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Internationalism in climate action and China's role

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Policy insight

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Summary

Internationalism in climate action and China's role within it

China's engagement in the climate agenda is usually viewed through a domestic policy lens. Analysis tends to focus on the country as a source of climate risk, given its status as the world's largest emitter of carbon dioxide, and on the opportunities that come with its potential transition from a carbon-intensive manufacturing growth model to a more sustainable path.

A different, at times overlooked, dimension is China's role in international collaboration and coordination in climate action. This is becoming increasingly important, reflecting growing and intensifying economic ties between China and the rest of the world, particularly emerging markets and developing economies. As these countries begin to chart their own paths to sustainable development, partnerships with China are poised to become more and more important. This relates particularly strongly to China's roles as a source of investment in energy infrastructure, as a creditor and provider of sustainable development finance, and as a pioneer in research and innovation for green technologies and solutions.

Evolution of China's domestic energy policy away from fossil fuels

China's energy policy has been evolving as the country steps up efforts to tackle climate change and environmental pollution.

The country's energy resource endowment is often characterised as 'rich in coal and poor in oil and gas', which makes coal the most dominant fuel in its energy mix. It was not until the implementation of the Renewable Energy Act in 2006 that China began to diversify on this front, with a focus on promoting the development of non-fossil fuels.

The last decade has seen notable progress in this energy transition. In 2014, China's President Xi Jinping called for an 'energy revolution'. In 2017 this was translated into the *Energy Supply and Consumption Revolution Strategy (2016–2030)*, officially setting out the overall national targets and strategies for building a "clean, low-carbon, safe and efficient" energy system.

In late 2020 China pledged to reach carbon neutrality by 2060, and in March 2021 it unveiled its plan to build a "new type of power system with new energy at the centre". The following month President Xi announced that China will strictly control coal use, further elevating the importance of non-fossil energy sources and indicating coal will no longer dominate the country's energy mix.

Moving forward, to achieve this energy transition and meet its greenhouse gas emissions targets, China will have to encourage the uptake of renewable energy to replace fossil fuels. In order to improve the integration of renewables into the grid, China should significantly expand energy storage capacity, to provide the necessary flexibility for enabling much higher penetration of renewables. Besides centralised renewables generation, China should also promote distributed renewable generation in the load centres of Central and Eastern China.

Hydrogen is also a promising solution, requiring the promotion of green hydrogen from electrolysis and upgrading the existing natural gas storage system to accommodate hydrogen. China should also support further development of New Energy Vehicles (NEVs), as NEV battery packs and smart charging piles can also provide flexible storage capacity, helping to balance electricity load variation as the share of renewables increases. Other measures to further improve the grid flexibility include demand-side response and better grid management, and China should deepen electricity market reform to support further development of renewables.

Besides domestic energy transition, China's role in promoting the energy transition internationally is critical as the world's largest emitter of carbon dioxide, as well as being a front-runner in clean-energy technologies. Though China is leading the world in the production and installation of renewables, it needs to work with other countries to further increase integration of renewables into the grid.

China should contribute strongly to increasing global investment in low-carbon industries, which includes not only its domestic investment but also overseas investment and financial aid for renewable energy. Through continuous large-scale investment and strong policy support, China is core to driving down the costs of renewables, which will have a global benefit.

China could also lead the world in nuclear power development, which is also crucial in helping the world reach net-zero.

Finally, China should play a bigger role in supporting low- and middle-income countries in achieving an energy transition, moving away from fossil fuels, through the influence of overseas investment – in particular helping the countries of the Belt and Road Initiative (BRI) to achieve a low-carbon transition through, for example, strategies embodied in the *Guidance on Promoting Green Belt and Road* and the *Green Investment Principle (GIP)*.

Incentives for promoting sustainable development in debtor country partners

China's role as a creditor and its relationship with debtor countries and other public and private institutions have evolved over time. In particular, the country's role in the global financial system has grown substantially in the past two decades, making China one of the world's largest creditors, with a Net International Investment Position of US\$2.15 trillion. This has been driven largely by the significant accumulation of reserves by the People's Bank of China, which are mostly held in liquid safe-haven assets such as US Treasury bills. Other public institutions, such as the China Investment Corporation, have invested extensively in real assets such as real estate in infrastructure, as well as in equities.

The geographical distribution of China's foreign investments has reflected a growing focus on the Belt and Road Initiative. However, the track record of these investments in terms of environmental, economic and debt sustainability has at times been called into question. There is an enormous opportunity for China to demonstrate in practice the clear and positive links between climate action and sustainable economic development through greening its BRI investments.

Decisions such as that announced by President Xi at the United Nations General Assembly in September 2021 to end overseas coal finance are not only in China's political and diplomatic interests in terms of cementing its role as a global leading force in the climate change agenda, but are in its economic interests, too. Creditors that remain exposed to climate-related risks could face hits to their portfolios as the urgency of the transition grows.

Reflecting this context, China's strategy in terms of international cooperation should focus on promoting sustainable economic development in the countries to which it lends to minimise the risk of climate-related debt crises. It should look to engage with fellow creditors through multilateral arrangements such as the G20's Debt Service Suspension Initiative and the Common Framework to support debtor economies.

China should also continue and step up its participation in multilateral climate and sustainability initiatives, including the Central Banks and Supervisors Network for Greening the Financial System, the G20's Sustainable Finance Working Group, the International Platform on Sustainable Finance and the Sustainable Banking and Finance Network. The country should also look to join initiatives it is not yet part of, such as the Coalition of Finance Ministers for Climate Action, and to encourage more of its private sector institutions to join the Glasgow Financial Alliance for Net Zero (GFANZ).

Accelerating climate action and diplomacy through research, development and innovation

Developing clean technology is expected to provide positive 'spillover' effects within the economy and contribute to meeting the Paris Agreement's temperature goals and the Sustainable Development Goals.

The *Made in China 2025* strategy, released in 2015, features prominently in China's R&D and innovation policies and articulates China's aspiration to become a world leader in high-tech industries. The *Made in China 2025* policy for the auto industry is expected to be designed to help China attain its commitment of achieving peak carbon dioxide emissions by 2030 and carbon neutrality by 2060.

China has stated aims to become a world leader in artificial intelligence by 2030 and in science and innovation by 2050. Its domestic research, development and innovation (R&D&I) policies are also strategically aligned with its pursuit of science diplomacy and enhanced international cooperation in this area. The country's R&D spending accounted for 2.4 per cent of the country's aggregate GDP in 2020.

Cooperation over climate action between China and the European Union related to R&D has been strengthened in light of China's rapid R&D&I development, the flagship initiative being the EU-China Emissions Trading Systems (ETS) Cooperation Project. The EU supported the design and implementation of China's national ETS, which was launched at the end of 2017. The annual High-level Environment and Climate Dialogue between China and the EU, initiated in 2020, reaffirmed the joint commitment of the EU and China to advance the implementation of the Paris Agreement and to intensify their cooperation on climate change and clean energy. China has also strengthened climate diplomacy with the UK, where the UK-China dialogue on climate and energy, the Climate Science for Service Partnership China (CSSP China) and the UK-China Joint Strategy for Science, Technology and Innovation Cooperation have been instrumental.

The internationalisation of China's R&D policy is embedded in China's commitment to the 2030 Agenda for sustainable development and its participation in UN-led climate action. China's hosting of the Convention on Biological Diversity (CBD) COP15 conference in 2021 to 2022 also demonstrates its leadership role in global climate governance, given the links between biodiversity loss and climate change.

China should reorganise and reprioritise its climate-related R&D policies and initiatives, and aim to turn itself into a global R&D&I power that is able to influence global standards, supply chains and drive global innovation in technologies that will help combat climate change.

Looking forward

China has pledged to 'phase down' coal consumption during its 15th Five Year Plan, which starts in 2026, and is to develop a national plan to cut methane. In the critical decade of the 2020s, China has the opportunity to further transform and upgrade its energy and industrial structures, promote research, development and the application of green and low-carbon technologies and intensify international climate cooperation on climate change. China should aim to be at the forefront of raising climate ambition and accelerating climate action for a sustainable and more equitable world.

1. Introduction

This paper examines China's domestic and foreign policymaking for the energy transition, and its role in promoting multilateralism and international collaboration on building a sustainable world.

This is a critical moment for China and the world in the wake of the COVID-19 pandemic: awareness is increasing of the need for a new form of economic development and growth that promotes sustainability and resilience, particularly against global threats, including infectious diseases, biodiversity loss and climate change. Internationalism will be of fundamental importance to this agenda as the world moves further into the 2020s.

China demonstrated its global leadership in 2020 with its role in global economic recovery and its ambitious pledge to achieve carbon neutrality by 2060.

China held the first phase of the 15th meeting of the Conference of the Parties (COP 15) to the Convention on Biological Diversity (CBD) in October 2021 in Kunming, with the second phase to take place from April to May 2022. Building on continuous climate talks with the United States, it announced the *US-China Joint Glasgow Declaration* at COP26, the 26th session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) in Glasgow in November 2021. These are very important summits that carry the international expectation of proposing new pathways and multilateral cooperation for achieving biodiversity targets and climate change commitments. The need for advancing the resilience agenda has never been greater, as has been demonstrated powerfully in the attempts to respond to COVID-19.

China submitted its updated Nationally Determined Contribution (NDC) to the UNFCCC in October 2021, reflecting its increased political will and ambition to respond to climate change. In the updated NDC, 'coal' is mentioned 59 times, with clear plans to phase out outdated production capacity and increase efficiency (UNFCCC, 2021). Notably, the NDC also mentions the Global Alliance of Universities on Climate (GAUC), which was launched jointly by Tsinghua University with other leading universities across the world at the Davos Forum in January 2019. By encouraging and bringing more young people into the collaborative platform for learning, exchanging ideas and making their voices heard, GAUC showcases Chinese youth leadership and promotes cooperation among global universities.

In the next few years, China will have opportunities to show further leadership on climate – through building back better from COVID-19, the implementation of its 14th Five-Year Plan, its support for a sustainable recovery in other countries (including the countries of the Belt and Road Initiative), and its role in international fora, including the G7 and G20 summits and the United Nations climate change summits. China can help to foster a greater understanding of the benefits of multilateralism and international collaboration.

Plan of the paper

The plan of the paper is as follows: Chapter 2 looks into China's role in accelerating the world's energy transition away from fossil fuels; Chapter 3 discusses the country's impact on sustainable development through managing foreign debt, and Chapter 4 focuses on its contribution to global innovation and R&D that are core to combatting climate change. Chapter 5 offers concluding remarks.

2. Promoting the transition to renewable energy and clean technology

Globally, about 73 per cent of all anthropogenic greenhouse gas emissions result from energy-related activities, in particular from the combustion of fossil fuels. Therefore, promoting the transition of energy away from fossil fuels to reduce energy-related carbon emissions is at the heart of the climate change challenge.

