Oil

Australia's crude oil, condensate and LPG resources, PJ

Oil facts

Carnavon basin produces around **2/3 of Australia's crude & condensate**

The Brent spot price has ranged from **US$17–134 a barrel** in the last 2 years

In 2021, around **28%** of refinery feedstock was domestically produced

World consumption

29% Diesel

26% Gasoline

14% LPG and Ethane

12% Other

6% Fuel oil

5% Jet fuel and Kerosene

Australia's oil

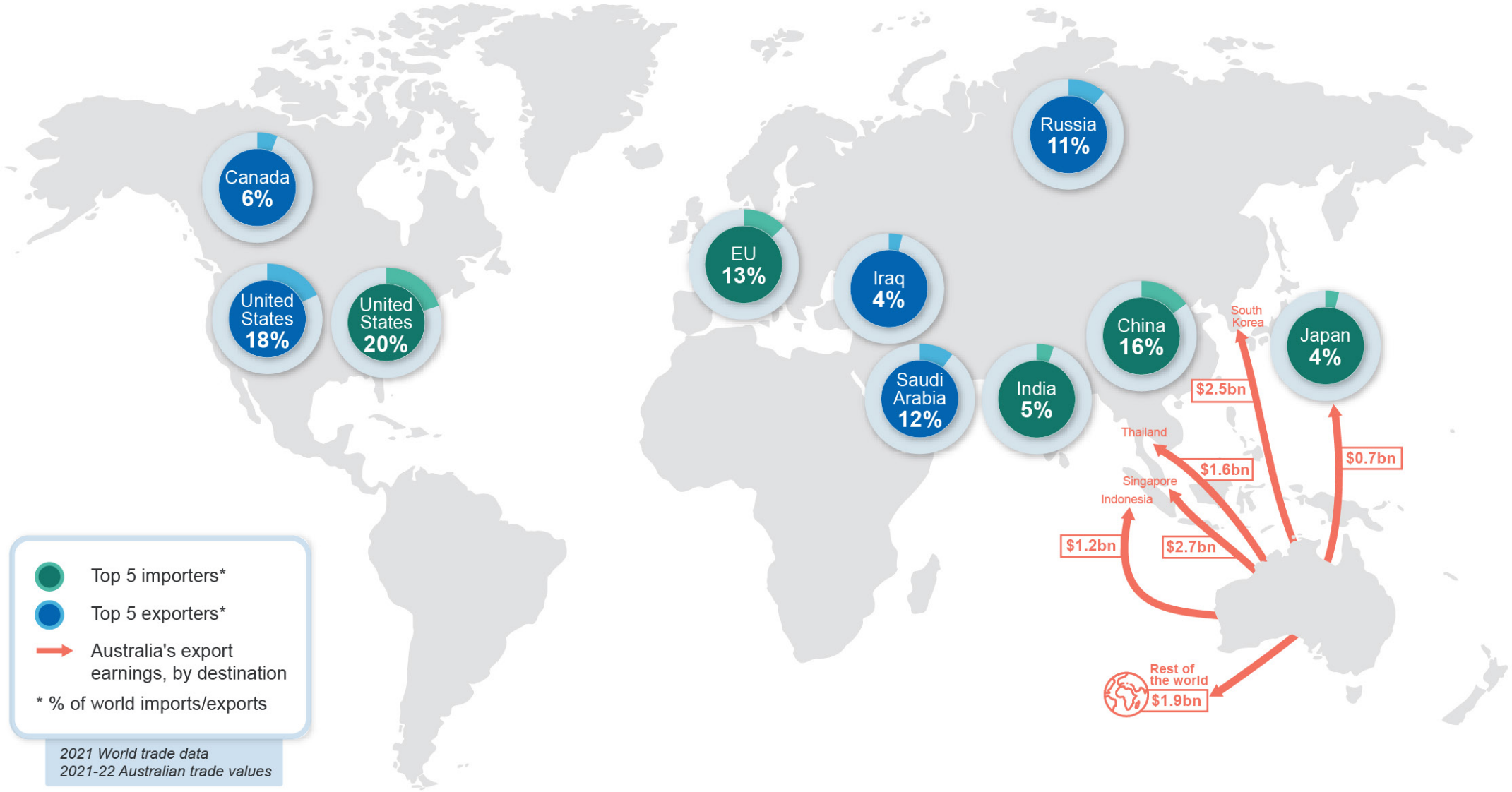
0.3% of the world's oil reserves held

$14 billion worth of oil exports in 2021-22

0.5% of global production

Oil

Trade map | September 2022



8.1 Summary

- Oil prices are forecast to trend downward over the outlook period, following multi-year highs in the first half of the year. However, there is a higher than normal level of uncertainty around the forecasts. Brent crude oil is forecast to average US$103 a barrel in 2022, before declining over the rest of the forecast period.
- Australian crude oil and feedstock exports rose to 292 thousand barrels a day (kb/d) in 2021–22. Export volumes are forecast to decrease to 267 kb/d in 2022–23, before returning to 286 kb/d in 2023–24.
- Australian oil export earnings rose by 88% to $14.0 billion in 2021–22, due to the surge in oil prices. Elevated prices and a weak AUD/USD should see earnings reach $15.0 billion in 2022–23. Earnings for 2023–24 are forecast at $13.4 billion, as prices fall from 2022–23 levels.

