

Transition Finance in China: latest develop- ment and future outlook



Forward

To move to a low-carbon economy and meet the targets of reducing emissions by 45% by 2030, and net zero by 2050, immediate action is needed around the world and from all industries. For many industries this will necessitate a fundamental transformation of their current business, particularly in the hard-to-abate sectors, such as cement, steel and aviation, and in sectors that cannot meet the requirements of a low-carbon economy, such as fossil fuel power generation. With a growing number of countries and regions, companies, and investors setting net-zero decarbonisation targets, there is a huge financing opportunity.

The transition finance label is gaining traction as a tool for investors to identify appropriate activities. However, a widely accepted definition has yet to materialise. As a result, investors harbour concerns that they could be accused of transition-washing by supporting activities that do not actively contribute to the rapid reduction of Greenhouse Gas (GHG) emissions.

This report intends to:

- Provide a review of current transition finance concepts and practices,
- Discuss the principles that credible transition finance should adhere to and,
- Use the Chinese steel sector as a case study for the application of transition finance.

Against the backdrop of China's 30-60 climate goals (to achieve peak carbon by 2030 and carbon neutrality by 2060), the trillions of dollars of finance needed for the low-carbon transition in sectors such as energy, industry, buildings, and transport present an enormous opportunity for investors. To further the development of a consensus on transition finance in China and internationally, this report makes the following preliminary recommendations:

- 1. Investors:** socialise and create a single definition of transition, which should be ambitious, flexible, and inclusive.
- 2. Regulators and policymakers:** play a leading role in promoting transition finance activities, in terms of policy support, procurement and incentives.
- 3. Issuers:** set up internal frameworks and prepare issuance in line with currently available transition finance principles and frameworks.
- 4. Entities:** formulate transition strategies according to the scientific paths, and finance through transition finance products.
- 5. Market analysts and service providers:** test and use the transition concept to assess real transactions and financial products.

Contents

Forward 2

1. Introduction 3

2. International Transition Finance Practice and Progress 5

3. Application of Transition Finance in China 12

4. Case studies of Transition Finance Applications based on the Steel industry 15

5. Summary and discussion 19

Appendix I: International Transition Pathways Research Organisations 21

Appendix II: Organisations that provide transition services to investors 22

Appendix III: Overview of transition finance definitions and key areas 24

Appendix IV: Transition (UoP) issuance to date 26

Appendix V: Summary of research on the paths for key sectors to realise carbon peak and carbon neutrality in China 27

Appendix VI: SLB examples in China's Steel and Cement Production Industries 30

Endnotes 31

1. Introduction

Climate change is the most serious challenge facing the world in 2021. In its Sixth Assessment Report published in 2021, the Intergovernmental Panel on Climate Change (IPCC) highlighted that limiting global temperature rise to no more than or slightly above 1.5°C will require a rapid and far-reaching transition in land, energy, industry, buildings, transport and urban systems. The IPCC special report in 2018 stated that global net human-caused emissions of carbon dioxide (CO₂) would need to fall by around 45% from 2010 levels by 2030, reaching net zero by around 2050.¹

By 2 November 2021, over 140 countries had announced or are considering net zero targets, covering 90% of global emissions.² The implications of this are enormous – investors no longer question if a shift will happen, but rather how quickly it will happen and how it will play out. Assets and activities with no transition pathway are already seeing declining market share and restricted access to financing.

Transition must extend beyond the fossil fuel sector – every entity in every sector needs to be aligned with the net zero emissions target by 2050. The IEA's net-zero report³ outlines a pathway to net zero which excludes new investment in fossil fuels and requires that the least efficient coal plants be phased out by 2030, and the remaining coal plants still in use are retrofitted by 2040. By 2050, almost 90% of electricity generation will have to come from renewable sources.

Bonds are an important tool for the low-carbon transition of economic entities. Large GHG emitters, however, are still largely absent from the labelled debt market as they do not have the necessary assets to print use of proceeds (UoP) bonds. However, the transformation of these activities is an essential component of delivering on the goals of the Paris Agreement as they currently contribute substantially to global emissions.

The largest GHG emitters are present in most mainstream investment portfolios and will need large investments to finance their transition. The market is starting to expand the framework that was developed for green UoP bonds, and new financial mechanisms such as Sustainability Linked Bonds (SLBs) or Transition Bonds have developed to fund transition activities. With this expansion, the types of assets and activities that are being financed are extending beyond typically green activities and this has allowed a more diversified cross-section of the global economy to access this finance.

At present there are no market standards to define these new financial mechanisms. Some of the transactions to date have raised concerns in the market about inconsistencies across transition-labelled products and the potential for greenwashing. Investors have also expressed concerns that the label does not encourage sufficiently ambitious action.

1.1 Definition of transition

The transition finance space remains at a nascent stage globally and, so far, there is no single global definition of transition or a transition taxonomy. This section provides some definitional underpinnings of transition which will be used for the remainder of the paper.

Transition to a common goal

Across all definitions of transition, there is agreement that transition should be towards a common goal which, in the case of climate mitigation, is the alignment with the objectives of the Paris Agreement.

For the purposes of this paper, our focus is on how economic entities, asset portfolios or specific economic activities can move from today's high GHG emissions to levels commensurate with meeting the goals of the Paris Agreement: a climate mitigation transition. We begin with climate as this is the focus of most transition-labelled transactions to date, and it is integral to achieving many of the United Nations Sustainable Development Goals (SDGs).

The need for a common and ambitious goal is critically important: it means that the transition label cannot include activities that are a bit green but have very limited impact on reducing global emissions. Instead, transition must be in support of a common and ambitious pathway to align with the goals of the Paris Agreement.

Transition means change over time: it is a journey, not a destination

Transition does not mean that the activity is green right now; it is a journey over time to green. However, given the steep decarbonisation required to meet the goals of the Paris Agreement, this journey cannot last forever. The timescale is critical to whether warming can be kept below 1.5°C. Sector-specific transition pathways must be science-based and meet ambitious time frames.

Transition covers high GHG-emitting sectors

While most activities and entities will need to initiate some level of transition to meet the goals of the Paris Agreement, the transition concept has been used primarily in reference to high GHG-emitting sectors and activities, and how to aid their sustainable transition. This is in recognition that such sectors have a more difficult pathway to transition as they have multiple economic and technological barriers to overcome. For these sectors, it is likely that a transformation will be required rather than a less invasive shift to greener activities.

The distinction is important as such sectors have not featured in the green finance market to date, despite their vital role in reducing global emissions and large presence in investment portfolios.

Transition can encompass interim activities

The Climate Bonds Initiative's (Climate Bonds) White Paper, Financing Credible Transitions, proposes that a transition label should also be applicable to interim activities: investments that are making a substantial contribution to halving global emissions by 2030 and reaching net zero by 2050, but do not have a long-term role to play.

Transition is not 'light green'

The transition concept and label are completely different from business as usual. To transition in line with the Paris Agreement requires a complete re-orientation of the global economy and, for the activities of some entities, a complete transformation. The transition concept captures this ambitious journey that each activity and entity must make for the world to avoid catastrophic climate change.

Five categories for transition finance are:

NERO ZERO

Activities already at or near net-zero emissions that may require some further decarbonisation but not a significant transition - e.g. wind power generation.

PATHWAY TO ZERO

Activities needed beyond 2050 and have a clear 1.5-degree decarbonisation pathway – e.g. shipping

NO PATHWAY TO ZERO

Activities that are needed beyond 2050 but at present, do not have a clear 1.5 degree decarbonisation pathway to 2050 – e.g. long-haul passenger aviation.

INTERIM

Activities currently needed but should be phased out by 2050 – e.g. production of energy from municipal waste

STRANDED

Activities that cannot be brought into line with global warming targets and have an alternative, low-emissions substitute - e.g. electricity generation from coal.

1.2 Essential elements of a credible transition framework

The transition bond market is part of a larger climate finance market. If credible, it will assure investors, provide clear guidance for financial institutions, and offer additional financial support for issuers. A single definition of 'transition' will bring huge opportunities to investors, and at the same time provide the entire market with a principled guide to avoid the risk of 'greenwashing'.

In the White Paper, Financing Credible Transitions, we identified that a credible transition should be:

- **Ambitious** – this means in line with 1.5°C and the Paris Agreement.
- **Flexible** – applicable to whole entities, everything they do, and a range of associated financial products.
- **Inclusive** – allow all sectors and activities to participate if they demonstrate compliance with the principles and framework outline.

To realise this ambitious goal, the White Paper further proposes five principles for an ambitious transition. It then divides economic activities into five different categories depending on how they fit into the transition finance landscape with either the green or transition finance label applicable to different categories depending on their pathway to alignment with the Paris Agreement.

1.3 Green and transition taxonomies

A green taxonomy is a classification system that establishes a list of environmentally sustainable economic activities. It is a tool for assessing the alignment of economic activities with a goal which, for the purposes of this paper, is climate mitigation. The purpose of a green finance taxonomy is to provide clarity to the market and to reduce the potential for greenwash when defining and labelling green assets.

A transition taxonomy is being discussed and proposed as a tool specifically for high-carbon emission entities and sectors to help their transition. In doing so, a transition taxonomy

5 principles for an ambitious transition



1. In line with 1.5 degree trajectory

All goals and pathways need to align with zero carbon by 2050 and nearly halving emissions by 2030.



2. Established by science

All goals and pathways must be led by scientific experts and be harmonised across countries.



3. Offsets don't count

Credible transition goals and pathways don't count offsets, but should count upstream scope 3 emissions.



4. Technological viability trumps economic competitiveness

Pathways must include an assessment of current and expected technologies. Where a viable technology exists, even if relatively expensive, it should be used to determine the decarbonisation pathway for that economic activity.



5. Action not pledges

A credible transition is backed by operating metrics rather than a commitment / pledge to follow a transition pathway at some point in the future. In other words, this is NOT a transition to a transition.

We propose that a climatetransition taxonomy is defined as: a classification system for high-GHG emissions activities and sectors to reach alignment with the Paris Agreement (net zero) in the time frame required by climate science.

could also outline a clear and time-based pathway to achieve the alignment with the Paris Agreement.

Given that both green and the proposed transition taxonomies have a common goal, they can be seen as subsets of the broader sustainable finance taxonomy. However, we propose here that there is a useful distinction to be made between the two frameworks. The value of a separate transition taxonomy is that it can focus on activities whose starting points are further away and the journeys

to reach net zero are either unclear or have significant hurdles to overcome.

The line between activities that belong in a transition taxonomy and a green one is not definitive. As a result, some jurisdictions may separate transition and green taxonomies while others may not. The EU, for example, puts all transition activities within the broader sustainable taxonomy.

We note that the transition taxonomy is useful in providing an understanding of entity exposure to sustainable activities and is one type of information that companies can use to plan and communicate their transition. However, the taxonomy alone is not sufficient for communicating the details of a company's overall transition.

2. International Transition Finance Practice and Progress

2.1 Progress of research on transition pathways

Globally, a series of studies exploring possible transition pathways for various industries is underway. These studies demonstrate the characteristics of **diversification and multiple perspectives**. Some institutions focus on the technological path of the industry (see **Annex I** for details), some focus on providing advice and guidance to enterprises, and some focus on providing corresponding guidelines, tools, and disclosure standards as services to investors. (Please see **Annex II** for the list of organisations and institutions providing services to investors.)

Existing research has focused more on the pathway to transition, or how to transition. Climate Bonds is working with multiple parties to take the guidance one step further by providing detailed criteria and standards for evaluating a credible transition and, in doing so, providing the market with a framework of transition standards that is inclusive, trusted, and flexible.

In terms of the research on transition pathways, most of the existing guidelines address a subset of the total range of economic activities, assets and projects that need to be decarbonised rapidly and need further development and refinement.

Transition targets, pathways and metrics exist for some sectors but not others. There is already research covering construction (construction and refurbishment) and land transport (manufacture and operation of road vehicles, trains and related infrastructure).

However, there is almost no guidance for aviation, shipping, and other heavy industry. Clear criteria relating to heavy industry are only mentioned in four frameworks: the EU Taxonomy, the China Green Bond Support Project Catalogue, the Transition Pathways Initiative (TPI), and the Corporate Knights and Clean Capitalism Commission Classification. Meanwhile, the first two classification schemes only relate to current performance and do not establish a transition pathway to achieve long-term goals.

There is a lack of guidance on the time required to transition for economic activities that will be phased out by 2050. Guidance is needed to develop transition targets and pathways that exploit time-limited mitigation potential and avoid locking in or prolonging the life cycle of such economic activities. Similarly, for entities where the transition requires the business to move away from its current activities, little work has been done on specifying any time-based trajectory for the transition.

The market lacks guidance on the classification of certain economic activities as **interim**. Certain economic activities or business entities will need to be phased out by 2050, but the market currently lacks viable alternatives, categorisation, definitions, and guidance for such economic activities, or a timeline for their completion and transition.

