Steel

Australian steel refineries

Steel facts

- Made in specialised blast furnaces mostly out of **iron and carbon**
- 1,000 kg of steel requires 1,400 kg of iron and 800kg of coal to make
- Pure steel is **1,000 times stronger** than iron
- Steel is the **world's 2nd largest industry**

World consumption

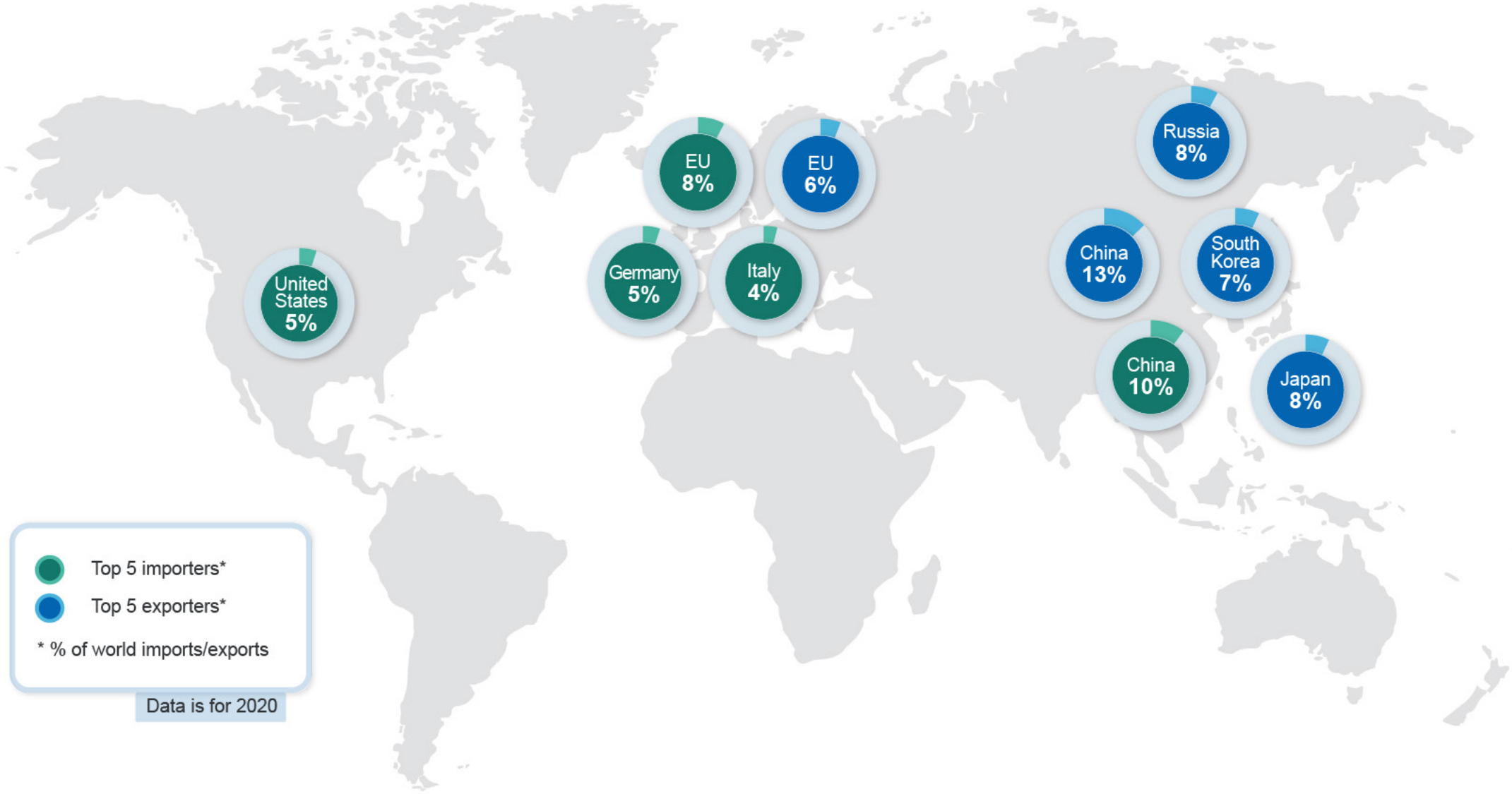
- **52%** Construction
- **16%** Mechanical machinery
- **12%** Other applications
- **12%** Automotive
- **5%** Other Transport
- **3%** Electrical Equipment

Australia's steel

- **5.7m tonnes** produced each year
- **100,000+** employed in steelmaking
- **Significant export markets**
  - China
  - Japan
  - South Korea
  - Taiwan
  - India

Steel

Trade map | March 2022



3.1 Summary

- World steel consumption is estimated to have grown 3.8% year-on-year in 2021, reflecting a rebound in industrial production as the world recovers from the COVID-19 pandemic.
- Global steel production rose by 3.7% year-on-year in 2021. A recovery among producers such as the US, Europe, Japan, and India more than offset a 3.0% fall in output in China, the world's largest producer.
- World steel output is forecast to grow by 2.2% in 2022. However, the potential for further energy shortages amongst major producers, and the Russian invasion of Ukraine presents significant risks to this forecast.
- Over the outlook to 2027, world steel output is projected to grow by an average of 1.2% a year. Low growth in China's steel output is expected to be offset by more rapid growth from India, Brazil and South East Asia.

