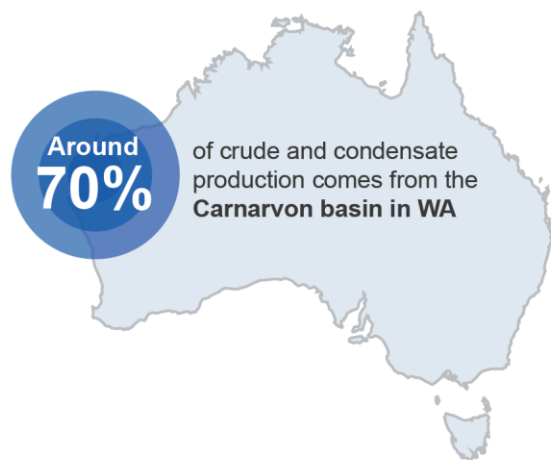


Oil

Resources and Energy Quarterly December 2017



Australia's production of crude and condensate peaked in 2000, at **41,300 ML**



Around **17%** of refinery feedstock is domestically produced. On average 83% is imported.

Australia's refinery production



45%
automotive gasoline



35%
diesel



13%
aviation turbine fuel



3%
LPG

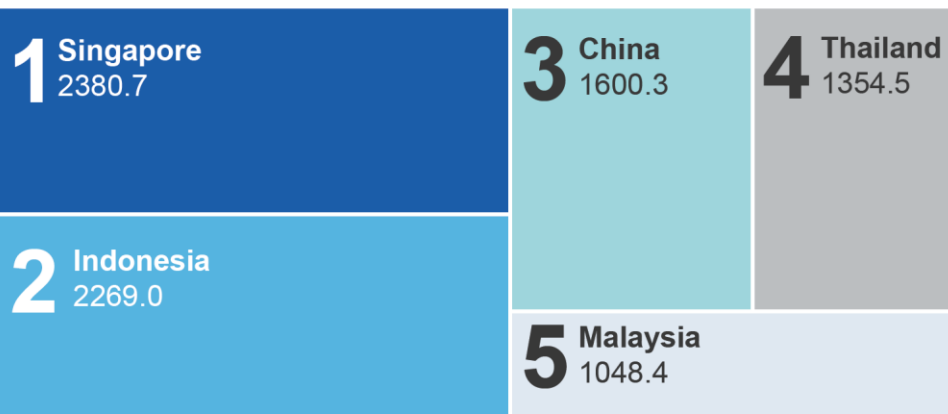


2%
fuel oil



2%
other

Top export destinations for Australia's crude oil, 2016-17 (million litres)



Historic price snap shot: Brent crude oil in the last five years (US\$ per barrel)



8.1 Summary

- Australia's crude oil and condensate exports are forecast to increase from \$5.5 billion in 2016–17 to \$6.0 billion in 2017–18, driven by higher oil prices. Further increases are expected in 2018–19, as higher condensate production supports forecast export earnings of \$7.0 billion.
- Over the outlook period, Australia's production will be characterised by decreasing crude oil production, which will be offset by higher condensate production, related to several new LNG projects.
- World oil prices are forecast to steadily increase over the outlook period, as constrained world production continues under the OPEC Production Agreement and world consumption grows, particularly in emerging Asia.

8.2 Prices

Oil prices reach two year highs

Brent crude oil averaged US\$60 a barrel during the December quarter, while WTI averaged US\$54 a barrel. Oil prices reached the highest point in two years, and reflecting strong consumption growth, supply uncertainty stemming from conflict in the Middle East and the continuation of the OPEC Production Agreement. The extension of the OPEC production agreement to the end of 2018 has strengthened the outlook for oil prices, as agreement compliance has been moderately good and the announcement improved market certainty about production in 2018.