Definitions of transition agree that all transition is towards a common goal which, in the case of climate mitigation, is alignment with the Paris Agreement and net zero by 2050. **However, transition-focused pathway studies and industry initiatives are not based on the same objectives, methodologies, and principles.**

For example, few transition pathways align with 1.5°C warming targets. Some include offsets, some are based on best-in-class benchmarks, and some are driven by a policy agenda as much as a climate science agenda. Therefore,

interested parties will need to pay particular attention to the emission reduction targets to be achieved by the different pathways when using the relevant guidelines. The existing guidance is not always consistent with the Transition Principles set out in this report. A full review of all existing guidance and the assumptions underpinning them is needed to fully understand their alignment with these Principles and with each other.

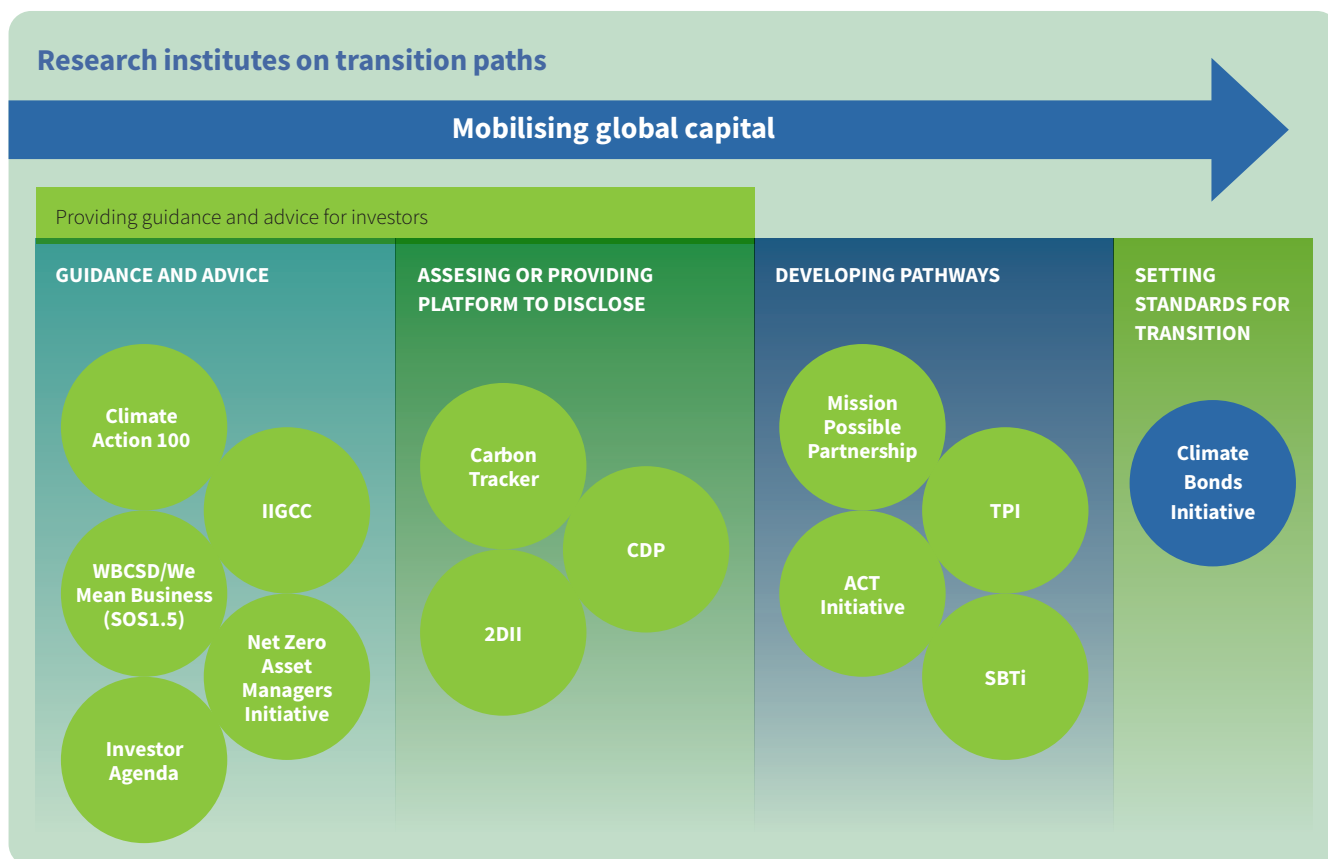


Table 1. Progress in the development of transition pathways in selected industries

	Climate Bonds ⁴	Science-based Targets initiative (SBTi)	Transition Pathway Initiative (TPI)	Assessing Low-Carbon Transition Initiative (ACT)	Mission Possible Partnership (MPP)
Iron & Steel	In progress	In progress	Complete	In progress	Complete
Cement	In progress	In progress	Complete	Complete	Complete
Basic chemicals	In progress	Planned but not yet started	Planned but not yet started	In progress	Planned but not yet started
O&G E&P	In progress	In progress	Complete	Complete	Planned but not yet started
Integrated oils	Planned but not yet started	In progress	Planned but not yet started	Planned but not yet started	Planned but not yet started
Agriculture	In progress	In progress	Planned but not yet started	Planned but not yet started	Planned but not yet started
Hydrogen	In progress	Planned but not yet started	Planned but not yet started	Planned but not yet started	Planned but not yet started
Chemical intermediates	Planned but not yet started	Planned but not yet started	Planned but not yet started	Planned but not yet started	Planned but not yet started
Formulated chem products	Planned but not yet started	Planned but not yet started	Planned but not yet started	Planned but not yet started	Planned but not yet started
Aluminum	Planned but not yet started	Planned but not yet started	Complete	In progress	Complete
Paper & Pulp	Planned but not yet started	Planned but not yet started	Complete	In progress	Planned but not yet started
Glass	Planned but not yet started	Planned but not yet started	Planned but not yet started	In progress	Planned but not yet started
Auto manufacture	Planned but not yet started	Planned but not yet started	Complete	Complete	Planned but not yet started
Low carbon transport	Complete	In progress	Planned but not yet started	Complete	Planned but not yet started
Heavy duty road transport	Planned but not yet started	In progress	Planned but not yet started	Planned but not yet started	Planned but not yet started
Aviation	Planned but not yet started	Complete	Complete	Planned but not yet started	In progress
Mining	Planned but not yet started	Planned but not yet started	Complete	Planned but not yet started	Planned but not yet started
Apparel	Planned but not yet started	Complete	Planned but not yet started	Planned but not yet started	Planned but not yet started
Food & Beverage	In progress	Planned but not yet started	Planned but not yet started	In progress	Planned but not yet started
Aerospace & Defense	Planned but not yet started	Planned but not yet started	Complete	Planned but not yet started	Planned but not yet started
Electrical utilities	Planned but not yet started	Complete	Planned but not yet started	Complete	Planned but not yet started
Shipping	Complete	Planned but not yet started	Complete	Planned but not yet started	Planned but not yet started
Financial institutions	Planned but not yet started	Complete	Planned but not yet started	Planned but not yet started	Planned but not yet started
ICT	Planned but not yet started	Complete	Planned but not yet started	Planned but not yet started	Planned but not yet started
Forestry	Complete	In progress	Planned but not yet started	Planned but not yet started	Planned but not yet started
Retail	Planned but not yet started	Planned but not yet started	Planned but not yet started	Complete	Planned but not yet started
Buildings	Complete	In progress	Planned but not yet started	Complete	Planned but not yet started

Planned but not yet started

In progress

Complete

2.2 The current state of transition finance

Transition to net zero requires strong financial support. To achieve the goals of the Paris Agreement, the annual infrastructure investment need is estimated at USD9tn while the estimate is between USD1.6tn and USD3.8tn for the energy transition.⁵ According to the estimates set by Bloomberg's New Energy Finance, the world needs USD92tn of investment to achieve the goals of the Paris Agreement.⁶ Public funding will not be enough to meet these needs. Promoting private capital to invest in business transition is critical to achieve the required scale.

Since 2020, transition finance has received widespread attention internationally, and a growing number of players have taken action to drive the transition. Numerous market participants are proposing their own solutions including the definition of transition finance, transition criteria, frameworks, disclosure requirements, industry standards, and taxonomies.

At the level of policy makers and regulators, including from the EU, Japan, Canada, China, and the Organisation for Economic Co-operation and Development (OECD), concepts and guidance related to transition finance have been developed:

In addition to the research on transition finance frameworks undertaken by sovereign and supra-sovereign institutions, market participants, industry associations, standard setters and financial services institutions have also been active in transition finance practices and have made various advances.

In September 2020, Climate Bonds published a White Paper titled **Financing Credible Transitions**, which provides an initial framework and five principles for identifying credible transition finance activities. According to the framework proposed in the White Paper, a credible transition financial standard accepted by the market should not only be able to meet the ambitious goals of the Paris Agreement but should also be flexible enough to be applicable to various types of market tools. In addition, these standards need to be sufficiently inclusive fundamentally, so that all regions, sectors, and different types of stakeholders in the global economy would be able to obtain financial support for low-carbon transition activities through relevant guidelines.

Table 2. Progress in transition finance at a national and regional level

Japan

In May 2021, the Financial Services Agency, the Ministry of Economy, Trade and Industry, and the Ministry of the Environment of Japan published Basic Guidelines on Transition Finance.⁷ The guidelines are aimed at promoting financing for businesses that are either already decarbonised (e.g., renewable energy) or are transitioning towards decarbonisation to realise Japan's goal of a carbon-neutral society by 2050. The guideline has been drafted in accordance with the Climate Transition Finance Handbook published by ICMA. The guidelines incorporate the ICMA Handbook's recommendations on disclosures.

Tokyo plans to set up working groups in the April 2021 – March 2022 fiscal year and put together a detailed transition roadmap for each heavy GHG emitting industry, including steel, chemical, power, gas and shipping, to decarbonise their operations towards 2050.⁸

European Union

In March 2020 the EU Technical Expert Group (TEG) published the EU Taxonomy Regulation, a report that identifies transition finance categories and related criteria. In January 2021, the European Commission asked the newly established Platform on Sustainable Finance to provide advice on transition finance, looking at how the EU Taxonomy could provide a framework for inclusive transition finance for companies, and other economic actors working to improve their environmental impact. In March 2021, the Sustainable Finance Platform released its Transition Finance Report, which focuses on responding to relevant questions about transition finance.⁹

Currently, the EU Taxonomy consists of scientific criteria in four areas: low carbon, transition, enabling, and adaptation, with projects in the transition and enabling categories also included in the climate change mitigation category.

The EU taxonomy covers transition activities which are described as economic activities that contribute to greenhouse gas emissions at a level that is consistent with current best practice in the sector; that does not prevent the development and deployment of low-carbon alternatives; and that does not result in locking up carbon-intensive portfolios, given their economic lifetimes. The transition part will be assessed every three years and will become progressively more stringent.

Canada

The Canada Standards Association started a process to work on a Transition Taxonomy in 2019, as part of creating a full National Standard of Canada for Transition Finance.¹⁰

It was to build on existing taxonomies and guidance, in particular the EU Taxonomy, and aims to establish a definition of transition for the Canadian market to identify business activities that can access transition finance.^{11,12}

Seven priority sectors were: i) oil and gas (upstream, midstream and downstream utilities), ii) utilities (energy production), iii) agriculture, iv) forestry, v) transportation (focus on heavy-duty vehicles – railways, aviation, trucking), vi) materials (cement, steel, glass) and vii) mineral mining. The process is currently on hold as an initial version of the Taxonomy failed to secure a majority vote from the Technical Committee working on it.

OECD

The OECD Development Co-operation Directorate launched a new line of work called transition finance, first presented at its February 2018 formal meeting. It carried out seven pilot studies over the course of 2018–19 on countries facing different transition challenges: Cabo Verde, Chile, Lebanon, Solomon Islands, Uganda, Vietnam and Zambia. The transition finance work explores the interactions of different sources of financing for sustainable development as countries develop and reach higher levels of income.¹³ The OECD's transition framework focuses more on the financing challenges faced by countries in transitioning their economies to meet the Sustainable Development Goals.

Five Hallmarks of a Credibly Transitioning Company



1. Paris-aligned targets

- Select sector-specific transition pathway aligned with Paris Agreement goals
- Company-specific KPIs that align as early as possible with that pathway
- Science based, address scope 1, 2 & 3 emissions and address short, medium and long term



2. Robust Plans

- Set the strategy and plan to deliver on those KPIs
- Prepare associated financing plan detailed cost estimates and expected source of funding
- Put in place necessary governance frameworks to enact change



3. Implementation action

- Capital expenditure, operating expenditure
- Other actions detailed in the strategy



4. Internal reporting

- Track performance
- Re-evaluated and recalibrate KPIs as needed



5. External reporting

- External reporting and independent verification on the KPIs and strategy to deliver (per Hallmarks 1 and 2)
- Annual reporting of independently verified progress in terms of action taken and performance against targets. (per Hallmarks 3 and 4)

In September 2021, Climate Bonds published a discussion paper entitled **Transition Finance for Transforming Companies: Avoiding greenwashing when financing company decarbonisation**. The discussion paper suggests five hallmarks of a credibly transitioning company, namely: 1) goals that are aligned with the Paris Agreement (when setting goals, note that: common industry green transition pathways and company-specific KPIs need to reflect short-, medium- and long-term decarbonisation trajectories), 2) robust transition plans, 3) implementation actions, 4) internal monitoring, and 5) external reporting.