3.2 World consumption and production

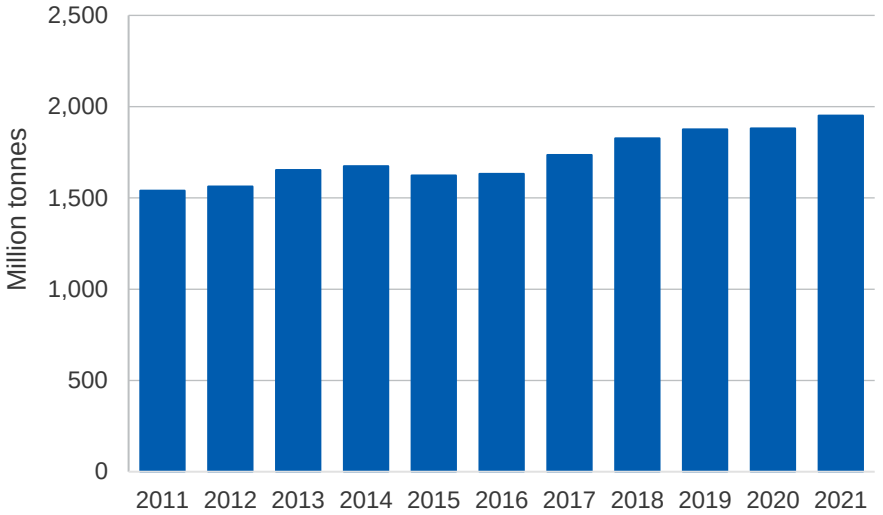
Growth in world steel production to ease in 2022

World steel output in calendar 2021 reached 1.95 billion tonnes. This was 3.7% higher compared with 2020, and 4.0% higher than 2019 levels (Figure 3.1). The impressive rise in steel production was underpinned by a strong rebound of the global economy following impacts in 2020 from the COVID-19 pandemic, with world GDP rising by 5.9% in 2021.

However, the strong rise in global steel output in 2021 reflected a mixed performance across major producers. China — with around half of global production — recorded a 3.0% year-on-year fall in 2021. This was China's first fall in annual steel output since 2015, and the largest drop in at least 15 years. This followed emission-related steel production curbs enforced throughout 2021, as well as weakening domestic demand for steel.

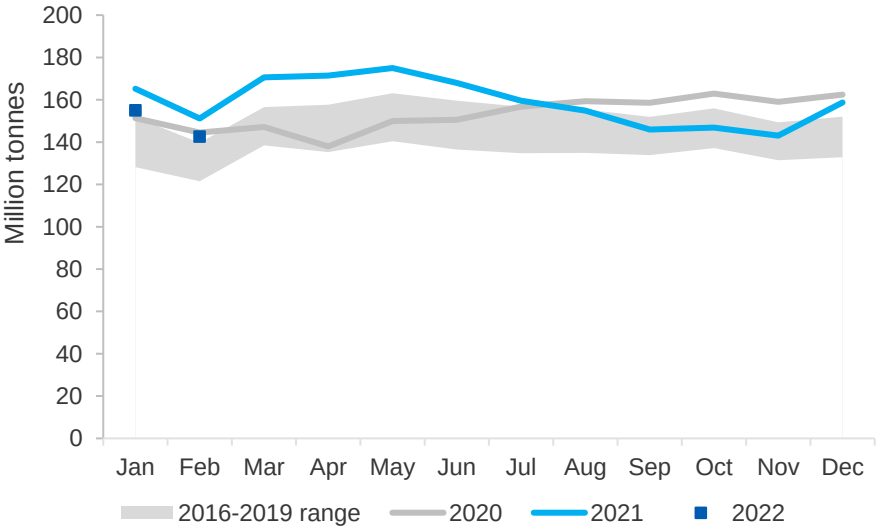
At the same time, ex-China production in 2021 grew by 13% year-on-year (and was 4.3% above the 2019 total). This included significant recoveries for the US (up 18% year-on-year), India (up 18%), Japan (up 16%) and the EU (up 15%), with industrial production resilient despite renewed waves of the COVID-19 pandemic.

Figure 3.1: Global annual steel production



Source: World Steel Association (2022)

Figure 3.2: Global monthly steel production



Source: World Steel Association (2022)

Figure 3.3: World industrial production and steel output

Source: World Steel Association (2022); Bloomberg (2022); CPB (2022)

On a monthly basis, global steel output slowed considerably in the second half of 2021, falling from a peak of 24% growth year-on-year in April, to a contraction of 9.8% year-on-year by October (Figure 3.2).

