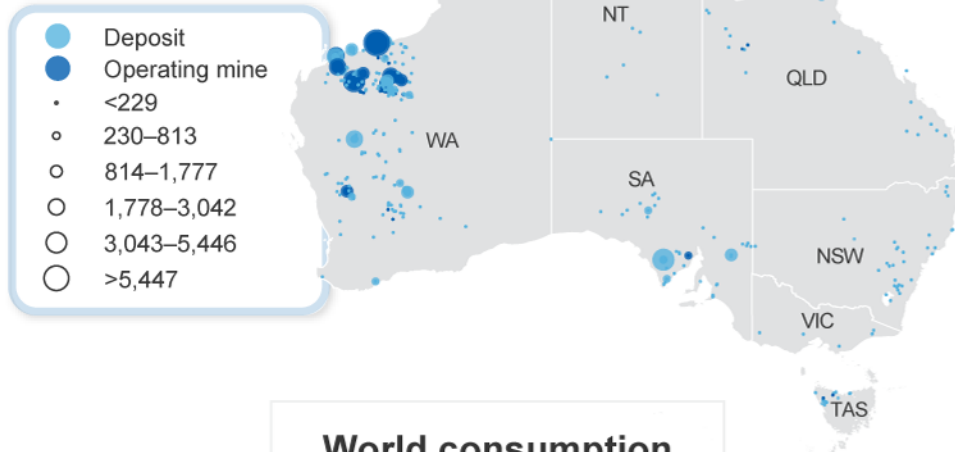


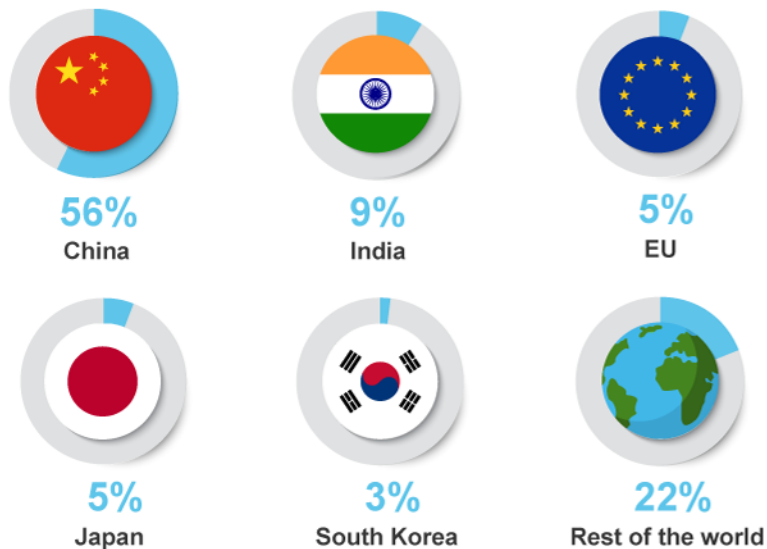


# Iron Ore

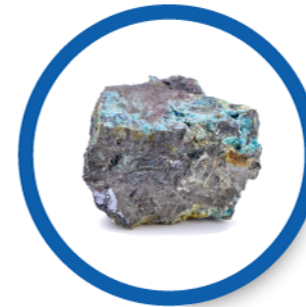
## Major Australian iron ore deposits, Mt