Positive outlook for oil prices

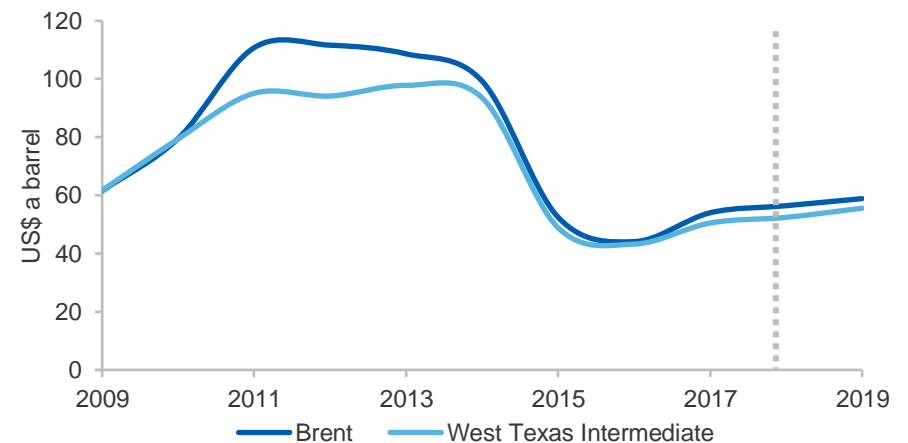
Current high spot prices are expected to fall back at the start of 2018, as the factors supporting recent price strength are not expected to last. Oil prices are forecast to increase modestly, supported by strong OPEC compliance and expectations about consumption growth. Crude oil prices are forecast to increase by 4.5 per cent in 2018, with Brent crude averaging US\$56 a barrel and WTI averaging US\$52 a barrel. Oil prices are forecast to increase further in 2019, averaging US\$59 a barrel for Brent and US\$55 a barrel for WTI.

Figure 8.1: Oil prices over the last year



Source: Bloomberg (2017); Brent and West Texas Intermediate spot prices

Figure 8.2: Annual oil prices



Source: Bloomberg (2017); Brent and West Texas Intermediate spot prices; Department of Industry, Innovation and Science (2017)

8.3 World oil consumption

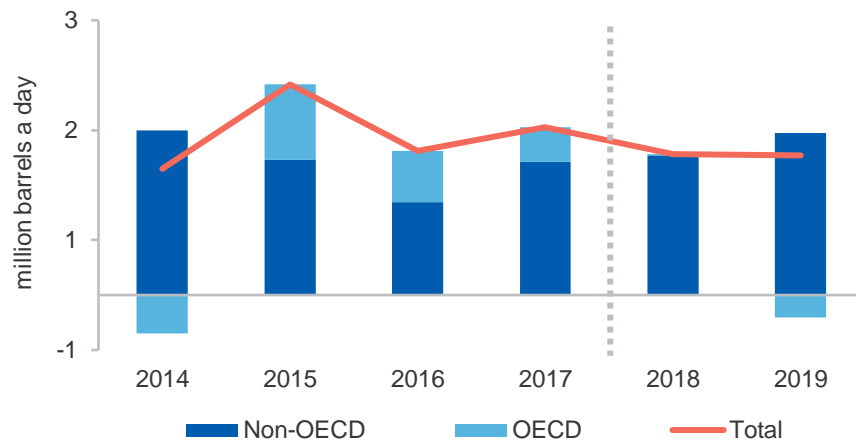
In 2017 oil consumption is estimated to have expanded by 1.6 per cent, to 97.7 million barrels a day, supported by growing non-OECD consumption.

Consumption to reach 100 million barrels a day

Over the outlook period, consumption is forecast to increase at an annual rate of 1.3 per cent in 2018 and 2019, and is set to exceed 100 million barrels a day in 2019. OECD consumption is expected to stay at current levels, at around 47 million barrels a day. Non-OECD consumption is forecast to increase at an average annual rate of 2.7 per cent, reaching 53.2 million barrels a day in 2019.

Future population growth and low oil prices are expected to support consumption growth, however the rate of growth is expected to slow over the outlook period. China's consumption is forecast to increase by 1.9 per cent a year, to reach 12.9 million barrels a day in 2019. Long-term projections of consumption will be affected by government policies, as discussed in Box 8.1.