The decline in steel output growth over the period reflects the intensification of steel production curbs in China in the second half of 2021. Further to this, the slowdown echoed a comparable slowdown in global industrial production growth, as the post-COVID pandemic recovery matures and low-base effects from 2020 wear off. The downtrend appears to have stabilised to some degree by the end of 2021, with month-on-month growth in industrial production and steel output in December of 1.2% and 11% respectively (Figure 3.3).

In January this year, the IMF was forecasting the pace of global GDP growth to ease to 4.4% in 2022, reflecting a return to longer-run growth levels, and continuing near-term impacts from the COVID-19 pandemic (see *Macroeconomic Outlook* chapter). This was expected to see growth in global steel output moderate to around 2.2% in 2022.

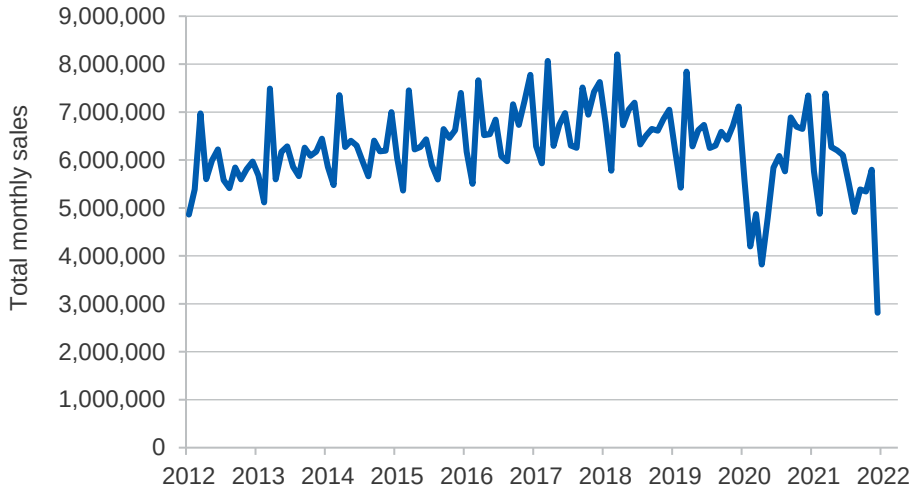
However, the current Russian invasion of Ukraine carries the potential to further constrain the global steel market in 2022. As the world's 5th and 14th largest steel producers respectively, Russia and Ukraine's combined output in 2021 (97 million tonnes) represented around 5% of global production. Russia was also the world's second largest exporter of steel for the most recently available data (2020), with major export markets including the EU (22%), Asia (23%), and Central Asia and Eastern Europe (20%). Energy shortages amongst other major producers — including China, the EU and India — also pose risks to supply in the near term.

Over the rest of the outlook period, diminishing pent up demand and the removal of pandemic-related fiscal and monetary support in most countries, is expected to see growth in steel demand ease to lower (but still positive), longer-run levels. World steel production is projected to grow at an average annual rate of 1.0%, from 1.99 billion tonnes in 2022 to 2.10 billion tonnes in 2027.

Amongst the major producers, China's annual steel output is projected to remain relatively flat over the outlook period. This follows reports of similar production caps in 2022 as in 2021 (capped at or below 2020 levels); the Chinese Government's stated aim for peak steel emissions by 2030; the current deleveraging of its residential property sector; and its ongoing ambition to shift its economy away from investment-reliant growth. However, this outlook remains susceptible to shorter-run policy changes. China's pushing back of its aim of peak steel emissions (from 2025 to 2030) in February this year, and recent easing in domestic credit conditions signals the Chinese Government's intent to meet stated GDP growth targets. This could provide a tailwind to steel production in 2022.

Existing major producers, such as the EU, Japan and South Korea, are all expected to see positive but low growth over the outlook period, with an ongoing focus on pursuing higher-efficiency/lower-emissions production, and a shift toward electric arc furnace (EAF) and hydrogen-based steelmaking. The biggest growth in global steel production over the outlook period is expected to come from emerging producers, such as India (with 4.9% annual growth to 2027), South East Asia (4.8% annual growth) and Brazil (3.3% annual growth).

Figure 3.4: Global monthly automotive sales



Source: Bloomberg (2022)

World demand for steel set to grow due to construction (and infrastructure)

Global steel consumption is projected grow at an average annual rate of 1.2%, increasing from 1.96 billion tonnes in 2021, to around 2.11 billion tonnes by 2027.

Construction — representing about 50% of global steel demand — is expected to see solid growth over the outlook. This expansion will be spurred by considerable levels of infrastructure investment, pledged across many major nations in the last two years to support the global transition to low carbon emissions. This includes the US$1.2 trillion Bipartisan Infrastructure Framework — signed into law by US President Biden in November 2021 — as well as similar packages for the EU and India.

Following severe impacts in 2021 from the global semiconductor chip shortage (and other supply chain issues), the automotive sector had expected to see some improvement in conditions in 2022. The chip shortage contributed to global car sales in December 2021 falling to their lowest levels since the 1990s (Figure 3.4).

