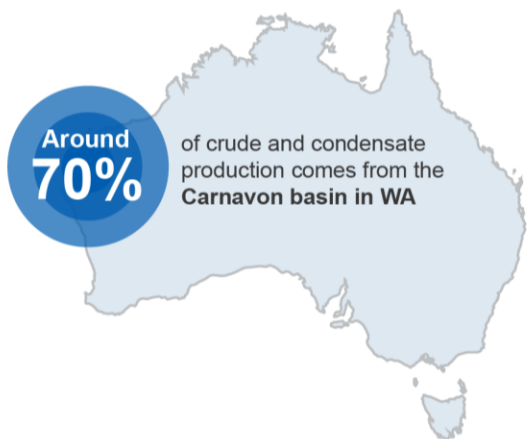


Oil

Resources and Energy Quarterly September 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

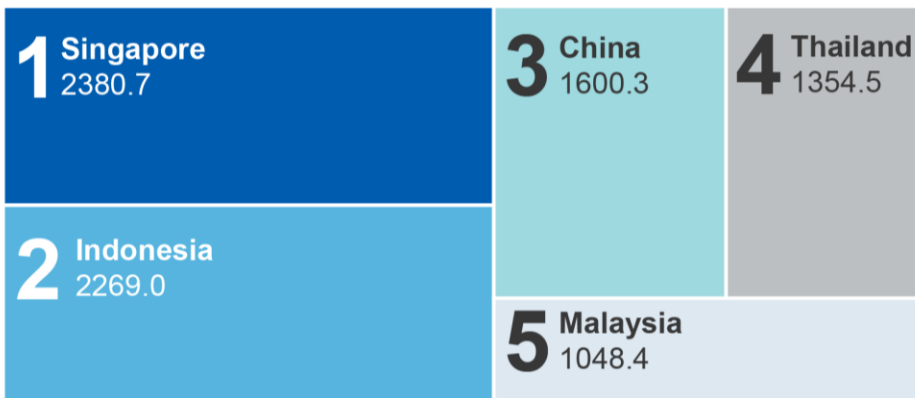


2%
fuel oil



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)



Summary

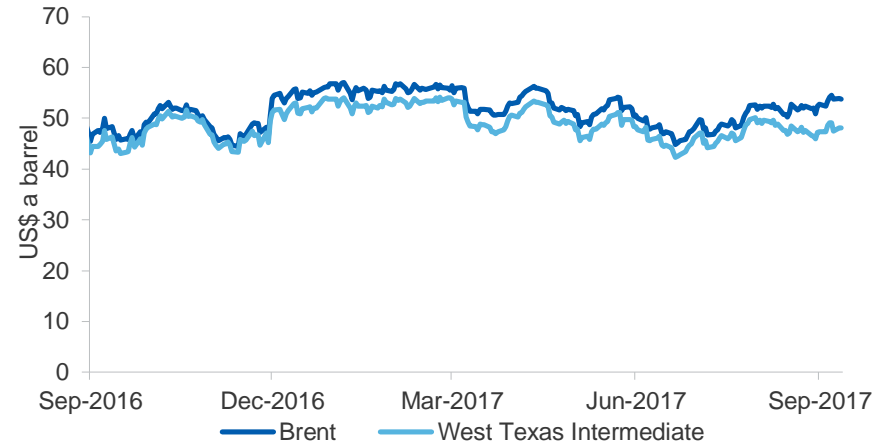
- Australia's crude oil and condensate export earnings are forecast to increase to from \$5.5 billion in 2016–17 to \$7.3 billion in 2018–19, an annual increase of 10 per cent.
- Australia's rate of crude oil and condensate export volumes is forecast to reach 224,000 barrels a day in 2017–18, before expanding 16 per cent to 259,000 barrels a day in 2018–19, as oil field decline is offset by higher condensate production from new LNG projects.
- Oil prices are expected to increase modestly over the outlook period, the Brent spot price is forecast to average US\$52 a barrel in 2017 and to gradually rise to an average US\$57 a barrel in 2019.
- The main uncertainties around the oil price outlook and Australia's export earnings are compliance with the OPEC Production Agreement and continued increases in US oil production.