## 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**

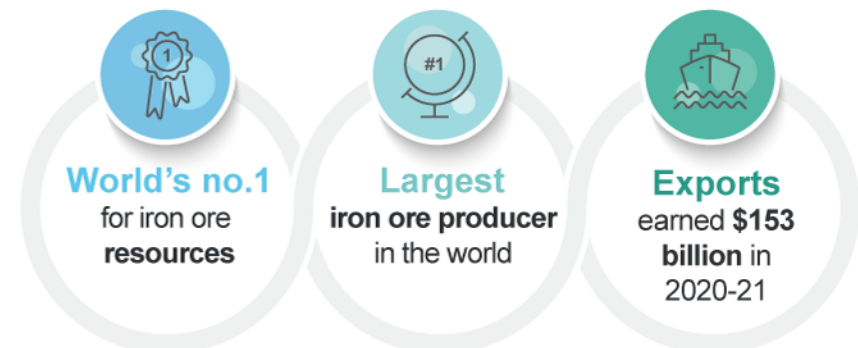


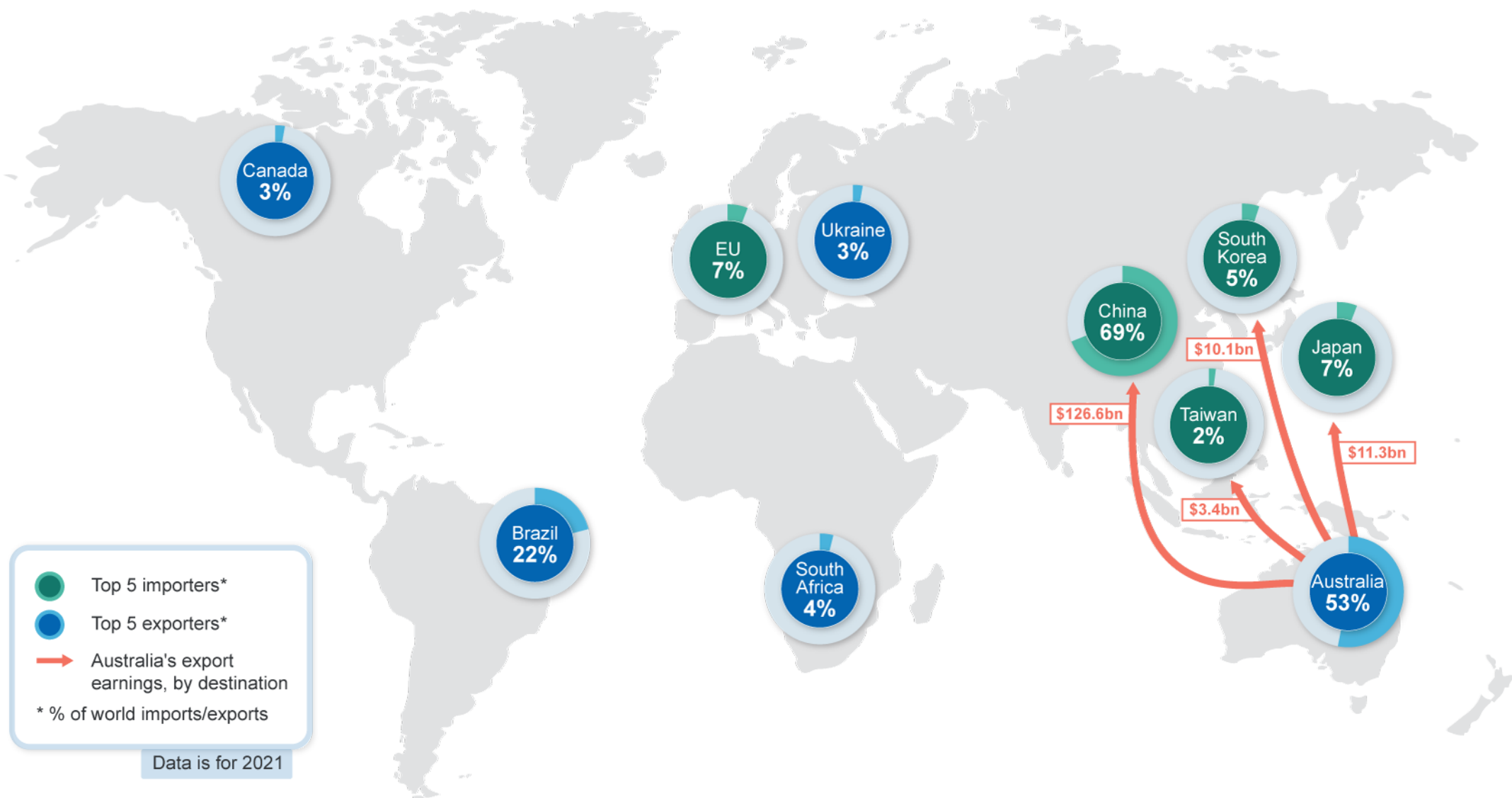
Humans have been working with iron for at least **5,000 years**



Iron was central to the **industrial revolution**

## Australia's iron ore





## 4.1 Summary

- Iron ore prices have remained relatively stable in the June quarter 2022, and are expected to average around US\$130 a tonne (CFR).
- While China is still expected to ramp up infrastructure-related construction activity (raising its steel and iron ore demand) in 2022, recent outbreaks of the COVID-19 pandemic are delaying this upswing.
- Australian export volumes are estimated to have grown (by 8 million tonnes) to 876 million tonnes in 2021–22, with new supply coming online. Exports are forecast to rise to 929 million tonnes by 2023–24.
- Australia's iron ore export earnings are projected to ease from \$133 billion in 2021–22 to \$116 billion in 2022–23, and fall to \$85 billion by 2023–24. This reflects moderating prices expected over the outlook.

