



# KAPSARC Oil Market Outlook (KOMO)

Q2, 2022

## Preface

The KAPSARC Oil Market Outlook (KOMO) modeling experts have performed extensive revisions to the model this quarter:

1. Expanding the model to 2026.

When the model was developed in 2019, it had a limit of going up to 2023. In the first quarter of this year, the KOMO modeling experts conducted significant revisions and future-proofed it.

2. Revising the historical numbers based on the International Energy Agency's (IEA's) latest adjustments.

In the methodology for KOMO published in 2019, we stated that we used the IEA's numbers for our econometric modeling. The data used was the IEA's demand numbers up to 2018. Since the IEA revised its historical data for China, Saudi Arabia, and a few other countries, we revised the historical inputs which resulted in a demand hike of roughly 600 thousand barrels per day (Kb/d). Global oil demand in 2018 was set at 98.9 million barrels per day (MMb/d) and is now at 99.5 MMb/d.

3. Revising Russia's production capacity by 1.75 MMb/d down gradually over four quarters.

Given recent events, the conflict between Russia and Ukraine has escalated with Russia sending troops into Ukraine. As a result, several countries, particularly the United States (U.S.) and those in the European Union (EU), have contested these actions and placed sanctions on Russia. Whether Russian oil will be sanctioned and replaced by other countries, and how long this situation may endure, are all in question. Hence, the KOMO experts conducted two main scenarios where Russian oil would either be "unpopular" or "unavailable." In the *unpopular* scenario, we assumed that Russian production would diminish by 500 Kb/d to 2.5 MMb/d. The global dependence on Russian oil indicates that there will still be buyers if substitutes are not readily available, and if there are no further military escalations. In the *unavailable* scenario, a significant escalation in the conflict leads to secondary sanctions implemented by major consumers (U.S./EU). In this case, we estimate a decline of roughly 4 MMb/d to 5 MMb/d, but for now we consider this outcome less likely. As a result, our base case scenario (blending the two) estimates a decline of 1.75 MMb/d from Q2 2022. We expect this decline to happen gradually over the coming year as existing contracts expire and consumers shift to alternative suppliers.

## Summary

This quarter's highlights:

The drivers of this quarter's global demand outlook stem from multiple factors (i.e., the Russian-Ukrainian conflict, lower trade confidence, the U.S. Federal Reserve's interest rate hike, overall downward gross domestic product (GDP) revisions, continued inflation and the recent lockdowns in China due to COVID-19).

As a result, we anticipate a quarter-on-quarter (QoQ) decline in OECD demand of roughly 1 million barrels per day (MMb/d). However, seasonal consumption and developing country growth seem to be exceeding expectations, counterbalancing the OECD declines for a net global QoQ change of 0 MMb/d. Indeed, QoQ demand from the U.S and Canada, OECD Asia as well as Eastern OECD Europe are expected to decline, while Asian and Gulf Cooperation Council (GCC) demand are expected to increase significantly. Saudi Arabia's QoQ demand growth will be the highest as the summer season kicks in and the need for cooling becomes more visible (+730 Kb/d). For further details about Saudi Arabia's energy policies, refer to our editorial "Saudi Arabia's reform of its electricity sector has increased the oil available for export."

On the supply side, 760 thousand barrels per day (Kb/d) of net global growth is expected this quarter, with OPEC+ maintaining close to their 400 Kb/d monthly growth as well as gradually imposing their baseline adjustments of 1.632 MMb/d in May (500 Kb/d for Russia and Saudi Arabia each, 332 Kb/d United Arab Emirates, and 150 Kb/d for Iraq and Kuwait each). Although these accumulated adjustments are expected to happen this year, we do not expect them all to take place in May, but to be added proportionally month by month. We estimate that Russia's production may decline by roughly 500 Kb/d this quarter, with the remaining adjustments happening gradually over the year. Most OPEC+ members should reach their pre-pandemic production levels by the year end, as per its stated plan, barring physical limitations.

As oil prices were relatively high at the end of 2021, and passed the \$100 mark in Q1 2022, many OPEC+ members have seen a budget surplus for the first time in several years. This should go a long way toward maintaining cohesion among the group going forward if corrective action is needed to stem an oil surplus that could occur if (as assumed) Russian supply is less impacted than expected, OPEC+ and other supply sources remain robust, and demand is more reserved than prior estimates.

**Total global oil demand is expected to increase year-on-year (YoY) by 2.47 MMb/d in 2022 to 99.7 MMb/d, 900 Kb/d less than our Q1 2022 forecast. It is expected to grow by a further 2.13 MMb/d in 2023, 350 Kb/d less than our Q1 2022 forecast. These downward revisions are due to the Russian-Ukrainian conflict, the recent lockdowns in China as well as continued inflation levels across a wide array of commodities, particularly energy commodities. Indeed, supply chain disruptions, strengthening demand and the tightening of labor markets in both the developed and developing world are factors to be monitored.**

### *Summary continued...*

In our previous forecast, we estimated that inflation would fall in several developed and emerging economies. Inflation remains above its pre-pandemic levels. These challenges resonating from high demand and supply disruptions are coupled with the current conflict taking place in Ukraine. The prices of other commodities, such as wheat from Ukraine, are rising due to drier weather, a lack of fuels in February and March for farmers to grow crops, and export limitations. Hence, high fuel prices and, in the case of Ukraine, no sources of fuel alongside delayed and diminished seeding and sowing is likely to persist into 2022 and 2023. Furthermore, Russia produces roughly 11% of total global liquids and 18% of gas. Past underinvestment due to low prices, the pandemic, and a swift shift of priorities away from oil and gas toward renewables leaves us with a volatile mix of factors that are unlikely to be resolved quickly. Indeed, gas prices have even shot up to \$139/b in Q1 2022.

The International Monetary Fund (IMF) predicts global economic growth of around 3.6% in 2022 and 3.6% in 2023 (last year's expectations for 2022 were set at 4.9%). The OECD in its December outlook, "A balancing act," took a more moderate forecast with 4.5% in 2022 and 3.2% for 2023 (0.4% less than the IMF). However, their latest March report suggests that their 2022 forecast could be revised down by over 1%.

Despite the concern over the new lockdowns in China, lower confidence in trade, fuel rationing in Europe and a slowing global recovery, continued high inflation levels and soaring prices, the downsizing of monetary support, and the looming risk of a recession, KOMO's demand forecast hinges on the relative strength of post-COVID gross domestic product (GDP) growth. Furthermore, KOMO's baseline demand assumes that energy supplies will continue to grow and many of the negative situations which added a premium to confidence negativity sentiment remain temporary.

It is assumed that the global community, particularly the developing world, will carry most of the oil demand growth in 2022 and 2023. So, despite the rough patch that we faced in the first quarter of this year, the developing world should catch up to its growth projections despite elevated prices or an economic slowdown. In fact, even with an impact similar to that of the Global Financial Crisis, the KOMO modeling experts believe demand would continue growing (refer to the recession scenario in the Demand section).

COVID-19 variants are no longer expected to have profound impacts on economies nor demand. Although each country is applying their own measures independently, and some remain more conservative than others, two truths are emerging. The first is the acceptance that COVID-19 and its variants will remain a part of our daily lives. Vaccines will continue to roll out, booster shots may be needed in the short term, and public interactions will eventually return to some form of normal. The second, which is a silver lining for demand, has to do with transportation. Although the first quarter of this year has been challenging for aviation, the upward trend of flights and passengers travelling in 2021 indicates that in 2022 demand for aviation will resume to its pre-pandemic levels (refer to our editorial on aviation). This entails the possibility of further growth from global pent-up demand. Even China, which has a "zero-COVID" strategy and recently implemented lockdowns in Jilin, Shenyang, and areas of Shanghai and Beijing, is using a softer tone in official communications.

### *Summary continued...*

In almost all cases, hospital capacity is increasing, deaths (the most important measure) are falling sharply, restrictions are easing, and it seems that COVID-19 might be passing into the rear-view mirror.

In our previous report, we stated *“We also considered the results of our biannual survey indicating expectations for a 40%-48% likelihood of economic downturn risks for the next two years as well as a 78%-88% likelihood that inflation will persist in 2022 but drop in 2023. Respondents put the likelihood of further lockdowns in 2022 at 50%-65%, but they also see a significant fall in the number of lockdowns in 2023.”* This statement still stands. However, we do see the impact of these risks possibly running into 2023. So the results of our next survey in the Q3 publication should be enlightening.

Total global oil supply is expected to grow by about 5.67 MMb/d in 2022 (about 1.27 Kb/d less than our Q1 2022 forecast) and by 1.7 MMb/d in 2023 (about 800 Kb/d more than our Q1 2022 forecast). The downward revision for 2022 is partly due to the ongoing conflict between Russia and Ukraine, making Russian energy commodities unpopular. However, this downward revision could have been steeper if not for the past three quarters of elevated prices that have encouraged non-OPEC+ producers to increase production.

Indeed, national oil companies' (NOCs) budgets are in surplus for the first time in a while, and some investors are returning to the energy sector because of record profits. Furthermore, policymakers have been leaning toward the environmental, social, and governance (ESG) movement since before the Paris Agreement in 2015. However, energy security has now taken center stage.

An interesting question on the supply side is how will OPEC+ and international oil companies (IOCs) react to the current price environment?

As stated in OPEC's press release of the 27<sup>th</sup> OPEC and non-OPEC Ministerial Meeting on March 31, OPEC and its partners will continue with their agreed plans of monthly increments of 400 kb/d-432 Kb/d while also adjusting for the May revisions. Russia, on the other hand, as stated in the preface, is expected to witness declines of around 1.75 MMb/d. However, the KOMO modeling experts believe that both increments and the phase out will happen gradually, so not all of the May adjustments will take place and nor will Russian production disappear instantaneously. Although we do hear several countries asking OPEC members to increase production, the whole purpose of last year's revisions was so that all OPEC+ members, who cut back 9.7 MMb/d to accommodate the COVID-19-induced fall in demand, would be able to return to their 2019 levels. Given that demand is lower than expected by roughly 900 Kb/d, a steady hand on the tiller and a 'wait and see' approach should be the best way forward to avoid future volatility.

IOCs have been increasingly diversifying their portfolios and reducing their carbon exposures. However, given the recent geopolitical developments, their diversification plans were expedited, with several companies reducing their exposure to Russia by exiting or cutting their investments. Although IOCs are under

*Summary continued...*

pressure at the moment to fill in the gap and substitute Russian energy, it will be challenging for them to act in a speedy manner as oil and gas projects take several years to develop, and ESG risks/liabilities are mounting. Furthermore, those seeing an opportunity in developing big new projects or expanding existing ones are probably concerned that the market may not need them if Russia and Ukraine reach a diplomatic solution and sanctions against Russia are lifted.

Nevertheless, producers with shale deposits might be able to increase production, but to what extent? U.S. shale production is expected to grow by 1 MMb/d in 2022. Despite the upward trend in rig counts, drilled but uncompleted oil or gas wells (DUCs) have been drawing down significantly to maintain production at current levels and show fiscal discipline to their investors. This problem has been exacerbated by supply chain issues and skyrocketing tubular steel and sand prices. Without a ready-made backlog of DUCs to support growth in 2023, expansion is limited by new well development and depressed pricing of roughly 300 Kb/d.

Shale will constitute less than 20% of global liquids growth this year, while OPEC and its partners will represent more than 63%. Note that the OPEC+ share was set at around 75% in our previous forecast. This difference represents the possible lost production from Russia as well as the declining production capacity of several OPEC+ members. Depending on how things play out with Russian oil (is it 'unpopular' or 'unavailable?'), the interpretation of what counts as spare capacity changes significantly, which is an important indicator for the market and oil prices.

These base-case supply/demand trends suggest that the surplus should average 1.4 MMb/d in 2022 and 1 MMb/d in 2023. Q1 of this year is expected to have started with a surplus, despite dwindling inventories in some countries and rising prices. Furthermore, given the recent developments in March, Q2 2022 may average a surplus of 1 MMb/d-1.5 MMb/d. It is expected that this surplus will carry through 2022 and 2023 unless there is a material change to our Russia, OPEC+, or demand assumptions.

Under these assumptions, target inventory levels for the OECD are expected to rise by 194 MMb to 4,615 MMb in 2022 and increase by 36 MMb in 2023. The actual rise of target inventories, almost doubling from our last report, comes as the geopolitical risk premium rises, which naturally translates into countries trying to store more oil to build energy security. On the other hand, actual inventory levels, although below the new target levels throughout the next two years, are expected to continue growing. This would create an environment for prices to remain elevated beyond real fundamentals and actual oil demand. Hence, prices for 2022 will certainly be correlated to sentiment at a risk premium, despite global liquids being at adequate levels.

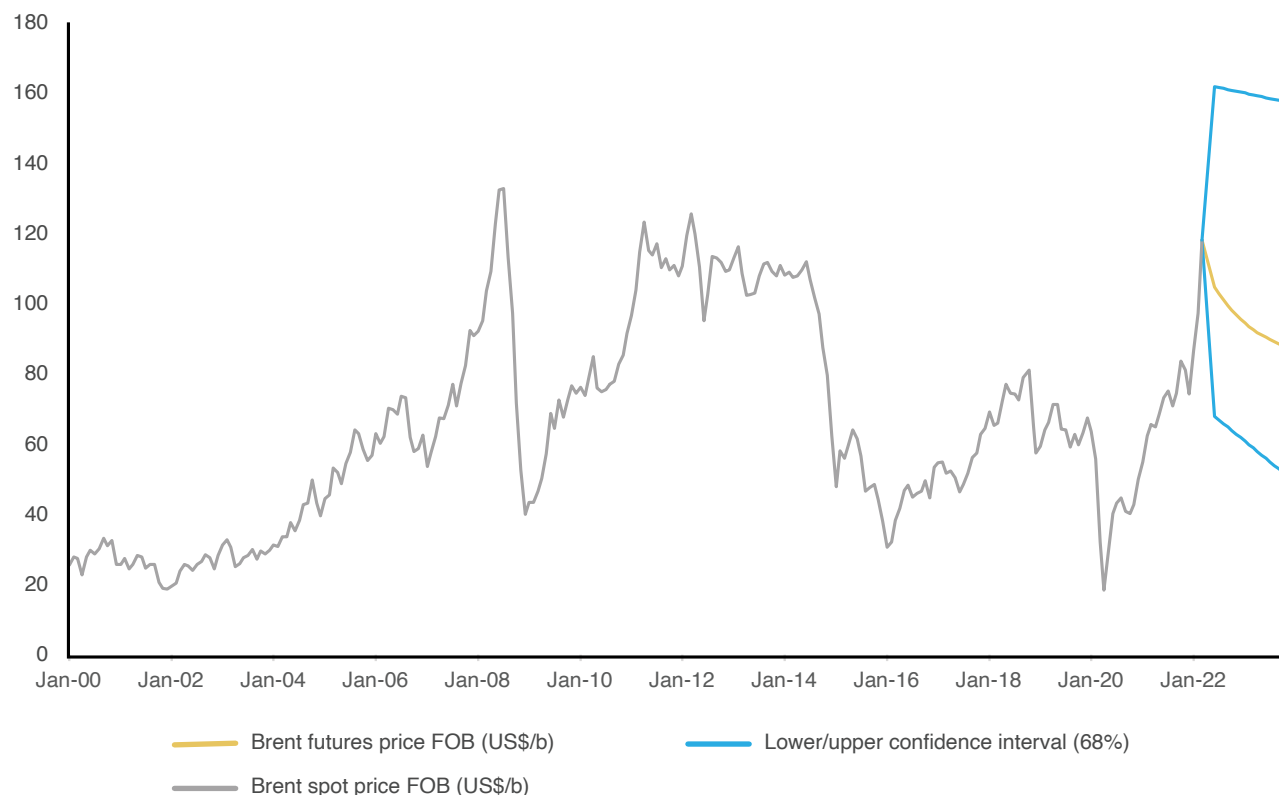
	2019	2020	Growth	2021.0	Growth	2022	Growth	2023	Growth
<b>Demand</b>	100.5	92.7	(7.9)	97.2	4.6	99.7	2.5	101.8	2.1
<b>Supply</b>	100.3	93.9	(6.4)	95.4	1.6	101.1	5.7	102.8	1.7
<b>Δ</b>	(0.3)	1.2		(1.8)		1.4		1.0	

## 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.

Despite the different shape of our confidence intervals, the figure above reflects high volatility on world oil markets, and the backwardation present in the Brent futures market.

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



Source: KAPSARC calculations based on NYMEX data, CME Group, FINCAD, March 2022.