Prices

During the September quarter, crude oil prices steadily increased from prices posted in the month of June, as expectations about a world oversupply of oil started to diminish. Brent crude oil averaged US\$50 a barrel and West Texas Intermediate (WTI) crude averaged US\$47 a barrel for the September quarter, showing little change on June quarter prices. Modest price increases have been supported by reductions in US commercial oil stocks, which have been falling since the March quarter. In the June and September quarters, the pick-up in seasonal refining activity and the redirection of Saudi Arabia's exports away from the US has contributed to a reduction in inventories. This perceived decrease in world oil oversupply has driven moderate price strengthening, as the OPEC 2017 Production Agreement has continued with mixed compliance outcomes.

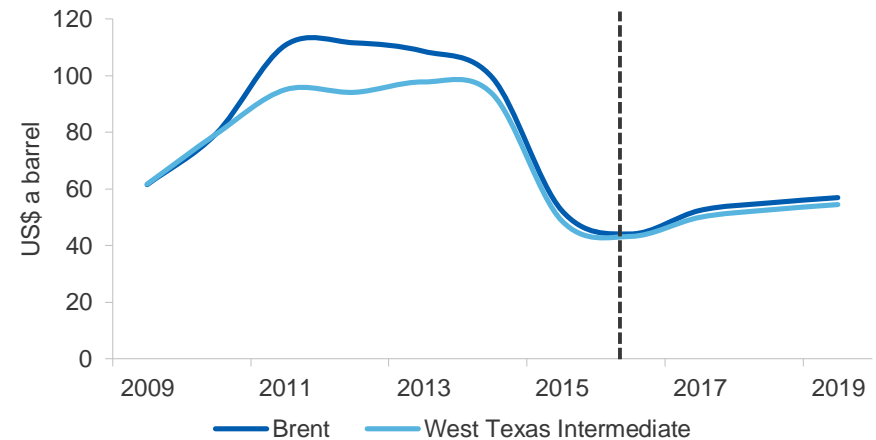
At the end of July, commercial stock levels were 35 million barrels above the five-year average level of 3,240 million barrels — the target stock level of the 2017 OPEC Production Agreement.

Figure 8:1 Recent movement in oil prices



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)

Modest price growth forecast as world market rebalances

Over the outlook period, oil prices are expected to increase at a moderate rate, as world production surpluses start to diminish. Brent crude oil is forecast to average US\$52 a barrel in 2017, and WTI US\$2 lower, as OPEC production constraints continue reducing an oversupplied world market. In 2018, average prices are forecast to be US\$55 a barrel for Brent, and US\$53 for WTI, as higher consumption from non-OECD countries exceeds production increases, despite growing US oil production. The 2019 price for Brent is forecast to average US\$57 a barrel and US\$55 a barrel for WTI.

World oil consumption

World oil consumption has risen faster than expected to date in 2017, supported by low oil prices, strong economic conditions in the US and high consumption in Europe. For 2017 as a whole, consumption is expected to increase by 1.7 per cent to 97.7 million barrels a day. Over the outlook period, consumption growth is expected to occur solely in Non-OECD markets, primarily China and India. In 2018, consumption is forecast to increase by 1.4 per cent to 99 million barrels a day, before reaching a forecast 100.4 million barrels a day in 2019.

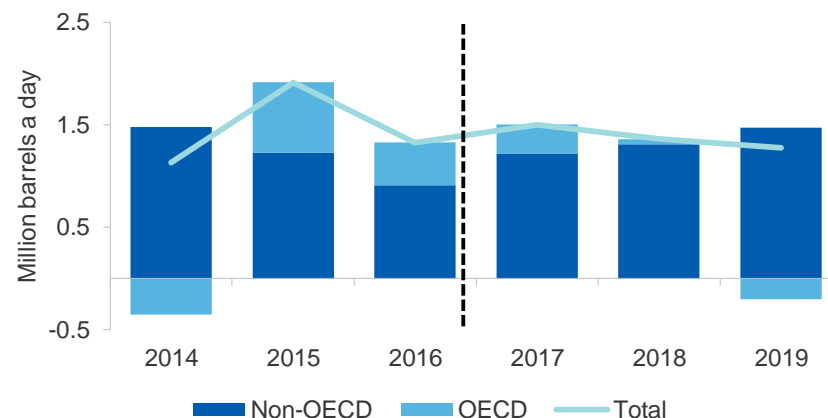
New consumption growth from Non-OECD markets

China accounts for around 12 per cent of world oil consumption, which is likely to expand 4.3 percent, to 12.4 million barrels per day in 2017. Consumption increases are expected to moderate over the outlook period, increasing by 2.6 per cent in 2018 and 2.4 per cent in 2019. Lower car sales and reduced vehicle miles travelled — resulting from significant congestion problems and tightening pollution controls — will contribute to this decline.

