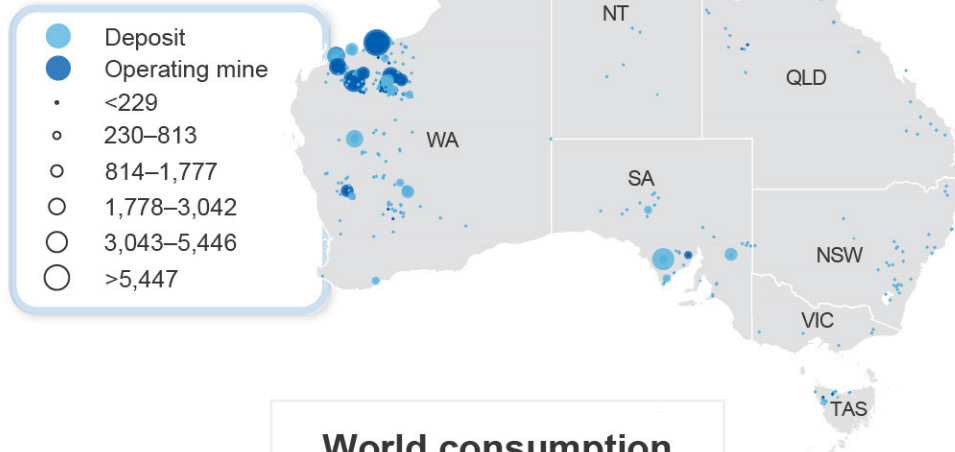


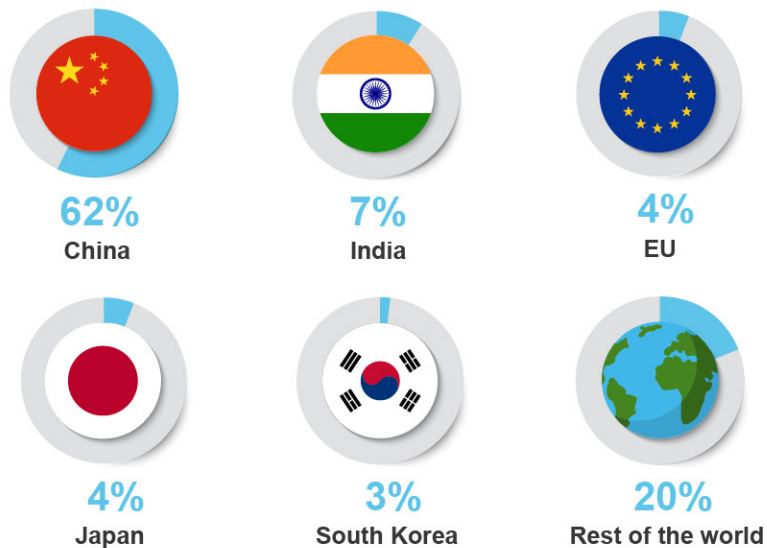


Iron Ore

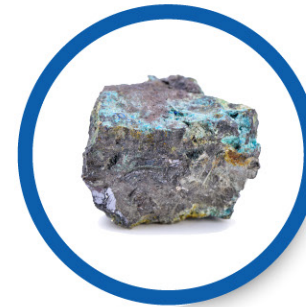
Major Australian iron ore deposits, Mt



World consumption



Iron ore



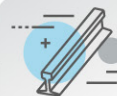
Iron is the most abundant element on earth, forming much of the **planet's core**



