

# The Australian gold industry

Resources and Energy Quarterly June 2019

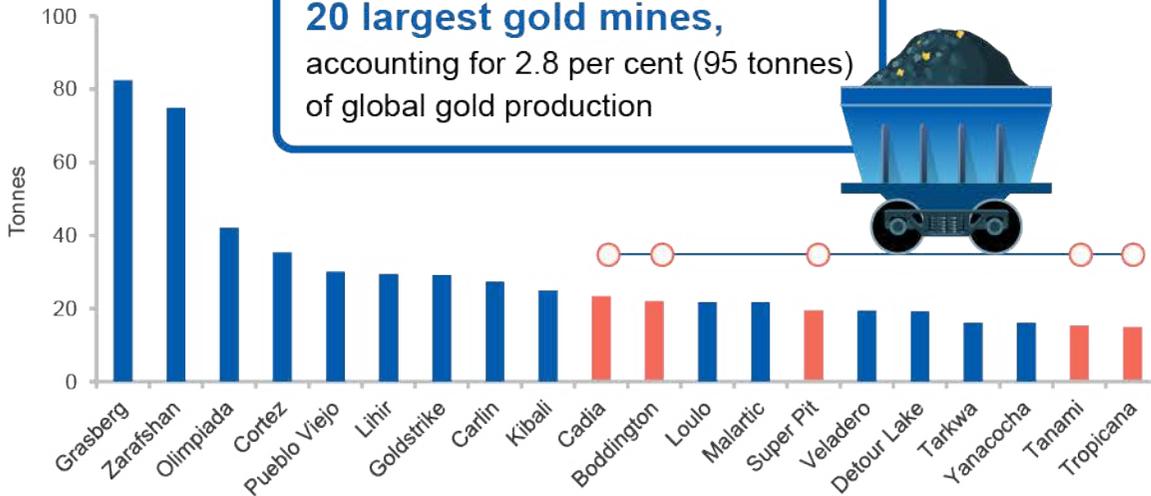


Australia has the world's largest economic demonstrated resources (EDR) of gold, with 18 per cent of global EDR

Australia is the world's second largest gold producer



Australia has 5 of the world's 20 largest gold mines, accounting for 2.8 per cent (95 tonnes) of global gold production



## 16.1 Summary

Gold is in greater abundance in Australia than any other country in the world. Australia has the world's largest economic demonstrated resources (EDR) of gold, with 18 per cent of global EDR. The Australian gold industry:

- has five of the world's twenty largest gold mines and two of the world's twenty largest gold mining companies;
- is the world's second largest gold producer and the sixth largest gold exporter (exporting \$19 billion in 2018);
- directly employed 22,600 people in 2018.

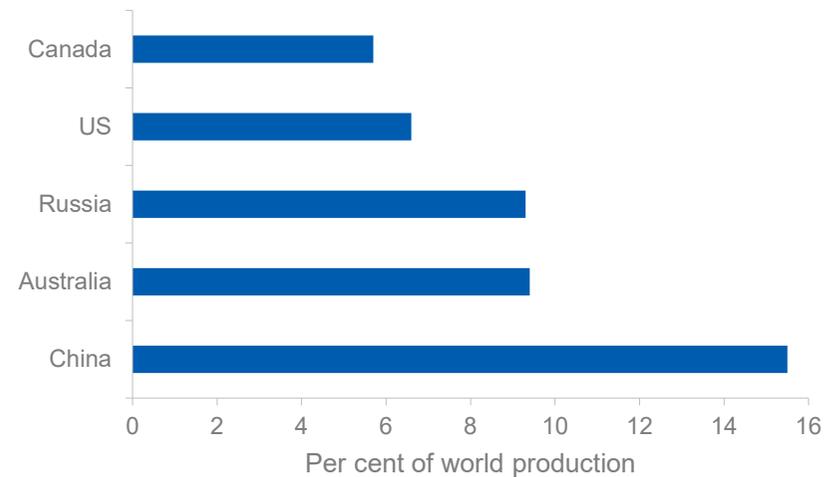
## 16.2 Mine production

Australia is the world's second largest gold producer, accounting for 9.4 per cent (or 315 tonnes) of global gold mined production in 2018 (Figure 16.1). China produced 518 tonnes of gold in 2018, making it the world's largest gold producer (accounting for 15 per cent of global gold mined production). Russia (9 per cent), the United States (7 per cent) and Canada (6 per cent) make up the next three largest gold mine producers.

