Financing the decarbonisation of China's steel industry: technology, policy and instruments



Published by the Climate Bonds Initiative

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Report summary

This decade is pivotal for the transition of the steel sector towards the targets set out in the Paris Agreement. In China, 78% (730.8 Mt/yr) of the existing coal-based blast furnace capacity will need reinvestment by 2030, demonstrating the magnitude of investment needed to develop and roll out low-carbon steelmaking technologies to transform the sector.¹ Therefore, financial flows must be aligned with a Paris-compatible scenario to avoid lock-in, and be in place for the next investment cycle, given the longevity of steel assets.

Currently, zero-carbon steel is technically feasible but expensive. The steel sector in China requires fixed-asset investment estimated to be at least CNY1.6tn (USD220bn) for decarbonisation by 2050, the finance for which could be supplied by the sustainable debt market.² This report explores levers to accelerate the decarbonisation of the steel sector and describes how transition finance can supply the required capital. The following aspects are explored:

 Alignment of guidance. Provincial transition finance guidance is already in place and needs further alignment both inter-provincially, and internationally to support capital flows towards steel transition.

- Inclusive policies to encourage all types
 of entities. Transition finance guidance
 and policies must be inclusive for all types
 of entities to accelerate the deployment of
 low-carbon production and provide incentives
 for companies to achieve a climate-aligned
 transition. More focus should be given to
 deep decarbonisation methods (e.g., green
 hydrogen) and the transition of small and
 medium enterprises (SMEs).
- The labelled bond and loan market can provide the finance required. Steel entities should be encouraged to deploy the labelled bond and loan market to finance the transition. Investor appetite is strong, and the market can absorb the funding needed with guidance available from Climate Bonds and others to ensure credibility.
- Carbon pricing mechanisms will add urgency to the transition. Carbon pricing mechanisms (carbon trading markets and carbon tariffs) domestically and internationally will increase emission costs and operating pressure on steel companies, which will encourage them to transition.
- Strong public policy should create demand for green steel. Green public procurement can stimulate green steel demand and accelerate the shift by companies in the steel sector from high-emitting methods to lowcarbon production.

Introduction

Steel production currently accounts for around 8% of global CO₂ emissions, making it the largest contributor to greenhouse gas (GHG) emissions among the global industrial sectors.³ Despite pledges and actions, current decarbonisation progress in this industry is falling behind the Paris Agreement goals.⁴ Meanwhile, global steel production is highly concentrated geographically. Nearly half of the world's steel is currently produced in China and the world's five largest steelmakers account for about three-quarters of global production: China's Baowu Group, HBIS, Ansteel Group, Shagang Group, Luxembourgbased ArcelorMittal, and Japan's Nippon Steel.⁵

For steel and other industrial sectors known as hard-to-abate, the barriers to decarbonisation are much higher than other sectors. Steel is a capitalintensive industry so its transformation depends on innovative low-carbon technologies being mobilised, a process that requires significant financial support.

Global agreement on emissions reduction, and China's own nationally determined contribution (NDC) to reach peak emissions by 2030 and carbon neutrality by 2060 (2030:2060 targets), call for the steel industry to develop operable plans to reduce its emissions. China's leading steel producers, including the HBIS Group, Ansteel, and Baowu Group (which represent 22% of China's total steel production and 12% of world steel production respectively) have all released carbon peak and carbon neutrality roadmaps and action plans. Yet the steel sector in China requires fixed asset investment estimated to be at least CNY1.6tn (USD220bn) for decarbonisation by 2050, according to recent research by Rocky Mountain Institute and Climate Bonds.⁶ Among the estimated CNY1.6tn fixed asset investment, researchers estimate 33% investment for energy efficiency, 23% for electric arc furnace, 18% for direct iron reduction, 14% for CCUS, 7% for blast furnace hydrogen injection, and 5% for pellet manufacturing.

The decarbonisation of steel is not only a technological challenge but also a financial and political one. In addition to the identification of a new range of decarbonisation levers guided through sector criteria, it will require finance from the private sector, supported by policy measures. The USD120tn debt market is well placed to absorb this financing need. Climate Bonds research points to a shortage of supply of green bonds bearing the required credentials, suggesting that there is sufficient investor demand to support the required transition.7 However, steel asset lifetimes often exceed 40 years so the investment decisions made today can lock in billions of tons of emissions and potentially billions of dollars in stranded assets.8

This report summarises policy, technology, and market options, and discusses how policies, sector criteria, and tools can support steel companies to finance low-carbon transitions and adopt deep decarbonisation technologies.

Background on steel decarbonisation

Steel production and decarbonisation options

Technologies such as recycling, low-carbon hydrogen, electrification, and carbon capture, utilisation and storage (CCUS) present opportunities to transform the



steel industry. There are several ways to achieve carbon neutrality in steel production in the medium- and long-term.

Option 1: scrap-based production in electric arc furnaces (EAFs) to produce recycled steel. According to the International Energy Agency (IEA) the share of recycled steel in steel production may rise to 45% by 2050, while overall steel demand could increase by 40%.⁹ Hence, the increase in global steel demand coupled with limited availability of scrap steel will still require significant primary steel production (use of iron ore to produce steel) by 2050, demonstrating that EAFs cannot be the only solution.¹⁰

Option 2: low-carbon hydrogen-based direct reduced-iron EAF technology (hydrogen-based DRI-EAF). HYBRIT, the first project to deliver a batch of fossil-free steel, made from low-carbon hydrogen, was launched in 2016 and jointly funded by Swedish Steel Company (SSAB), Mining Company (LKAB) and Power Company (Vattenfall). Low-carbon hydrogen is used to directly reduce iron ore and the first batch of fossil-free steel was delivered in 2021.¹¹

Option 3: complement existing fossil energybased production processes with CCUS to neutralise greenhouse gas emissions in the iron and steelmaking process.