US\$/b	Q2 2022	Q3 2022	Q4 2022	Q1 2023	Q2 2023	Q3 2023	Q4 2023	Q1 2024
Futures	\$105	\$101	\$97	\$93	\$91	\$89	\$87	\$86
50% CI	\$76 - \$143	\$74 - \$142	\$71 - \$140	\$68 - \$139	\$65 - \$137	\$62 - \$135	\$59 - \$134	\$56 - \$132
68% CI	\$97 - \$161	\$65 - \$161	\$62 - \$160	\$59 - \$159	\$56 - \$158	\$53 - \$158	\$50 - \$157	\$47 - \$156
95% CI	\$42 - \$260	\$40 - \$264	\$37 - \$270	\$35.35 - \$277.06	\$32 - \$283	\$30 - \$289	\$27 - \$295	\$25 - \$301

Note: CI = confidence interval

## Key issues for the oil market in 2021 and 2022

In the past few publications of KOMO, we have started this section by highlighting issues related to COVID-19 and its variants. However, in this publication we deemed it necessary to reflect on other things, such as the impact of elevated inflation on governments (particularly the developing world), the risk of a global recession, how elevated prices could prompt a faster shift toward energy transition in the longer term and how this could expedite future oil demand destruction, etc.

With regards to inflation, it would be prudent to understand how inflation on some primary commodities can seep into other commodities. Since oil prices have been elevated for the past few months, it would be natural for the prices of the commodities it transports to also be elevated. In late 2021, several economic organizations estimated that prices would decline; however, that has not happened. The risk of losing Russian oil production after several years of low investments has finally materialized as demand continues to strengthen. Couple this fact with supply chain disruptions (particularly food) and you have a recipe for a humanitarian crisis and civil unrest. Although several economies can carry these burdens, several developing countries will be forced to choose between fuel and food. If this situation were prolonged, it would not only impede demand for oil but continue to impede economic growth as well, and in a worst-case scenario, ignite further protests and riots.

We hear repeated concerns in the media today about the next recession, but no economist can actually predict it. However, a few scenarios we see happening today could lead to this outcome:

1. A fast increase in interest rates and the termination of fiscal stimulus/monetary support.
2. Sustained elevated energy prices and fuel rationing in Europe for a prolonged period.
3. The Russian-Ukrainian conflict expanding into neighboring territories.

Regardless of what is to come, one thing is for certain: Elevated prices are not good for either consumers or producers. Although producers might gain in the short term, they risk deteriorating long-term oil and gas demand as non-producers accelerate their energy transition.

In CERAWEEK 2022, an interesting dialogue took place around the topic “Funding Future Oil and Gas Supply: Preemptive Underinvestment?” Bob Maguire, a managing director in the Carlyle Group, highlighted the challenges that many investors face. One is trying to find a middle ground between the fossil fuel community and the ESG community. The fact that both groups cannot reach a middle ground is a factor making investors shy away from the sector. The second thing

he highlighted hit the nail on the head concerning a time frame for the transition. Investments are intended to grow, thrive, and become sustainable. However, investors are likely to continue shying away from the oil and gas sector, despite the possible high returns in the short run, simply because they have no reference for a timeframe regarding the energy transition.

Hence, if there is an unseen benefit in what is going on, it is in bringing both groups to the table. The oil and gas sector needs constructive cooperation with its ESG counterparts, and investors need a timeline to plan accordingly. Addressing these two factors should bring stability to the market.

Regardless of what is to happen, our demand forecast remains predicated on the vaccine rollout continuing, and health conditions improving. We believe that the world is on the right track, but we also believe that it could be better prepared for further minor waves as the downside risks are so great. The key to bringing back the labor force, dissolving bottlenecks and reigning in inflation is widespread vaccine distribution, and this will likely be accomplished by the end of 2022, though inflation might take longer to resolve.

As a result, we anticipate oil demand growth in 2022 averaging 2.47 MMB/d, with non-OECD countries leading the increase, representing 1.52 MMB/d. OECD demand growth is expected to average 960



## Key issues for the oil market in 2021 and 2022...

Kb/d in 2022. Despite the significant rise, both OECD and non-OECD countries are expected to remain at roughly 500 Kb/d each, below our previous forecast in Q1 2022. Hence, demand returning to pre-pandemic levels is likely to be delayed until the end of this year or early 2023.

The outlook for supply in 2022 and 2023 has much to do with the price curve of the past few months as well as with relations between Russia and consumer nations. Regardless of what happens to prices, all eyes are on policymakers' attitudes toward Russian oil. Will Russian energy commodities be *unpopular*, or will they be *unavailable*? In the *unpopular* case, Russian oil will still remain as part of the global market and spare capacity will be relatively high, stabilizing prices to an extent. However, if Russian oil becomes *unavailable* with 4-5 MMb/d removed, spare capacity will become a major issue and prices will remain significantly elevated. The base case of this report assumes Russian oil remains *unpopular* with some of the risk of it being *unavailable*. It assumes that the full removal of Russian oil from the market is unlikely, so those barrels still qualify as spare capacity in the short term.

There are many divergent future scenarios, but most agree that western IOCs are likely to reduce their investments and close shop in the former Soviet Union (FSU) region. Although these actions remain beyond KOMO's two-year scope, they will substantially affect future production capacity. Would this warrant more

investment in upstream activity going forward, or perhaps shift investments elsewhere such as to Brazil or Guyana? Or would this mean that OPEC+ would need step up its strategy? All these actions would seem to have a positive outcome, but they would also face substantial risk in the event of a political resolution between the U.S., EU and Russia, rendering any future investment in higher cost reserves obsolete if Russian oil comes back to the market.

This leaves four players other than OPEC+ that can ramp up production and address the possible supply gap: Iran, Venezuela, Libya, and U.S. shale. With regards to Iran, the Joint Comprehensive Plan of Action (JCPOA) continues to be under discussion, but there has already been a significant level of covert exports and ramp-up underway. So even under a scenario of breakthroughs, Iran is likely to grow its production by only 200 Kb/d-300 Kb/d this year. Both Iran and Venezuela face the same problem of an extensive period of time without development, so a speedy ramp-up is unlikely. Furthermore, Venezuela's production has been supported by Russia and Iran. So if Iran finds a resolution and Russia becomes capped, Venezuela might face additional challenges without their support. Although the IOCs are eager to come back to Venezuela, their objective would likely be to recoup the debts they are owed, which would eat into Venezuelan revenues. Moreover, Libya has been struggling internally with its oil fields the victim of ongoing unrest. Despite prices rising, the pressure on this sector has

worsened, so a speedy recovery will depend on a political shift. In all of the regions mentioned above, higher fuel and food prices will only exacerbate the tensions. This leaves shale, where production is likely to grow by 1 MMb/d in 2023 and 300 Kb/d in 2023. Although shale has showed immense potential in growing beyond 1 MMb/d YoY, 2020 and 2021 had low levels of drilling, which is why DUCs continue to decline, maintaining production levels despite high prices.

OPEC and its partners have shown restraint and have balanced the market since 2020, doing what they can based on their budgets and abilities. Larger, better-off members like Saudi Arabia and the United Arab Emirates (UAE), among others, have invested in increasing their production capacity, with more to come. Other members are now potentially facing difficulties regaining their prior production levels, either due to a lack of investment or the disuse of existing oil fields. In all cases, we assume that OPEC and its partners will stick to their ceiling quotas, but that does not necessarily mean that their anticipated increments of 400 Kb/d will materialize. Furthermore, we also assume that the May baseline adjustments agreed last year will be brought online gradually.

Hence, global supply growth for 2022 is estimated at 5.67 MMb/d, with the majority coming from existing sources like OPEC+. Next year could see 1.71 Kb/d of additional supply come online, most of it also coming from OPEC's ongoing easing.

### *Key issues for the oil market in 2021 and 2022...*

*KOMO's supply/demand forecast is an average for each quarter and does not consider short-term volatility. Actual changes to supply and demand will, of course, remain volatile, reflecting the responses to current geopolitical changes and the duration of the COVID-19 pandemic. Other challenges may include unexpected oil supply cuts due to hurricanes, OPEC+ compliance, and geopolitical tensions escalating/diminishing, among others.*

## Demand forecast

Global oil demand is projected to grow by 2.5 MMb/d in 2022 and increase by an additional 2.1 MMb/d in 2023 YoY. However, fears over the global economic and geopolitical outlook have pushed our forecast for 2022 down. In our previous report, KOMO Q1 2022, we estimated quarter-on-quarter (QoQ) global demand would grow slightly in Q1 2022. However, given higher oil prices and continued inflation, on top of the geopolitical issues in Eastern Europe, demand shrunk by roughly 530 Kb/d. This quarter, however, oil demand is expected to continue to stagnate, despite doing exceptionally well in the non-OECD countries, with Saudi Arabia leading the demand growth used for cooling purposes (730 Kb/d). The stagnation is primarily the result of reductions in the OECD nations, particularly OECD Asia and Eastern Europe.

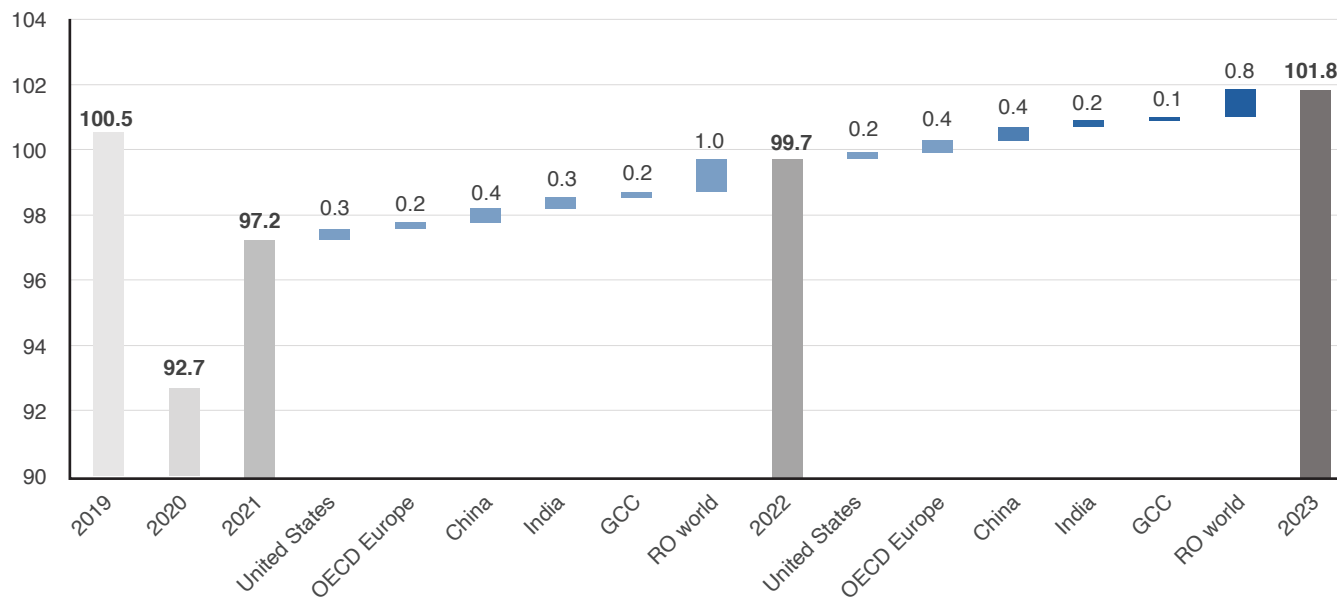
Although 2021 witnessed an unusual pattern of similar growth levels in both OECD and non-OECD countries, 2022 is back on track, with non-OECD countries leading demand growth. Hence, OECD growth for 2022 and 2023 is expected to reach 960 Kb/d and 830 Kb/d, respectively, whereas non-OECD countries are estimated to witness growth of between 1.5 MMb/d and 1.3 MMb/d.

The U.S. is expected to witness the highest growth for 2022, at around 460 Kb/d, carrying 32% of OECD growth this year. As mentioned in our last publication, all OECD countries are expected to witness demand growth in 2022 except for New Zealand, which is expected to stagnate and see slight declines. Next year, on the other hand, will show smoother growth across all members.

China is the runner-up in global growth for 2022 and leads the growth for non-OECD countries at around 430 Kb/d, representing 28% of non-OECD growth. Note that China's growth for 2021 was estimated at 1 MMb/d, so a relative decline of 60% is worrying. However, it also shows China's potential for higher growth under positive conditions or under a lower price environment. Both the U.S. and India follow through with growth in 2022 at around 320 Kb/d and 340 Kb/d, respectively.

As for regional growth, Latin America, Africa and the Middle East are expected to grow at around 200 Kb/d each, while Eurasia is expected to witness declines of roughly 300 Kb/d due to the sanctions on Russia. Although OECD Europe is expected to witness demand growth this year of around 200 Kb/d, it remains to be monitored, given how the conflict in Ukraine is escalating.

Annual global oil demand growth, MMb/d, 2019 - 2023



Source: KAPSARC, March 2022.

### Demand forecast...

What if a recession occurred?

(Analysis conducted on March 28, 2022)

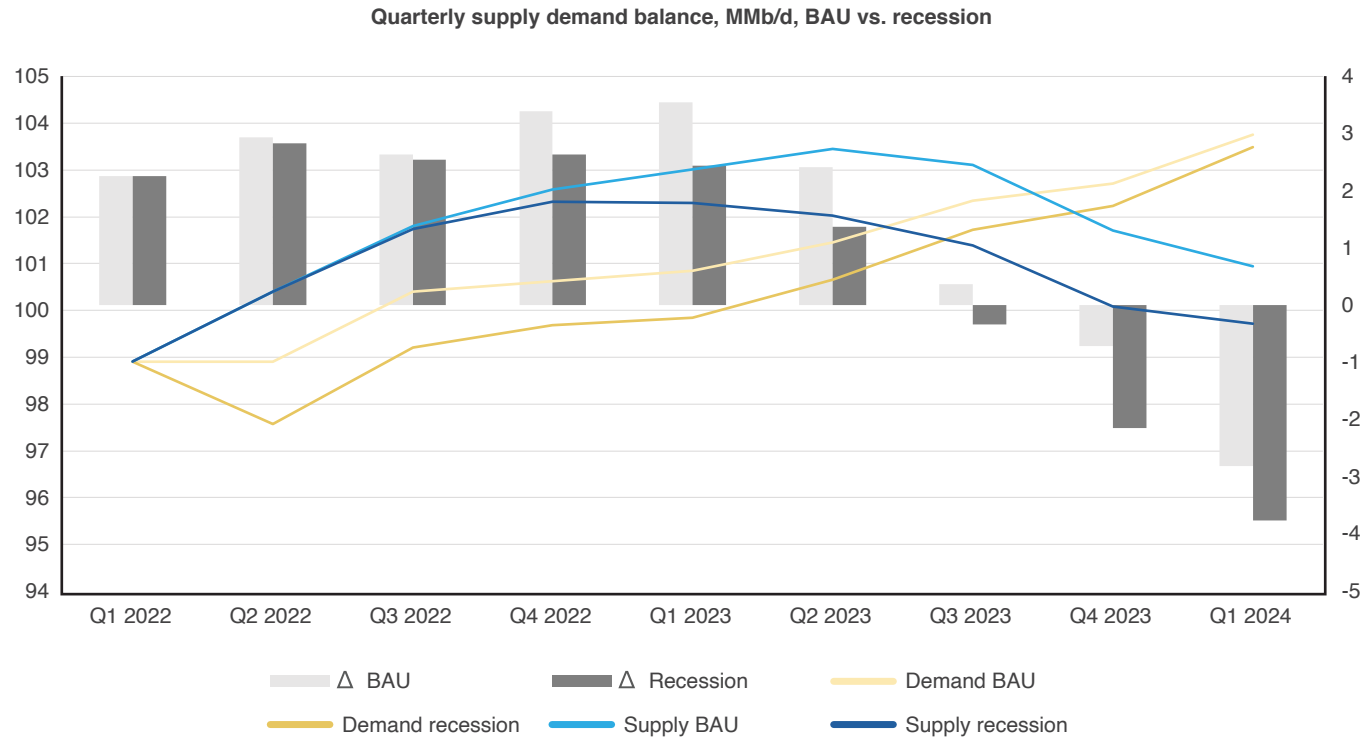
As mentioned in the discussion of key issues impacting oil markets for 2022 and 2023, we keep reading in the news about a possible recession. Although likely, and our last survey concluded that there is a 40%-48% likelihood of an economic downturn, we believe that it would need a trigger, such as:

1. A fast increase in interest rates and the termination of fiscal stimulus/monetary support.
2. Sustained elevated energy prices for a prolonged period.
3. The Russian-Ukraine conflict expanding to neighboring territories.

