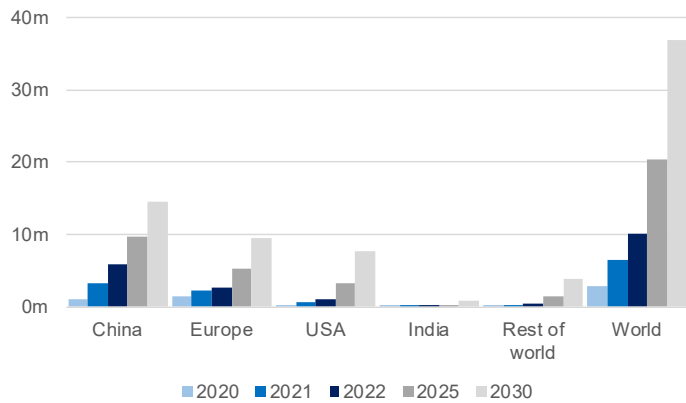




WESTERN AUSTRALIA BATTERY AND CRITICAL MINERALS PROFILE – March 2024

Electric car sales outlook¹

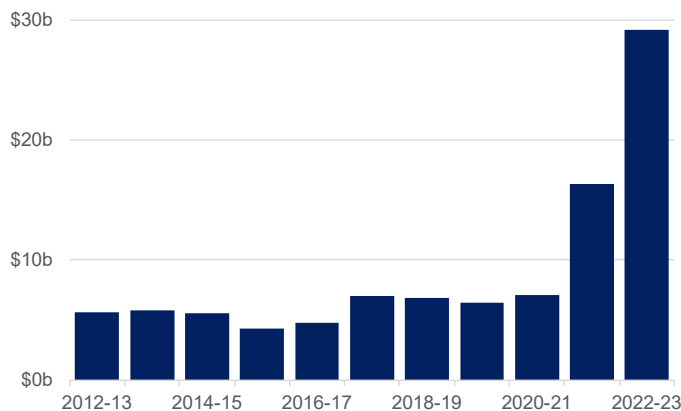


m = Million. ¹ Sales of battery electric cars and plug-in hybrid cars under the Stated Policies Scenario, which includes existing policies and measures and policy ambitions and targets that have been legislated by governments to support the deployment of electric vehicles.

Source: International Energy Agency, Global EV Outlook 2023 (Annual).

- In 2022, global electric car sales rose 57% to 10.2 million, despite total car sales falling 3% globally. The growth in electric car sales led to the number of electric cars on the road globally increasing to 26 million in 2022.
- Higher demand for electric vehicles is increasing the demand for battery and critical minerals. Automotive lithium-ion battery demand increased by 65% in 2022.
- Electric vehicle batteries now account for a much larger share of global demand for lithium (up from 15% in 2017 to 60% in 2022), cobalt (up from 10% to 30%) and nickel (up from 2% to 10%).
- Under the International Energy Agency's (IEA) Stated Policy Scenario, global electric car sales are projected to rise to 37 million in 2030, by which time there will be 226 million electric cars on the road globally.

Battery and critical minerals¹ sales from Western Australia



¹ Lithium (spodumene concentrate), nickel, cobalt, manganese, copper and rare earths.

Source: WA Department of Mines, Industry Regulation and Safety, Resource Data Files (Bi-Annual); and WA Department of Jobs, Tourism, Science and Innovation.

- Western Australia has significant resources of battery and critical minerals and already produces many of these minerals for export.
- China is the largest market for Western Australia's battery and critical minerals, accounting for around 80% of the value of the States's battery and critical mineral exports in 2022-23. Western Australia also exports to markets in Asia (including South Korea and Japan), Europe and North America.
- The value of Western Australia's battery and critical minerals sales rose from \$16.3 billion in 2021-22 to \$29.2 billion in 2022-23.
- Direct full-time equivalent employment in Western Australia's battery and critical minerals industry rose 40% to 20,883 in 2022-23.

Western Australia's battery and critical minerals industry

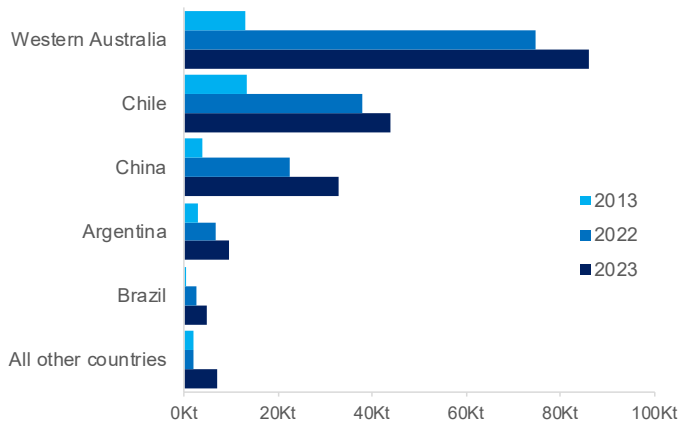
- [Lithium](#)
- [Nickel](#)
- [Cobalt](#)
- [Manganese](#)
- [Copper](#)
- [Rare earths](#)

- Western Australia's lithium, cobalt and nickel exports are mostly used in battery manufacturing, although some exports are used for other purposes.
- New investment in battery and critical minerals processing is expected to result in Western Australia moving further down the value chain and exporting more minerals specifically for battery manufacturing. For example, Western Australia currently exports lithium mainly as spodumene concentrate, but will export more lithium hydroxide in coming years.
- This report provides information on the battery and critical minerals industry, including:
 - global reserves and production
 - global demand and prices
 - Western Australia's reserves, production, sales, royalties and employment.



Lithium

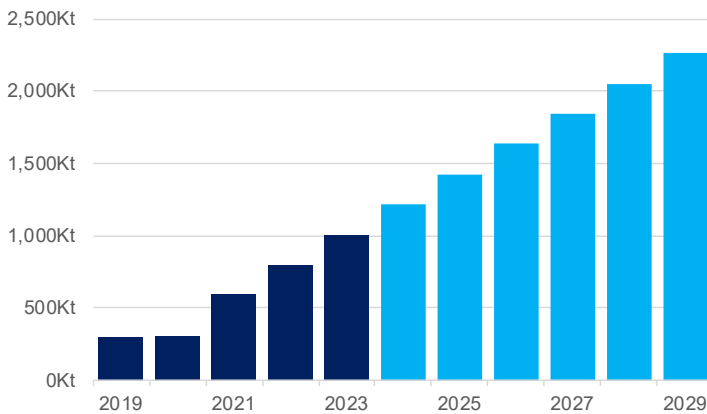
Lithium supply¹



Kt = Thousand tonnes. ¹ Lithium content from mine production.
Source: US Geological Survey, Mineral Commodity Summaries (Annual).

- Western Australia is the largest lithium supplier in the world, accounting for 47% of global supply in 2023, followed by Chile (24%).
- Western Australia accounted for 100% of Australia's lithium production in 2023.
- Global lithium supply rose from 35,000 tonnes to 180,000 tonnes between 2013 and 2023, with supply from Western Australia contributing 49% of the increase.
- In 2023, lithium supply from:
 - Western Australia rose 15% to 86,000 tonnes
 - Chile rose 16% to 44,000 tonnes
 - China rose 46% to 33,000 tonnes
 - Argentina rose 46% to 9,600 tonnes
 - Brazil rose 86% to 4,900 tonnes.

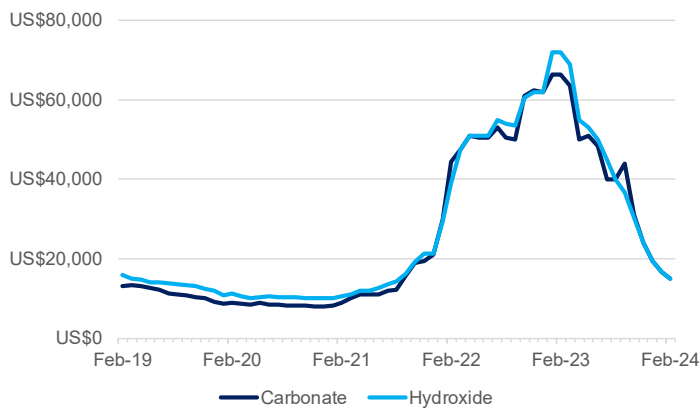
Lithium demand¹



Kt = Thousand tonnes. ¹ Demand is ahead of consumption by around 12 months due to time taken to manufacture batteries.
Source: Office of the Chief Economist, Resources and Energy Quarterly (Quarter).

- Lithium is mainly used in rechargeable batteries for mobile phones, laptops, digital cameras and electric vehicles. Rechargeable batteries account for 80% of the world's consumption of lithium.
- World lithium demand rose 26% to 1 million tonnes in 2023.
- The Australian Government's Office of the Chief Economist forecasts annual world lithium demand will rise 126% to 2.3 million tonnes between 2023 and 2029.

