29 Cu 63.546 Copper

Major Australian copper deposits (Mt)

Copper facts

- The average home contains **180 kg of copper**
- 80% of copper ever produced **is still in use today**
- An electric car contains about **5x more copper** than an equivalent ICE car
- China consumes half of the **world's copper**

World consumption

- **31%** Equipment
- **30%** Building Construction
- **15%** Infrastructure
- **12%** Transport
- **12%** Industrial

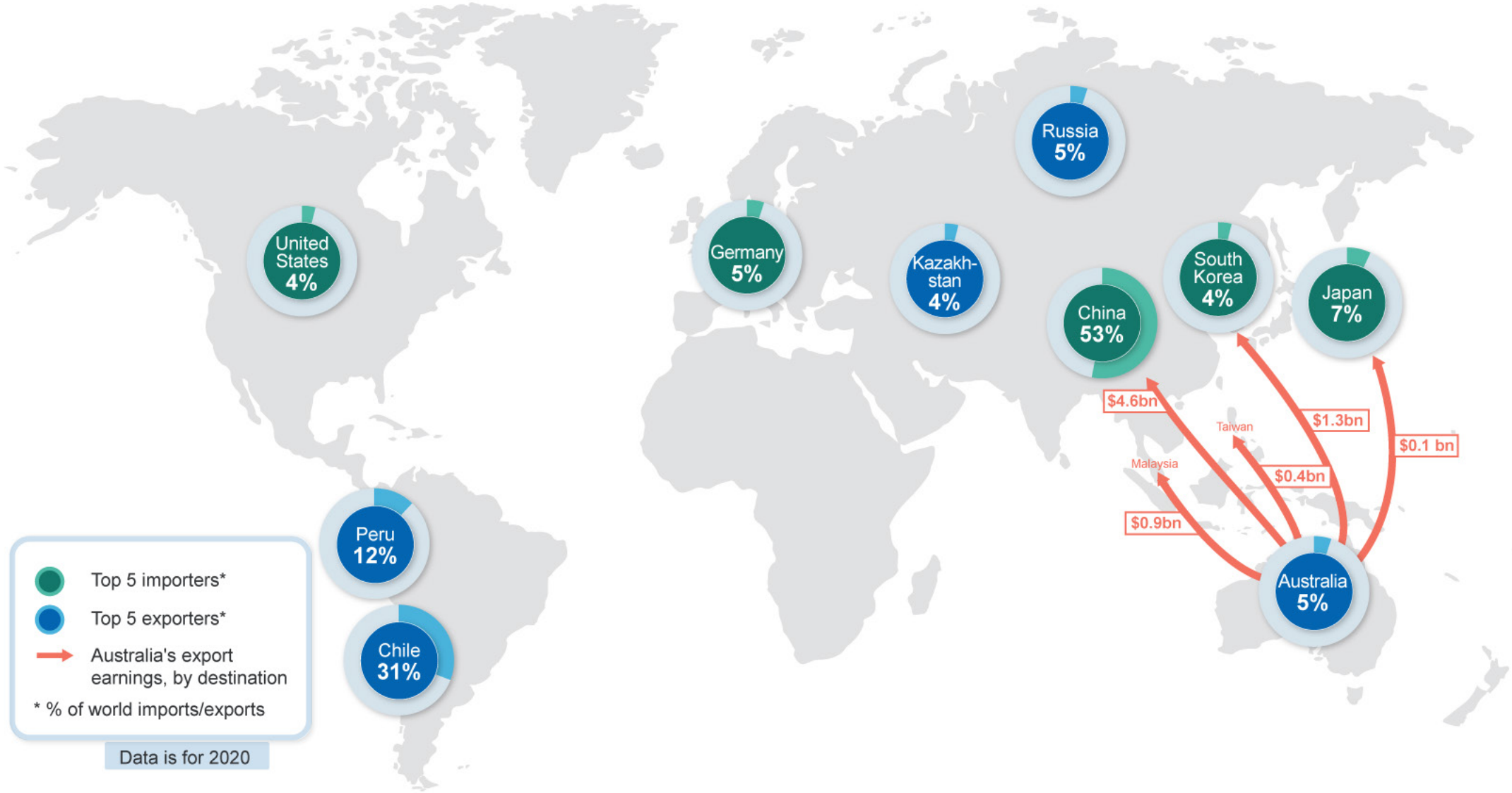
Australia's copper

- **Ranked no 2** for **copper resources**
- **6th largest mined copper producer** in the world
- **Copper exports** worth more than **$11 billion** in 2021