The Hong Kong Green Finance Association (HKGFA) released the Navigating Climate Transition Finance in November 2020, which proposes important principles that market authorities and market participants should consider when defining the operational framework for climate transition financing. The principles adopt the format and transparency requirements of existing regulatory standards or market-accepted frameworks. They also propose that issuers and borrowers disclose: medium and long-term plans aligned with the Paris Agreement; constraint(s) on engaging in low-carbon activities with evidence; technologies and activities for climate transition financing; measures in place to 'do no significant harm' and propose a 'do least harm' strategy; a deliberate phase-out plan for transition technologies and activities to make way for net-zero compatible technologies and activities.¹⁴

ICMA released the Climate Transition Financing Handbook in December 2020.¹⁵ It is a high-level, principles-based guidance for investors. Unlike Climate Bonds, which aims to harmonise definitions of transition and provide clear criteria, the Handbook does not set out definitions or classification schemes for climate transition

projects. Instead, it specifies the forms of financing and disclosure requirements for climate transition bonds to demonstrate the credibility of the transition. In addition, the Handbook makes it clear that the transition finance need to meet the Paris Agreement 1.5 °C objectives. ICMA clarifies that the forms of funds raised for transition finance include: (1) debt financing instruments with a specific use of funds raised, i.e., bonds that comply with the Green Bond Principles, the Socially Responsible Bond Principles and the Sustainability Bond Guidelines; or (2) debt financing instruments with funds raised for general corporate purposes that comply with the Sustainability Linked Bond Principles. Meanwhile, the four key elements recommended for disclosure in the Handbook are:

1. Issuers' climate transition strategy and corporate governance.
2. The importance of considering environmental elements in the business model.
3. The climate transition strategy should be informed by scientifically based goals and pathways.
4. Transparency of information relating to implementation.

Financial Services Institutions are also conducting business in the transition finance. **Sustainalytics** launched its second-party advice service for transition bonds in June 2020 which assesses a transition framework in two ways.¹⁶ Firstly, it assesses the bond issue itself, focusing on the UoP, fund management, project selection and fund allocation reporting. Secondly, it assesses the issuer itself, whether it has established a strategy to address climate change and whether the strategy clearly states how it plans to adapt its business model to contribute positively to the transition to a low-carbon economy.¹⁷

Multiple banks, including BNP Paribas, DBS Bank, HSBC and Crédit Agricole CIB, have issued their own definitions of transition bonds. Bank of China and China Construction Bank have also issued a Transition Bond Management Statement and a Transition Bond Framework respectively. Among the pioneering banks, DBS Bank published its Sustainable and Transition Finance Framework and Taxonomy in June 2020, which is the world's first taxonomy covering transition finance.¹⁸

Shareholder action can be seen as an initial incentive for companies to be more transparent with their information and to make stronger commitments to climate action, for example by joining initiatives such as Climate Action 100+. Similar initiatives include the Transition Pathway Initiative, which provides a benchmark for corporate transition plans. The Say on Climate campaign promotes shareholder input into climate transition action plans. For many companies, more of their debt is in the fixed income market, where investors and advisers are increasing pressure on companies to set decarbonisation targets. Since the launch of the Net Zero Asset Managers initiative in December 2020, 128 companies with USD43tn in assets under management have joined the initiative. In terms of total funds under management, they account for almost half of the entire global asset management industry.¹⁹ The 40 institutional investors of the UN's Net Zero asset Owner Alliance also have a combined asset under management of USD6.6tn.

The Glasgow Financial Alliance for Net Zero (GFANZ), launched in 2021, brings together more than 450 companies with combined assets over USD130tn, working together to support a common goal: accelerating the transition to a net-zero global economy.

See **Annex III** for an overview of transition finance definitions and key areas.

Summary

To date, there is no internationally agreed conceptual definition of what constitutes credible transition finance and the criteria for classifying its operations.

Guidance on transition finance has been or is being developed by several market participants, including research institutions, investor organisations, national and regional bodies, and financial institutions. In terms of the technical specifications and binding frameworks for transition finance, progress varies from institution to institution. Furthermore, the ambition of government departments and institutions in relation to the climate transition goals associated with transition finance varies considerably from country to country.

Nonetheless, a consensus can be seen as follows:

- Transition finance **supports high GHG emitting**, hard-to-abate or high environmental impact sectors; and
- Transition finance to date has been focused on the **climate mitigation transition**; and
- Transition finance aims to achieve an appropriately **ambitious transition to zero carbon**.

The term transition can be applied to whole entities or their individual activities.

The European Union, Bank of China and China Construction Bank focus on activity-level transition; that is, the transition applicable to a specific activity (or sub-sector) for it to be green. Both the Development Bank of Singapore (DBS) and Climate Bonds have considered the transition at the activity and entity level.

DBS Bank has proposed two verification methods in order to label the activities: One is to judge whether economic activities meet the conditions based on the purpose of their application; the other is to identify company financing with unspecified Use of Proceeds, and mark them as 'Corporate in Transition', as long as this transaction meets the three criteria: Divested, Diversified and Decarbonised within the past 12 months. When the applied financing subject meets one of the criteria, it then can be labelled as corporate in transition.²⁰

Climate Bonds includes both economic entities and activities in its White Paper and provides decision-making processes for the transition of entities and economic activities respectively.

The fields which financial service institutions focus on demonstrate a high level of consistency. The difference lies in the order and progress of the relevant standards and research in the key fields, as well as the differences in the specific technology choices among them.

Cement, steel, and energy are generally selected as the priority industries for development. DBS Bank launched the Sustainable and Transition Finance Framework and Taxonomy in June 2020, and at the same time introduced the economic activity classification of 16 industries that conform with the labels set by DBS Bank as sustainable and transition financial industries.²¹ Sustainalytics set the priority on publishing research on transition paths for the gas and steel industries. HSBC took the UK as an example to discuss the key areas of transition finance, then focused on the sustainable transition of the chemicals industries in Oman, Saudi Arabia and the United Arab Emirates. Acting as the standard-setter, Climate Bonds will publish standards on cement and basic chemicals in early 2022 followed by standards on steel, oil, and gas.

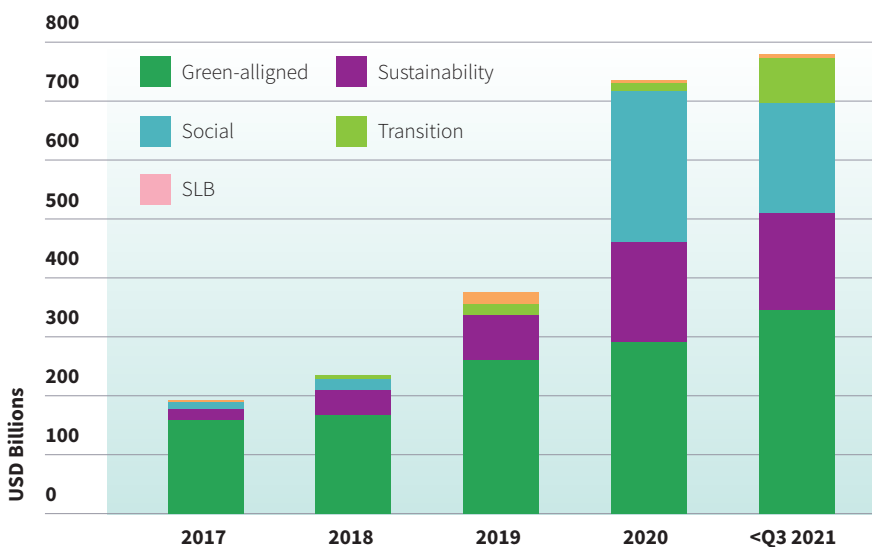
2.3 Transition finance practice

The global sustainable finance market is evolving rapidly and becoming increasingly attractive to companies aiming to decarbonise their portfolios. Issuance of green, social and sustainability (GSS) bonds and sustainability linked bonds (SLBs) collectively reached USD779.2bn in Q3 2021. See Figure 1.

Among the labelled debt instruments available in the market, green UoP bonds are the most mature and well accepted. Initiated by the European Investment Bank (EIB) in 2007, in 2020 issuance reached USD290bn from the full range of issuer types including corporates, banks, municipalities, and sovereigns. At current rates of growth, it is expected that USD1tn will be issued annually by 2023.²² The green UoP bond label has a long history of being used to raise finance for companies that are not yet near zero and need to decarbonise. For example, UoP relating to Buildings and Transport are both very well represented in the green bonds market.

Beyond the green label, a variety of other UoP bonds have emerged in recent years. These include the explicitly labelled transition bonds. By the end of 2020, 13 transition (UoP) bonds had been issued, including those from the European Bank of Reconstruction and Development (EBRD) and energy company SNAM. Five more were issued in the early months of 2021, including those from the Bank of China. See **Annex IV** for the full list. Interestingly, this label has attracted interest from companies that have made little foray into labelled green bonds.

Figure 1. Growth in Sustainable Finance instruments 2017–2021 Q3



Source: Climate Bonds Initiative

GSS Bonds

UoP Bonds Defined by the allocation of proceeds to specific environmentally or socially beneficial projects, assets activities, or expenditures. This category includes the following labels:

- **Green Bonds** – Proceeds allocated to climate and/or environmentally beneficial projects.
- **Social Bonds** – Proceeds allocated to socially beneficial projects.
- **Sustainability Bonds** – Proceeds are allocated to a mix of environmentally and socially beneficial projects.
- **Blue Bonds** – A subset of green bonds, but with proceeds allocated to ocean-based projects
- **Climate Resilience Bonds** – A subset of green bonds, with proceeds specifically allocated to climate related projects
- **Transition Bonds** – Similar to green bonds, often with proceeds allocated to decarbonising assets or projects

- **Pandemic Bonds** – In the main, a subset of social bonds, with proceeds allocated to addressing pandemic related social issues, such as healthcare or employment. But may be allocated to projects with both social and environmental impacts.

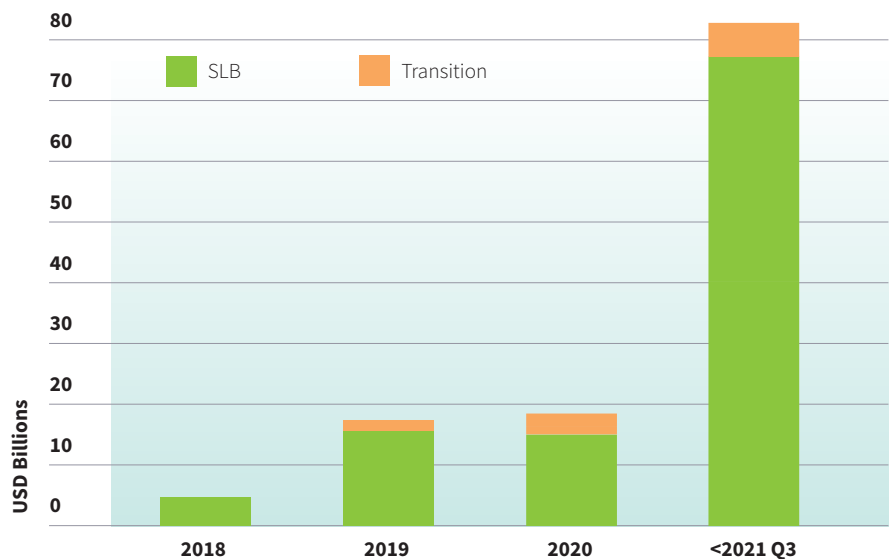
SLBs Proceeds of SLBs are usually not allocated to specific projects, assets or activities but used for general corporate purposes. The sustainability angle comes from the issuing entity making forward commitments to future delivery of sustainability outcomes, often in the form of company level key performance indicators (KPIs). In some cases, the cost of capital is linked to achievement of those KPIs.

Hybrid: Sustainability-linked green bonds (SLGBs) A hybrid that ties the use of proceeds model of a green bond with the performance-based structure of an SLB. The first SLGB was issued by Japanese construction company, Takamatsu, in March 2021. There are expectations that this structure will gain traction rapidly over the coming years.

Beyond UoP bonds, other labels such as the relatively recent SLBs have also emerged. SLBs do not have a stated UoP, but the cost of capital is tied to company-level KPIs. SLBs are attractive to issuers who don't have sufficient capital expenditures connected to sustainability projects, to smaller issuers that might lack the capacity to implement effective tracking or reporting practices required for use of proceeds instruments, or more generally to issuers who simply prefer to set performance indicators and reporting requirements at company level, rather than dedicated tracking and reporting of specific eligible projects and assets.

The growth in SLBs in the first Q3 of 2021 has been substantial, with volumes of USD77.32bn, forming 10% of the total labelled debt issuance. This includes issuance from companies who have previously issued UoP bonds.