Figure 8.3: Forecast consumption growth



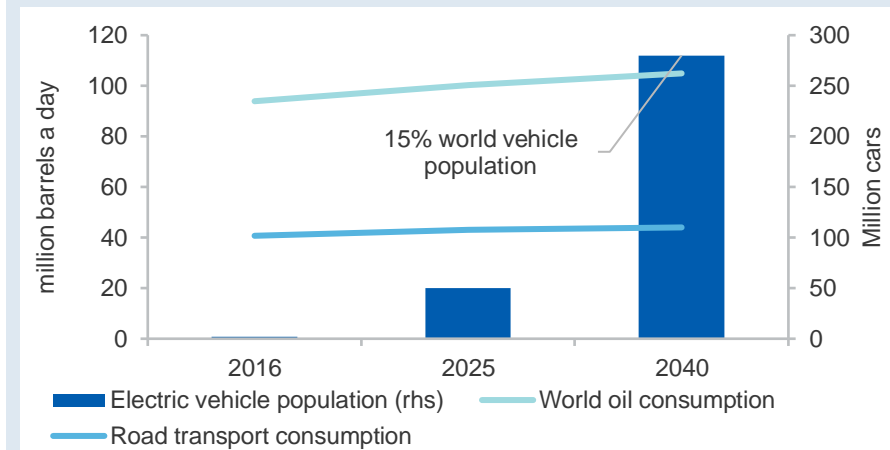
Source: International Energy Agency Monthly Oil Data Service (2017); Department of Industry, Innovation and Science (2017)

Box 8.1: Long-term oil consumption in the IEA's *World Energy Outlook*

The long-term outlook for oil markets is highly dependent on uptake of new technologies and energy sources. Under the International Energy Agency's (IEA) main scenario, the 'New Policies Scenario' in the 2017 World Energy Outlook, oil consumption grows moderately to 2025, before transitioning to lower growth from 2025 to 2040. Oil consumption is projected to grow 0.6 per cent a year to 2040. Lower consumption in the US and Europe is expected to be offset by expanding markets in the Asia Pacific and the Middle East.

Road transport, the largest component of oil consumption, is projected to grow by 0.3 per cent a year to 2040, maintaining a consistent share of total oil consumption. Vehicle efficiency policies and expanding electric vehicle fleets will have a dampening effect on oil consumption growth, however, in a low oil price environment, these transitions will be very dependent on government policies. The IEA projects the 2040 vehicle fleet will be twice as efficient as it is today, though aviation, shipping and road freight remain heavily dependent on oil.

Figure 8.4: Oil consumption growth in IEA New Policies Scenario



Source: International Energy Agency (2017), World Energy Outlook 2017, OECD/IEA, Paris

8.4 World oil production

Global production and consumption rebalancing in 2018

In 2017 world production is estimated to have been 97.3 million barrels a day, a marginal increase on 2016 levels. Over the outlook period production total production is forecast to increase by 1.8 per cent, to reach 99.1 million barrels a day in 2018. This is lower than previously forecast, as the OPEC Production Agreement has recently been extended. Lower OPEC production is expected to be offset with higher non-OPEC production, primarily from the US. Canada and Brazil are also expected to increase production, lifting total non-OPEC production to 59.5 million barrels a day in 2018, 2.5 per higher than 2017.

Towards the end of the outlook period, as OPEC production is expected to return to the market, world production is forecast to reach 100.7 million barrels a day in 2019.

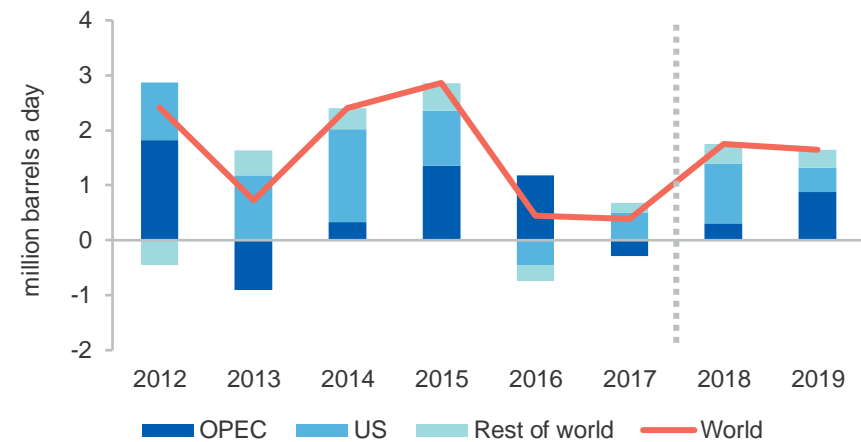
The rate at which US production increases and compliance under the OPEC Production Agreement are uncertainties that heavily affect the outlook and are downward risks to the oil price forecast.