India's oil usage is forecast to rise by 2.5 per cent in 2017, to 4.7 million barrels a day. Over the outlook period, improved economic conditions and rising vehicle ownership is expected to accelerate consumption growth, by a forecast 5.9 per cent in 2018 and 6.3 per cent in 2019.

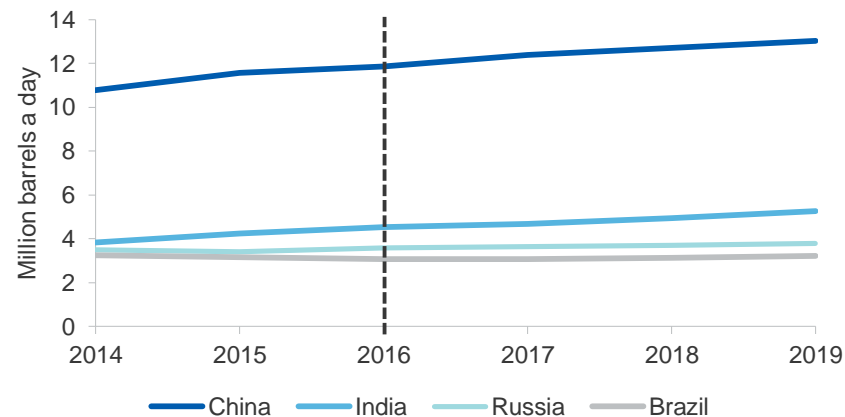
Total Non-OECD consumption is expected to increase at an average rate of 2.5 per cent in 2017 and 2018. So far in 2017, consumption growth in Indonesia and Malaysia has been negatively affected by changes to oil price mechanisms and taxation arrangements.

Figure 8:3 Annual growth in world oil consumption



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

Figure 8:4 Consumption growth in major Non-OECD economies



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

World oil production

World oil production was consistent in the June quarter before decreasing in August. Higher production from the US, Canadian oil sands and a new production platform in Brazil was outweighed by lower OPEC production. In August lower OPEC production and disrupted US production contributed to lower production.

For the year as a whole, 2017 world production is forecast to remain at a similar level to 2016, as OPEC declines are countered by higher Non-OPEC production. Annual production is forecast to be 97.4 million barrels a day in 2017.

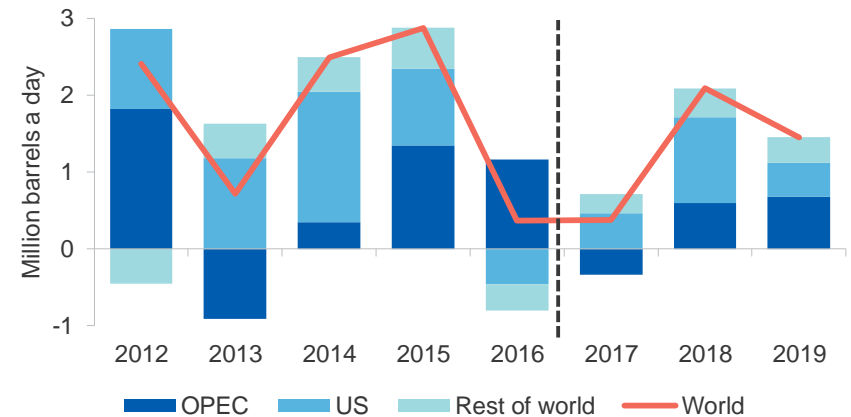
In 2018, production dynamics between OPEC and the US are expected to shift. Total world production is forecast to be 99.5 million barrels a day, 2.2 per cent higher than 2017. Provided the OPEC agreement ends at the end of the March quarter 2018 (as currently scheduled), production from participating countries — particularly Saudi Arabia and Russia — is expected to increase. Over the outlook period, US production is expected to reach record levels. World production is forecast to reach 100.9 million barrels in 2019.