8.2 World consumption

Consumption forecast to lift, but geopolitics adding to high uncertainty

Global oil consumption is predicted to rise by 2.2% in 2022 to 100 million barrels per day (mb/d), still lagging behind pre-COVID levels of 2019. However, final usage for 2022 is subject to heightened uncertainty, with a number of global developments capable of drastically impacting demand.

China's dynamic zero-COVID policy led to the introduction of severe lockdown restrictions in major consuming regions/cities (including Shanghai) in H1 2022. A resurgence of outbreaks in second-tier cities, like Wuhan, saw lockdowns renewed in early July. Restrictions were subsequently eased but new outbreaks can be expected to hamper any recovery in consumption in the September and December quarters. COVID outbreaks in the world's second largest oil consuming nation will thus continue to be a major risk to global oil consumption in the near term.

Economic activity in major OECD nations has shown early signs of deterioration, with surging fuel costs and high inflation weighing on growth. Reduced exports of refined petroleum products from Russia — due to official sanctions and independent corporate actions — have boosted retail prices for gasoline and diesel fuel. The high prices for road fuels are afflicting demand, with both OECD gasoline and diesel consumption declines posted in June, according to preliminary data. It was previously expected that the Northern hemisphere summer driving season would help boost gasoline demand this year. However, the soaring pump prices are expected to weigh on this growth.

At the same time, jet fuel demand in the OECD has continued to recover due to the ongoing rebound in air traffic. For the June quarter, jet fuel posted the largest annual growth rate among all OECD refined fuel products demand (up 38%). According to International Air Transport Association data, global air traffic in July increased 59% compared to July 2021, and is now measuring 75% of pre-COVID levels. The International Air Transport Association expects global traveller numbers to exceed pre-COVID-19 levels by 2024.

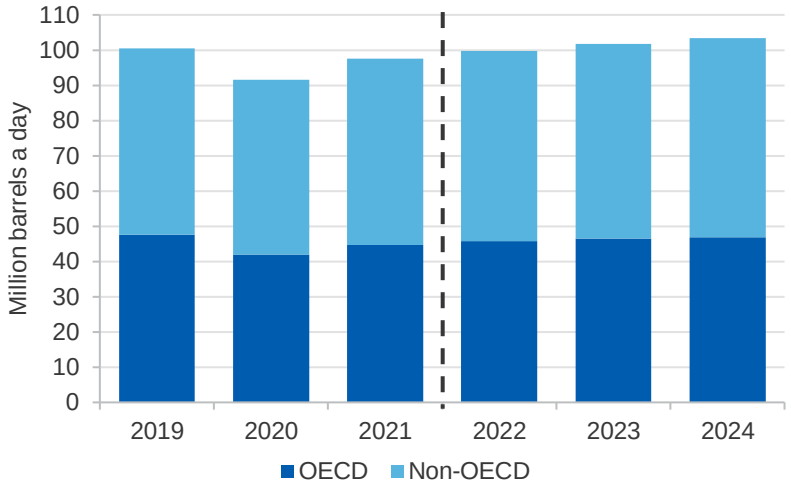
Soaring natural gas prices (see *Gas chapter*), which remain well above oil price rises over the same period, have triggered a significant interest in fuel switching for industrial activities and power generation in Europe and the Middle East. Gas-to-oil switching, mostly in industry, is expected to result in a boost in demand for the remainder of this year and into 2023. Heat waves early in the Northern Hemisphere summer have already resulted in an increase of fuel oil and direct crude use for power generation in various Middle Eastern and European nations.

Consumption of naphtha is forecast to fall in 2022 — the only major oil product forecast to decline overall. This comes after continual annual growth due to thriving petrochemical demand. Naphtha demand fell by 1.1 mb/d (more than double the typical seasonal fall) between January and May 2022. The decline primarily reflects the fallout from the Russian invasion of Ukraine — Russia is the world's largest naphtha exporter.

Rising crude oil prices have affected margins in the US petrochemical industry. Asia typically accounts for about 70% of global naphtha usage, but this year's severe lockdowns in China have impacted domestic producers and have prevented China's neighbours from importing the product. However, some recovery in naphtha consumption is expected in the second half of the year, due to the easing situation in China.