Figure 2. Growth in transition bonds and SLBs 2018–2021 Q3



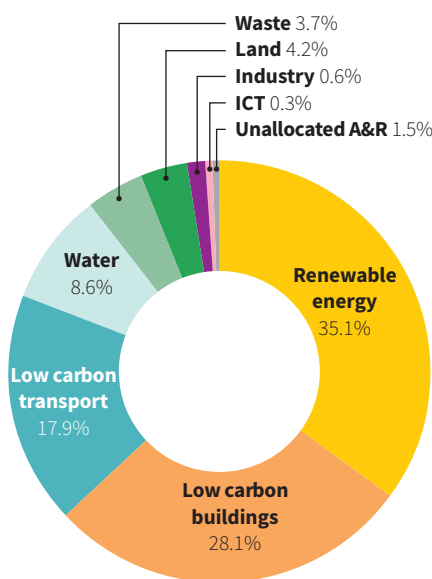
Source: Climate Bonds Initiative

High-emitting sectors that are critical to a successful economy-wide transition, including industrial sectors and fossil fuel dependent sectors, are far more prominent in the SLB market than the green UoP market (even when viewing transition as a subset of green), where they are still largely absent. See Figures 3a and 3b. For example, entities from the oil and gas sector are not widely active in the green bond market, with Repsol's foray receiving criticism, yet the reality is that the oil and gas sector will also need to transition. Italian oil and gas company ENI was one of the bigger SLB's issued in the first half of 2021 with a USD1.2bn SLB. Operators in these sectors are at an earlier stage of their transition and so see greater potential to engage with investors via forward-looking SLBs.

Given their forward-looking KPIs, all SLBs are inherently about transition, whether a climate, broader green, and/or social transition. For a decarbonisation transition specifically, they represent a fantastic opportunity for companies' net-zero targets to be linked up with access to sustainable finance.

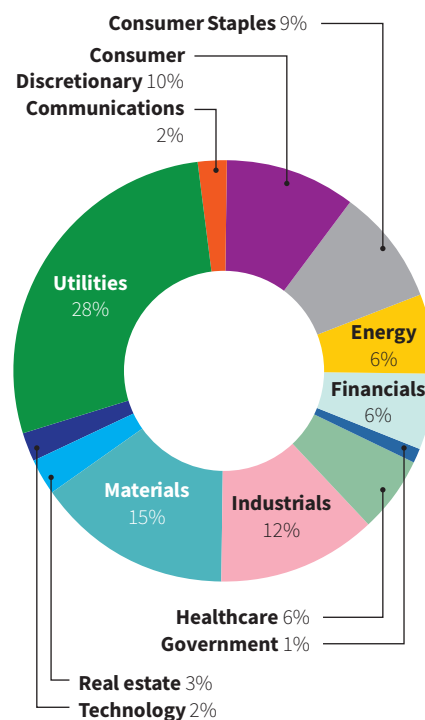
There have been some concerns around the credibility and impact of SLLs and SLBs. In particular, for SLLs, there is very limited transparency leading to some doubts around the impacts of these deals. For both types of transactions, there are concerns that as the KPIs are set by the issuing entity, they are not material or sufficiently ambitious to be easily assessed against broader goals such as the Paris Agreement. Nevertheless, if structured well, they can be a valuable addition to the green and transition finance landscape.

Figure 3a. GSS bonds by Use of Proceeds



Source: Climate Bonds Initiative

Figure 3b. SLB issuance by issuer sector



Source: Climate Bonds Initiative

Transition Finance Case Study

Issuer: **Orsted (formerly DONG)**

Debt financing instrument: **Green bond**

Climate Bonds classification of this economic activity: **Near-zero activities**

Orsted issued a green bond in 2017. This UoP bond set out a clear corporate strategy and commitment for achieving energy transition to net-zero energy sources. The green bond framework aligned with the GBP;²³ proceeds were used to finance renewable energy projects and excluded nuclear or fossil fuel energy generation projects. It also set quantitative targets of improvements at the corporate and project level. Decarbonisation at the corporate level included stopping the use of coal generation by 2023 and ensuring

that the share of green energy generation exceeded 95% by 2023. This would reduce GHG emissions from power generation and heat by 96% by 2023.²⁴ Orsted also compared its trajectory of improvements to pathways that comply with the Paris Agreement for both green energy generation and GHG emissions.²⁵

At the time, there was not yet discussion in the market about any transition label. This UoP bond used the green label to flag and finance the company's transition away from fossil fuel. The very pivotal place that these projects had within the company's asset portfolio restructuring toward renewables was evident. It may have been this context of a full strategic reorientation that ensured the bond's green credentials. The bond was later often cited as a prime historical example of transition.²⁶ The 2017 bond meets the criteria for being called green.

3. Application of Transition Finance in China

3.1 China's 30-60 target and low-carbon transition path

In September 2020, Chinese President Xi Jinping proposed the important 30-60 target, which states that China will peak CO2 emissions by 2030 and work towards achieving carbon neutrality by 2060.²⁷ The target has provided considerable impetus for China's government and industry to set decarbonisation targets and pathways.

The Central Climate Leading Group is coordinating the 30-60 target workstreams across government, formulating a timeline and road map for carbon peak and carbon neutralisation. A '1+N' policy system is planned to guide this

process, where the '1' refers to the guiding opinions that set out the overarching principles of all forthcoming policies that aim to facilitate China's peaking and neutrality goals, and the 'N' will include carbon peaking action plans covering ten key aspects such as green finance, manufacturing, transportation, low-carbon technology, etc.,^{28,29}

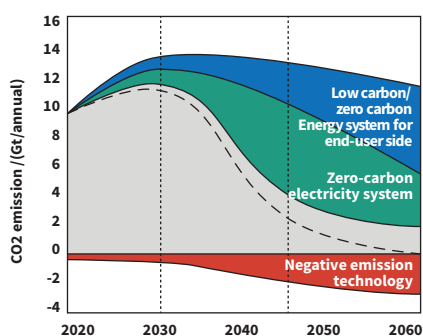
There is broad consensus in China that the decarbonisation of key sectors such as power, industry, transportation, and construction must be accelerated, and the remaining emissions should be offset with enhanced carbon sinks and carbon capture and storage (CCS).

A large number of domestic and international experts, think tanks and research institutes have already explored and researched China's carbon neutrality and transition pathways in key areas.^{30,31,32}

Table 3. Policies relevant to China's carbon targets

Policies/ National Ministries and Commissions	Date	Policy Deployment
Guiding Opinions on Coordinating and Strengthening Response to Climate Change and Eco-environmental Protection Work, by The Ministry of Ecological Environment ³³	11 January 2021	The guideline encourages the development of specific plans for key sectors such as energy, industry, transportation, and construction. It also promotes key industries such as steel, building materials, non-ferrous metals, chemicals, petrochemicals, electric power, coal, and other key industries to propose clear peak goals and action plans.
The Fourteenth Five-Year Plan for National Economic and Social Development of the People's Republic of China and the Outline of Visionary Goals by 2035 ³⁴	13 March 2021	This guideline is set to assist in implementing the nationally determined contribution target for combating climate change by 2030 and formulate an action plan on realising carbon emissions peaking before 2030. It promotes the low-carbon transition in industries, construction, and transportation sector
National Development and Reform Commission	16 November 2021	NDRC is currently stepping up the top-level design of carbon peaking and carbon neutrality, formulating an action plan for peaking carbon emissions by 2030. The commission will formulate implementation plans on achieving carbon peaking for the power, steel, and non-ferrous metal, petrochemical, chemical, building materials, construction, transportation, and other relevant industries and sectors. ³⁵
Opinions of the Central Committee of the Communist Party of China and the State Council on the Complete and Accurate Implementation of the New Development Concept and Proper Carbon Dumping and Carbon Neutral Work ³⁶	22 September 2021	Deeply adjust the industrial structure and formulate implementation plans for carbon peaking in energy, iron and steel, non-ferrous metals, petrochemicals and chemicals, building materials, transportation, construction and other industries and fields. Actively develop green finance and encourage developmental policy-oriented financial institutions to provide long-term and stable financing support for achieving carbon peaking and carbon neutrality in accordance with the principles of market-based rule of law.
State Council Action Plan for Carbon Peaking by 2030 ³⁷	24 October 2021	The carbon peak will be integrated into the whole process and all aspects of economic and social development, focusing on the implementation of the Ten Carbon-Peaking Actions including the green and low carbon transition, energy efficiency and carbon reduction, industrial carbon peaking, urban and rural construction carbon peaking, low-carbon transportation, circular economy, low-carbon science and technology innovation, enhance carbon sink capacity, step-by-step carbon-peaking actions in each region.

Figure 4. Schematic diagram of net-zero emission path in China³⁸



Based on the research results, the transitional activities and paths of key sectors are summarised in Table 4 (see **Annex V** for details):

Stimulating and guiding investment into low-carbon sectors is particularly crucial for achieving carbon-peaking targets in the near and medium term, and achieving carbon neutrality goals in the long term. The finance needs have been estimated as follows. (See Table 5)

Although there is no consensus of the scale of transition finance required, estimates indicate the funding needs for realising carbon neutrality by 2060 will be in the trillions of RMB/USD.

Table 4. Transition activities in key areas

Key Sectors	Necessary action
Industry	Energy saving, and consumption reduction, quality and efficiency improvement, raw material and fuel substitution technology, actively develop high-tech industries and advanced manufacturing industries, electrification of industries, etc.
Transportation & Communication	Coordinate the spatial layout of transportation infrastructure; optimise the transportation structure; promote the standardisation and cleanliness of green transportation equipment; improve transportation efficiency; improve transportation fuel composition; at the same time strengthen the concept of green transportation, electrification, etc.
Buildings & Constructions	Simultaneously promote energy efficiency improvements and energy structure optimisation: improve the energy-saving standards of new buildings; promote ultra-low energy-consumption buildings and increase the coverage of energy-saving renovation for existing buildings. Improve the heating methods for buildings in northern China, build additional heat storage facilities, develop distributed intelligent renewable energy networks, and achieve synergy among heat, electricity and gas. Improve the level of electrification as well.
Energy & Electricity	Accelerate the development of wind, solar and new energy sources; fully tap the potential of hydropower, nuclear power, and biomass power generation; accelerate the promotion of the flexible transition of thermal power facilities; stimulate the development of energy storage technology; establish and improve the price mechanism and power dispatch system that adapt to the rapid development of new energy; promote the construction of a new digitalised power system.

Table 5. China's carbon peak and carbon neutrality funding requirements³⁹

Institution/Name of individuals	Carbon peak	Carbon neutral
Gang Yi (People's Bank of China)	2021 - 2030: RMB2.2tn (USD345bn)/year	2030 - 2060: RMB3.9tn (USD612bn)/year
China International Capital Corporation (CICC)	2021 - 2030: RMB22tn (USD3.5tn)	Full process: RMB139tn (USD21.8tn)
Jun Ma (The Institute of Finance and Sustainability)	/	Full process: RMB100-500tn (USD15.7-78.5tn)
Rocky Mountain Institute/China Investment Association	/	2020 - 2050: RMB70tn (USD11tn) of investment in infrastructure facilities.
Institute of Climate Change and Sustainable Development, Tsinghua University	/	2020 - 2050: RMB174.38tn (USD27.4tn)
International Institute of Green Finance, Central University of Finance and Economics	2021 - 2030: RMB14.2tn (USD2.23tn)	/
Chinese Academy of Environmental Planning (CAEP)⁴⁰	2021 - 2025: RMB9.3tn (USD1.5tn) 2026 - 2030: RMB11.5tn (USD1.8tn)	/

3.2 Practice and progress of transition finance in China

China's finance sector has been embracing a strong green wave considering the country's recent commitment to achieving carbon neutrality. Green finance has become an effective way to leverage private sector capital to finance projects with reliable green benefits. However, under the current green finance system, it is difficult for companies in high-carbon emitting industries to obtain financing from the green financial market, as they do not meet the scope of support for green finance. To better facilitate the low-carbon transition for high-emitting industries, Chinese financial sectors are actively exploring new methods to incorporate transition finance into the current green finance dynamic. Transition finance instruments available in China are mainly transition bonds and sustainability-linked bonds, similar to elsewhere, represented in the green bonds market.