Lithium prices¹

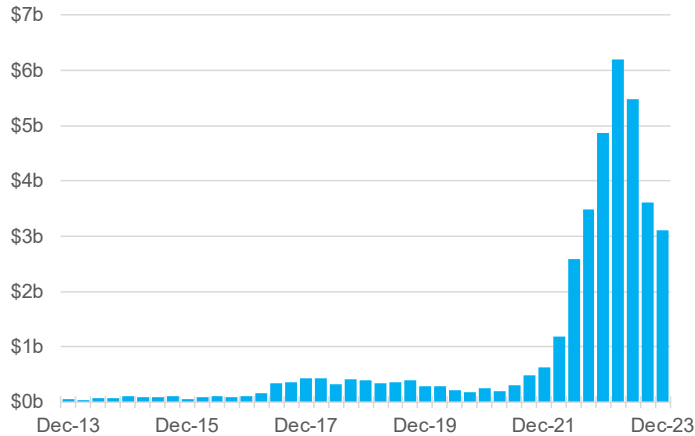


¹ US dollars a tonne. Asia, Cost, insurance and freight (CIF). ² Unit price of Western Australia's spodumene exports (free on board) converted to US dollars using the monthly average exchange rate.
Source: S&P Global Market Intelligence/Benchmark Minerals (Month).

- Lithium prices declined sharply in 2023 due to a large increase in global supply and slowing demand for lithium from China's passenger plug-in electric vehicle sector.
- For lithium carbonate, the monthly average price fell 15% to US\$15,000 a tonne in February 2024. The annual average price declined 11% to US\$45,363 a tonne in 2023.
- For lithium hydroxide, the monthly average price fell 15% to US\$15,000 a tonne in February 2024. The annual average price declined 8% to US\$47,229 a tonne in 2023.
- For lithium spodumene², the monthly average price fell 18% to US\$1,211 a tonne in January 2024. The annual average price fell 2% to US\$3,420 a tonne in 2023.
- The Office of the Chief Economist forecasts the annual average price of:
 - lithium spodumene will be US\$1,139 a tonne in 2024 and US\$1,379 a tonne in 2025.
 - lithium hydroxide will be US\$15,870 a tonne in 2024 and US\$18,393 a tonne in 2025.



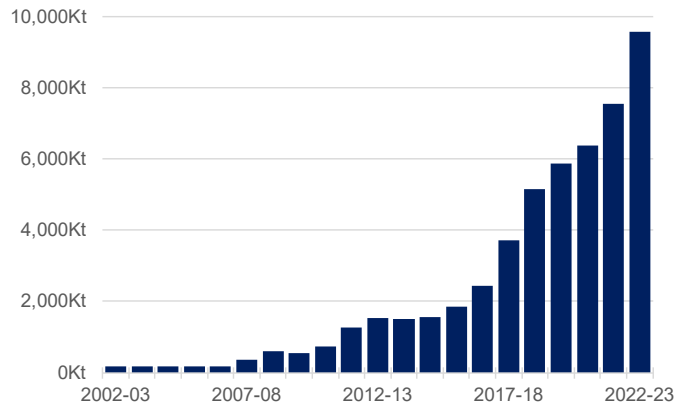
Lithium¹ exports from Western Australia



¹ Spodumene concentrate. May include some other crude minerals prior to January 2021.
Source: Based on data from ABS 5368.0 International Trade in Goods and Services, Australia (Monthly).

- Western Australia exports lithium mainly as spodumene concentrate for further processing.
- China is Western Australia's largest market for lithium, accounting for 99% of the State's lithium exports in 2023.
- Western Australia exported \$3.1 billion of lithium in the December quarter 2023, 14% less than in the previous quarter.
- The total value of Western Australia's lithium exports rose 52% to \$18.4 billion in 2023.
- Western Australia has started producing lithium hydroxide and will export it in greater volumes in coming years. The Kwinana and Kemerton processing plants (located south of Perth), respectively have capacity of around 25,000 and 50,000 tonnes of lithium hydroxide per year, supplied by lithium concentrate from the Greenbushes and Mt Marion mines in Western Australia.

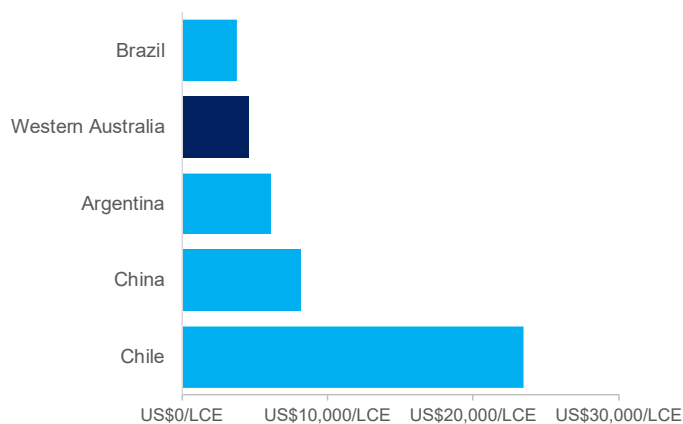
Lithium resources in Western Australia¹



Kt = Thousand tonnes. ¹Estimated based on 99% of Australia's identified lithium resources.
Source: Based on data from ABS 5204.0 Australian System of National Accounts (Annual), Geoscience Australia, Australia's Identified Mineral Resources (Annual); and WA Department of Jobs, Tourism, Science and Innovation.

- Western Australia has the second largest lithium reserve, accounting for 22% of the world's lithium reserves in 2023.
- Chile has the largest lithium reserves, accounting for 34% of the world's lithium reserves in 2023.
- Western Australia's estimated economic demonstrated lithium resource has increased rapidly over the past decade due to increased expenditure on lithium exploration.
- In 2022-23, Western Australia's estimated economic demonstrated lithium resource rose 27% to 9.6 million tonnes. This resource could sustain the State's lithium production for 31 years at 2022-23 production rates.

Lithium production costs per unit¹: 2023

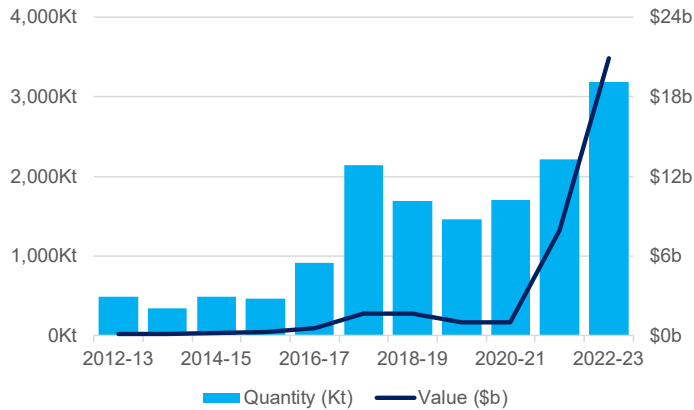


Note - Data covers 91% of 2023 global recovered lithium production. The chart includes the top 5 global producers.
¹ Total cash costs per tonne of lithium carbonate equivalent (LCE) in US dollars. LCE is a benchmark product for the different lithium products of concentrate, carbonate, hydroxide, chloride and direct shipping ore.
Source: S&P Global Market Intelligence (Annual).

- Western Australia's lithium producers are among the world's lowest-cost producers and produce lithium at a much lower cost than the world's other major producers. The cost competitiveness of Western Australia's lithium producers is due to relatively low costs for chemicals, royalties, onsite services and energy.
- The average total cash cost of Western Australia's lithium production was US\$4,607 a lithium carbonate equivalent in 2023, below the world average of US\$9,714 a lithium carbonate equivalent.
- Western Australia produces lithium at a much lower cost than Chile, the world's second largest lithium producer. In 2023, Western Australia's average total cash cost of lithium production was 80% lower than Chile's average total cash cost of US\$23,478 a lithium carbonate equivalent.



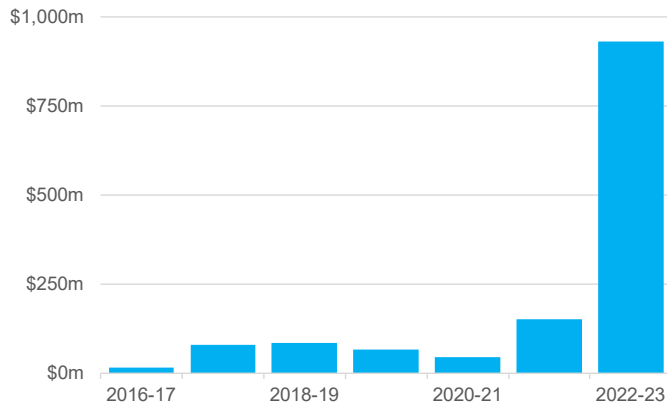
Lithium¹ sales from Western Australia



Kt = Thousand tonnes. ¹ Spodumene concentrate.
Source: WA Department of Mines, Industry Regulation and Safety, Resource Data Files (Bi-Annual).