Iron ore deposits were originally **formed by algae**

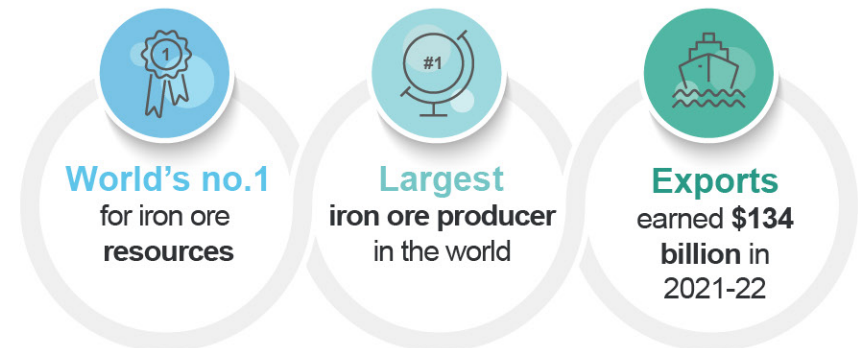


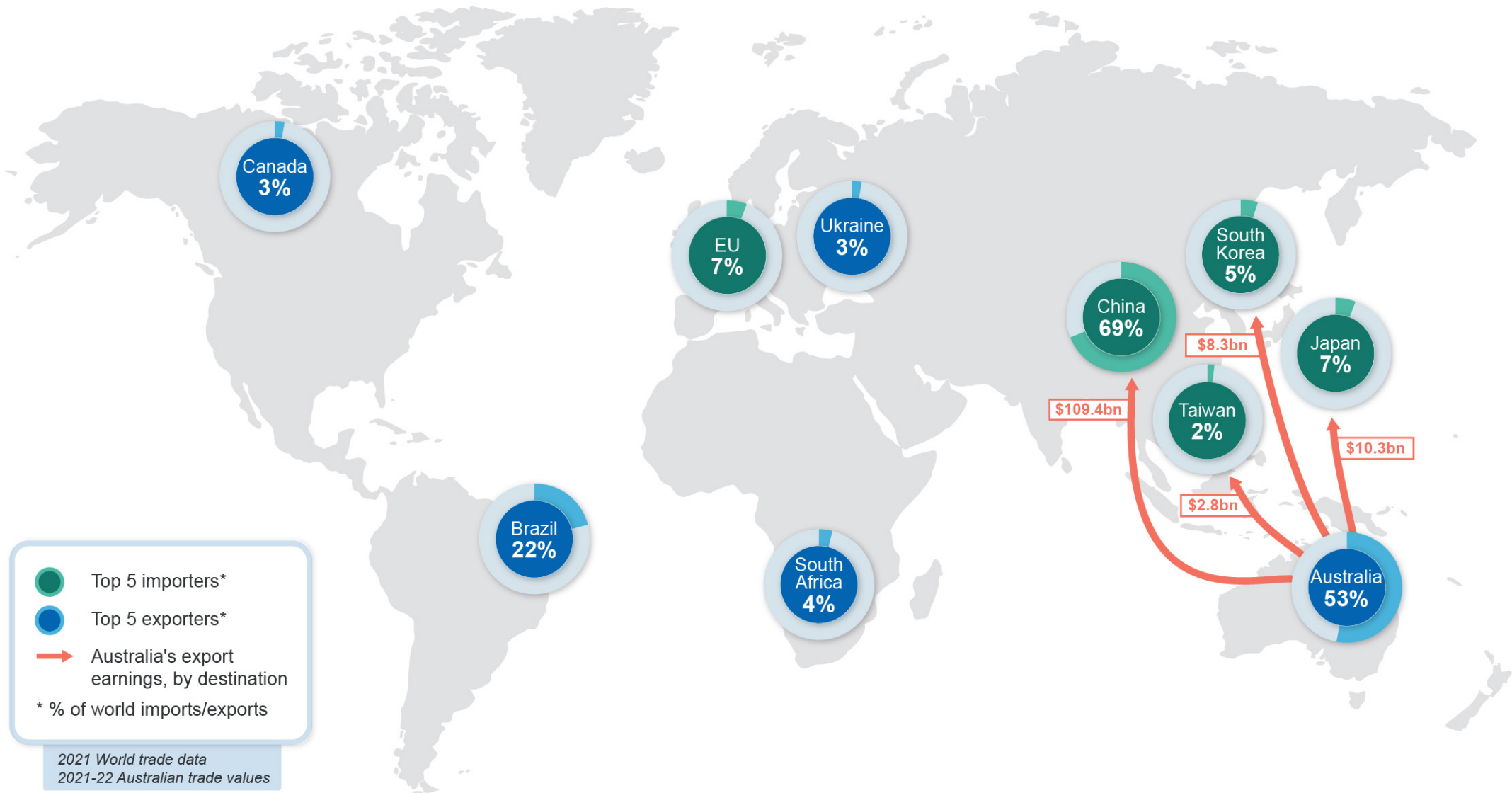
Humans have been working with iron for at least **5,000 years**



Iron was central to the **industrial revolution**

Australia's iron ore





4.1 Summary

- Iron ore prices have fallen by around 20% in the September quarter 2022. Combined with growing global recessionary fears, new COVID-19 outbreaks and weakness in China's housing sector, have dampened world steel and iron ore demand in recent months.
- Australian export volumes were 0.9% higher year-on-year in the first half of 2022, with new greenfield supply starting to come online from major producers. Exports are forecast to increase by 3.1% in 2022–23 to reach 903 million tonnes, and rise by 3.8% to 937 million tonnes in 2023–24.
- Lower prices over the outlook are expected to see Australia's iron ore export earnings ease from \$134 billion in 2021–22 to \$119 billion in 2022–23, and then to \$95 billion in 2023–24.

4.2 Prices

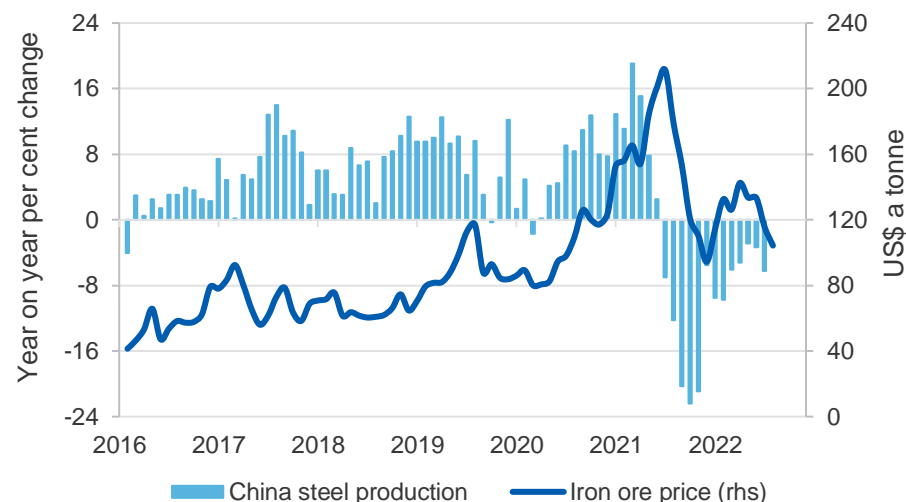
Iron ore prices dip in September quarter on weaker global steel demand

Following a solid recovery in iron ore prices in the first half of this year, the benchmark iron ore spot price (62% Fe fines CFR Qingdao) has again dipped in the September quarter, averaging around US\$100 a tonne (Figure 4.1). The rebound in prices in the first half of 2022 followed an improvement in monthly steel output in China over much of the period, as well as the expectation of a substantial boost in the country's infrastructure-related construction activity from the June quarter.