The Australian gold industry comprises 71 operating gold projects (some containing multiple individual gold mines) across all Australian states and the Northern Territory. Western Australia leads production, with 68 per cent (or 218 tonnes) of Australian gold production in 2018–19, followed by New South Wales, which accounted for 13 per cent (or 42 tonnes) of Australia's total gold output in 2018–19 (Figure 16.2).

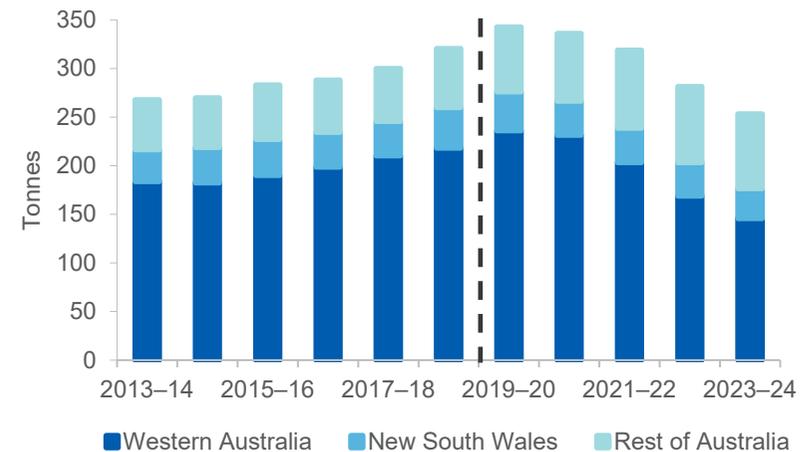
Australia has five of the world's twenty largest gold mines (Figure 16.3). These include the Cadia mine, in 10<sup>th</sup> position, Boddington (11<sup>th</sup>), Super Pit (14<sup>th</sup>), Tanami (19<sup>th</sup>) and Tropicana (20<sup>th</sup>). These five gold mines account for 2.8 per cent (or 95 tonnes) of global gold production (Figure 16.3). The Cadia Hill gold mine, located near Orange in New South Wales and owned by Newcrest Mining, is the second largest open-cut mine in Australia after the Super Pit at Kalgoorlie, Western Australia. The operation was merged with Cadia Valley in the December quarter 2010. Over 280 tonnes of gold has been produced from the Cadia Valley operations since commercial

Figure 16.1: World's top 5 gold producers, 2018



Source: AME (2019); Department of Industry, Innovation and Science (2019)

Figure 16.2: Gold mine production by Australian states and territory



Source: Department of Industry, Innovation and Science (2019)

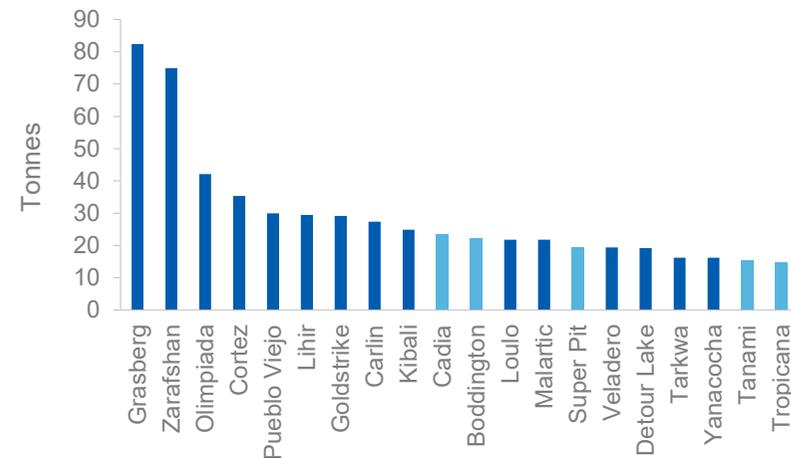
production began in 1999. Production is forecast to rise by 3.3 tonnes a year in 2020, as the mine's expansion project is completed in the second half of 2019. The Boddington gold mine is located 130km southeast of Perth in Western Australia. Gold was discovered in Boddington in 1980. The mine is estimated to contain 364 tonnes of gold reserves and 112 tonnes of gold resources. It produced over 22 tonnes of gold in 2018.

