energy provider. Gray and blue hydrogen sources are more attainable and workable for PEM fuel cell vehicle growth in Saudi Arabia. In contrast, there are few studies on the life cycle assessment (LCA) of heavy-duty vehicles in the literature. The advancements in battery recycling, the emergence of solid-state battery technology and its application to cars, the use of aluminum to reduce weight in vehicle production, and pipelines to transport hydrogen will all affect life-cycle emissions and energy consumption. It would be beneficial to investigate these areas of research in the future.

ENERGY TRANSITION AND EXPORT DIVERSIFICATION IN OIL-DEPENDENT COUNTRIES: THE ROLE OF STRUCTURAL FACTORS

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Summary

Oil-exporting countries are heavily reliant on their carbon assets (including oil and gas) for economic prosperity. Taking a closer look at economies that rely on oil income, they have not been greatly advantaged by utilizing their natural resources. Oil countries have faced many difficulties in managing their wealth, such as the Dutch disease, the unsteadiness of resource revenues, and a lack of skills transfer, to name a few. Nations who export oil (like the Gulf Cooperation Council countries) are changing their systems and working towards making their economies less reliant on exhaustible resources. There are many who have set out a strategic plan or vision to head in this direction. Saudi Arabia has implemented The National Transformation Program that seeks to boost the government's operational proficiency and upgrade the infrastructure to encourage economic growth. This paper illustrates how these policy measures and reforms could increase the chances of countries having a more diversified and resilient economy.

Editorial: Interesting Papers From the 44th IAEE Conference...

RESILIENCE OF SAUDI ARABIA'S ECONOMY TO OIL SHOCKS: EFFECTS OF ECONOMIC REFORMS

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Summary

This study evaluates how the realization of Vision 2030 policies affects the Saudi economy's capacity to withstand oil price and production shocks. Using the Blazquez et al. (2021) Dynamic Stochastic General Equilibrium model to capture the economic diversification policies and generate a resilience index, we determine that lacking economic diversification, policy reforms designed to stimulate long-term economic growth such as instituting a Value Added Tax (VAT), may increase the instability of macroeconomic aggregates. A resilience index constructed of impulse functions evaluates this. The analysis suggests that putting in place a VAT or adjusting domestic energy costs can improve economic growth over time but does not make the economy more resilient. When the policy package includes the economic diversification policies of Vision 2030, the economy's resilience increases by 60%.

SHORT-TERM ACTIONS TO ADDRESS THE CURRENT OIL AND GAS CRISIS IN THE APEC REGION

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Summary

This paper outlines some short-term measures that APEC countries can take to reduce the financial burden caused by interruptions in their oil and gas supply. Although there is potential for these short-term actions to be executed, there could be some limits or hurdles preventing this from happening. Further investment may be necessary, not only in oil and gas, but in the supply chains that facilitate these activities, to put into place further short-term mitigation measures to help with this and any potential future energy crisis.

Editorial: Interesting Papers From the 44th IAEE Conference...

ESG AND ITS IMPACT ON OIL & GAS INVESTMENTS

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Summary

Climate change activists and social issues have caused external disapproval of the oil and gas industry, which has generated a stigma that has resulted in investors becoming disinterested in financing upstream projects, thus decreasing investment attractiveness. To ensure energy security from 2025 and beyond, a significant increase in investment in oil and gas is an absolute necessity. Unclear understanding of the environmental, social and governance (ESG) criteria can lead to a lack of investments and instability in the oil and gas sector. Fulfilling ESG criteria is not solely dependent on environmental activities, and the governance and social factors are not being given the attention they deserve. Climate policies have a considerable amount of pressure and influence on governments, national oil companies, and international oil companies.

GLOBAL OIL INVENTORY RESPONSES TO GEOPOLITICAL SHOCKS

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Summary

Economic and geopolitical disruptions often cause unrest in global oil markets in several ways. The reaction of oil stocks to supply-side shocks in the global crude oil market is determined by the producers affected, the activity of specific importers, and the market condition prior to the shock. This fluctuation makes it immensely tough to estimate the new market balance, which could arise from unforeseen or premeditated (e.g., resulting from sanctions) market disruptions. Unexpected results may happen due to specific details of bilateral trade relations and different pre-existing market situations. Simulations back up the fact that, depending on market situations and exporting countries, oil inventories will respond to a supply shock in a certain way, validating the GOVAR model for the issue at hand. Investigating the behavior of diesel and gasoline stocks, as well as the ratio between crude and products inventories, in reaction to market shocks could be the subject of further research.