Global oil consumption is forecast to increase by 2.1% to 102 mb/d in 2023, rising above pre-pandemic levels. Consumption is forecast to reach 103 mb/d in 2024 (Figure 8.1). Growth is expected to be driven by the gradual rebound in air traffic — and subsequent jet fuel demand — and gas-to-oil switching. However, outbreaks of new COVID-19 variants in China, and a weakening global economic outlook, may weigh on oil demand. Sanctions on imports of Russian oil will result in a rearrangement of global trade, and could shift global demand patterns in the near term.

Figure 8.1: Global oil consumption, OECD and non-OECD



Source: Department of Industry, Science and Resources (2022); International Energy Agency (2022).

Recovery in OECD aviation demand exceeds declines elsewhere

The weakening economic climate (see *Macroeconomic overview*) has become a major risk to overall oil consumption in major OECD nations for the remainder of this year, and over the forecast period. In 2022, demand is expected to rise 2.4% from 2021. OECD growth is forecast to be restricted to 1.4% in 2023, and hold steady in 2024. Consumption may not return to 2019 levels, due to the uptake of electric vehicles (see the *Lithium chapter* and Figure 8.1).

Soaring transport fuel prices, high inflation and weakening consumer confidence may result in a decline in OECD gasoline and diesel consumption growth for the remainder of 2022 and into 2023. Preliminary June consumption data shows a fall for both products, with the US registering some of the lowest seasonal levels for gasoline consumption in decades.

Nonetheless, the recovery in jet fuel demand has made impressive gains, as borders have reopened and consumers look to holiday internationally. The recovery is set to continue, providing a strong boost to overall consumption figures.

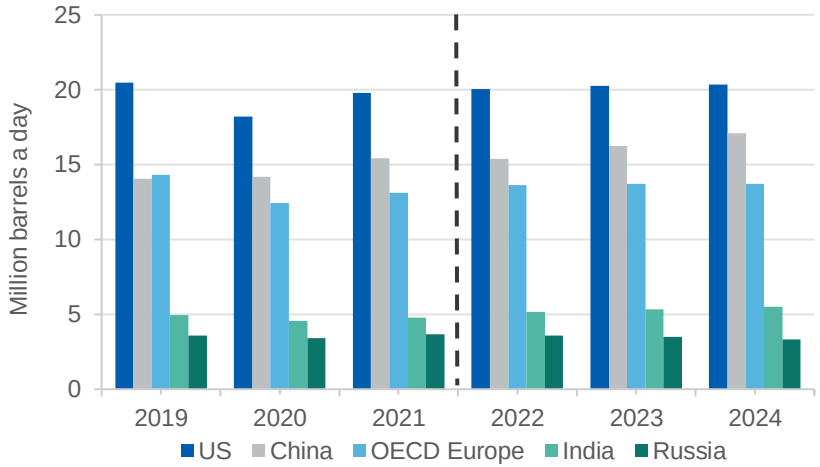
The fallout from the Russian invasion of Ukraine will influence the course of oil trade, and potentially consumption, in the major OECD nations. The US announced a ban on Russian oil, gas and other energy imports on 8 March 2022. In 2021, around 8% of US oil imports came from Russia. At the beginning of June 2022, the EU adopted the sixth package of sanctions on Russia, including an almost total embargo on Russian oil. A price cap is now being proposed (see Box 8.1 below).

The EU sanctions will ban seaborne imports of Russian crude oil from 5 December 2022, and ban petroleum product imports from 5 February 2023. The sanctions will cover around 90% of oil imports from Russia. Imports via pipeline will be exempt from the sanctions, due to member states like Hungary, Slovakia and the Czech Republic depending very heavily on imports via the Druzhba pipeline. However, Germany and Poland, who consumed 500 kb/d of the 750 kb/d carried in the pipeline, will voluntarily give up those imports. In 2021, 25-30% of Europe's oil imports were supplied by Russia, so these measures will require the EU to secure a substantial oil supply from outside of Russia.

With natural gas prices soaring, and EU members committing to reducing their demand for gas by 15% from August 2022 to March 2023 (see *Gas chapter*), gas-to-oil substitution is forecast to rise significantly in OECD Europe. Increased demand for crude, non-transport gasoil and fuel oil could add up to 300 kb/d to oil product deliveries until the end of 2023.

In 2022, US oil demand growth is forecast to slow down to 1.3%, reflecting the deteriorating macroeconomic climate. In 2023, consumption is expected to grow a further 1.0%. OECD Europe demand is forecast to rise 3.9% in 2022 and by less than 1% in 2023.

Figure 8.2: Major oil consumers



Source: Department of Industry, Science and Resources (2022); International Energy Agency (2022).