Australia also has two of the world's twenty largest gold mining companies, of which Newcrest Mining is in 10<sup>th</sup> position and Northern Star Resources is in 20<sup>th</sup> position (Figure 16.4). These two companies account for 2.9 per cent (or 99 tonnes) of global gold mined production.

Most gold mining companies have adopted the World Gold Council's guidelines for reporting all-in sustaining cost (AISC) of production. Australia's average AISC is US\$742 a troy ounce, which is below the world AISC average of US\$804 a troy ounce (Figure 16.5). Thus Australian gold producers are, on average, more competitive with lower mining, processing, administrative and support costs than gold producers in Canada, US, Brazil and South Africa, but less competitive than those in Russia, China and Mexico. With the price of US\$1,332 an ounce (as of 12 June 2019), healthy margins are being made throughout the Australian sector on a per ounce gold basis.

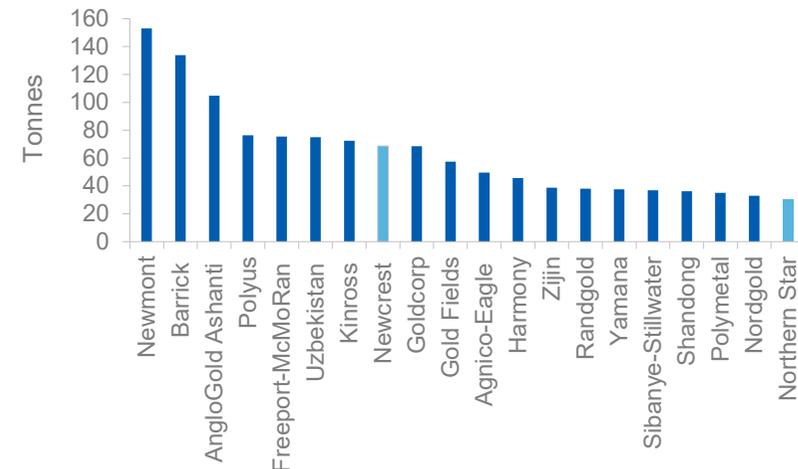
Over the medium to long term, Australia's position as the world's second largest gold producer is expected to be challenged by Russia, as some mature gold mines in Western Australia come to their end of life. Based on 2018 production rates, gold mine capacity likely to close in Australia is projected to be around 153 tonnes between 2019 and 2024 (Figure 16.6). In Russia, gold production is projected to hit a record of 400 tonnes by 2030, as a result of increased exploration and production activity in the eastern Siberia, Magadan and Yakutia regions. China is expected to remain the world's largest gold producer in the medium term. The Chinese Ministry of Industry and Information Technology has implemented plans to lift the country's annual gold output to over 550 tonnes by 2020; such output has the twin objectives of creating/maintaining employment in the industry and helping to raise China's gold reserves.

**Figure 16.3: World's top 20 gold mines, 2018**



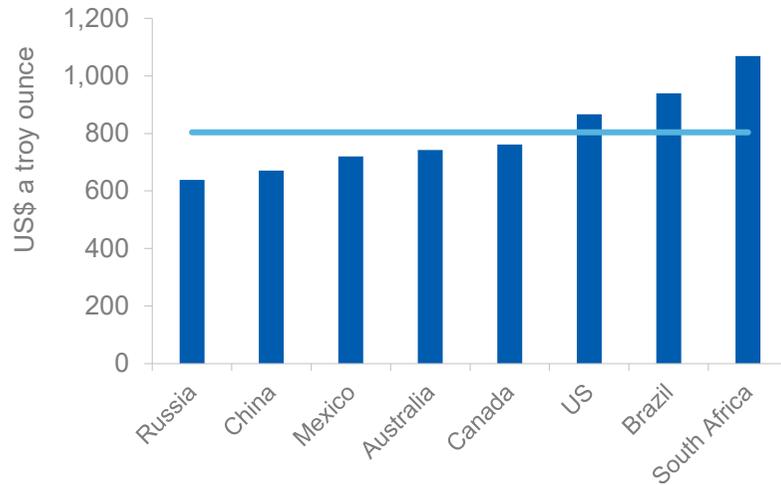
Source: AME (2019); Department of Industry, Innovation and Science (2019)