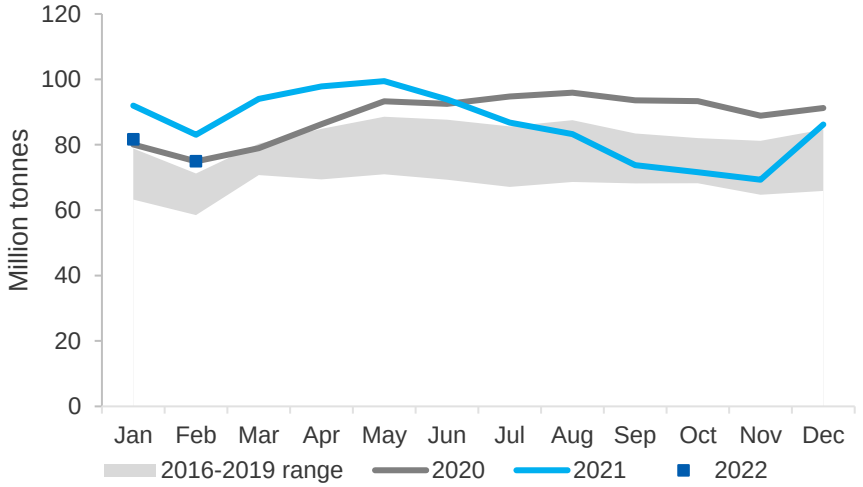
However, intensified impacts are now expected for global car production in 2022 due to the current Russian invasion of Ukraine. Ukraine and Russia are the world's largest producers of neon and palladium respectively, which are critical inputs to semiconductor chips and catalytic converters. This, and other shortages have already seen major producers in Europe announce new production cuts from March, with preliminary estimates of 2.6 million less light vehicles to be produced globally in 2022 and 2023.

Over the outlook period, the sector will be buoyed by the projected rise of electric vehicles. In 2021, global EV sales doubled (year-on-year) to reach 6.5 million. Market share has also tripled over the past two years, with EV sales now representing close to 9% of the global car market.

China's steel output in 2021 records biggest fall in over 15 years

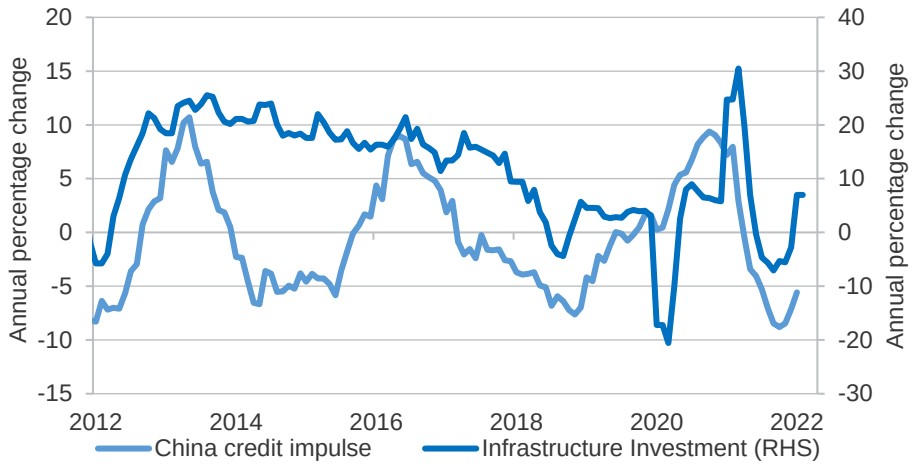
Following record output for the first half six months of 2021 (up 12% compared with the same period in 2020), China's total steel production of 1.03 billion tonnes for the whole of 2021 was 3.0% lower than previous year. This included output for the months of September, October and November that were more than 20% lower than in the same month in 2020 (Figure 3.5).

Figure 3.5: China monthly steel production



Source: Bloomberg (2022); World Steel Association (2022)

Figure 3.6: China's fiscal and monetary conditions



Notes: Infrastructure investment year-on-year change based on 3 month moving average; China credit impulse is constructed by Bloomberg Economics and measures the impacts of new lending increment to GDP growth

Source: Bloomberg (2022)

The fall in steel production reflects emissions-related production curbs introduced by China's Central Government last year, as part of the country's efforts at the time to achieve peak steel emissions by 2025 and net zero emissions by 2060.

Output curbs were initially placed on China's biggest steel-producing city Tangshan in February, with an order for many mills to achieve a 30-50% reduction on levels in 2020. However, these restrictions were expanded to China's 30 other provinces from June 2021, with mills instructed to maintain full year output at 2020 levels.

A power supply crunch in China from September also impacted steel output in the second half of 2021. Thermal coal shortages saw more than half of China's 31 provinces implement power rationing and forced blackouts, severely hampering steel production over the period (see *Thermal coal* chapter). Direct production cuts appeared to have primarily impacted long steel producers, while reduced industrial production saw muted demand for flat steel products.

Winter steel production curbs have been enforced for much of the March 2022 quarter. These curbs — intended to mitigate pollution levels in the northern provinces — required mills to maintain output around 30% below 2021 levels for the period 1 January to 15 March. Steel output in January-February 2022 was also impacted by efforts from China's Central Government to reduce industrial activity and ensure reduced air pollution (and blue skies) for the Beijing Winter Olympics.