## 4.2 Prices

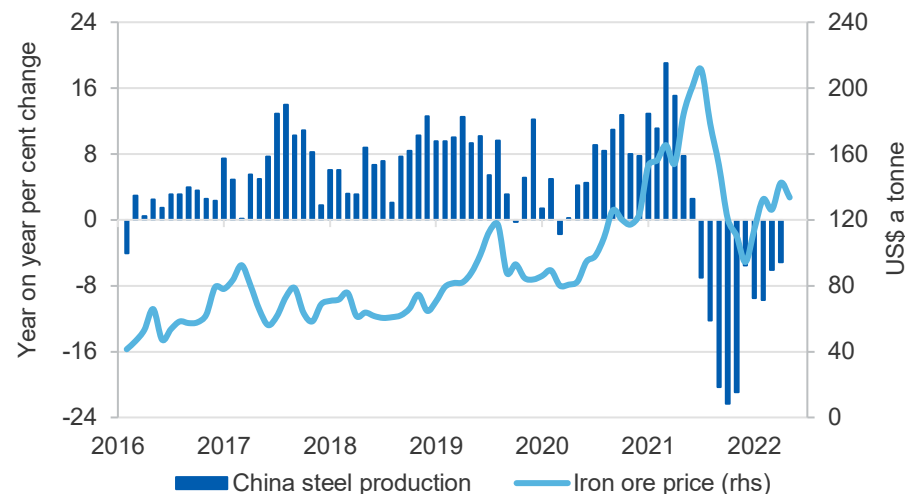
### Iron ore prices maintain 2022 rebound in the June quarter

Following a volatile 2021, the benchmark iron ore spot price (62% Fe fines CFR Qingdao) has steadily trended up so far in 2022. Up to end May, the monthly averages have been about US\$120-140 a tonne. This marks a rebound from the lows of US\$80 a tonne, reached in November 2021, as China sought to cut steel output in the second half of 2021 (Figure 4.1).

The rebound in prices in 2022 follows a partial improvement in monthly steel output in China, as well as the expectation of a substantial boost in infrastructure-related construction activity this year. With China's GDP growth (year-on-year) below 5% for the last three quarters (to March quarter 2022), China's authorities are expected to introduce further stimulatory fiscal and monetary policies in the second half of 2022 — with an emphasis on infrastructure-related stimulus (see *Steel chapter*).

Industrial activity and steel output were expected to ramp up from the June quarter 2022, in response to this infrastructure investment surge, as winter emissions curbs were withdrawn. However, new COVID-19 outbreaks and related containment measures across many of China's provinces from March, appear likely to delay this upturn until the second half of 2022.

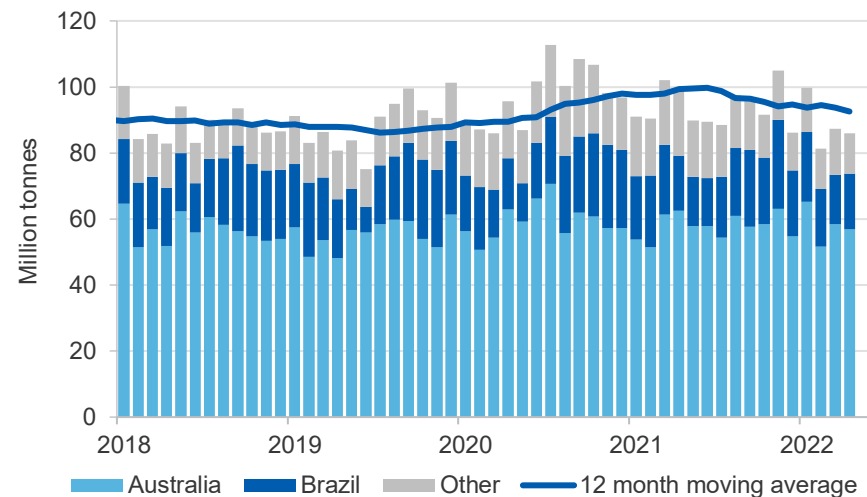
**Figure 4.1: Iron ore price and China steel production, monthly**



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

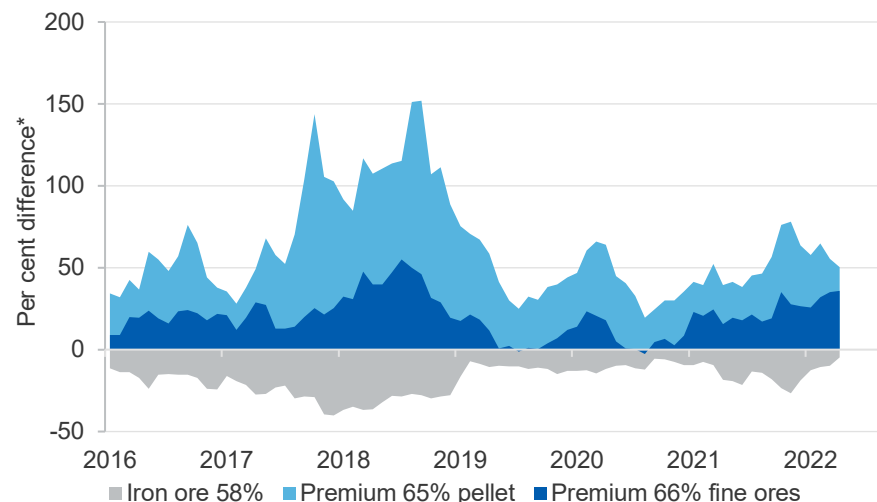
Source: Bloomberg (2022) China import prices; World Steel Association (2022)