**Figure 16.4: World's top 20 gold mining companies, 2018**



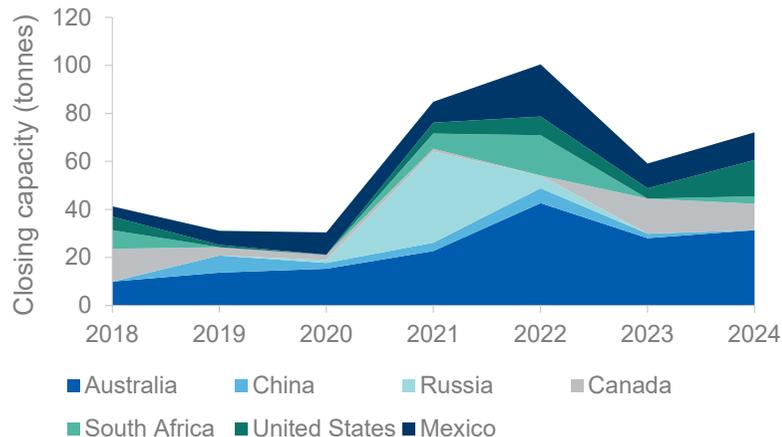
Source: AME (2019)

**Figure 16.5: Gold production all-in sustaining costs**



Notes: Blue line represents the average world all-in sustaining costs  
 Source: AME (2019)

**Figure 16.6: Mine capacity set to be closed, by country**



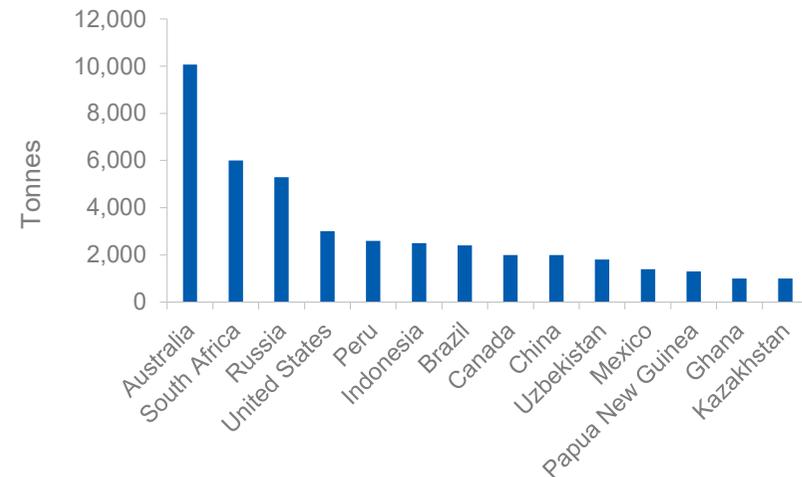
Source: AME (2019)

### 16.3 Economic demonstrated resources and exploration

The long term future and sustainability of the Australian gold industry is measured by its economic demonstrated resources (EDR) — resources that are established, analytically demonstrated or assumed with reasonable certainty to be profitable for extraction or production. Australian EDR accounts for the largest resource by any country, with 18 per cent of the global total, ahead of South Africa (11 per cent), Russia (10 per cent), the United States (6 per cent), and Peru (5 per cent) (Figure 16.7). At the end of 2017, Australia had an accessible EDR of 10,070 tonnes of gold, of which 38 per cent (or 3,869 tonnes) was classified as ore reserves. Approximately 75 per cent (or 2,903 tonnes) of the gold in ore reserves is attributable to 71 operating gold projects.