OPEC holds strong on production agreement and extends

The 2017 OPEC Production Agreement, held by 22 OPEC and non-OPEC producers including Russia, commenced in January 2017 and aimed to reduce annual production by 1.8 million barrels a day. The production controls were introduced to reduce excess oil supplies in world markets, to reduce stock levels and support higher prices. With modest improvements in these areas, OPEC has recently extended the agreement until the end of 2018.

In 2017, the agreement was largely upheld, with an 87 per cent compliance rate in the year to October. Saudi Arabia's estimated production in the year to October was 3.6 per cent lower than the same period in 2016. As a result, OPEC's combined production for 2017 is estimated to be around 0.7 per cent lower than 2016 levels, at 39.3 million barrels a day.

Figure 8.5: Change in world production



Source: International Energy Agency Monthly Oil Data Service (2017); Department of Industry, Innovation and Science (2017)

Record US production and exports

US oil production is estimated to have increased by 4.6 per cent in 2017, to 13.0 million barrels a day. Lower production related to Hurricane Harvey and Hurricane Nate, was outweighed by higher shale oil production. Shale oil production has reached record high levels, averaging an estimated 5.6 million barrels a day in December, as industry activity returns after a low oil price period in 2016.

US production is expected to reach record levels over the outlook period, supported by growth in unconventional oil and liquids production. As US output increases, world production dynamics are expected to shift, as discussed in Box 8.2. In 2018, US crude oil production is forecast to rise 9.6 per cent, to 14.1 million barrels a day. The most significant output increases are expected from the Permian Basin. Across the US, Drilled but Uncomplete Well numbers reached 7,342 in October, the highest on record. Stronger oil prices are likely to support continued drilling, solidifying expectations about US production growth.

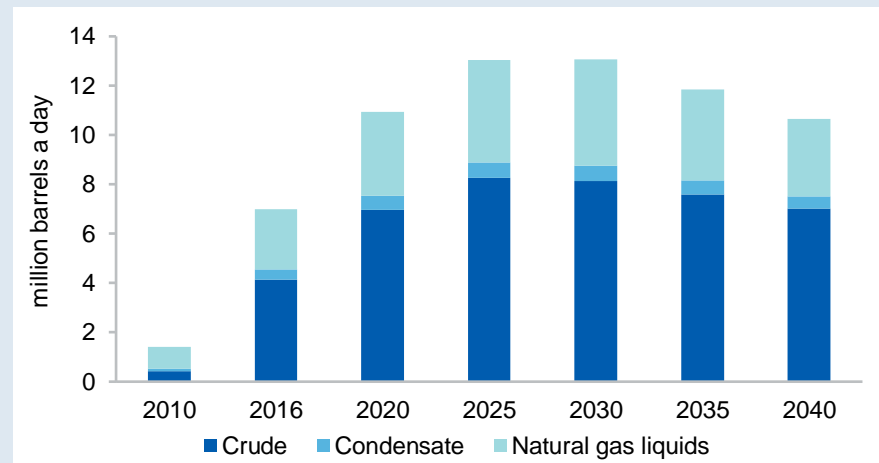
Box 8.2: US production projections in the IEA's World Energy Outlook

Significant changes in world production dynamics are highlighted in the IEA's 2017 World Energy Outlook, with growth in US production accounting for 80 per cent of world production growth to 2025. The size of US tight oil reserves have been revised up, from 80 billion barrels in WEO 2016 to 105 billion barrels in WEO 2017. Although there is uncertainty around the exact resource size and related production costs, the outlook for higher non-conventional US production is significant.