As the world's largest greenhouse gas emitter, China's energy transition strategy is crucial for the global climate action agenda. This chapter explores how China's domestic energy policies are evolving and how they can contribute to promoting both the domestic and global energy transition as it steps up efforts to tackle climate change and environmental pollution.

China's domestic energy policies and pathways for promoting the energy transition

Over the past four decades, China's economy has seen rapid development, with the country transforming from low-income to upper-middle-income status. China's progress has been enabled by strong investment in infrastructure and a heavy reliance on fossil fuel energy. China's energy resource endowment is often characterised as 'rich in coal and poor in oil and gas', which makes coal the most dominant fuel, due to its abundance and its relatively low cost before rapid advances were made in renewable technologies.

After the Renewable Energy Act came into force in 2006, China began to diversify its energy mix, with a significant focus on promoting the development of non-fossil fuels. In 2007, the *Mid- and Long-term Development Plan for Renewable Energy* was issued by the National Development and Reform Commission (NDRC), setting targets for increasing the share of non-fossil fuels in primary energy consumption, from 7.5 per cent in 2007 to 10 per cent by 2010 and 15 per cent by 2020.¹ China also launched the *Medium- and Long-Term Plan for Nuclear Power Development for 2005 to 2020*² in the same year, with the target of expanding installed nuclear capacity to 40 gigawatt-electric (GWe) by 2020 and having more than 40 nuclear power plants under construction during the 11th Five-Year Plan period (2006–2010). Installed nuclear capacity reached 44.66 GWe in 2018, two years ahead of schedule.

Over the last decade, as China has continued to recognise the impacts of environmental degradation and climate change, the country has stepped up to the challenges to play an increasingly important role in global environmental governance and the low-carbon transition. In terms of its energy policies, President Xi Jinping called for an 'energy revolution' in June 2014,³ covering five priorities: curbing energy consumption; diversifying energy supply; promoting energy technology innovations; reforming the energy system (e.g. through electricity market reforms); and improving energy security through strengthened international collaboration. These have combined into a long-term energy strategy. In 2017, the NDRC and National Energy Administration (NEA) published the *Energy Supply and Consumption Revolution Strategy (2016–2030)*,⁴ officially setting out the overall national targets and strategies for building a "clean, low-carbon, safe and efficient" energy system.

Recent policy developments

The past few years have seen rapid developments in renewables in China, and the country is leading the world in the production and installation of wind and solar energy (Figures 2.1 and 2.2). In March 2021, at the ninth meeting of the Central Financial and Economic Affairs Commission, President Xi named some key action areas for China to achieve the climate goals of peaking carbon emissions by 2030 and

¹ https://www.ndrc.gov.cn/xxgk/zcfb/tz/200709/t20070904_965446.html

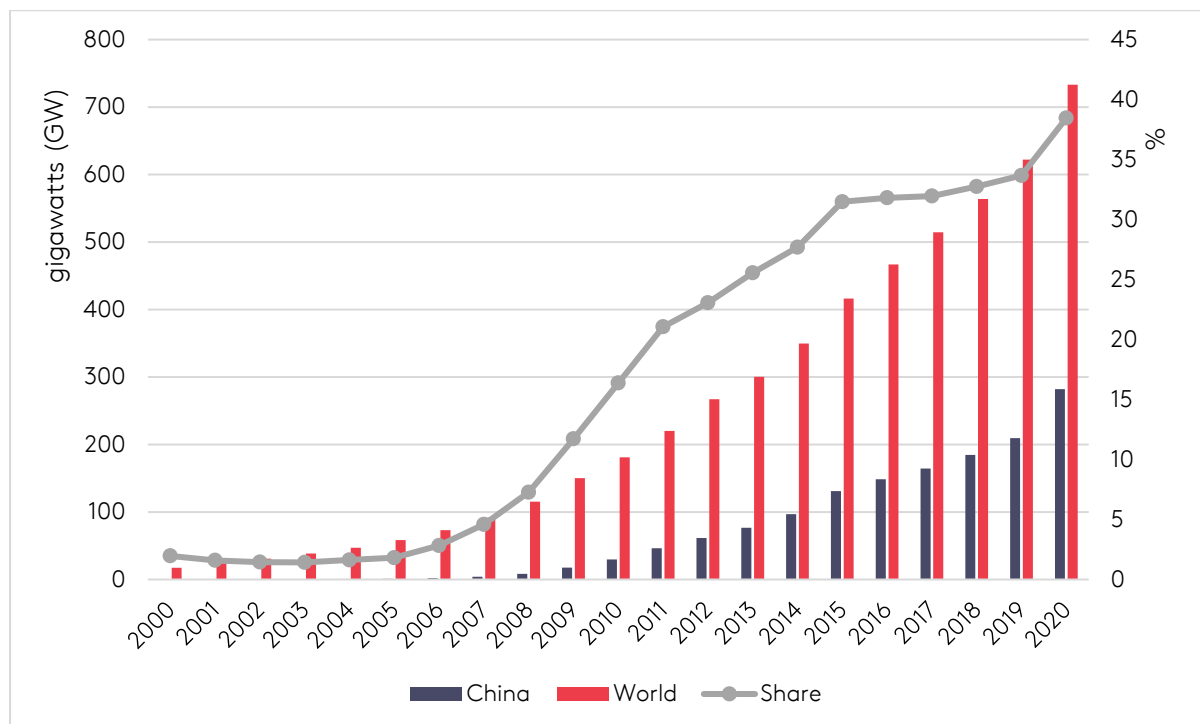
² http://www.gov.cn/gzdt/2007-11/02/content_793797.htm

³ http://www.xinhuanet.com/politics/2014-06/13/c_1111139161.htm

⁴ <https://www.ndrc.gov.cn/fggz/zcssfz/zcgh/201704/W020190910670685518802.pdf>

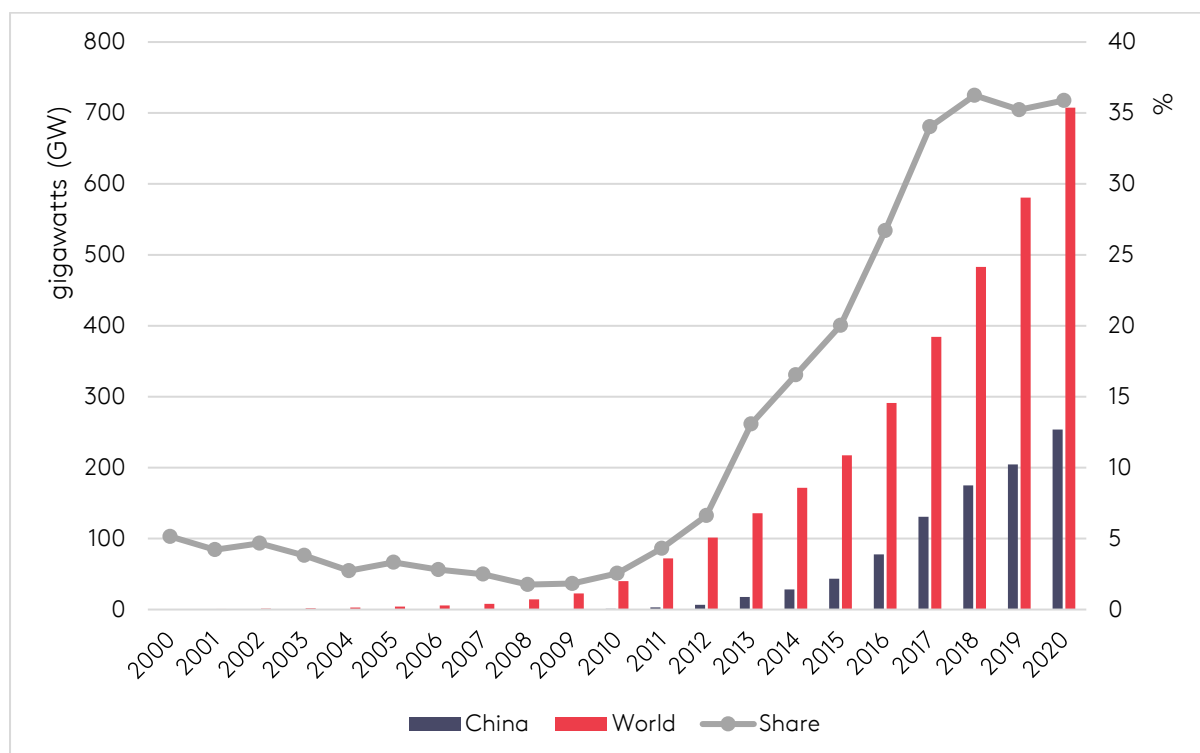
reaching carbon neutrality by 2060, which included the plan to build a “new type of power system with new energy at the centre”,⁵ further elevating the importance of non-fossil energy sources, and indicating that coal would no longer dominate the country’s energy mix.

Figure 2.1. China’s cumulative installed wind capacity and global share, 2000-20



Source: BP (2021)

Figure 2.2. China’s cumulative installed solar PV capacity and global share, 2000-20



Source: BP (2021)

⁵ http://www.xinhuanet.com/politics/leaders/2021-03/15/c_1127214324.htm

The main focus of China's current energy policies is to accelerate the transition to non-fossil fuel energy sources. In April 2021, President Xi announced at the Leaders Summit on Climate that China will "limit the increase in coal consumption over the 14th Five-Year Plan period (2021-2025) and phase it down in the 15th Five-Year Plan period (2026-2030)". This was reiterated in the *US-China Joint Glasgow Declaration* released in November 2021 at COP26 in Glasgow. This policy announcement could mean that China's emissions peak within the 14th Five-Year Plan period (i.e. by 2025) (Stern and Xie, 2021).

In October 2021, one week before COP26 started, China unveiled its overall strategy for achieving its climate goals – the *Working Guidance for Carbon Dioxide Peaking and Carbon Neutrality*, or '1+N', policy framework (NDRC, 2021), setting specific targets for energy consumption and electricity generation. According to the strategy, the share of non-fossil energy in total energy consumption will increase to around 25 per cent by 2030 and over 80 per cent by 2060. For electricity generation, the country plans to install over 1,200 GW of solar and wind generation capacity by 2030.

Challenges and ways forward for domestic energy policy

The grid flexibility challenge

These ambitious targets imply increasing levels of renewable energy sources integrated into the grid, bringing challenges for the energy system in terms of the stability of the power system. The intermittency of renewables highlights the increasing need for flexibility in the power system to balance real-time mismatches between electricity demand and supply. This is a global issue. Experience to date has been limited to cases where the share of non-fossil fuel energy sources is no more than 50 per cent, in which the stability of the power system is mainly maintained by improving the flexible dispatch of fossil fuel power generation and increasing balancing services to the grid, for example in the UK and Germany. The world still lacks the experience to maintain the stability of the power system in a reliable way when the proportion of non-fossil fuel energy generation rises to over 80 per cent.