Appendix

World oil demand, 2022 - Q1 2025 (MMb/d)

		2022	Q1	Q2	Q3	Q4	2023	Q1	Q2	Q3	Q4	2024	Q1	
Americas	OECD	United States	20.5	20.5	20.5	20.6	20.4	20.5	20.3	20.4	20.7	20.8	20.6	20.7
		Canada	2.4	2.4	2.3	2.4	2.5	2.4	2.4	2.4	2.5	2.5	2.5	2.5
		Mexico	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0
		Chile	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.4	0.4	0.4	0.4	0.4
		Total	25.1	25.1	25.1	25.2	25.1	25.2	25.0	25.1	25.5	25.6	25.3	25.4
	Non-OECD	Argentina	0.7	0.7	0.7	0.7	0.6	0.7	0.6	0.7	0.7	0.7	0.7	0.4
		Brazil	3.1	3.0	3.1	3.2	3.2	3.1	3.1	3.2	3.3	3.3	3.2	3.1
		Venezuela	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
		RO Latin America	2.4	2.3	2.4	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.5	2.5
		Total	6.4	6.3	6.5	6.6	6.6	6.5	6.5	6.6	6.8	6.8	6.7	6.3
Total Americas		31.5	31.4	31.6	31.8	31.7	31.6	31.5	31.8	32.3	32.4	32.0	31.7	
Europe	OECD	Germany	2.2	2.1	2.2	2.3	2.2	2.2	2.1	2.3	2.3	2.2	2.2	2.2
		France	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.7	1.7	1.6	1.6	1.6
		United Kingdom	1.4	1.4	1.4	1.5	1.5	1.4	1.5	1.5	1.5	1.5	1.5	1.5
		Poland	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.8	0.8	0.7	0.7
		Türkiye	1.0	0.9	1.0	1.1	1.1	1.0	0.9	1.1	1.2	1.1	1.1	1.0
		RO OECD Europe	6.7	6.9	6.6	6.7	7.0	6.8	6.9	7.1	7.0	7.0	7.0	7.0
	Total OECD Europe	13.7	13.7	13.6	13.9	14.2	13.8	13.7	14.3	14.4	14.2	14.1	13.9	
Asia-Oceania	OECD	Australia	1.1	1.1	1.1	1.1	1.2	1.1	1.1	1.1	1.2	1.1	1.1	
		Japan	3.5	4.0	3.3	3.3	3.6	3.5	3.8	3.2	3.4	3.8	3.6	4.0
		Republic of Korea	2.5	2.7	2.5	2.4	2.6	2.5	2.6	2.4	2.4	2.6	2.5	2.6
		New Zealand	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
		Total	7.2	7.9	7.0	7.0	7.5	7.4	7.8	6.9	7.1	7.7	7.4	7.9
	Non-OECD	China	14.8	15.1	15.5	15.7	15.9	15.5	15.9	15.8	15.7	15.9	15.8	15.9
		India	5.2	5.5	5.7	5.0	5.6	5.5	5.8	5.9	5.2	5.7	5.7	6.0
		Indonesia	1.8	1.8	1.8	1.8	1.8	1.8	2.0	1.9	1.9	1.8	1.9	1.9
		RO Asia	7.0	7.4	7.2	7.2	7.1	7.2	7.7	7.4	7.5	7.4	7.5	8.0
		Total	28.8	29.8	30.3	29.7	30.4	30.0	31.4	31.0	30.2	30.9	30.9	31.8
Total Asia-Oceania		36.0	37.7	37.2	36.7	37.9	37.4	39.2	37.9	37.3	38.6	38.3	39.7	
Middle East	OECD	Israel	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
		Bahrain	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
	Non-OECD	Iraq*	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.9
		Kuwait	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4
		Oman	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
		Saudi Arabia	3.7	3.2	4.0	4.4	3.6	3.8	3.3	4.1	4.5	3.7	3.9	3.3
		Qatar	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
		UAE	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
		Total GCC	6.5	6.0	6.9	7.5	6.5	6.7	6.1	7.1	7.6	6.7	6.9	6.2
		Iran	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.8	1.8	1.8
		RO Middle East	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5
		Total	8.8	8.3	9.2	9.7	8.8	9.0	8.4	9.4	9.9	9.0	9.2	8.5
	Total Middle East		9.0	8.5	9.4	10.0	9.0	9.2	8.7	9.6	10.2	9.2	9.4	8.8
Africa	Non-OECD	Egypt	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.9	0.8	0.9
		South Africa	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
		Other Africa	2.7	2.9	2.9	2.6	2.8	2.8	3.0	3.0	2.7	3.0	2.9	3.2
	Total Africa		4.1	4.3	4.2	4.0	4.2	4.2	4.5	4.4	4.2	4.4	4.4	4.6
Eurasia	Non-OECD	Russia	3.7	3.6	3.5	3.8	3.6	3.6	3.4	3.5	3.8	3.7	3.6	3.5
		RO Eurasia	2.0	1.8	1.9	2.1	2.0	2.0	1.8	2.0	2.2	2.1	2.0	1.8
	Total Eurasia		5.7	5.4	5.4	5.9	5.7	5.6	5.2	5.5	6.0	5.8	5.6	5.4
Global Demand		100.1	101.0	101.5	102.4	102.7	101.9	102.9	103.4	104.3	104.6	103.8	104.2	