China's zero-COVID strategy to slow non-OECD consumption growth

Total consumption growth for the non-OECD region is forecast to be comparatively moderate, at 1.9% (compared to the 6.8% in 2021). This is largely due to the strict COVID lockdown measures in place in major regions of China throughout the majority of the June quarter. With Chinese demand set to grow solidly in 2023, non-OECD consumption is expected to lift by a further 2.8% to 55 mb/d in 2023, and to continue rising to 57 mb/d by 2024. Non-OECD demand is expected strongly exceed OCED demand over the outlook — including by a forecast 20% in 2023.

Chinese consumption for the June quarter 2022 fell 6.4% compared to the same period last year. This reflected the impact of the implementation of the Chinese government's zero-COVID policy, which saw hundreds of millions of people subject to strict containment measures. Chinese demand in 2022 is forecast to remain at 2021 levels, at just over 15 million barrels a day (Figure 8.2). However, demand largely depends on the unpredictable path of the virus and the Chinese government's response, which may change.

Strong economic growth, continuing demand by the manufacturing sector, and effective COVID-19 management, have all supported Indian oil consumption growth so far in 2022. Gasoline and diesel usage are expected to see major gains this year, due to increased mobility and strong industrial activity. After China, India is the second largest net oil importer, and typically imports around 85% of its oil.

In 2021, less than 3% of India's crude imports came from Russia. However, in 2022, sanctions from advanced Western nations, emerging market gaps, and reports of significant discounts, have led to a massive and rapid increase in Indian imports of Russian oil. This trend is set to continue over the outlook period. In 2022, Indian oil consumption is expected to grow a solid 8.0% year-on-year to 5.1 mb/d, reaching pre-pandemic levels (Figure 8.2).

Oil consumption forecasts for Russia remain uncertain. June data shows a rebound in aviation consumption, after registering declines since March. However, growth in overall oil consumption is expected to slow in the second half of this year, leading to overall falls in 2022 (1.4%) and 2023 (3.3%), due to rising sanctions.

Box 8.1: EU insurance ban and the oil price cap

Since June, Western countries have discussed introducing a price cap for Russian oil imports, to limit financing for Russia's invasion of Ukraine and reduce energy prices. In 2021, 45% of the Russian federal budget came from oil and gas revenues, and Russia was the largest oil exporting country in the world (13% of total exports).

The price cap is a proposal aimed at minimising the adverse impact of EU sanctions on oil consumers. These sanctions were agreed upon by the EU in June, and are set to come into effect in December 2022. In particular, the EU has banned European companies (incl. British and Norwegian) from providing

insurance for Russian cargoes. These companies currently cover some 97% of oil tankers worldwide. Uninsured tankers would be unacceptable for many ports and canals (notably Suez), thus theoretically stranding much Russian oil from the world market. With this prospect, oil prices have already surged, and could go higher.

On 2 September, the G7 announced support for the price cap. This arrangement would allow cargoes to be insured only if they are sold at or below a certain price — to be set at a level just above Russia's cost of production and below the pre-invasion price for the Ural benchmark: $40-60/barrel.

8.3 World production

Global production set to rise with increased OPEC+ quotas and US output

Developments surrounding Russia's invasion of Ukraine will likely continue to create uncertainty around global oil production for at least the rest of this year. The trajectory of production in Russia — the world's third largest oil producer and largest exporter of oil to global markets — remains unknown amidst changing trade flows. OPEC+ supply remains similarly uncertain, not least due to ongoing talks for a return to the Iran nuclear deal (see further below). Despite this, global production is expected to lift this year, reflecting increased OPEC+ production volumes and a boost from other non-OPEC+ producers — including the US, Canada and Brazil.

Global output is expected to rise by 5.0% to 100 mb/d in 2022. In 2023, output is expected to rise to 102 mb/d; a potential annual output record (Figure 8.3). In 2024, production should grow by 1.4% to 103.1 mb/d.

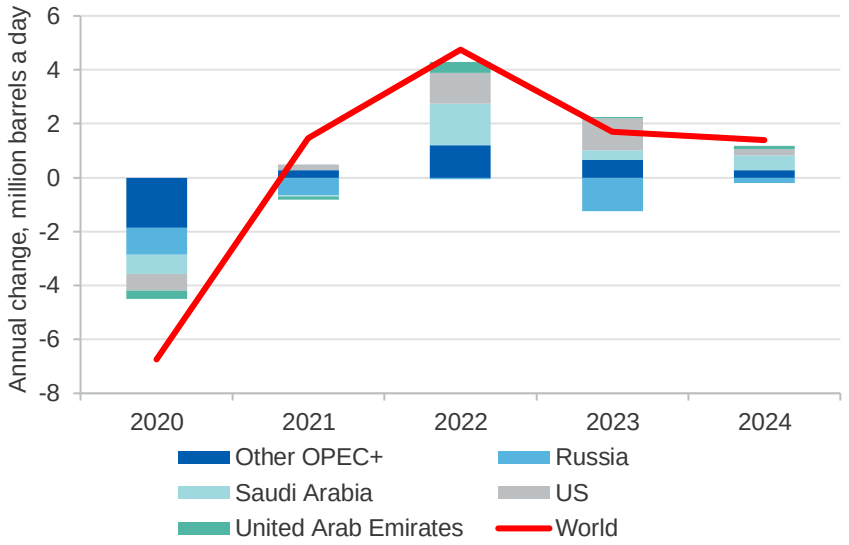
OPEC+ supply progressively rising, but underperforming stated targets