- Greenbushes is Western Australia’s largest lithium mine, accounting for 51% of the State’s lithium production in 2023. Other major lithium mines included Pilgangoora (17%), Wodgina (12%), Mt Marion (11%) and Mt Cattlin (6%).
- The quantity of Western Australia’s lithium sales rose 44% to 3.2 million tonnes in 2022-23.
- The value of Western Australia’s lithium sales increased from \$8.0 billion in 2021-22 to \$20.9 billion in 2022-23.
- Western Australia’s third lithium hydroxide plant is under construction at Kwinana as part of the Mt Holland project, due for completion in 2025. The plant will have the capacity to produce 50,000 tonnes a year of lithium hydroxide.
- Trains 1 and 2 at the Wodgina lithium mine restarted in 2022 after the mine went into care and maintenance in November 2019. Train 3 is currently operating, resulting in increased capacity. A final investment decision on Train 4 is expected in 2024.
- The Kathleen Valley lithium project was sanctioned for development in August 2022 and is targeting first spodumene production in mid-2024.
- The P1000 expansion of the Pilgangoora lithium operation was sanctioned in March 2023. The expansion will increase the project’s production by 47% to 1 million tonnes of spodumene concentrate a year.

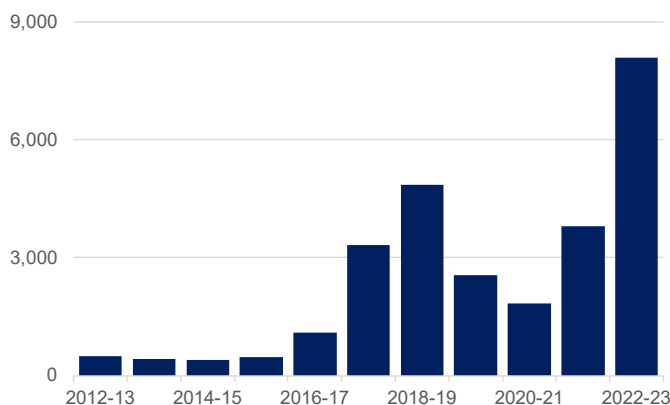
Lithium royalty revenue in Western Australia



Source: WA Department of Mines, Industry Regulation and Safety, Resource Data Files (Bi-Annual).

- Western Australia has a 5% royalty rate on the value of lithium concentrate (spodumene) feedstock.
- Lithium accounted for 7% of Western Australia’s royalty revenue (including North West Shelf grants) in 2022-23.
- Lithium royalties in Western Australia rose from \$150 million in 2021-22 to \$930 million in 2022-23.

Lithium employment in Western Australia¹



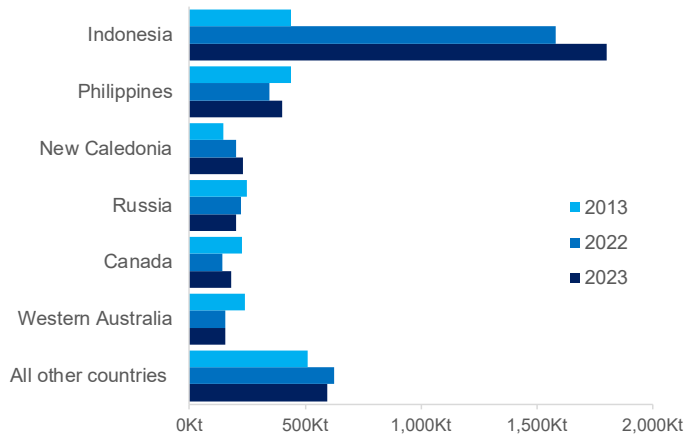
¹ Direct employment. Full-time equivalent (average on site).
Source: WA Department of Mines, Industry Regulation and Safety, Resource Data Files (Bi-Annual).

- Direct full-time equivalent employment in Western Australia’s lithium industry rose from 3,801 in 2021-22 to 8,092 in 2022-23.
- Western Australia’s largest employing lithium mine sites in 2022-23 were:
 - Greenbushes (1,658)
 - Pilgangoora (1,539)
 - Mt Marion (1,148).



Nickel

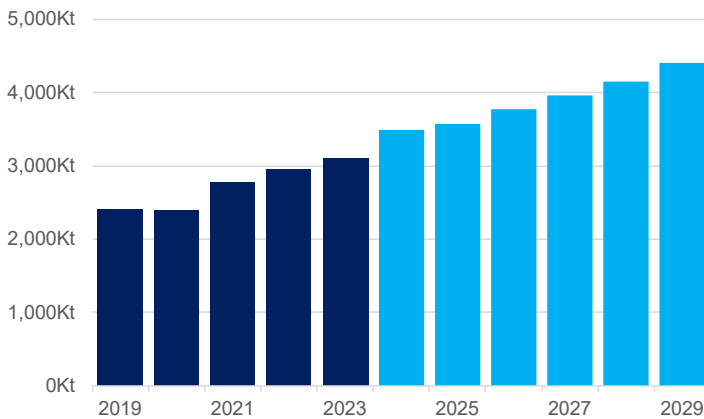
Nickel supply¹



Kt = Thousand tonnes. ¹ Nickel content from mine production.
Source: US Geological Survey, Mineral Commodity Summaries (Annual).

- Western Australia is the 6th largest nickel supplier in the world, accounting for 4% of global supply in 2023.
- Indonesia is the largest nickel supplier in the world, accounting for 48% of global supply in 2023.
- Western Australia accounted for 97% of Australia's nickel production in 2023.
- Global nickel supply rose 45% to 3.6 million tonnes between 2013 and 2023, mainly driven by increased supply from Indonesia.
- In 2023, nickel supply from:
 - Indonesia rose 14% to 1.8 million tonnes
 - Philippines rose 16% to 400,000 tonnes
 - New Caledonia rose 15% to 230,000 tonnes
 - Russia fell 10% to 200,000 tonnes
 - Canada rose 26% to 180,000 tonnes
 - Western Australia rose 2% to 156,000 tonnes.

Nickel consumption



Kt = Thousand tonnes.
Source: Office of the Chief Economist, Resources and Energy Quarterly (Quarter).

- Nickel is mainly used to make stainless steel, which accounts for 65% of global nickel consumption. The use of nickel for electric vehicle batteries is growing. Around 15% of the world's nickel is consumed in batteries, including rechargeable batteries for electronics, power tools, transport and emergency power supply.
- World nickel consumption rose 5% to 3.1 million tonnes in 2023.
- The Office of the Chief Economist forecasts world nickel consumption will rise 42% to 4.4 million tonnes between 2023 and 2029.

Nickel prices¹

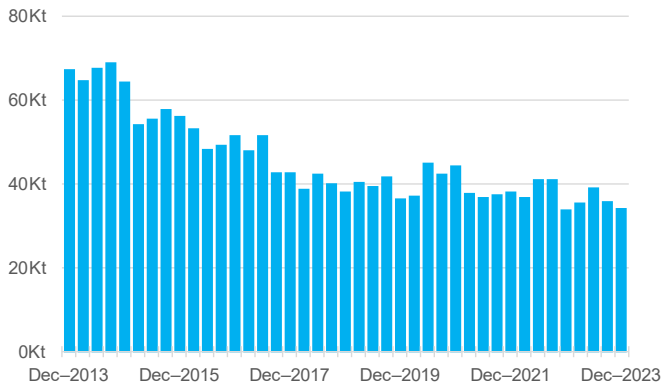


¹ US dollars a tonne. London Metal Exchange (LME) Cash.
Source: S&P Global Market Intelligence/Thomson Reuters (Month).

- Nickel prices declined sharply in 2023 as global supply increased and demand for nickel from China's passenger plug-in electric vehicle sector weakened. However, nickel prices stabilised somewhat in February 2024.
- The monthly average nickel price rose 10% to US\$17,670 a tonne in February 2024.
- The annual average nickel price fell 17% to US\$21,225 a tonne in 2023.
- The Office of the Chief Economist forecasts the annual average nickel price will be US\$16,954 a tonne in 2024 and US\$17,650 a tonne in 2025.



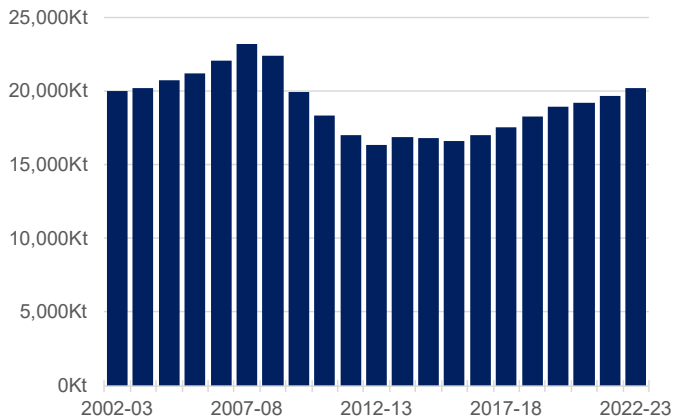
Nickel production¹ from Western Australia



Kt = Thousand tonnes. ¹ Nickel content from mine production.
Source: Office of the Chief Economist, Resources and Energy Quarterly (Quarter).