For the remainder of 2022, signs are emerging that China's fiscal policy will be more expansionary, which should bolster demand for steel. China is expected to increase new infrastructure investment — which typically represents around 20-25% of China's total consumption of steel — in the first half of this year. For 2022, the Government has announced a quota of 1.46 trillion yuan (US$229.8 billion), which will include the front loading of financing of 102 mega infrastructure projects (roads, rail, power, industrial parks, etc) in the first six months of the year. Flow through of this funding is expected to boost construction activity from the June quarter 2022.

Credit conditions are also expected to be eased this year, following a more contractionary policy stance in 2021 (Figure 3.6). Recent cuts to both the bank Reserve Ratio Requirement (RRR) and benchmark mortgage rate signal strong policymaker intent to stabilise the economy, after slowing growth conditions in the second half of 2021. More expansionary monetary conditions are expected to assist, by boosting consumption and domestic activity.

China's manufacturing sector appears to have recovered from the country's recent power crunch, with the manufacturing output increasing by 7.3% year-on-year in February 2022 (from a low of 2.5% growth in September last year). However, with the US and many other major economies expected to tighten monetary conditions in 2022, this sector remains exposed to a potential weakening in global demand for China's exports in the first half of the outlook period.

However, renewed outbreaks of the COVID-19 pandemic in a number of provinces in recent months poses some risks to China's total steel output in 2022. This includes lockdowns and other emergency restrictions placed on China's largest steel production hub — Tangshan — from late March.

China's property sector remains critical to steel demand in 2022

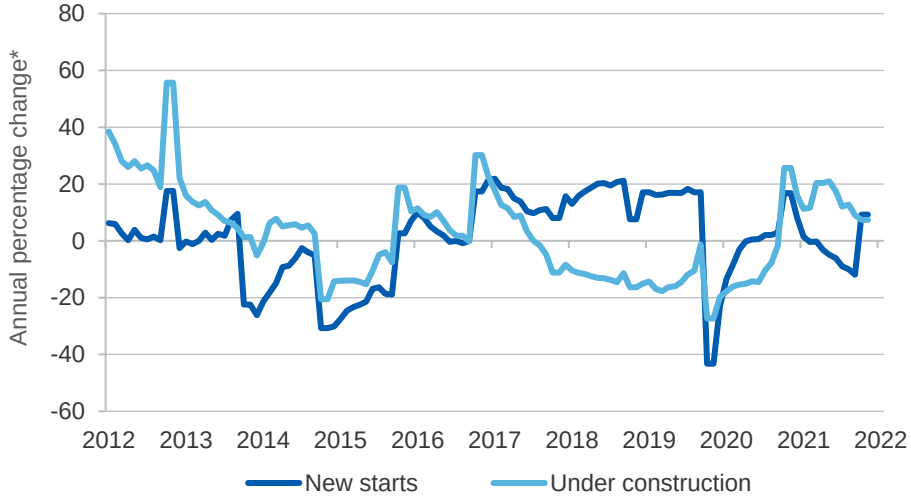
A key risk to steel demand this year remains the continued weakness in the Chinese residential property sector, which typically accounts for around 35-40% of China's total steel consumption.

China's property sector continues to experience liquidity pressures, with a number of major developers having recently defaulted on offshore and onshore-held debt, and many offloading housing stock in order to meet interest payments. This led to significant falls in construction starts in the second half of 2021 (Figure 3.7), as well as total new home sales in January 2022 for China's top 100 developers falling around 40% year-on-year. Weakness in the sector has also stalled new land sales in China's top 50 cities, which were down close to 80% year-on-year in January 2022. This carries broader implications for China's economy and government spending over the outlook, with land sales typically accounting for a significant proportion of local government revenue.

In recent months, China's Government appears to have taken further steps to stabilise the property sector and ensure the completion of existing projects. Many state-owned developers have taken over assets of distressed private developers and are making land purchases. The Central Government also appears to have loosened its Three Red Lines policy, with previously-restricted funding now available to developers to finish existing projects.

The Chinese Government has also reiterated its aims to shift its economy away from investment- and exports-driven 'quantity' growth and toward a more consumption-oriented 'quality' growth in coming years. Over the outlook period, China's total steel production is projected to remain relatively flat at around 1.03 billion tonnes annually (Figure 3.8). While China recently pushed back its aim for peak emissions from its steel industry (from 2025) to 2030, decarbonisation efforts are still expected to have a growing impact on output over the coming years. This also includes a greater share of production coming from scrap-based EAF production, with the Chinese Government aiming for 300 million tonnes of scrap-based steel production by 2025.