Surprisingly, even under a situation where the global economy faces a recession similar to that of the 2008-2009 financial crisis, the model still estimates growth in demand of roughly 1 MM/d-1.6 MMb/d.

	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Q1 2023	Q2 2023	Q3 2023	Q4 2023	Q1 2024
Demand BAU	93.93	96.66	99.07	99.30	98.91	98.91	100.40	100.63	100.85	101.45	102.35	102.72	103.76
Demand recession	93.93	96.66	99.07	99.30	98.91	97.57	99.21	99.69	99.85	100.66	101.72	102.24	103.49
Supply BAU	93.93	96.66	99.07	99.30	98.91	100.40	101.80	102.59	103.02	103.45	103.10	101.71	100.95
Supply recession	93.93	96.66	99.07	99.30	98.91	100.40	101.75	102.32	102.29	102.03	101.39	100.09	99.72
Δ BAU	-0.70	-1.23	-1.92	0.78	2.25	2.93	2.63	3.39	3.55	2.41	0.37	-0.72	-2.81
Δ Recession	-0.70	-1.23	-1.92	0.78	3.77	2.83	2.54	2.64	2.45	1.37	-0.33	-2.15	-3.77

Demand forecast...



Source: KAPSARC, March 2022.

## Demand levels, MMb/d

2021	Q1	Q2	Q3	Q4	2021
<b>OECD</b>	43.1	44.7	46.3	46.4	<b>45.1</b>
<b>Non-OECD</b>	50.8	52.0	52.8	52.9	<b>52.1</b>
<b>Global demand</b>	93.9	96.7	99.1	99.3	<b>97.2</b>

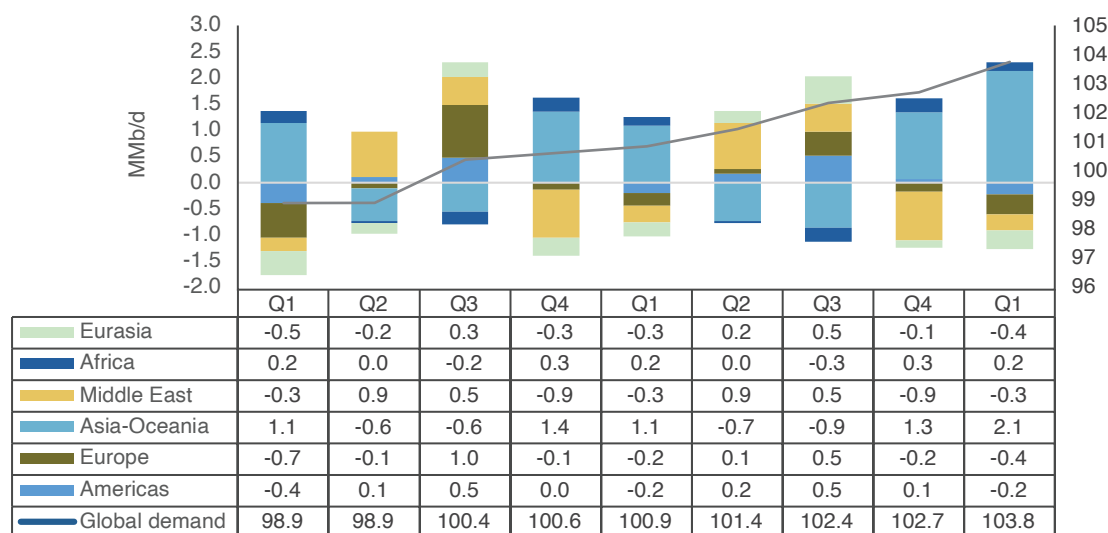
2022	Q1	Q2	Q3	Q4	2022
<b>OECD</b>	45.9	44.9	46.5	47.1	<b>46.1</b>
<b>Non-OECD</b>	53.1	54.0	53.9	53.5	<b>53.6</b>
<b>Global demand</b>	98.9	98.9	100.4	100.6	<b>99.7</b>

2023	Q1	Q2	Q3	Q4	2023
<b>OECD</b>	47.0	46.1	47.0	47.5	<b>46.9</b>
<b>Non-OECD</b>	53.9	55.4	55.3	55.2	<b>54.9</b>
<b>Global demand</b>	100.9	101.4	102.4	102.7	<b>101.8</b>

2024	Q1
<b>OECD</b>	47.5
<b>Non-OECD</b>	56.3
<b>Global demand</b>	103.8

Non-OECD countries are expected to retain a 54% share of global oil demand in 2022 and 2023. They will also account for 61% of demand growth in 2022 and 2023. Although non-OECD countries were expected to represent a higher portion of growth in 2023, the cut in demand growth faced by OECD countries in 2022 will start to recover in 2023. QoQ, the Middle East will witness the largest change, as demand from Saudi Arabia and other GCC countries increases in preparation for the summer cooling season.

Regional oil demand growth, MMb/d, Q1 2022 - Q4 2023



Source: KAPSARC, March 2022.

## United States

MMb/d	2021	Q1	Q2	Q3	Q4	2022	Q1	Q2	Q3	Q4	2023	Q1
United States	20.0	20.2	20.2	20.4	20.5	20.3	20.4	20.4	20.6	20.7	20.5	20.6

### 2022-2023

U.S. oil demand is expected to grow by around 320 Kb/d in 2022 and continue to grow by 200 Kb/d in 2023, reaching its 2019 levels by the end of our forecast, in Q4 2024.

for several fuels during the quarter, such as gasoline by 230 Kb/d and heavy fuels by 180 Kb/d. However, declines in gas and diesel oil of roughly 310 Kb/d, and

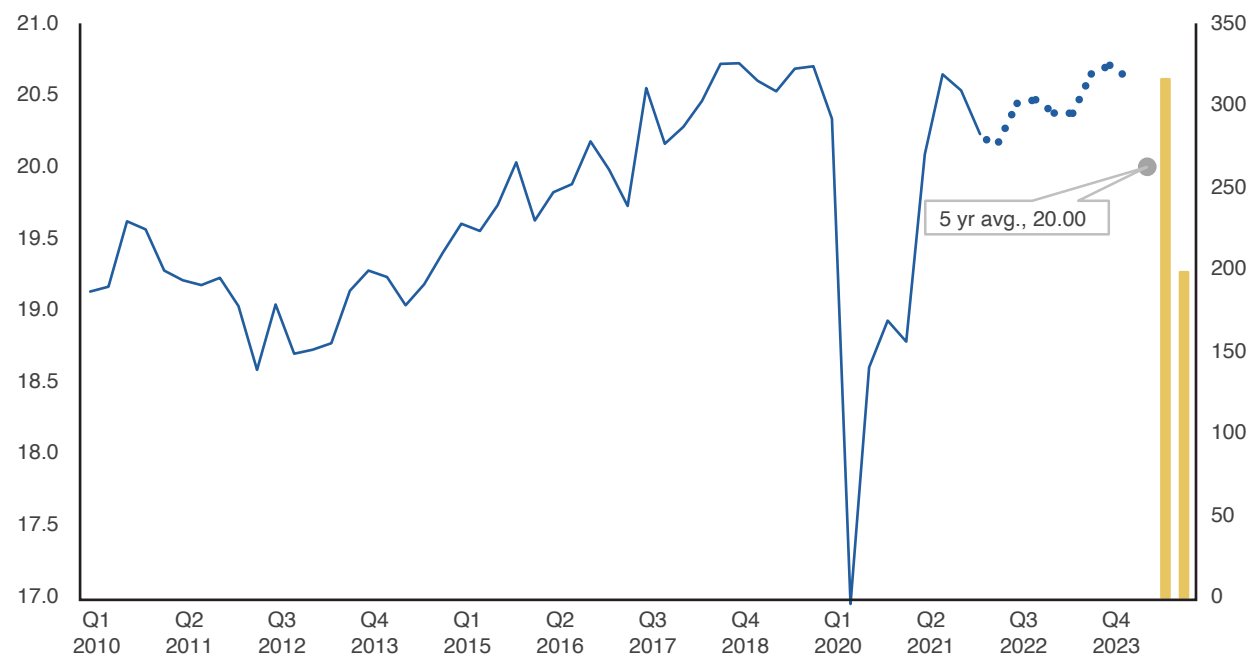
LPG and fuel oil of around 40 Kb/d each, will counter that growth as the need for these fuels declines due to the end of the winter season, reflecting normal seasonal behavior.

Just as transportation fuels were hit the hardest in 2020, they have recovered the fastest in 2021 and are expected to continue to do so in 2022. U.S. gasoline demand in 2022 should see the strongest growth (150 Kb/d), followed by gasoil/diesel (60 Kb/d), liquified petroleum gas (LPG) (40 Kb/d) and other heavy fuels. The semiconductor shortage has resulted in a surge of sales for second-hand vehicles during 2021. This year is expected to see vehicle price inflation and, as a result, we estimate vehicle fuel demand will remain modest, but with the potential to increase. The impact of the recent U.S. Strategic Petroleum Reserve release declaration on prices is expected to be minimal. However, as the risk of geopolitical tensions eases and an oversupply becomes more evident, the need for this kind of intervention again may be reduced.

### Q2 2022

We expect U.S. demand to decline this quarter by around 50 Kb/d. We anticipate a surge in demand

United States, MMb/d (L) and 22-23 growth Kb/d (R)



Source: KAPSARC, March 2022.

## OECD Europe

MMb/d	2021	Q1	Q2	Q3	Q4	2022	Q1	Q2	Q3	Q4	2023	Q1
OECD Europe	13.3	13.1	13.0	14.0	13.9	13.5	13.7	13.7	14.2	14.0	13.9	13.7

### 2022-2023

OECD Europe's oil demand is expected to grow by 200 Kb/d in 2022 (400 Kb/d less than in our Q1 2022 report) and another 400 Kb/d in 2023. Like the U.S., OECD Europe was expected to recover much faster, but not regain all of its lost demand from 2020. However, their demand has been subdued due to the recent geopolitical tensions and continued elevated inflation rates. Demand may even decline further, based on how the aforementioned situations unravel.

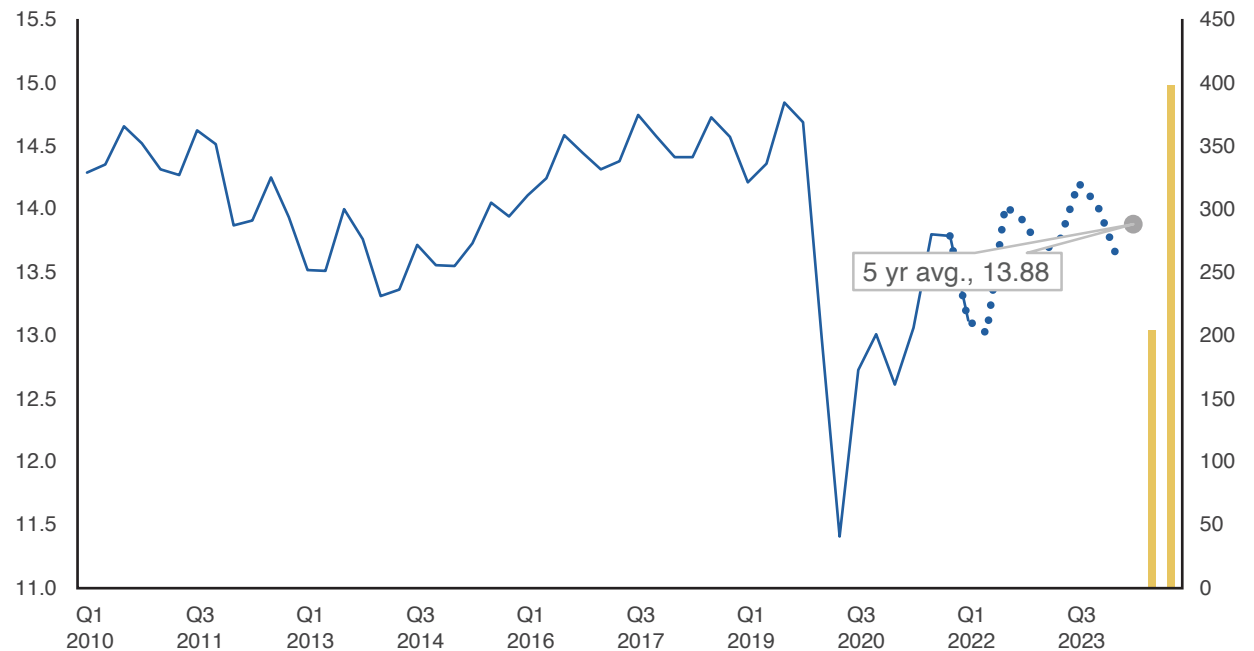
We expect growth across all fuels of around 4 Kb/d-30 Kb/d, except diesel demand, which is expected to grow by roughly 90 Kb/d in 2022. However, if Russia and Ukraine reach a ceasefire or long-haul international travel rebounds more strongly, we would expect higher numbers for OECD Europe.

### Q2 2022

The outlook for OECD Europe this quarter is determined by its eastern borders. The conflict has reduced confidence, and expectations for Russia and Ukraine's GDP declines are around 20%-35% for 2022. This impact would eventually seep into the rest of Europe at a cost. As such, we estimate that although jet fuel and gasoline should increase by roughly 100 KB/d and 130 Kb/d, respectively, the declines in diesel and gasoil

of around 110 Kb/d, LPG by 80 Kb/d and naphtha by 60 Kb/d are estimated to reduce OECD Europe's QoQ demand by 100 Kb/d.

OECD Europe, MMb/d (L) and 22-23 growth Kb/d (R)



Source: KAPSARC, March 2022.



## China

MMb/d	2021	Q1	Q2	Q3	Q4	2022	Q1	Q2	Q3	Q4	2023	Q1
China	15.0	15.2	15.5	15.4	15.6	15.4	15.7	15.9	15.7	15.9	15.8	16.8

### 2022-2023

China's oil demand is expected to grow by around 430 Kb/d in 2022 and 390 Kb/d in 2023. Its economy is losing momentum this year and, as a result, we estimate modest demand growth for all fuels, ranging from 110 Kb/d for diesel to 30 Kb/d for jet fuel. The uncertainty surrounding the Chinese real estate company Evergrande, and the fact that the government intervened, that the measures taken in 2020 and 2021 to address COVID-19 have put many in unemployment due to shutdowns for many small and medium enterprises, and the expected decline in China's population for the first time in its history is a wake-up call for its government. This explains its shift in investment focus away from infrastructure toward smarter growth options. Furthermore, the recent lockdowns in China's industrial and economic hubs during a period of festivities has shaved off some of its growth for this year. Nevertheless, the Chinese government has been effective in implementing measures to mitigate COVID-19, so the recent variant is expected to be controlled.

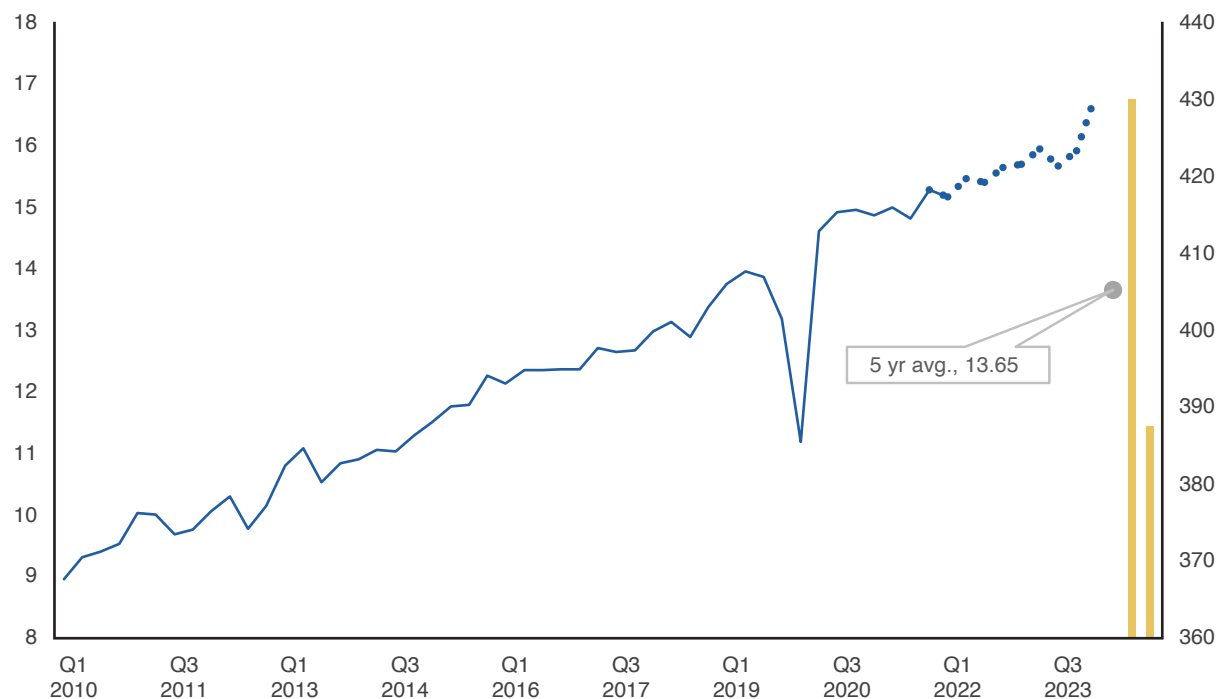
A silver lining of China's demand growth projection is the potential scenario where China continues purchasing oil from Russia at a discount. Our model estimates that China's demand can grow by 380 Kb/d further if its effective purchase price is reduced by buying sanctioned oil.