Option 4: further development of new technologies such as electrolysis of iron ore.

There are two main sources of input materials for steel production: a) iron-making and steelmaking based on iron ore, and b) recycling scrap steel for re-smelting. Presently, there are three main steel production processes:

- Blast Furnace Basic Oxygen Furnace (BF-BOF) production process;
- Scrap-based electric arc furnace (EAF) production process, and;
- Hydrogen metallurgy process.

Each of these steel production processes presents large differences in carbon emissions, both in terms of the source of the carbon emissions and the intensity per output. Those are laid out in the table below.

The main challenge to improving hydrogenbased metallurgy is the supply and cost of lowcarbon hydrogen. Currently, global low-carbon

Table I. Steel	production	process and	l sources of	'emissions.

Production process	Main source of emissions	Average emission intensity based on 2022. (CO ₂ per ton of crude steel cast)
BF-BOF	Mainly from the combustion of fossil fuels such as coal coke, indirect emissions from the use of electricity and heat, and processes emissions such as consuming limestone.	2.33
Scrap-EAF	Mainly from the emissions generated using electricity and heat, as well as emissions from scrap steel, limestone, and other industrial production processes. There is also a small amount of emissions from the combustion of fossil fuels such as fossil gas.	0.68
DRI-EAF (Hydrogen metallurgy is at the pilot stage, including hydrogen-based direct reduction iron-making, hydrogen-based smelting reduction iron-making, etc.)	Current carbon emissions mainly come from the combustion emissions of fossil fuels such as coke oven gases, emissions from the use of electricity and heat, and emissions from industrial production processes such as the use of limestone. Note: to date, hydrogen mainly comes from hydrogen-rich gases such as coke oven gases. In the future, the use of green hydrogen will be explored.	1.37

* Emission intensity from the World Steel Association for a global average based on 2022 calculation.²³

hydrogen production accounts for approximately 5% of the total. As demand from the global industrial and transportation sectors is expected to grow, many governments have released industrial low-carbon transition strategies that include plans to scale their production, including through subsidies. There has been a significant increase in near-zero-emission primary steelmaking projects globally, with the pipeline growing from 5 Mt/yr in 2021 to 13 Mt/yr in 2022, and a capacity of over 100 Mt/yr is required for the sector to keep on track to net zero.¹² Currently, 40 Mt have been planned for direct reduced iron capacity, and several corporations have announced plans to increase EAF steel production capacity.13

Green hydrogen is believed to have the potential to reduce emissions from steel production emissions by up to 98%. As scrap steel is limited, the use of green hydrogen to replace coal as a reducing agent will be essential to support steel decarbonisation. The cost of green hydrogen is influenced by various factors such as the cost of renewable energy electricity (solar, wind, etc.,), electrolyser system costs, electrolyser operating time, hydrogen policies, and end-use applications. According to the International Renewable Energy Agency (IRENA), the cost of green hydrogen is expected to decrease from an average of 4-6 USD/kg to below 2 USD/kg by 2030. Similar forecasts have been made by PwC, by comparing projections of 15 scenarios from seven different reports, indicating a global reduction of 50% in green hydrogen costs before 2030.¹⁴ A joint report by the China Hydrogen Alliance and Accenture suggests that the production cost of hydrogen in China is expected to decrease to 2.18 USD/kg by 2030.¹⁵

Downstream steel users, such as automakers and real estate companies, are already actively prepurchasing zero-carbon and low-carbon steel. As of May 2022, Adient, BMW Group, Electrolux, Marcegaglia, Mercedes-Benz and others all have pre-purchased zero-carbon steel from Swedish steel company H2 Green Steel. Together, these offtake agreements account for approximately 1.5 Mt per annum for 5-7 years and represent more than half of the expected H2 Green Steel first-year production capacity of 2.5Mt.¹⁶

Chinese steel corporate transition objectives

To meet China's targets of peak carbon by 2030 and carbon neutrality by 2060, the top three Chinese steel-producing companies (Baowu, Ansteel, HBIS),



representing 22% of China's total production, have announced emission reduction targets. Baowu aims to achieve a 30% reduction by 2035, and carbon neutrality by 2050.¹⁷ HBIS strives to achieve carbon neutrality by 2050, and Ansteel also pledges to reduce emissions by 30% by 2035.^{18,19}

Steel companies have also started to take action towards decarbonisation. For example, in 2021, HBIS started to pilot the DRI project construction in Hebei.²⁰ In 2023, the HBIS Group obtained approval for the first full-scale green primary steel project in China, representing a USD683m investment, with the construction period scheduled from October 2023 to September 2025.²¹ In 2022, Ansteel started to construct a 10,000-ton capacity green hydrogen demonstration project.²²

More than 80% of Chinese steel companies are SMEs with a production scale of less than five million tons, and these 80% of steel companies contribute to 40% of total Chinese steel production. Credible transition finance instruments for SMEs are being developed to support the required transformation.

Transition finance for steel decarbonisation: policy, standard development, and market landscape

Transition finance refers to finance earmarked to support the dynamic process of decarbonising an entity. Transition finance can be seen as a sub-set of green finance because it contributes to a better environmental outcome. This chapter summarises steel sector-specific transition finance guidance from regulators and banks, the market landscape of labelled bonds and loans in China, and a discussion on levers to accelerate the steel sector transition.