29 Cu 63.546

Copper

Trade map | March 2022



12.1 Summary

- Copper prices increased 51% to US$9,300 in 2021 as global industrial activity recovered from COVID-19. Prices are expected to ease slightly as mine production comes online over the outlook period, stabilising at around US$8,000 a tonne (in real terms) in 2027.
- Australia's copper exports are projected to fall to 834,000 tonnes in 2021–22 as scheduled maintenance is completed. Copper exports are expected to grow to over 1 million tonnes in 2026–27 as high copper prices incentivise production from new mines and mine expansions (see *Australia section*).
- As prices and output grow, Australia's copper export earnings are projected to lift from $11.8 billion in 2020–21 to $13.8 billion (in real terms) in 2026–27, up an average 2.6% a year.

12.2 World consumption

China looks set to pick up after the Winter Olympics

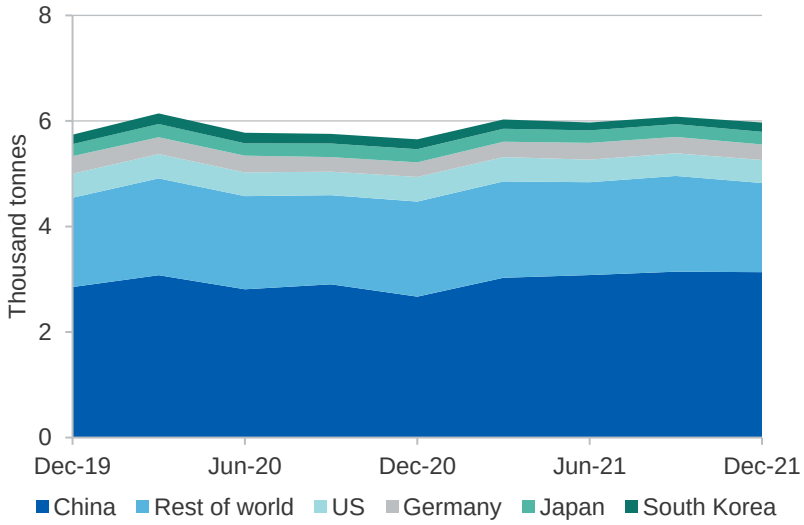
China accounted for more than half of global refined copper consumption in 2021 (Figure 12.1). However, Chinese consumption slowed towards the end of 2021, as episodes of power rationing and uncertainty in the property market softened industrial production, a key consumption industry for copper.

Industrial production remained similarly soft early in the March quarter 2022, due to the Lunar New Year holiday and Beijing Winter Olympic Games. The Caixin Manufacturing PMI fell to a 23-month low of 49.1 in January, indicating manufacturing activity contracted during the month. While PMIs rose in February — a sign that activity is picking up — recent COVID-19 outbreaks in eastern China remain a downside risk for the first half of 2022.

As a result of weak refined copper consumption in the second half of 2021, growth in consumption has been downgraded to 1.4% for 2021 (from 3.7% in the December 2021 *Resource and Energy Quarterly*). Consumption is estimated to grow by 2.5% in 2022, to reach almost 26 million tonnes.

That said, headwinds are starting to emerge. The US Federal Reserve and other central banks are expected to raise interest rates on several occasions in 2022, in response to inflation hitting 40-year highs. In addition, the Russian invasion of Ukraine is creating high levels of uncertainty in Western markets, which, over time may lead to impacts for industrial production and global copper demand.

Figure 12.1: Outlook for refined copper consumption



Source: World Bureau of Metal Statistics (2022); Department of Industry, Science, Energy and Resources (2022)

Energy transition and growing applications to support consumption

The global energy transition towards low emissions technologies is expected to positively impact copper consumption over the outlook period. Copper's conductivity, malleability and durability, make it vital to electric vehicles (EVs), batteries and renewable energy generation. Expanding EV charging networks and improving transmission infrastructure will also support consumption.

Copper used in EVs, batteries and chargers could account for as much as 10% of world refined consumption by 2030.

Demand for EVs — which contain up to five times more copper than conventional cars — has continued to exceed expectations. Infrastructure such as charging stations and improved transmission lines will be needed to support this growing trend.

While EVs and other energy economy technologies will increase their share of total refined copper consumption, traditional copper applications will still account for the majority of consumption. China remains the largest source of consumption risk, given it has the lion's share of copper consumption. If China's rapid industrial growth levels out, consumption growth will be heavily affected.