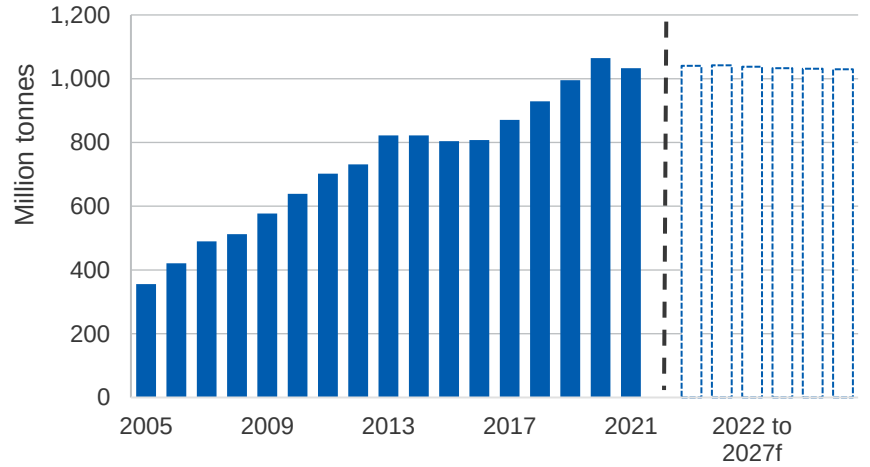
Figure 3.7: China's residential property sector



Notes: * Annual percentage change is calculated based on an average of the same month for the past two years; both series based on million square metres of floor space.

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

Figure 3.8: China steel production to 2027



Notes: **f** forecast

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

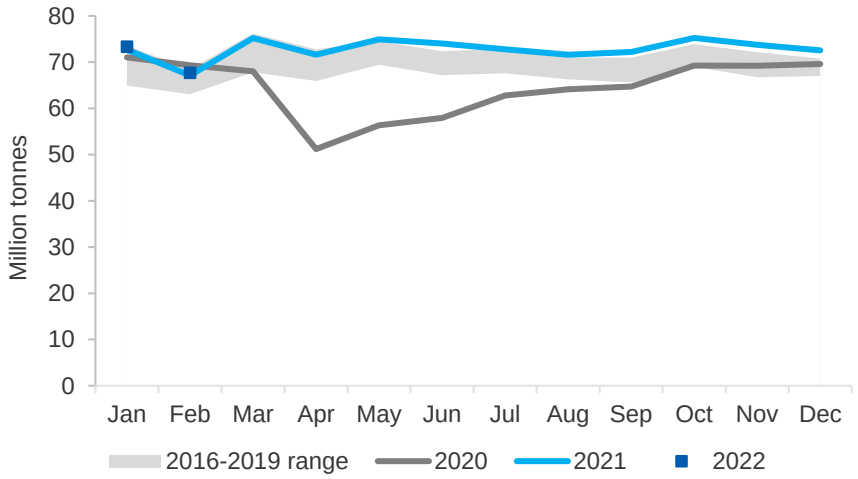
Strong recovery in 2021 steel output for major producers outside China

Despite new outbreaks of the pandemic and other supply chain disruptions, production was resilient across other major steel-producing economies throughout 2021. For the full year, world steel output (excluding China) was 918 million tonnes, an increase of 13% year-on-year for 2020, and 4.3% higher compared to 2019 levels (Figure 3.9).

Steel production in the EU — the world's second largest steel-producer — grew 15% year-on-year in 2021 (and was 1.5% higher than the same period in 2019).

After a rapid expansion in economic activity in the June quarter, Eurozone GDP growth slowed considerably in the second half of 2021. This follows a waning base effect — with economic activity most subdued in the June 2020 quarter — as well as renewed waves of the COVID-19 pandemic, and acute global supply chain disruptions. These issues have seen Euro area industrial output trend lower for the last nine months (from April 2021), to reach a low of zero growth (year-on-year) in January this year (Figure 3.10).

Figure 3.9: Monthly steel production – Global (exc. China)



Source: World Steel Association (2022)

The Eurozone Manufacturing PMI in February showed some stabilisation of this downtrend, with a reading of 58.2. This included increased momentum in 'new orders' and 'employment', as producers looked through the most recent Omicron wave. Supply delays also appeared to be easing, though lead times remained stretched for many critical inputs. With average factory gate prices also at record highs, consumer price inflation is expected to remain elevated in the first half of 2022.

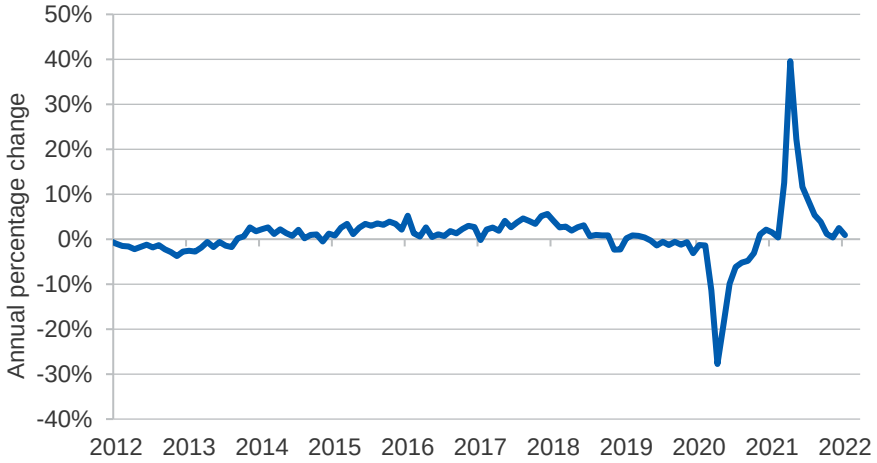
The Euro area continues to be heavily affected by the global semi-conductor shortage. Major automakers, such as BMW, Renault and Volkswagen, were forced to idle production in the second half of 2021, and December global car sales fell to their lowest levels since the 1990s. The industry was expecting chip shortages to persist well into this year (with some easing), however this may now be further exacerbated by the current Russian invasion of Ukraine, given the potential for shortages of a number of critical raw inputs.