However, renewed outbreaks of COVID-19 infections — in combination with China's 'dynamic zero' COVID policy — and ongoing weakness China's residential property market, have stalled the recovery in steel and iron ore demand in recent months. Chinese manufacturing activity — another major end-user of steel — has also slowed, with industrial production in China's manufacturing sector growing just 3.8% year-on-year in July.

China's total imports of iron ore slackened considerably in H1 2022, with volumes (536 million tonnes) around 4.5% lower than the corresponding period in 2021. This included falls from major importing nations such as Brazil (–6.1%), South Africa (–3.5%) and India (–65%) (Figure 4.2).

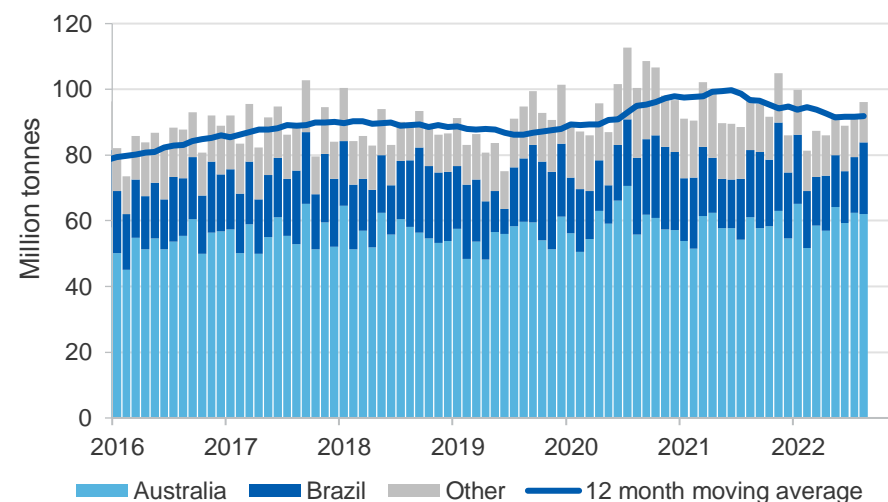
Figure 4.1: Iron ore price and China steel production, monthly



Notes: China import Iron ore fines 62% Fe spot (CFR Tianjin port)

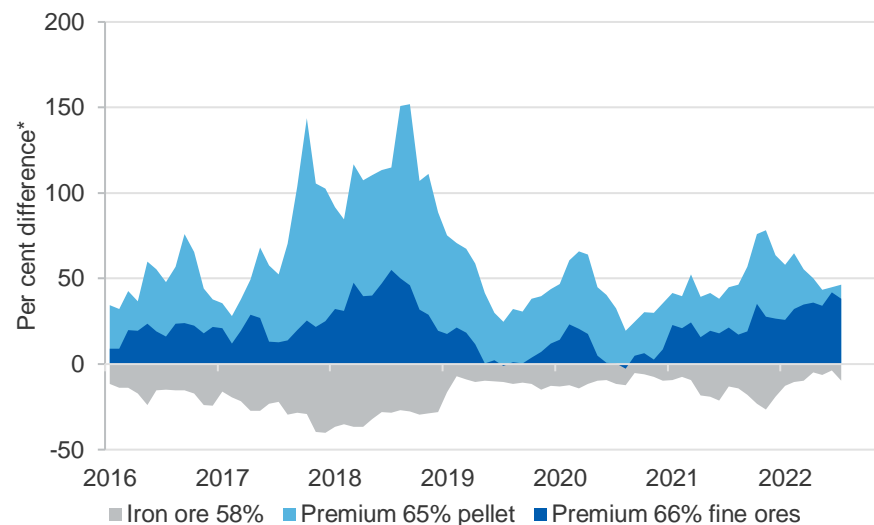
Source: Bloomberg (2022) China import prices; World Steel Association (2022)

Figure 4.2: China's monthly iron ore imports



Source: Bloomberg (2022)

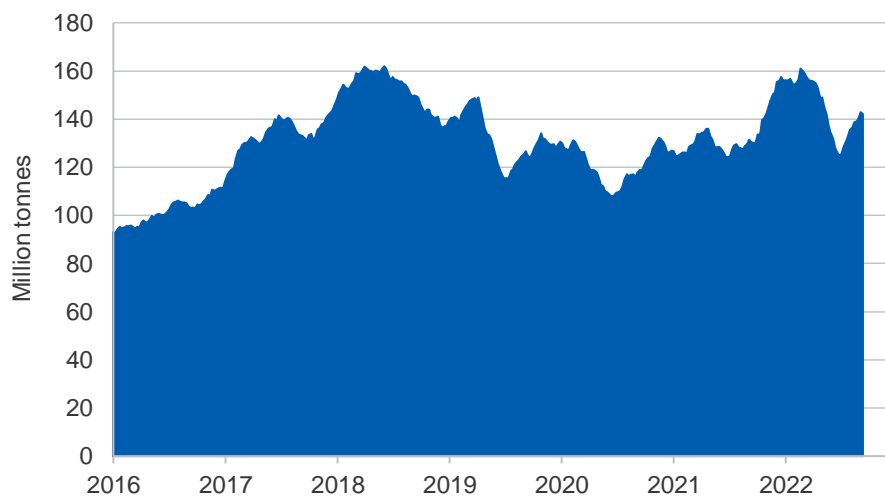
Figure 4.3: Iron ore price spread between grades