Government policies to support long-term copper consumption

Implementation of new Government policies should support future global copper consumption. China's 14th Five Year Plan includes increased investment in high speed rail, telecommunications, and electrification of transport and renewable energy, all of which would result in greater copper use.

The EU is also pushing ahead with its de-carbonisation plans which will support copper consumption. In the US, the Biden administration has signalled an intention to increase EV usage, wind generation capacity and investment in charging infrastructure. However, these intentions may face headwinds trying to pass legislation.

Refined copper consumption is expected to grow at an average annual rate of 1.7% to reach 28 million tonnes in 2027. Most of this growth is weighted towards the first half of the outlook period, however there is potential for growth to be upgraded towards the second half of the outlook if nations bring plans to de-carbonise forward.

12.3 World production

Uncertainty around Chile and Peru production

Mine production in Peru continues to improve quarter-on-quarter, with output growth of 4.0% in the December quarter 2021. However, protest activities at MMG's Las Bambas mine are an ongoing risk. While the blockade referenced in the December 2021 REQ was lifted, a new and ongoing blockade of the road used by MMG has forced production to cease on February 20 2022. Even accounting for mine disruptions, significant growth in mine production is expected from Peru through to 2023.

Chilean production improved by 5.4% in the December quarter 2021, after falling by 2.5% in the September quarter 2021. Production at BHP's Escondida mine continues to decline quarter-on-quarter due to lower feed grade. Brazilian production declined 14% in the December quarter.

Mine production to increase, taking some heat off prices

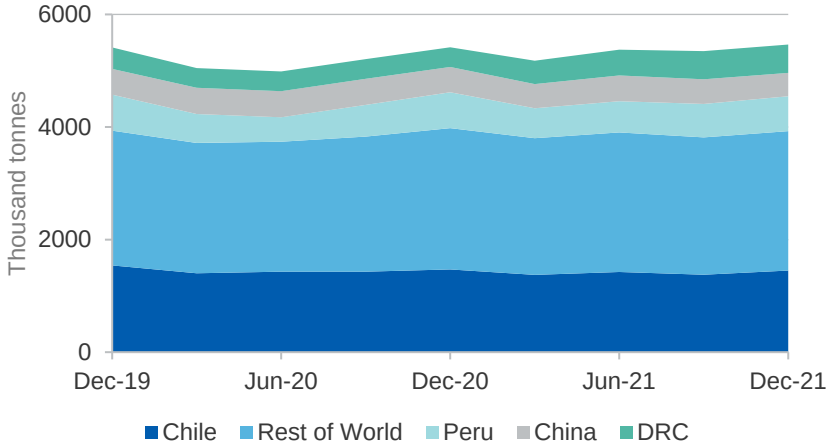
Global mine production is forecast to reach 23 million tonnes in 2022, up from 21 million tonnes in 2021 (Figure 12.2). Current high prices — a reflection of market tightness — and expectations of future demand growth, are creating strong incentives for development projects.

Over the outlook period, significant gains in production are expected to come from Peru and Chile, though both countries face some short-term issues in bringing product to export markets. Significant investment in capacity in Indonesia is also expected to boost world production growth over the outlook period.

The Kamoa-Kakula copper project in the in Democratic Republic of Congo is expected to increase the combined capacity of its two concentrators by 21%, in an attempt to reduce bottlenecks. Once these upgrades are complete, it will be the fourth-largest copper producer globally, processing 9.2 million tonnes per year. A third concentrator is expected to be commissioned in the fourth quarter of 2024. Other major copper projects set to start production in 2022 include Quellaveco (Peru), Spence-SGO (Chile), Quebrada Blanca QB2 (Chile) and Udokan (Russia).

Long project development timelines are always a risk to copper mine production forecasts. World mine production is projected to continue growing at an average rate of 3.3% to 2027, to reach almost 26 million tonnes. Mine production is expected to face headwinds at the end of the outlook period, driven by deteriorating reserves and resources, and environmental and social responsibility issues. The prices of co-products — such as cobalt — will play an important role in decisions regarding expansion or operation restarts.