The IEA projects US tight liquids production will almost double between 2016 and 2025, reaching 13.05 million barrels a day in 2025. This significant production growth is expected to facilitate the US becoming a net oil exporter around 2028.

Towards the end of the outlook period, US production is expected to plateau as OPEC production returns to dominance. Through steady expansion in production to 2040, OPEC's share of world production is projected to increase from the 40 per cent to around 45 per cent in 2040.

Figure 8.6: US tight liquids production in the IEA's New Policies Scenario



Source: International Energy Agency (2017), World Energy Outlook 2017, OECD/IEA, Paris

8.5 Australia's production and trade

Higher export earnings, supported by prices and condensate production

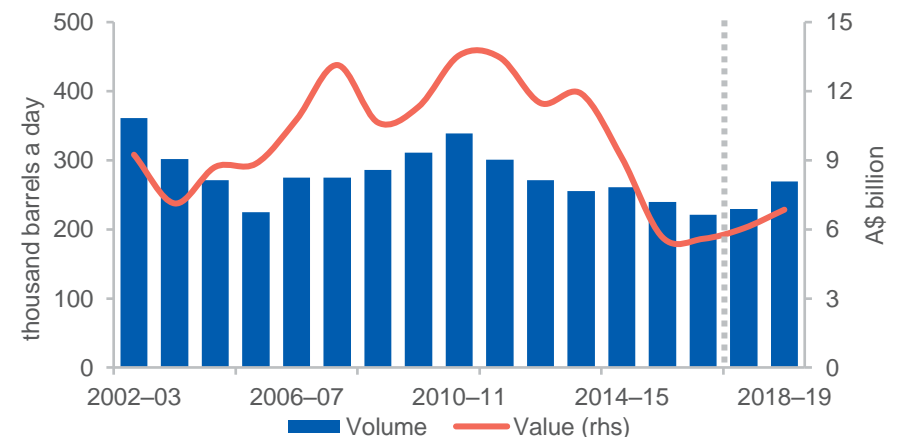
Australia's petroleum export earnings rose to \$1.5 billion in the September quarter, an annual increase of 13 per cent. Higher export volumes and higher realised prices supported this growth.

Export earnings are forecast to increase from \$5.5 billion in 2016–17 to \$7.0 billion in 2018–19, as significantly higher condensate production leads to increases in export volumes. Modest increases in oil prices are also expected to support earnings growth.

Revisions to export forecasts

Since the September 2017 *Resources and Energy Quarterly*, forecast export earnings have been revised down slightly, as the impact of higher prices is outweighed by the stronger Australian dollar and delayed commencement of new condensate production. Forecast export earnings have been revised down by \$175 million in 2017–18 and by \$287 million in 2018–19.

Figure 8.7: Australia's export volumes and values



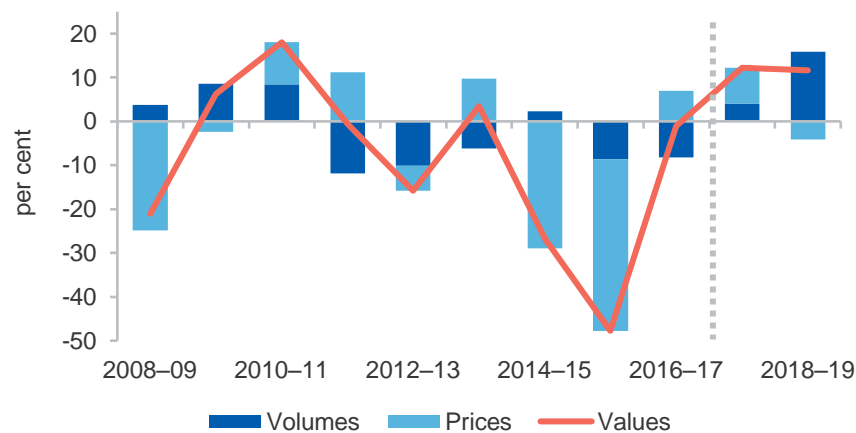
Source: Department of Environment and Energy, Australian Petroleum Statistics (2017); EnergyQuest (2017); Department of Industry, Innovation and Science (2017)

Strong increase in export volumes driven by condensate production

Export volumes increased to 243,000 barrels a day in the September quarter, 6.4 per cent higher than in the same period last year. Export volumes are forecast to increase from 221,000 barrels a day in 2016–17 to 269,000 barrels a day in 2018–19, as lower crude oil production is outweighed by significant increases in condensate production related to the new LNG projects.