**Figure 4.2: China's monthly iron ore imports**



Source: Bloomberg (2022)

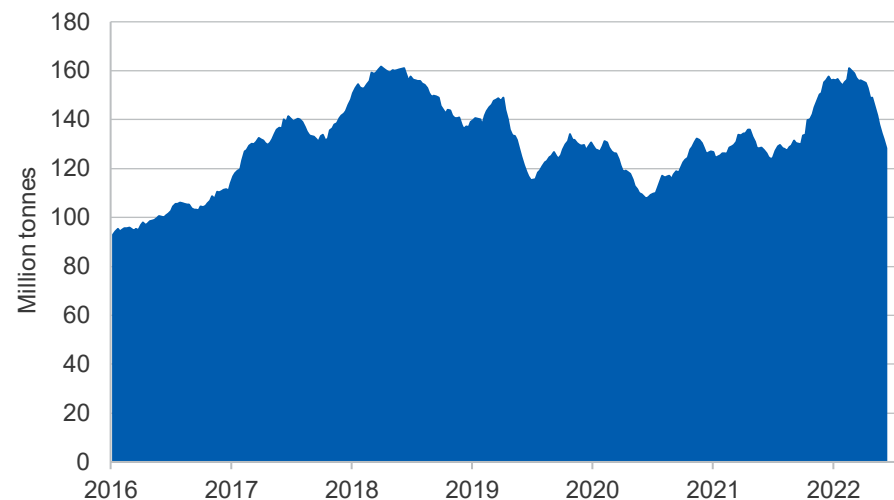
**Figure 4.3: Iron ore price spread between grades**



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)

China's total imports of iron ore have slowed considerably so far in 2022, with total volumes in January-April of 354 million tonnes. This is 7.3% lower year-on-year, and 1.1% less than the same period in 2020. Broken down by major supplier, this includes a fall of 11% year-on-year for Chinese imports of Brazilian iron ore over the period (Figure 4.2), while imports of Australian iron ore were 1.4% higher year-on-year.

Weather disruptions appear to have affected Brazilian production in the early part of this year, with heavy rains in Vale's Southern and South-Eastern systems, as well as CSN's Casa de Pedra mine. The bad weather coincided with higher freight rates for the shipping route between Brazil and China — up about 25% in early May compared to the start of the year. Both remain key risks to Chinese import volumes in the near term.

In recent months, global iron ore markets have been further disrupted by the fallout of the Russian invasion of Ukraine. This conflict is now projected to cause a loss of some seaborne iron ore supply in the short term, though iron ore and steel markets will likely reorganise over the outlook period (see *World Trade section*).

By grade, weakened demand for steel in China — and the suppressing effect this has had on steel mill margins — appears to have interrupted the ongoing rise in premiums for 65% and 66% grade ores seen since 2020. However, the partial loss of Ukrainian pellet supply from seaborne markets, and persistently tight supply of 66% (particularly Carajás) fines in recent months is likely to limit any fall. The removal of winter sintering restrictions in March has also seen a narrowing of the 58% Fe discount, as mills look to keep production costs low (Figure 4.3)

Following a run up of portside inventory to multiyear highs (of around 160 million tonnes) in February, iron ore stocks have declined in recent months to reach around 130 million tonnes by mid-June (Figure 4.4). The accumulation of portside stocks from mid-last year remains expected to provide a buffer for steel mills as they ramp up steel production for the rest of the year, mitigating the potential risk of tightening seaborne iron ore supply similar to that seen in the first half of 2021.

### Iron ore prices remain vulnerable to supply shocks in 2022

Combined exports for the world's two largest iron ore producers — Australia and Brazil — were 279 million tonnes in the March quarter 2022. This was a 2.3% fall quarter-on-quarter, reflecting the impact of seasonal rainfall that tends to affect both nations in the first half of each year.

Following a comparatively dry March quarter 2022 in Australia, severe weather in the Pilbara in May saw record rainfall for the month. And the current negative phase of the Indian Ocean Dipole — an event that tends to bring more rainfall to northern Australia — could see further disruptions to production and exports in coming months. Australian producers have also cited ongoing impacts from labour supply shortages in recent months, at both existing operations and bringing replacement capacity online.

The Russian invasion of Ukraine is also expected to tighten seaborne iron ore markets over the rest of 2022. In 2021, combined exports for both countries were estimated at around 70 million tonnes (equivalent to around one month's export volumes for Australia), with major export destinations including China, the EU and Asia. This included around 30 million tonnes (or 20% of global supply) of agglomerated iron ore products, such as higher iron-content pellets and briquettes.