Transition finance framework and criteria development

Steel companies can access financing from China's green finance market, though only a few activities are eligible under current guidance. In the Chinese green finance market,



according to the *Green Bond Endorsed Projects Catalogue (2021 version)* by the People's Bank of China (PBoC), steel companies can obtain financing through labelled green bonds from various categories at the project level, including energy efficiency, heat recycling, waste and resource recycle, green hydrogen, biomass, and CCUS.²⁴ The current Chinese green finance market covers support at the project level and a small number of economic activities in the highemitting industries; thus, the emerging Chinese transition finance standards and guidance can facilitate more targeted financing for the transition of steel companies to net zero.

Financial regulators are actively developing guidance to promote the orderly growth of the Chinese transition finance market. The PBoC and relevant departments are researching transition finance guidance to support the low-carbon transition of high-emitting industries, and steel is one of the focus sectors. Since 2022, at least eight provinces and cities in China have launched transition finance guidelines, including Hebei, a key steel-producing province that accounts for 20% of China's total steel production.²⁵ Hebei Province's Transition Finance Guidelines for the Iron and Steel Industry (2023-2024 Edition) lists 176 technologies that the provincial transition finance guidance can support. The guideline defines the time frame for the transition: shortterm targets (2025), medium-term targets (2030), and long-term targets (by 2060). In addition, the Hebei provincial transition finance guidance also applies to downstream companies (e.g., automotive companies), incentivising them to purchase green steel.

In the international market, transition finance has also received widespread attention. At the national level, countries or regions have started to formulate guiding policies for the development of transition finance, and there are ongoing efforts to harmonise definitions.

- Guidelines such as the *Transition Finance Guidelines* issued by the Research Institute for Environmental Finance of Japan are consistent with the International Capital Markets Association (ICMA) *Climate Transition Finance Handbook* and steel is one of the key sectors.²⁶ Such guidelines include a transition road map for the industry, listing potential relevant decarbonisation technologies, including energy efficiency improvements, heat recovery, CCUS, electric furnaces, COURSE50,²⁷ and hydrogen-based direct reduction of iron.²⁸
- The *EU Taxonomy* uses technical screening criteria to determine whether steel production meets specific thresholds, including molten iron, sinter, coke, cast iron, and EAF, as well as setting requirements for scrap steel input into EAF.²⁹
- The Singapore-Asia Taxonomy for Sustainable Finance 2023 adopts the Climate Bonds Steel Criteria, which sets detailed decarbonisation requirements for the use of proceeds, assets, entities, and sustainabilitylinked debt instruments.^{30,31}

Financial institutions have also released frameworks for the steel sector, which open more financing channels for the Chinese steel sector to access climate finance. The industry-led, and UN-convened, Net-Zero Bank Alliance (NZBA) released its Transition Finance Guide in October 2022, which includes basic requirements for the transition finance framework of NZBA member banks that encourage each bank to establish its transition finance framework.³² By the end of 2023, a few member banks of NZBA such as Standard Chartered Bank, DBS, and Maybank had established a transition finance framework and included the steel industry as part of their transition finance project catalogue. In China, China Construction Bank and Bank of China successively issued the Transition Bond Framework and the Transition Bond Management Statement.

Based on public information disclosure, the table below summarises current practices from financial institutions on transition finance definitions and eligibility for the steel sector.

Table 2. Transition finance frameworks from financial institutions for the decarbonisation of the steel sector.				
Financial Institutions	Transition Frameworks	Eligible financing types	Steel sector	
DBS	Sustainable & Transition Finance Framework & Taxonomy ³³	Use of proceeds Corporate level financing	 Iron or steel producers (excluding coal-fired iron or steel plants): 1. Decarbonisation technologies (e.g., scrap-based (recycled) steel, carbon capture ar storage, electrolysis). 2. Energy efficiency of blast furnace (e.g., coke dry quenching, production gases reuse power production). 	
Standard Chartered	Transition Finance Framework ³⁴	Eligible projects and activities Corporations where at least 90% of the company's revenues are derived from activities in the Framework	Scrap-based production of steel; Scrap-based EAF; Hydrogen based DRI; Iron ore electrolysis; Electrification of ancillary equipment; Partial hydrogen injection into commercial blast furnaces; Innovative smelting reduction; Natural-gas based DRI with CCUS; Innovative blast furnace retrofit.	
Maybank	Transition Finance Framework ³⁵	Transition/ transition-linked bonds/loans	 Blast furnace: Emissions intensity below 1.551 tCO₂e/t of steel; and meets either of the criteria: 1. the average emissions intensity over the entire lifetime of the facility is below 0.897 tCO₂e/t of steel, OR 2. the facility follows TPI's 2-degree scenario decarbonisation pathway throughout its lifetime. Retrofit of existing facilities that result in an emissions intensity lower than 1.551 tCO₂e/t through the following measures, including but not limited to: increasing thermal efficiency; use of biochar; integrating CC(U)S. EAF + scrap using 90% of iron content from scrap. DRI-EAF subject to the any of the following feedstock criteria: DRI using renewable energy with EAF; DRI using biogas/hydrogen/ biochar) with EAF; R&D on low-carbon solutions such as direct electrolysis or smelting reduction. 	
China Construction Bank	Transition Bond Framework ³⁶	Use of proceeds	 Reduction of carbon emissions/energy consumption during steel processing (including but not limited to the use of hydrogen and biomass as reducing agents). Collection and recycling of scrap iron and steel, and utilisation of scrap iron and steel for steel reproduction. Furnace heating with low-carbon fuel (including but not limited to natural gas). Recovery and utilization of waste heat energy (including but not limited to recovery and utilisation of waste heat energy during sintering and dry quenching). Carbon capture and storage technology for the steel industry. Research and development of technologies that can reduce carbon intensity/energy consumption of steel production. 	
Bank of China	Transition Bonds Management Statement ³⁷	Use of proceeds	 Reduction of carbon emissions/energy consumption during steel processing (including but not limited to the use of hydrogen and biomass as reducing agents). Collection and recycling of scrap iron and steel, and utilisation of scrap iron and steel for steel reproduction. Furnace heating with natural gas (including but not limited to natural gas). Recovery and utilisation of waste heat energy (including but not limited to recovery and utilization of waste heat energy during sintering and dry quenching). Carbon capture and storage technology for the steel industry. Research and development of technologies that can reduce carbon intensity/energy consumption of steel production. 	