### Q2 2022

China's QoQ demand is expected to grow by 300 Kb/d. The driver for growth this quarter is expected to come from diesel, representing 45%. China faced diesel

demand decline in Q1, but Q2 of this year is expected to recuperate that loss. Other fuels expected to have significant rises in demand are the heavier crudes category as well as gasoline demand.

China, MMb/d (L) and 22-23 growth Kb/d (R)



Source: KAPSARC, March 2022.

## India

MMb/d	2021	Q1	Q2	Q3	Q4	2022	Q1	Q2	Q3	Q4	2023	Q1
India	4.9	5.4	5.5	4.8	5.2	5.2	5.5	5.7	5.0	5.5	5.4	5.7

### 2022-2023

India's oil demand is expected to grow by around 340 Kb/d in 2022 and 200 Kb/d in 2023. Although 2022 should see healthy growth, 2022 and 2023 also face the challenge of state elections leading up to the general election of 2024. We expect higher demand this year due to the Indian government's intention to front-load its welfare and economic growth-oriented policies.

Prior to the pandemic, the government intended to provide tax breaks to kickstart the economy. However, crude prices have remained high during the past two quarters, reflected in higher gasoline and diesel prices at the pump. Nevertheless, recent state elections went as expected and have returned a positive result for the ruling party.

A substantial portion of India's economic growth stems from the industrial sector. However, its GDP growth in 2021 and perhaps 2022 will be largely carried by the services sector, so oil demand will not hinge on GDP growth alone. We expect diesel to represent one third of India's demand growth this year, followed by heavier products used for infrastructure development, then by demand for gasoline and LPG.

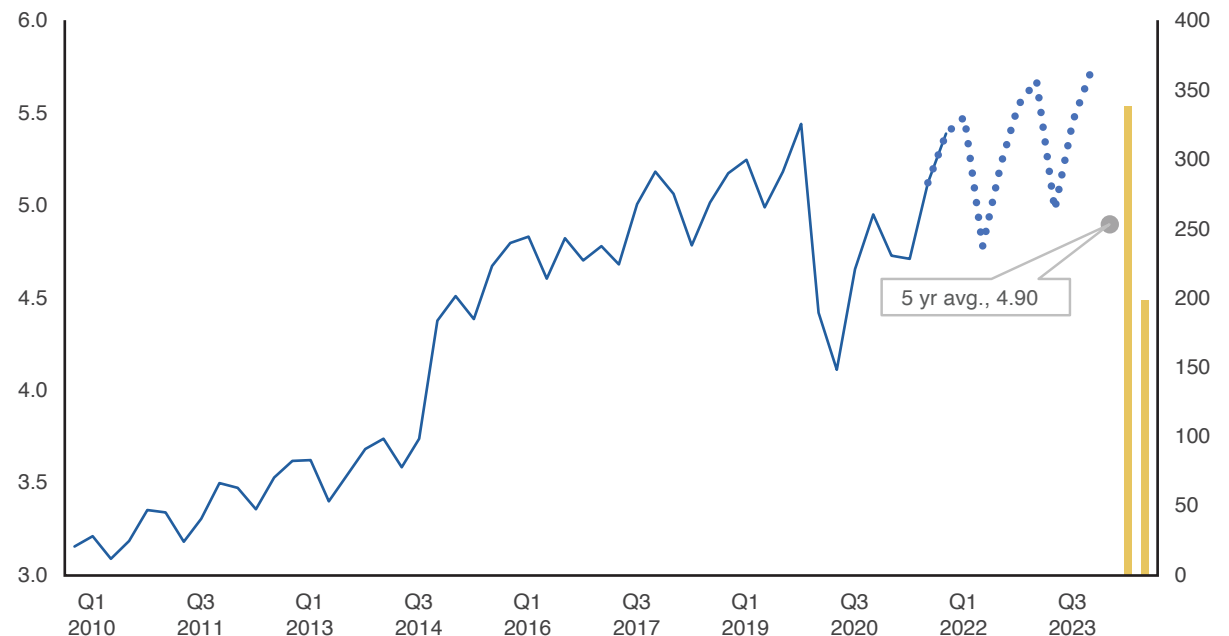
Although imports from Russia and Ukraine represent 2% of India's imports, Russia's discounts on its oil exports to India are likely to increase. Indeed, a \$30/b

discount per barrel, and possibly more, could increase India's demand by roughly 200 Kb/d. However, we believe that India's storage capacity would limit that increase in demand to 100 Kb/d-150 Kb/d.

### Q2 2022

India is expected to see QoQ demand growth of 90 Kb/d. Surprisingly, this quarter we expect demand to stagnate with LPG, naphtha, jet fuel and heavy crudes showing slight declines, and diesel and gasoline growing by 150 Kb/d and 40 Kb/d, respectively.

India, MMb/d (L) and 22-23 Growth Kb/d (R)



Source: KAPSARC, March 2022.

## Saudi Arabia

Mmb/d	2021	Q1	Q2	Q3	Q4	2022	Q1	Q2	Q3	Q4	2023	Q1
Saudi Arabia	3.6	3.1	3.8	4.2	3.4	3.6	3.1	3.8	4.2	3.5	3.7	3.1

### 2022-2023

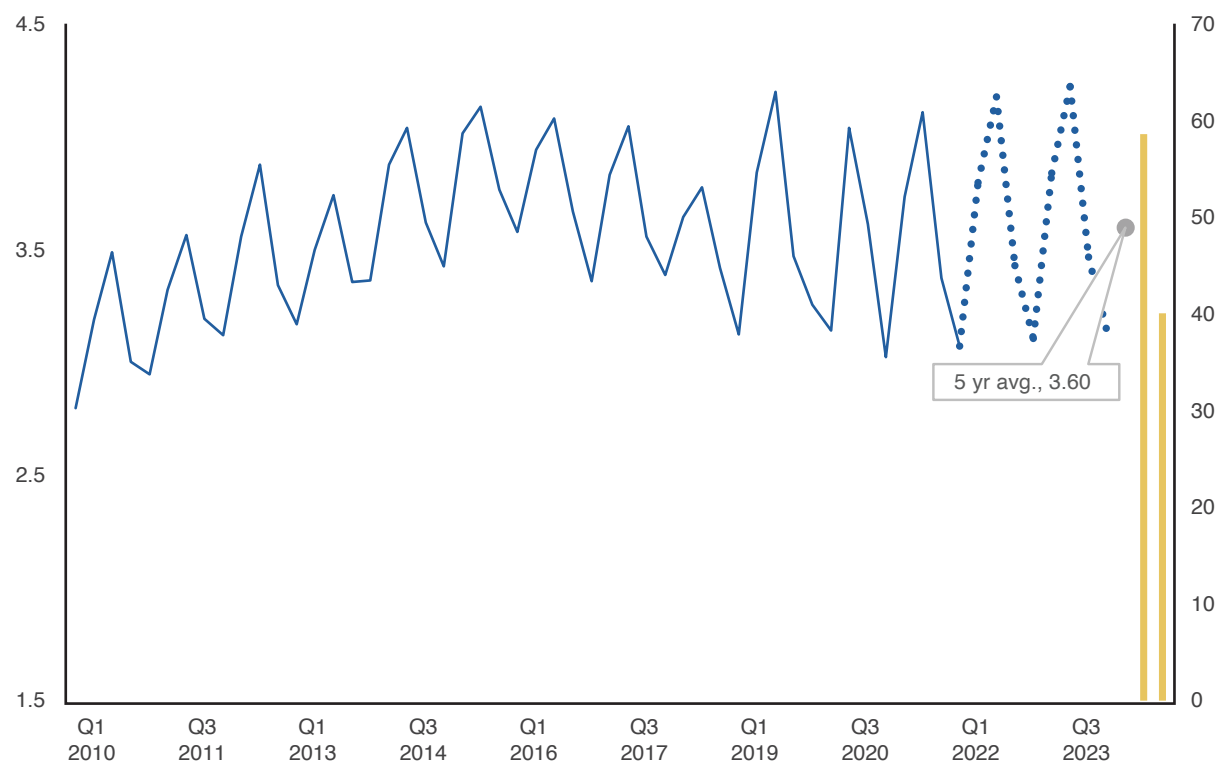
Saudi Arabia's oil demand is expected to grow by 60 Kb/d in 2022 and 40 Kb/d in 2023.

Demand growth is expected to remain modest across all fuels. Those that will grow more than other fuels are fuel oil at 11 Kb/d and heavier fuels at 13 Kb/d, followed by gasoline at 10 Kb/d. Although the Kingdom's GDP growth for 2022 might be double what it was in 2021 (IMF: 2.8% in 2021 and 4.8% in 2022), the country is leapfrogging other nations in fuel switching and enhancing efficiency, with its GDP growth and oil consumption trajectories diverging.

### Q2 2022

Saudi Arabia is expected to witness a QoQ demand growth of 730 Kb/d. Due to hotter weather, demand for heavier products as well as fuel oil and diesel will grow. Other heavy products are expected to represent almost 50% of that growth, followed by fuel oil at around 150 Kb/d then diesel demand at 80 Kb/d.

Saudi Arabia, MMB/d (L) and 22-23 growth Kb/d (R)



Source: KAPSARC, March 2022.

## Discussion

“In the midst of every crisis, lies great opportunity.” – Albert Einstein

“It ain’t over till it’s over.” – Yogi Berra

Since the Russian conflict with Ukraine began on February 24, the entire oil market has changed. Europe, hugely dependent on Russian oil and gas, has had to weigh its outrage toward Russia against its need for energy. The debate is hotly contested, with participants’ opinions directly proportional to their level of reliance. Unprecedented (the word of the decade) sanctions have been levied on Russia, barring them from the SWIFT international banking system, cutting off their access to much of their foreign reserves. Moreover, self-sanctioning has caused many companies to exit the country.

As a result, there is a lot of uncertainty in the oil market: How much Russian oil will be removed? Who can replace it? How will this impact the energy transition?

Different forecasters have attempted to answer these questions in different ways, with the most common approach being to generate one scenario, or a large number of them. One result does not capture the nuances of the problems presented, but 15 is equally unhelpful. In this edition of KOMO, we simplify things down to two scenarios for the discussion, and one for the base case:

1. **Unpopular** (0.5-2.5 MMb/d): Russian oil has fewer buyers and some logistical challenges.
2. **Unavailable** (4-5 MMb/d): Russian oil is not legal (secondary sanctions) or the flow is blocked.
3. **Base case** (1.75 MMb/d): A blend of the two scenarios to account for risks.

In applying the base case, we also surmised that the move away from Russian oil will take time as contracts expire and alternative sources are found. This will likely take a year to be implemented.

What is interesting is what everyone else is doing. Existing crude flows are shifting clockwise, with Russia turning east to China and India, while others are shifting west to fill in the gaps. Canada wants to help but is likely limited by their export capacity across the Atlantic. Shale production is still sluggish without support from investors while they wait for the government to change its attitude toward fossil fuels. Venezuela and Iran are talking with U.S. officials regarding sanctions, but there are difficulties as Venezuela and Iran now have leverage in the negotiations. Kazakhstan’s exports to Europe have been suspiciously curtailed via a pipeline that passes through Russian territory. The U.S. announced a 1 MMb/d SPR release, with a six-month release schedule. Governments worldwide are adjusting their fuel taxes, and protectionism is rising in grain exports, which may soon extend to energy supplies.

We still see a surplus in the market this year, though smaller than our previous forecast. Reports of supply draws do not capture all storage worldwide (Russian storage must be overflowing, and stockpiles for several non-OECD nations will increase), and the price environment we are in is largely driven by fear and uncertainty. There is enough supply out there, but the real uncertainty is how long it will take for things to settle down for the supply chains to reorganize themselves.

Highlights from this edition are:

- OPEC+ is holding steady but may face some new problems over time.
- Shale production is growing moderately because producers’ focus has shifted to the longer term.
- Strange things are happening everywhere.

## Supply forecast

Global liquids supply is expected to grow by about 5.67 MMb/d in 2022 to reach an average of 101.1 MMb/d for the year. We expect 2023 to see a further 1.7 MMb/d increase in supply, with OPEC+ cuts having ended, and an average supply of 102.8 MMb/d for the year. This is a reduction in supply in 2022, mostly from Russia, and an increase for 2023 on the back of increased pricing.

We have kept the assumption that OPEC+ members with new baselines will bring their supply online and relax other cuts smoothly, instead of all at once. In running a ‘what-if?’ scenario of a sudden boost in production from the four remaining members (KSA, Kuwait, Iraq, and the UAE), we saw a general downward movement in pricing, but ended up with non-OPEC countries curtailing some of their production as the scenario pushed pricing (based on fundamentals, NOT risk premiums) below some oil fields’ break evens. In either case, OPEC+ is the main source of production growth in 2022 and 2023, although the 2023 growth will be muted due to the remaining cuts ending by about September.

Our risk profiles are unchanged from the last edition, as the survey was not scheduled for this quarter. However, we expect some significant alterations in the next edition that may impact several of the usual subjects (Iran, Venezuela, shale, OPEC+, etc.).

Non-OPEC supply growth comes from the usual suspects of Canada, Norway, Brazil, the U.S. and, interestingly, “Other Europe.” We investigated the source data of the “Other Europe” entry to check its members (no, it does not include Ukraine). It includes mostly small contributions from multiple Western European nations due to increased pricing.

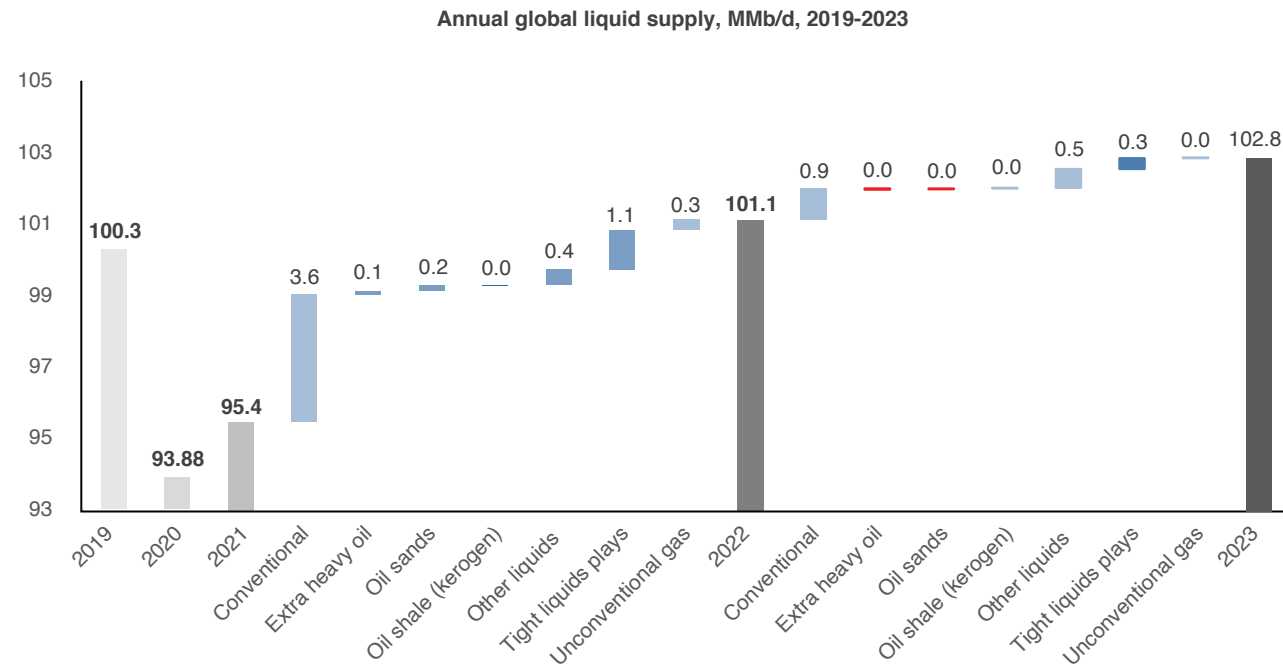
Shale should see an upswing in production this year, with 1.1 MMb/d of growth globally, with just over 1 MMb/d of that coming from the U.S. Further growth in 2023 will be much more muted, with only 310 Kb/d, as drilling is not keeping up with the drawdown of DUCs to maintain production, despite increased spending.