In early 2021, the Bank of China (BOC) announced the Transition Bond Management Statement and the China Construction Bank (CCB) announced the Transition Bond Framework which give a clear definition of a transition bond, and a list of eligible project categories.^{41,42}

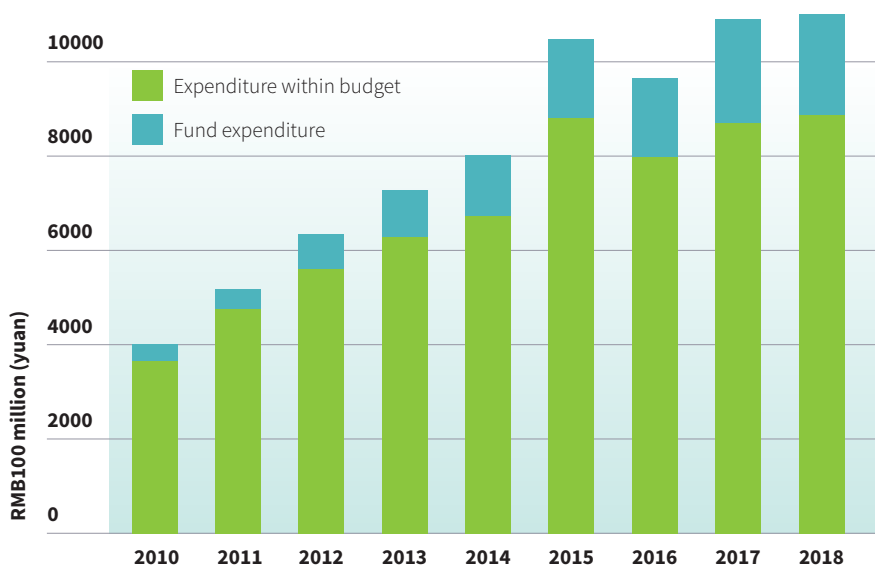
On 7 January 2021, following the guidance of the Climate Transition Finance Handbook (2020) issued by the ICMA and referring to the industry classification enlisted in the EU Taxonomy, BOC issued transition bonds, split between a USD500m 3-year bond and a RMB1.8bn 2-year bond. The funds raised were earmarked for natural gas co-generation projects, natural gas power generation, and cement plant waste heat recovery projects.⁴³

On 23 April 2021, in Singapore, CCB issued RMB2bn in two-year transition-themed bonds with a coupon rate of 2.85%. The bond aims to provide a stable source of funds for projects with substantial environmental benefits in carbon-intensive industries. The funds raised by the transition-themed bonds will be invested in selected projects, covering industries such as electricity, gas, steam, manufacturing, and steel.⁴⁴

On 28 April 2021, China's National Association of Financial Market Institution Investors (NAFMII), an important market regulator in the labelled bond space, launched its regulation on SLBs to broaden new financing channels for sustainable development. Ten Questions and Ten Answers for SLBs were compiled based on the international Sustainable Development Linked Bond Principles, and additional issuance requirements appropriate to the domestic market have been proposed.⁴⁵

On 10 May 2021, China Huaneng, Datang International Power, Yangtze Power, GD Power Development, Shaanxi Coal and Chemical Group, Liuzhou Steel Group, and Hongshi Group successfully issued the first batch of seven SLBs.

Figure 5. Categories of climate fiscal expenditures



Source: 2010-2019 China Fiscal Yearbook; Compiled by CECEP

The first batch of projects issued medium and long-term bonds of two years or more, with a total issuance value of RMB7.3bn (USD1.15bn).⁴⁶

(See Annex VI for details)

Existing finance challenges

There is a large divergence between the supply and demand of transition funds. Estimates indicate that trillions of RMB are needed to finance the transition; however, the current financing amounts to just billions. At the same time, China's climate funds are mainly allocated via budgetary expenditures or fiscal transfer expenditures. The proportion of fundings through funds, Public-Private-Partnership and other sources, is still relatively small, which is obviously different from that of the EU and other countries in terms of capital sources.

Strict definitions within the green finance system. At present, many transition activities or projects of hard-to-abate industries are not included in the current green finance system, although they are vital for China to meet its carbon neutrality targets. Many of high-emission industries are actually the backbone of the Chinese economy. For example, for the key transition industries mentioned above, industrials accounted for 32% of China's GDP in 2019, construction accounted for 7%, and transportation accounted for 4%⁴⁷. These high carbon emission industries need more diversified

financial tools to support their transformation and transition whilst delivering vital services.

The roadmap for achieving carbon peak and carbon neutrality is unclear, and it is difficult for transition funds to targeting climate transition activities.

By Jan 2021, provinces and cities such as Beijing, Tianjin, Shanxi, Shandong, Hainan and others have specified their carbon emission peak targets⁴⁸. So far a number of different regions and industries have developed low-carbon roadmaps; however, the methods used are non-standard, most lack clarity and detailed implementation plans for carbon peaking. Without clarity on transition activities for key industries, it is challenging for policy and financial support to be developed effectively for a low-carbon transition.

There is a lack of information and data, therefore a lack of smooth channels for climate funding to match transition projects.

Reaching China's carbon targets requires engagement from both traditional industries, such as steel, cement, and electricity, as well as emerging strategic industries. Identifying low-carbon transition projects and companies in need of transition finance support requires knowledge, evaluation standards, and tools. At the same time, the basic data collection, information disclosure, and statistical systems for key transition projects are not fully in place, meaning climate funds are unable to identify transition projects.

Case study of Transition Finance in the Steel Industry

Issuer:
Liuzhou Steel Group (MTN001)

Debt financing instrument: **SLB**

On 7 May 2021 Liuzhou Steel Group, as the only iron and steel enterprise among the first eight enterprises who successfully issued an SLB. The RMB500m (USD78.5m) deal have a tenor of 2+1 years and a coupon rate of 4.1%. The bond fully integrates the SDGs into the terms of bond issuance, setting the linked target as 'nitrogen oxide emissions per unit product of 0.935kg/t in 2022', down 0.188kg/t from 2020.

4. Case study of Transition Finance Applications based on the Steel Industry

4.1 Current status of carbon emissions in the steel industry

The realisation of the 30-60 target depends on the green transition of the whole economy and society, and the low-carbon pathways and transition targets of different industries vary greatly depending on their industrial structure, social needs, and technological status. To explore the application of transition finance in greater depth, we have chosen to analyse the steel industry as an example.

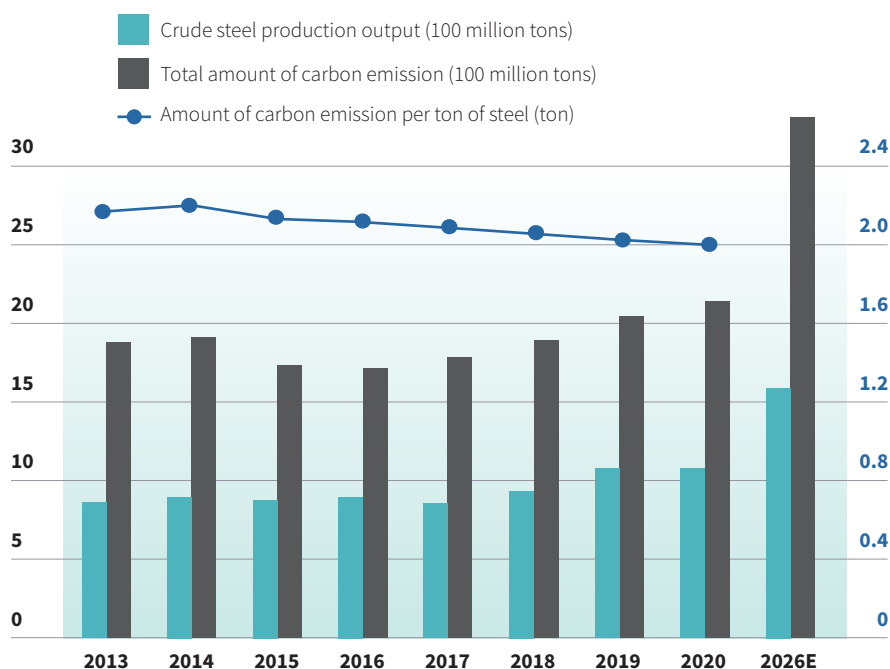
The steel industry is a pillar of China's industrial economy, accounting for about 5% of China's GDP. Half of the global steel output (1.8 billion tons) is produced in mainland China, accounting for about 15% of China's total carbon emissions.

From 2013 to 2020, China's crude steel output increased by 31% from 813 million tons to 1.065 billion tons, total carbon emissions of the steel industry increased by 20% from 1.748 billion tons to 2.11 billion tons indicating increased efficiency of production. However, the growth of the industry means carbon emissions will reach 3.148 billion tons in 2026. This shows that although the steel industry in China has achieved initial outcomes in energy-saving and emission reduction in recent years, the situation is still grim, and there is definitely much room for further improvement.⁴⁹ (Figure 6)

4.2 Analysis of carbon reduction paths for the steel industry

China Metallurgical Industry Planning and Research Institute (CMIPRI), a leading industry body, is drafting an Action Plan for Carbon Peaking and Reduction in the Iron and Steel Industry (the Action Plan) which has provided a clear carbon peak action plan and roadmap for the steel industry. In this plan, peak carbon emissions will be achieved by 2025, carbon emissions will then reduce by 30% by 2030 leading to 420 million tons of emissions reduction.⁵⁰

Figure 6. Total amount of national steel production, carbon emission of the steel industry, and carbon emission per ton of steel from 2013 to 2026



Source: Prospective Industry Research Institute, Research report on Opportunities and Challenges Brought by Carbon Peak and Carbon Neutrality, Prospective Industry Research Institute, July 2021.

1. Steel production to stabilise by 2025

Domestic demand for steel has slowed in recent years, in addition, from May 1 2021 the steel export tax rebate policy will be withdrawn which will depress steel exports.⁵¹ The National Development and Reform Commission and the Ministry of Industry and Information Technology have issued guidelines to encourage consolidation of domestic crude steel production capacity and restrict future crude steel growth. Overall, domestic crude steel output will stabilise, which is a factor enabling the industry to achieve carbon emissions peak targets.

2. Reduced Carbon Intensity of Production

Between 2015 and 2018 the carbon emission intensity per ton of steel production fell in response to the use of low-carbon metallurgical technologies. Manufacturing process efficiencies and new technologies are already being adopted and uptake is likely to increase further to allow the sector to achieve the target of 30% carbon reduction.

3. In depth carbon reduction and neutrality in the industry will be accelerated greatly by technologies such as hydrogen metallurgy and CCUS/CCS

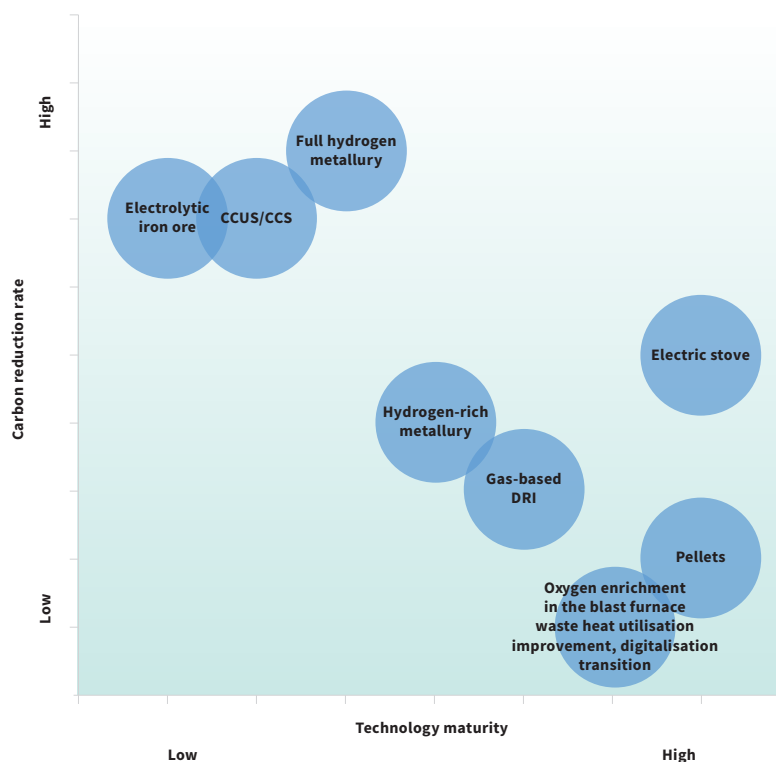
Hydrogen metallurgy with a direct reduction shaft furnace as a carrier is feasible for realising a zero-carbon target, and is expected to become economically viable worldwide. Green hydrogen provides significant carbon reductions down to carbon neutral production. At present, the mainstream hydrogen metallurgical technologies, domestically and abroad, include blast furnace hydrogen enrichment, and shaft furnace hydrogen enrichment. Except for Japan's COURSE50 with hydrogen enriched in the blast furnace, which is proved to achieve the effect of 10% carbon reduction other processes are still in the pilot stage. The large-scale promotion of hydrogen metallurgy is mainly restricted by constraints on costs and the availability of upstream green hydrogen. While China's solar costs and new lower cost electrolyzers are a major contributor to break these constrictions.

CCUS/CCS has great potential for emission reduction, but due to economic, technological, and environmental impacts, the timing for unrolling large-scale development is unclear. Carbon capture, utilisation and storage (CCUS/CCS) refers to an industrial process that separates carbon dioxide (CO₂) from industrial emission sources and directly uses or stores it (CCUS contains CO₂ as a resource) to achieve CO₂ emission reduction. At present, domestic steel mills are still in the research stage of CCUS/CCS, and need major breakthroughs in technology and costs to achieve large-scale promotion and application.