- Nickel West is Western Australia's largest nickel operation and includes the Mt Keith and Leinster mines, the Kambalda Concentrator, Kalgoorlie Smelter (matte) and Kwinana Refinery (powder and briquettes). BHP is assessing a period of care and maintenance for the operation due to weaker prices. Many other miners sell nickel ore to Nickel West for processing.
- The Mt Keith and Leinster mines accounted for a combined 30% of Western Australia's paid nickel mine production in 2023.
- Murrin Murrin is Western Australia's largest nickel mine, accounting for 21% of the State's paid nickel mine production in 2023. Other major nickel mines included Nova-Bollinger (13%), Ravensthorpe (12%), Forrestania (8%), Cosmos (8%), South Kambalda (6%) and Savannah (5%).
- Western Australia produced 34,382 tonnes of nickel in the December quarter 2023, 5% less than in the previous quarter.

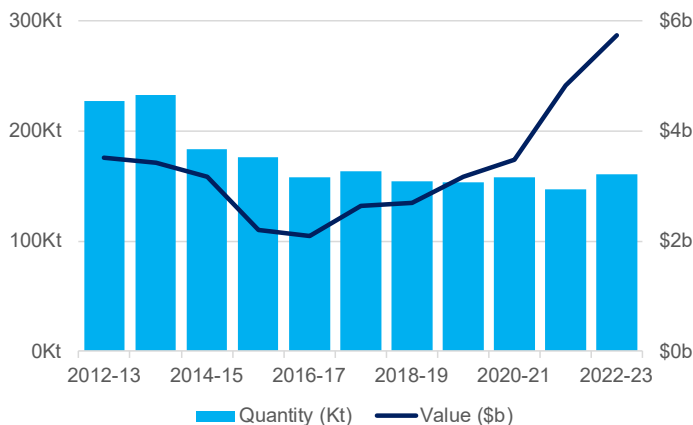
Nickel resources in Western Australia¹



Kt = Thousand tonnes. ¹ Estimated based on 89% of Australia's identified nickel resources.
Source: Based on data from ABS 5204.0 Australian System of National Accounts (Annual), Geoscience Australia, Australia's Identified Mineral Resources (Annual); and WA Department of Jobs, Tourism, Science and Innovation.

- Western Australia has the second largest nickel reserves, accounting for 14% of the world's nickel reserves in 2023.
- Indonesia has the largest nickel reserves, accounting for 36% of the world's nickel reserves in 2023.
- Western Australia's estimated economic demonstrated nickel resource has increased steadily over the past decade.
- In 2022-23, Western Australia's estimated economic demonstrated nickel resource rose 3% to 20.2 million tonnes. This resource could sustain the State's nickel production for 103 years at 2022-23 production rates.
- The value of Western Australia's nickel and cobalt exploration expenditure rose 5% to \$282 million in 2023.

Nickel sales from Western Australia

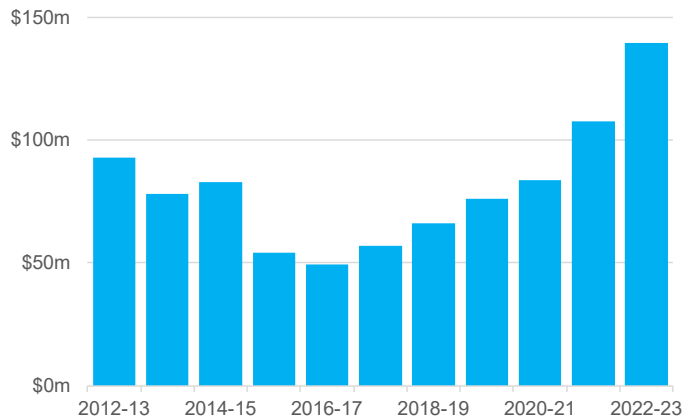


Kt = Thousand tonnes.
Source: WA Department of Mines, Industry Regulation and Safety, Resource Data Files (Bi-Annual).

- Nickel produced in Western Australia is mainly used in battery manufacturing. For example, over 85% of Nickel West's nickel production is sold to battery material suppliers.
- The quantity of Western Australia's nickel sales rose 9% to 160,000 tonnes in 2022-23.
- The value of Western Australia's nickel sales rose 19% to \$5.7 billion in 2022-23.
- China is Western Australia's largest market for nickel exports, accounting for 47% of the State's nickel exports in 2022-23. Other major nickel export markets in 2022-23 included Japan (13%) and South Korea (12%).



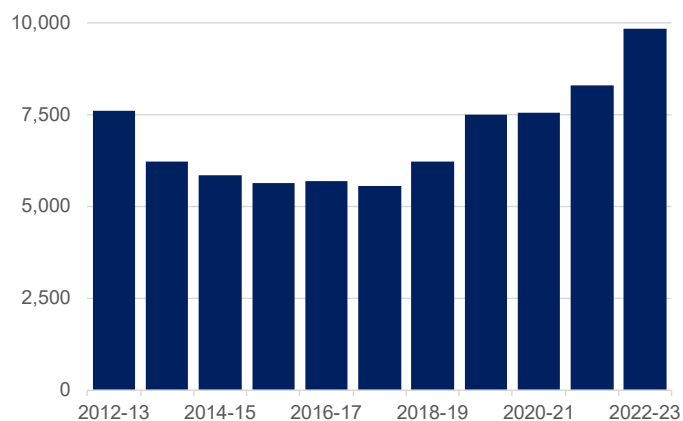
Nickel royalty revenue in Western Australia



Source: WA Department of Mines, Industry Regulation and Safety, Resource Data Files (Bi-Annual).

- Western Australia has a 2.5% royalty rate on the value of nickel sold.
- Western Australia's nickel industry is receiving support through the WA Government's Nickel Financial Assistance Program, which provides a 50% rebate on royalties paid on nickel sales each quarter between March 2024 to June 2025. The rebate will be provided if the average price of nickel in concentrate is below US\$20,000 a tonne for a given quarter.
- Nickel accounted for 1.1% of Western Australia's royalty revenue (including North West Shelf grants) in 2022-23.
- Nickel royalties in Western Australia rose 30% to \$140 million in 2022-23.

Nickel employment in Western Australia¹



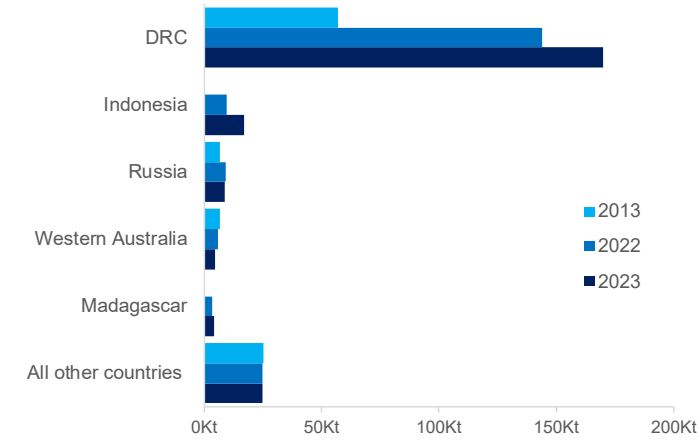
¹ Direct employment. Full-time equivalent (average on site).
Source: WA Department of Mines, Industry Regulation and Safety, Resource Data Files (Bi-Annual).

- Direct full-time equivalent employment in Western Australia's nickel industry rose 19% to 9,839 in 2022-23.
- Western Australia's largest employing nickel mines and processing sites in 2022-23 were:
 - Murrin Murrin (1,642)
 - Mt Keith (1,038)
 - Ravensthorpe (903).



Cobalt

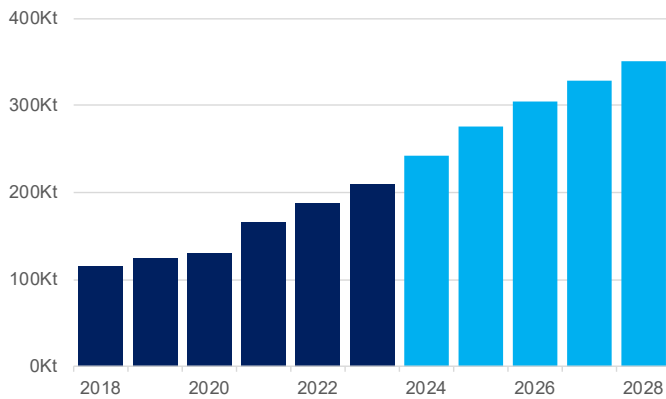
Cobalt supply¹



Kt = Thousand tonnes. ¹ Cobalt content from mine production.
Source: US Geological Survey, Mineral Commodity Summaries (Annual).