World oil supply, Q1 2023 - Q1 2025 (MMb/d)

	Q1	Q2	Q3	Q4	2023	Q1	Q2	Q3	Q4	2024	2025 Q1
Africa	7.51	7.57	7.41	7.33	7.46	7.28	7.23	7.18	7.12	7.20	7.05
Americas	35.28	36.29	37.13	37.23	36.48	37.38	38.04	38.48	38.25	38.04	38.01
Asia	9.21	9.03	9.09	9.11	9.11	9.13	9.14	9.14	9.13	9.14	9.13
Eurasia	13.86	13.65	13.70	13.69	13.73	13.70	13.74	13.78	13.80	13.75	13.82
Europe	4.20	4.26	4.35	4.42	4.31	4.47	4.52	4.56	4.61	4.54	4.66
Middle East	30.11	30.34	30.67	31.01	30.53	31.21	31.35	31.47	31.57	31.40	31.55
Total	100.17	101.15	102.35	102.81	101.62	103.17	104.02	104.61	104.47	104.07	104.22
	Q1	Q2	Q3	Q4	2023	Q1	Q2	Q3	Q4	2024	2025 Q1
Conventional	71.31	71.53	71.95	72.18	71.74	72.19	72.20	72.16	71.98	72.13	71.75
Extra heavy oil	3.41	3.45	3.53	3.57	3.49	3.59	3.60	3.60	3.60	3.60	3.59
Oil sands	3.32	3.25	3.25	3.28	3.28	3.26	3.23	3.30	3.32	3.28	3.29
Oil shale (kerogen)	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06
Other liquids	6.87	7.32	7.63	7.53	7.34	7.43	7.86	8.07	7.85	7.80	7.69
Tight oil	12.31	12.56	12.87	13.05	12.70	13.39	13.74	14.03	14.22	13.84	14.35
Unconventional gas	2.90	2.99	3.06	3.15	3.02	3.25	3.34	3.40	3.43	3.36	3.48
Total	100.17	101.15	102.35	102.81	101.62	103.17	104.02	104.61	104.47	104.07	104.22
	Q1	Q2	Q3	Q4	2023	Q1	Q2	Q3	Q4	2024	2025 Q1
Algeria	1.01	0.99	0.75	0.63	0.85	0.57	0.54	0.52	0.52	0.54	0.51
Angola	1.12	1.13	1.15	1.14	1.13	1.12	1.10	1.07	1.04	1.08	1.00
Congo	0.26	0.25	0.25	0.24	0.25	0.23	0.22	0.22	0.21	0.22	0.21
Equatorial Guinea	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Gabon	0.19	0.19	0.19	0.18	0.19	0.18	0.18	0.17	0.17	0.18	0.16
Iran	2.58	2.60	2.63	2.68	2.62	2.68	2.71	2.76	2.81	2.74	2.78
Iraq	4.46	4.45	4.41	4.39	4.43	4.38	4.38	4.38	4.37	4.38	4.37
Kuwait	2.69	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
Libya	1.16	1.17	1.19	1.20	1.18	1.21	1.21	1.22	1.23	1.22	1.25
Nigeria	1.26	1.28	1.29	1.30	1.28	1.30	1.31	1.30	1.29	1.30	1.28
Saudi Arabia	9.72	9.87	10.09	10.28	9.99	10.38	10.43	10.45	10.46	10.43	10.47
UAE	3.05	3.03	3.02	3.06	3.04	3.12	3.16	3.18	3.19	3.16	3.19
Venezuela	0.71	0.77	0.84	0.90	0.80	0.95	0.98	1.01	1.02	0.99	1.03
Oil field production	28.28	28.50	28.57	28.77	28.53	28.90	28.98	29.05	29.09	29.01	29.03
Other production	5.48	5.59	5.70	5.78	5.64	5.81	5.84	5.87	5.89	5.85	5.88
OPEC	33.77	34.09	34.27	34.56	34.17	34.71	34.83	34.92	34.97	34.86	34.91
	Q1	Q2	Q3	Q4	2023	Q1	Q2	Q3	Q4	2024	2025 Q1
Call on OPEC	34.63	34.42	34.28	34.46	34.45	34.40	34.25	34.59	35.14	34.60	34.87
OPEC	33.77	34.09	34.27	34.56	34.17	34.71	34.83	34.92	34.97	34.86	34.91
OPEC Partner	15.66	15.45	15.50	15.49	15.52	15.48	15.51	15.54	15.56	15.53	15.57
Non-OPEC	50.74	51.61	52.58	52.77	51.92	52.97	53.68	54.15	53.93	53.69	53.73
Total	100.17	101.15	102.35	102.81	101.62	103.17	104.02	104.61	104.47	104.07	104.22