Notes: *Difference to benchmark of 62% iron fines CFR

Source: Bloomberg (2022); China import prices

Figure 4.4: China's weekly iron ore port stocks



Source: Bloomberg (2022)

Weakening demand in China, combined with a cost increase in many raw materials inputs has also driven steel mill margins down so far in 2022, with reports of as many as half of all mills operating at a loss in July (particularly EAF-based steelmaking). This contributed to a falling premium for 65% Fe grade pellets and a narrowing in the discount for 58% Fe fines (to just US\$4 a tonne in July), as mills sought to reduce operating costs (Figure 4.3).

On the supply side, weaker export volumes from Brazil in H1 2022 (down 7.5% year-on-year) have more than offset a modest increase from Australia (up 0.9%) over the period, contributing to slightly tighter global seaborne supply. This was due to heavy rains in Vale's Southern and South-Eastern systems in the March quarter, as well as permitting delays in its Northern operations. These are expected to ease as H2 matures.

Global iron ore markets also continue to experience fallout from the Russian invasion of Ukraine. With Ukraine's typical supply chains either blockaded or disrupted by Russian forces, iron ore exports in recent months have plummeted, particularly for pellets. This is having an outsized impact on European steel producers in 2022 (see [World Trade section](#)).

Following a multi-month decline in China's portside stocks, iron ore inventories rebounded from July, reaching around 140 million tonnes by mid-September (Figure 4.4). Despite the increase in portside stocks, inventories at steel mills remain low in year-on-year terms, which may provide some tailwind to iron ore demand over the rest of 2022.

Infrastructure aiming to offset frailty in China's property sector in H2 2022

The boost in new infrastructure investment and looser credit conditions in China in recent months are expected to provide some support to iron ore demand (and prices) over the outlook period. China is now expected to spend more than RMB 7 trillion (US\$1 trillion) in the 2022 calendar year. In recent months, the one-year and five-year Loan Prime Rates have fallen, easing monetary conditions. This is expected provide a boost to construction activity and steel demand late in 2022 and in 2023.

However, until now these policies have been unable to fully counteract the ongoing weakness seen in China's residential property sector. New residential housing starts and new home sales continued to fall at a double digit rate year-on-year in the year-to-August. This has intensified liquidity concerns amongst Chinese developers, and led to stalled projects and generally weaker sentiment throughout China.

Property construction is China's biggest consumer of steel, and real estate more generally accounts (directly and indirectly) for as much as 30% of the country's GDP. Without stabilisation and recovery of this sector in coming months, the rebound in China's demand for steel is likely to be muted.

On the supply side, volumes from the world's two largest producers — Australia and Brazil — are expected to continue to grow throughout the second half of the year, as weather conditions improve and new supply comes online. This will likely outweigh reduced volumes now projected from India (due to new export duties imposed on concentrate and pellet exports from May), as well as Russia and Ukraine (due to the ongoing conflict). Overall, the coming months are expected to see less tightness in the global seaborne market.

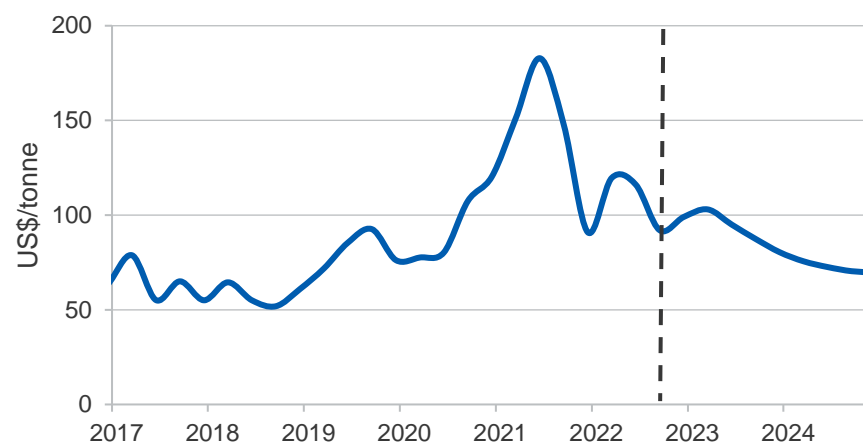
The spot price for 62% Fe iron ore fines (FOB) for calendar 2022 is now forecast to average around US\$110 per tonne in 2022 (Figure 4.5).

Weaker demand and more supply to continue to push prices lower to 2024

Over the rest of the outlook period, iron ore prices are projected to decline toward (lower) longer-run levels. This follows more modest growth in blast-furnace steelmaking (compared with the past decade) from major producers such as the EU, US and China, as the world undergoes a transition to a low emissions environment. Slower growth in blast furnace steelmaking capacity will also take place alongside growing supply from Australia and Brazil. Growing global recessionary fears present further downside risks to iron ore prices over this period.