And in May this year, the Indian government announced a new 50% tax on exports of iron ore and concentrates. The move is seen as part of the government's efforts to substantially boost domestic steel output over the next few years (see *Steel chapter*). India exported around 36 million tonnes of iron ore in 2021, with around 85% of it going to China.

### Weaker demand growth and more supply to push prices lower to 2024

The boost in new infrastructure investment and easier credit conditions in China this year, is expected to provide some support to prices for the rest of 2022. However, this is likely to be offset by further weakness in China's residential property sector, with new housing starts and home sales continuing to fall by double digits year-on-year in May (see *Steel chapter*).

The mixed demand picture comes alongside new supply which continues to come online from major producers in Australia, as well as an expected

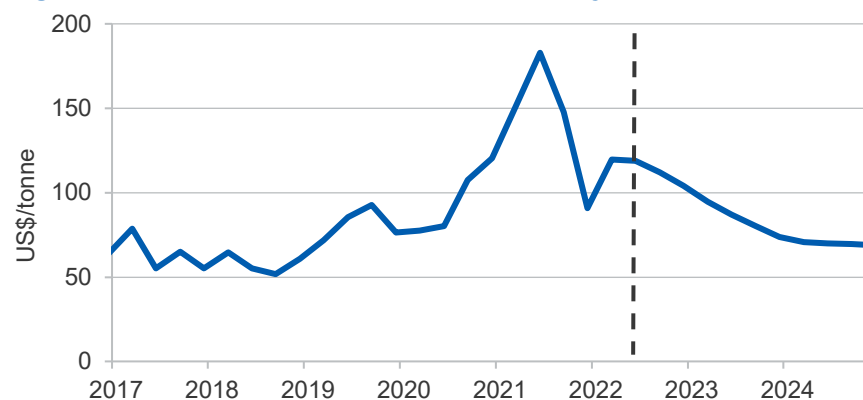
recovery in Brazilian supply for the rest of this year following recent weakness. The spot price for 62% Fe iron ore fines (FOB) for calendar 2022 is now forecast to average US\$115 per tonne in 2022.

Over the rest of the outlook period to 2024, iron ore prices are forecast to decline to lower long-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. This softer demand will also take place alongside growing supply from Australia and Brazil.

Earlier this year, the Chinese government announced a plan to further consolidate its steel industry, with an aim for the top 10 steel companies to account for 60% of the nation's steel output by 2025. Reports in June also suggested China's government is considering establishing a centralised iron ore purchasing platform. These developments would likely enhance Chinese producers' negotiating power in the seaborne iron ore market, and could put downward pressure on prices over the outlook period.

From a forecast average price of around US\$115 per tonne (FOB) in 2022, the benchmark iron ore price is projected to average US\$85 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 falls slightly in the March quarter 2022

In the March quarter 2022, combined shipments for Australia, Brazil, South Africa and Canada — representing more than 80% of global seaborne supply — were estimated at around 305 million. This was a 3.1% fall year-on-year, and 0.6% lower than 2018 — the last full year of unaffected global supply prior to the 2019 Brumadinho tailings dam collapse in Brazil.

The total volume of iron ore exported from Australia in the March quarter 2022 was around 207 million tonnes. This was 1.1% higher compared with the March quarter 2021, and follows a comparatively dry start to 2022. The result also reflects a ramp up of major brownfield and greenfield projects for Rio Tinto, BHP and Fortescue in 2022, with further increases expected for the remainder of the year (see Australia section).

Total Australian exports are forecast to reach 894 million tonnes in 2022, an increase of 2.5% year-on-year. Over the outlook period, Australia's iron ore exports are projected to rise at an average annual rate of 2.8%, to reach around 950 million tonnes by 2024 (Figure 4.7).

Total shipments of iron ore from Brazil — the world's second largest exporter behind Australia — were around 72 million tonnes in the March quarter 2022. This was a fall of 21% (or 19 million tonnes) quarter-on-quarter, and 11% less than the same period in 2021.

Brazil's largest producer, Vale, had total production of 64 million tonnes in the March quarter 2022, a fall of 6.0% year-on-year. This followed a temporary halt to its Southern and South-eastern Systems operations in January due to rainfall (typical in the March quarter each year), and licensing and plant delays in its Northern System operations.

For 2022, Vale has retained its guidance at 320 to 335 million tonnes. The company expects to finalise the installation of new loaders and crushing plants in its Northern System, which should see its S11D project ramp up to 80 million tonnes per annum capacity through the year.