A possible response is to significantly expand the energy storage capacity so that the excess electricity generated can be stored for times of high demand. There are different technological solutions here. Hydrogen is one and is drawing increasing attention. The Energy Transitions Commission (2019) argued that China should increase the annual use of hydrogen from 25 million tonnes in 2019 to over 81 million tonnes, an over threefold increase, to achieve net-zero emissions by 2050. This involves producing green hydrogen from electrolysis and requires upgrading the existing natural gas storage system so that it can deal with hydrogen, which can then be burned to generate electricity when needed. Also, as the stock of New Energy Vehicles (NEVs) increases in China, there will be massive flexible storage capacity represented by NEV battery packs and smart charging piles, which can be used for balancing electricity load variation. Besides energy storage solutions, other measures such as demand-side response and better management of the grid can also help improve the grid's flexibility and thus reliability.

In addition, like in many other countries in the world, China's solar PV and wind farms are mostly land-based, installed in regions rich in sunshine and wind (centred on Northwest China), where the price of land is low enough, but these areas are far from the load centres of Central and Eastern China (i.e. where there is high usage and demand), which poses further challenges for the large-scale integration of renewables. A potential solution is to promote distributed renewable generation in Central and Eastern China. Though installation costs would be much higher, it could effectively reduce the energy loss and construction costs of long-distance transmission. And as pointed out by the International Energy Agency (2017), the declining cost of renewable technologies and the digitalisation of the energy industry is creating a more enabling environment for distributed renewable generation.

Electricity market

Another challenge comes from the electricity market. Besides the incomplete forward electricity market and non-market-based economic dispatch (see Hepburn et al., 2021), the electricity price formation mechanism is heavily distorted in China. For over a decade, electricity transmission and distribution prices in China have continued to be administratively lowered by the government. In October 2021, the NDRC released the *Notice on deepening the market-oriented reform of coal-fired power pricing* amid the country's power crunch (Global Times, 2021a). This marks a milestone for China's power reform by

relaxing the price fluctuation range for power trading; all electricity generated from coal-fired power is to be priced through market transactions.

In addition, although electricity prices for households are usually much higher than for non-residential consumers (industrial and commercial power users), as the costs of electricity supply are higher for households due to their low voltage, long distance transmission, and more variable and unpredictable electricity demand profiles, this is not the case in China. A high level of cross-subsidies are given to households each year by the Chinese government, partly coming from non-residential (commercial and industrial) consumers as they bear much higher tariffs, to keep household electricity prices at a very low level. For example, in 2016 the average electricity prices for industrial use and residential use in Australia were 0.109 and 0.219 US\$/kWh, while in China these were 0.112 and 0.084 \$/kWh, respectively (Li et al., 2020). As a result, most provincial power grid companies and power enterprises are unprofitable and reforms are thus needed to the existing electricity pricing mechanism. These could include cancelling transfer payment subsidies for household electricity consumption, to reflect the real costs of electricity supply.

China's role in leading the world's energy transition

If the Paris Agreement goals are to be achieved, the world must strengthen cooperation on promoting the energy transition. To address this importance, COP26 dedicated a day to energy (Day 4 on 4 November 2021), and the summit ended with an agreement to phase down coal and a call to end fossil-fuel subsidies.

China is playing a part in the global effort to push forward the energy transition through its roles in various multilateral organisations, including participation in the G20 Energy Ministers' Meetings and in the G20 Energy Transitions Working Group; its membership of the International Energy Forum, a global platform that brings together energy ministers from 71 countries; collaboration with the International Energy Agency (IEA), though it is not an IEA member country; and discussions under the UNFCCC and with Asia-Pacific Economic Cooperation (APEC), among many other organisations.

Given its major impact on the global energy market and renewable energy development, China is expected to play a much larger role. The *US-China Joint Glasgow Declaration* released at COP26 is a major step forward, showing the joint leadership of the two largest economies. It identifies some key areas for both countries to cooperate on; on energy, it focuses on grid integration of renewable energy, the electricity transmission network and distributed renewable generation.

As society and politics move strongly against coal and as the costs of renewables continue to decline fast, how to scale up renewable generation in the power grid system is a critical issue for all countries. However, there are still fossil fuel subsidies in place for the private sector, which remains the biggest financial obstacle hampering the world's energy transition to renewable energy sources. The Global Subsidies Initiative suggests that more than 53 countries took action on fossil-fuel subsidy reform over the period 2015 to 2020 (Sanchez et al., 2020), and the International Energy Agency has called for all governments to eliminate fossil fuel subsidies (IEA, 2021).

The irrational dependence on fossil fuels is associated with transition risks: that these assets will be 'stranded' in the future (Caldecott, 2018), which would be a massive waste of national wealth. This is a risk for China particularly, as it still has dozens of coal-fired power plants currently under construction or planned, which will either lock in decades of polluting and high emissions or will have to become stranded assets. Investment in non-fossil fuel technologies will thus avoid these significant transition risks but also offer much greater energy security for China, decreasing its currently high level of dependence on imported fossil fuels (Hepburn et al., 2021).

The need for China to work with other countries on grid integration of renewable energy

China became the world's largest producer of wind and solar energy in an astonishingly short period of time. According to the National Energy Administration, China had 253.43 GW in installed PV power generation capacity at the end of 2020, a significant increase on 0.02 GW in 2009; similarly, the total installed capacity of wind power generation increased from 16.1 GW in 2009 to 281.53 GW in 2020 (see Figures 2.1 and 2.2 above). In 2020, the surge in renewable deployment resulted in China's share of coal-

fired power capacity in its total power generation mix dropping to below 50 per cent for the first time. However, renewable energy sources provided only 29 per cent of China's electricity generation that year; while this is the same as the G20 average (Climate Transparency, 2021), it is quite low considering China's large scale of installed renewable generation capacity. China could increase this proportion while ensuring the stability of the grid system by learning from other countries about integration of renewable generation and grid management, through enhanced international cooperation and experience sharing.

For comparison, the UK is a country that has been successful in integrating renewable energy on a large scale, with renewables accounting for 37 per cent of the country's annual electricity generation in 2019 (Department for Business, Energy and Industrial Strategy, 2020). The large deployment of energy storage and innovation in the ancillary services market mechanism has contributed to the stability of the electricity system to ensure that power grids with high levels of renewables do not suffer from system balance problems. The UK and China have a long history of working together on climate change-related issues; for example, for over a decade they have collaborated on climate change risk assessments, with support from both countries' expert climate change committees (Committee on Climate Change and China Expert Panel on Climate Change, 2018). It is important to build more bilateral collaboration of this kind.

China's contribution to global investment in renewable energy

China's role in promoting global investment in low-carbon industries is vital, considering the scale of the transformation needed. The recent report *World Energy Transitions Outlook: 1.5°C Pathway* by the International Renewable Energy Agency (IRENA) estimates that the share of renewables in global electricity generation needs to increase to more than 90 per cent by 2050, with electricity accounting for over 50 per cent of total final energy consumption, to be in line with a pathway compatible with 1.5°C of global warming (IRENA, 2021a). The IEA's report *Net Zero by 2050 – A Roadmap for the Global Energy Sector* drew a similar conclusion: the IEA's estimates show that under a net-zero carbon emissions pathway, about 90 per cent of the world's electricity generation needs to come from renewable energy sources by 2050 (IEA, 2021). Within this, wind and solar PV together are estimated to take a share of nearly 70 per cent, with most of the remainder coming from nuclear.

To enable these changes to happen over the coming decades, the world needs to increase investment significantly. The IRENA report concludes that at least about \$131 trillion will be needed over the period between now and 2050 to finance the energy transition and build an energy system compatible with the 1.5°C climate target.

For China itself, estimates of the scale of investment needed to enable the country to achieve carbon neutrality by 2060 include 174 trillion yuan (~\$27.3 trillion), as predicted by Tsinghua University,⁶ or 139 trillion yuan (~\$21.8 trillion), according to Yi Gang, Governor of the People's Bank of China (Tang, 2021), covering new investment across renewable energy generation, advanced energy storage, zero-carbon buildings, and other sectors including transport, forestry and agriculture. This investment, if realised, will also generate jobs to replace those lost in fossil fuel-related sectors, deliver public health benefits, upgrade China's expertise in renewable technologies, and reduce the cost of energy in the longer term.

Why China is crucial to driving down the costs of renewable energy

With the shift to renewables, China's international role in energy markets has evolved, with the country becoming a global leader in promoting renewable energy development and core to driving down the cost of renewables. According to IRENA (2021b), the global weighted-average levelised cost of energy (LCOE) of onshore wind saw a 13 per cent fall in 2020 from 2019, dropping from \$0.045/kWh to \$0.039/kWh. This was largely due to China's significant additions of new capacity (with 69 GW added to the grid in 2020, accounting for two-thirds of new installed capacity globally), and China's lower-than-global-average installed costs of onshore wind. The story is similar for offshore wind and solar PV.

Being the largest market for new capacity of renewable power generation, China benefits from huge domestic demand and a broad range of policies that specifically target support to the wind and solar PV

⁶ <https://www.efchina.org/Attachments/Report/report-lceg-20210711/%E6%91%98%E8%A6%81-%E4%B8%AD%E5%9B%BD%E9%95%BF%E6%9C%9F%E4%BD%8E%E7%A2%B3%E5%8F%91%E5%B1%95%E6%88%98%E7%95%A5%E4%B8%8E%E8%BD%AC%E5%9E%8B%E8%B7%AF%E5%BE%84%E7%A0%94%E7%A9%B6.pdf>

industry, which have stimulated technological innovation and quickly driven down their costs. It is argued that China's investment in clean technologies will not only lower the costs of these technologies but also lead to a positive 'spillover' effects in other countries (Pollitt, 2020). If leading economies including China significantly and continuously increase investment and policy support for low-carbon industries to accelerate the energy transition, world demand will rise and thus push forward the development of these new technologies and drive down the costs further. China could also work collaboratively with other countries to support low- and middle-income countries in achieving an energy transition moving away from fossil fuels, through the influence of their overseas investment decisions.

A leading role for China in developing nuclear power

Besides renewable energy, nuclear power is also crucial in helping the world reach net-zero. Although currently nuclear accounts for around only 5 per cent of China's electrical power, the country has the highest rate of growth in nuclear power globally and is expected to have the largest nuclear power fleet before long, featuring advanced third-generation reactor technology, to play a significant role in baseload electricity generation.

China is also seeking to expand its involvement in nuclear power projects overseas. For example, the Hinkley Point C nuclear project in the UK has joint investment from France's EDF and China General Nuclear Co., Ltd (CGN). CGN has announced plans to increase investment in overseas nuclear power projects, particularly in Belt and Road Initiative (BRI) countries (Yin, 2021). However, in contrast to the situation with renewable technologies, it is unclear if China's plans for building many more nuclear power plants at home and abroad could significantly reduce the construction costs of nuclear power projects in other countries. The Energy Technologies Institute analysed what drives cost in nuclear power projects globally and concluded that "significant cost reduction opportunities require coordinated and sustained action of multiple parties" (ETI, 2018).