Chinese labelled bond and loan markets

As mentioned above, climate transition finance refers to finance earmarked to support the dynamic process of decarbonising an entity. Transition-linked bonds can



be used by corporates to finance their climate transition either as use of proceeds (UoP) bonds or general purpose bonds linked to key performance indicators (KPIs):

- UoP bonds, such as green or sustainability bonds, fund projects with specific and dedicated environmental and/or social benefits. Adherence to standards and predetermined UoP categories provide the means to defining and disclosing their impact.
- Performance-linked bonds, such as sustainability-linked bonds (SLBs), are used for an issuer's general-purpose financing to set ambitious, realistic, and explicit sustainability targets at the corporate level. They involve penalties or rewards linked to meeting (or not) pre-defined and time-bound sustainability performance targets (SPTs) for each of its predetermined KPIs.

According to Climate Bonds, China was the world's largest green bond market for the second consecutive year. As of the end of 2023, a total of CNY4.46tn (USD616.2bn) of labelled green bonds had originated from China in domestic and overseas markets, of which nearly CNY2.7tn (USD372bn) meet Climate Bonds' green definitions.

Despite the continuous expansion of the Chinese labelled bond market, only 0.1% has originated from issuers in the steel sector. Steel companies can issue green bonds according to the *Chinese Green Bond Endorsed Projects Catalogue (2021 edition)* for various projects, including recycling, energy efficiency, hydrogen, and CCUS. According to the Climate Bonds datasets, issuers from the Chinese steel sector had issued 23 green bonds (CNY3.5bn) and six sustainability-linked bonds (CNY1.6bn) by the end of 2023, representing 0.1% of the total Chinese labelled bond market volume (CNY4.46tn).

The Chinese labelled loan market is nine times the size of the labelled bond market; however, loan disclosure tends to be scant. By the end of 2023, the total outstanding green loan volume was CNY30.08tn (USD4.15tn) according to the PBoC, representing 12.7% of the total China loan market.³⁸ Granular data on the total volume of green loans for steel projects is not available, nor are details on proceeds toward greenhouse gas reduction projects. Information disclosed through case studies shows that green loans have supported the pollutant control projects of the steel sector over the past several years. For example, as of July 2022, a total of 251 steel companies in China with a crude steel production capacity of about 681 million tons have completed or are implementing an ultralow emission transformation. The cumulative investment in ultra-low emission transformation of steel companies across the country has exceeded CNY150bn (USD21bn).39

Compared to the progress towards low-carbon transition (estimated at least CNY1.6tn), the current issuance volume from the Chinese steel sector is very small (accumulated CNY5.1bn). The labelled bond and loan market can supply the required capital but issuers operating in the steel sector must be encouraged to price deals with the recommended transparency and credibility.

Case study 1: Hydrogen metallurgical decarbonisation financing

This case study introduces a performancebased instrument designed to support hydrogen-based steel production.

In May 2022, Baoshan Iron and Steel Co., Ltd. priced a CNY500m (USD70m) SLB with an interest rate of 2.68%. The deal was issued to support the Zhanjiang iron and steel million-ton hydrogen-based shaft furnace system project. It uses hydrogen metallurgy technology to replace carbon with hydrogen, uses hydrogen-based shaft furnace low-carbon metallurgy to replace the conventional blast furnace process, and uses hydrogen energy to replace fossil energy.

In addition, the hydrogen-based shaft furnace system project uses coke oven gas, a by-product of the coking process, as reducing gas to achieve resource recycling and reduce the consumption of fossil fuel and the generation of carbon dioxide in the steel production process.

This bond uses nitrogen oxide emissions per ton of steel not exceeding 0.63 kg/ton of crude steel in 2023 as the KPI, which aims to achieve a 6% decrease in nitrogen oxide emission from 2020.

Climate Bonds strongly encourages the use of GHG emission-reduction targets in SLBs, which help demonstrate the issuer's commitment to both its decarbonisation efforts, and the central government's 30:60 decarbonisation targets.