Table 6. Estimation on the reduction of carbon emissions per ton of steel through different process's optimisations⁵²

Technology	Reduction of carbon emission intensity per ton of steel
Electric furnace steelmaking (including DRI-electric furnace, pure scrap electric furnace)	34%-80%
Pellets replace sintering	3.20%
Increase waste heat and energy utility, industry blast furnace, energy consumption for average coking process reaches the lowest level	8%
Upstream power structure change	1.5-2%

Figure 7. Distribution overview of carbon reduction process and technical feasibility concerning the steel industry



Source: Hwabao Securities, 'Investment of trillions in the next ten years, focusing on low-carbon technology providers-deep research report on carbon neutrality in the steel industry', June 15, 2021.

4.3 Funding the transition of steel industry⁵³

Large scale investments are needed to fund carbon emission reductions in the steel sector, whilst the initial cost is relatively low, the marginal costs rise rapidly along with an increase in reduction rate. It is estimated that investments of RMB2tn (USD314bn) are needed to reduce emissions by 30% compared to 2020⁵⁴. To achieve carbon neutrality, China's steel industry will need investments of about RMB20tn (USD3.14tn). It is roughly estimated that its annual investment is up to RMB500bn (USD78.5bn), and the annual investment per ton of steel is RMB500 (USD78.5).⁵⁵

Focusing on the main technologies and the use of hydrogen, the investment scope and scale are estimated as follows. (Table 7)

The steel industry faces a huge demand for financing in addition to its promising investment prospects. Iron and steel enterprises can optimise their capital structure and raise funds for development through a variety of financing instruments, or a combination of financing instruments and financing models (Table 8).

At present, most of the funds available for iron and steel enterprises come from their own funds, bank loans, corporate bonds, stock market financing, mutual guarantees and mutual loans between enterprises, and fund lending in the private sector but there are several problems as follows:⁵⁶

Table 7. Forecast on the scope and scale of new investment on high maturity, practical technology⁵⁸

Technology	Scope of investment	New investment (RMB100m)
Electric furnace steelmaking	Investment in high-efficiency electric furnace-rolling plant, gas-based DRI-electric furnace, investment in rolling manufacturing	3000
Pellet manufacturing	Investment in belt roaster	1800
Energy efficiency improvement	High oxygen blast furnace transition, steel plant intelligence transition, investment in steel plant energy conservation	> 2000
DRI direct reduction iron	Coke oven gas treatment, direct reduction iron shaft furnace, gas recycling	700-1000
Blast furnace hydrogen-rich	Coke oven gas treatment, blast furnace injection system transition	2000
Total		9500 - 9800

1. Stock market listed steel companies mainly focus on bond financing, and the proportion of equity financing is low. Since 2008, especially under the “four trillion stimulus policy”,⁵⁷ to meet the growth of domestic demand, the steel industry has mainly expanded its scale by increasing debt, with the debt-to-

asset ratio rising rapidly year by year. By the end of December 2017, the average asset-liability ratio of 93 large and medium-sized steel companies nationwide reached 67.23%.

Table 8. Main current financing models for steel companies⁵⁹

Type of Financing means	Financing Channels or Methods	Sources of Funds	Financial Market	Main Financing Tools
Internal Financing	Capital, asset depreciation, intangible asset amortisation, retained earnings	Company / enterprises' international source	/	/
	Bank financing	Indirect financing	Commercial banks	Loan from banks
	Trust financing		Trust company	Trust loan
	Leasing financing		Financing leasing company	Leasing loan
External Financing	Bond financing	Direct Financing	Bond exchange market, inter-bank bond market	Enterprise bonds, corporate bonds, short-term financing, medium bills, directional instruments, ultra-short-term equity financing
	Equity financing		Equity exchange market	Chinese stock shares, preferred stocks
	Hybrid financing		Equity exchange market, bond market	Payable bonds, convertible bonds, perpetual bonds, private bonds, corporate asset securitisation

2. Debt financing depends highly on banks, mainly short-term loans, which is seriously mismatched with the long-term capital needs of enterprises.

According to data from Wind, the 28 listed steel companies on Shanghai and Shenzhen stock markets have accumulated a total of RMB647bn (USD101.6bn) in direct financing through the market and inter-bank bond market, and the accumulated equity financing totals RMB253.4bn (USD39.8bn). The proportion of equity financing in direct financing is less than 40%, and equity financing in all fundraising is less than 25%. Due to the poor operation and management efficiency of steel companies, few of these companies qualify for direct financing on the financial market, especially equity financing. To a certain extent, the capital market ignores the demand for equity financing of steel companies, resulting in insufficient equity financing for the steel sector.

Based on statistics from Wind, the interest-bearing debt in the annual indirect financing of the 28 enlisted steel companies is mainly commercial bank loans, and the additional debt is mainly short-term loans within one year, which takes about 81% of all additional debt. However, during the actual operation of steel enterprises, except for a few sporadic maintenance projects, most of the fixed asset investment and environmental protection renovation projects are projects with a large demand for funds and with a construction period of more than one year. The current financing model based on short-term loans drives companies into borrowing new ones to repay the old, resorting to short-term financing and long-term investment. The mismatch of investment and financing maturity leads to potential business risks.

3. Rising cost for financing steel enterprises.

Given that the steel industry is currently still facing problems such as overcapacity, product structure imbalance, high financial leverage, backward inventory management methods, and high environmental pressures, the transition and upgrading of steel enterprises has caused financial institutions to face certain potential risks. Thus financial institutions remain hesitant in supporting the steel industry. At the same time, the traditional equity financing and debt financing of steel companies are restricted in the capital market. With financing costs rising, fundamental changes are unlikely to occur in the short term.

The above shows that in the context of the 30-60 target and their own sustainable development, steel enterprises have a strong demand for financing; while the existing financing channels and methods are far from adequate, and the steel industry urgently needs new financial products, instruments, investment and financing mechanisms and policy support to achieve a green and low-carbon transition. Based on this, Climate Bonds believes that the low-carbon transition of the steel industry requires the following support:

(1) Innovative financial products from financial institutions. With the low boom in the early part of the steel business and the low level of return on investment, steel companies usually fail to meet the conditions for equity financing and can only borrow new debt to refinance existing liabilities. Rigid deleveraging and closing the back door to leveraged debt financing will only trigger the risk of corporate capital chain breakdowns. Financial institutions can develop innovative financial products, tools and investment and financing mechanisms, extend short loans into long loans, optimise the loan term structure, and give steel enterprises sufficient time-space to digest the cost of reform, while actively expanding equity financing support.

(2) Active low-carbon transition of enterprises.

Overcapacity and the high energy consumption and carbon emission attributes of the industry make financing for iron and steel companies costly. In the context of 30-60, banks have strengthened their environmental risk assessments and environmental efficiency has become an important factor in the credit rating of enterprises, which is both a challenge and an opportunity for steel enterprises. Steel companies should improve their business performance while actively transforming into low-carbon enterprises to improve their credit ratings, broaden their financing channels and reduce their financing costs. For example, in the interbank market, the average cost of financing for the same iron and steel company issuing the same debt financing instrument is 120-150bp lower for a company with a AAA main credit rating than for a company with an AA rating.⁶⁰

(3) Policies to promote transition finance development.

Policymakers and regulators can support and encourage the development of transition finance in the same way as they support green finance: organise joint research and discussion among academia and industry as soon as possible on the concept, standards, and classification of transition finance, as well as the corresponding assessment and management systems,⁶¹ and the introduction of corresponding incentive mechanisms and policies to better promote the 30-60.

5. Summary and discussion

The low-carbon transition of the high-emitting industries is among the most challenging parts of the fight against climate change, and no sector can afford to fall behind. The green transition of high-emitting industries is a critical conundrum that will only be resolved with the participation of all market participants including policymakers, regulators, bankers, and investors.

China holds a pivotal position in the global low-carbon transition and has committed to act with its ambitious 30-60 climate target. China can leverage its solid foundation and practical experience in economic development, industrial upgrading, and green finance. The vigorous development of transition finance will help China to achieve its climate goals and provide the world with an important case study.

Transition finance has received a great deal of attention and has been tested both internationally and nationally, but still faces considerable challenges.

First, **progress in research on transition goals and pathways varies across industries, making it difficult for transition finance to accurately support action on climate goals.**

Both international and domestic studies of transition pathways reflect varying progress to determine pathways across industries, and some key industries still lack consensus, transition targets, and pathways. In the case of China, different regions and industries have multiple low-carbon development models and different roadmaps, and most localities and industries have not yet issued clear roadmaps to reach the peak, or the existing implementation plans to reach the peak are not sufficiently granular. Together with the lack of coordination across finance and the real economy, it is difficult to target financial support, and financial and fiscal instruments cannot be precisely aligned with key projects or enterprises for low-carbon transition.

Secondly, **there is a structural contradiction between the supply and demand for transition finance in China.** China's demand for transition finance in the trillions of dollars is far greater than the current climate investment and financing efforts and financial support, and it is difficult to support the 30-60 target with financial resources alone. At the same time, the existing green finance system is more strictly defined, and, under the current green finance system, it is difficult for companies in China's high-carbon sectors to access finance in the green finance market as many transition activities do not fit into the scope of green finance support. In particular, financial institutions have become more cautious in investing in high-energy consumption and high-carbon emission industries in the context of a dual carbon background.

Thirdly, **there is a lack of information and data, and poor access to climate finance to transition projects.** Low-carbon transition initiatives include both traditional industries, such as steel, cement and electricity, and also involve many new strategic industries. The identification of low-carbon transition projects or low-carbon transition enterprises supported by transition finance is highly specialised, and there is an urgent need to develop corresponding assessment standards and tools. At the same time, the collection and collation of basic data, information disclosure, and the statistical system of key transition projects are not perfect, which has caused certain difficulties for climate finance to match with key transition projects.

In response to these issues, we make the following recommendations:

1. Investors: socialise and harmonise a single definition of transition

Investors have clearly expressed their requirements on transition finance, that is, transition activities must demonstrate sufficient ambition to avoid greenwashing. To be credible, transition frameworks and standards should be science-based and supported by specific performance indicators and tools to track the progress of transition activities. Such frameworks and standards should also be applicable for a range of users, including business entities, to formulate their transition pathways and strategies.

2. Policymakers: promote transition finance

Regulators and policymakers can play a leading role in promoting transition finance, in terms of policy support, procurement and incentives. Through policy guidance, regulation, constraints and incentives, industries can help to reduce barriers for some activities to transition. In areas where economic viability is a barrier, large scale government procurement or incentives for green technologies (e.g., green cement, low-carbon steel etc.) can help to create economies of scale, bring certainty to forward investment and bring down the cost of green technologies. In the solar industry, government incentives in Germany and China helped to create scale in the industry which then drove down costs. This model must be applied to other emergent green technologies.

Financial sector can work closely with the real economy, formulating investment and financing plans for specific sectors with clear actions and measures. In China, the low-carbon transition of the economy will be coordinated by a '1+N' policy system, with the provision of an Action Plan to Reach Peak Carbon for key sectors. The mid and long-term green development plans and the spatial layouts of major industries are under development and expected to be unveiled soon.

In order for transition finance to achieve its intended impact, a coordination mechanism between industry planning and financial development planning would be in dire need, especially in the area of renewable and green hydrogen energy, industrial low-carbonization, green buildings, electrification of transportation, phasing out outdated coal power plants, and etc.

Multiple financial mechanisms and tools can be developed to support and accelerate transition finance.

With the rapid development of green finance in China, transition finance can certainly draw from its successes and pitfalls. Regulator can update current green finance standards according to "30-60" target and formulate transition taxonomy for high emission sectors; encourage the launching the transition bonds, transition funds, transition insurance and other financial instruments; and put forward requirements for financial institutions to calculate and disclose their exposure of high-carbon assets and the carbon footprint of major assets., with the aim to support the formulation of their low-carbon transition plan.

Through more rigorous transition pathway research, policy coordination and market practice, the transition finance market is expected to expand to include more industries and economic activities, and further connect China's carbon neutrality commitments and Paris Agreement goals. This would promote the comparability, compatibility, and interoperability of global transition finance standards.

3. Issuers: get issuing in line with the principles

Issuers can adopt the current available transition finance principles and framework. The more it is used, the more issuers it will attract, and the more capital will be directed to ambitious GHG emissions' reductions. We acknowledge that there is inconsistent or non-existent scientific guidance for some activities at present, and this should be developed urgently.

If guidance is inconsistent, entities should be transparent over the source of the mitigation goal and transition pathway they are following, and why that was selected over alternative options.

If guidance does not exist, we recommend the adoption of the most ambitious measures available to maximise mitigation potential and high levels of transparency report on the transition goal and pathway. Best practice can create precedent.

4. Entities: act on low-carbon transition

Market entities including companies and financial institutions can formulate transition strategies according to the scientific paths, and finance through transition finance products. In addition, they can adopt new finance instruments to support their low-carbon

strategies. For example, U.S. Steel amended its two billion asset-based revolving credit facility to include an increase or decrease in the margin payable based on achievement of targets related to carbon reduction, safety performance and facility certification by ResponsibleSteel™.⁶²

5. Market analysts and service providers

Test and use transition concepts to assess real transactions and financial products.