- Western Australia is the 4th largest cobalt supplier in the world, despite accounting for only 2% of global supply in 2023.
- The Democratic Republic of Congo (DRC) is by far the largest cobalt supplier in the world, accounting for 74% of global supply in 2023.
- Western Australia accounted for 100% of Australia's cobalt production in 2023.
- Global cobalt supply rose 138% to 230,000 tonnes between 2013 and 2023, mainly driven by increased supply from the DRC.
- In 2023, cobalt supply from:
 - the DRC rose 18% to 170,000 tonnes
 - Indonesia rose 77% to 17,000 tonnes
 - Russia fell 4% to 8,800 tonnes
 - Western Australia fell 21% to 4,600 tonnes
 - Madagascar rose 14% to 4,000 tonnes.

Cobalt consumption



Source: S&P Global Market Intelligence – Battery Materials Summary (Quarter).

- Cobalt is mainly used in rechargeable battery electrodes, as well as superalloys to make gas turbine blades and aircraft engines. Over 80% of the world's consumption of cobalt is for manufacturing rechargeable batteries.
- World cobalt consumption rose 12% to 209,000 tonnes in 2023.
- S&P Global Market Intelligence forecasts world cobalt consumption will rise 68% to 351,000 tonnes between 2023 and 2028.

Cobalt prices¹

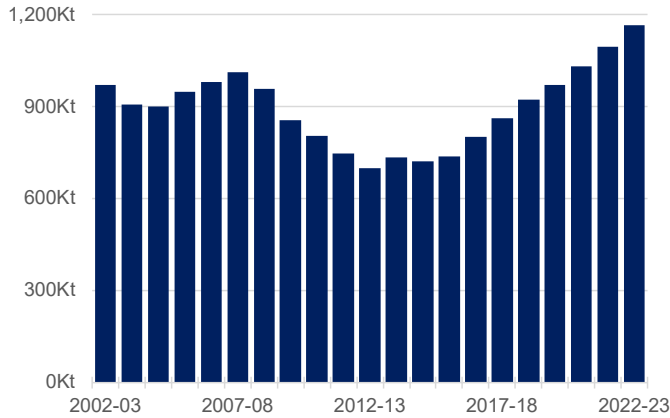


¹ US dollars a tonne. London Metal Exchange (LME) Cash.
Source: S&P Global Market Intelligence/Thomson Reuters (Month).

- Cobalt prices declined sharply in the first half of 2023 as the demand for cobalt from China's passenger plug-in electric vehicle market weakened. However, cobalt prices have stabilised somewhat in recent months due to increased demand for cobalt-contained batteries.
- The monthly average cobalt price fell 2% to US\$28,202 a tonne in February 2024.
- The annual average cobalt price fell 46% to US\$33,924 a tonne in 2023.
- S&P Global Market Intelligence forecasts the annual average price of cobalt will be US\$35,324 a tonne in 2024 and US\$38,389 a tonne in 2025.



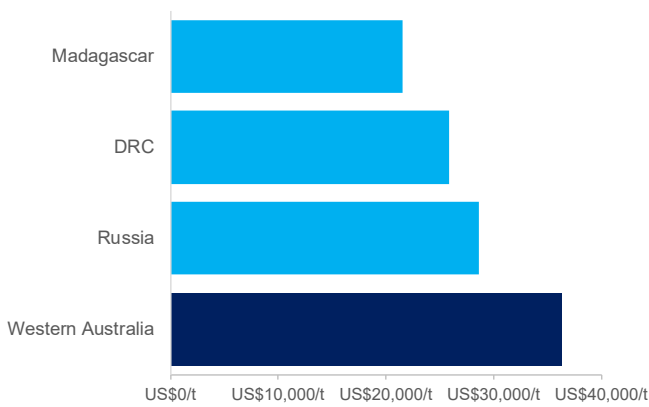
Cobalt resources in Western Australia¹



Kt = Thousand tonnes. ¹ Estimated based on 67% of Australia's identified cobalt resources.
Source: Based on data from ABS 5204.0 Australian System of National Accounts (Annual), Geoscience Australia, Australia's Identified Mineral Resources (Annual); and WA Department of Jobs, Tourism, Science and Innovation.

- Western Australia has large cobalt reserves, accounting for 11% of the world's cobalt reserves in 2023.
- The DRC has the largest cobalt reserves, accounting for 57% of the world's cobalt reserves in 2023.
- Western Australia's estimated economic demonstrated cobalt resource has increased steadily over the past decade.
- In 2022-23, Western Australia's estimated economic demonstrated cobalt resource rose 7% to 1.2 million tonnes. This resource could sustain the State's cobalt production for 238 years at 2022-23 production rates.

Cobalt production costs per unit¹: 2023

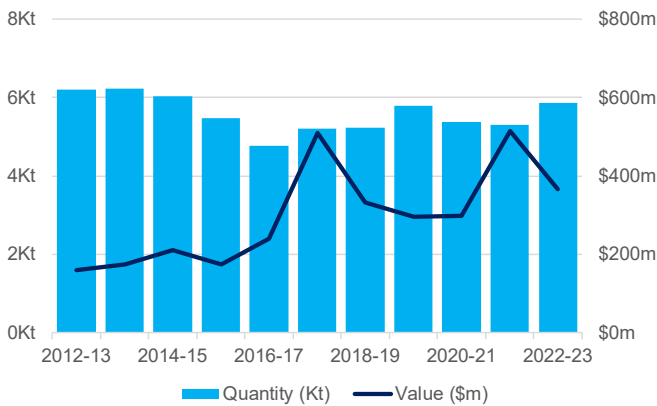


Note - Data covers 85% of 2023 global recovered cobalt production. The chart includes 4 of the top 5 global producers (there is no data available for Indonesia).

¹ Total cash costs per tonne of paid cobalt production in US dollars on a co-product or shared cost basis.
Source: S&P Global Market Intelligence (Annual).

- Western Australia's cobalt producers are among the world's highest-cost producers, mainly due to relatively high costs for labour, chemicals and onsite services.
- The average total cash cost of Western Australia's cobalt production was US\$36,352 a tonne in 2023, above the world average of US\$27,769 a tonne.
- Western Australia's close proximity to major cobalt markets in Asia reduces shipping costs relative to some of its competitors. The average cost of seaborne shipment for Western Australian cobalt producers is lower than the world average.

Cobalt sales from Western Australia



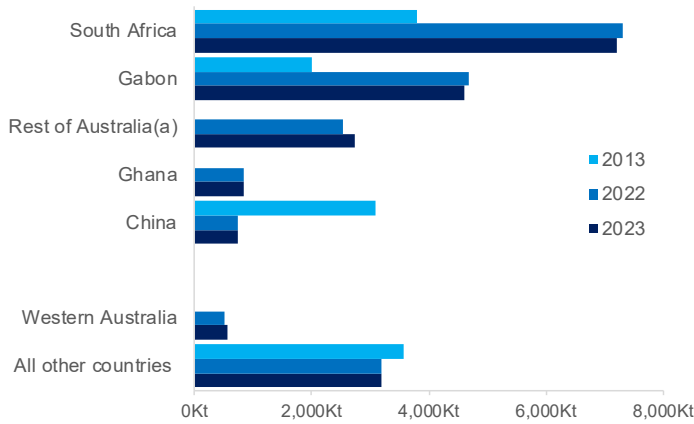
Kt = Thousand tonnes.
Source: WA Department of Mines, Industry Regulation and Safety, Resource Data Files (Bi-Annual).

- Western Australia's cobalt production mainly comes from the State's major nickel mines.
- In 2023, Murrin Murrin accounted for 67% of Western Australia's paid cobalt mine production, followed by Ravensthorpe (12%) and Nova-Bollinger (9%).
- The quantity of Western Australia's cobalt sales rose 10% to 6,000 tonnes in 2022-23.
- The value of Western Australia's cobalt sales fell 28% to \$368 million in 2022-23.
- Mt Thirsty is a major cobalt deposit proposed for development in Western Australia, which could produce 19,000 tonnes of cobalt a year and 25,000 tonnes of nickel a year if developed.



Manganese

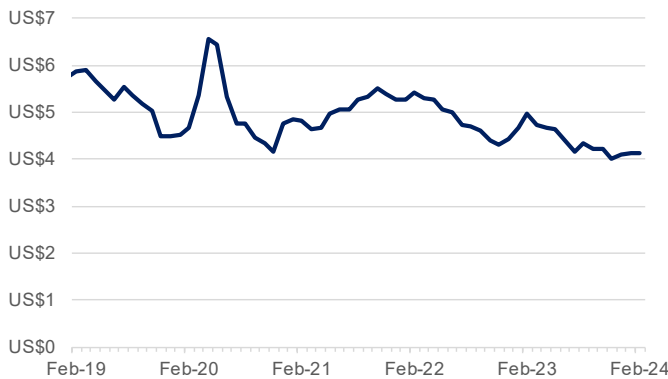
Manganese supply¹



Kt = Thousand tonnes. ¹ Manganese content from mine production. (a) Northern Territory.
Source: US Geological Survey, Mineral Commodity Summaries (Annual).