Over the outlook period, Vale is expecting to complete the first stages of raising its Itabiruçu dam (by the December quarter 2022). This dam forms part of the Itabira complex — with 40 million tonnes annual production capacity — and was shut down in 2019, in response to the Brumadinho tailings dam collapse. Its reopening is seen as a crucial step in the company's plan to return to 400 million tonnes per annum of production. Vale's aim also incorporates bringing its Serra Sul 120 project — with 20 million tonnes of additional capacity — into production by 2024.

Total Brazilian exports are forecast to reach 373 million tonnes in 2022, a rise of around 4.5% compared with 2021. Over the outlook period, Brazil's total iron ore export volumes are projected to grow by around 5.8% annually, to reach around 420 million tonnes by 2024 (Figure 4.7).

In 2022, combined exports from other major producers South Africa, Canada and India are forecast to fall by 7.5% to reach 147 million tonnes. This is primarily due to a projected fall (of around 20%) in Indian exports. While India's iron ore exports rose in 2021 — in response to strong Chinese demand — India is expected to continue boosting its domestic steelmaking capacity. This will involve securing greater domestic supply of raw materials, such as iron ore.

Canada is forecast to record a modest (3.7% or 2 million tonne) increase in iron ore exports in 2022. This incorporates Champion iron completing its first shipment of high-grade 66.2% iron concentrate from its Bloom Lake Phase II project in May. The company anticipates the expansion of the project's commercial production capacity (15 million tonnes per annum combined with the Phase I project) towards the end of 2022.

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

### Conflict in Ukraine expected to see restructuring of ferrous markets

The Russian invasion of Ukraine is now projected to see a reorganisation of iron ore and steel exports for both countries over the remainder of 2022 (and likely beyond). This is expected to see some loss of iron ore supply in



global seaborne trade, though this should be mitigated by the redirection of products to new markets.

Ukraine exported 44 million tonnes of iron ore in 2021 (around 2.7% of global supply). With the majority of Ukraine's iron ore mines based in areas outside major conflict zones, key producers have been able to maintain partial production and exports in recent months. This has involved the use of rail and river barges to circumvent the closure of the country's primary export hub at the port of Pivdennyi. Reduced demand from domestic steel mills — with many located in Russian-held or contested territory — has also seen some reallocation of iron ore supply toward export markets.

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).

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

#### China continuing to develop iron ore supply sources in Africa

In March this year, the China Iron and Steel Association announced a new 'cornerstone plan' to diversify the country's iron ore supply chain: Australia currently accounts for over 60% of the nation's iron ore imports. The plan includes an aim to increase equity output from overseas mines (from 120 million tonnes in 2020) to 220 million tonnes by 2025.

The most notable prospect is the Simandou iron ore mine, located in Guinea, with a potential production capacity of 200 million tonnes per year (around 15-20% of output currently produced in the Pilbara region of

Western Australia). The project requires significant investment in mining-related and transport infrastructure to get minerals to market, including the development of a new port and 650 kilometres of new railway, which got underway in 2021.

Following a full halt of the project by Guinea's ruling junta at the start of March this year, a new agreement has now been signed with Rio Tinto and partners (who own blocks 3 and 4 of the project) and a Chinese-backed consortium SMB Winning (who own blocks 1 and 2). The deal includes strict timelines, including all port and rail infrastructure to be finished by 2024, and commercial production to begin by 31 March 2025.

A number of smaller mines in Africa also remain under development. In May this year, Chinese steel producer Sinosteel signed a 50 year contract with the Cameroonian government to mine the Lobe mine, with an expected production of around 4 million tonnes of high grade ore per year.

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 over the next few years. However, the persistence of supply chain disruptions and inflationary pressures presents a growing risk to steel demand growth over the outlook, which has repercussions for iron ore demand over the period.

## 4.4 Australia

### Rise in export volumes in 2022 lessens fall in prices from first half of 2021

Australia's total iron ore export earnings in the March quarter 2022 were \$31 billion, a 20% (or \$7.5 billion) fall year-on-year. The decrease primarily reflects the lower price for iron ore in 2022, with the unit export price for March quarter averaging around \$154 per tonne, 31% lower compared with the same period in 2021.

Australia exported 207 million tonnes of iron ore in the March quarter 2022. While this was 8.6% (or 19 million tonnes) lower quarter-on-quarter, it reflects the typical seasonal pattern for Australian iron ore exports, where wet weather in the northern part of the country impacts the March quarter most intensely each year (Figure 4.6). Compared with the same

period last year, export volumes for the March quarter 2022 were 1.1% higher. 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.