From a forecast average price of around US\$110 per tonne (FOB) in 2022, the benchmark iron ore price is projected to average US\$90 per tonne in 2023 and around US\$70 per tonne in 2024 (Figure 4.5).

Figure 4.5: Iron ore price outlook, quarterly



Notes: China import iron ore fines 62% Fe spot (FOB)

Source: Bloomberg (2022); Department of Industry, Science and Resources (2022)

4.3 World trade

Global iron ore supply improved in June quarter, but remains tight in 2022

Combined shipments for Australia, Brazil, South Africa and Canada — representing more than 80% of global seaborne supply — were estimated to be around 334 million tonnes in the June quarter 2022. This was 9.0% higher quarter-on-quarter, reflecting an improvement in weather conditions in Australia and Brazil (following a typically wet March quarter).

However for the first half of 2022, total shipments for the four major exporting-countries were around 640 million tonnes, a fall of 1.3% compared with the same period in 2021. This was due to weaker export volumes for Brazil (down 7.5% year-on-year) and South Africa (down 4.6%) over the period.

Total iron ore exports from Australia in the first half of 2022 were around 430 million tonnes. This was 0.9% higher year-on-year, and was on account of a comparatively dry March quarter this year, as well as the ramp up of major brownfield and greenfield projects for Rio Tinto, BHP and Fortescue this year (see [Australia section](#)).

Total Australian exports are forecast to reach 882 million tonnes in 2022, an increase of 1.3% year-on-year. This includes the continued ramp up of projects such as Gudai-Darri (Rio Tinto), South Flank (BHP) and Eliwana (Fortescue), expected to add more than 50 million tonnes in the full year 2022. Over the outlook period, Australia's iron ore exports are projected to rise at an average annual rate of 3.2%, to reach around 959 million tonnes by 2024 (Figure 4.7).

Total shipments of iron ore from Brazil — the world's second largest exporter behind Australia — were around 154 million tonnes in the first half of 2022.

Brazil's largest producer, Vale, had total production of around 137 million tonnes in the first half of 2022, a fall of 3.7% year-on-year. This followed heavy rains in its Southern and South-eastern Systems operations in the March quarter, continued tie-in effects at its S11D mine, and licensing issues in its Northern System operations.

For 2022, Vale has revised its guidance down (from 320-335 million tonnes) to 310-320 million tonnes. The company has continued to emphasise a 'value over volume' strategy in recent quarters, with an aim to produce higher-grade, lower-impurity ore at the expense of maximising production volumes. This includes construction of a US\$345 million 'green' pig iron plant in its Northern System, with initial annual production capacity of 250,000 tonnes and a planned start-up of 2025.

Total Brazilian exports are forecast to reach 347 million tonnes in 2022, a fall of around 2.8% compared with 2021. Over the outlook period, Brazil's total iron ore export volumes are projected to grow by around 2.7% annually, to reach around 390 million tonnes by 2024 (Figure 4.7).

In 2022, combined exports from other significant producers South Africa, Canada and India are forecast to fall by 12% to 140 million tonnes. This is primarily due to a projected fall (of around 50%) in Indian exports. While India's iron ore exports rose in 2021 — in response to strong Chinese demand — India is expected to continue raising its domestic steelmaking capacity. This drive is expected to include securing increased domestic

supply of raw materials such as iron ore, with the government raising the export duty on iron ore concentrates (to 50%) and pellets (to 45%) in May.

Over the outlook period to 2024, iron ore exports ex Australia and Brazil are projected to decline modestly, with most new supply expected to merely replace depleting projects.

[Russia/Ukraine prompting both a market restructure and regional shortfall](#)

The Russian invasion of Ukraine has continued to see a reorganisation of iron ore and steel exports in recent months. Supply chain constraints are likely to lead to some shortfalls in regional supply of iron ore in 2022.

With most of Ukraine's iron ore mines located in areas outside major conflict zones, Ukrainian producers had been able to maintain a reasonably high level of exports through the early months of the invasion. This was despite Russia's blockade of the country's primary export hub at the port of Pivdennyi, with Ukrainian producers redirecting cargos by rail and barge to ports in Poland and Romania for export.

However, with rising energy costs and Russian strikes on this improvised logistics network in June, exports have declined in recent months, and are expected to remain weak for the rest of 2022. This has led to major iron ore producers such as Metinvest and ArcelorMittal suspending a number of operations from July.

Ukraine's iron ore exports are forecast to fall by around 36% in 2022 to reach 28 million tonnes. This will result in a loss of around 4% of the global iron ore trade pellet trade from the global market in 2022, and is expected to have a considerable impact on European steelmakers, and particularly EAF-based steelmaking in the region.

In 2021, Russia exported around 25 million tonnes of iron ore, with major markets including the EU (41% or 10.4 million tonnes) and China (39% or 9.7 million tonnes). In addition to iron and steel import bans (see *Steel chapter*), a number of major European steelmakers have announced the removal of Russian materials (such as iron ore) from their steel supply chains. While Russia temporarily suspended publication of trade data in

late April, reports suggest a fall of as much as 30% month-on-month in March for iron ore exports (and a similar fall for ferrous products).