- Western Australia is the 9th largest manganese supplier in the world, accounting for 2% of global supply in 2023.
- South Africa is the largest manganese supplier in the world, accounting for 31% of global supply in 2023.
- Western Australia accounted for 17% of Australia's manganese production in 2023.
- Global manganese supply rose 18% to 20 million tonnes between 2013 and 2023, mainly driven by increased supply from South Africa and Gabon.
- In 2023, manganese supply from:
 - South Africa fell 1% to 7.2 million tonnes
 - Gabon fell 1% to 4.6 million tonnes
 - Western Australia rose 9% to 554,000 tonnes.

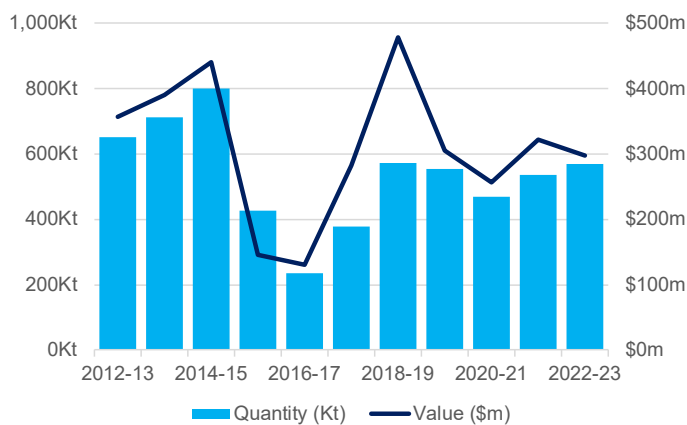
Manganese prices¹



¹ US dollars a dry tonne. Minimum 32% manganese and 20% iron content, Tianjin (China)-South Africa.
Source: S&P Global Market Intelligence/Thomson Reuters (Month).

- Manganese is mostly used in steel production. There is increasing demand for manganese from the battery manufacturing industry as electrolytic manganese dioxide and electrolytic manganese metal are used in the production of rechargeable electric vehicle batteries.
- The monthly average manganese price rose 0.4% to US\$4.1 a tonne in February 2024.
- The annual average manganese price fell 9% to US\$4.4 a tonne in 2023.

Manganese sales from Western Australia



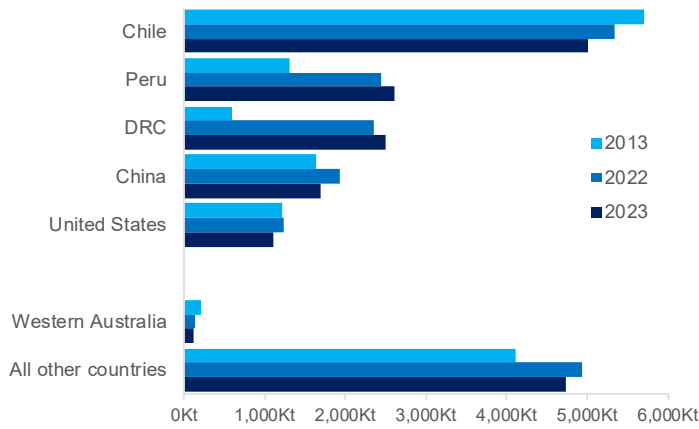
Kt = Thousand tonnes. Note – Values in some years are estimated using average unit prices.
Source: WA Department of Mines, Industry Regulation and Safety, Resource Data Files (Bi-Annual) and WA Department of Jobs, Tourism, Science and Innovation.

- Western Australia's manganese production comes from the Woodie Woodie and Butcherbird mines.
- Woodie Woodie returned to full-scale production in October 2017, after being put on care and maintenance in February 2016.
- Butcherbird started operating in 2021 at a capacity of 365,000 tonnes a year. Production capacity was expanded to 1 million tonnes a year in 2022.
- In 2022-23, the quantity of Western Australia's manganese sales rose 6% to 568,000 tonnes.
- The value of Western Australia's manganese sales fell 8% to \$298 million in 2022-23.
- Direct full-time equivalent employment in Western Australia's manganese industry rose 10% to 625 in 2022-23, with 561 workers employed at the Woodie Woodie mine and 64 workers employed at the Butcherbird mine.



Copper

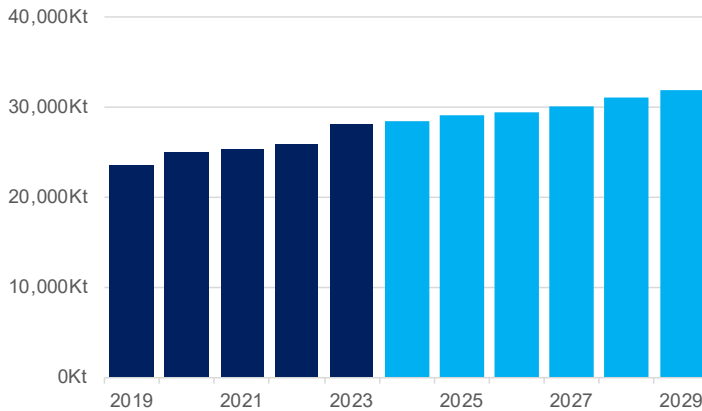
Copper supply¹



Kt = Thousand tonnes. ¹ Copper content from mine production. (a) Mainly South Australia, New South Wales and Queensland. Source: US Geological Survey, Mineral Commodity Summaries (Annual).

- Western Australia is not a major global copper supplier, ranking as the 14th largest global supplier in 2023.
- Chile is the largest copper supplier in the world, accounting for 23% of global supply in 2023.
- Western Australia accounted for 17% of Australia's copper production in 2023.
- Global copper supply rose 23% to 22 million tonnes between 2013 and 2023, mainly driven by increased supply from the DRC.
- In 2023, copper supply from:
 - Chile fell 6% to 5.0 million tonnes
 - Peru rose 6% to 2.6 million tonnes
 - DRC rose 6% to 2.5 million tonnes
 - China fell 12% to 1.7 million tonnes
 - United States fell 11% to 1.1 million tonnes
 - Western Australia fell 19% to 114,000 tonnes.

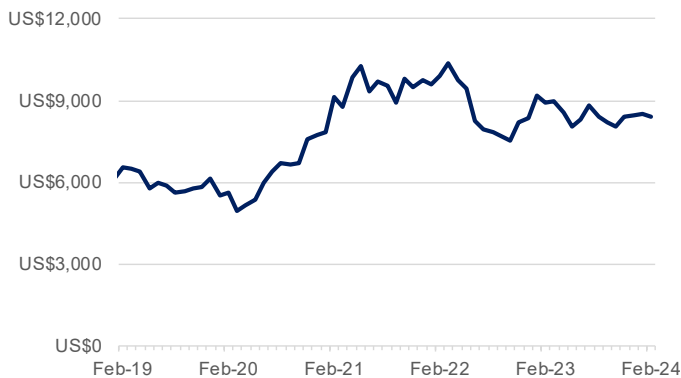
Copper consumption



Kt = Thousand tonnes. Source: Office of the Chief Economist, Resources and Energy Quarterly (Quarter).

- Copper is used in building construction, power generation and transmission, electronic product manufacturing and in the production of industrial machinery and transport vehicles. Building and infrastructure construction accounts for 45% of the world's consumption of copper, with 31% of copper consumed in equipment manufacturing, 12% in transport vehicles and 12% used for industrial uses.
- Electric vehicle motors, batteries and charging infrastructure require significant amounts of copper. Electric vehicles require five times more copper than vehicles with internal combustion engines.
- World copper consumption rose 8% to 28 million tonnes in 2023.
- The Office of the Chief Economist forecasts world copper consumption will rise 14% to 31.9 million tonnes between 2023 and 2029.

Copper prices¹

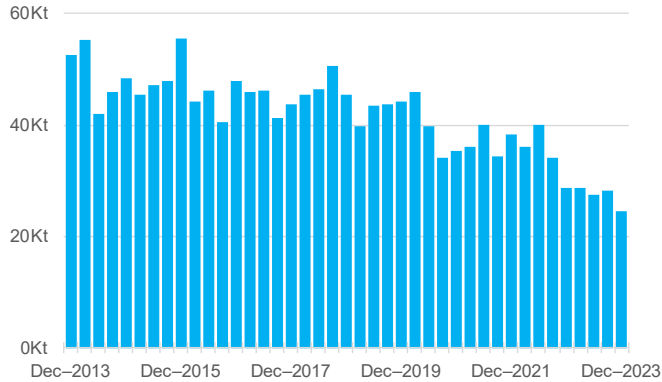


¹ US dollars a tonne. London Metal Exchange (LME) Grade A Cash. Source: S&P Global Market Intelligence/Thomson Reuters (Month).