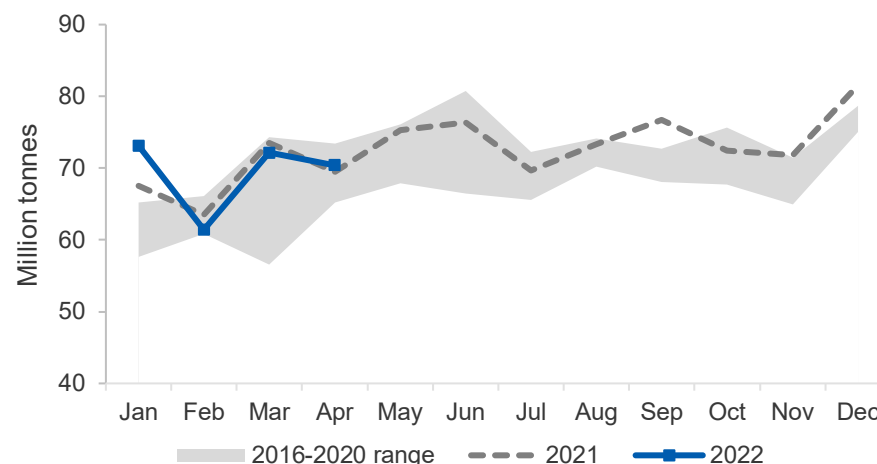
However, despite the improvement, major producers continued to identify supply and labour shortages, compounded by the COVID-19 border restrictions in place until March this year. This, is in addition to the outbreak of record rainfall in the Pilbara in May, and a negative Indian Ocean Dipole that could see further disruptions to production and exports in the June and September quarters.

Iron ore exports to China reached close to \$26 billion in the March quarter 2022, around 83% of Australia's total iron ore export earnings. By value, Australia's exports to China in the March quarter 2022 were 21% lower year-on-year, while volumes (171 million tonnes) were 1.6% higher.

Rio Tinto shipped 72 million tonnes of iron ore in the March quarter 2022. This was a fall of 15% quarter-on-quarter, and 8% lower than the same period in 2021. The company has cited the continuing impact of resource shortages and supply chain quality issues through 2022. Despite these issues, the company expects a continued lift in production volumes for these projects over the remainder of 2022, and have left their full year (2022) guidance steady at 320-335 million tonnes. This includes its new 43 million tonne per annum greenfield project Gudai Darri, which delivered its first ore in June this year.

BHP's iron ore output was nearly 60 million tonnes in the March quarter 2022. This was a fall of 10% quarter-on-quarter, but was flat compared with the same period in 2021. The company acknowledged the substantial impact that temporary labour constraints (related to COVID-19) have had, notably with train driver shortages. BHP also flagged maintenance work undertaken — for both rail and port infrastructure — during the quarter, as having had an impact on overall volumes. BHP has retained 2021–22 financial year guidance at 249-259 million tonnes. This includes a ramp up of its South Flank project, which achieved an average production rate of 58 million tonnes per annum in the March quarter 2022.

**Figure 4.6: Australian monthly iron ore export volumes**



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

Fortescue's total iron ore exports were 47 million tonnes in the March quarter 2022. This was a fall of 2% quarter-on-quarter, but a 10% rise compared with the same period in 2021. Total shipments of 140 million tonnes for the nine months to March 2022 also represented a new record for the company. The strong result was underpinned by the continued ramp up of the company's Eliwana project, which was already running at its nameplate production capacity of 30 million tonnes per annum in April. The result was reflected a reduced impact from labour shortages, due to the company's use of autonomous haulage fleet. As a result, Fortescue has raised its 2021–22 fiscal year production guidance (from 180-185 million tonnes) to 185-188 million tonnes.

Fortescue is also continuing to develop its 22 million tonne per annum Iron Bridge Magnetite Project (with production ramp up expected over the next 12 to 18 months). This included the key milestones of the unloading of five module ships at Port Hedland, and advanced progress on the installation of a crusher in the March quarter.



In February this year, the Western Australian Government approved the development plan to increase Port Hedland's export capacity to 660 million tonnes of iron ore per year (previously 495 million tonnes per annum). This plan includes a substantial increase in allocation for BHP, Fortescue and Roy Hill. The WA Government has provided funding as part of its 2022–23 Budget for road infrastructure to the port, as well as dredging of the port. The WA Government expects final approvals by mid-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 \$133 billion in 2021–22. Lower prices are forecast to lead to lower earnings for iron ore over the outlook period, with total export value of \$116 billion in 2022–23, before falling to \$85 billion by 2023–24 (Figure 4.7).