Canadian oil sands is ready and willing to help ease the supply problems in the EU, but it may not be able to get it there with limited options to reach the Gulf Coast. On top of this, Canadian Prime Minister Trudeau just announced a plan to cut national carbon emissions, of which oil and gas represents a significant portion, further depressing investor sentiment in the sector. Canada’s growth for 2022 is expected to be around 170 Kb/d, but 2023 looks mostly flat, as Canadian supply grew quickly in the winter of 2021/2022 and more capacity may not be forthcoming.

OPEC+ is following its production plan, but an assumed drop in Russian production of 1.75 MMb/d, phased in over a year as contracts expire, has pushed its net growth for 2022 down to 3.2 MMb/d, with 2.4 MMb/d in 2023 capturing the tail end of the cuts from the end of 2022.

The important issue to watch out for in the coming months and quarters is not market fundamentals, but political risks. Will the conflict in Ukraine be resolved? Will sanctions be added or removed from various nations? Will the U.S. midterm elections in November re-energize shale? It will be fascinating to watch it all unfold.

## Supply forecast...



Source: KAPSARC, March 2022.

## OPEC+

As the driver of the oil market, OPEC+ is still moving ahead at speed but has a worrying “check engine” light on the dashboard. The conflict in Ukraine has made things infinitely more complicated on the political front, with relationships being tested in many ways.

From the purely physical side of things, cutting Russian barrels is eating into the potency of the phased rollback of cuts for both the total supply and the OPEC+ portion of supply. While we still see a positive supply/demand balance heading forward, this is not evenly distributed among consumers. Supply security and anxiety is already causing a headache, exacerbating energy inequality across the globe, with potential export bans and governments subsidizing energy prices to calm the public.

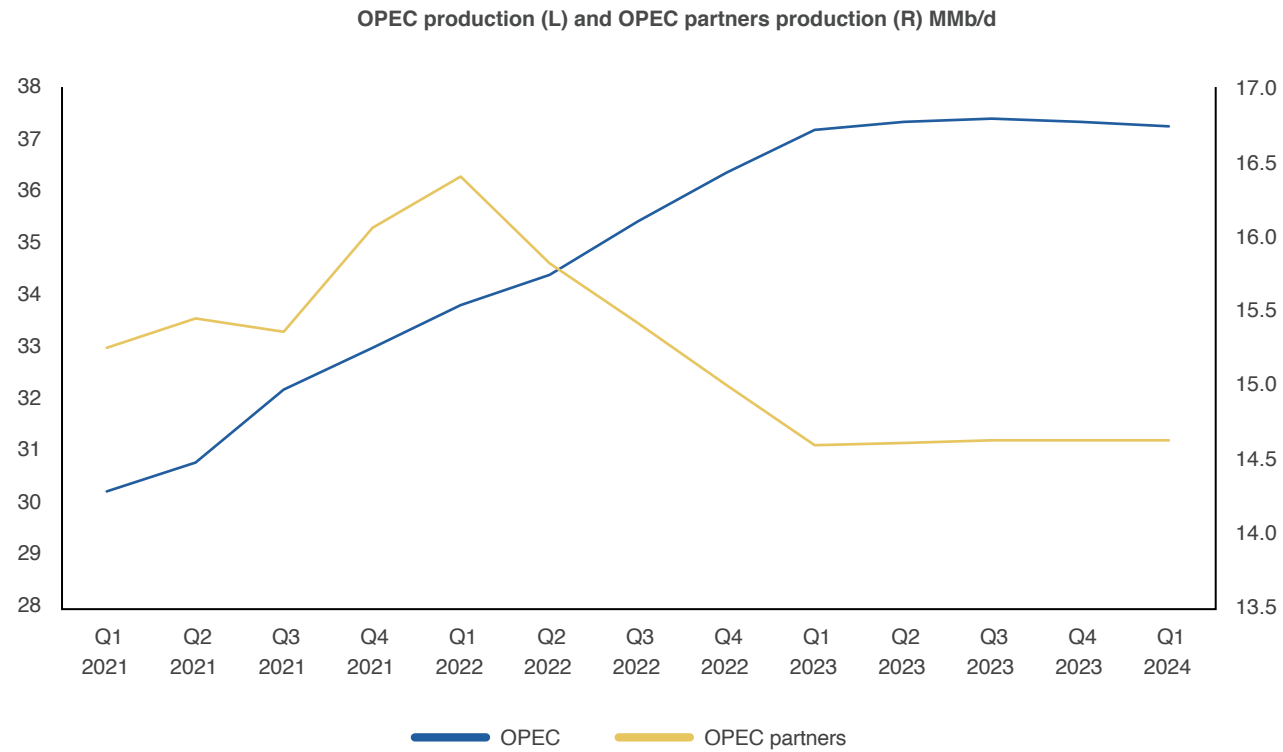
Trade flows are evolving in a clockwise fashion, with Russian barrels starting to reroute themselves east to China and India, while others are heading west to fill in the demand gaps in Europe and its partners. While this may be a short-term pricing benefit to the other OPEC+ members, on a longer timeline it is preferable to defend market share with China and India. The EU’s demand for oil has been declining over time, and its intentions to transition to cleaner energy are less reassuring when one considers security of demand. Who will be displaced in the Chinese and Indian markets? Probably smaller, less politically connected producers and western nations, because China and India also play the long game.

There is also some funny business going on with supply interference. The Caspian Pipeline (CPC), which carries crude from Kazakhstan through Russia to Europe, has suspiciously gone down for maintenance after “storm damage.” Russian demands added pressure to the Iranian Joint Comprehensive Plan of Action, alongside drone and missile attacks on Saudi Arabia. Lastly, the U.S. administration approached Venezuela to discuss lifting its sanctions, but the discussions seem less than optimistic. There is a double-edged sword of Venezuela needing help from the IOCs to increase production, while also facing a garnishing of its oil revenue due to old debts to those same companies.

How much additional production could Iran and Venezuela actually add? Iran has been producing and exporting at a growing rate, and could probably help the market from a signaling standpoint more than anything else. However, Iran would mainly benefit from selling their barrels without a black market discount. Venezuela has been helped by both Russia and Iran while under sanctions and could face difficulties if Iran was legitimized (because they would not need to send condensate), or if Russia had secondary sanctions imposed (because tankers would not be available). Lifting U.S. sanctions on Venezuela might help the global oil market, but it might not help Venezuela itself if it has to repay its debts to the IOCs needed to boost production. This may partly be why Venezuela’s negotiations with U.S. officials are having trouble.

Long story short: OPEC+ is following its plan for now, but soon the plan might need to change.

## OPEC+...



Source: KAPSARC, March 2022.



## OPEC and partners supply changes for 2021 - 2023, Kb/d

	2021	2022	2023		Kb/d
Mexico	(2.1)	(24.2)	(167.7)		50
South Sudan	(2.5)	11.1	10.4		0
Equatorial Guinea	(20.0)	(3.5)	(18.5)		-50
Brunei	(0.5)	12.5	4.1		-100
Sudan	12.9	(6.3)	(15.6)		-400
Bahrain	(7.9)	(5.5)	(0.4)		
Oman	2.5	(1.3)	(13.3)		
Gabon	(29.1)	51.0	21.0		
Congo	(12.5)	(3.9)	(14.4)		
Malaysia	(0.1)	24.8	1.0		
Azerbaijan	(14.8)	58.3	50.3		
Kazakhstan	(2.5)	98.8	48.5		
Algeria	(232.5)	89.3	58.2		
Nigeria	12.5	105.1	(18.8)		
Kuwait	(20.0)	309.1	212.1		
Iran	432.5	283.7	669.2		
Venezuela	60.0	142.4	74.7		
UAE	(87.5)	404.8	350.8		
Saudi Arabia	(93.0)	1,440.8	801.8		
Iraq	(5.0)	418.2	270.8		
Libya	795.0	3.0	87.9		
Russia	202.3	(159.1)	(1,073.8)		
OPEC	689.5	3,206.4	2,421.0		
<b>OPEC Partners</b>	170.7	67.5	(1,189.4)		
<b>OPEC+ TOTAL</b>	860.2	3,273.9	1,231.6		

Source: KAPSARC, March 2022.

## OPEC+ spare capacity

The spare capacity discussion becomes more interesting and difficult as time goes by. The official definition of spare capacity is “production that can be brought online within 30 days, and maintained for at least 90 days,” but this feels a little narrow in the world we live in today. The reason to be concerned with how much spare capacity exists is because slack is needed to smooth out supply shocks and keep the price within a reasonable range (based on fundamentals; ignore the risk premium for a moment).

There are a few “non-traditional” sources of spare capacity that are now being explored. The U.S. effectively controls spare capacity in Iran and Venezuela through its sanctions. Discussions between the U.S. and those regimes are ongoing, but, as mentioned in the previous section, that may not make much of a difference even if they are successful. SPR releases, when issued as 1 MMb/d with an undetermined end date certainly could qualify as “within 30 for at least 90”... but the real unknown stems from Russia.

The problem with Russian crude from a modeling standpoint is the uneven and non-economic behavior of the consumers. Self-sanctioning by countries is a choice, one that leads to higher prices for those self-sanctioning, while lowering prices (discounts) for those willing to buy it. Under the “one pool of oil” view of the world, other than some drags on the system like methods of payment, access to tankers, and angry longshoremen who will not unload the cargo, that production is still there!

Just because Russian oil is *unpopular*, this does not mean it does not exist, so wiping it off the books is unreasonable. Even the assumed 1.75 MMb/d of production to be shut in for our base case does not disappear; it becomes spare capacity because workarounds may be found or a solution to the conflict could be worked out. Yes, longer term, there will be a capacity rot, but that does not set in over a couple of months. Russian crude could absolutely come online within 30 days, depending on who makes what decisions.

Even in the case of secondary sanctions, which should theoretically make Russian crude *unavailable*, it is hard to redefine the unsold barrels as non-existent. They could be easily returned to the market if the U.S. and its allies adjust their policies.

We have discussed more traditional sources among the unsanctioned members of OPEC+ before. Some members have less supply, and are falling behind on their quotas, while others have more in the tank (Saudi Arabia, Kuwait, Iraq, the UAE, and Russia). The agreed adjustments will begin to be applied in May. We assumed this new capacity would be eased in gradually instead of suddenly, as confirmed by the OPEC+ meeting at the end of March. There is talk that the targets for Saudi Arabia, Russia, the UAE, Iraq and Kuwait could have been higher, and that other members’ targets could have been increased as well. So that makes for interesting speculation, as we have

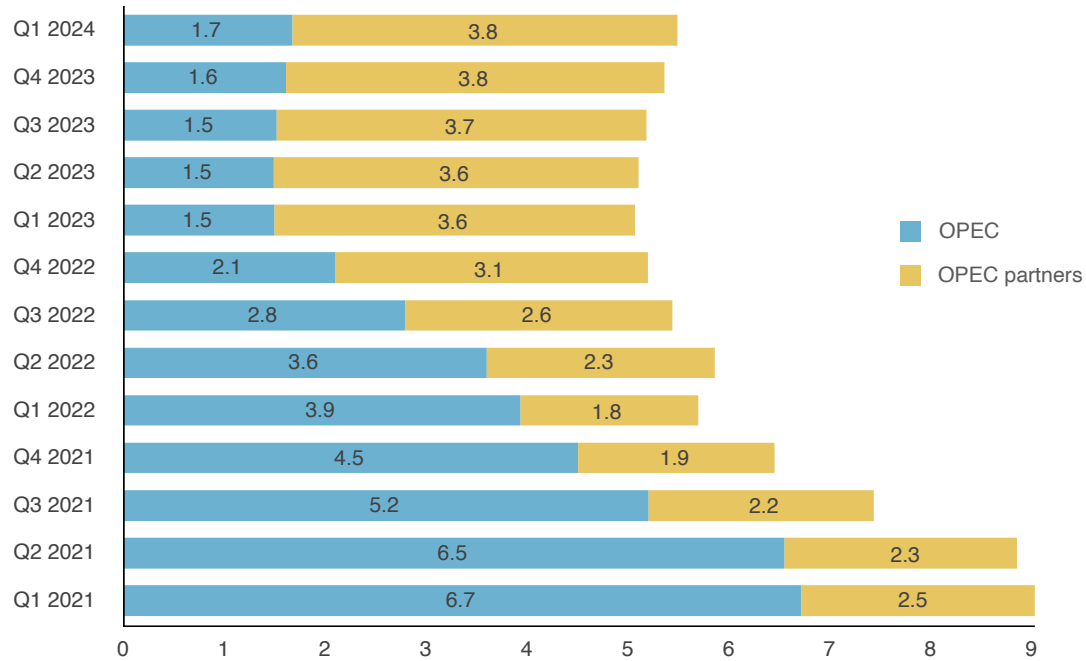
not seen such a high production level in action before. Add to this the plans for significantly increased capacity in the coming years (Iraq, the UAE, Saudi Arabia, Iran, etc.), and it gets harder to predict supply, with some players increasing and others decreasing their production.

Lastly, a forecast of spare capacity makes the entire definition of “within 30 days” odd. What about production that takes 60 days to bring online? Actions today can increase production (via enhanced oil recovery, for example) within our two-year window. So maybe we need to work on a metric other than the current one when discussing spare capacity. As a legacy metric, like the Dow Jones Industrial Average, it is interesting and easy to make, but not really that useful.

**The existing KOMO methodology for spare capacity has been included in the figure below. *Unpopular* Russian barrels are treated as spare, because they can technically come back online, depending on the resolution of the conflict in Ukraine.**

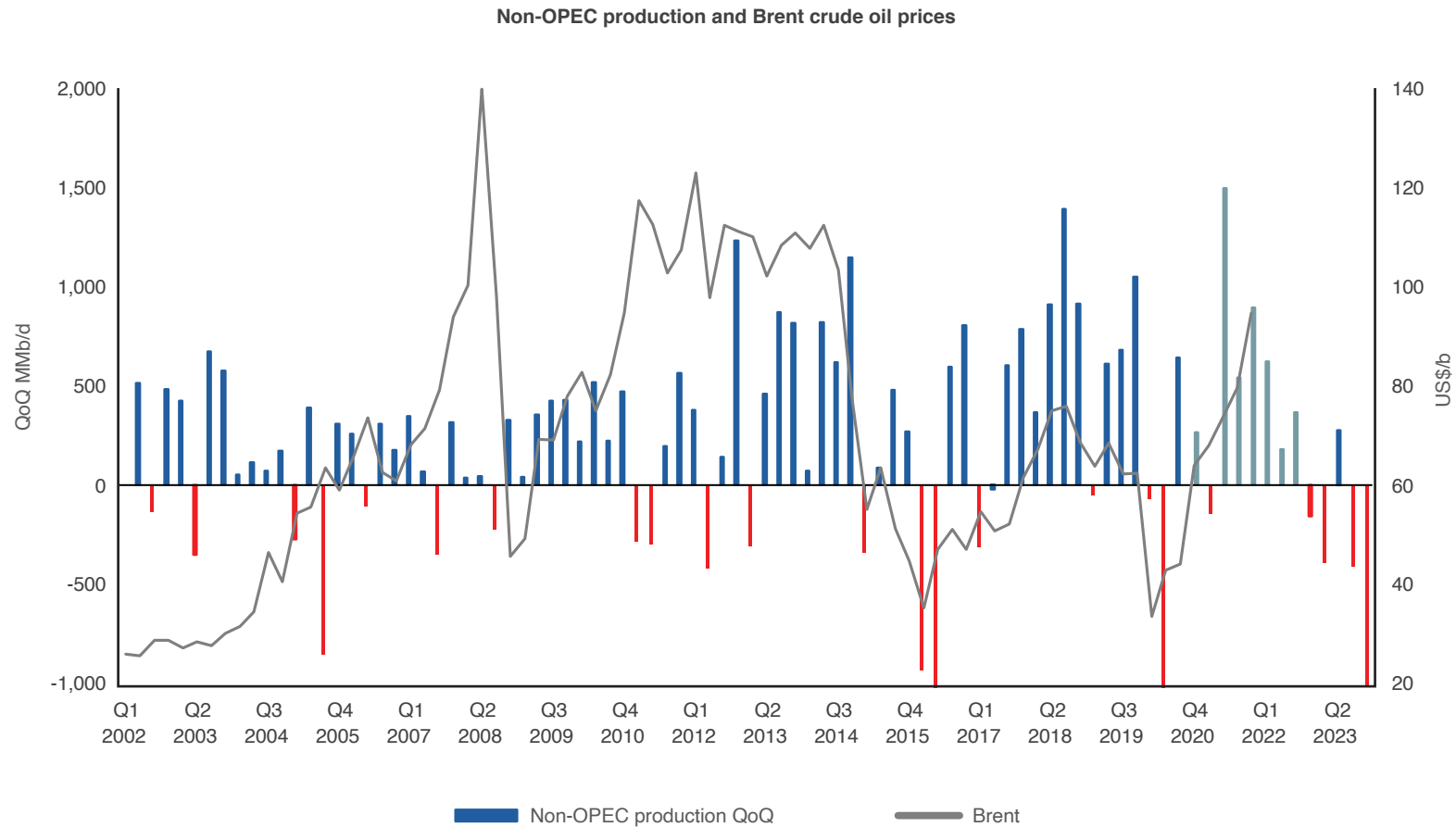
*OPEC+ spare capacity...*

OPEC and partners spare capacity, MMb/d  
Technical base



Sources: Rystad; KAPSARC, March 2022.