Promoting the energy transition along the Belt and Road

The BRI, proposed by President Xi Jinping in 2013, aims to build a trade and infrastructure network connecting Asia, Europe and Africa along and beyond the ancient Silk Road trade routes, to form a new Silk Road Economic Belt and a 21st Century Maritime Silk Road. Recently, several countries in Latin America and the Caribbean have been highlighted as "a natural extension" of the BRI. Additional components include a Digital Silk Road to improve telecommunications networks and a Health Silk Road. It has become one of the world's most important frameworks for foreign capital investment, with 142 countries signing a memorandum of understanding (MoU) with China as of December 2021 (Table 2.1).

Table 2.1. Regional distribution of countries in the Belt and Road Initiative

Region	No. of countries signing an MoU with China
Sub-Saharan Africa	42
Europe and Central Asia	34
East Asia and Pacific	25
Latin America and Caribbean	18
Middle East and North Africa	17
South Asia	6

Source: Green Finance & Development Center (2021)

The BRI presents an enormous opportunity for China to practically demonstrate the clear and positive links between climate action and sustainable economic development.

Most BRI investments focus on infrastructure, particularly on energy and transport, which respectively accounted for 39 and 25 per cent of total investments from 2013 to 2020 (Green Finance & Development Centre, 2021). This focus raises concerns about the BRI's carbon footprint. Yet policies to promote a green transition have been announced, such as the *Guidance on Promoting Green Belt and Road*,⁷

⁷ http://www.gov.cn/xinwen/2017-05/27/content_5197523.htm

released in 2017, emphasising the importance of incorporating eco-environmental protection into BRI projects; and the *Green Investment Principles (GIP)*, first published in 2018, setting out principles for greening BRI investment (discussed further in Box 3.1 below).

In September 2021, President Xi announced at the United Nations General Assembly that China will stop building new coal-fired projects abroad. This is a very important step to support partner economies, many of which are part of the BRI, in moving towards a sustainable economic development model. While the majority of coal investment comes from private sector financing in Japan, the US and South Korea, China is the largest *public* financier of overseas coal plants. This includes \$15.6 billion of finance in overseas coal fired power plants from 2013–18 from the Export-Import Bank of China and the China Development Bank, accounting for 50 per cent of global public finance commitments and 40 per cent of generation capacity (Ma and Gallagher, 2021). However, when looking at both public and private financing for overseas coal plants, about 87 per cent of total finance is funded by entities outside China (ibid.).

No new overseas coal-fired power projects have been announced by China since 2020, and over \$65 billion of coal-fired power projects backed by China have been either suspended or cancelled since 2014 (Wang, 2021). Reasons for this include the fact that more and more BRI countries have recognised they can reap the benefits of a low-carbon transition and thus have announced they will phase out new coal investments; the costs of renewable energy are falling fast, which no longer makes coal an attractive option; and as society and politics are moving strongly against coal, coal-related projects have come under closer scrutiny.

With today's renewable energy technologies such as wind and solar PV, China has a real opportunity to help BRI countries embark on a low-carbon form of development, powered by a clean energy system, to avoid historical problems of pollution and congestion. China can share its experience and lessons, employ its technological and financial strengths, and promote sustainable investment abroad. At the same time, China itself would move up the value chain.

3. China's role as a creditor in promoting sustainable economic development and debt sustainability

As one of world's largest creditors, China has a strong incentive to work towards enhancing debt sustainability in the countries in which it invests. This requires working with them bilaterally to support sustainable economic development through investments that promote climate change mitigation and adaptation. It also means acting together with global partners to enhance debt sustainability through joined-up creditor thinking and action, including in international fora such as the G20 and UNFCCC.

This chapter explores China's role as a creditor, examining the increase in the level of financing China has provided globally and especially to emerging market and developing economies (EMDEs), and the modalities of this financing in terms of the institutions involved and the mechanisms of relief at time of debt distress. It also explores how the likelihood for increased frequency and intensity of such episodes is increasing as a result of the climate crisis, before examining China's role in providing finance specifically directed at supporting sustainable development.

China's expanded role in the global financial system

China's role in the global financial system has grown steadily and substantially over the past two decades. This is reflected in the level, composition and shifts in its total foreign assets and liabilities. These increased from below US\$2 trillion in the early 2000s to over \$15 trillion in 2020, according to the International Monetary Fund's Balance of Payments statistics. Still, China's total assets and liabilities rank below those of economies with highly developed financial sectors, including most G7 countries and financial centres such as Luxembourg and the Netherlands. Furthermore, as a share of GDP, its total assets and liabilities are relatively low, suggesting there is scope for further integration and growth for China's participation in the global financial system.

While both assets and liabilities have increased substantially, assets have grown even faster, propelling China to become one of the world economy's largest creditors. In 2020, the net international investment position (NIIP) of mainland China stood at \$2.150 trillion and that of Hong Kong at \$2.152 trillion, behind only Japan and Germany. In contrast, the US has maintained its role as the world's biggest debtor, with a NIIP of minus \$14 trillion (Table 3.1).

Table 3.1. The world's largest creditors and debtors, 2020

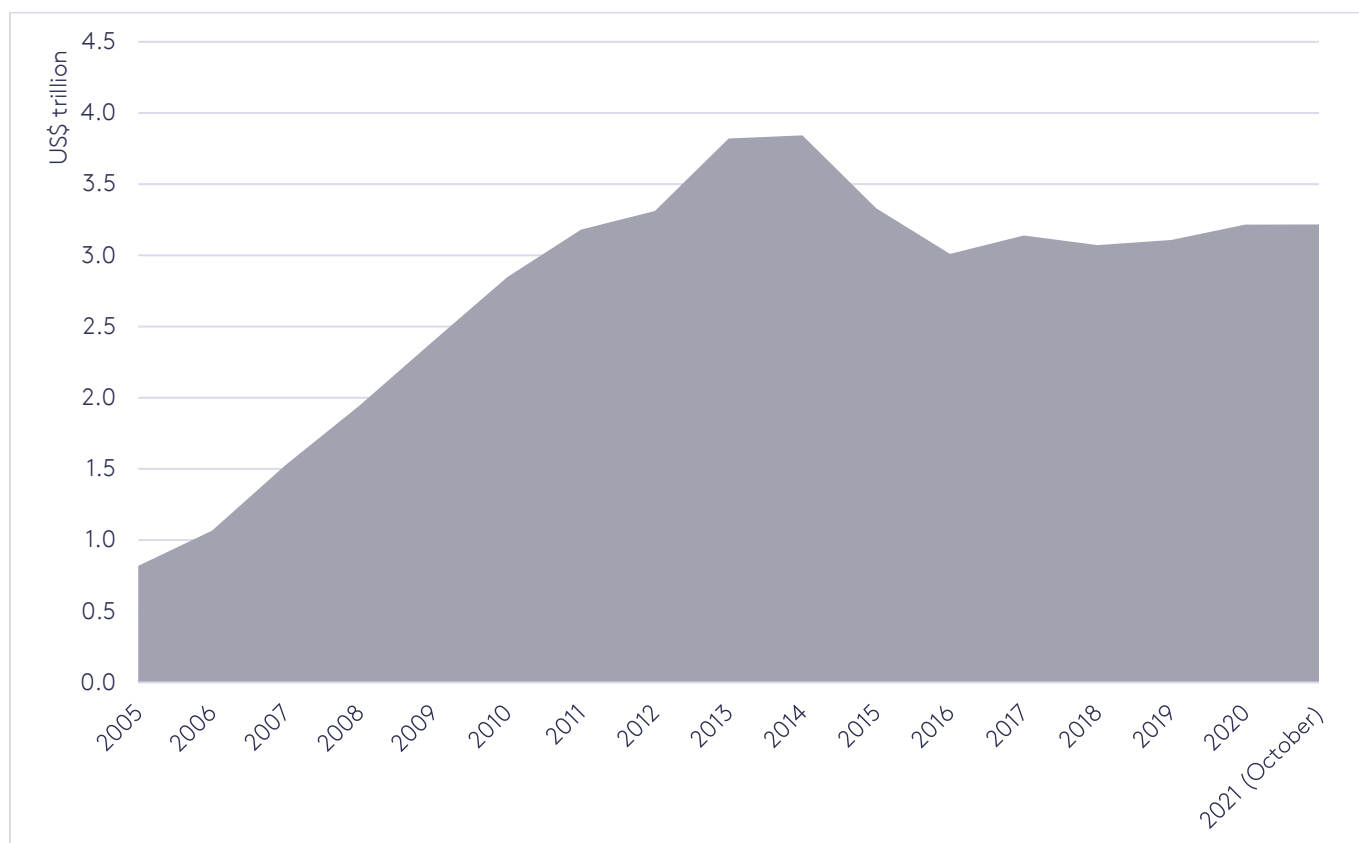
Top five creditors (US\$bn)		Top five debtors (US\$bn)	
Japan	3,440.8	United States	-14,011.2
Germany	2,548.9	Spain	-1,177.3
Hong Kong	2,152.8	France	-853.5
Mainland China	2,150.3	Ireland	-797.2
Norway	1,146.2	Australia	-756.3

Source: International Monetary Fund Balance of Payments Statistics

Composition of reserves

The strong growth of China's foreign assets largely reflects the significant accumulation of reserves by the State Administration of Foreign Exchange of the People's Bank of China (PBoC). These increased from around \$0.5 trillion in the early 2000s to over \$3.2 trillion in 2020 as China became steadily more integrated into the global economy (Figure 3.1). While the exact composition of the reserves across cash, bank deposits, bonds and other financial assets has not been disclosed, it is known that a significant share of the PBoC's reserves are held in US Treasuries. With holdings of around \$1.1 trillion at the end of 2020, China is the second largest foreign holder of US Treasuries after Japan (\$1.3 trillion) and far ahead of the UK in third place (\$441 billion) (US Department of the Treasury/Federal Reserve Board, 2021).

