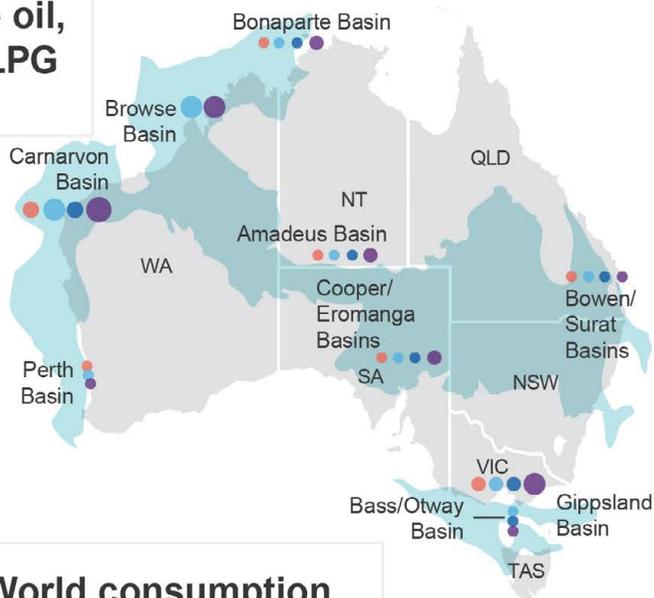
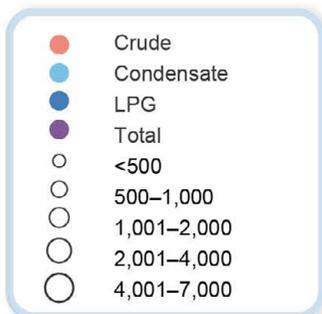


Oil

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



World consumption



Oil facts



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



Brent spot price ranged from **US\$26–86 a barrel**, in the last 5 years



Around 22% of refinery feedstock is **domestically produced**



Crude oil & condensate peaked at 687,000 barrels a day in Australian (2000–01)

Australia's oil



Holds **3%** of the world's oil resources



Oil exports worth **\$10b** in 2019



Accounts for **3%** of oil production

8.1 Summary

- Oil prices are forecast to fall to average US\$60 a barrel in 2020, as the COVID-19 outbreak impacts global air and vehicular travel, especially in China. Over the medium term, price gains are likely to be minimal, due to slow demand growth and rapidly rising US shale oil supply.
- Over the outlook period, global oil consumption growth is expected to slow further, and to be concentrated in China and India.
- Annual real earnings from Australian oil exports are expected to peak in 2021–22 at \$11 billion, before declining to a projected \$9.6 billion in 2024–25.

8.2 Prices

Oil prices are expected to recover, but remain relatively low

Oil prices have recently declined to 13 month lows, largely driven by fears of lower consumption growth. The negative impact of the COVID-19 outbreak in China has more than offset the impact of OPEC+ production cuts and the December 2019 US-China Phase One trade deal.

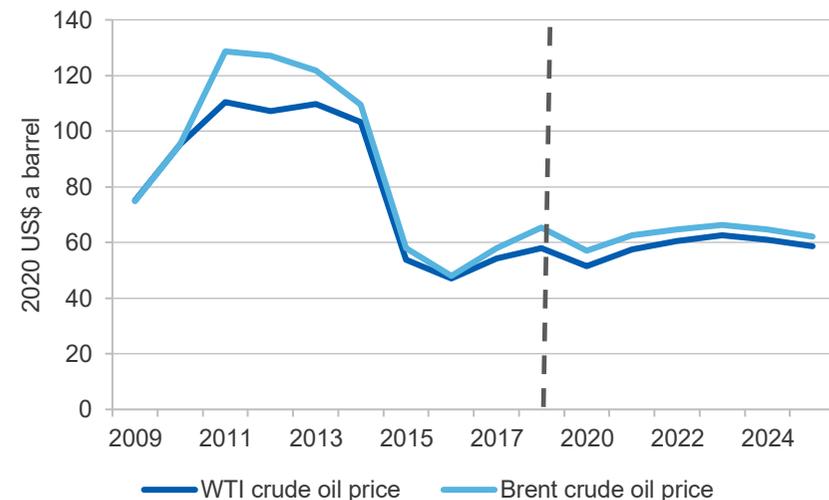
The COVID-19 outbreak has affected oil prices in early 2020. Brent oil prices fell by 15 per cent in January, when the majority of cases were confined to China. Despite the localised impacts, global oil prices fell significantly as China accounted for around 14 per cent of 2019 global consumption, and around 80 per cent of global consumption growth. Between 31 January and 5 March 2020, the global spread of the disease resulted in oil prices falling by a further 11 per cent. Oil consumption in the first quarter of 2020 has been negatively affected by quarantine actions that have reduced travel demand, and by many refineries scaling back operations.