## Non-OPEC+



Sources: IEA, March 2022; KAPSARC, March 2022.

### Non-OPEC+ growth:

- In 2022, the supply of global tight oil will rise by 1.120 MMb/d, and unconventional gas liquids will rise by 280 Kb/d, while oil sands will reclaim 170 Kb/d.
- In 2023, the outlook for global tight oil is a drop of 310 Kb/d, with unconventional gas liquids growing by 30 Kb/d, and oil sands staying effectively flat.
- Key issues for non-OPEC+ producers to consider are the political landscape and the levers available to OPEC+ and western nations to stabilize supply.

## Non-OPEC (tight oil and oil sands)

Shale, once the superhero of oil production growth, is watching world events with a disinterest that is understandable. True, the rig count is up, and secondary plays like the Bakken are showing signs of life with mergers and acquisitions activity, but there is no explosion of drilling like the old days (all of five years ago). The corporatization of the shale patch has shifted its focus to investor returns and risk mitigation, which prevents shale producers from making the big gambles that defined their origin story.

Over 100 firms have gone bust during the pandemic, and survivor's bias has favored the bigger, more conservative players. Despite its reputation for speed and short-cycle focus, the sector as a whole has shifted its thinking to a focus on resilience and long-term plans because of the number of firms that have faced bankruptcy. This would explain producers' complaints about drilling leases, despite sitting on reserves that would take years to work through. They are not worried about what may happen six months from now; they are worried about what happens after the crisis, when energy security gives way to energy transitions.

Calls from the U.S. President to shale companies go unanswered because the government is not a shareholder. Shale investors are happy with returns as they are now and believe that even if the long-term outlook for the oil price is downhill, they can diversify their portfolio with renewables and it will all work out fine. So far, they have been right... So far.

The only problem is that shale firms have been coasting on their drilled but uncompleted (DUC) wells to maintain production and have not been maintaining their supply. Their cashflow statements are great on paper but hide what looks like a going-out-of-business sale. This is not sustainable; it is a stalling tactic.

There is something, however, they may be waiting for. The U.S. midterm elections are looming, and high gas prices are an incumbent's kryptonite. The current

patriotic sentiment surrounding the response to Russia's invasion of Ukraine will wear thin if the conflict drags into a stalemate and if efforts to boost supply from Iran, Venezuela, and OPEC+ are unsuccessful. This will likely hand control of Congress to those who are more industry friendly.

Then maybe it will be time to produce policies more favorable to shale producers.

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



Source: KAPSARC, March 2022.

## Non-OPEC (tight oil and oil sands)

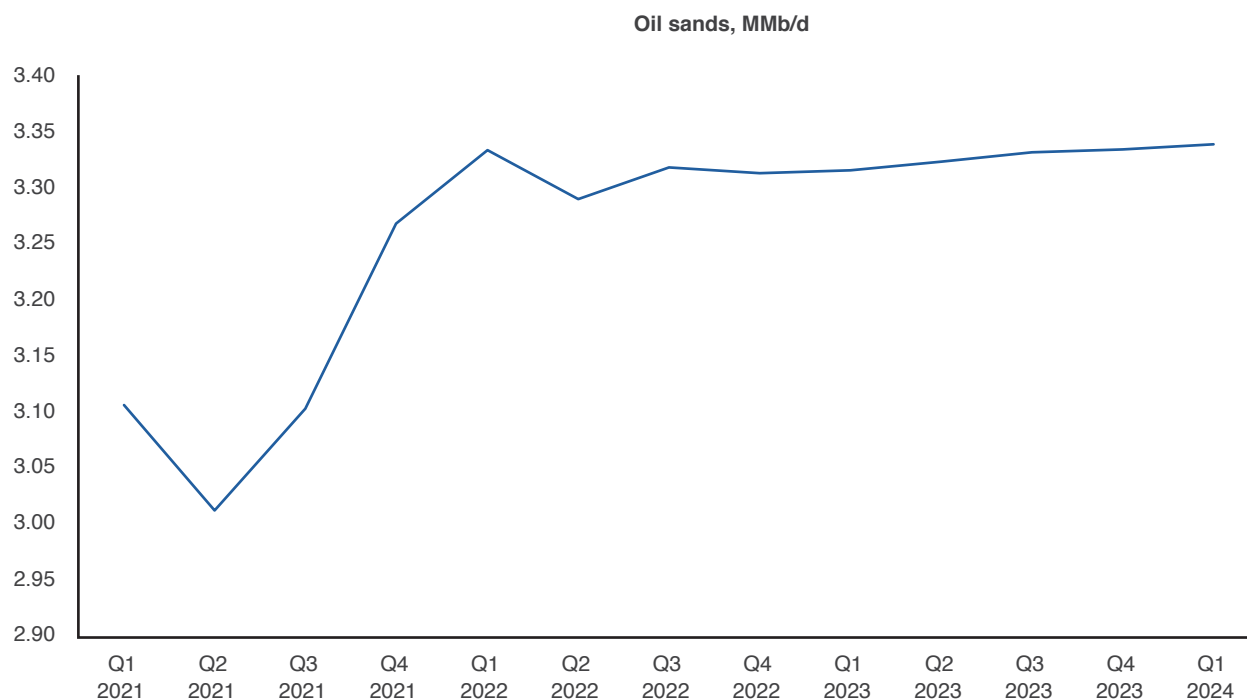
Canada, as always, is a land of contradictions. Excited by high prices, cries for help from the EU, and a particular relevance because the Urals blend and vacuum gasoil demanded is comparable, Canadian producers have committed to increase their crude production by 200 Kb/d (and 100 Kb/d of natural gas liquids) to help fill the gap. However, there are many problems with this plan.

First, the oil sands producers were already reaching peak production, with little further potential growth from new projects because, unlike shale, oil sands development takes years to come online. Second, getting it to the EU involves passing through choked pipelines to the U.S. Gulf of Mexico, and you cannot brute force a resolution by sending oil sands via rail. Third, spring maintenance season is upon us, cutting some output intermittently. Fourth, the difficulty in gaining funding from investors has not eased, with the environmental record of oil sands proving resiliently unappealing even at current prices.

Even if these were not problems, other considerations weigh on the mind of the humble oil-sands producer. What if the Russian sanctions were dropped? What would we do with all this extra-heavy, difficult to transport production? Pair this with Prime Minister Trudeau's newly unveiled plan to cut carbon emissions, with a significant portion allocated to oil and gas, and there seems much less reason to celebrate.

The producers have touted a 22% increase in spending over last year, but this is a rebound from depressed levels during the pandemic, and it will take longer to see any real gains than our forecast window allows.

For now, with some margin of error, we expect oil sands supply to be almost flat after their gains from Q1 through the next eight quarters.



Source: KAPSARC, March 2022.

## Risk scenarios January 2022

\*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 to estimate potential impacts, taking two components into account: probability and impact.

**Probability:** A shaded chart at the top right of the table below 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)	2022	2023	2024
Producer supply risks	OPEC+ compliance remaining high	Supply	↑ 400			
	Government interventions to curtail production levels for Norway	Supply	↓ 31 - 83			
	Iran no longer under sanctions	Supply	↓ 20 - 70			
	U.S. shale industry increases investments in drilling activity	Supply	↓ 0 - 58			
	U.S. administration further constrains oil and gas companies in the U.S.	Supply	↓ 0 - 114			
	Input production costs to negatively impact production levels	Supply	5% of new liquids ↓			
	Venezuela's oil production can be sustained	Supply	↓ 10 - 45			
	Brazil's oil production will grow at the same pace as it was growing in 2019	Supply	↓ 100 - 288			
Demand risks	Economic downturn	Demand	↓ 195 - 500			
	Continued inflation	Demand	↓ 86 - 200			
	Further COVID-19-related lockdowns	Demand	↓ 440 - 2000			
	Long haul/international aviation rebound	Demand	↑ 220 - 1000			
	India's growth in oil demand reaching pre-pandemic levels	Demand	↑ 246 - 500			
	China's refining quotas lifted	Demand	↑ 46 - 100			

OPEC reacting with additional cuts if market goes into surplus	Yes	81%
COP 26 outcome impacting oil industry	No	86%
Tourism activity resuming to pre-pandemic levels	Yes	62%
U.S. dollar getting stronger	No	52%
U.S.-China geopolitical relations improving	No	90%
Oil prices averaging more than \$60-\$70 per barrel in 2022 and 2023	Yes	86%
Shale returning to pre-COVID-19 levels	Yes	52%

The results are based on a survey conducted biannually

## 2021 and 2022 balances

Given the recent changes to KOMO's supply/demand balances, as well as the recent price levels, we estimate a surplus in 2022 of around 1.4 MMb/d, followed by another more moderate surplus in 2023 of 1 MMb/d.

The KOMO forecast assumes that OPEC+ will continue with its monthly increments throughout the first quarter of 2022 and begin adjusting their base levels in May. However, given the scenario where Russian crude is merely *unpopular*, with an estimated decline of 1.75 MMb/d, we believe that OPEC+ countries will continue with their 400 Kb/d monthly increments until they reach their pre-pandemic production levels by the end of 2022.

Despite the recent reported withdrawals from inventories, a surplus should either be happening now or be already underway, but with an uneven distribution. The economies that report most often have had weekly declines, so it is projected that there is not enough supply. However, there probably is enough supply in some non-OECD nations.

Based on this projection, and that 2022 and most of 2023 are still headed toward a (thankfully more modest) surplus, it is understandable that OPEC and its partners take a cautious 'wait and see' approach, rather than overcorrect too quickly. This is because it is easy for the group to increase production, but it would be significantly more challenging for them to bring production down after restricting their supply for so long.

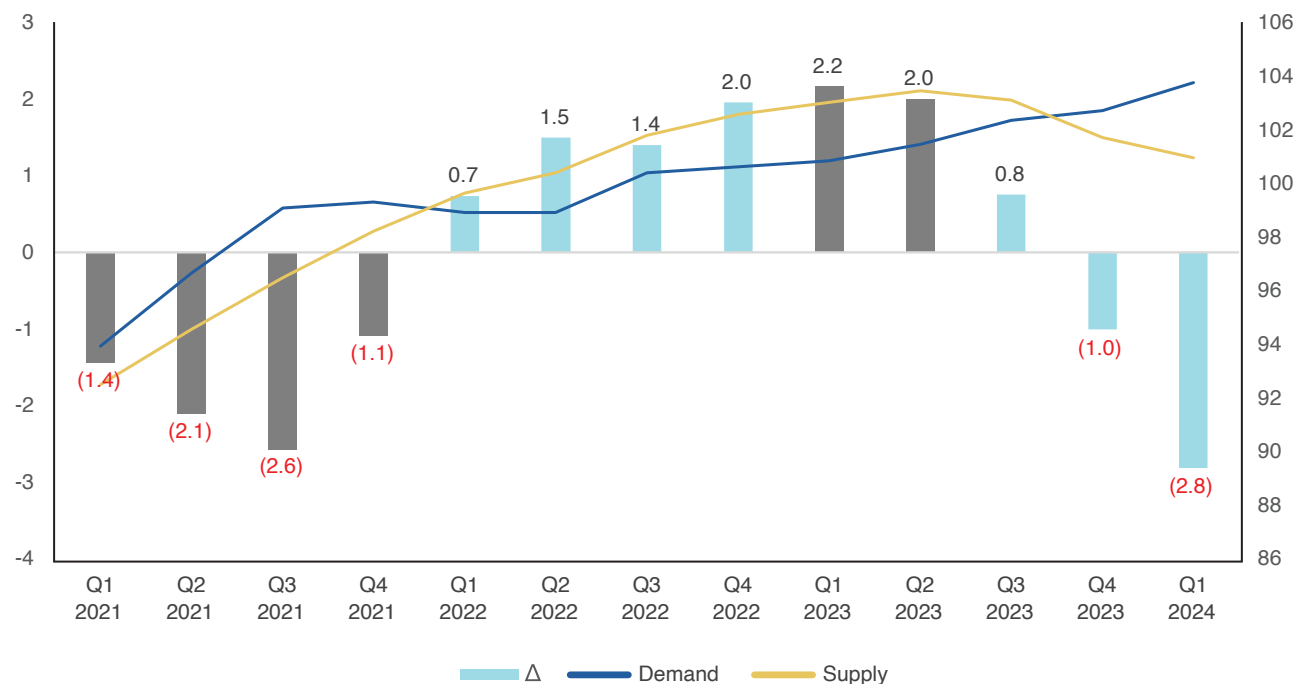
Since our outlook assumes continued elevated levels of spare capacity throughout the forecast interval, OPEC+

compliance rates are a known risk if pricing remains elevated and/or if fiscal realities test the resolve of some members.

NOTE: Some market forecasts include extreme scenarios for \$300/b oil based on mass coordinated action against Russia, a lack of illicit leakage into the

market, very optimistic demand conditions, and a very pessimistic view on OPEC+ spare capacity that strains credibility. Basic demand elasticity and the allure of massive discounts should prevent this edge case from ever happening for more than a day unless World War III were to occur.

Quarterly supply demand balance, MMb/d, Q1 2020 - Q1 2024



Source: KAPSARC, March 2022.



## Price fundamentals (inventories)

Price movements for the foreseeable future will continue to be mainly influenced by evolving inventory levels and the level of escalation of the Russian-Ukrainian conflict. Another factor weighing on price movements will also be OPEC and its partners' increments. In this outlook we expect target inventory levels to increase considerably due to the risk of geopolitical tensions. So, although real inventories are projected to continue increasing, target levels will remain elevated. This dynamic will, in effect, keep prices above their fundamentals for the near future or until supply anxiety decreases.

Nevertheless, high saturation levels are expected and the pressure on OPEC+ to increase production will continue in the coming months despite a possible surplus. The KOMO modeling experts ran a scenario on what would happen if the May adjustments were instantaneous, rather than a gradual increment. The model demonstrated that a fast increase by OPEC+ would eventually cause production to deteriorate for non-OPEC+ producers. So, in the long run, production will be more balanced despite the strong volatility we witness today.

In this regard, target inventory levels for the OECD are expected to rise by 194 MMb to 4,615 MMb in 2022 and increase by 36 MMb in 2023. Real inventory levels are expected to decline by 39 MMb then rise by 232 MMb/d in 2023 to reach 4,324 MMb.

In our last publication we stated *“Although the KOMO model forecasts eight quarters ahead, we already see that a potential period of \$100/b+ is nearing, yet this remains beyond our two-year forecast.”* If we assume an annual growth of 1 MMb/d, this price environment would have happened by 2024 or 2025. If we assume that Russia loses 1.75 MMb/d for the foreseeable future, the horizon for a tight market based on fundamentals and underinvestment may show up in our official window much sooner than expected.

However, the risk in the oil market is not price volatility in such a short timeframe, but rather in investors shying away from providing the much-needed capital to meet future needs. This inaction is already having an impact today.

### Price fundamentals (inventories)...

On March 31, 2022, while this report was being written, the Biden administration published “FACT SHEET: President Biden’s Plan to Respond to Putin’s Price Hike at the Pump,” which included plans to release the equivalent of 1 MMb/d from the U.S. SPR for six months. This amounts to roughly 180 MMb, equivalent to a little less than two days of global oil demand. Hence, although this release may not have any real significant impact, we can also consider it as a substitute for Russian oil, which accounts for roughly 4 MMb/d-6 MMb/d of oil exports, or 20% of Russian exports over six months. Nevertheless, the quality of crudes matters, so the impact of the SPR release on the oil market may be limited.