So far, OPEC+ producers have stuck to their July 2021 decision to steadily wind back the (COVID-19 induced) production cuts of early 2020. The group agreed to increase production every month, commencing in August 2021, and meet monthly to reaffirm members' commitments and ensure market stability.

At their June meeting, the alliance agreed to accelerate its production hikes through the Northern Hemisphere summer, lifting its output target by 648 kb/d in July and August, up from the 432 kb/d rise in June, and 400 kb/d increase in the preceding months. However, in their meeting on 3 August, the group agreed to increase its production target by a modest 100 kb/d, which was nonetheless removed in their 5 September meeting.

The group has struggled to hit production targets; in July 2022, output rose by 570 kb/d among the 19 members involved in the supply deal, compared to a planned 648 kb/d increase. Some member countries, including Nigeria, Malaysia and Angola, are struggling to meet quotas, due to a lack of spare capacity and chronic operational issues.

Figure 8.3: Change in oil production by major producers



Source: Department of Industry, Science and Resources (2022); International Energy Agency (2022).

At their August meeting, the group noted a "severely limited availability of excess capacity" and that there was insufficient investment in the upstream sector. Then, in September, OPEC countries emphasised the adverse effects on the oil market of volatility and a decline in liquidity, emphasising its commitment to intervene if it disagrees with these conditions.

Russian production is expected to decline as sanctions from the EU are implemented. However, the extent to which this happens is still mired in high levels of uncertainty. In July figures showed that Russian production lifted by 25 kb/d to reach 11,090 kb/d, down just 310 kb/d from pre-invasion levels, following previous months of decline. Crude exports have remained above pre-war levels, albeit with changing destinations. Russian oil products have recovered somewhat but remain below the 3.13 mb/d peak just before the invasion. The rise helped to offset maintenance-related outages in Kazakhstan and further losses in Libya for the OPEC+ group. Production in Libya, which is currently exempt from a quota under the OPEC+ supply deal, has been impacted by shut-ins at several fields due to the ongoing political crisis in that nation.

Meanwhile, talks for a return to the Iran nuclear deal (officially called the Joint Comprehensive Agreement Plan of Action) are ongoing. The EU submitted a "final draft agreement" to both USA and Iran, which would enable a major expansion of Iranian oil exports to global markets. An easing of sanctions on Iran could eventually add 1.3 mb/d to global supply. However, the latest Iranian response was deemed inadequate by the USA and no changes are expected for the remainder of 2022.

In 2022, OPEC+ output is expected to rise 6.3% to 52 mb/d and hold at similar levels in 2023 and 2024.

Non-OPEC+ production to rise and react to change in global trade flows

After a slow start to 2022 — which included freezing temperatures in major producing regions — US production is expected to rise steadily for the rest of 2022, and contribute nearly half of the supply growth of non-OPEC+ growth in 2022. Production growth is forecast to moderate in 2023 and 2024.

Various sanctions on Russian crude, and elevated prices, have provided an opportunity for US producers to bring further supply online. Since the invasion, monthly exports of US crude and products to Europe have soared to some of their highest levels since 2016, according to Kpler shipping data. The trend is set to continue as the EU partial ban on Russian oil imports takes effect. US production is expected to rise 6.9% to 18 mb/d in 2022 — a potential annual average record. However, investor support, amid weakening economic conditions, remains a key risk to US production and rate of ramp up.

Brazil, Canada and Norway are also expected to drive higher non-OPEC + supply in 2022. In 2022, non-OPEC+ production is expected to surpass pre-COVID-19 levels, averaging 48 mb/d. In 2023, production is forecast to average 50 mb/d.

8.4 Prices

Fallout from Russia's invasion of Ukraine driving price volatility this year

Oil prices have travelled a turbulent path so far in 2022 (Figure 8.4). Following Russia's invasion of Ukraine, prices broke the US$100 a barrel mark in the first days of March and continued to soar. Brent prices peaked at US$134 a barrel on 8 March 2022 — the highest levels since July 2008 — with the risk of sustained energy supply shocks, and sanctions on Russian oil, creating significant market uncertainties. Volatility continued into the June quarter. In early June, prices returned to early March levels, as the market reacted to the EU's partial ban on Russian oil imports, and the supply decisions of OPEC+.