Russia is expected to seek new markets for displaced export volumes previously sent to Europe, including markets such as Asia, Africa and the Middle East. However, this reorganisation may be constrained by logistical issues in shipping to these regions, as well as ongoing self-sanctioning by other non-European steel producers.

[China announces a significant new state-owned iron ore enterprise](#)

In July, China established a new state-backed entity, China Mineral Resources Group, with the official business registration citing responsibilities including the import and export of commodities, sales, iron ore mining, processing, and supply chain management services. The new company has registered capital of RMB 20 billion (around US\$3bn). The move is seen as an effort by the Chinese government to guarantee the supply of important minerals resources and increase the negotiating power of China's steel industry. This could include establishing a single, central purchasing platform for iron ore, though how this would function across China's vast steel industry remains unclear. Further detail on the company is expected in Q4 2022.

[Development of Guinea's Simandou project back on track](#)

Following another halt to the project in June, the establishment of a new company — *La Compagnie du TransGuinée (CTG)* — in July has seen renewed progress on the prospective Simandou iron ore mine. CTG will oversee the delivery of a new port and transport infrastructure required to bring the mine to production and export.

The Simandou iron ore mine, located in Guinea, has a potential production capacity of 200 million tonnes per year (around 15-20% of output currently produced in the Pilbara region of Western Australia). However, the project requires significant investment in mining-related and transport infrastructure to get minerals to market. This includes development of a new port and 650 kilometres of railway, which got underway in 2021.

The new company — a joint venture between Winning Consortium (WCS), Rio Tinto and the Guinean Government — will now oversee the project construction. Delivery is expected to be bound to the requirements set by the Guinean Government in March, with all port and rail infrastructure to be finished by 2024, and commercial production to begin by Q2 2025.

In August, a new agreement was signed by the Fortescue-backed joint venture, Ivindo Iron SA, to explore the Belinga iron ore project in Gabon. Belinga is seen as one of the largest untapped reserves of high-grade iron ore in the world, with prior estimates suggesting an annual production capacity of 30 million tonnes per annum. Located around 500km east of Gabon's coastal capital Libreville, the project would require extensive port and rail infrastructure to bring product to the market. Fortescue is expecting an exploration program of around US\$90 million over 3 years.

The global seaborne iron ore market is expected to remain relatively balanced over the outlook period, with growth in exports from both Australia and Brazil offsetting falls from mid-tier exporters such as India. However, growing macroeconomic headwinds — such as weakening global growth, energy shortages and further COVID-19 outbreaks — present a mounting risk to steel demand growth over the outlook, which would have repercussions for iron ore demand.

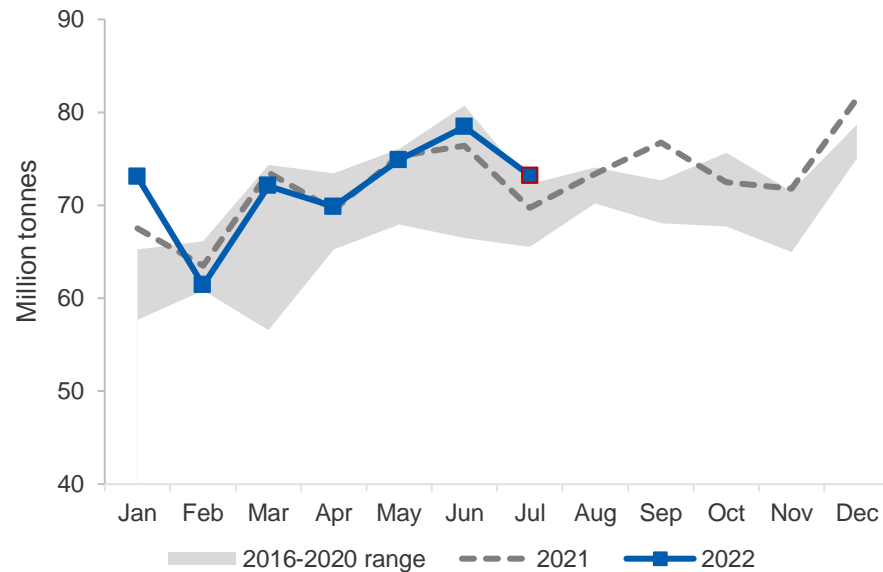
4.4 Australia

[Rising export volumes in first half of 2022 \(partially\) offset fall in prices](#)

Australia's total iron ore export earnings in the June quarter 2022 were \$36 billion, a 28% (or \$14 billion) fall year-on-year. The decrease primarily reflects the lower price for iron ore in 2022, with the unit export price for June quarter averaging around US\$116 per tonne, 37% lower compared with the same period in 2021.

Australia exported 223 million tonnes of iron ore in the June quarter 2022. This was 8.1% (or 17 million tonnes) higher quarter-on-quarter, reflecting the recovery from seasonal wet weather typical in the March quarter. Compared with the same period last year, export volumes for the June

Figure 4.6: Australian monthly iron ore export volumes



Source: ABS (2022) International Trade, Australia, 5368.0; Department of Industry, Science and Resources (2022)

quarter 2022 were 0.9% higher (Figure 4.6). This follows the ongoing ramp up of projects for Rio Tinto, BHP and Fortescue (Gudai Darri, South Flank and Eliwana respectively) so far in 2022, with further production gains expected over the rest of 2022.