The Eurozone is projected to experience low, but steady, growth in steel consumption over the outlook period (Figure 3.11). A major driver of demand will be Europe's construction sector, which accounts for around 35% of the region's steel consumption. The Eurozone Construction PMI reading was 56.6 in January 2022, the sharpest rise in activity in 4 years. Ongoing housing shortages, combined with relatively low growth in new home permits over the last two years, is expected to bolster construction activity in coming years, along with new infrastructure investment — committed as part of the European Green Deal.

However, risks to this outlook remain: Europe's natural gas and oil supplies remain at risk of further shortages, given the current Russian invasion of Ukraine. Alongside energy price volatility, the conflict could lead to further sanctions and actions by major economies that would disrupt trade and economic activity throughout Europe.

Rising price pressures have also seen inflation reach its highest levels in decades in February this year. While supply chain disruptions were expected to ease in 2022, price pressures are raising expectations of a new cycle of monetary tightening in Europe over the next few years.

Figure 3.10: EU monthly industrial production



Source: Bloomberg (2022)

US steel production grew by 18% year-on-year in 2021. However, production remained around 2.0% below calendar 2019.

2021 saw record prices in the US for a number of finished steel products, most notably hot-rolled coil. This reflected a slow recovery in domestic mill capacity, coupled with a stimulus-led recovery in steel use, that saw demand dramatically outpace supply through much of 2021. Prices eased noticeably from November, as domestic mills brought supply back online and imports lifted. This has also been helped by the US-EU agreement in October 2021 to cut US tariffs on steel imports from the EU.

The global semiconductor shortage that has impacted US automakers throughout 2021 looks set to continue into 2022. As a consequence of the disruptions, many major US auto manufacturers are beginning to investigate internal supply chain opportunities to develop chips, though any production remains years away. The impact of current chip shortages on steel demand and scrap supply therefore remains a risk over the outlook period.

US steel production is expected to maintain healthy growth of around 3.2% annually over the outlook period (Figure 3.11). This includes around 10 million tonnes in new EAF-based steelmaking, to be brought online over the next two years. This will support a projected rise in the US' domestic steel demand over the outlook to 2027, as the US$1.2 trillion Bipartisan Infrastructure Framework (BIF) is implemented. This package includes US$550 billion in new federal government investment for roads and bridges, rail, and water and electrical infrastructure. It also marks the biggest investment in US infrastructure since the 1950s. Recent estimates from the American Iron and Steel Association suggest that as much as five million tonnes of new demand for steel is created for every $100 billion in new investment, indicating a significant boost to US steel consumption from the new package over the outlook period.

Indian steel output was around 118 million tonnes in 2021, 18% higher year-on-year. While this partly accounts for the impacts of a (2020) low base effect — when steel output fell 10% year-on-year — the rebound in the nation's manufacturing and construction industries is ongoing, contributing to rising steel demand.

Following rapid expansion in industrial activity in the first half of 2021, growth in India's industrial production slowed to 0.4% year-on-year in December, with weaker production in industries such as mining, manufacturing and utilities. This is due to a number of rising supply side issues, including a severe power crunch — owing to the shortages of coal — as well as semi-conductor shortages and higher input costs.

India is expected to see a significant increase in infrastructure spending in 2022, as part of its $1.5 trillion National Infrastructure Pipeline to 2025. Around US$500 billion will be spent in the next financial year (starting April 1) for projects including 25,000km of new national highway, 400 new trains and 100 cargo terminals. Construction is also forecast to grow by double digits in India's 2022 fiscal year (April 2021 to March 2022), after a fall of 7.3% in its previous financial year.

Over the outlook period, India is projected to grow its steel output by close to 5% annually, and could challenge the EU for position as the world's second largest steel producer by 2027 (Figure 3.11). In December 2021, India's Minister for Steel announced a target to double national steel production capacity to 300Mt by 2030–31 (from current capacity of 144Mt).

The Indian Government intends to support this target with the Production-Linked Incentive (PLI) Scheme it introduced in July 2021.

Total steel production for South East Asian countries, including the Philippines, Indonesia, Malaysia and Thailand, is projected to grow by around 6.8% annually over the outlook period, from 62 million tonnes in 2021 to more than 90 million tonnes by 2027 (Figure 3.11). This will help meet growing domestic demand for steel in these countries, including from government-led infrastructure projects, and the continued development of export-oriented manufacturing capacity.