Figure 3.1. Chinese foreign exchange reserves, 2005–2021

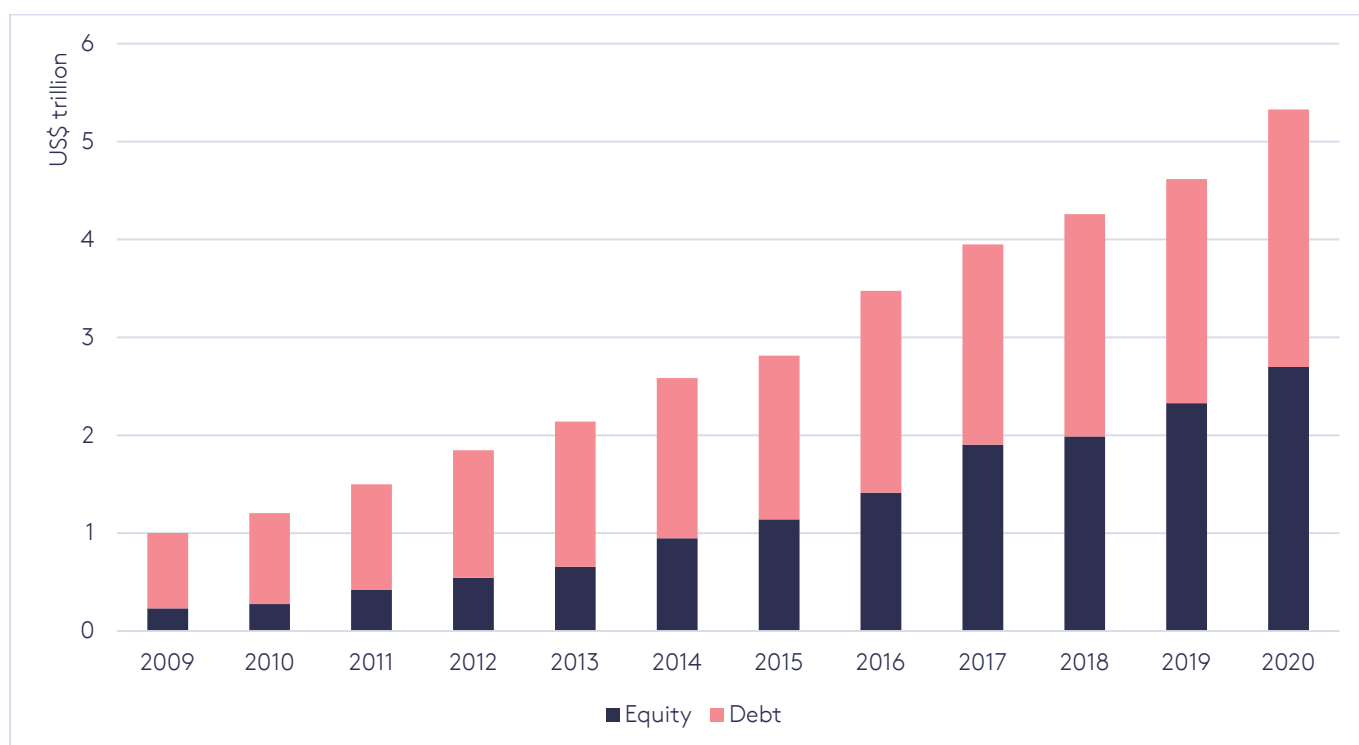


Source: State Administration of Foreign Exchange [China] (2021)

The allocation to US Treasuries fulfils the need for reserves to be held in highly liquid and safe assets. These assets do not generally have defined environmental footprints. But for the purposes of increasing financial returns, other Chinese public investment institutions have been investing heavily overseas, including in emerging markets, and in alternative assets including infrastructure and real estate. The assets under management of the China Investment Corporation (CIC) increased from around \$800 billion in the 2010s to over \$1 trillion in 2020. The vast majority of investments have been in the finance sector, followed by energy, logistics and real estate (Heritage Foundation, 2021). They include, for example, investments in financial institutions such as Morgan Stanley, Blackstone and Goldman Sachs, but also in utilities and infrastructure such as the UK's Thames Water and Heathrow Airport. Investments of this nature can have more defined climate-related characteristics, creating more risks for China as a sustainable investor but also more opportunities for it to align its foreign lending and investment to its sustainability strategies.

Overall, the composition of Chinese foreign assets over time has undergone a rebalancing away from bonds and towards equities. Data published by the International Monetary Fund show that from humble beginnings, close to zero up until 2013, the share of equity investments increased to close to half by 2020 (Figure 3.2).

Figure 3.2. Chinese foreign assets, debt vs. equity, 2009–2020



Source: International Monetary Fund (2021)

An increased focus on the Belt and Road Initiative

The geographical distribution of China's foreign investments has increasingly reflected a growing focus on the Belt and Road Initiative.

The BRI investments have at times been criticised for their track record on environmental, economic and debt sustainability. For example, the Council on Foreign Relations' (CFR) Independent Task Force on the BRI, co-chaired by former US Treasury Secretary Jack Lew and [retired] Admiral Gary Roughead, has noted that the initiative "undermines global macroeconomic stability" as it "worryingly adds to countries' debt burdens". The Taskforce also highlighted that the BRI "locks countries into carbon-intensive futures" and makes "climate change mitigation significantly more difficult" through "its export of coal-fired power plants". Finally, it warned that it undermines competitive market structures and introduces market failures as it "tilts the playing field in major markets toward Chinese companies" (Hillman and Sacks, 2021). At the same time, even this highly critical report acknowledges that "if implemented sustainably and responsibly, BRI has the potential to meet long-standing developing country needs and spur global economic growth" (ibid.).

Greening the BRI: an economic imperative for a major creditor

The September 2021 decision to end finance and prevent any future investment in coal is in China's political and diplomatic interests, cementing its role as a global leader in the climate change agenda. But it is also in its economic interest, given its net international investment position (NIIP), as described above, and particularly its role as one of the world's largest creditors.

Financial regulators and private financial institutions are increasingly demonstrating enhanced awareness of the potential of climate-related financial risks. The Central Banks and Supervisors Network for Greening the Financial System (NGFS) has, via multiple reports, outlined the physical and transition risk channels through which these could materialise. From disruption to economic activity and trade to the accumulation of stranded assets, such risks could have substantial material effect on banks' loan books and investors' portfolios, and, by extension, to the stability of the financial system at large.

Asset owners, asset managers, banks and other parts of the wider financial ecosystem are responding to these issues by adjusting their practices and portfolios to address the presence of climate-related risks. By the time of COP26 in November 2021, over 450 major financial institutions from across 45 countries, controlling assets of over \$130 trillion, had joined the Glasgow Financial Alliance for Net Zero (GFANZ), committing to align their activities with the science on climate change, including setting near-term decarbonisation targets, planning on how to meet longer-term pledges, and reporting on progress.

Strategies can take a variety of forms, from negative screening and divestments to active ownership and shareholder engagement, to best-in-class and thematic or impact investment strategies. There is also increasing realisation of the benefits of sustainable investing in terms of greater resilience and higher returns. The relative popularity of these different strategies has begun to shift as motivations for sustainable investment have moved from managing reputation risk to delivering impact, and as improvements in technology and data have enabled better measurement of impact and assessment of credibility of transition plans. Investors are increasingly becoming focused on achieving impact rather than minimising headline risks, making active ownership strategies more popular than blunt exclusions (Kyriakopoulou, 2020).

Private investors' processes for determining, assessing and addressing climate-related financial risks in portfolios can be instructive to sovereign investors, too. Specifically, climate risk management and sustainable investment strategies are becoming key parts of the toolkit of both types of investor. Indeed, sovereign wealth funds are increasingly following such strategies, too. The One Planet Sovereign Wealth Funds network was founded at the One Planet Summit in December 2017 by six sovereign fund members, from the Middle East (Abu Dhabi Investment Authority, Kuwait Investment Authority, Qatar Investment Authority and Saudi Arabia's Public Investment Fund), Europe (Norges Bank Investment Management) and Asia-Pacific (New Zealand Super Fund). It has since grown to 19 members, who state a united mission to "integrate climate change risks and invest in the smooth transition to a low emissions economy" (One Planet Sovereign Wealth Funds, n.d.) – but it does not yet include China.

Box 3.1. China's sustainable investment strategies for the Belt and Road

Many of the BRI countries are roughly where China was two decades ago in terms of income per capita, with great potential for rapid growth (Hepburn et al., 2020). If they follow a similar approach to development with a focus narrowly on physical capital accumulation fuelled by the extensive use of fossil fuels – polluting first and cleaning up later – the consequences for the whole world would be devastating.

In response to this and in line with the strategies explored on the previous pages, China has developed two flagship strategies for sustainable investment on the Belt and Road:

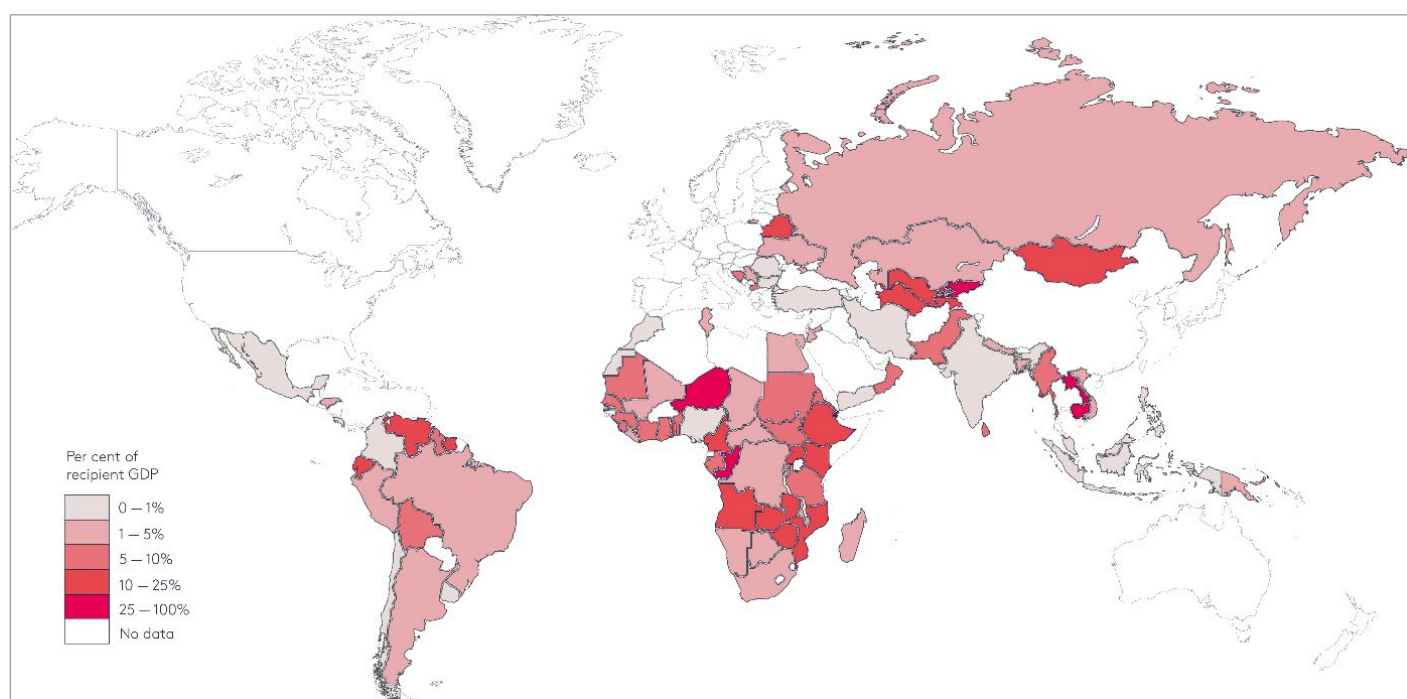
- The *Green Investment Principles* for greening investment in the Belt and Road (UK-China Green Finance Centre, 2021). The seven principles cover strategy, operations and innovation and are designed to encourage signatories to incorporate sustainability and environmental, social and governance (ESG) factors into their strategies, measure, manage and communicate information related to their exposure to climate risks, and deploy green financial instruments and green their supply chains.
- Establishment of the **BRI Green Development Coalition** (BRIGC) in 2019, under the Ministry of Ecology and Environment (MEE). The coalition's aim is to integrate sustainable development into the BRI through joint efforts and to facilitate BRI countries to achieve the Sustainable Development Goals. In 2020, it launched a Traffic Light System, classifying BRI projects as red, yellow or green according to their environmental impact. Coal-related investments are put on the red project list, with strict regulation (BRIGC, 2020).