Oil prices in 2020 are also expected to be negatively affected by assumed higher OPEC+ production. After numbers in this report were finalised, OPEC+ members met on 6 March 2020, but could not agree on production targets to address the impacts of COVID-19. The organisation also could not reach an agreement to extend the production cuts already in place for the first quarter of 2020. These events resulted in Brent oil prices falling by

24 per cent on 9 March 2020, down to a three-year low of US\$34 a barrel. As of 10 March 2020, it is uncertain if future negotiations will address tensions between OPEC+ members. While OPEC+ production is assumed to increase for the second quarter of 2020 and remain elevated for the remainder of 2020, this outlook is subject to considerable uncertainty. Higher OPEC+ production is expected to weigh on prices in 2020, particularly in the first half of 2020 when global oil consumption is assumed to be constrained by COVID-19. These developments are also expected to increase competition in export markets, and low global prices are likely to affect the investment decisions of higher-cost producers.

Also affecting oil prices are the impacts of the International Maritime Organisation 2020 (IMO 2020) regulations. IMO 2020 came into force in January 2020, reducing the maximum amount of sulphur that can be included in shipping fuels. These regulations have created price premiums for oils suited to refining into low-sulphur fuels, including Brent and WTI grades. These price premiums are expected to be sustained over the medium term.

Figure 8.1 Historical and projected real oil prices

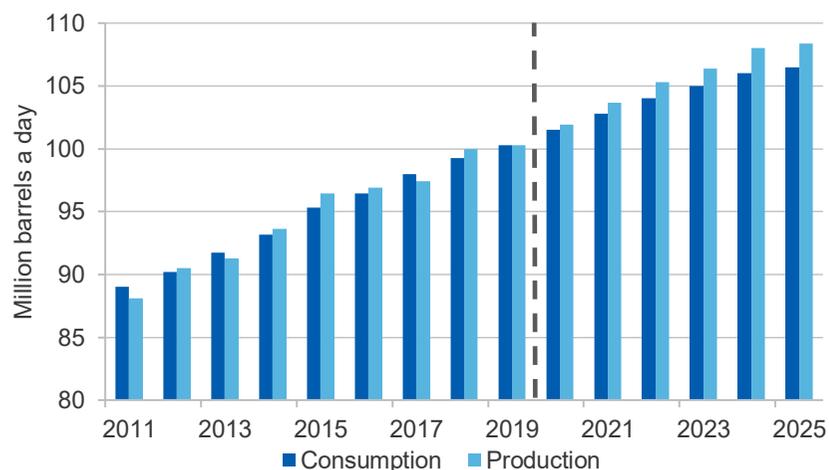


Source: Bloomberg (2020); Department of Industry, Science, Energy and Resources (2020)

Assuming the economic impacts of COVID-19 ease in the first half of 2020, prices are expected to increase in the second half of 2020. The price of Brent crude oil is expected to fall by 6.6 per cent to average US\$60 a barrel in 2020, while the West Texas Intermediate (WTI) price is expected to fall by 4.6 per cent to average US\$54 a barrel. Both prices in real terms are well below the long-term averages between 2009 and 2019 (Figure 8.1). Tensions in the Middle East & North Africa (MENA) may lead to temporary production disruptions, which could increase prices (see *Box 8.1*). However, over the rest of the outlook period, prices are expected to grow slowly. Slowing consumption growth and rapid growth in US production will continue to weigh on prices, and limit the effectiveness of OPEC+ efforts to increase them. In 2021, the Brent oil price is forecast to average \$US62 a barrel (in 2020 dollars).