- Copper prices fell 1% in February 2024, declining for the first time following consecutive rises over the previous three months.
- The monthly average copper price fell 1% to US\$8,402 a tonne in February 2024.
- The annual average copper price fell 2% to US\$8,535 a tonne in 2023.
- The Office of the Chief Economist forecasts the annual average price of copper will be US\$8,340 a tonne in 2024 and increasing to US\$8,827 a tonne in 2025.



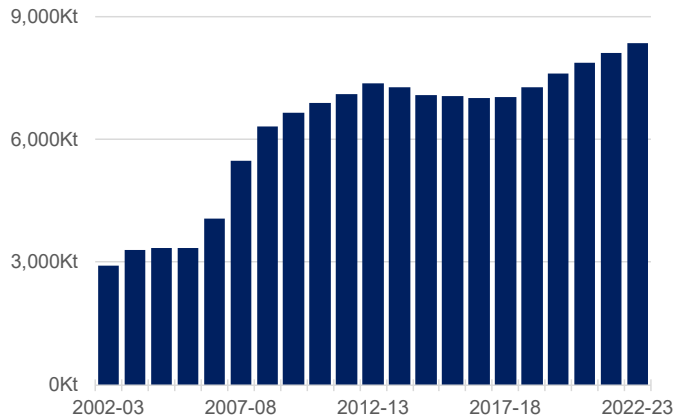
Copper production¹ from Western Australia



Kt = Thousand tonnes. ¹ Copper content from mine production.
Source: Office of the Chief Economist, Resources and Energy Quarterly (Quarter).

- Western Australia's copper production mainly comes from 2029 mines that also produce gold or nickel.
- Boddington is Western Australia's largest copper mine, accounting for 44% of the State's copper production in 2023, followed by Telfer (18%) and Golden Grove (17%).
- Western Australia produced 24,618 tonnes of copper in the December quarter 2023, 13% less than in the previous quarter.

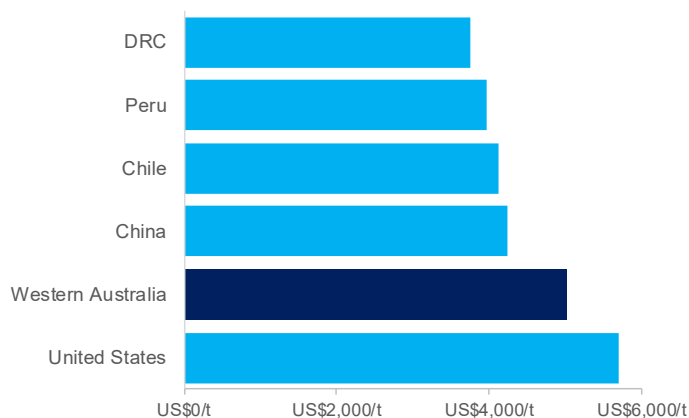
Copper resources in Western Australia¹



Kt = Thousand tonnes. ¹ Estimated based on 8% of Australia's identified copper resources.
Source: Based on data from ABS 5204.0 Australian System of National Accounts (Annual), Geoscience Australia, Australia's Identified Mineral Resources (Annual); and WA Department of Jobs, Tourism, Science and Innovation.

- Western Australia accounted for 0.8% of the world's copper reserves in 2023.
- Chile has the largest copper reserves, accounting for 19% of the world's copper reserves in 2023.
- Western Australia's estimated economic demonstrated copper resource has increased steadily over the past 5 years.
- In 2022-23, Western Australia's estimated economic demonstrated copper resource rose 3% to 8.3 million tonnes. This resource could sustain the State's copper production for 72 years at 2022-23 production rates.
- The value of Western Australia's copper exploration expenditure fell 4% to \$186 million in 2023.

Copper production costs per unit¹: 2023

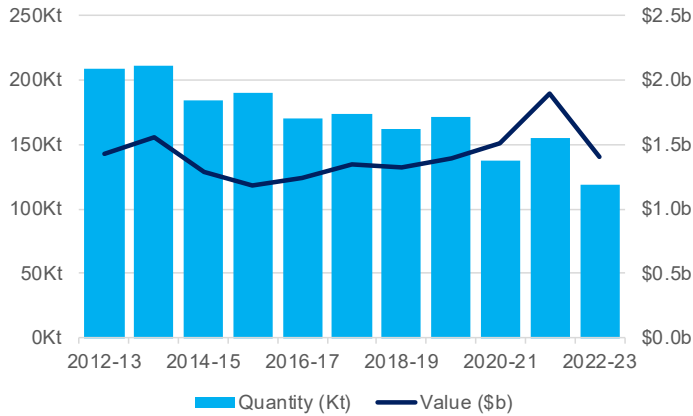


Note – Data covers 87% of 2023 global recovered copper production. The chart includes the top 5 global producers and Western Australia.
¹ Total cash costs per tonne of paid copper production in US dollars on a co-product or shared cost basis.
Source: S&P Global Market Intelligence (Annual).

- Western Australia's copper producers are reasonably cost-competitive against other global producers. Western Australia's copper production has relatively low costs for chemicals, royalties and energy, but relatively high costs for onsite services and labour.
- The average total cash cost of Western Australia's copper production was US\$5,018 a tonne in 2023, above the world average of US\$4,280 a tonne.



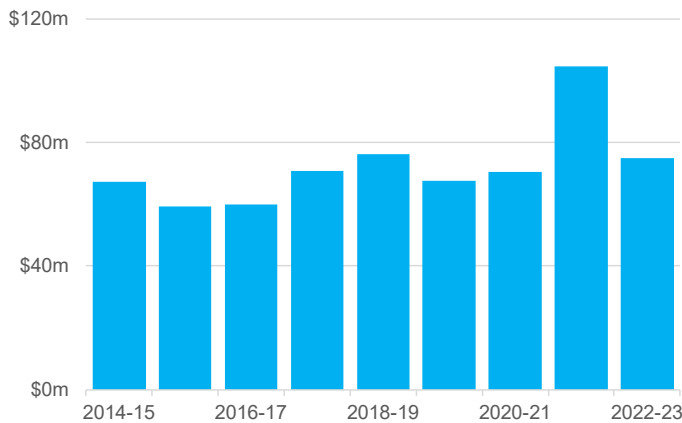
Copper sales from Western Australia



Kt = Thousand tonnes.
Source: WA Department of Mines, Industry Regulation and Safety, Resource Data Files (Bi-Annual).

- Copper produced in Western Australia is exported mainly as concentrates for further refining in overseas facilities.
- The Philippines is Western Australia's largest market for copper, accounting for 22% of the State's copper exports in 2022-23. Other major copper export markets in 2022-23 were South Korea (21%) and Japan (15%). China was the State's largest market for copper prior to imposing import restrictions on Australian copper in 2020.
- The quantity of Western Australia's copper sales fell 23% to 119,000 tonnes in 2022-23.
- The value of Western Australia's copper sales fell 26% to \$1.4 billion in 2022-23.
- The West Musgrave copper/nickel project was sanctioned for development in September 2022. BHP has slowed construction work on the project due to market conditions. The project was aiming to produce 35,000 tonnes of copper concentrate a year and 28,000 tonnes of nickel concentrate a year, starting in the second half of 2025.
- Western Australia has several proposed copper projects that if developed would add around 60,000 tonnes of annual copper production from 2026. Proposed projects include Caravel, Winu and Sulphur Springs.

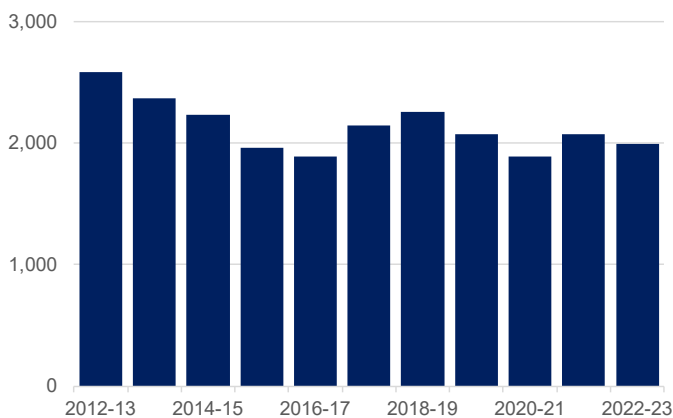
Copper¹ royalty revenue in Western Australia



¹ Includes lead and zinc.
Source: WA Department of Mines, Industry Regulation and Safety, Resource Data Files (Bi-Annual).