However, several gold deposits (estimated to hold around 30 tonnes of gold) are not available for exploration because of legal and land use restrictions. These include the Jabiluka, Koongarra and Coronation Hill mines in the Northern Territory.

**Figure 16.7: World economic demonstrated resources of gold**



Source: Geoscience Australia (2019); Statista (2019) World mine reserves of gold

At present, the Australian gold industry is enjoying favourable market conditions, with record high Australian dollar gold prices. Both Australian and US dollar gold prices have moved upward over the last few years, and upward movements are forecast — in the March 2019 REQ — to continue throughout the 2019-2024 outlook period (Figure 16.8). The high price has helped to invigorate exploration in the Australian gold sector, as gold producers plan to raise their gold resources. Australia's gold exploration expenditure has increased for four consecutive years, from 2014 to 2018, with growth averaging AUD\$684 million a year.

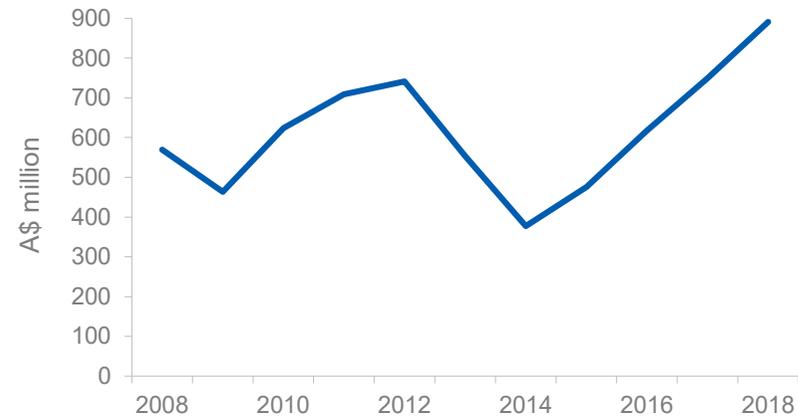
In 2018, gold accounted for 41 per cent of total Australian minerals exploration expenditure, with AUD\$891 million spent on exploration (Figure 16.9). The majority of gold exploration expenditure has been used for upgrading resources around existing deposits, especially on converting inferred resources into higher resource categories.

**Figure 16.8: AUD and USD gold prices**



Source: London Bullion Market Association (2019); Department of Industry, Innovation and Science (2019)

**Figure 16.9: Australia's gold exploration expenditure**



Source: ABS (2019) Mineral and Petroleum Exploration

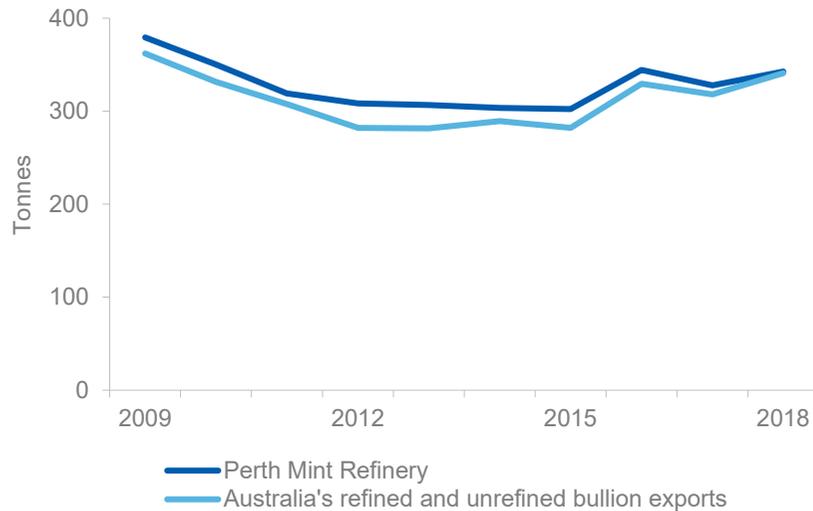
## 16.4 Refining

Australia is not only a major producer and exporter of gold, it is also a key player in the world gold refining industry. Most gold mined in Australia is refined at Perth Mint Refinery in Western Australia before being exported to the overseas markets. Perth Mint is one of the largest refineries in the world, with an annual refining capacity of over 300 tonnes (Figure 16.10). The refinery is one of a few global gold refiners who have accreditation from the major gold exchanges — the London Bullion Market Association (LBMA), the New York Commodity Exchange (COMEX), the Shanghai Gold Exchange (SGE), the Tokyo Commodity Exchange (TOCOM), and the Dubai Multi Commodities Centre (DMCC).