Figure 8.4: Brent oil price, daily – 2020 to 2022

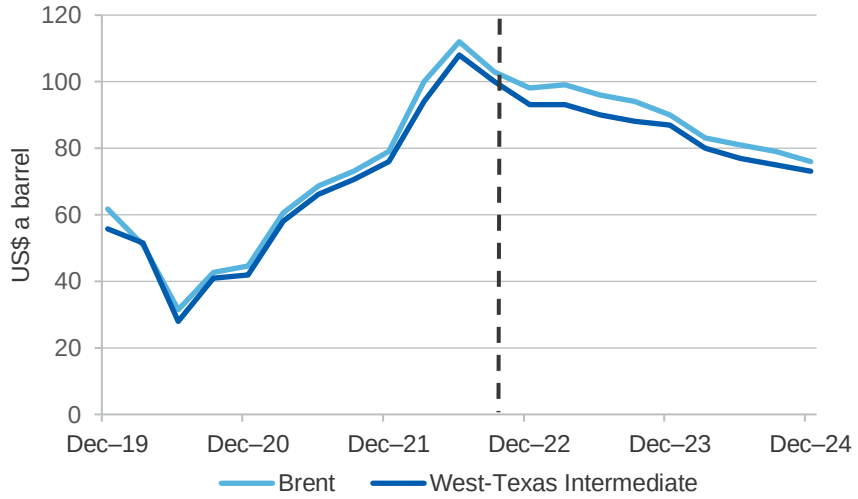
Source: Bloomberg (2022); Department of Industry, Science and Resources (2022).

Prices gradually declined from these highs, with Brent averaging 109 a barrel in July. In early August, prices once again dipped below US$100 a barrel, weighed down by a darkening global economic outlook. In September, prices continued to drop, averaging an estimated $90 a barrel with the September quarter average still up some 20% year-on-year.

Prices forecast to decline, but high market uncertainty to persist

On a quarterly average basis, oil prices are forecast to continue on a downward trend from the highs reached earlier in the year, averaging US $98 a barrel in the December quarter 2022 before steadying in the March quarter 2023. Increased supply from the US is expected to help offset Russian production losses. With sluggish demand, prices are forecast to soften over the forecast period, averaging US$95 a barrel in 2023, and US $80 a barrel in 2024 (Figure 8.5).

Figure 8.5: Price outlook



Source: Bloomberg (2022); Department of Industry, Science and Resources (2022)

As with recent *Resource and Energy Quarterly* reports, forecasts of prices come with elevated levels of uncertainty and high potential for some volatile moves. The ongoing fallout from the Russian invasion of Ukraine, weaker growth and high inflation will create risks for oil supply and demand — especially in major markets in Europe and US.

There is high market uncertainty surrounding the implementation of EU sanctions on Russian oil imports late in the year — particularly the influence of the re-orientation of global trade, production in Russia and intertwined demand effects with declining natural gas use. In addition, the extent and longevity of future COVID-19 restrictions in China — or other global responses to future virus strains — have a strong potential to impact global demand growth and, subsequently, prices.

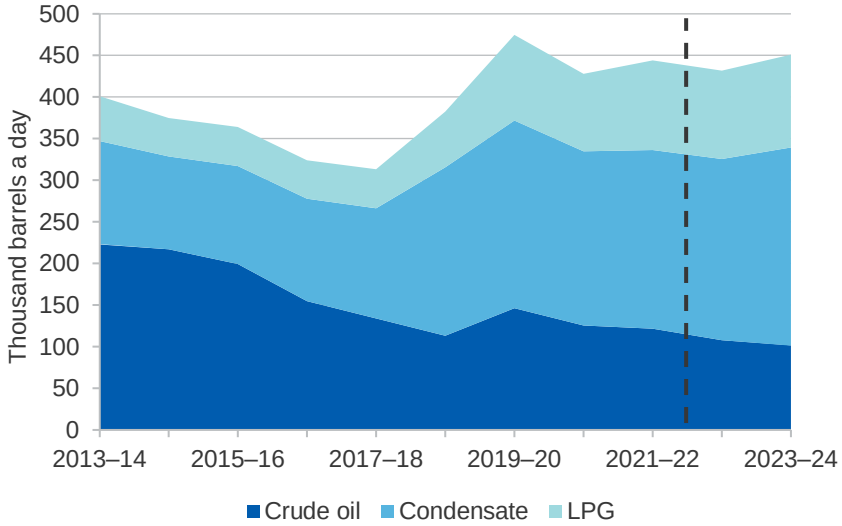
8.5 Australia

Anticipated final investment decisions to influence future oil production

Australian crude and condensate production held steady at 330 kb/d in 2021–22. National condensate production recorded an overall rise 2021–22. However, after production reached record levels in the second half of 2021, in tandem with the record LNG production (see *Gas chapter*), national condensate output rates declined considerably in the March quarter. This was largely attributed to Prelude remaining shut for Q1 2021, due to critical safety issues. Overall crude and condensate production is forecast to hold steady over the outlook — falling to 325 kb/d in 2022–23, before returning to 339 kb/d in 2023–24. In 2021–22, condensate accounted for 48% of Australian crude, condensate and LPG output. Crude oil accounted for 27% (Figure 8.6).