More detail on how Climate Bonds plans to do so is given in the box below.

Implications for Climate Bonds

The following areas are currently under consideration:

- **Certified Climate Bonds:** We already certify many financial products relating to sectors and activities that could be classified as transition under the framework developed in our Financing Credible Transitions white-paper and work is underway to develop criteria that define transition pathways in more of these sectors – industrials, such as cement and steel, are particular priorities. These cover UoP bonds, asset-backed securities and other debt instruments. We are not currently able to certify whole-entity transitions, but in September 2021, Climate Bonds published a discussion paper entitled Transition Finance for Transforming Companies: Avoiding greenwashing when financing company decarbonisation, and we are keen to receive feedback, comments and suggestions.
- **Climate Bonds Database:** We currently collect data for green and other labelled bonds that is used as the base data for indices around the world. For green bonds, the data is screened to ensure that bonds are aligned with the Climate Bonds Taxonomy. For social bond data, no such taxonomy exists, and the data is collected without any additional filtering. For transition bonds, we collect and tag all bonds labelled as transition. We are also looking to develop a methodology to screen these deals in line with the framework outlined in our Financing Credible Transitions white-paper.

Annex I. International Transition Pathways Research Organisations

Name of Institution	Main job content	Industries involved
Assessing Low-Carbon Transition Initiative	Using a future-proof sector-specific approach, assess the readiness of companies for transition and provide them with trend indicators on their transition plans. ⁶³	Transition pathways have been developed for the retail, automotive, construction and real estate sectors; pathways are being studied and refined for the agri-food, steel, oil and gas, transport and cement sectors; and ACT plans to develop transition pathways for the aluminium, chemicals, pulp and paper, and glass sectors.
The Mission Possible Partnership	The plan is to unite seven industry leaders to agree on industry decarbonisation targets and develop decarbonisation roadmaps for these seven industries. ⁶⁴	Seven sectors: aluminium, aviation, cement, chemicals, shipping, steel and trucking
Transition Pathway Initiative (TPI)	Designed to assess the transition to a low-carbon economy by businesses that have a significant impact on climate change and to assess the readiness of these businesses to make the transition to low carbon, TPI provides carbon performance benchmarks that include emission performance pathways aligned to three emission reduction scenarios: 1) the Nationally Determined Contributions (NDCs) scenario under the Paris Agreement commitments; 2) the 2 °C temperature rise scenario; and 3) the below 2 °C temperature rise scenario. ⁶⁵	The assessment framework applies to industries such as electric utilities, oil and gas, aluminium, cement, mining, paper, steel, airlines, automotive and shipping.
Science Based Targets Initiative (SBTi)	A science-based framework was designed to develop and assess net-zero targets for the corporate sector. SBTi verifies companies' carbon reduction strategies to ensure they are in line with the latest climate science in order to meet the Paris Agreement targets. ⁶⁶	Transition pathways exist for power, financial institutions, apparel and footwear, OEMs (car manufacturers) and ICT. Industry approaches for oil and gas, aluminium, forestry, land and agriculture and chemicals are currently under development.

Annex II. Organisations that provide transition services to investors

Name of Organisation	Key tasks related to transition
Global Investor Coalition on Climate Change	GICC has worked with its regional counterparts (Ceres, IGCC, AIGCC) to develop guidance for brownfield sectors such as real estate, construction materials, steel, oil and gas, automotive, power companies, mining and others. ⁶⁷ With a focus on governance and disclosure, the guidelines clarify the level and pace of transition that investors want to understand and showcase current best practices and alternative technologies/approaches as a way to provide insight into future potential and the pace of change.
Climate Action 100+	The Net-Zero Company Benchmark, launched by Climate Action 100+, using publicly disclosed data, to assess the speed at which high-emitting companies are transitioning to low-carbon business models and the governance processes they are adopting to achieve this goal, using 10 key indicators.
World Business Council for Sustainable Development	WBCSD worked with 30 companies to develop the Circular Transition Indicators (CTI) 2.0 to support companies in using a universal, consistent tool to measure their circularity.
Investor Agenda	The Investor Climate Action Plans (ICAPs) Anticipation Ladder and Guidance, published by Investor Agenda, provides clear guidance for investors on the publication and implementation of comprehensive climate action plans, including steps investors can take to enable institutional investors to accelerate action to address the climate crisis and accelerate the transition to a net-zero economy.
Institutional Investors Group on Climate Change	The Net Zero Investment Framework is a blueprint for investors and provides common set of recommended actions, metrics, methodologies (inc. investment trajectories) which investors can use to maximise their contribution to net zero by 2050.
Net Zero Momentum Tracker initiative	Co-sponsored by Climate Works Australia and the Monash Institute for Sustainable Development, the report brings together and assesses climate action commitments made by Australian business, government and other key sectors. In particular, the report on the resources sector analyses the 22 highest emitting companies in Australia's resources sector, assessing whether each company's climate action commitments are consistent with the global goal of achieving net-zero emissions by 2050. ⁶⁸ Sector reports released to date cover the real estate, banking, superannuation, local government, retail, transport and resources sectors.
Paris Agreement Capital transition Assessment	A free online tool based on the analysis of the 2°C initiative. The tool covers both equity and bond issuers and is based on an analysis of companies' investment and production plans in the area of high-emission activities and low-carbon solutions, both currently and over the next five years. The tool is used to analyse the 'technology exposure gap' to show the extent to which a given portfolio's investment/production plans are consistent with a given climate scenario. This consistent analysis in itself meets the investor's climate change target analysis requirements; it can also be used as a tool for deeper analysis of inconsistent areas/sectors, or for product design.
Sustainability Accounting Standards Board	The standard's range of topics covers environment, social capital, human capital, business models and innovation, leadership and governance, in addition, standards for 77 industries in 11 sectors, including: mining and mineral processing, multiple other manufacturing industries, finance, transport, infrastructure and services. It has also published a materiality map to identify the dimensions of sustainability that may affect each of the 11 key sectors. ⁶⁹ The mapping lists for each industry issues that may be less important, issues that are critical to 50% of businesses, and issues that are critical to more than 50% of businesses.
The Corporate Knights and the Council for Clean Capitalism	<p>The Clean transition Bond Guide (CTBG), a taxonomy for clean financing in heavy industry, was published in 2018 covering oil and gas, energy utilities, mining, metals and other non-fossil fuel commodities (e.g., cement, chemicals, steel and metallurgy).⁷⁰ Carbon-intensive industries are identified as eligible transition categories, and the guidance distinguishes between eligible transition project categories and eligible clean project categories.</p> <p>The Clean Transition Bond Guidelines provide specific qualification criteria based on a minimum level of GHG emission reductions, but it is unclear whether the proposed reductions are consistent with the requirements of the Paris Agreement targets. In addition, the GHG emissions being accounted for do not include Scope 3 emissions (i.e., emissions from the use of products), thus omitting the most important component of emissions from this sector.</p>

Organisations assessing or providing information disclosure platforms	
Name of institution	Key tasks related to transition
CDP	They use the material that is disclosed to them to run a well-established rating mechanism (based on TCFD) for companies and cities. It assesses whether plans are ambitious enough.
2 Degrees Investing Initiative	Measure the alignment of climate portfolios with climate scenarios. Run PACTA tool that measures alignment of financial portfolios with climate scenarios.
Carbon Tracker	Focus on ensuring companies are using robust and realistic Paris-aligned scenario modelling approaches, demonstrating to investors what companies need to do to align with well below 2°C and what they are currently doing.

Annex III. Overview of transition finance definitions and key areas

Name of organisation/ institution	Definition	Key areas
Climate Bonds Initiative	The transition label is used for investments that are making a substantial contribution to halving global emissions by 2030 and reaching net zero by 2050, but do not have a long-term role to play; or will have a long-term role to play, but at present, the pathway to net zero is not certain.	The initial industries to focus on are cement and basic chemicals. Steel, aluminium, oil and gas, and aviation are also considered.
Sustainalytics	The decarbonisation of economic activities along with emissions-reduction pathways that are consistent with the economy-level goal of net-zero carbon by 2050.	Research on the transition path and potential investment needs of the natural gas and steel industries have been released, other industry reports such as shipping, aviation, cement and aluminium will be launched soon.
BNP Paribas	<p>Transition finance applies to: 1) a sector that is not currently green; 2) it does not turn green immediately; and 3) industries that can and need to become greener (or less brown) faster, at a pace consistent with recognised sustainability programmes, or at least have a publicly available roadmap of transition strategies to bring them within an acceptable timeframe.⁷¹</p> <p>BNP cites the following two factors to demonstrate the impact of the Transition Bond.⁷²</p> <p>1. Policy objectives. A demonstrable carbon reduction target will be a key way for companies to demonstrate the attributes of a transition bond issue to investors during roadshows.</p> <p>2. Science-based targets (SBTs) and key performance indicators (KPIs). Through SBTs and KPIs, issuers can demonstrate the achievement of precise milestones and targets, thus giving investors a clear picture of how the company's ambitions match its ambitions as an investor.</p>	<p>Sectors of interest are:⁷³</p> <p>1. Mining - especially minerals critical to a low- carbon economy, such as lithium and cobalt</p> <p>2. Heavy industry (e.g., cement, aluminium, iron, steel, chemicals)</p> <p>3. Utilities (e.g., electricity, gas, water, cable, telecommunications)</p> <p>4. Transportation</p>
DBS	<p>Companies in polluting sectors (to) adopt incremental solutions to become greener.⁷⁴</p> <p>DBS considers an activity 'transition', if it can meet the following conditions: 1) displace more carbon-intensive options, document and independently verify the extent of greenhouse gas (GHG) emissions reduction (forecast or realised) compared to industry norms; or 2) enables the wider application or integration of less carbon-intensive options.</p>	The Sustainable and transition Finance Framework and Taxonomy presents economic activities from 16 industries that are in line with DBS's sustainable and transition label.
HSBC	Any form of financial support that helps high-carbon companies start to implement long-term changes to become greener. ⁷⁵	The focused industries are chemicals, energy systems, transportation (shipping and aviation), steel, cement, and construction.

<p>Hong Kong Green Finance Association</p>	<p>Climate transition finance is about financing technologies and activities that produce lower carbon outcomes than business-as-usual; and support transition to a climate resilient economy, but do not represent the best alternatives in that sector and remain inadequate in meeting decarbonisation targets.⁷⁶</p> <p>Three safeguard measures to ensure effective and eventual contribution to emissions reductions:</p> <ol style="list-style-type: none"> 1. Outlining a credible plan (by the issuer or borrower) to align with Paris Agreement goals within a precise timeline 2. Minimising carbon emissions and other negative externalities during operation of partially satisfactory technologies and activities 3. Setting a deliberate plan to phase out partially satisfactory technologies and activities to make way for net-zero compatible technology and activity. 	<p>The report discussed the transition technology and related policies of the steel, cement, and energy industries in detail.</p>
<p>Bank of China</p>	<p>Transition finance which aligns with international guidelines or standards, namely, in accordance with the respective national and regional pathways of achieving carbon neutrality, ultimately, and transition finance which covers projects for the reduction of pollution and emissions from traditional industries through technical retrofits and equipment upgrades towards low carbon or zero carbon.⁷⁷</p>	<p>Eligible projects include:</p> <p>Production of Electricity from Gas, Cogeneration of Heat/Cool and Power from Gas, Production of Heat/Cool from Gas, Manufacture of Cement, Manufacture of Aluminium, Manufacture of Iron and Steel, Manufacture of Fertilisers and Nitrogen Compounds</p>
<p>China Construction Bank</p>	<p>Transition finance which aligns with international guidelines or standards, namely, in accordance with the respective national and regional pathways of achieving carbon neutrality, ultimately, and transition finance which covers projects for the reduction of pollution and emissions from traditional industries through technical retrofits and equipment upgrades towards low carbon or zero carbon.⁷⁸</p>	<p>Eligible project category:</p> <p>Gas power generation, gas cogeneration, gas heating or cooling, cement production, aluminium production, steel production, petrochemical production, fertiliser and nitrogen compound production, paper production, air transportation</p>