The Perth Mint distributes over \$18 billion of pure gold, silver and platinum bullion bars and coins to investors in more than 100 countries every year. Through its depository capacity, the Perth Mint also provides the world's sole government precious metals investment and storage program.

ABC Refinery — the exclusive manufacturer of ABC Bullion — is Australia's largest and most technologically advanced independent gold refinery in Australia, and it is accredited by the SGE and LBMA.

**Figure 16.10: Perth Mint Refinery and Australia's refined and unrefined bullion exports**



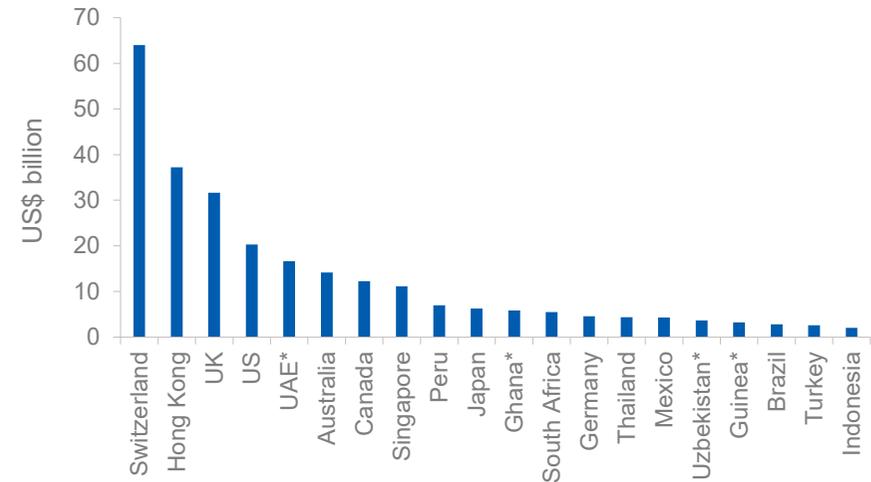
Source: Perth Mint Refinery (2019); Australian Bureau of Statistics (2019)

## 16.5 Exports, imports and domestic consumption

Australia is the world's sixth largest gold exporter, behind Switzerland, Hong Kong, the United Kingdom, the United States and the United Arab Emirates (Figure 16.11). In 2018, Australia exported 341 tonnes of refined and unrefined gold bullion, with a value totalling USD\$14 billion (AUD\$19 billion). These figures are dominated by re-exports associated with Exchanged Traded Funds and other investment flows.

Demand for Australian gold was largely dominated by Hong Kong and China, who accounted for 37 and 31 per cent, respectively, of Australia's gold exports in 2018. Hong Kong is a fast-growing market for Australian gold, as the Special Administrative Region's close links to China and the recent collaboration between the Shanghai Gold Exchange and the Chinese Gold and Silver Exchange has increased physical gold trading activities. Other important destinations for Australia's gold include the

**Figure 16.11: Gold exports by country, 2018**



Notes: \* 2017 figures

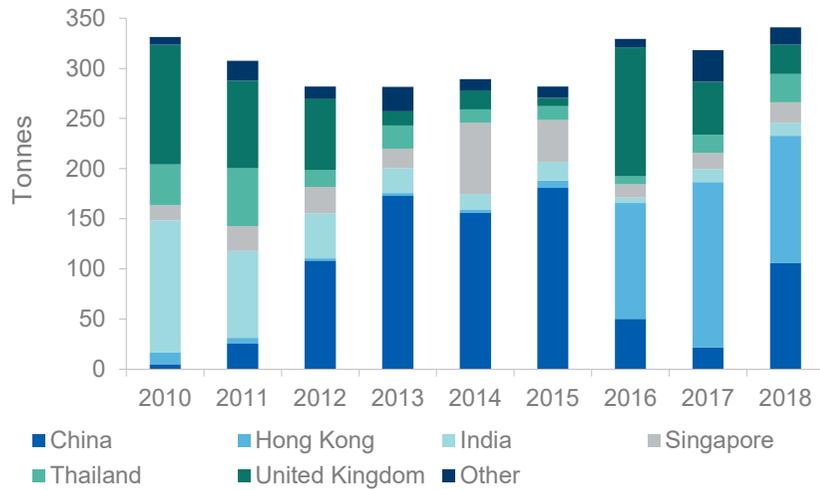
Source: International Trade Centre (2019) Trade Map