Table 3. Examples of 3ED issuers in the eninese steer sector							
lssuer	Amount (USD)	Issuance date	Maturity date	KPI type	KPI details		
Anshan Steel	320m	26/01/2022	26/01/2025	Energy consumption per ton of steel	584 kgce/t by 2020 (baseline) 565 kgce/t by the end of 2022 (target)		
Baoshan Steel	776.4m	6/09/2021	6/09/2024	Nitrogen oxide (NOx) emissions per ton of steel	0.67 kg/ton in 2022 (baseline) 0.63 kg/ton by the end of 2023 (target)		
Liuzhou Steel	32m	7/05/2021	7/05/2024	NOx emissions per unit of product (crude steel)	1.123 kg/ton in 2020 (baseline) 0.935 kg/ton in 2022 (target)		
Shandong Steel	154.6m	30/08/2021	30/08/2024	Enhancement of production efficiency	604.00 kgce/t in 2020 (baseline) 592.00 kgce/t in 2022 (target)		
HBIS	138.7m	08/12/2023	08/12/2026	Waste steel recycling	193,200 tons in 2022 (baseline) 235,000 tons in 2024 (target)		

Fable 3. Examples of SLB issuers in the Chinese steel sector

Case study 2: Electric arc furnace decarbonisation financing

EAF is a typical decarbonisation method. China has stated its ambition to increase EAF steel's share of total crude steel to at least 15% in 2025 and 20% in 2030.⁴⁰ Financial institutions can further explore opportunities for EAF financing.

In October 2023, Bank of China Luxembourg priced a 3-year, EUR300m (USD328m) green transition bond with the UoP earmarked for four projects related to the production or recycling of steel in Hebei Province, China.

Case study 3: Certified climate bonds for low-carbon steel manufacturing

Hybar priced USD330m of Certified Climate Bonds in August 2023. Proceeds will finance the construction of a new electric scrap metal recycling and steel manufacturing facility in Osceola, Arkansas. The facility is designed to produce 630,000 tons of rebar annually.

This issuance is the first certified transaction under the rigorous standards of Climate Bonds Steel Criteria. Kestrel provided an independent external review to support this Certification. The Climate Bonds Steel Criteria were issued in December 2022 and include mitigation and adaptation as well as resilience requirements to provide assurance on alignment of the bonds and the financed activities with international GHG reduction targets.

Discussion

Financing the low-carbon transition of steel production



guidelines and standards to promote the orderly development of China's transition finance market. Several provinces in China have issued provinciallevel transition finance guidance, including the major steel-producing province, Hebei, which issued steel sector-specific transition finance guidance in 2024. Additionally, major banks, both domestically and internationally, have released transition finance frameworks that include sectoral criteria for the steel sector, opening channels for steel companies to access climate financing.

Transition finance guidance and policies should be applicable to all types of companies to accelerate the deployment of low-carbon production assets and technologies and provide incentives for companies to achieve climatealigned transition. Climate Bonds makes four recommendations to accelerate the low-carbon transition of China's steel sector.

Transition finance guidance is issued at the provincial level, while China's national-level transition finance guidance is still under development. Current provincial-level transition finance guidance has different requirements for eligible projects and companies.

Recommendation 1. The emerging Chinese national transition taxonomy and guidance can further align provincial transition finance guidelines, enhance interoperability between Chinese transition and international transition taxonomies, provide incentives for low-carbon production methods, customise financing for small-to-medium companies, and enhance entity-level transition plans.

Although banks have released transition finance frameworks for the steel sector, the issuance of bonds in the market remains very limited. **Recommendation 2.** Banks that have established transition finance investment frameworks could consider implementing reasonable incentive measures, encouraging companies to enhance the quality of information disclosure. Banks can further integrate incentives into their transition frameworks, for example, by designing incentives for companies with highquality transition plans, or projects with high decarbonisation potential.

At present, steel entities have not yet chosen greenhouse gas metrics for SLBs, nor have they disclosed sufficient transition plans for climate targets, actions, and capital expenditure spending.

Recommendation 3. Steel companies should produce credible transition plans. Robust transition plans including Paris-aligned emissionreduction targets, and clear capital expenditure plans are prerequisites for entity-level climate financing standards, such as Climate Bonds Steel Criteria. These transition plans should be used to inform the design of SLBs. To date, SLB issuers from the steel sector have used pollutants as KPIs. It is recommended that issuers directly select KPIs related to GHG emission-reduction targets for climate financing.

Current financing and policy focus concentrate on improving energy efficiency, while deep decarbonisation technologies (e.g., green hydrogen) require more financing support.

Recommendation 4. Policies should support hydrogen infrastructure and supply chain development to accelerate green hydrogen deployment for high-emitting sectors. The current financing for decarbonising Chinese heavy industrial sectors is mainly for mature technologies (e.g., energy efficiency improvement).⁴¹ Green hydrogen can reduce more than 90% of steel production emissions. Steady infrastructure development and a complete supply chain will support green hydrogen cost reduction and accelerate the steel sector low-carbon transition.

Box 1. Credible transition plans to access private capital required for the transition

Financing opportunities will be determined by the availability and credibility of corporate transition plans, which support credible SLBs, critical to unlocking capital for steel entities. Climate Bonds has published a report, *The role of policymakers in mobilising private finance to ensure a credible and just transition in steel and cement*, which outlines the need for a robust transition plan and what it should look like for the steel sector.⁵¹

Carbon pricing to enhance steel sector carbon management awareness and capacity

Policies such as carbon pricing mechanisms (carbon trading markets and carbon tariffs), imposed on steel companies both domestically and internationally, will impose emission costs and operating pressure to incentivise their transition.

The EU CBAM sets a carbon price aimed at imports of non-EU products equivalent to the one paid by EU producers for making the same products. However, should EU importers demonstrate that a carbon price to produce those goods has already been paid in a non-EU country, this amount could be deducted, providing an incentive to decarbonise outside the EU as well.