Oil prices are expected to increase modestly over the outlook period, but remain lower than historical averages. Higher US production is likely to limit the influence of OPEC+ actions to support global prices. The Brent oil price is expected to rise steadily to reach \$US65 a barrel in 2025.

Figure 8.2: Supply and demand outlook



Sources: Department of Industry, Science, Energy and Resources (2020); International Energy Agency (2020).

Gains in oil output (mainly from the US, which has seen production costs fall and technology improve) are expected to exceed oil consumption growth over the outlook period (Figure 8.2). As a result, prices are unlikely to be sustained above US\$70 a barrel in real terms. The potential for unexpected outages in MENA output, and resolutions to current MENA tensions will remain influential factors in the oil market.

8.3 World oil consumption

After negligible growth in 2019, global oil consumption is projected to increase from 100 million barrels a day in 2019 to 107 million barrels a day by 2025. This growth is expected to be driven by non-OECD nations, most notably China and India. Global consumption growth is forecast to vary significantly between years, with consumption growth in 2020 expected to be constrained by lower travel demand as a result of COVID-19 impacts.

Should Chinese oil consumption conditions return to more usual conditions, growth is likely to pick up after 2020. Late in the outlook period, growth is expected to moderate due to structural slowdowns in developing Asia's oil consumption growth and higher expected global electric vehicle sales (see *Lithium* chapter).

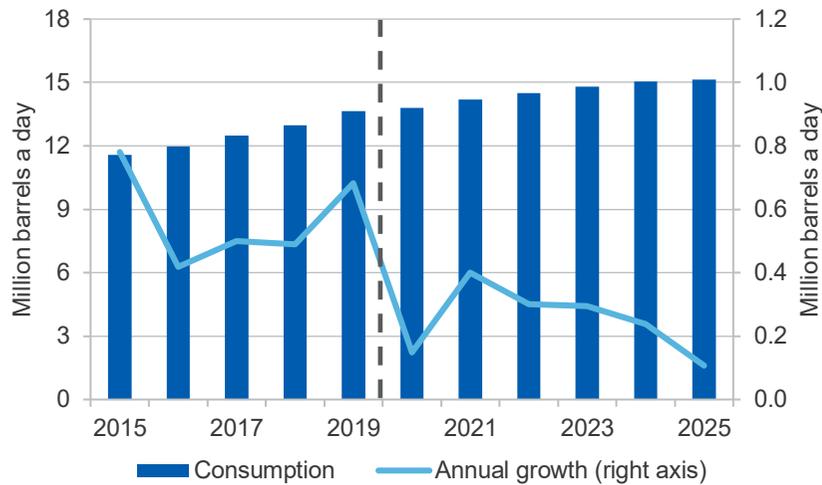
Higher non-OECD consumption expected

Non-OECD consumption growth is forecast to increase from 52 million barrels a day in 2019 to reach 59 million barrels a day by 2025.

China's consumption is forecast to increase from 13 million barrels a day in 2019 to reach 15 million barrels a day in 2025 (Figure 8.3). The majority of this growth is expected to occur from 2021, since the COVID-19 outbreak is expected to limit 2020 consumption growth. Late in the projection period, Chinese consumption growth is expected to slow due to the Chinese government's 2025 target that electric vehicles account for 25 per cent of new vehicle sales (see *Lithium* chapter).

Indian consumption growth is projected to increase by 20 per cent between 2019 and 2025 to reach 6.0 million barrels a day in 2025. Growth is expected to pick up in 2021 as economic growth gathers momentum.

Figure 8.3: Chinese consumption growth



Sources: Department of Industry, Science, Energy and Resources (2020); International Energy Agency (2020).

Consumption growth in other non-OECD nations is expected to increase due to ongoing economic development. The majority of this growth is expected to come from developing Asia and Africa. Higher Asian consumption growth is expected to be met through more diversified sources of supply. In recent years, major Asian importers have been substituting away from Middle Eastern oil and towards US product.

This trend is expected to continue, due to both the geopolitical risks associated with Middle Eastern oil supply chains and growing availability of US oil exports. China is expected to lift imports of US products, in order to contribute towards purchase targets for US energy products as part of the US–China Phase One trade agreement (see Box 2.1).