Sources: EIA; KAPSARC, March 2022.

## Price fundamentals (Brent)

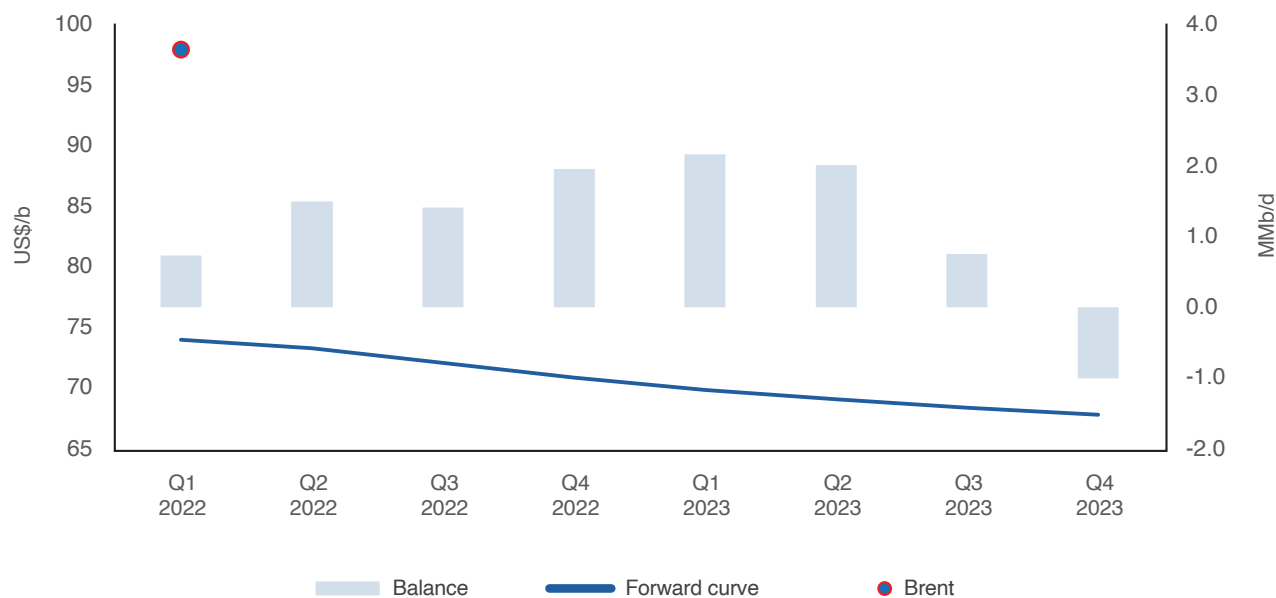
	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Q1 2023	Q2 2023	Q3 2023	Q4 2023
<b>Bloomberg</b>	97.98	95.52	92.51	90.35	87.00	85.51	82.51	
<b>Market sentiment</b>	97.98	79.30	79.30	79.30	86.00	86.00	86.00	89.00

	2022	2023
<b>Bloomberg</b>	94.09	84.73
<b>Market sentiment</b>	83.97	86.75

Source: Bloomberg, April 3, 2022.

\*Market sentiment is based on publicly available forecast data.

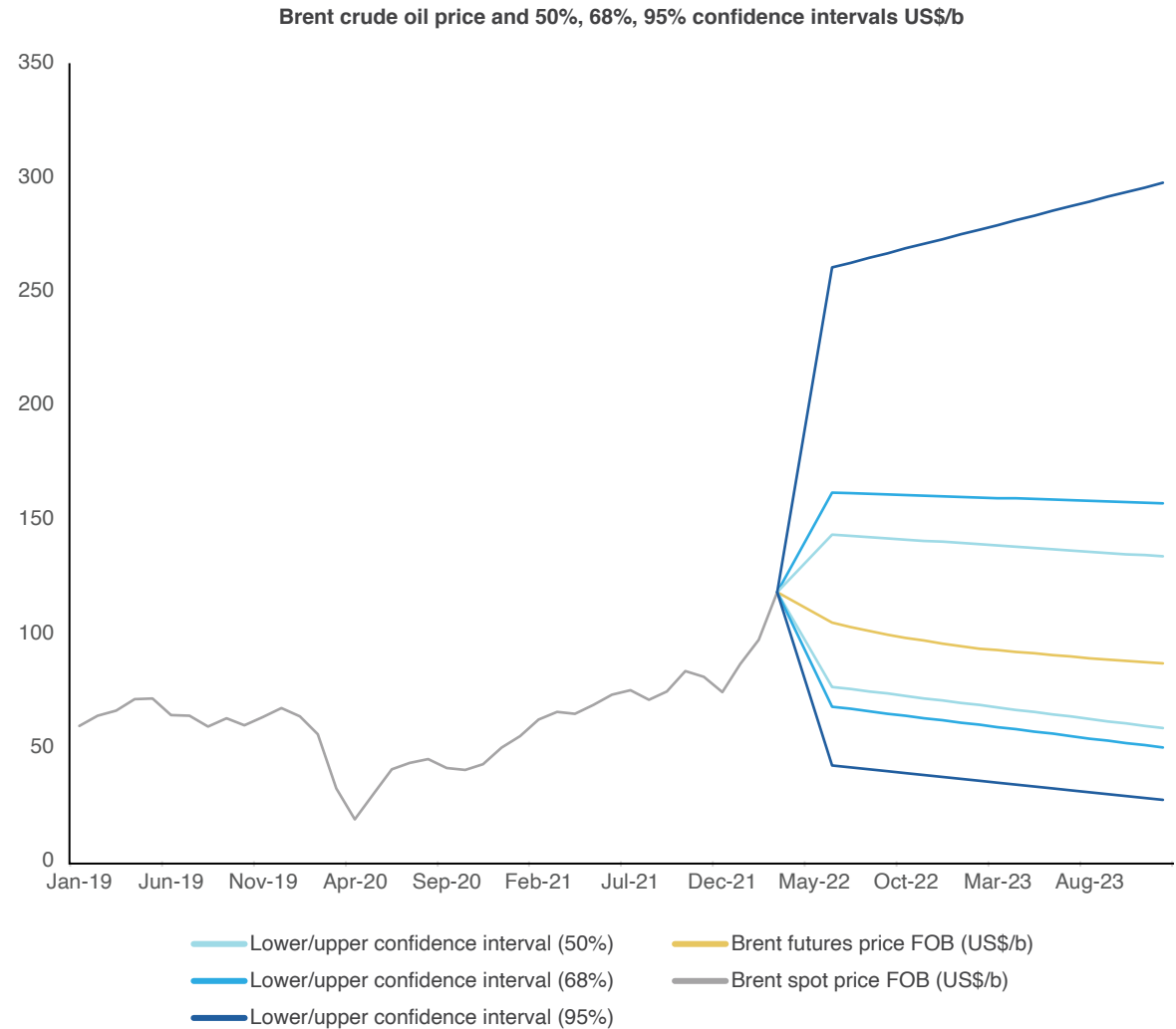
Balances and forward curve



## Price fundamentals (forward and future curves)

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

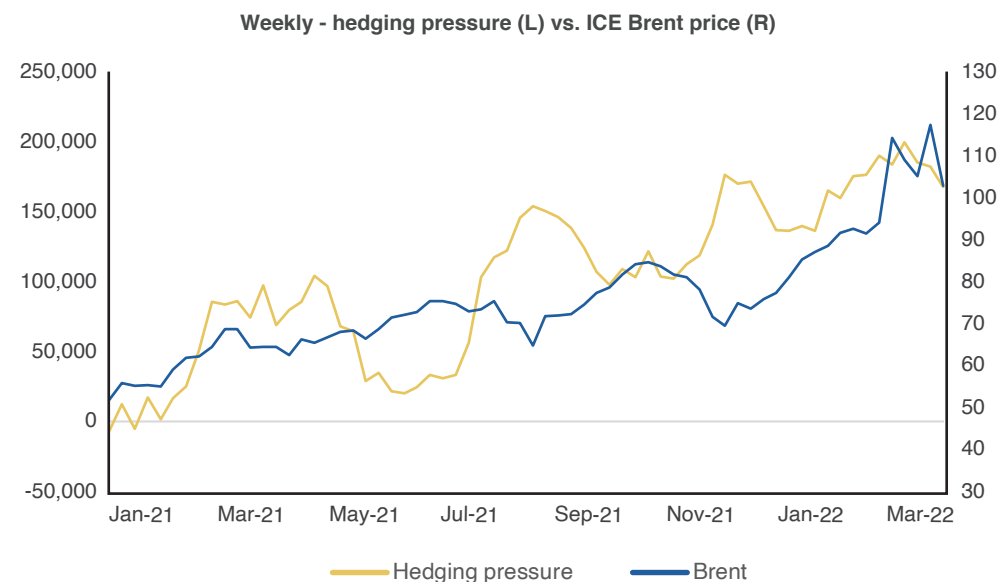
Despite the different shape in our confidence intervals, the figure reflects high volatility on world oil markets, and the backwardation present in the Brent futures market.



Source: KAPSARC calculations based on NYMEX data, CME Group, FINCAD, April 2022.

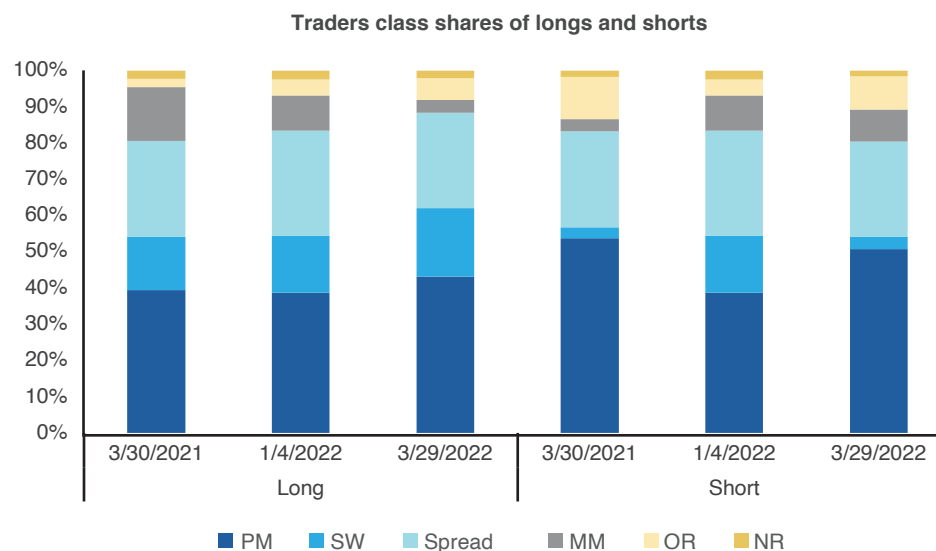
## Price fundamentals (markets)

**Hedging pressure (HP):** The graph to the right shows the settlement price for Brent against hedging pressure. Hedging pressure is a measure of physical commercial (producers/merchants/processors/users) net-short positions relative to net-managed money long positions. It indicates a negative relationship between Brent prices and market hedgers. Given high prices in Q3 and Q4 of 2021, followed by a cold winter and then the Russian conflict, it is expected that hedging pressure should go up as Brent prices decline. A number of producers, including Occidental and Pioneer, are closing their 2022 hedges due to expected robust market fundamentals.



Source: Bloomberg, April 2, 2022.

**Trader class shares:** Despite rising oil prices throughout this year, reaching rates as high as \$139/b, trader long position shares have been declining ( $\approx 21\%$ ) between March 2021 and the beginning of April 2022. Furthermore, money managers long positions (MML) have decreased significantly from 208,066 at the beginning of this year to 68,125 at the end of March. This could indicate market volatility, severe inflation, or even expectations of an oil price decline. It could also mean that MM are looking to other commodities for higher returns due to the current oil price volatility (excluding mining).



Note: Refer to the glossary for abbreviations.  
Source: Bloomberg, April 3, 2022.

## Price fundamentals (markets)

**U.S. Dollar Index:** Although the U.S. Dollar Index (DXY) sometimes has a negative relationship with commodity prices, Brent and the U.S. dollar have both been trending up recently. This has partly been fueled by an improved economic outlook for the U.S. alongside increased oil demand, both of which are linked. Indeed, the U.S. economy is improving relatively quickly compared with other parts of the world, and the recent hike in interest rates by the Federal Reserve (Fed) is supporting that continued trend. Furthermore, and as stated in the summary of this report, inflation has been playing a role in this trend.



Source: Bloomberg, April 3, 2022.

## Editorial: Aviation in an unprecedented time

Contributed by Andres Guzman Valderrama, KAPSARC

With the onset of the COVID-19 pandemic, aviation stopped globally as countries implemented travel restrictions in an attempt to contain and prevent the spread of the virus. Due to the unexpected effects of COVID-19, daily activities were significantly disrupted. However, preventive measures and restrictions were slowly relaxed as countries dealt with the virus. Domestic flights were gradually reinstated, while international flights took longer because cross-border restrictions were more substantial. During 2020, aviation suffered its biggest ever decline, with significant losses in airport and tourism revenue. This was even after the industry's resilience had been tested many times since the Second World War (e.g., external events like the oil crisis in the 1970s, the 9/11 terrorist attack in 2001, and the Global Financial Crisis in 2008). Despite all these previous events, aviation had always had sustained year-on-year growth. The COVID-19 pandemic brought new challenges to its resilience, speed of recovery, and growth prospects in the short, medium, and long run. As the COVID-19 pandemic and aviation are global, the industry's full recovery will depend on the general situation around the world. The impact of the COVID-19 pandemic on the daily number of flights and passengers shows that the supply of and demand for air travel dropped sharply.

In 2020, there were 53% fewer domestic and international flights per week in Saudi Arabia than in 2019, while in 2021, there were 22% fewer flights per week than in 2019. The figures for passengers carried per week differ because of the preventive measures taken, such as social distancing and limited/restricted country access based on the evolution of the virus. These results show that, in Saudi Arabia, the pandemic shrunk aviation demand at a greater pace in 2020 than in 2021. In 2021, global aviation demand steadily grew, including in countries such as Saudi Arabia, with the removal of restrictions and the start of vaccination campaigns. However, domestic and international situations differ significantly because of the differing responses from national governments.

Although aviation is likely to fully recover to its pre-pandemic level (i.e., the year 2019), this sector still faces serious energy-related concerns in the following months. These include the introduction of new technologies, new alternative fuels (hydrogen, sustainable aviation fuels, and electric power), new airline carriers, and changes in passenger load factors. As a result, the problems facing the aviation sector have prompted governments to embrace new policies and measures to help alleviate this sector's recent supply and demand challenges.

## Editorial: A net-zero carbon future and bunkering challenges in the shipping industry

Contributed by AHM Mehbub Anwar, KAPSARC

The shipping industry has a critical role in a net-zero carbon future. In response to the Paris Agreement, the International Maritime Organization (IMO) has set ambitious goals of halving greenhouse gas emissions from international shipping by 2050 and reducing its carbon dioxide emissions intensity by 40% by 2030 and 70% by 2050, compared with their 2008 levels. Bunker and tanker facilities are crucial to achieving the IMO's emissions reduction ambition, which requires a parallel process that looks at the best options for today as well as working collectively on developing the right fuels for tomorrow. Over the next five years many shipping operators plan to use alternatives to traditional bunker fuel such as liquified natural gas (LNG) or liquified petroleum gas (LPG). However, they want to understand the alternative fuel market beforehand to ensure they are making good long-term investments. It seems that other alternative fuels may come after LNG, and the industry needs to keep working on finding other future carbon-neutral fuels.

LNG is growing as a share of the bunkering market. Prices for LNG have remained below the cost of other IMO-compliant marine fuels, which has supported the growth in LNG bunker sales. While LNG has a higher energy density than HFO (heavy fuel oil), it has a low volumetric density, which results in storage of LNG fuels taking twice the space of HFO. Depending on tanks' characteristics, LNG may take up to three times the space of HFO storage. Hydrogen's energy density is approximately three times that of HFO, but its volumetric density is significantly lower than HFO. Subsequently, the storage of liquefied hydrogen can take up approximately five times the space of the same energy stored in HFO. The relatively low energy density of ammonia means higher storage volumes, which takes around two and a half times more space than HFO. Other characteristics can also be taken into account, namely pressure and temperature characteristics. However, the purpose of this editorial is to highlight the volumetric aspects.