Over the outlook period, additional condensate output is expected from the Wheatstone, Icthis and Prelude LNG projects, which have nameplate capacities of 3, 100 and 36 thousand barrels a day, respectively. Condensate and LPG production from these projects will be directed towards export markets. The Wheatstone project commenced operations in October, and Icthis is due to start exporting in the March quarter of 2018. Prelude is expected to commence operations in the September quarter of 2018.

Figure 8.8: Annual growth in crude oil and condensate export values, contributions from prices and export volumes



Notes: Log change is used to approximate percentage change.

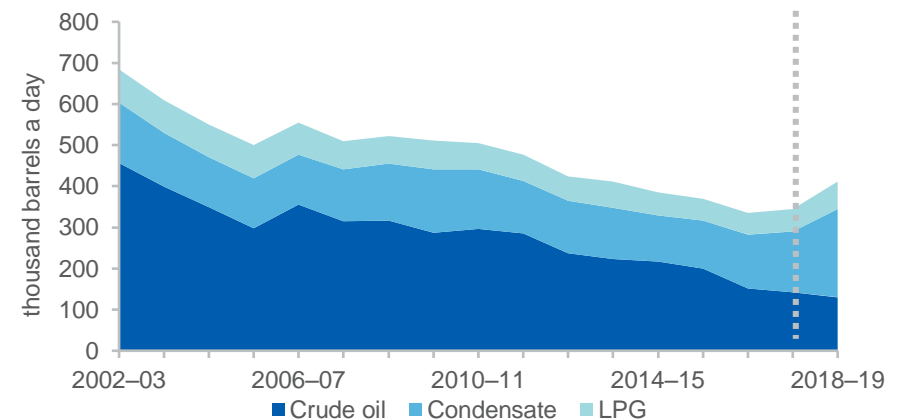
Source: ABS (2017) International Trade, Australia, 5465.0; Department of Industry, Innovation and Science (2017)

Australia's condensate production overtakes crude oil production

Australia's production of crude and condensate averaged 298,000 barrels a day in the September quarter. Significantly lower production in the Bonaparte, Gippsland and Cooper basins contributed to a 7.4 per cent annual decrease in production. Condensate production, increasing by 3.9 per cent over the year, exceeded crude oil production for the first time. Higher output from Gorgon LNG supported condensate production to reach 151,000 barrels a day in the September quarter.

Over the outlook period, Australia's production of crude oil and condensate is forecast to average 291,000 barrels a day in 2017–18, before increasing to 344,000 barrels a day in 2018–19. In addition to new condensate production, the crude oil development project in the pipeline, Greater Enfield, is expected to add 40,000 barrels a day oil production capacity in mid-2019. At the end of the outlook period, condensate production is forecast to account for around 52 per cent of Australia's total petroleum production, up from 39 per cent in 2016–17.

Figure 8.9: Australia's petroleum production



Source: Department of Environment and Energy, Australian Petroleum Statistics (2017); EnergyQuest (2017); Department of Industry, Innovation and Science (2017)