The effects of the CBAM extend beyond the impact on the EU and its ETS. One

of the CBAM's goals is to promote global decarbonisation. In 2021, Turkey's climate envoy stated that the EU CBAM proposal incentivised the country to ratify the Paris Agreement.⁴²

In the case of iron and steel, sectors very highly impacted by the CBAM, the most affected economies in terms of economic value are China, Turkey, India, and Russia.

China accounted for around EUR7.4bn (USD8.1bn) in iron and steel exports to the EU in 2022.⁴³

While the economic value of exports is a meaningful indicator, the impact of CBAM will also be determined by its relative importance as a share of total exports for a country. The steel sector is expected to be included in the Chinese Emissions Trading System (ETS) in the next few years, which would help build the business case for low-carbon production processes in addition to reducing the impact of the EU CBAM (and potentially other CBAMs) on Chinese industry.⁴⁴

Globally, a green window could also help to compensate for any carbon border tax-induced trade impact. Governments can reduce tariffs on environmentally friendly goods and services through a green trade window to stimulate the flow of green capital and goods. This can help to incentivise the greening of global industry and economic processes, and improve the competitiveness of goods such as green steel. World Trade Organisation members are engaged in negotiations to establish an agreement to eliminate tariffs on environmental goods.⁴⁵

Green public procurement to promote demand for green steel

Chinese public authorities procure approximately 350 Mt of steel annually, which causes around 689 Mt of CO_2 emissions.⁴⁶

Box 2. The EU Carbon Border Adjustment Mechanism

In October 2023, the EU Carbon Border Adjustment Mechanism (CBAM) entered into application in its transitional phase. The CBAM places a levy on certain carbonintensive semi-processed goods, such as steel, equalising the price of carbon emission paid for EU products with the price for imported goods. Ultimately, the CBAM aspires to build a green level playing field.⁵²

The CBAM is complementary to the EU Emissions Trading System (ETS), the world's first and largest emission trading system, to reduce emissions while preventing the risk of carbon leakage. The ETS is one of the main EU policies to address climate change and the costeffective reduction of emissions. The EU ETS works on the cap-and-trade principle; within this cap, companies buy or receive allowances that they can trade with each other.⁵³

Other than iron and steel, the EU CBAM covers cement, aluminium, fertilisers, electricity, and hydrogen, as well as indirect emissions under certain conditions. The CBAM will apply starting on 1 January 2026 and will be fully phased in from 2035. Several non-EU countries such as Canada and the UK are also considering similar initiatives.^{54,55}

This is a lever to unlock potential and boost demand for low-carbon products, such as steel, via green public procurement. Globally, the purchasing power of governments and other public bodies totals around USD11tn each year.⁴⁷

Due to the size of the Chinese steel market, green public procurement (GPP) policies would also have a significant global impact. Steel public procurement demand in China is three times the total steel demand in India, the second-largest steel market globally, showing an incredible emission reduction potential achievable through green public procurement. Almost 100 Mt of steel are consumed each year in India, releasing around 200 Mt of CO₂.⁴⁸

China has already begun to adopt GPP policies, including some local-level pilot programmes, and the main entities in the process are the Ministry of Housing and Urban-Rural Development, the Ministry of Industry and Information Technology, the Ministry of Finance, and the State Administration for Market Regulation. Nevertheless, no mandatory requirements around the emission intensity of steel used in public procurement are currently in place.

GPP policies can only be effective when implemented through standardised measurements and emissions reporting methodologies. The Chinese government could accelerate the adoption of national-level standards to ensure consistent embodied emissions reporting. Local-level pilot programmes already exist; therefore, a national policy would ensure consistent adoption.

Awareness of this is increasing as national and local governments amplify their efforts to decarbonise through sustainable purchasing practices. Catching up with international best practices and initiatives would significantly increase China's potential to power up its steel decarbonisation actions and become a frontrunner in ambitious GPP policies for steel.

In 2021, a coalition of governments and organisations, led by the United Kingdom and India, with current members including Canada, Germany, Japan, Saudi Arabia, Sweden, the United Arab Emirates, and the United States, launched the new Clean Energy Ministerial Industrial Deep Decarbonisation Initiative (IDDI). Coordinated by the United Nations Industrial Development Organisation, this initiative aims to create market demand for low-carbon industrial materials, especially steel and cement.⁴⁹

Entry by China to the IDDI framework would provide access to the international market for low-carbon industrial materials, which could be leveraged for domestic decarbonisation efforts. Governments that sign IDDI's Green Public Procurement Pledge are required to start using low-emission steel, cement, and concrete by 2030 for public construction projects, and monitor and disclose their embodied carbon emissions by 2025. At COP28, large economies committed to leverage their spending to support innovation in high-polluting sectors such as steel and cement. As part of their IDDI pledges, Canada, Germany, the UK, and the US committed to ambitious green public procurement policies.⁵⁰ For example, Canada has committed to a 30% reduction in the embodied carbon of public construction projects from 2025.

Outlook

China dominates the global steel production industry, accounting for 53% of the world's total capacity and 15% of the country's total carbon emissions. Nearly 80% of China's steel assets will need to be retired or require refinancing by 2030, which presents a low-carbon investment opportunity and a critical window to mobilise capital for transition.

In the context of 30:60 climate targets and rising carbon prices, steel companies need to strengthen emission management and take action towards low-carbon transition. Steel issuers can refer to existing green and transition finance guidelines to access climate financing and accelerate corporate climate action. Investor appetite to support credible issuance is strong.