Figure 12.2: Outlook for mined copper production



Source: World Bureau of Metal Statistics (2022); Department of Industry, Science, Energy and Resources (2022)

Strong momentum in refined production growth

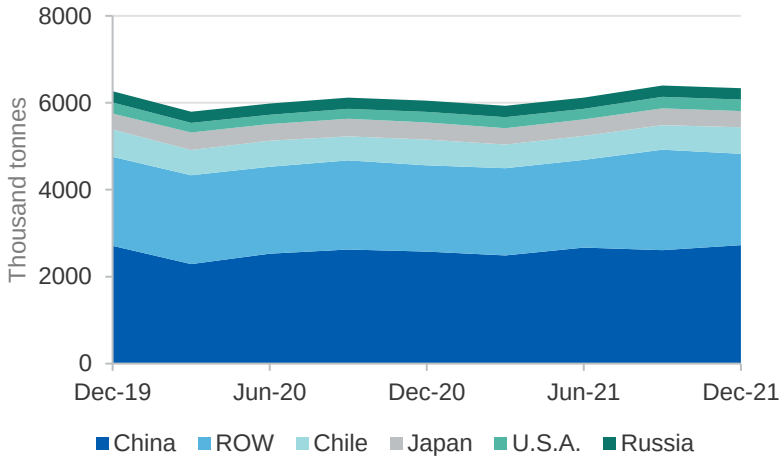
After growing by 2.8% in 2020, refined copper production has grown by 4.4% in 2021 to 25 million tonnes (Figure 12.3), as new Chinese refining capacity comes online and high prices encourage increased processing. Refined production is expected to grow by 4.1% to 26 million tonnes in 2022. This is expected to exceed copper consumption and thus stabilise inventories, in turn reducing some of the upward price pressure in the global copper market.

Chinese copper production fared well through episodes of power rationing in the second half of 2021, mainly due to its relatively low energy intensity and its importance in low emissions technology. Monthly refined production in December 2021 was 961,000 tonnes, exceeding the pre-pandemic record set in December 2019.

Refinery production is projected to increase at an average 2.2% over the outlook period, to 29 million tonnes in 2027. New refinery capacity is expected to come online in China, Peru, Russia and Indonesia. Refined copper production faces expansion challenges, concentrate and electricity cost pressures, increasingly tight emission and sulphur capture limits, as well as generally tighter approval processes.

The Russian invasion of Ukraine is not expected to have a large effect on world refined copper production. Russia typically accounts for 4.0% of the global refined market, with most of this exported to China and Europe. Any material traditionally exported to Europe could be absorbed by China in the event of sanctions.

Figure 12.3: Outlook for refined copper production



Source: World Bureau of Metal Statistics (2022); Department of Industry, Science, Energy and Resources (2022)

12.4 Prices

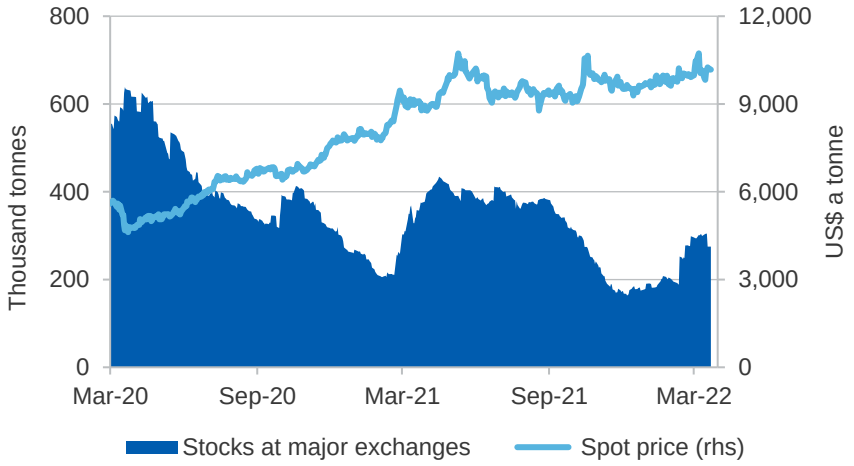
Copper price remains high despite Chinese stockpiling

2021 was a strong year for copper prices, with LME copper averaging around $9,300 a tonne — an increase of 51% year-on-year. In October 2021, prices rose from US$9,100 a tonne to US$10,600 in just 3 weeks (Figure 12.4).

Meanwhile, disruptions to industrial production in China — due to the Winter Olympics and Lunar New Year festivities, and a resurgence of COVID-19 cases — saw Chinese copper consumption soften. This led to a spike in Shanghai Futures Exchange warehouse stockpiles, which have quadrupled since the start of 2022.