Sustainable strategies and international cooperation: rationale and options

China, in its role as one of the world's largest creditors (and *the* largest official creditor), has a significant incentive to follow sustainable investment and growth strategies, for two main reasons.

First, debt distress episodes are more likely in the future than they have been in the past. While China's increased exposure to foreign debtors has grown substantially over the past 20 years, this was not accompanied by a higher level of debt distress episodes. This is partly explained by very benign liquidity conditions over that period, with highly accommodative monetary policy by the world's major central banks. However, while inflation is expected to remain relatively low in the medium term, consensus expects monetary policy to tighten somewhat and this raises the risk of more frequent debt distress episodes, creating vulnerabilities for creditors. According to World Bank chief economist Carmen Reinhart and colleagues, the average stock of debt owed to China for the 50 most indebted recipients of Chinese direct lending increased from less than 1 per cent of GDP in 2005 to more than 15 per cent in 2017 (Horn et al., 2019). The study also found that debt to China for these countries is now close to 40 per cent of their total reported external debt on average (Figure 3.3).

Figure 3.3. External debt to China, 2017 (direct loans only)



Source: Debt estimates by Horn et al. (2019), based on loan-level data. They exclude Chinese portfolio debt holdings and short-term trade debt. GDP data are from IMF World Economic Outlook. Debt-to-GDP data calculated by Horn et al. (2019)

Second, the kicking-the-can-down-the-road approach to underappreciated climate risks is nearing its end and institutions that remain exposed can face high costs. The One Planet Sovereign Wealth Funds network does not yet include the China Investment Corporation. Chinese institutions that act as foreign investors and creditors should look increasingly to deploy climate risk management tools to assess and address their exposure to climate-related risks in terms of their portfolios of loans and investments abroad. This includes sovereign debt contracts – entire countries can be exposed to both physical and transition climate-related financial risks. Neglecting to carry out these assessments would mean that China's foreign investments do not deliver the investment returns and economic development benefits to their full potential (as warned by the CFR report on the BRI) but also create vulnerabilities and credit risks for China in its position as a creditor. The *Green Finance Roadmap* put together by Tsinghua University, Vivid Economics and ClimateWorks Foundation suggests that China extend the green requirements that it applies domestically (such as mandatory environmental assessment requirements) to its BRI investments (Vivid Economics, 2019).

Reflecting these motivations to embrace sustainability in its foreign investments, China's strategy for international cooperation could take the following forms:

- 1. Engagement with governments, institutions and companies in the countries to which it lends.** Active shareholder engagement strategies are becoming increasingly accepted as more effective than divestments and blunt exclusions in terms of impact. Chinese institutions should look to leverage their positions as creditors to influence policies and decisions by those to whom they lend towards more sustainable and climate-aware forms of economic growth and development.
- 2. Engagement with fellow creditors.** Linked to the above point, China should look to work more actively and closely with the international multilateral system in supporting debtor countries during times of debt distress. This will be particularly critical in the aftermath of the COVID-19 pandemic, which has elevated the debt burden for many emerging and developing economies to which China lends. The present system is hampered by a lack of international standards for sovereign debt lending, which can be problematic in terms of the discretionary nature of resolving individual cases of enforcing sovereign debt contracts.
- 3. Multilateral climate action.** Finally, China should continue to engage in the multilateral system through participating in initiatives that promote sustainability and mitigate global risks from climate change. Deepening its participation in initiatives in which it is already a member and joining new ones would not only respond to criticism that China's foreign lending practices risk locking countries into carbon-intensive futures but also enhance China's own economic prospects in enhancing the credit risk profile in its loan book.

The following section explores China's progress along these dimensions.

Financing practices and relationships in China

Delivering the agenda outlined in this chapter requires first and foremost a nuanced understanding of the complexity of the reality of China's lending relationships. Behind the big picture of China's role as one of the world's largest creditors and the world's largest official creditor lies a multitude of individual state-owned and private creditor institutions.

China's rapid and consistent economic growth and development has supported and been supported by a growing banking system. While the country's financial system is not yet fully liberalised, its banking sector has grown to become the largest in the world in terms of assets. This mostly reflects domestic activity, and the PBoC has been increasing its focus on the regulation of climate-related financial risks in terms of domestic lending practices. This includes reducing risks on banks' portfolios as well as incentivising lending towards activities that support the green transition.

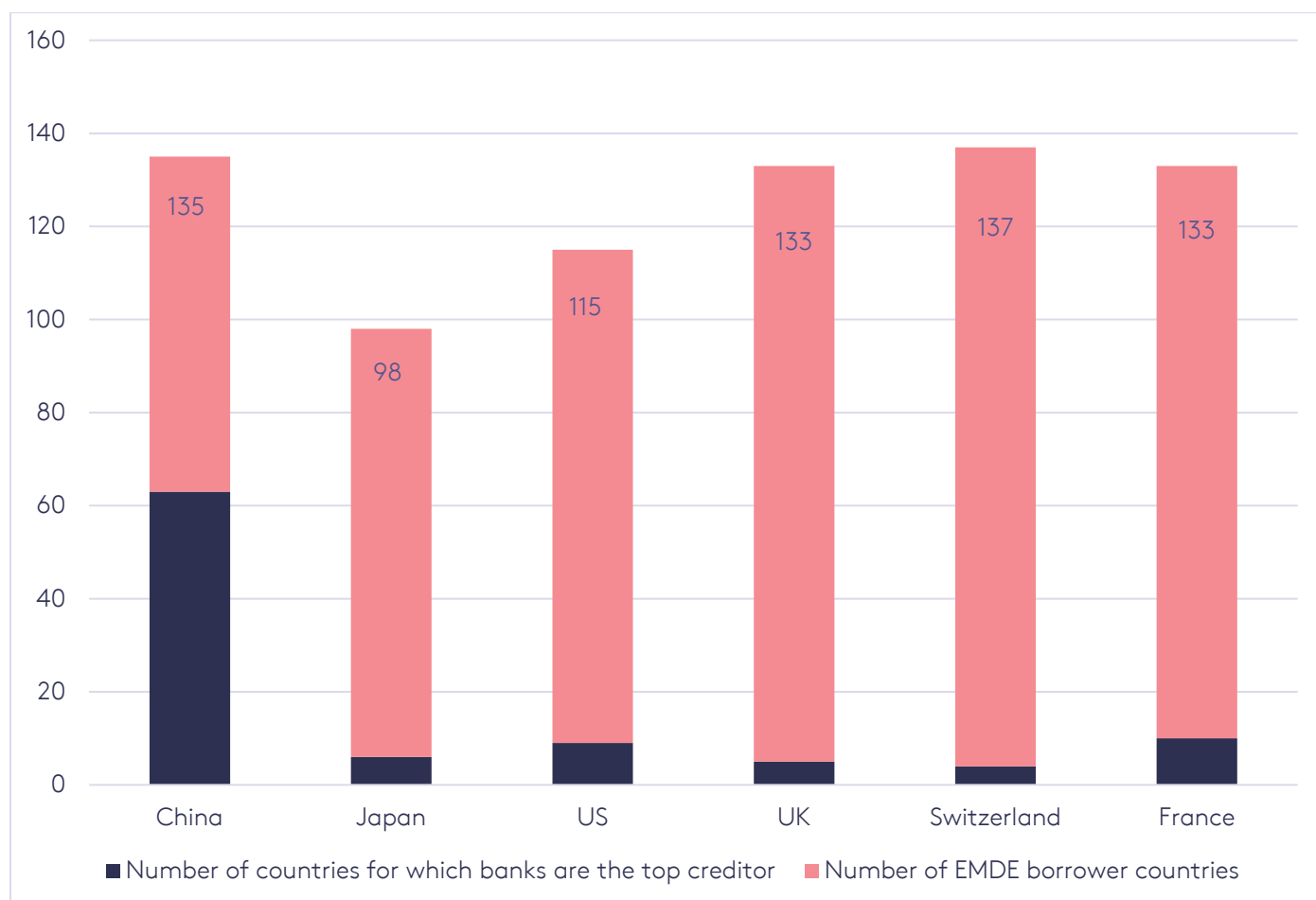
In addition to the development of the domestic banking sector, Chinese banks' international footprint has expanded substantially, mirroring the growth in the country's broader engagement in the international financial system. China's cross-border lending stands at around 18 per cent of Chinese GDP, with 43 per cent going to borrowers from emerging market and developing economies (EMDEs) (Cerutti et al., 2020). Chinese banks have become the most important creditor for 66 of 185 borrower countries, more than any other banking system, and are the largest cross-border creditors for almost half of all EMDEs (63 out of 143) (Figure 3.4). By comparison, for example, French banks count as the most important lender for just 10 EMDEs, despite their significant historic ties.

Overall, Chinese financing can be broadly categorised into three types:

- First, interest-free loans that are overseen by the China International Development Cooperation Agency (CIDCA) in the form of foreign aid (China State Council, 2014).
- Second, concessional and preferential loans that are provided to sovereign borrowers in concessional terms or as preferential buyers' credit (Export-Import Bank of China). There are three Chinese policy banks that act as official creditors: China Export-Import Bank, China Development Bank and China Agricultural Bank.

- Third, commercial loans, that are structured, priced and documented in accordance with prevailing market conditions and practice. These are offered by China's three policy banks as well as by commercial banks and corporates.

Figure 3.4. Number of borrower countries in emerging market and developing economies (EMDEs) and share of countries for which banks are the top creditor, by bank home country



Source: Bank for International Settlements locational banking statistics; calculations by Cerutti et al. (2020)

Reforming frameworks for international debt cooperation

Within the broader sustainable development agenda, China should strive to work more closely with international creditors to support debt sustainability and facilitate international cooperation on debt restructuring with multiple creditors.