The growth in volumes came despite supply and labour shortages experienced by many producers, due to COVID-19 border restrictions in place until March this year. Record rainfall in the Pilbara in May also caused further disruptions to production and exports in the June quarter.

Iron ore exports to China reached around \$30 billion in the June quarter 2022, around 84% of Australia's total iron ore export earnings. By value, Australia's exports to China in the June quarter 2022 were 26% lower year-on-year, while volumes (171 million tonnes) were 3.3% higher.

Rio Tinto shipped almost 80 million tonnes of iron ore in the June quarter 2022. This was a rise of 12% quarter-on-quarter, and 5% from the same

period in 2021. The company has cited continued impacts from skilled labour constraints, COVID-19 disruptions and wet weather impacts in 2022, contributing to H1 shipments being around 2% lower year-on-year.

The company has left their full year (2022) guidance steady at 320-335 million tonnes. This includes ramp up of its new 43 million tonne per annum Gudai Darri — the company's first greenfield iron ore project in over a decade — which delivered its first ore in June 2022.

In September, Rio Tinto also announced it will be developing its new Western Range project in partnership with China Baowu Group. The new project is intended to sustain production from its existing Paraburdoo hub, and is expected to produce 25 million tonnes per annum. Construction is forecast to begin in early 2023, with first production by 2025.

BHP's iron ore output was around 64 million tonnes in the June quarter 2022. This was 8% higher quarter-on-quarter, but remained flat compared with the same period in 2021. Despite temporary labour constraints (related to COVID-19), and rail and port maintenance through 2022, the company was able to meet its 2021–22 financial year guidance, reaching production of 253 million tonnes. This includes a ramp up of its South Flank project, which managed an average production rate of 67 million tonnes per annum in the June quarter 2022 (up from 58 million tonnes per annum in March). BHP has set 2022–23 guidance of 246–256 million tonnes, reflecting port debottlenecking work it has underway, as well as a continued ramp up of its South Flank mine.

Fortescue's total iron ore exports were 49.5 million tonnes in the June quarter 2022. This was a 6% higher quarter-on-quarter, but flat compared with the same period in 2021. Total shipments of 189 million tonnes for the 2021–22 financial year represented a 4% increase year-on-year, and exceeded the company's guidance of 180-185 million tonnes. The strong result was underpinned by continued ramp up of its Eliwana project, which ran at its nameplate production capacity of 30 million tonnes per annum in April. Fortescue has set its 2022–23 fiscal year production guidance at 187–192 million tonnes. This will likely include first production of its

22 million tonnes per annum Iron Bridge Magnetite project in the March 2023 quarter, which will deliver high grade 67% Fe magnetite.

In February this year, the Western Australian Government approved a development plan to increase Port Hedland's export capacity to 660 million tonnes of iron ore per year (the port achieved throughput of 523 million tonnes of iron ore in 2020–21). This plan includes a substantial increase in allocation for BHP, Fortescue and Roy Hill. As part of its 2022–23 Budget, the WA Government has provided funding for road infrastructure to the port, as well as dredging of the port. The WA Government expects to finalise capacity allocations and development approvals in 2022.

Export values to ease over outlook on moderating prices

Higher production volumes and stable prices are estimated to have led to Australia's iron ore export earnings reaching around \$134 billion in 2021–22. Weaker prices are forecast to lead to lower earnings for iron ore over the outlook period, with total export value of \$119 billion in 2022–23, falling to \$95 billion by 2023–24 (Figure 4.7).

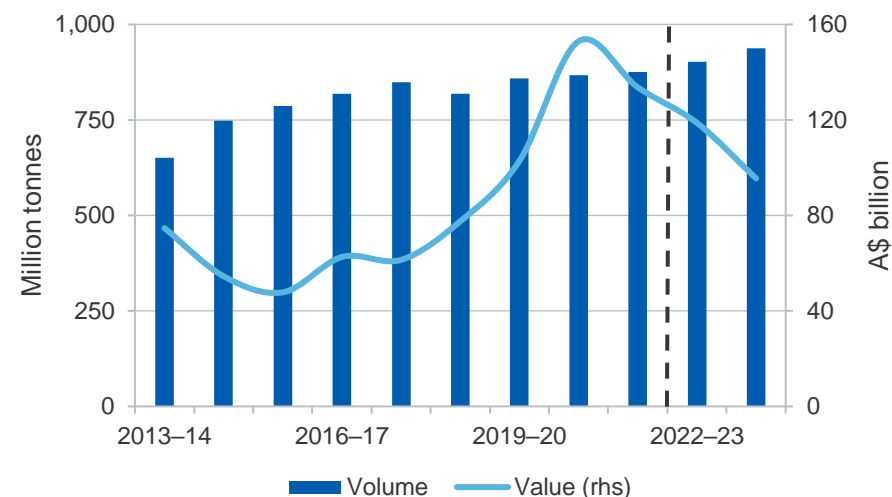
Iron ore exploration expenditure highest in 9 years in June quarter

A total of \$201 million was spent on iron ore exploration in the June quarter 2022 (Figure 4.8). This was an increase of 44% compared with the previous quarter, and 33% higher than the same quarter in 2021. Exploration has remained elevated in recent quarters following iron ore prices reaching historical highs in the first half of 2021.