Mixed compliance with OPEC Production Agreement

OPEC production has fluctuated in recent months, with some high production being outweighed by scheduled maintenance and ongoing supply issues in Libya and Venezuela. In July, total production was 39.8 million barrels a day, the highest level in 2017, before declining in August due to volatile production from Libya.

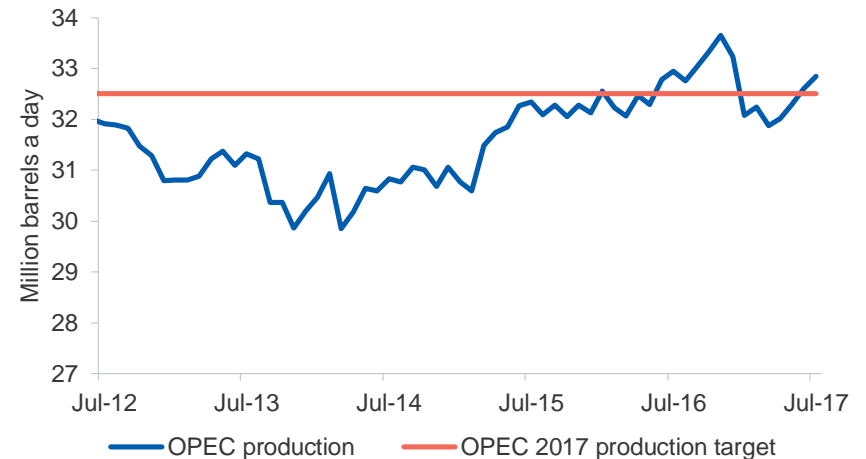
The validity of the 2017 Production Agreement is being stretched, as stagnant oil prices impose a heavy strain on producing nations. Compliance between agreeing OPEC and Non-OPEC members has continued to diverge. In recent months, Saudi Arabia and Qatar have reduced output by more than their committed amounts, Ecuador withdrew their support, and a number of countries over-produced — notably Iran, Algeria and the UAE. In August however, agreement compliance improved, as Russia and Kazakhstan undertook seasonal oil field maintenance. The average compliance rate is 87 per cent for 2017.

Figure 8:5 Change in OPEC and US production



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

Figure 8:6 OPEC production and 2017 Production Agreement



Source: International Energy Agency Oil Market Report (June 2017); Department of Industry, Innovation and Science (2017)

Reviving output from Nigeria and Libya — OPEC members who are not part of the agreement — has also contributed to higher OPEC production. Libya’s production reached 1 million barrels a day in July, however since then there have been a number of disruptions to production, including domestic unrest, industrial action at ports and militia blockades. Production from Nigeria has recovered in recent months, returning to 2016 levels. The Nigerian government has announced production targets that are supported by purchase contracts, however, both infrastructure and security threats remain as production risks. If output continues to grow, Nigeria may be pressured to join the OPEC Production Agreement and withhold further increases.

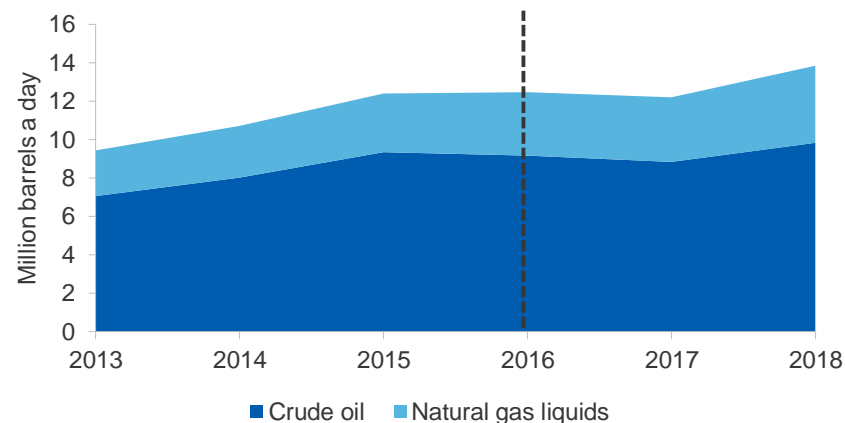
US production expectations continue to be revised up

As operating costs have declined and the number of new rigs drilled steadily increased over the past year, US production forecasts have been continually revised upwards for the outlook period. With particularly strong growth from the Permian Basin, 2017 production is forecast to be to 13 million barrels a day, an annual increase of 3.8 per cent. Further increases in 2018 are expected to bring production to a record level of 14.1 million barrels a day, up 8.6 per cent.