Petroleum exploration expenditure continues to decline

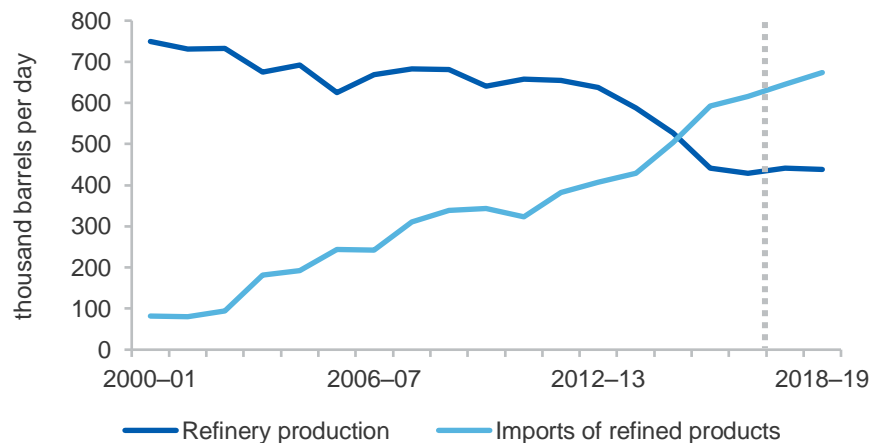
Australia's petroleum exploration expenditure was \$285 million in the September quarter, a 20 per cent decrease over the year. Low oil prices have caused a decline in exploration activity, as has the high cost nature of Australia's reserves.

Australia's refinery activity

Australia's rate of refinery production was 451,000 barrels a day in the September quarter, unchanged from the same period in 2016. Refined product imports were 10 per cent higher than the September 2016 quarter, at 9,240 million litres, driven by higher diesel imports.

Over the forecast period, refinery production is expected to increase slightly, reflecting higher production rates from refinery facilities. Refinery production is forecast to average 439,000 barrels a day in 2018–19, increasing at an annual rate of 2.3 per cent over the outlook period.

Figure 8.10: Australia's refined product trade balance



Source: Department of Environment and Energy (2017) Australian Petroleum Statistics; Department of Industry, Innovation and Science (2017)

Table 8.1: Oil outlook

World	Unit	2016	2017 f	2018 f	2019 f	Annual percentage change		
						2017 f	2018 f	2019 f
Production a	mb/d	97.0	97.3	99.1	100.7	0.4	1.8	1.7
Consumption a	mb/d	96.1	97.7	98.9	100.2	1.6	1.3	1.3
WTI crude oil price								
– nominal	US\$/bbl	43.2	50.5	52.4	55.0	16.8	3.8	4.8
– real b	US\$/bbl	44.2	50.5	51.4	52.7	14.4	1.7	2.5
Brent crude oil price								
– nominal	US\$/bbl	44.1	54.0	56.4	58.9	22.5	4.5	4.3
– real b	US\$/bbl	45.0	54.0	55.3	56.4	19.9	2.3	2.1
Australia	Unit	2015–16	2016–17	2017–18 f	2018–19 f	2016–17	2017–18 f	2018–19 f
Crude oil and condensate								
Production a	kb/d	317	283	291	344	-10.8	2.8	18.3
Export volume a	kb/d	239	221	230	269	-7.8	4.1	17.2
– nominal value	A\$m	5,444	5,476	6,045	7,008	0.6	10.4	15.9
– real value g	A\$m	5,651	5,588	6,045	6,853	-1.1	8.2	13.4
Imports a	kb/d	342	351	378	363	2.5	8.1	-4.2
LPG								
Production ac	kb/d	53	52	54	68	-1.6	3.2	27.5
Petroleum products								
Refinery production a	kb/d	442	429	442	439	-3.0	3.0	-0.6
Exports ad	kb/d	10	18	13	9	73.7	-30.0	-28.6
Imports a	kb/d	593	616	645	674	3.9	4.6	4.5
Consumption ae	kb/d	950	1,004	1,039	1,030	5.7	3.5	-0.8

Notes: **a** Number of days in a year is assumed to be exactly 365; **b** In 2017 calendar year dollars; **c** Primary products sold as LPG; **d** Excludes LPG; **e** Domestic sales of marketable products; **f** Forecast; **g** In 2016–17 financial year Australian dollars; **s** Estimate; **z** Projection. A barrel of oil equals 158.987 litres

Source: ABS (2017) International Trade Statistics Service, cat. no.5464.0; Energy Information Administration (2017); Department of Industry, Innovation and Science (2017)