The alternative fuels mentioned above are currently being considered and there is a high potential that they can reduce carbon emissions, given that appropriate bunkering facilities are currently being offered. Hydrogen and ammonia, which appear to be cleaner alternatives for the future, are not yet ready to be commercialized on a larger scale. Nonetheless, that day seems far off. After the initial wave of scrubber installations, further investment has slowed due to the sharp drop in very low-sulphur fuel oil use. This means that ship owners who intended to install scrubbers and planned continuing to use high-sulfur fuel oil may reconsider their decisions to go forward with their net-zero carbon targets. Recently the merits of methanol and ammonia are getting attention, and the increasing role of biofuels in the clean energy mix could be considered as a 'bridging' fuel. This sort of 'drop-in' fuel does not require any significant modifications to engines and infrastructure, which may mean it has cost advantages for ship owners and operators.



## Editorial: Saudi Arabia's reform of its electricity sector has increased the oil available for export

Contributed by Abdulelah Darandary, KAPSARC

Recent policies and reforms have allowed Saudi Arabia to increase its oil export potential. The Kingdom aims to reduce its domestic use of oil and free up more than one million barrels per day by 2030. Rationalizing energy consumption, a priority of Saudi Vision 2030, targets three sectors that contribute to more than 90% of the country's total primary energy consumption: residential, transport, and industry.

The first wave of reforming energy prices was implemented in 2016 for residential, industrial, and commercial customers, with electricity prices increasing by around 20%. The second wave of reforms materialized in 2018, in addition to a new value-added tax of 5%, which resulted in a rise of 41% in residential customers' electricity prices.

The government has set a domestic target to fully replace crude oil, diesel, and heavy fuel oil use with natural gas and renewables. The fuel price reform of the electricity sector has already significantly contributed to this fuel displacement. Table 1 highlights the change in regional fuel use for power between 2015 and 2019, highlighting a significant phasing out of crude, heavy fuel oil, and diesel in major consuming regions. To compensate for this, the allocation of natural gas to the electricity sector increased by two thirds from 2015 to 2019.

**Table 1.** Regional fuel disparities.

**Share of regional fuel consumption for electricity generation in Saudi Arabia**

Region	2015				2019			
	Crude	Diesel	Gas	HFO	Crude	Diesel	Gas	HFO
Central	43%	8%	50%	0%	28%	1%	72%	0%
Eastern	25%	12%	63%	0%	2%	1%	97%	0%
Western	50%	19%	0%	31%	36%	3%	10%	51%
Southern	23%	77%	0%	0%	37%	25%	0%	38%

Note: 0.56/MMb/d of crude consumed in 2015, and 0.39/MMb/d in 2019.

Source: ECRA, 2015 and 2019.

*Editorial: Saudi Arabia's reform of its electricity sector has increased the oil available for export...*

A recent KAPSARC Commentary<sup>1</sup> used a partial equilibrium model to estimate the counterfactual regional residential electricity consumption that would have prevailed in the absence of the 2016-2018 price reforms. The counterfactual estimates are fed into a cost-minimization model for electricity, the KAPSARC Power Model (KPM), which considers costs and fuel access, among other constraints. The analysis shows that price reforms have saved a significant amount of oil previously used to meet residential electricity demand. A forthcoming paper<sup>2</sup> expands this analysis by including all electricity customers in the Kingdom. It finds that, without the price reforms in the power sector, the quantity of oil used to generate electricity would have been 2 Kb/d per day (50%) higher in 2019.

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<sup>1</sup> Darandary, Abdulelah, Jeyhun Mikayilov, and Hatem Al Atawi. 2021. "Saving Costs and Emissions by Reforming Electricity Prices in Saudi Arabia: A Counterfactual Assessment."

<sup>2</sup> Darandary, Abdulelah. 2022 [forthcoming]. "Fuel and Carbon Dioxide Emission Savings: Quantifying the Impacts Of Price Reforms."



**Appendix**

## World oil demand, 2021 - Q1 2024 (MMb/d)

		2021	Q1	Q2	Q3	Q4	2022	Q1	Q2	Q3	Q4	2023	Q1		
Americas	OECD	United States	20.0	20.2	20.2	20.4	20.5	20.3	20.4	20.4	20.6	20.7	20.5	20.6	
		Canada	2.4	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.6	2.6	2.5	2.5
		Mexico	1.7	1.8	1.8	1.8	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	2.0
		Chile	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.3
		<b>Total</b>	<b>24.4</b>	<b>24.8</b>	<b>24.8</b>	<b>25.2</b>	<b>25.2</b>	<b>25.0</b>	<b>25.1</b>	<b>25.1</b>	<b>25.5</b>	<b>25.5</b>	<b>25.5</b>	<b>25.3</b>	<b>25.5</b>
	Non-OECD	Argentina	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
		Brazil	3.0	3.0	3.1	3.1	3.1	3.1	3.0	3.1	3.2	3.2	3.1	3.1	3.1
		Venezuela	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
		RO Latin America	2.3	2.4	2.4	2.5	2.4	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.5
		<b>Total</b>	<b>6.3</b>	<b>6.4</b>	<b>6.5</b>	<b>6.6</b>	<b>6.6</b>	<b>6.5</b>	<b>6.5</b>	<b>6.7</b>	<b>6.8</b>	<b>6.8</b>	<b>6.8</b>	<b>6.7</b>	<b>6.7</b>
<b>Total Americas</b>		<b>30.8</b>	<b>31.2</b>	<b>31.3</b>	<b>31.8</b>	<b>31.8</b>	<b>31.6</b>	<b>31.6</b>	<b>31.8</b>	<b>32.3</b>	<b>32.4</b>	<b>32.0</b>	<b>32.2</b>		
Europe	OECD	Germany	2.1	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	
		France	1.6	1.7	1.6	1.7	1.7	1.6	1.7	1.6	1.6	1.6	1.6	1.7	
		United Kingdom	1.3	1.3	1.4	1.4	1.5	1.4	1.4	1.4	1.4	1.4	1.4	1.4	
		Poland	0.7	0.6	0.7	0.8	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	
		Turkey	0.9	0.8	1.0	1.1	1.0	1.0	0.8	1.0	1.1	1.1	1.0	0.9	
		RO OECD Europe	6.6	6.5	6.2	6.8	6.8	6.6	6.8	6.8	7.0	6.9	6.9	6.9	6.8
	<b>Total OECD Europe</b>	<b>13.3</b>	<b>13.1</b>	<b>13.0</b>	<b>14.0</b>	<b>13.9</b>	<b>13.5</b>	<b>13.7</b>	<b>13.7</b>	<b>14.2</b>	<b>14.0</b>	<b>13.9</b>	<b>13.7</b>		
Asia-Oceania	OECD	Australia	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.2	1.1	1.2	
		Japan	3.5	3.8	3.2	3.4	3.8	3.6	4.0	3.3	3.4	3.7	3.6	4.0	
		Republic of Korea	2.5	2.6	2.4	2.4	2.6	2.5	2.6	2.4	2.4	2.7	2.5	2.7	
		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	
		<b>Total</b>	<b>7.1</b>	<b>7.7</b>	<b>6.8</b>	<b>7.0</b>	<b>7.8</b>	<b>7.3</b>	<b>7.9</b>	<b>7.0</b>	<b>7.1</b>	<b>7.7</b>	<b>7.4</b>	<b>8.1</b>	
	Non-OECD	China	15.0	15.2	15.5	15.4	15.6	15.4	15.7	15.9	15.7	15.9	15.8	16.8	
		India	4.9	5.4	5.5	4.8	5.2	5.2	5.5	5.7	5.0	5.5	5.4	5.7	
		Indonesia	1.7	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.0	
		RO Asia	6.6	7.1	6.9	6.9	6.8	6.9	7.3	7.1	7.1	7.1	7.1	7.5	
		<b>Total</b>	<b>28.2</b>	<b>29.4</b>	<b>29.6</b>	<b>28.9</b>	<b>29.5</b>	<b>29.4</b>	<b>30.4</b>	<b>30.6</b>	<b>29.6</b>	<b>30.3</b>	<b>30.3</b>	<b>32.1</b>	
<b>Total Asia</b>		<b>35.3</b>	<b>37.1</b>	<b>36.5</b>	<b>35.9</b>	<b>37.3</b>	<b>36.7</b>	<b>38.4</b>	<b>37.6</b>	<b>36.8</b>	<b>38.0</b>	<b>37.7</b>	<b>40.2</b>		
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	0.2	
	Bahrain	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
	Non-OECD	Iraq*	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	
		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	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
		Saudi Arabia	3.6	3.1	3.8	4.2	3.4	3.6	3.1	3.8	4.2	3.5	3.7	3.1	
		Qatar	0.2	0.2	0.2	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	
		UAE	0.9	0.9	1.0	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	
		<b>Total GCC</b>	<b>6.0</b>	<b>5.5</b>	<b>6.4</b>	<b>6.9</b>	<b>6.0</b>	<b>6.2</b>	<b>5.6</b>	<b>6.5</b>	<b>7.1</b>	<b>6.1</b>	<b>6.3</b>	<b>5.8</b>	
		Iran	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.7	1.7	1.8	1.8	
	RO Middle East	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4		
<b>Total</b>	<b>8.1</b>	<b>7.6</b>	<b>8.5</b>	<b>9.0</b>	<b>8.1</b>	<b>8.3</b>	<b>7.8</b>	<b>8.7</b>	<b>9.2</b>	<b>8.3</b>	<b>8.5</b>	<b>8.0</b>			
<b>Total Middle East</b>		<b>8.3</b>	<b>7.9</b>	<b>8.7</b>	<b>9.3</b>	<b>8.3</b>	<b>8.6</b>	<b>8.0</b>	<b>8.9</b>	<b>9.5</b>	<b>8.5</b>	<b>8.7</b>	<b>8.2</b>		
Africa	Non-OECD	Egypt	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7		
		South Africa	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	3.0	2.9	2.7	2.9	2.9	3.1	3.0	2.8	3.0	3.0	3.2	
<b>Total Africa</b>		<b>4.0</b>	<b>4.2</b>	<b>4.2</b>	<b>3.9</b>	<b>4.2</b>	<b>4.1</b>	<b>4.4</b>	<b>4.3</b>	<b>4.1</b>	<b>4.3</b>	<b>4.3</b>	<b>4.5</b>		
Eurasia	Non-OECD	Russia	3.6	3.6	3.3	3.4	3.1	3.3	3.1	3.1	3.5	3.4	3.3	3.3	
		RO Eurasia	1.9	1.7	1.9	2.1	2.0	1.9	1.7	1.9	2.1	2.0	1.9	1.8	
<b>Total Eurasia</b>		<b>5.5</b>	<b>5.4</b>	<b>5.2</b>	<b>5.4</b>	<b>5.1</b>	<b>5.3</b>	<b>4.8</b>	<b>5.0</b>	<b>5.6</b>	<b>5.4</b>	<b>5.2</b>	<b>5.1</b>		
<b>Global Demand</b>		<b>97.2</b>	<b>98.9</b>	<b>98.9</b>	<b>100.4</b>	<b>100.6</b>	<b>99.7</b>	<b>100.9</b>	<b>101.4</b>	<b>102.4</b>	<b>102.7</b>	<b>101.8</b>	<b>103.8</b>		

## World oil supply, 2022 - Q1 2024 (MMb/d)

	2022 Q1	2022 Q2	2022 Q3	2022 Q4	2023 Q1	2023 Q2	2023 Q3	2023 Q4	2024 Q1
Africa	7.49	7.65	7.76	7.81	7.81	7.77	7.71	7.60	7.51
Americas	34.12	34.74	35.33	35.47	35.41	35.65	35.24	34.06	33.50
Asia	9.18	9.13	9.12	9.12	9.11	9.08	9.01	8.86	8.72
Eurasia	14.50	13.97	13.58	13.15	12.74	12.75	12.78	12.80	12.83
Europe	4.21	4.32	4.45	4.57	4.67	4.73	4.77	4.75	4.72
Middle East	30.14	30.59	31.56	32.47	33.28	33.47	33.60	33.65	33.67
<b>Total</b>	<b>99.64</b>	<b>100.40</b>	<b>101.80</b>	<b>102.59</b>	<b>103.02</b>	<b>103.45</b>	<b>103.10</b>	<b>101.71</b>	<b>100.95</b>
	2022 Q1	2022 Q2	2022 Q3	2022 Q4	2023 Q1	2023 Q2	2023 Q3	2023 Q4	2024 Q1
Conventional	72.09	72.10	72.78	73.33	73.70	73.74	73.54	72.85	72.23
Extra heavy oil	3.45	3.45	3.46	3.47	3.48	3.47	3.44	3.31	3.39
Oil sands	3.33	3.29	3.27	3.26	3.27	3.27	3.28	3.28	3.29
Oil shale (kerogen)	0.04	0.04	0.04	0.05	0.05	0.05	0.06	0.06	0.06
Other liquids	6.39	6.94	7.23	7.13	7.06	7.50	7.71	7.51	7.35
Tight oil	11.58	11.78	12.15	12.42	12.53	12.52	12.23	11.89	11.70
Unconventional gas	2.76	2.80	2.86	2.92	2.94	2.91	2.83	2.80	2.93
<b>Total</b>	<b>99.64</b>	<b>100.40</b>	<b>101.80</b>	<b>102.59</b>	<b>103.02</b>	<b>103.45</b>	<b>103.10</b>	<b>101.71</b>	<b>100.95</b>
	2022 Q1	2022 Q2	2022 Q3	2022 Q4	2023 Q1	2023 Q2	2023 Q3	2023 Q4	2024 Q1
Algeria	0.97	0.99	1.01	1.03	1.05	1.05	1.05	1.05	1.05
Angola	1.16	1.14	1.12	1.11	1.09	1.06	1.02	0.94	0.86
Congo	0.28	0.26	0.26	0.25	0.25	0.25	0.25	0.25	0.24
Equatorial Guinea	0.09	0.10	0.10	0.09	0.09	0.08	0.07	0.06	0.06
Gabon	0.19	0.17	0.17	0.17	0.16	0.16	0.16	0.16	0.15
Iran	2.55	2.59	2.68	2.87	3.11	3.31	3.45	3.51	3.53
Iraq	4.32	4.38	4.54	4.67	4.75	4.75	4.75	4.75	4.75
Kuwait	2.61	2.66	2.76	2.86	2.94	2.94	2.94	2.94	2.94
Libya	1.08	1.15	1.20	1.22	1.22	1.24	1.26	1.29	1.33
Nigeria	1.32	1.38	1.42	1.45	1.47	1.47	1.46	1.42	1.38
Saudi Arabia	10.03	10.21	10.55	10.89	11.22	11.22	11.22	11.22	11.22
UAE	2.95	2.99	3.21	3.35	3.47	3.48	3.48	3.48	3.48
Venezuela	0.68	0.70	0.71	0.74	0.78	0.80	0.79	0.77	0.75
Oil field production	28.24	28.74	29.73	30.71	31.60	31.80	31.88	31.83	31.74
Other production	5.56	5.64	5.68	5.65	5.58	5.54	5.52	5.50	5.51
<b>OPEC</b>	<b>33.80</b>	<b>34.38</b>	<b>35.41</b>	<b>36.35</b>	<b>37.18</b>	<b>37.34</b>	<b>37.40</b>	<b>37.33</b>	<b>37.25</b>
	2022 Q1	2022 Q2	2022 Q3	2022 Q4	2023 Q1	2023 Q2	2023 Q3	2023 Q4	2024 Q1
Call on OPEC	33.07	32.88	34.01	34.40	35.02	35.33	36.65	38.34	40.06
OPEC	33.80	34.38	35.41	36.35	37.18	37.34	37.40	37.33	37.25
OPEC Partner	16.40	15.81	15.41	14.99	14.59	14.60	14.62	14.62	14.62
Non-OPEC	49.44	50.21	50.98	51.24	51.25	51.51	51.09	49.76	49.08
<b>Total</b>	<b>99.64</b>	<b>100.40</b>	<b>101.80</b>	<b>102.59</b>	<b>103.02</b>	<b>103.45</b>	<b>103.10</b>	<b>101.71</b>	<b>100.95</b>

## Glossary

<b>MMb/d</b>	Million barrels of oil per day
<b>Kb/d</b>	Thousand barrels of oil per day
<b>Target inventories</b>	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.
<b>Real inventories</b>	Represents the real inventory levels based on KOMO's forecast of supply/demand and inventory surplus/deficit balances.
<b>Hedging pressure</b>	<p><math>HP = PMnS - MMnL</math>, 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>
<b>PM</b>	Producers/merchants/processors/users
<b>SW</b>	Swap dealers
<b>MM</b>	Managed money
<b>OR</b>	Other reporters
<b>NR</b>	Non-reporters
<b>OPEC partners</b>	Azerbaijan, Bahrain, Brunei, Kazakhstan, Malaysia, Mexico, Oman, Russia, South Sudan and Sudan

## About KAPSARC

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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 2022 was used in the preparation of this Report.



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