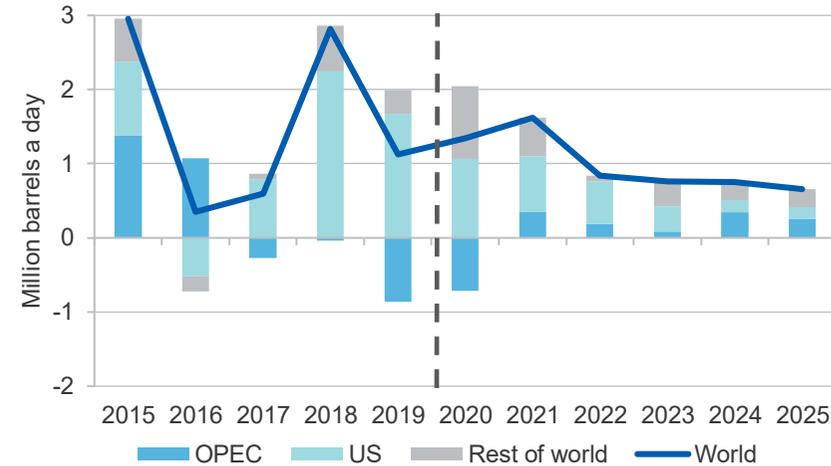
OECD consumption is expected to remain flat

OECD consumption is expected to remain steady at 48 million barrels a day over the outlook period, as energy efficiency improves. With US consumption expected to sit at around 21 million barrels a day, this should result in US exports increasing.

8.4 World oil production

In recent years, global oil production growth has faced countervailing pressures between rapidly expanding US production and production limiting actions from OPEC+. A consequence of this has been the US accounting for a higher share of global production, which has constrained the ability of OPEC+ to influence prices (Figure 8.4).

Figure 8.4: World production growth



Sources: Department of Industry, Science, Energy and Resources (2020); International Energy Agency (2020).

OPEC+ production to recover in late 2020

In 2019, OPEC+ production fell by 2 per cent due to over-compliance with OPEC+ production cuts and unexpected outages in Iran and Venezuela. Production in 2020 is forecast to increase, due to the assumed ending of OPEC+ production targets in the second quarter of 2020. As of 10 March 2020, the extent and likelihood of these increases remains uncertain, increasing the uncertainty of price and production forecasts. Libyan production is forecast to fall as a result of instability in the country.

Beyond 2020, OPEC+ production is expected to increase due to higher production targets. Production from the largest OPEC+ producers is expected to increase moderately over the outlook period.

Box 8.1: Impacts of diplomatic tensions on oil markets

Geopolitical tensions in the Middle East have historically affected global oil markets, with developments in tensions having ripple effects on oil production, trade and subsequently global prices. For most of 2019, it appeared that the tensions were posed by US sanctions on Iran and Venezuela. However, in September 2019 an attack on Saudi oil infrastructure resulted in new concerns over global oil security. The threat of production disruptions increased further in January 2020, due to escalating tensions between Iran and the US, and domestic political conflict in Libya.

In 2018, the US government announced it was withdrawing from the Joint Comprehensive Plan of Action, and would re-introduce sanctions on international purchasers of Iranian oil. Several importers were granted extensions on purchases of Iranian oil until May 2019 before facing US sanctions. As a result of these sanctions, Iranian exports and production have fallen. At the time of writing, negotiations between Iran and the US have made little progress, and tensions escalated further in January 2020.

On 3 January 2020, the US government announced that the US military had conducted a strike that killed General Qasem Soleimani. On 8 January 2020, the Iranian government announced that they it was responsible for the airstrikes at multiple Iraqi airbases housing US troops. These tensions saw the US government announce new sanctions on Iran on 10 January 2020. These sanctions target multiple sectors, including construction, manufacturing, textiles and mining. Any further output disruptions in Iran are unlikely to significantly affect global oil prices, as existing US sanctions are already limiting Iranian exports. But disruptions to production in other countries have the potential to quickly tighten the world market.

Regional tensions may also affect oil trade, due to the potential for Iran to disrupt ships passing through the Strait of Hormuz. This narrow channel connects Middle Eastern oil exporters with global consumers, with an estimated 20 per cent of global trade passing through the Strait. The proportion of OPEC+ exports passing through the Strait is higher still, and

any disruption to trade could thus raise prices. This price gain would be significant, since most OPEC+ spare capacity would be unavailable to global consumers.