Beyond the forecast period, there are several potential and progressing projects. These will act to offset the impact on crude and condensate production of natural decline in existing fields. Santos and Carnarvon Energy are targeting their Dorado project to be FID ready in the second half of 2022, with the Front-End Engineering and Design stage nearing completion.

Figure 8.6: Composition of Australian oil production



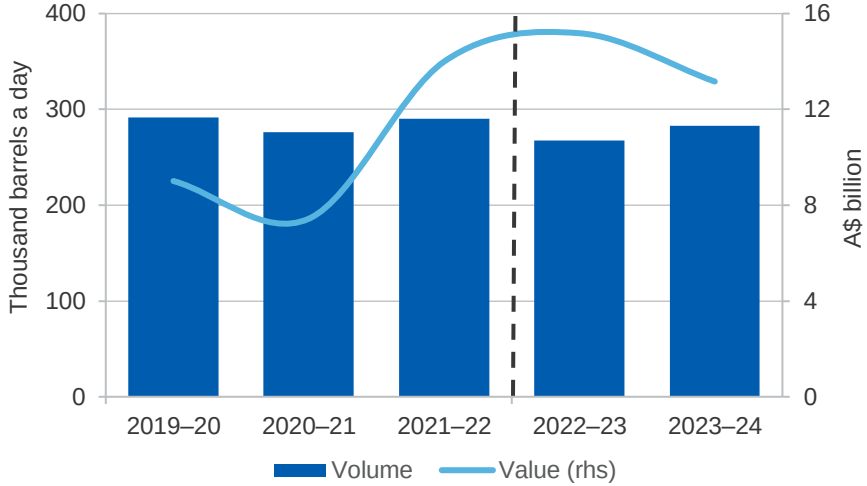
Source: Bloomberg (2022); Department of Industry, Science and Resources (2022)

In late March, Santos announced the Pavo-1 exploration well confirmed a significant oil discovery in the Bedout sub Basin, less than 50 km east of the Dorado field. The 2C continent resource at the Pavo site, assessed at 43 million barrels of oil, could add significant value to the Dorado project. Dorado has an estimated initial capacity of 75-100 kb/d — nearly 25% of 2021–22 Australian crude oil and condensate output.

Australian export earnings lifting with high oil prices

A rise in export volumes and the jump in oil prices, coupled with a strong US dollar, provided a strong boost to Australian crude and condensate export revenue in 2021–22. Export earnings soared to $15.0 billion — up 88% year-on-year. With prices forecast to remain elevated overall, export earnings will rise further in 2022–23, to $14.9 billion. Earnings are forecast to return to $13.4 billion in 2023–24, as prices decline (Figure 8.7).

Figure 8.7: Australian oil and feedstock exports



Notes: Includes crude oil and condensate, but excludes LPG.
Source: Australian Bureau of Statistics (2022); Department of Industry, Science and Resources (2022).

Domestic refinery production falling, but refined fuel consumption lifting

Australian refinery output of petrol, diesel and jet fuel has continued to fall, following the closure of the Kwinana and Altona refineries in 2021. Refinery output in 2021–22 was 29% lower than 2020–21, reflecting Altona's closure in August 2021. There are now two remaining Australian refineries — Ampol's refinery in Lytton (Queensland) and Viva Energy's refinery in Geelong (Victoria). In 2021–22, domestic refinery output represented around 29% of Australia's total fuel consumption, down from 41% in 2020–21. Refined product imports increased by 15% in 2021–22, due to the reduced refining capacity.

Australia's total oil consumption lifted slightly (by 2.3%) in 2021–22, but with COVID recovery in transport fuel demand now tracking very strongly, overall consumption is expected to continue to lift in 2022–23 and 2023–24. COVID-19 lockdowns and disruptions weighed heavily on petrol demand in 2021–22, with demand falling 5%. However, demand for diesel and jet fuel saw significant lifts, of 3% and 33% (respectively) from