Revisions

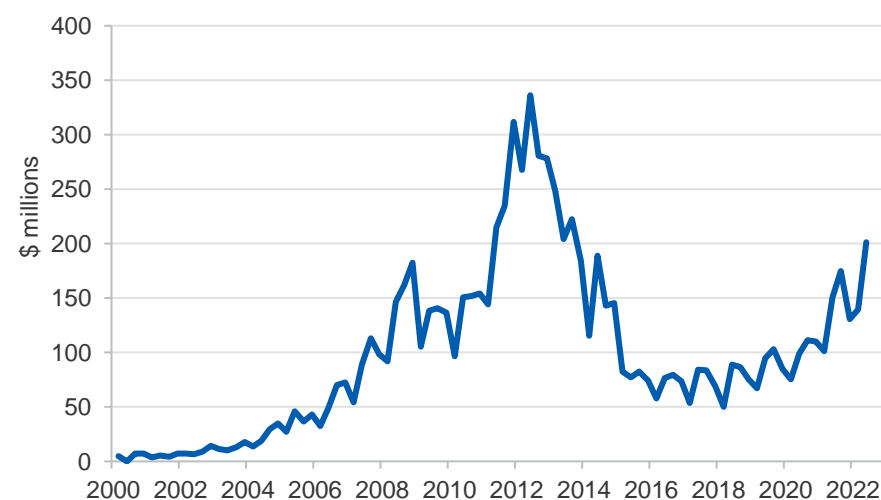
Forecast export earnings for 2022–23 (in nominal terms) have been revised up from \$116 billion in the June 2022 *Resources and Energy Quarterly* to \$119 billion in this edition, due to changes in price expectations. Export earnings have been revised up (by around \$9 billion) to \$95 billion for 2023–24. This reflects an expectation of a slower fall in iron ore prices and weakening AUD through 2023 and 2024.

Figure 4.7: Australia's iron ore export volumes and values



Source: ABS (2022) International Trade, Australia, 5368.0; Department of Industry, Science and Resources (2022)

Figure 4.8: Australian iron ore exploration expenditure



Source: ABS (2022) Mineral and Petroleum Exploration, Catalogue 8412.0

Table 4.1: World trade in iron ore

	Million tonnes				Annual percentage change		
	2021	2022 ^f	2023 ^f	2024 ^f	2022 ^r	2023 ^r	2024 ^r
World trade	1,626	1,588	1,634	1,703	-2.3	2.9	4.2
Iron ore imports							
China	1,126	1,112	1,106	1,095	-1.2	-0.6	-1.0
Japan	113	110	112	112	-3.0	1.8	0.6
European Union	94	78	83	86	-17	6.5	3.5
South Korea	74	76	78	80	2.0	2.6	2.4
Rest of Asia ^a	57	74	77	86	29	5.1	11
Iron ore exports							
Australia	871	882	920	959	1.3	4.2	4.3
Brazil	357	347	362	387	-2.8	4.3	6.9
South Africa	68	66	67	68	-2.9	1.5	1.5
Canada	54	57	58	58	5.6	1.8	0.0
Ukraine	44	28	29	30	-36	3.5	3.4

Notes: ^a Excludes China, Japan, South Korea, Taiwan and India; ^f Forecast; ^r Compound annual growth rate

Source: World Steel Association (2022); International Trade Centre (2022); Department of Industry, Science and Resources (2022)

Table 4.2: Iron ore outlook

			Million tonnes			Annual percentage change		
World	Unit	2021	2022 ^f	2023 ^f	2024 ^f	2022 ^r	2023 ^r	2024 ^r
Prices ^a								
– nominal	US\$/t	143	107	91	72	-25	-14	-21
– real ^b	US\$/t	155	107	89	68	-31	-17	-23
Australia	Unit	2020–21	2021–22	2022–23 ^f	2023–24 ^f	2021–22 ^r	2022–23 ^r	2023–24 ^r
Production								
– Steel ^e	Mt	5.7	5.8	5.8	5.8	2.0	0.0	0.0
– Iron ore	Mt	912	928	958	979	1.7	3.2	2.3
Exports								
Steel ^e	Mt	0.78	0.81	0.81	0.81	4.5	0.5	0.2
– nominal value	A\$m	773	992	925	967	28	-6.8	4.6
– real value ^g	A\$m	864	1,061	925	928	23	-13	0.3
Iron ore	Mt	867	875	903	937	1.0	3.1	3.8
– nominal value	A\$m	152,975	133,649	118,754	95,477	-13	-11	-20
– real value ^g	A\$m	170,950	142,996	118,754	91,609	-16	-17	-23

Notes: **a** Spot price, 62% iron content, fob Australian basis; **b** In 2022 US dollars; **c** Crude steel equivalent; Crude steel is defined as the first solid state of production after melting. In ABS Australian Harmonized Export Commodity Classification, crude steel equivalent includes most items from 7206 to 7307, excluding ferrous waste and scrap and ferroalloys; **f** forecast; **g** In wet metric tonnes; **h** In 2022–23 Australian dollars; **r** Compound annual growth rate

Source: ABS (2022) International Trade in Goods and Services, Australia, 5368.0; Bloomberg (2022); World Steel Association (2022); company reports; Department of Industry, Science and Resources (2022)