Glossary

MMb/d	Million barrels of oil per day
Kb/d	Thousand barrels of oil per day
Target inventories	A theoretical construct reflecting the aggregated 'normal' level of inventories desired by the oil industry to meet contractual obligations, provide a cushion for the complex supply chain that tends to deliver the product in batches, and buffer unanticipated changes in the supply of and demand for crude oil. It is derived from OECD inventory data using a trend component reflecting long-term economic growth, and a seasonal component reflecting phenomena such as the winter heating season, and summer driving and cooling seasons.
Real inventories	Represents the real inventory levels based on KOMO's forecast of supply/demand and inventory surplus/deficit balances.
Hedging pressure	<p>$HP = PMnS - MMnL$, where PMnS is producer/merchant/processor/user net short, and MMnL is managed money net long.</p> <p>Note that HP is always positive, meaning that managed money net longs are insufficient to meet all of the desired hedging of the PM traders. Also, a negative relationship between price and HP is expected. This is because as HP increases, there is expected to be downward pressure on price: more shorts seeking counterbalancing longs will put downward pressure on the price. The increased hedging pressure costs the short hedgers more because they have to accept lower prices.</p>
PM	Producers/merchants/processors/users
SW	Swap dealers
MM	Managed money
OR	Other reporters
NR	Non-reporters
OPEC partners	Azerbaijan, Bahrain, Brunei, Kazakhstan, Malaysia, Mexico, Oman, Russia, South Sudan and Sudan

About KAPSARC

KAPSARC is an advisory think tank within global energy economics and sustainability providing advisory services to entities and authorities in the Saudi energy sector to advance Saudi Arabia's energy sector and inform global policies through evidence-based advice and applied research.



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KOMO usually uses the IMF’s GDP forecasts. However, due to the timing of this publication, Oxford Economics’ GDP forecast numbers were used, rather than those of the IMF.

Same information as of April 2023 was used in the preparation of this Report.



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