As highlighted earlier in this chapter, the most effective way to enhance debt sustainability is to enhance the economic outlook. Overseas investment that effectively supports the transition to a sustainable, low-carbon economy primarily powered through renewable energy should be the top priority. Such investments should be delivered within a framework of high environmental standards, for example through establishing negative lists and guidance directories for investment. The BRI Green Investment Coalition and the Green Investment Principles are good examples in that direction.

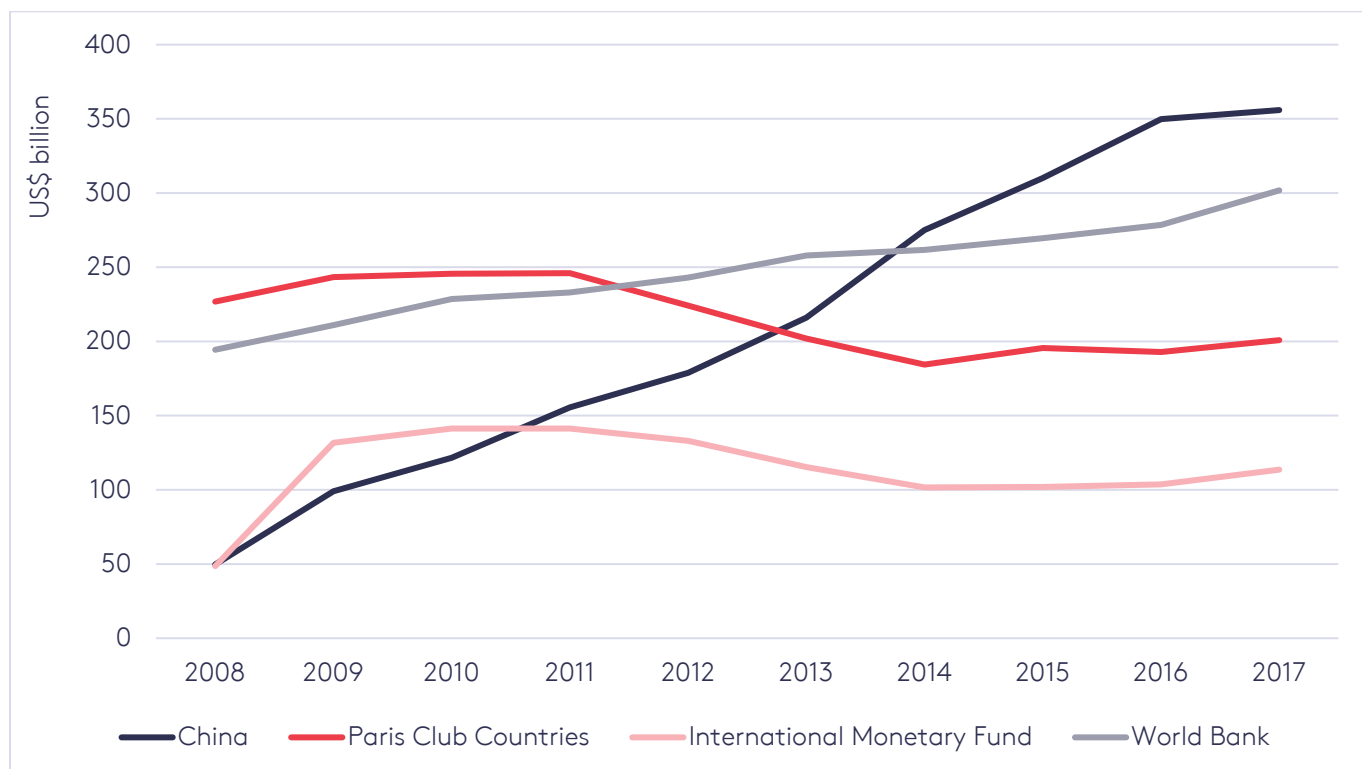
Still, the present picture suggests that historic build-up of debt and challenging economic circumstances, not least as a result of the COVID-19 pandemic and the materialising of climate risk, may pose challenges to debt sustainability that will require debt restructuring considerations.

The Paris Club has been the dominant framework for coordinated action among creditors since its creation in 1956. An informal group of just 22 permanent members, it has at times been referred to as a 'creditors' cartel'. The terms of debt relief offered by the Paris Club members have evolved to become more extensive over time. Originally limited only to extending repayment periods, they now include debt

reduction in net present value terms, with the share of debt that can be cancelled and the group of eligible countries increasing over time.

A significant concern for the Club has been how to coordinate with creditors that are not part of it. This has become increasingly important as China – which is not a member – has grown in importance as a creditor to countries involved in debt relief discussions (see Figure 3.5). In particular, members have been concerned about situations where debt relief granted by their members enables borrowers to repay loans to non-Paris Club creditors. The ambiguity over the public or private nature of some of the Chinese creditor institutions is complicating matters more (discussed further below). In 2016, under China’s G20 Presidency, discussions began to reform the Paris Club with the view to including China into some new arrangement, potentially to be headquartered in Beijing. However, that agenda has not progressed far since.

Figure 3.5. Aggregate external public debt owed to official creditors, 2008–2017



Source: Horn et al. (2019)

Since the start of the COVID-19 pandemic, concern has grown even further among Paris Club members as the share of debt owed to creditors that are part of the Club has decreased to around a third, according to World Bank calculations. In response, the G20 set up the Debt Service Suspension Initiative (DSSI), which provides temporary suspension of debt service payments owed to official bilateral creditors, including China. The initiative took effect in May 2020 and as of 23 November 2021 it had delivered more than \$5 billion in relief to 40 eligible countries, with the suspension period running until December 2021.

With the prospect of the DSSI expiring at the end of 2021, the G20 together with the Paris Club in November 2020 endorsed the Common Framework initiative to continue to support low-income countries with unsustainable debt. So far Zambia, Chad and Ethiopia have requested treatment under the Common Framework. A creditor committee including China was launched for Chad in April 2021. If successful, the Chad example could pave the way for future cases.

Modalities of debt relief

In exploring the forms debt relief can take, looking at past practices is instructive. Options for relief include cancellation, where part or all of a debt is written off, and haircuts, where the face-value of the principal debt is reduced. Debt can also be restructured, in the form of a renegotiation of its terms such as interest rates, maturity and grace period for repayment. Reprofiting, a type of restructuring, involves extension of maturity but without rate reduction or principal haircuts. Finally, debt can be refinanced when a new loan is issued to pay off an old loan, effectively extending the repayment time and possibly accompanied by an interest rate reduction.

So far, cases where China has cancelled or restructured debt have varied across these forms (see Table 3.2). And while they have been relatively limited in terms of monetary value, there has been a clear trend of increasing frequency and value.

Table 3.2. Chinese debt restructuring cases by treatment type

Treatment	Reprofilng of debt service payments within original maturity	Short maturity extensions (e.g. 3-7 years)	Long maturity extensions (e.g. 10-20 years)	Maturity extension and interest rate reduction
Cases	Mozambique (2017); Cameroon (2019)	Cameroon (2002); Zimbabwe (2007, 2010, 2012); Niger (2018)	Ethiopia (2018)	Zimbabwe (2003, 2004); Seychelles (2011); Taiwan (2019)

Source: Acker et al. (2020)

A 2020 study by the China Africa Research Initiative (CARI), that tracked the evolution of Chinese foreign lending and associated debt relief practices, noted that between the 1970s and 2000, Chinese lending was “mostly limited to interest-free foreign aid loans” and the first response to debt distress was an extension of the repayment period without a haircut (Acker et al., 2020). Further, since 2000, the Chinese government began offering debt write-offs of interest-free loans, along the lines of the IMF and World Bank’s Highly Indebted Poor Countries (HIPC) Initiative (ibid.). This is particularly notable given China’s increasingly deep relationship with African economies: aggregating data from China’s web of lending relationships, the study found that there have been more than 1,000 Chinese loan commitments in 49 African countries since 2000 and that these have been offered by a mix of a total of 30 institutions in addition to the China Export-Import Bank, which has acted as the main creditor to African governments (ibid.).

Acker et al. further found that between 2000 and 2019, China cancelled around \$3.4 billion of debt in Africa. The vast majority of cancelled debt applied to “mature, interest-free foreign aid loans that had gone into default”, according to the authors. These represent only a very small share of China’s lending activities.

For the remaining types of loans (concessional, preferential and commercial loans), the most common practice is to restructure or refinance them. The CARI study found that during the same period (2000–2019), China had restructured or refinanced \$15 billion of loans across at least 26 individual African loans. The largest is the \$7.5 billion refinancing of Angola’s state-owned petroleum and natural gas production enterprise, Sonangol.

Barriers to delivering debt relief

Transparency is a key challenge across China’s various types of lending. There is little information on the aggregate levels of Chinese foreign credit, the terms around its maturity and whom it is held by. Horn et al. (2019) in their study of China’s overseas lending found that around half of its lending to developing

countries is “hidden” and not reported to the IMF or the World Bank, “distorting policy surveillance, risk pricing, and debt sustainability analyses”. In September 2021, another study by CARI estimated that Zambia’s debt to Chinese public and private lenders is \$6.6 billion, almost double the amount disclosed by the previous Zambian government (Brautigam, 2021).

Additionally, ambiguity over the public or private nature of Chinese financial institutions can prove problematic when the need for debt relief arises. This need is likely to increase in frequency and magnitude as climate-related transition risks materialise, which has been widely and repeatedly highlighted by the NGFS; several central bankers have warned of a potential “climate-driven Minsky moment”, in which the prices of various assets suddenly collapse (Carney et al., 2019). This is particularly relevant for the fossil fuel sector and for oil-exporting and fossil fuel-intensive economies. Fitch Ratings has highlighted that “as demand for fossil fuels declines, major exporters will face a loss of GDP, government revenue and export receipts in the absence of offsetting trends, such as economic diversification” (Fitch Ratings, 2021). It warned that “over time, this will lead to higher government debt, lower assets and higher net external debt”.

More recently, these risks have been further exacerbated by the crisis of the COVID-19 pandemic, which has generated a surge in global debt. In September 2021, the Institute for International Finance released data from its Global Debt Monitor showing that total debt levels have increased by around \$36 trillion during the pandemic to stand at \$296 trillion or 353 per cent of global GDP, with a record high of 363 per cent of GDP recorded earlier in 2021 (Institute for International Finance, 2021). Multilateral institutions have expressed concern over the risks associated with the increase in debt level. The World Bank in July 2021 highlighted that “public debt in emerging markets has surged to levels not seen in 50 years”, continuing that “many developing countries have increasingly taken on debt on non-concessional terms from private lenders and non-Paris Club members”, with an implicit reference to China (World Bank, 2021) (see also Figure 3.5 above).