To encourage steel companies to deploy the transition finance market Climate Bonds recommends:

1. Enhancing interoperability among existing transition guidelines with the forthcoming national and international transition guidelines.

2. Introducing favourable incentives to encourage steel issuer to participate.

3. Encouraging entities to implement, monitor, and update robust and ambitious transition plans.

4. Referencing GHG reduction targets in SLB frameworks.

5. Directing more financing towards deep decarbonisation technologies.

A coordinated effort between industry, policymakers, investors, and civil society is necessary to incentivise the steel sector through increased understanding and use of trusted tools, such as the Climate Bonds Steel Criteria. Looking forward, regulators and financial institutions must further incentivise steel companies to accelerate the deployment of low-carbon production. This can be achieved through enhanced access to green and transition financing, improved carbon management, and increased procurement of green steel to stimulate demands.

Endnotes

1. Agora. 2023. Global Steel Transformation Tracker. https://www.agoraindustry.org/data-tools/global-steel-transformation-tracker#c425 2. Shuyi Li, Wei Li, and Shutong (Lucy) Lu, RMI, CBI, 2024, https://rmi

nancing-the-low-carbon-transition-in-heavy-industry/. 3. Mckinsey. 2020. Laying the foundation for zero-carbon cement. the-foundation-for-zero-carbon-cement#cement

4. International Energy Agency (IEA), International Renewable Energy Agency (IRENA), UN Climate

Change High-Level Champions. 2023. Accelerating Sector Transitions Through Stronger International Collaboration. https://iea core.windows.net/assets/2d1710bf-a883-4173-8489-fb4d40ac522e/

5. International Energy Agency (IEA), International Renewable Energy Agency (IRENA), UN Climate

Change High-Level Champions, 2022, Accelerating Sector Transitions Through Stronger International Collaboration. https://iea.blob.co windows.net/assets/49ae4839-90a9-4d88-92bc-371e2b24546a/

6. Shuyi Li, Wei Li, and Shutong (Lucy) Lu, RMI, CBI, 2024, https://rmi. org/insight/financing-the-low-carbon-transition-in-heavy-industry/. 7. Green Bond Pricing in the Primary Market, H1 2023, Climate Bonds Initiative, Green Bond Pricing Paper (H1 2023) | Climate Bonds Initiativ 8. International Energy Agency (IEA), International Renewable Energy Agency (IRENA), UN Climate

Change High-Level Champions. 2022. Accelerating Sector Transitions Through Stronger International Collaboration. <u>https://iea.blob.core.</u>

9. International Energy Agency (IEA). October 2020. Iron and Steel Technology Roadmap. www.iea.org/reports/iron-and-stee chnology-roadmap

10. Climate Bonds Initiative, 2022. Climate bond steel criteria background paper. https://www.climatebonds.net/files/files round%20paper%20CBI%20Steel%20Criteria_Final.pdf

11. HYBRIT. https://www.hybritdevelopment.se/en/ 12. International Energy Agency (IEA), International Renewable Energy Agency (IRENA), UN Climate

Change High-Level Champions. 2023. Accelerating Sector Transitions Through Stronger International Collaboration. <u>https://iea.blob.</u> THEBREAKTHROUGHAGENDAREPORT2023.pdf

13. Agora Industry, Wuppertal Institute and Lund University (2021): Global Steel at a Crossroads. Why the global steel sector needs to invest in climate-neutral technologies in the 2020s. https://statio agora-energiewende.de/fileadmin/Projekte/2021/2021-06 IND INT

GlobalSteel/A-EW_236_Global-Steel-at-a-Crossroads_WEB_V2.pdf 14. PwC. 2022. Analysing the future cost of green hydrogen. https:// es/esg/the-er future-cost-of-green-hydrogen.htm

15. China hydrogen alliance. 2023. The Green Hydrogen Acceleration Initiative: China green hydrogen enabling measures proposal report https://www.chinah2data.com/file/bigdata-docs/05ce414b9d32cfbd bc8a8536c7e5a4df.pdf

16. Climate Bonds Initiative. 2022. A fork in the road for the global steel sector. ww.climatebonds.net/files/reports/cbi_steel_fork_01c98.pdf 17. China Baowu Steel Group Corporation limited Green and lowcarbon development report. 2022. https://res.baowugroup.com/

attach/2023/08/11/859d8fcb17894a128df7c1a8e71d23e4.pdf

18. HBIS group sustainability report 2022. https://www 148b1e0fa8bd1695177012869 pdf

19. Xinhua news. 2021. Anshan Iron and Steel Group released a low-carbon metallurgical roadmap. http:

20. HBIS Group Sustainable Development Research Center. https:// worldsteel.org/wp-content/uploads/Presentation Menglong-LI.pdf 21. Another New Project For Hydrogen Direct Reduction Iron Has Been Announced, How Profitable Such Projects Are Remains To Be Seen |

anghai Non ferrous Metals (archive.org 22. Ansteel group sustainability report 2022. http://www.ansteel.cn/d/ file/kechixufazhan/kechixufazhanbao

23. World Steel Association. World Steel in figures 2024. https:// worldsteel.org/data/world-steel-in-figures-2024/

24. Xiao Xinli, Wang Han, Fang Qi, Qian Lihua, Political Commissar Lu. Industrial research. 2023. Keep pace with the times and adapt to the new stage of green development - Interpretation of the "Green Industry Guidance Catalog (2023 Edition)" (Draft for Comments) 25. China National Bureau of Statistics.