Low and zero-carbon steel to become more widespread over the outlook

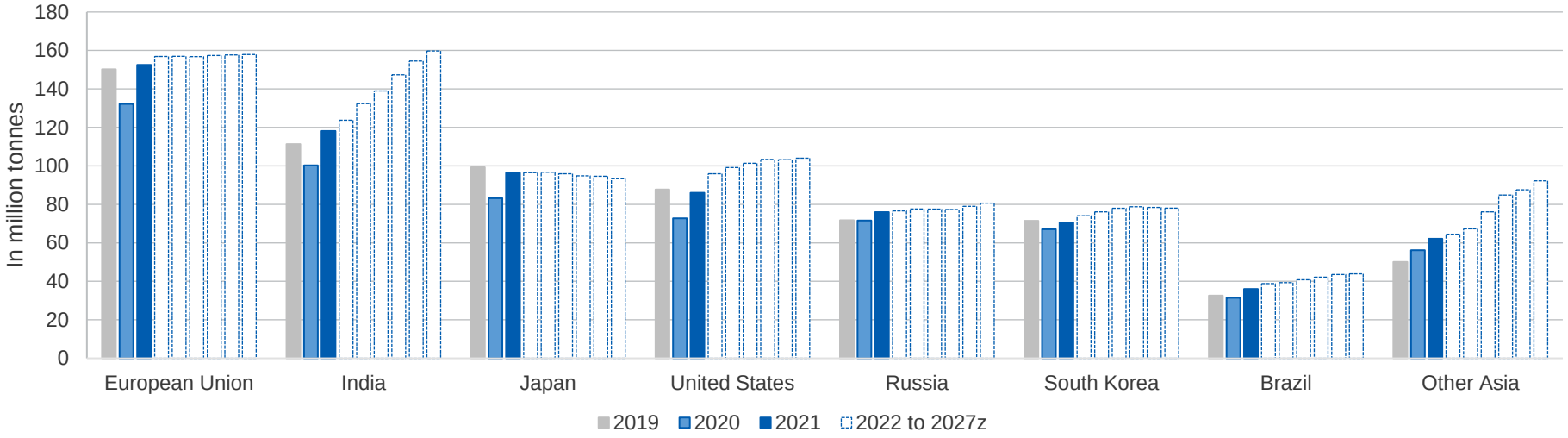
World production of low and zero-carbon steel is expected to increase over the outlook period, as the steel industry continues to respond to the global transition to low carbon emissions.

A number of different technologies and processes are being developed to produce low and zero-carbon steel. This includes the use of renewable energy in Electric Arc Furnace-based making (including the DRI-EAF process, where DRI feedstock is created using green hydrogen); as well as nascent technologies such as Molten Oxide Electrolysis, where (renewable) electricity turns iron ore directly into liquefied metal. Collectively, this evolution is often referred to as 'green steel' (though this term often also incorporates scrap-based steelmaking, recycled steel, and conventional steel with emissions offsets).

Many major steel producers have recently committed to ambitious emissions-related targets. This includes over 6 million tonnes of new DRI-EAF capacity, to be delivered over the next five to ten years for producers such as Swedish-based SSAB, German steelmaker Salzgitter, and the world's largest steel producer, ArcelorMittal.

The rise of these products is expected to take some time, and largely displace more traditional, high-emissions steel, rather than substantially increase total global steel production in the aggregate.

Figure 3.11: Annual steel production (exc. China)



Notes: **z** projection

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

Table 3.1: World steel consumption and production

	Million tonnes							
Crude steel consumption	**2021**	**2022[f]**	**2023[f]**	**2024[z]**	**2025[z]**	**2026[z]**	**2027[z]**	**CAGR[r]**
China	1,026	1,029	1,032	1,027	1,021	1,013	1,011	-0.2
European Union	150	156	161	166	171	172	174	2.6
United States	94	106	114	118	122	126	128	5.3
India	99	104	113	122	132	141	142	6.3
Japan	56	57	59	61	61	62	62	1.8
South Korea	51	53	54	55	55	56	56	1.7
Russia	49	50	52	54	55	56	57	2.5
Brazil	25	27	30	32	34	35	35	5.9
World steel consumption	1,959	2,004	2,028	2,050	2,072	2,089	2,106	1.2
Crude steel production	**2021**	**2022[f]**	**2023[f]**	**2024[z]**	**2025[z]**	**2026[z]**	**2027[z]**	**CAGR[r]**
China	1,033	1,040	1,042	1,038	1,033	1,031	1,030	-0.1
European Union	153	157	157	157	157	158	158	0.6
India	118	124	132	139	147	155	160	5.2
Japan	96	96	97	96	95	95	93	-0.5
United States	86	96	99	101	103	103	104	3.2
Russia	76	77	78	78	77	79	81	1.0
South Korea	71	74	76	78	79	78	78	1.7
Brazil	36	39	39	41	42	44	44	3.3
World steel production	1,951	1,993	2,019	2,044	2,064	2,081	2,097	1.2

Notes: **e** Estimate; **f** Forecast; **r** Compound annual growth rate; **z** Projection

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