Despite this, copper prices have remained stubbornly high, averaging just shy of US$10,000 in the March quarter 2022 (Figure 12.4). Logistics challenges remain present, with higher shipping costs and longer transit times reducing the ability of increasing supply to moderate prices. Prices are expected to moderate over the year and dip to around US$9,400 by the December quarter, to average $9,700 over the year.

Figure 12.4: Copper exchange inventories and spot price



Source: LME (2022) official cash price; Bloomberg (2022)

Prices are expected to average around US$8,900 in 2023. Further over the outlook period, prices are expected to moderate, as new supply comes online and pushes the market into surplus. High prices may incentivise supply to come online sooner, or for marginal projects to be pushed through — which would see downward pressures on the copper price — though higher labour costs may present challenges.

The spot price is projected to reach US$8,000 a tonne (in real terms) by 2027, as the price of copper softens. These price projections are sensitive to the balance in world copper markets, which will be affected by the pace of world economic growth, and the pace of low-emissions technology uptake.

12.5 Australia

Price and volumes growth to boost copper export earnings

Copper export earnings reached over $11 billion in 2020–21, 12% higher year-on-year (Figure 12.5). This growth is attributed to the recovery in the copper price over this period, as export volumes saw a slight decrease due to scheduled maintenance at several projects.

Export volumes are expected to remain subdued — at around 834,000 tonnes — in 2021–22, as scheduled maintenance operations reach completion. Once these operations are completed, exports are forecast to rise to 932,000 tonnes in 2022–23. Copper export volumes are expected to peak in 2024–25, remaining steady at just over 1 million tonnes in 2026–27.

Copper export earnings are expected to be strong in 2021–22 due to strong global copper prices, increasing to $13.2 billion. The increase in export volumes in 2022–23 will negate the forecast softening in copper prices, with exports expected to be worth $14.3 billion in 2022–23. Over the rest of the outlook period, exports will be relatively stable, at $13.8 billion (in real terms) (Figure 12.5).

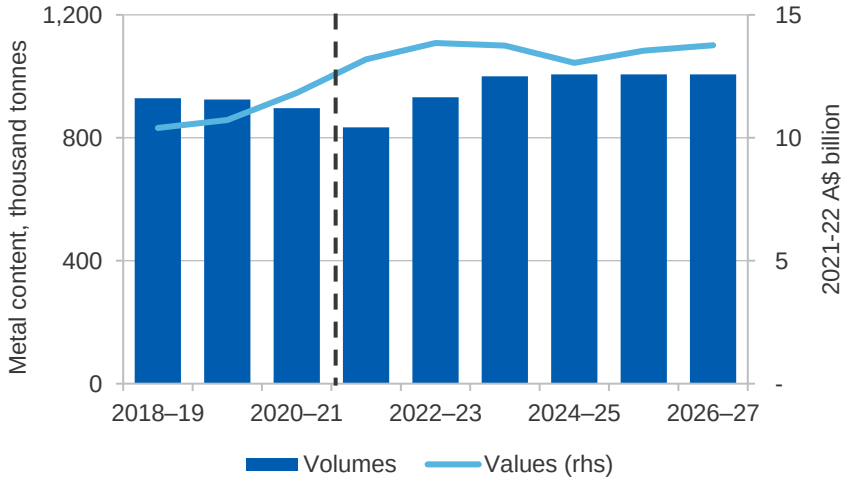
Production capacity to grow

The pace and extent of project development will depend on the persistence of current high prices. Final Investment Decisions (FIDs) are slated for several mines in 2022 and 2023, including Oz Minerals' West Musgrave project, KGL's Jervois Copper project and Havilah's Kalkaroo project. Work on the Wira shaft expansion at Prominent Hill is scheduled to start in the March quarter 2022, after a FID was made in August 2021. This capacity will come online towards the middle of the outlook period.

Meanwhile, BHP's Olympic Dam's production was down 70% year-on-year in the December quarter due to planned smelter maintenance, which was completed in January 2022. Production is expected to return to historic levels of 200,000 tonnes a year.

At 797,000 tonnes, Australian mine production in 2021–22 is expected to be 9.2% lower than 2020–21 production (Figure 12.5). Total mine production is expected to rebound to 907,000 tonnes in 2022–23, reaching 979,000 tonnes in 2026–27 (an annual growth rate of 1.8%).