US sanctions have also played a role in the decline of the Venezuelan oil industry. Venezuelan production has been on a long-term decline, due to the nationalisation of the oil sector and low infrastructure investment. This decline has been accelerated by the steady escalation of US sanctions from 2015. As a result, Venezuelan production declined by 63 per cent between 2015 and 2019.

On 14 September 2019, a terrorist attack on Saudi Arabian oil infrastructure caused fires and extensive damage. News of the attack caused Brent oil futures contracts to rise by \$12 a barrel when Asian markets next opened. This was the largest intraday move since the futures contract started trading in 1988. The attack reduced Saudi production by 8.2 per cent month-on-month in September. This disruption has proven to be temporary, with production recovering in October, to be above pre-attack levels. Nonetheless, this event has highlighted risks and vulnerabilities around Saudi oil production infrastructure.

In January 2020, a number of Libyan oil terminals and oil fields were subject to a military blockade as part of a wider struggle for control of the Libyan government. On 18 January 2020, the state-owned oil company declared 'force majeure' on oil exports from affected ports. As of 14 February 2020, export suspensions were estimated to have cost the government US\$1.4 billion, impacting heavily on the economy.

Resolutions to these tensions would likely have a significant impact on total OPEC+ production, since all countries facing tensions are members of the bloc. With these countries exempt from current production targets, if tensions ease, production targets for OPEC+ members are likely to come under pressure as the organisation seeks to sustain prices. In any case, all OPEC+ members are expected to be negatively impacted, either through lower production targets or lower global prices.

Russian production is projected to increase significantly in 2020, due to the assumed ending of OPEC+ production targets. Between 2021 and 2025, Russian production is forecast to increase further due to higher condensate production. Saudi Arabia accounted for a high proportion of OPEC+ cuts in the first quarter of 2020, and Saudi production over the rest of the year is expected to increase significantly. Saudi production is forecast to remain relatively steady over the rest of the projection period.

Production in countries exempt from current OPEC+ targets is expected to grow, although the growth rate remains uncertain. With these countries granted exemptions because of political tensions, future production growth will be dependent on diplomatic negotiations. Iran is the OPEC+ member with the greatest potential to increase production over the medium term. Sanctions on Iranian oil are assumed to remain over the outlook period, and production is projected to remain around current levels. With Iran having the infrastructure to quickly scale production and exports, any easing in US sanctions is expected to result in a rapid rise in world output. This would further complicate OPEC+ intentions to set global prices.

Production in Venezuela is forecast to remain relatively subdued, with outdated oil infrastructure making it unlikely that production will notably increase over the outlook period. However, there are signs that reforms are beginning in the Venezuelan oil sector, and production in Libya is forecast to recover in 2021, due to an assumed passing of blockades that are affecting production in the first quarter of 2020.

Strong non-OPEC+ production growth expected

In 2019, gains in non-OPEC+ production growth exceeded the drop in OPEC+ production. Despite higher OPEC+ production forecast for 2020, higher global production is expected to be largely driven by non-OPEC+ countries, particularly the US. Strong growth is also expected in Brazil, Canada and Norway. Non-OPEC+ growth is expected to slow over the outlook period, but to remain the key driver of global output growth. In the US, improving oil well efficiency continues to drive this growth, despite some infrastructure capacity constraints. The US is currently the largest oil producer in the world, and is expected to drive world output growth over

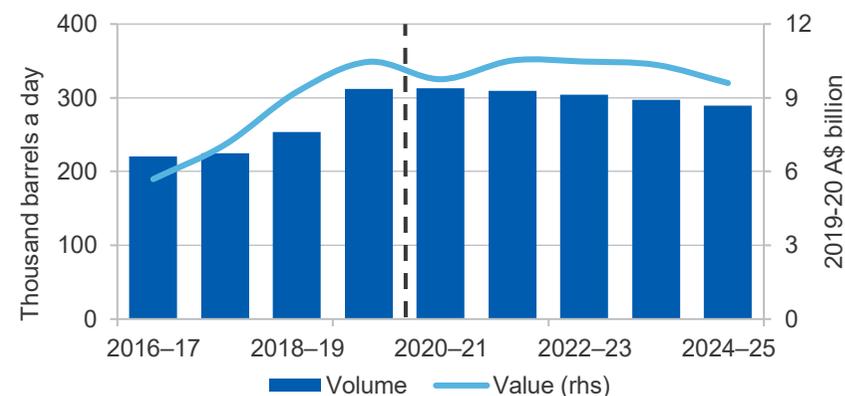
the medium-term (Figure 8.4) on the back of a long period of investment in exploration, wells and infrastructure. After hitting 17 million barrels a day in 2019 (growth of 11 per cent on 2018), US output is projected to reach 20 million barrels a day in 2025 (average annual growth of 3.1 per cent).