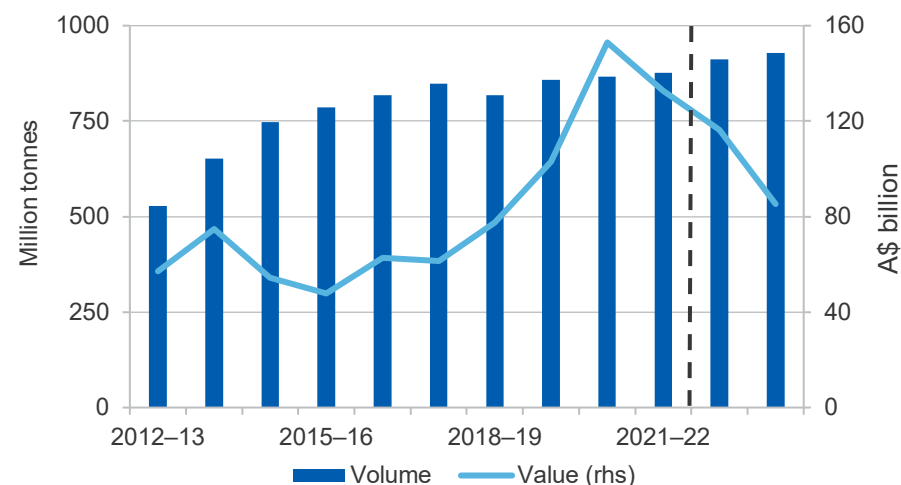
#### Iron ore exploration expenditure lifted in March quarter

A total of \$139 million was spent on iron ore exploration in the March quarter 2022 (Figure 4.8). This was an increase of 6.6% compared with the previous quarter, and 38% 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 2021–22 (in nominal terms) have been revised downwards from \$135 billion in the March 2022 *Resources and Energy Quarterly* to \$133 billion in this edition, due to weather and COVID-19 related impacts to export volumes. Export earnings have been revised up (by around \$8 billion) to \$116 billion for 2022–23. This reflects an expectation of a slower fall in iron ore prices through 2023. Forecast export earnings for 2023–24 remain around \$85 billion.

**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 <sup>f</sup>	2023 <sup>f</sup>	2024 <sup>f</sup>	2022 <sup>f</sup>	2023 <sup>f</sup>	2024 <sup>f</sup>
World trade	1,626	1,628	1,667	1,729	0.1	2.4	3.7
<b>Iron ore imports</b>							
China	1,126	1,124	1,118	1,107	-0.1	-0.6	-0.9
Japan	113	116	116	115	2.6	0.3	-1.0
European Union	94	86	88	91	-8.6	3.4	2.5
South Korea	74	79	81	83	6.1	2.6	2.3
Rest of Asia <sup>a</sup>	57	73	76	85	26.8	5.1	11.1
<b>Iron ore exports</b>							
Australia	872	894	915	948	2.5	2.3	3.6
Brazil	357	373	398	423	4.5	6.7	6.3
South Africa	68	69	70	71	1.5	1.4	1.4
Canada	54	56	57	57	3.7	1.8	0.0
Ukraine	44	28	29	30	-36.0	3.5	3.4

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

Source: World Steel Association (2022); International Trade Centre (2021); Department of Industry, Science and Resources (2022)

**Table 4.2: Iron ore outlook**

			Million tonnes			Annual percentage change		
World	Unit	2021	2022 <sup>f</sup>	2023 <sup>f</sup>	2024 <sup>f</sup>	2022 f	2023 f	2024 <sup>f</sup>
Prices <sup>a</sup>								
– nominal	US\$/t	143	114	84	70	-20.6	-26.2	-16.9
– real <sup>b</sup>	US\$/t	148	114	82	66	-23.3	-28.0	-19.1
Australia	Unit	2020–21	2021–22 <sup>f</sup>	2022–23 <sup>f</sup>	2023–24 <sup>f</sup>	2021–22 <sup>f</sup>	2022–23 <sup>f</sup>	2023–24 <sup>f</sup>
Production								
– Steel <sup>e</sup>	Mt	5.7	5.3	5.2	5.2	-7.3	-1.0	-0.4
– Iron ore	Mt	913	938	970	992	2.8	3.3	2.3
Exports								
Steel <sup>e</sup>	Mt	0.8	0.7	0.9	0.9	-7.7	24.9	-0.4
– nominal value	A\$m	773	857	811	807	10.8	-5.4	-0.4
– real value <sup>g</sup>	A\$m	794	883	909	892	11.2	2.9	-1.9
Iron ore	Mt	867	876	911	929	1.1	4.0	2.0
– nominal value	A\$m	152,975	132,798	116,295	85,311	-13.2	-12.4	-26.6
– real value <sup>g</sup>	A\$m	159.604	132.798	111.093	78.894	-16.8	-16.3	-29.0

Notes: **b** fob Australian basis; **c** Spot price, 62% iron content basis; **d** In 2021 US dollars; **e** In 2021–22 Australian dollars; **f** forecast; **h** 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; **i** In 2020–21 Australian dollars; **r** Compound annual growth rate; **s** estimate; **z** Projection

Source: ABS (2021) International Trade in Goods and Services, Australia, 5368.0; Bloomberg (2021) Metal Bulletin; World Steel Association (2021); AME Group (2021); Company Reports; Department of Industry, Science and Resources (2022)