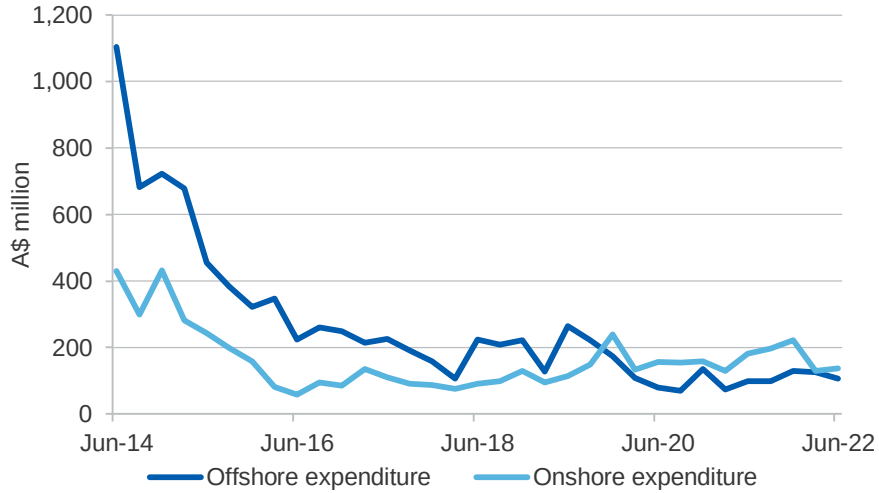
2020–21 levels. The increase in jet fuel demand saw a sharp increase when Australia's borders re-opened earlier this year, and has continued to build month on month, as both business and leisure air travel return. An increase in diesel demand reflects its broad consumer base across road transport, mining and agriculture. In 2021–22, diesel accounted for 61% of refined product imports, and aviation fuels accounted for 29%.

With reduced national refining capacity, and demand for aviation, road fuels and diesel set to strengthen, Australian refined product imports are forecast to continue to lift by a further 3.3% in 2022–23.

Exploration

Australia's petroleum exploration expenditure was $245.1 million in the June quarter 2022 (seasonally adjusted basis), a quarterly decrease of $96.9 million or 27.9%. This is 3.2% lower year-on-year. Offshore exploration fell 34.6% to $107 million, while onshore exploration spending decreased by 21.7% to $138.1 million (Figure 8.8).

Figure 8.8: Australian petroleum exploration (quarterly)



Source: Australian Bureau of Statistics (2022) Mineral and Petroleum Exploration, 8412.0.

Revisions to forecasts

Since the June 2022 *Resources and Energy Quarterly*, the forecast for Australia's crude and condensate export earnings has been revised up by around $700 million in 2022–23, same as for 2023–24. Both are driven by high oil price forecasts.

Table 8.1: Oil Outlook

World	Unit	2021	2022 [f]	2023[f]	2024[f]	Annual percentage change 2022[f]	2023[f]	2024[f]
Production[a]	mb/d	95	100	102	103	5.0	1.7	1.4
Consumption[a]	mb/d	98	100	102	103	2.2	2.1	1.6
WTI crude oil price								
– nominal	US$/bbl	68	100	90	76	48.1	-10.2	-15.3
– real[b]	US$/bbl	73	100	87	72	37.5	-12.9	-17.1
Brent crude oil price								
– nominal	US$/bbl	70	103	95	80	47.0	-8.3	-15.8
– real[b]	US$/bbl	76	103	92	76	36.5	-11.0	-17.7
Australia	**Unit**	**2020–21**	**2021–22**	**2022–23[f]**	**2023–24 [f]**	**2021–22**	**2022–23[f]**	**2023–24 [f]**
Crude and condensate								
Production[ac]	kb/d	335	336	325	339	0.5	-3.2	4.3
Export volume[a]	kb/d	276	292	267	286	6	-8	7
– Nominal value	A$m	7,434	14,022	14,953	13,377	88.6	6.6	-10.5
– Real value[h]	A$m	8,308	15,003	14,953	12,835	80.6	-0.3	-14.2
Imports[a]	kb/d	247	180	210	209	-27.0	16.9	-0.8
LPG production[acd]	kb/d	94	107	106	112	14.9	-1.0	5.2
Refined products								
– Refinery production[a]	kb/d	375	266	263	259	-28.9	-1.5	-1.2
– Export volume[ae]	kb/d	13	8	5	5	-36.6	-40.1	0.2
– Import volume[a]	kb/d	647	745	770	795	15.1	3.3	3.3
– Consumption[ag]	kb/d	913	934	996	1,016	2.3	6.6	2.0

Notes: **a** The number of days in a year is assumed to be 365, and a barrel of oil equals 158.987 litres; **b** In 2022 calendar year US dollars; **c** Historical production data was revised in the June quarter 2022 to align with the Australian Petroleum Statistics **d** Primary products sold as LPG; **e** Excludes LPG; **f** Forecast; **g** Domestic sales of marketable products, including imports; **h** In 2022-23 financial year Australian dollars.

Source: ABS (2022) International Trade in Goods and Services, Australia, Cat. No. 5368.0; International Energy Agency (2022); EnergyQuest (2022); US Energy Information Administration (2022); Department of Industry, Science and Resources (2022).