United Kingdom — with an 8.5 per cent share of Australia's gold exports — followed by Thailand (8.2 per cent), Singapore (6.2 per cent), and India (3.8 per cent) (Figure 16.12).

About a decade ago, India was Australia's largest gold exporting market, consuming 132 tonnes of Australian gold in 2010. However, gold exports to India have fallen significantly since 2014, at an average 13 tonnes of gold a year — 90 per cent down from the 2010 export level. There are various reasons for this decline, including increased import duties and increased gold refining capacity in India.

Australia imported semi-processed ore containing 112 tonnes of gold in 2018, with a value of AUD\$6.1 billion. Of this, 47 per cent came from Papua New Guinea (PNG), and 9.3 per cent from New Zealand (Figure 16.13). Virtually all gold ores from the Ok Tedi mine in PNG are shipped to the Perth Mint refinery for processing and re-export.

**Figure 16.12: Australia's major gold export markets**



Source: ABS (2019)

Australia's domestic gold market consumed 54 tonnes of refined and unrefined gold bullion in 2018 (Figure 16.14). This is down significantly from levels at the start of the decade. A number of factors explain the decline. In 2010, Australian gold consumption was likely boosted by safe haven demand associated with the Global Financial Crisis. The rise in the Australian dollar price of gold since 2010 is likely to have had an adverse impact on domestic consumption.

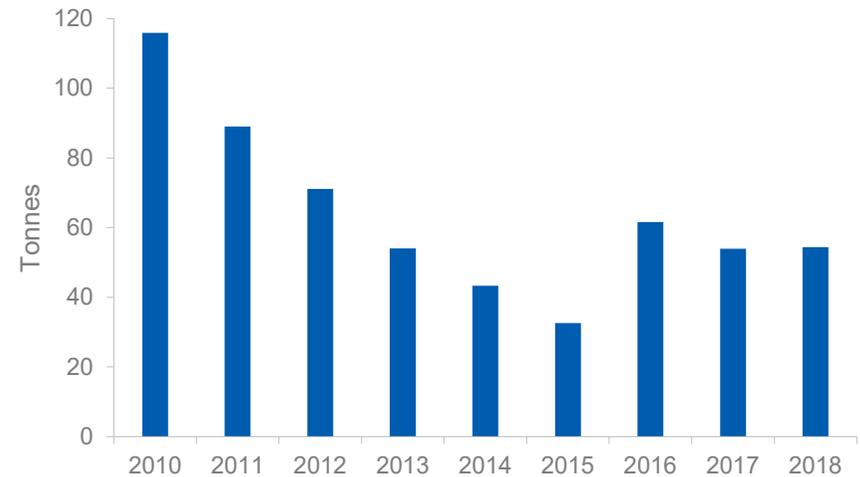
There are 82 gold bullion traders in Australia who provide facilities to buy, vault and trade physical gold bullions. Despite having no bullion market exchange, Perth Mint — as a member of the LBMA — has been considered as something of a proxy for the Australian gold market. It distributes over AUD\$18 billion of pure gold, silver and platinum bullion bars and coins to investors in more than 100 countries every year. Through their depository capacity, it also provides the world's sole government precious metals investment and storage program.