8.5 Australia's production and trade

Export earnings grow strongly on output surge

Quarterly crude and condensate export earnings in the December quarter 2019 reached \$3.0 billion, a year-on-year increase of 18 per cent. The majority of this increase was due to a 16 per cent rise in export volumes. Australian export earnings are expected to be \$10 billion in 2019–20 in real terms, and decrease marginally in 2020–21. Export values are projected to peak at \$11 billion in 2021–22 before easing to \$9.6 billion in 2024–25 (Figure 8.5). This trajectory largely reflects changes to real oil prices in Australian dollar terms.

Figure 8.5: Australia's annual oil export volumes and values



Notes: Includes crude oil and condensate, but excludes LPG.

Source: ABS (2020); Department of Industry, Science, Energy and Resources (2020)

Production growth to slow

Australian crude and condensate production reached 429,000 barrels a day in December 2019. This was 34 per cent higher than a year ago, and reflected higher crude oil and condensate production. Crude oil output rose by 51 per cent as a result of a ramp up in production at Woodside's

Greater Enfield project. Condensate output rose by 26 per cent, largely as a result of production ramp ups at the Prelude and Ichthys LNG projects.

Crude oil production is expected to increase in 2020–21 as the Greater Enfield project reaches peak production. Over the outlook period, crude oil production is expected to fall. No new projects are expected due to low global oil prices and Equinor’s decision in February 2020 to discontinue their exploration drilling plan in the Great Australian Bight.

Growing condensate output is expected to drive Australia’s petroleum production and export earnings over the outlook period. Production is expected to rise at an average annual rate of 3.5 per cent over the outlook period, from 286,000 barrels a day in 2018–19 to 351,000 barrels a day in 2024–25 (Figure 8.6). This is lower than growth over the last five years, as only a few projects from the recent wave of LNG investment are still ramping up production. Forecast higher production will largely be from the Prelude and Ichthys projects. Production may increase late in the outlook period due to a number of LNG projects in the pipeline. These projects include Scarborough and Pluto LNG (see *LNG* chapter).

LPG production is also expected to rise strongly in 2019–20, gaining by 50 per cent to reach 99,000 barrels a day. Growth in output is expected to be driven by the Ichthys and Prelude projects. Over the outlook period, output is expected to stay around these levels. Despite strong growth in the short term, output of condensate, crude and LPG is not expected to increase beyond 2020–21, a legacy of declining exploration expenditure, project economics and geological factors (Figure 8.6). Taking a longer historical perspective, even with strong volume growth described above, Australian crude oil, condensate and LPG production is expected to be at least 25 per cent below the peak recorded in 2002–03.

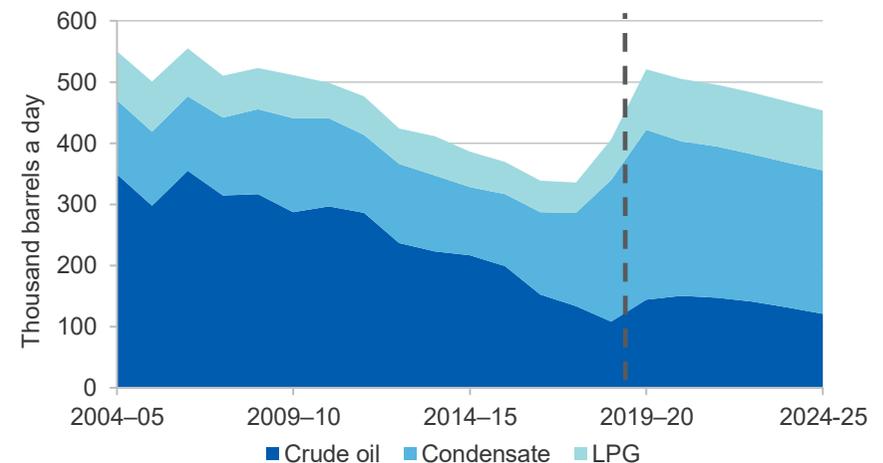
Australian consumption

Australian oil consumption has grown steadily in recent years, in contrast to stagnant consumption in most OECD nations. Oil consumption is expected to be around 9 per cent over the full outlook period, with the result driven by rising population.