The full impacts of Hurricane Harvey and Irma are still being realised. Oil production in the Gulf of Mexico was shut down, port movements were closed and 2.2 million barrels a day of refining capacity were closed and has only partially reopened. This will effect oil prices, stock levels and trade flows over the September and December quarters, and potentially longer.

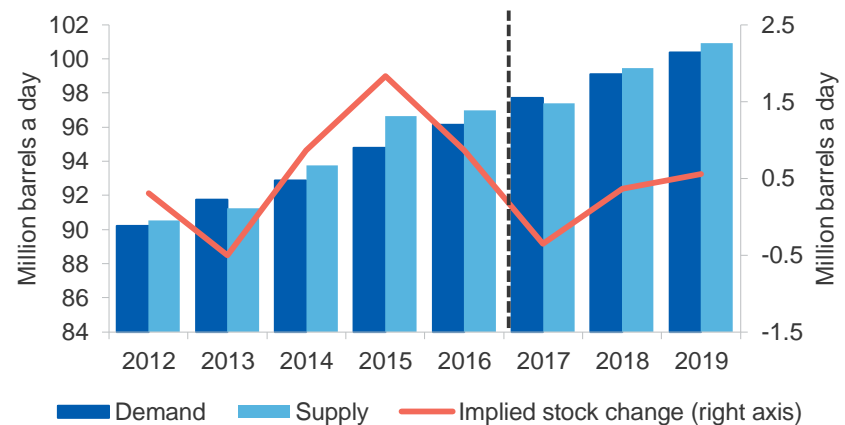
The modest outlook for oil prices is expected to dampen exploration and production expenditure over the outlook period, which is likely to weigh on productivity over the outlook period. The high rate of new rig drilling has been dampened by low WTI oil prices. In the first half of 2017 the rig count increased at an average monthly rate of 7 per cent, however it slowed considerably in July and August.

Figure 8:7 US crude and liquids production



Source: US Energy Information Administration (2017)

Figure 8:8 World production and consumption balance



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

Australian production and trade

Lower production contributes to reduced export volumes

Australia's exports of crude oil and condensate decreased at an annual rate of 8 per cent in 2016–17, to average 220,000 barrels a day. Lower production from declining oil fields contributed to this decrease.

Condensate production to support export growth over the outlook

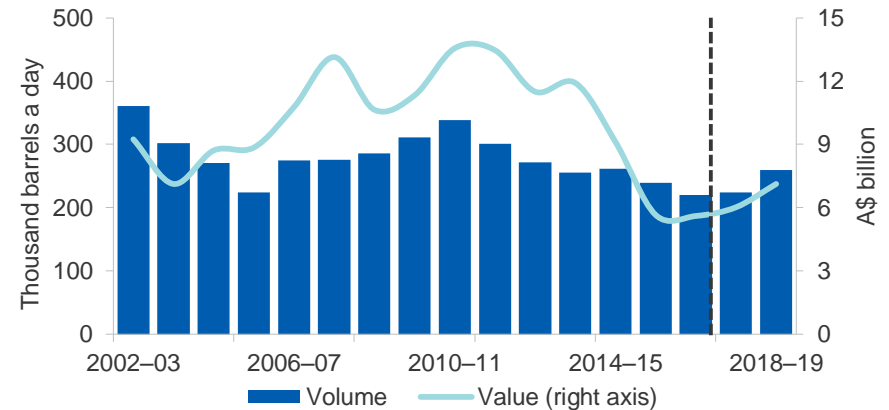
Crude oil and condensate export earnings were \$5.5 billion in 2016–17. Over the outlook period, export earnings are forecast to reach \$6 billion in 2017–18, an annual increase of 9.7 per cent, supported by higher oil prices. Export earnings are expected to increase considerably in 2018–19, reaching a forecast \$7.3 billion.