**Figure 16.13: Australia's gold imports**



Source: Australian Bureau of Statistics (2019); Department of Industry, Innovation and Science (2019)

**Figure 16.14: Australia's domestic gold consumption**



Source: Department of Industry, Innovation and Science (2019)

## 16.6 Opportunities and challenges

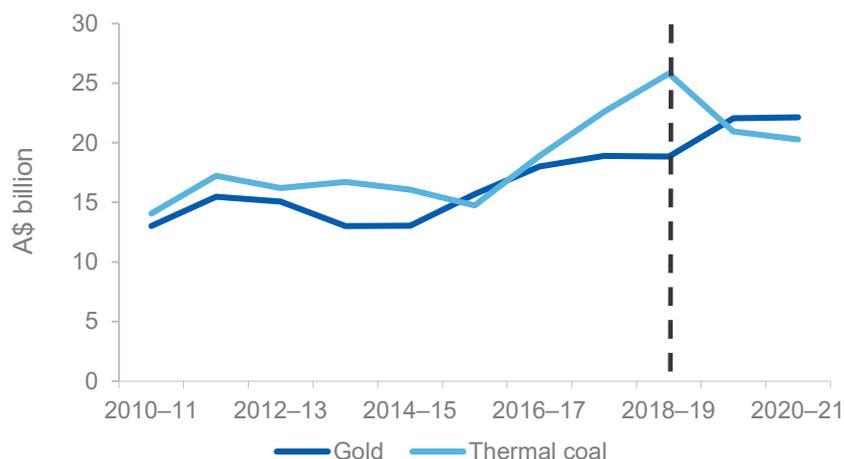
The Australian gold industry is expected to remain strong, with opportunities to export more gold, likely to Asia.

Asian countries consumed 80 per cent of global gold in 2018, of which China accounted for 32 per cent, India (25 per cent), the Middle East (9 per cent), and South East Asia (4 per cent). Hong Kong and China were the two largest export markets for Australian gold in 2018, and are expected to remain the principal markets for Australian gold over the coming years.

Australia's gold exports are forecast to grow over the next few years, to a peak of over \$22 billion in 2020–21 (Figure 15.15). The growth reflects expected rises in local gold production and export volumes to Asia, particularly Hong Kong and China.

If thermal coal is separated from metallurgical coal, gold is forecast to overtake thermal coal as the fourth largest export commodity in 2019–20 and 2020–21 (Figure 16.15), behind iron ore, LNG and metallurgical coal.

**Figure 16.15: Gold and thermal coal export values**



Source: Australian Bureau of Statistics (2019); Department of Industry, Innovation and Science (2019)

Maintaining Australia's position as the world's second largest gold producer, will require continuous efforts to improve the industry's competitiveness through innovation and enhanced exploration.

The application of new technology and innovative processes is enabling the industry to discover new resources, improve productivity, protect the environment, and support local communities. The innovation partnerships such as CRC Ore ([www.crcore.org.au](http://www.crcore.org.au)) and Mining3 ([www.mining3.com](http://www.mining3.com)), and collaboration with higher education institutions are examples of partnerships that address the challenge of extracting gold from lower grade ore and developing ways of separating gold from extracted materials. Innovation is also a means to overcome Australia's depleted gold resources — the running down of resource deposits.

Exploration is a key stage in the mining project development cycle. It is an investment in knowledge about the location, type, quantity and quality of deposits, which helps to inform future development. The decline in exploration success is largely due to the difficulty of exploring beneath post-mineralisation sedimentary basins. Australia is still under-explored, and future success is dependent on the expansion of the research and discovery to those areas that are under cover. The UNCOVER Australia ([www.uncoveraustralia.org.au](http://www.uncoveraustralia.org.au)) — an initiative that brings together geoscience researchers in industry, governments and academia, to explore and uncover Australia's hidden mineral wealth — has the potential to address the challenges that the Australian gold industry is facing.

Access to more geological data is important to the sustainability of Australia's gold industry. The AEM survey (the world's first innovation and largest airborne electromagnetic survey) uses aircraft-mounted equipment to map the degree of electrical conductivity below the earth's surface to a depth of several hundred metres. Geoscience Australia has completed the AME survey for the Northern Territory and Queensland, and conducted an AME survey for Western Australia. When completed, both surveys will cover more than one million square kilometres — an area larger than France and Germany combined — to help identify potential new mineral deposits ([www.ga.gov.au/efft](http://www.ga.gov.au/efft)).