26. Ministry of Economy, Trade and Industry; and Ministry of the Environment, Japan. Basic Guidelines on Climate Transition Finance.2021 https://www.meti.go.jp/pre

/2021/05/20210507001/20210507001-3.pdf. 27. The Course 50 project aims to reduce carbon dioxide emissions from steel plants by 30% by developing technologies to reduce

carbon dioxide emissions from blast furnaces and to efficiently separate and recover carbon dioxide from blast furnace exhaust

28. The Ministry of Economy, Trade and Industry (METI). 2021. Technology Roadmap Formulated for Transition Finance toward Decarbonization in the Iron and Steel Sector. https://www.meti.go.jp/ english/press/2021/1027_002.html

29. Europen Commission. 2021.https://ec.europa.eu/finance/docs. level-2-measures/taxonomy-regulation-delegated-act-2021-2800annex-1_en.pdf

30. Climate Bonds Initiative. 2023. SteelSector Criteria. https://www climatebonds.net/standard/Stee

31. Singapore-Asia Taxonomy for Sustainable Finance | 2023 Edition. December 2023. https://www.mas.gov.sg/-/media/mas-media-library/ development/sustainable-finance/singaporeasia-taxonomy-dec-2023.pdf

32. United nations environment programme finance initiative(UNEPFI).2022.NZBA Transition Finance Guide. <u>https://www.</u> wpcontent/uploads/2022/10/NZBA-Transition unepfi.org/wordpre 33. DBS Bank. 2022. Sustainable & Transition Finance Framework

& Taxonomy. https://www.dbs.com/iwovresources/images/

Finance%20Framework_Revision%201.pdf 34. Standard Chartered.20twenty three.Standard Chartered's Transition Finance Framework 2023.https://av.sc.com/corp-en/nr/content/docs/ andard-Chartered-Bank-Transition-Finance-Framework.pdf

35. Maybank, 2023. Maybank Group Transition Finance Framework 2023. https://www.maybank.com/iwov-resources/documents

36. China Construction Bank.20twenty one. Transition bonds

framework.http://www.ccb.com/cn/investor/ 1618282946/20210413110254366415 ndf

37. Bank of China.2023.Transition bonds management statement (2023 Version).https://www.boo t20231011_23860100 html

38. Zhang, Jing, Song, Ziying and Nedopil, Christoph, 2024, China green finance status and trends 2023-2024, Griffith Asia Institute Griffith University (Brisbane) and Green Finance & Development Center, FISF Fudan University (Shanghai), DOI: 10.25904/1912/5205 Xinhua news. 2022. The cumulative investment in ultra-low emission transformation has exceeded 150 billion yuan. http:/

40. 工信部联节[2022]88号,关于印发工业领域碳达峰实施方案 的通知. 2022. <u>https://www.g</u>g ent 5703910.htm

41. Shuvi Li, Wei Li, and Shutong (Lucy) Lu. RMI, CBI, 2024, https://rmi.org/insight/financing-the-low-carbon-

42. POLITICO. EU's looming carbon tax nudged Turkey toward Paris climate accord, envoy says. https://www.politico.eu/article/eu-carbonborder-adjustment-mechanism-turkey-paris-accord-climate-change/ 43. Eurostat. 2024. International trade in goods by type of good. 44. Yuan Yating, Yao Zhe. 2023. Is China's carbon market ready for the steel sector?

45. World Trade Organization. Environmental Goods Agreement (EGA). https://www.wto.org/english/tratop_e/envir_e/ega_e.htm 46. Hasanbeigi, A., Springer, C., Bhadbhade, N., 2024. Advancing

Green Public Procurement of Steel and Cement in China. Global Efficiency Intelligence. Florida, United States

47. World Economic Forum. 2022. Green Public Procurement: Catalysing the Net-Zero Economy.

48. Hasanbeigi, A., Bhadbhade, N. 2023. Green Public Procurement of Steel in India, Japan, and South Korea, Global Efficiency Intelligence. Florida, United States

49. Industrial Deep Decarbonisation Initiative. 2023. Decarbonizing Steel, Cement And Concrete. https://www.industrialenergyaccel org/wp-content/uploads/IDDI factsheet 23-Mar-2023.pdf

50. Industrial Decarbonization Accelerator. IDDI Green Public Procurement Pledge Announcement. https://www industrialenergyaccelerator.org/general/iddi-green-public-

procurement-pledge-announcement/ 51. Climate Bonds Initiative. 2024. The role of policymakers in mobilising private finance to ensure a credible and just transition in steel and cement

52. European Commission. Carbon Border Adjustment Mechanism mechanism er

53. European Commission. What is the EU ETS? https://climate.ec.europa. s-trading-system-eu-ets/what-eu-ets_en 54. UK Government. 2023. Addressing carbon leakage risk to support decarbonization. https://www.gov.uk/government/c

addressing-carbon-leakage-risk-to-support-decarbonisation 55. Government of Canada. 2021. Exploring Border Carbon Adjustments for Canada. https://www.canada.ca/en/department

finance/programs/consultations/2021/border-carbon-adjustments/ exploring-border-carbon-adjustments-canada.html

Climate Bonds

Published by the Climate Bonds Initiative

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Special thanks: Isadora Wang (Agora), Bonnie Zuo (Transition Asia), Wenjie Liu (Greenpeace)

Editorial Support: Caroline Harrison Design: Godfrey Design, Joel Milstead

Suggested Citation: Financing the decarbonisation of China's steel

industry: technology, policy and instruments. Climate Bonds Initiative, September 2024.

© Published by Climate Bonds Initiative, September 2024

www.climatebonds.net

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