Annex IV: Transition (UoP) issuance to date

Full Issuer Name	Original Label	Country	Amount Issued (USD)	Issue Date
Castle Peak Power Finance Company Ltd	Transition	Hong Kong	500.0 m	25/7/2017
Marfrig	Transition	United States	500.0 m	8/6/2019
EBRD	Green transition	Supranational	555.7 m	17/10/2019
EBRD	Green transition	Supranational	55.0 m	13/11/2019
Credit Agricole CIB	Transition	France	110.1 m	27/11/2019
Credit Agricole Corporate & Investment Bank		France	115.8 m	29/11/2019
EBRD	Green transition	Supranational	83.8 m	13/12/2019
Cadent Gas Limited	Transition	United Kingdom	566.8 m	11/3/2020
Snam SpA	Transition	Italy	564.9 m	17/6/2020
Castle Peak Power Finance Company Ltd	Transition	Hong Kong	350.0 m	22/6/2020
EBRD	Green Transition	Supranational	55.6 m	19/10/2020
Unity 1 Sukuk Ltd	Transition	United Arab Emirates	600.0 m	03/11/2020
EBRD	Green Transition	Supranational	20.0 m	20/11/2020
EBRD	Transition	Supranational	129.6 m	24/11/2020
Credit Agricole CIB	Transition	France	15.4 m	27/11/2020
Snam SpA	Transition	Italy	666.9 m	7/12/2020
BCPE SA	Transition	France	118.1 m	16/12/2020
Bank of China Ltd (Hong Kong Branch)	Transition	China	278.3 m	14/1/2021
Palgaz Doğalgaz Dağıtım Şirketi ve Ticaret AS	Low-Carbon Transition	Turkey	22.5 m	27/1/2021
EBRD	Green Transition	Supranational	205.3 m	28/1/2021
Snam	Transition	Italy	606.0 m	15/2/2021
Castle Peak Power Finance Company Ltd	Transition	Hong Kong	300.0 m	3/3/2021
Cadent Gas Limited	Transition	United Kingdom	743.2 m	19/3/2021
Snam	Transition	Italy	303.0 m	30/3/2021
China Construction Bank (Singapore)	Transition	Singapore	310.0 m	22/4/2021
Inter-American Investment Corporation	Transition	Supranational	100.0 m	11/6/2021
Snam SpA	Transition	Italy	579.3 m	30/6/2021
Seaspan Corp	Blue Transition	Hong Kong	750.0 m	14/7/2021
Nippon Yusen KK	Transition	Japan	90.0 m	29/7/2021
Nippon Yusen KK	Transition	Japan	90.0 m	29/7/2021

Annex V: Summary of research on the paths for key sectors to realise carbon peak and carbon neutrality in China

Chinese Academy of Environmental Planning (CAEP) ⁷⁹		
Theme	Goal	Path
Industry	During the 14th Five-Year Plan period, reach the overall carbon peak.	Resolutely curb the rapid expansion of 'two highs' projects, accelerate the construction of a high-efficiency and low-carbon circular industrial system, and vigorously promote industrial energy conservation and consumption reduction.
Transportation	Reach carbon peak at around 2030.	Key movements on enhancing the capacity to reach carbon peak in the transportation sector are listed as the following measures: vigorously increase the development speed of new energy vehicles; continue to reduce the carbon emission intensity of newly produced fuel vehicles; continue to promote the adjustment of the bulk cargo transportation structure, and accelerate the campaign on green and low-carbon travel.
Construction and Building	Reach carbon peak at around 2030.	To achieve the peak of emission in the construction sector, it is necessary to adhere to both energy efficiency improvement and energy structure optimisation. The target can be achieved by rationally controlling the scale of buildings, vigorously promoting clean heating in the northern region, improving the energy-saving standards of new buildings, promoting ultra-low-energy buildings, encouraging the coverage of energy-saving renovation of existing buildings, and actively promoting the application of renewable energy in the building sector.
Energy	Reach carbon peak at around 2030.	Speeding up the development of new energy of wind and solar power is an inevitable choice. Wind and solar power generation shall meet the main incremental demand for electricity. At the same time, it is necessary to fully tap the potential of hydropower, nuclear power, and biomass power generation; enhance the flexible transition of thermal power facilities; accelerate the development of energy storage technology; establish and improve the price mechanism and power dispatch system that adapt to the rapid development of new energy, and promote the utilisation of new energy as the main body for the new power system.
Institute of Climate Change and Sustainable Development, Tsinghua University ⁸⁰		
Theme	Path	
Industry	1. Industrial energy terminals: adjust the industrial structure, reduce the proportion of heavy and chemical industries, promote industrial transition and upgrading, improve energy quality and efficiency, reduce energy consumption and material consumption, improve energy and resource utilisation efficiency, accelerate the development of digital economy, rapidly develop high-tech industries and advanced manufacturing, promote the development of products towards the high end of the value chain, and reduce the intensity of energy consumption per unit of industrial added value. On the other hand, it is necessary to strengthen the electrification of the industrial sector and further replace the direct consumption of fossil energy such as coal and oil with electricity. It is predicted that under the 1.5°C scenario, the industrial electrification rate will reach 69.5% in 2050.	
Industry	2. Industrial processes: Carbon dioxide is also emitted during the utility and decomposition of raw materials in industrial processes such as steel, cement, building materials, and chemicals. The reduction of carbon dioxide emissions in industrial processes, on the one hand, stems from the optimisation of internal industrial structure and technological innovation and the development of alternative raw material fuel technologies. On the other hand, due to the adjustment of industrial structure and upgrading of product quality, the demand for energy-intensive products continues to decline.	
Transportation	Coordinate the spatial layout of transportation infrastructure, promote the intensive and efficient use of resources, optimise the transportation structure, increase the sharing rate of green transportation, promote the standardisation and cleanliness of green transportation equipment, improve transportation efficiency, reduce the turnover rate of energy consumption per unit of transportation, and improve the composition structure of transportation fuel. Promote the use of electrification, hydrogen fuel, and biofuel, and simultaneously strengthen the concept of green transportation, and campaign for the concept and lifestyle of public travelling.	

Theme	Path
Construction and Building	Strengthen the implication of building energy-saving standards, improve heating methods of buildings in northern China, replace coal-fired boilers with low-grade heat sources such as industrial and power plant waste heat, build additional heat storage facilities, develop distributed intelligent renewable energy networks, and achieve synergy between heat and electricity. At the same time, expand the commercial utilisation of rural biomass resources in the fields of heating, gas, and power supply, promote the energy-saving transition of existing buildings across the country, and improve the efficiency of equipment facilities. Through these efforts, we can strive to achieve the peak of carbon dioxide emissions by 2030.
Energy:	<p>The deep de-carbonisation of the power system requires the support of a safe, reliable, and sustainable energy system, with new energy and renewable energy as the main body. In the case of a large proportion of intermittent renewable energy being connected to the power grid network, this means: ensuring the safe and stable operation of the power grid; coordinating the inter-regional power transmission and the local distributed renewable energy smart network, so that they will complement each other; solving the problem of daytime grid peak distribution and seasonal renewable power resources storage; organising optimal dispatch of sources, networks, and loads, and securing the construction of energy network, to form a clean, low-carbon, safe and efficient power system.</p> <p>As carbon dioxide emissions are expected to peak around 2030, energy consumption will continue to show a slow growth trend; and the electrification of terminal sectors such as industry, construction, and transportation will continue to increase in the coming future. It is predicted that by 2050, the power demand will exceed 14 trillion kWh, which is nearly twice the volume of the current one, and non-fossil power will account for more than 90% of the total electricity.</p>

Chinese Academy of Engineering⁸¹

Substitution of raw materials: At present, carbon emissions from industrial processes are 1.3 billion tons. Low-carbon raw materials shall be used to replace high-carbon raw materials so as to reduce emissions. Emission in this sector is expected to drop to less than 300 million tons by 2060.	Improve the level of electrification: The current electrification rate in the industrial sector is 26%. It is necessary to accelerate the replacement of industrial electricity, develop electric furnace steel production, and promote the usage of electric boilers, electric furnaces, heat pumps, etc. It is estimated that by 2030 and 2060, the industrial electrification rate will reach 34% and 70%, respectively.
Increase the level of electrification: The current electrification rate in the transportation sector is less than 4%. It is necessary to accelerate the development of electric vehicles, electrified railways, urban rail transit, port shore power, and airport bridge power sources. It is estimated that by 2030 and 2060, the electrification rate of transportation will be increased to 10% and 50%, respectively.	Enhance the level of electrification: The current electrification rate of the construction sector is 40%. It is necessary to promote the electrification of building heating, the hot water supply, and cooking; accelerate the development of distributed energy and energy storage systems on roofs and walls; promote direct and flexible light storage buildings, and realise adjustable and flexible electricity generation. It is estimated that by 2030 and 2060, the electrification rate of buildings will reach 50% and 80%, respectively.
The first stage: Carbon Peak Stage (2021–2030): The carbon emissions of the power system will enter the peak plateau period around 2028. The electrification processes in industry, construction, transportation, and other sectors are advancing rapidly, while the demand for electricity continues to grow (with a growth rate of about 4.5%). The new increase in demand for electricity is to be met by clean energy. The installed capacity of new energy reaches 1.7 billion kilowatts, its proportion of power generation increased to 28%. The proportion of hydropower and nuclear power generation will reach 13% and 7%, and that of coal power and gas power generation will be at 42% and 9%, respectively.	The second stage: Deep Low-carbon Stage (2031-2050): The carbon emission of the power system drops rapidly after the plateau period, and after partial removal by CCUS, it drops to about 10%, and the power system achieves a deep low carbon. The growth rate of electricity demand will slow down (about 1.4% growth rate). The installed capacity of new energy is expected to reach 4.4 billion kilowatts, and the proportion of power generation will increase to 53%. The hydropower and nuclear power generation will reach 13% and 14%, and the coal and gas power generation will be 13% and 7%, respectively.
The third stage: The Deep Low-carbon Stage (2051–2060): Power system develops from a deep low-carbon to a zero-carbon power system. The installed capacity of new energy will reach 5.2 billion kilowatts, and the proportion of power generation will increase to 61%. The power generation of hydropower and nuclear power will reach 13% and 16%. The scale of CCUS is expected to expand further, and the proportion of coal and gas power generation will be 7% and 3%, respectively.	Reduce carbon emissions from the consumer side: Resort to clean energy to produce electricity and meet the energy needs of industry, construction, and transportation. It is estimated that by 2060, 95% of non-fossil energy will be converted into electric energy, and electric energy will account for more than 70% of terminal energy consumption.
Digitisation: Rapidly develop digital infrastructure, empower new power systems, and fundamentally change energy allocation methods.	Standardisation: Establish a standardisation system specialised in carbon emission reduction and strengthen international standard cooperation.

Annex VI: SLB examples in China's Steel and Cement Production Industries

Securities abbreviation	Issuing date	Total issuance (RMB100m)	Issuance interest rate (%)	Purpose of raised funds	Key indicators	2020 base period	Current bond sustainability performance target (SPT)	Environmental benefit estimation	Sustainability performance target evaluation basis
Hongshi MTN002 (Sustainability-Linked Bond)	2021/5/6	3	4.38	Repayment of bank borrowing	Cement production per unit - energy consumption	80.1 kgce/t	SPT 2023: 77 kgce/t	2023 Annual issuer's estimated savings standard 273,500 tons of coal and 604,300 tons of carbon dioxide emission reduction	The Sustainability-Linked Bond Principles (SLBP) issued by the International Capital Market Association (ICMA)
Shaanxi Coal and Chemical MTN003 (Sustainability-Linked Bond)	2021/5/6	10	4.48	Repayment of company's comprehensive with interest-bearing debt	Energy consumption per ton of steel	433.36 kgce/tt	SPT 2024: 430 kgce/t	Generate energy savings of 475,177 tons of standard coal per year and reduce carbon dioxide emissions by 1,150,850 tons.	
					New energy installed capacity	257.7 MW	SPT 2024: 400 MW		
					Thermal power supply standard coal consumption	330.3 gce/kWh	SPT 2024: 317 gce/kWh		
Liuzhou Steel Group MTN001 (Sustainability-Linked Bond)	2021/5/6	5	4.1	Return the company's interest-bearing debt principal and interest	Nitrogen oxide emissions	1.123 kg/t	2022 SPT: 0.935 kg/t		The Sustainability-Linked Bond Principles (SLBP) issued by the International Capital Market Association (ICMA).

Endnotes

- 1 <https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1.5c-approved-by-governments/>
- 2 Climate Action Tracker, CAT net zero target evaluations, <https://climateactiontracker.org/global/cat-net-zero-target-evaluations/>
- 3 IEA, NetZero2050-ARoadmapfortheGlobalEnergySector, May 2021, <https://iea.blob.core.windows.net/assets/0716bb9a6138-4918-8023-cb24ca47794/NetZero2050-ARoadmapfortheGlobalEnergySector.pdf>
- 4 Note: CBI has developed a Climate Bonds Taxonomy and sector specific standards, and is currently working on transition standards.
- 5 Climate Investment Opportunities: Climate aligned bonds & issuers 2020, https://www.climatebonds.net/files/reports/cbi_climate-aligned_bonds_issuers_2020.pdf
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Prepared by Climate Bonds Initiative and CECEP Hundred Technical Service (Beijing) Co., Ltd. and sponsored by UK PACT.
02/2022

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Design: Godfrey Design

The authors thank the generous contribution from Aliya Saiyerjiang, Chenhao Cai, Sean Kidney, Bridget Boule, Rachel Hemingway, Caroline Harrison, Manshu Deng, Xiaoyun Xu, Wenqin Lu, Lin Yang, Hongchun Bai and Daoqiang Lu for this report.

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