Australia’s refinery production steady

Australia’s refinery production averaged 490,000 barrels a day in 2019, slightly below than the 2018 average of 498,000 barrels a day. To meet Australian demand, 60 per cent of refined product was imported from overseas in 2018–19, including around 71 per cent of diesel and 35 per cent of automotive gasoline. Over the outlook period Australian refinery production is expected to vary with scheduled maintenance, and is projected to average 485,000 barrels a day in 2024–25. With domestic production volumes steady over the outlook period, imports are expected to continue to increase to accommodate higher consumption.

Figure 8.6: Australia’s petroleum production outlook



Source: EnergyQuest (2020); Australian Petroleum Statistics (2020); Department of Industry, Science, Energy and Resources (2020)

Exploration

Australia’s petroleum exploration expenditure was \$410 million in the December quarter, on a trend basis, and increase of 33 per cent year-on-year. Petroleum exploration expenditure totalled \$1.4 billion in 2019, 25 per cent higher than in 2018. With the 2018 total the lowest in nominal terms since 2005, there are signs that sentiment in the oil and gas sector is beginning to improve.

Table 8.1: Oil outlook

World	Unit	2019	2020 f	2021 f	2022 f	2023 z	2024 z	2025 z	CAGR r
Production ^a	mb/d	101.5	102.8	104.4	105.3	106.0	106.8	107.5	1.0
Consumption ^a	mb/d	100.1	101.0	102.6	103.9	104.9	105.9	106.7	1.1
WTI crude oil price									
Nominal	US\$/bbl	56.8	51.4	58.8	63.3	66.8	66.6	65.5	2.4
Real ^b	US\$/bbl	58.0	51.4	57.5	60.5	62.5	60.9	58.6	0.1
Brent crude oil price									
Nominal	US\$/bbl	64.0	57.1	63.9	67.6	70.8	70.6	69.5	1.4
Real ^b	US\$/bbl	65.4	57.1	62.6	64.7	66.2	64.6	62.1	-0.8
Australia	Unit	2018–19	2019–20 f	2020–21 f	2021–22 f	2022–23 z	2023–24 z	2024–25 z	CAGR r
Crude and condensate									
Production ^a	kb/d	340	422	403	394	382	369	355	0.7
Export volume ^a	kb/d	254	312	313	310	304	297	290	2.2
Nominal value	A\$m	9,071	10,463	9,948	10,956	11,171	11,304	10,762	2.9
Real value ^g	A\$m	9,242	10,463	9,755	10,518	10,473	10,338	9,599	0.6
Imports ^a	kb/d	375	350	342	345	365	366	377	0.1
LPG production ^{ac}	kb/d	66	99	101	101	100	99	98	6.9
Refined products									
Refinery production ^a	kb/d	502	482	486	479	484	478	485	-0.6
Export volume ^{ad}	kb/d	17	16	13	9	9	9	9	-9.5
Import volume ^a	kb/d	645	652	688	730	739	759	768	3.0
Consumption	kb/d	1,045	1,064	1,095	1,112	1,127	1,142	1,157	1.7

Notes: **a** The number of days in a year is assumed to be 365, and a barrel of oil equals 158.987 litres; **f** Forecast; **s** Estimate; **z** Projection; **b** In 2019 calendar year dollars; **c** Primary products sold as LPG; **d** Excludes LPG; **e** Domestic sales of marketable products; **g** In 2018–19 financial year Australian dollars; **r** Compound average annual growth between 2018 and 2024 or between 2017–18 and 2023–24. **Sources:** ABS (2019) cat. 5368.0, International Energy Agency (2020), Energy Quest (2020), US Energy Information Administration (2020), Department of Industry, Science, Energy and Resources (2020).