Australia's crude oil and condensate export volumes are forecast to average 259 thousand barrels a day in 2018–19, almost 16 per cent higher than 2017–18 export volumes. Volume increases are expected from higher condensate production that is co-produced with LNG, almost all of which is expected to be exported.

Revisions to forecast export earnings

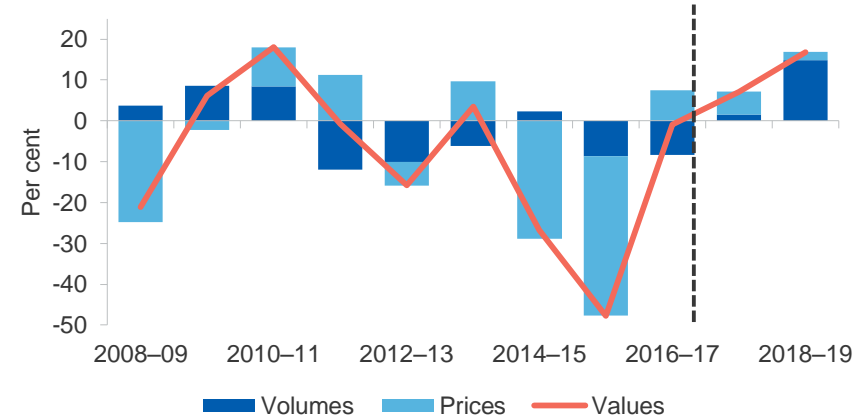
Forecast export earnings have been revised down by around \$123.5 million in 2017–18 and \$1.4 billion in 2018–19, from the June *Resources and Energy Quarterly*. Downward revisions to the oil price — prompted by higher expectations about US production and a lower realised oil price in the June quarter — have contributed to the revisions. Updated production schedules for condensate output, related the new LNG projects, also contributed to the lower forecasts.

Figure 8:9 Australia's exports of crude oil and condensate



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

Figure 8:10 Annual growth in crude oil and condensate export values, contributions from prices and export volumes



Notes: Log change is used to approximate percentage change. The approximation becomes less accurate the larger the percentage change.
Source: ABS (2017) *International Trade, Australia, 5465.0*; Department of Industry, Innovation and Science (2017)

Oil field production forecast to be exceeded by condensate production

Annual production for 2016–17 averaged 287,000 barrels per day, 9.5 per cent lower than the previous year. Lower oil production from the Bonaparte and Gippsland basins was outweighed by higher production from Gorgon LNG, which has increased at an average rate of 50 per cent per quarter since production started in the March quarter 2016.

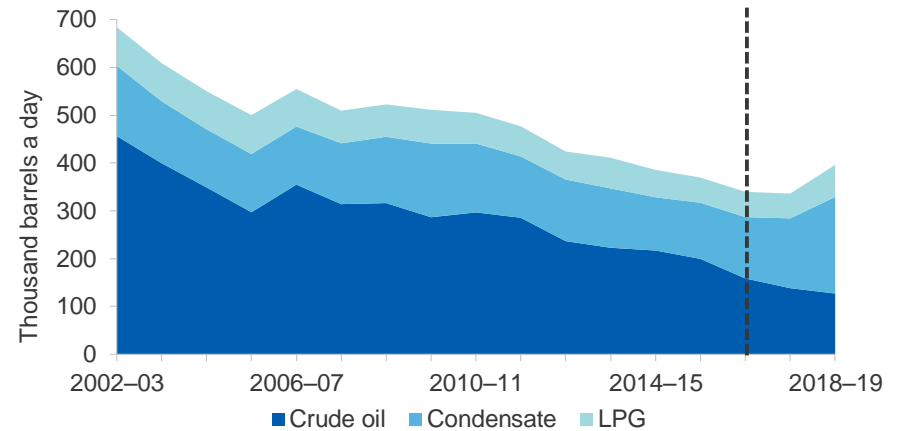
Over the outlook period, Australia’s production profile will be characterised by declining oil field production and higher condensate production generated from the new LNG projects. Australia’s total crude oil and condensate production rate is forecast to average 284,000 barrels a day in 2017–18 and 329,000 barrels a day in 2018–19. The Wheatstone and Ichthys LNG projects — with a combined condensate capacity over 100,000 barrels a day — are expected to start producing before the end of 2017. Prelude LNG, with condensate capacity of 35,000 barrels a day, is likely to start production mid-2018. These new projects are expected to contribute to condensate production overtaking crude oil production in Australia during 2017–18.