Figure 12.5: Australia's copper export volumes and values



Source: ABS (2022) International Trade in Goods and Services, 5368.0; Department of Industry, Science, Energy and Resources (2022)

High prices encouraging restarts

The Nifty copper mine in Western Australia has been acquired by Cyprium, after being placed on care and maintenance in 2019. The new owners have stated an expectation that the processing method will change to heap leaching to produce copper metal plate. Under this model, annual capacity is 20,000 tonnes, and Cyprium is targeting first production mid-2023.

Refined copper production to stabilise over the short-term

Refined output was down 30% quarter-on-quarter in the December quarter 2021. Glencore's Townsville Refinery saw a decrease in output after unusually high production in the September quarter 2021, while BHP's Olympic Dam production was reduced due to planned smelter maintenance. Refined output is expected to decrease to 380,000 tonnes in 2021–22, before rebounding by 17% to 444,000 tonnes in 2022–23.

It is uncertain whether Glencore's Townsville refinery will continue production after 2025. As a result, refined output is projected to drop substantially (from 412,000 tonnes in 2024–2025 to 299,000 tonnes in 2025–26), however strong copper prices may encourage continued operations.

Copper exploration hits new heights in the December quarter 2021

Copper exploration was $172 million in the December quarter 2021, more than doubling exploration for the December 2020 quarter and up 11% on the September quarter of 2021 (Figure 12.6). It is likely that higher copper prices and copper's involvement in the movement towards electrification is encouraging investment in exploration.

Figure 12.6: Australian copper exploration expenditure

Source: ABS (2022)

Revisions to the outlook

Since the December 2021 *Resources and Energy Quarterly*, the forecast for Australia's copper export earnings in 2021–22 has been revised down by $1.0 billion. The forecast for copper export earnings for 2022–23 has been revised down by $0.4 billion. Both downward revisions are a result of a downward revision of the price of copper export ores and concentrates.

Compared to the March 2021 *Resources and Energy Quarterly*, export earnings in 2025–26 are $2.3 billion lower at $15.1 billion (in nominal terms), due to a downward revision of export volumes and a downward revision of the price of copper ore and concentrates.

Table 12.1: Copper outlook

World	Unit	2021	2022[f]	2023[f]	2024[z]	2025[z]	2026[z]	2027[z]	CAGR[r]
Production									
–mine	kt	21,253	23,102	24,165	24,382	24,504	24,627	25,831	3.3
–refined	kt	25,183	26,228	27,041	27,609	28,023	28,471	28,772	2.2
Consumption	kt	25,306	26,126	26,969	27,779	27,400	27,713	28,054	1.7
Closing stocks	kt	1 148	942	1 348	1 595	1 544	1 441	1 268	1.7
–weeks of consumption		2.4	1.9	2.6	3.0	2.9	2.7	2.4	-0.1
Prices LME									
–nominal	US$/t	9,315	9,699	8,930	8,472	8,640	8,853	8,998	-0.6
	USc/lb	423	440	405	384	392	402	408	-0.6
–real[b]	US$/t	9,637	9,699	8,698	8,043	8,002	8,013	7,958	-3.1
	USc/lb	437	440	395	365	363	363	361	-3.1
Australia	**Unit**	**2020–21**	**2021–22[f]**	**2022–23[f]**	**2023–24[z]**	**2024–25[z]**	**2025–26[z]**	**2026–27[z]**	**CAGR[r]**
Mine output	kt	878	797	907	975	979	979	979	1.8
Refined output	kt	452	380	444	448	412	299	225	-11.0
Exports									
–ores and cons[c]	kt	1,672	1,644	1,812	2,064	2,220	2,535	2,760	8.7
–refined	kt	420	368	424	428	394	285	215	-10.6
–total metallic content	kt	896	834	932	1,000	1,006	1,006	1,006	1.9
Export value									
–nominal	A$m	11,440	13,189	14,287	14,555	14,162	15,068	15,696	5.4
–real[d]	A$m	11,827	13,189	13,854	13,748	13,045	13,542	13,762	2.6

Notes: **b** In 2022 calendar year US dollars; **c** Quantities refer to gross weight of all ores and concentrates; **d** In 2021–22 financial year Australian dollars; **f** Forecast; r Average annual growth between 2021 and 2027 or 2020–21 and 2026–27; **z** Projection.

Source: ABS (2022) International Trade, 5465.0; LME (2022) spot price; World Bureau of Metal Statistics (2022) World Metal Statistics; Department of Industry, Science, Energy and Resources (2022)