- Western Australia has a 5% royalty rate on the value of copper sold as concentrate.
- Copper accounted for 0.6% of Western Australia's royalty revenue (including North West Shelf grants) in 2022-23.
- Copper royalties in Western Australia fell 28% to \$75 million in 2022-23.

Copper employment in Western Australia¹



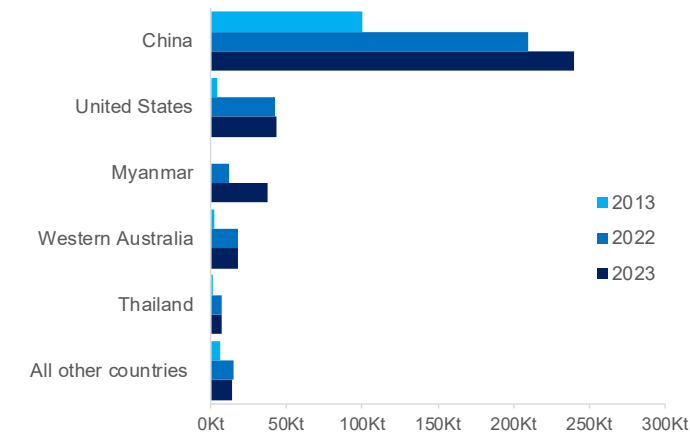
¹ Direct employment. Full-time equivalent (average on site).
Source: WA Department of Mines, Industry Regulation and Safety, Resource Data Files (Bi-Annual).

- Direct full-time equivalent employment in Western Australia's copper industry fell 4% to 1,994 in 2022-23.
- Western Australia's largest employing copper mine sites in 2022-23 were:
 - Golden Grove (945)
 - DeGrussa (354)
 - Jaguar (320).



Rare earths

Rare earths supply¹



Kt = Thousand tonnes. ¹ Rare earth oxide equivalent content from mine production.
Source: US Geological Survey, Mineral Commodity Summaries (Annual).

- Western Australia is the 4th largest rare earths supplier in the world, accounting for 5% of global supply in 2023.
- China is the largest rare earths supplier in the world, accounting for 65% of global supply in 2023.
- Western Australia accounted for 100% of Australia's rare earths production in 2023.
- Global rare earths supply more than tripled to 350,000 tonnes between 2013 and 2023, mainly driven by increased supply from China.
- In 2023, rare earths supply from:
 - China rose 14% to 240,000 tonnes
 - United States rose 2% to 43,000 tonnes
 - Myanmar rose from 12,000 tonnes to 38,000 tonnes
 - Western Australia was steady at 18,000 tonnes
 - Thailand was steady at 7,000 tonnes.

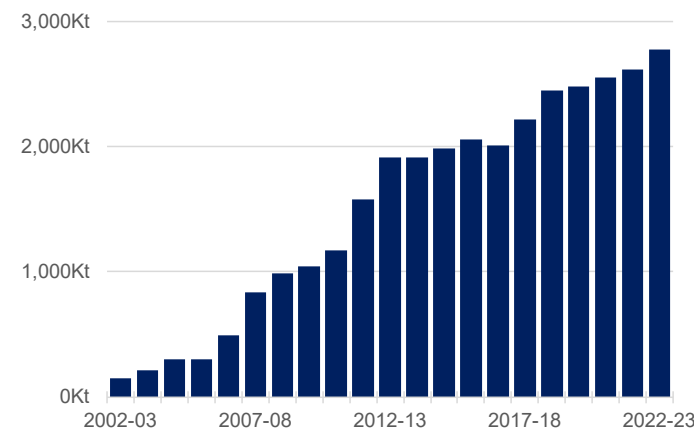
Neodymium prices¹



¹ US dollars a tonne.
Source: WA Department of Jobs, Tourism, Science and Innovation based on data from Trading Economics.

- Rare earths are used in high-tech consumer products and defence applications.
 - Neodymium is used in electric vehicle motor magnets and wind turbines.
 - Praseodymium is used in aircraft engines.
 - Cerium is used in catalytic converters for cars.
 - Lanthanum is used in lenses for cameras and telescopes.
- The monthly average neodymium price fell 6% to US\$66,014 a tonne in February 2024, as global supply constraints eased.
- The annual average neodymium price fell 43% to US\$92,912 a tonne in 2023.

Rare earths resources in Western Australia¹

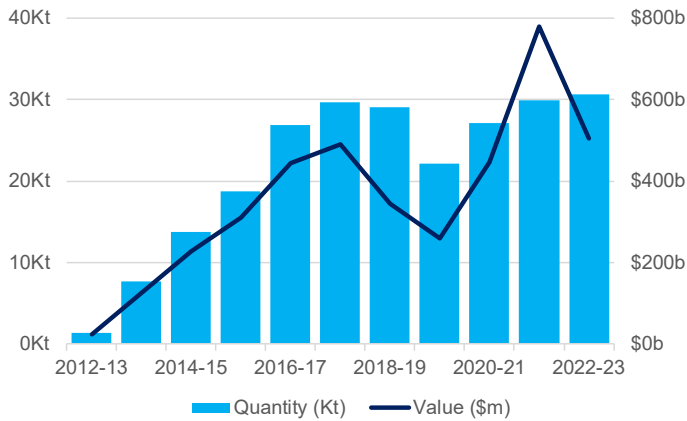


Kt = Thousand tonnes. ¹ Estimated based on 60% of Australia's identified rare earths resources.
Source: Based on data from ABS 5204.0 Australian System of National Accounts (Annual), Geoscience Australia, Australia's Identified Mineral Resources (Annual); and WA Department of Jobs, Tourism, Science and Innovation.

- Western Australia's rare earths reserves accounted for 3.5% of the world's rare earths reserves in 2023.
- China has the largest rare earths reserves, accounting for 45% of the world's rare earths reserves in 2023.
- Western Australia's estimated economic demonstrated rare earths resource has increased significantly over the past 6 years.
- In 2022-23, Western Australia's estimated economic demonstrated rare earths resource rose 6% to 2.8 million tonnes. This resource could sustain the State's rare earths production for 100 years at 2022-23 production rates.



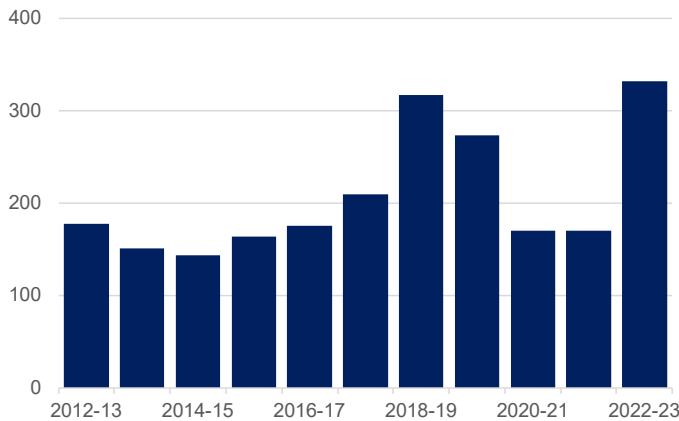
Rare earths sales from Western Australia



Kt = Thousand tonnes. Note – Values in some years are estimated using average unit prices.
Source: WA Department of Mines, Industry Regulation and Safety, Resource Data Files (Bi-Annual) and WA Department of Jobs, Tourism, Science and Innovation.

- Western Australia's rare earths production mainly comes from the Mt Weld mine.
- In 2022-23, the quantity of Western Australia's rare earths sales rose 2% to 31,000 tonnes.
- The value of Western Australia's rare earths sales fell 35% to \$505 million in 2022-23.
- The production capacity of the Mt Weld mine is being expanded by 12,000 tonnes of neodymium praseodymium equivalent a year by 2025.
- A rare earths processing plant is being constructed in Kalgoorlie to process rare earths concentrate from the Mt Weld mine. The plant will produce 38,000 tonnes of rare earths carbonate a year by 2025.
- In April 2022, the Eneabba rare earths refinery was sanctioned for development, after receiving a \$1.25 billion loan from the Australian Government. Construction of the 20,000 tonnes a year facility started in 2022 with first production expected in 2025.
- Early construction works started on the Yangibana rare earths project in 2022. The project is targeting first production in late 2024 (15,000 tonnes a year).
- The Browns Range Stage 2 project is another proposed rare earths development in Western Australia (3,000 tonnes a year). The Browns Range pilot plant operated between 2018 and 2021.

Rare earths employment in Western Australia¹



¹ Direct employment. Full-time equivalent (average on site).
Source: WA Department of Mines, Industry Regulation and Safety, Resource Data Files (Bi-Annual).

- Direct full-time equivalent employment in Western Australia's rare earths industry rose 95% to 332 in 2022-23.
- Western Australia's largest employing rare earths mine and processing sites in 2022-23 were:
 - Mt Weld (196).
 - Kalgoorlie Processing Plant (100).
 - Browns Range (36).