Australia’s Refinery Activity

Output from Australia’s refinery activity averaged 422,000 barrels a day in 2016–17, as strong production at some refineries balanced temporary shut-downs at other refineries. Over the last three years, the four major Australian refineries — Kwinana, Geelong, Lytton and Altona — have undertaken improvement works, significant maintenance or added additional capacity. With higher operating capacity and fewer scheduled shut-downs over the outlook period, 2017–18 refinery production is forecast to be 435,000 barrels a day, 3 per cent higher than the previous year.

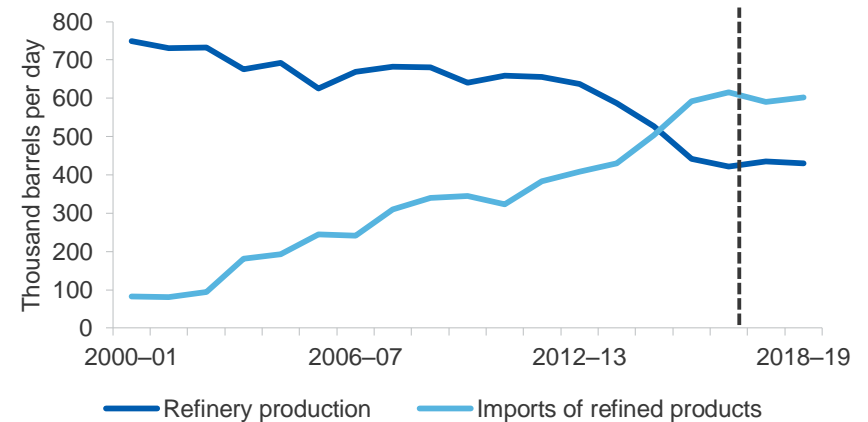
As refinery capacity utilisation improves imports of refinery products are expected adjust over the outlook period. At the end of the outlook period imports of refined products is forecast to reach 609,000 thousand barrels a day, as domestic consumption continues to expand.

Figure 8:11 Australia’s petroleum production



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

Figure 8:12 Australia’s production and imports of refinery products



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	97.4	99.5	100.9	0.4	2.2	1.5
Consumption a	mb/d	96.1	97.7	99.1	100.4	1.7	1.4	1.3
WTI crude oil price								
– nominal	US\$/bbl	43.2	50.0	52.6	54.5	15.6	5.3	3.6
– real b	US\$/bbl	44.1	50.0	51.5	52.2	13.3	3.1	1.3
Brent crude oil price								
– nominal	US\$/bbl	44.1	52.4	55.1	57.0	18.8	5.1	3.4
– real b	US\$/bbl	45.0	52.4	53.9	54.6	16.4	2.9	1.2
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	287	284	329	-9.5	-0.9	15.8
Export volume a	kb/d	239	220	224	259	-8.0	1.5	15.9
– nominal value	A\$m	5,444	5,489	6,020	7,295	0.8	9.7	21.2
– real value g	A\$m	5,658	5,608	6,020	7,125	-0.9	7.3	18.3
Imports a	kb/d	342	351	384	365	2.5	9.4	-5.0
LPG								
Production ac	kb/d	53	53	53	66	0.1	0.3	24.2
Export volume a	kb/d	34	38	45	54	12.0	16.8	20.4
– nominal value	A\$m	547	629	838	1 018	14.9	33.3	21.5
– real value g	A\$m	569	642	838	994	12.9	30.5	18.6
Petroleum products								
Refinery production a	kb/d	442	422	435	430	-4.5	3.0	-1.1
Exports ad	kb/d	10	18	12	9	73.7	-34.1	-24.2
Imports a	kb/d	593	615	577	609	3.8	-6.2	5.5
Consumption ae	kb/d	950	982	969	986	3.4	-1.4	1.8

Notes: **a** Number of days in a year is assumed to be exactly 365. A barrel of oil equals 158.987 litres; **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

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