International cooperation and multilateralism

To put this analysis into context and to understand the full picture, it is important also to look at China’s role in providing finance specifically directed at supporting sustainable development. This takes several forms, including:

- **Own government investment into domestic projects** supporting climate change mitigation and into R&D for technologies aiding climate change mitigation, as addressed in Chapter 2 on the energy transition.
- **Foreign direct investment and portfolio investment** supporting sustainable projects in partner economies – this is explored in the next chapter in terms of R&D investments.
- **Contributions to development finance** through China’s role in multilateral organisations. China has been playing a growing role in the multilateral development bank (MDB) system and has contributed to the creation of the Asian Infrastructure Investment Bank and the New Development Bank, headquartered in Beijing and Shanghai respectively.

China’s involvement in multilateral initiatives

Beyond the types of investment mentioned above, through the MDB system China also continues to engage with global partners through its leading roles in the following key multilateral initiatives.

G20 Sustainable Finance Working Group

Originally called the Green Finance Study Group, this initiative was launched in 2016 during China’s G20 Presidency with the mandate to “identify institutional and market barriers to green finance and options to enhance the mobilisation of private capital for green investment”. In its initial phase the group was co-chaired by the PBoC’s Ma Jun, with the Bank of England’s Michael Sheren. Following a two-year suspension of its work, the Group was re-established under the Italian Presidency in 2021 and upgraded to a Sustainable Finance Working Group. The G20 Finance Ministers and Central Bank Governors mandated the group to develop an “evidence-based and climate-focused G20 sustainable finance roadmap”.

China's particular importance to the group – as the country under whose Presidency the initiative was introduced and as its original co-chair – was recognised by the Italian Presidency, who upon re-establishing the group invited China and the US to act as its two co-chairs.

In the future, China could lead on several of the areas where the Group has issued recommendations. For example, given its head start in developing a sustainable taxonomy, China could work closely with governments in the G20 and beyond that are looking at its taxonomy as a starting point for the development of their own national taxonomies. These include Russia and Malaysia.

International Platform on Sustainable Finance (IPSF)

The PBoC was one of the eight founding members of the IPSF in October 2018. The platform, an initiative of the EU, aims to scale up mobilisation of private capital towards environmentally sustainable investments by acting as a multilateral forum of dialogue between policymakers, regulators and investors. The IPSF now has 18 members, which produce 55 per cent of global greenhouse gas emissions and are home to 50 per cent of the global population and represent 55 per cent of the world economy.

In July 2020, China and the EU initiated the Taxonomy Working Group, which they co-chair. This gives China the opportunity to lead efforts towards developing a 'Common Ground Taxonomy' that assesses the commonalities and differences in existing taxonomies for environmentally sustainable activities (IPSF, 2021).

Sustainable Banking and Finance Network (SBFN)

Two Chinese regulators, the China Banking and Insurance Regulatory Commission and the China Ministry of Environmental Protection, were among the first members of the SBFN in 2012. In 2014 the China Banking Association also joined the network.

China has actively engaged in the network through the Sustainable Finance Instruments Working Group, contributing to work to develop a practical toolkit for green bond issuance. There is substantial scope for further work in this area. While the green bond market is growing fast, it is still small overall. According to the Climate Bonds Initiative (2021), China was the second-largest source of green bond issuance in 2020, putting it in a good position to lead by example in sharing know-how across the international community to help scale up green bond issuance globally.

Central Banks and Supervisors Network for Greening the Financial System (NGFS)

The PBoC was one of the eight founding members of the NGFS at the One Planet Summit in December 2017. It has played an instrumental role in the development of the Network over the years and for most of its lifetime served as the chair institution for the NGFS's first workstream on microprudential supervision. The NGFS has since grown to 100 members and 16 observers at the time of writing.

Ma Jun of the PBoC now acts as chair of the research workstream. This gives China the opportunity to explore and push the frontiers of work for the Network. For example, Ma Jun co-chairs the Study Group on Biodiversity and Financial Stability (with the Grantham Research Institute's Nick Robins).

United Nations Framework Convention on Climate Change (UNFCCC) and the Conference of the Parties (COP)

At the highest level, international climate diplomacy is dominated by the United Nations, particularly the Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CBD), and the annual process of the Conference of the Parties (COP). Since the adoption of the UNFCCC in 1992 and its first COP summit in Berlin in 1995, China has played an instrumental role in supporting the process and scaling up climate action over the years. On the biodiversity agenda, China is hosting the UN Biodiversity Conference, COP15, in Kunming in May 2022.

The UNFCCC COP21 meeting in 2015 is widely accepted as a milestone for climate action with the signing of the Paris Agreement. China's efforts in the lead-up to Paris have been widely recognised. In 2014, under the leadership of President Xi Jinping and US President Barack Obama, China and the US issued a joint announcement on climate change, reaffirming the importance of bilateral cooperation (White

House, 2014). On the opening day of COP21 itself, the two countries again urged a common vision (ibid., 2015), and the US and China followed a similar approach in the run-up to COP26 in Glasgow: in April 2021 they issued a Joint Statement addressing the climate crisis (US State Department, 2021a), while in the final days of the summit they came forward with a Joint Glasgow Declaration that reaffirms their commitment to work together to strengthen implementation of the Paris Agreement (ibid., 2021b).

Looking ahead to COP27, scheduled for November 2022, China has an important role to play in relation to the collective commitment to bring forward more ambitious pledges. China has committed to peaking its emissions by 2030. Moving the peak date to 2025 would act as a significant boost to the world's ambitions as formulated through the COP process.

Opportunities for China in joining other initiatives

China could deepen its multilateral ties by joining further initiatives that bring together the international community in support to climate action and sustainable development. This includes joining the Coalition of Finance Ministers for Climate Action and signing up to its 'Helsinki Principles'.

The Coalition of Finance Ministers was set up at the 2018 IMF/WBG Annual Meetings in Bali. Initially a group of 39 finance ministries, the Coalition has expanded to include over 60 countries that have committed to aligning their policies and practices with the Paris Agreement targets. For example, as part of the work of the Coalition, ministers are exploring ways to implement carbon pricing, to take climate change into account when preparing state budgets, and to support the development of green finance. As this section has shown, China has demonstrated leadership in terms of greening monetary policy and regulation and supervision through the work of the PBoC and other regulatory agencies. Joining the Coalition would be a natural next step for China to demonstrate its commitment in using all policy levers, including fiscal policy, for supporting sustainable development and climate objectives.

On private finance, too, China can do more. The Glasgow Financial Alliance for Net Zero has emerged as the dominant forum for private sector financial institutions to contribute to accelerating the transition to a net-zero global economy. So far, only one of GFANZ's 450 members is from China (Bin Yuan Capital). Given the size and momentum in China's private finance sector, and the supportive domestic regulatory framework to boost Chinese financial institutions' green finance credentials, there is significant scope for them to engage more closely with peers under initiatives such as the GFANZ.

4. Accelerating climate action and diplomacy through research, development and innovation

Technology and innovation are two important pillars of the global transition to a net-zero carbon world, while R&D is needed to boost the enormous growth opportunities of the post-pandemic ‘build back better’ recovery.

China’s commitment to building a sustainable, just and equitable world through multilateralism and international collaboration is reflected in its focus on promoting innovation. This includes domestic policies and international partnerships to foster R&D with a view to supporting markets for clean technology and to increase accessibility to these technologies. Developing clean technology is also expected to provide positive ‘spillover’ effects within the economy and contribute to meeting the Paris Agreement targets and delivering the UN Sustainable Development Goals. These policies and collaborations are discussed in this chapter, which takes a deeper look at the climate diplomacy efforts China has made through research, development and innovation.

The domestic dimension of China’s R&D policy

China’s domestic research and development (R&D) policy development has benefited China’s economic development and is necessary to its net-zero future. The socioeconomic objectives that China pursues for its development and modernisation rely on research, development and innovation (R&D&I) policies. As per the IEA’s 2021 report *An Energy Sector Roadmap to Carbon Neutrality in China*, for China to reach carbon neutrality by 2060, research and innovation are essential for the transition to succeed and a major acceleration in clean energy innovation would be crucial. From 2015 to 2021, public spending on low-carbon energy research and development in China increased by 70 per cent, but according to the IEA, China’s “innovation system will need to be harnessed appropriately to stimulate the wide range of low-carbon energy technologies needed” (IEA, 2021). China has created a national innovation system coordinated by the Ministry of Science and Technology, which works with relevant government departments to improve incentive mechanisms for technological innovation.

The Made in China 2025⁸ strategy, published in 2015, features prominently in China’s R&D&I policies and articulates how China aspires to become a world leader in the high-tech industries, strengthening domestic innovation reducing its reliance on foreign technologies while moving up in global value chains. China is rapidly developing its industrial and research and innovation (R&I) performance, while implementing a trade policy that aims to ensure a level playing field for Chinese companies domestically and globally.

One prime example is the auto industry, in which China aspires to become a global leader in low-carbon innovation. China has been the world’s largest automotive manufacturing country and automotive market since 2009. Annual vehicle production in China from 2010 to 2020 accounted for over 30 per cent of production worldwide, exceeding that of the EU, or the US and Japan combined (Statista Research Department, 2021). The demand for vehicles in China is expected to grow further. This will make the fuel consumption and emissions from traditional fuel-powered cars one of the greatest challenges ahead in terms of reducing carbon emissions. By innovating in this area to reduce emissions, the auto industry is expected to help China attain its commitment of achieving peak carbon dioxide emissions by 2030 and carbon neutrality by 2060.

China has consistently adapted to changing economic realities and committed to strengthening its own domestic policies and industrial base; this is demonstrated through China aiming to become the world leader in artificial intelligence by 2030 and in science and innovation by 2050. Since adopting the Paris

⁸ See <http://english.www.gov.cn/2016special/madeinchina2025/>.

Agreement in 2015, its R&D&I policies and initiatives have been devised and reprioritised in terms of their contribution to addressing pressing global challenges, in particular climate change and biodiversity loss. To contribute to meeting the Paris Agreement's temperature goals, China's R&D&I policies have endeavoured to contribute to China's green development and to address the health and environmental impact of China's industrialisation.

Internationalisation of China's R&D&I policy

China's domestic R&D&I policies are strategically aligned with China's pursuit of science diplomacy and enhanced international cooperation. Bilateral cooperation on R&D between China and the UK and China and the EU, and China's pivotal role in the UNFCCC-led climate negotiations, exemplify this international dimension of China's policies in accelerating innovation and fostering R&D.

In 2020, China invested a total of 2.4 trillion yuan (US\$372 billion) in R&D; China's R&D spending accounted for 2.4 per cent of the country's aggregate GDP in 2020, recording the highest growth in nearly a decade (Global Times, 2021b). China's spending on R&I as a proportion of GDP was higher than in the EU from 2016 to 2021 (Amoroso et al., 2021). China's R&D intensity, R&D spending as a percentage of GDP (also referred to as 'gross domestic expenditure on R&D', or GERD), recently surpassed that in the EU, and China further increased its R&D intensity to 2.5 per cent in 2020.

China and the EU

Cooperation between China and the EU on climate-related R&D has been strengthened alongside China's rapid R&D&I development. EU-China scientific cooperation is underpinned by the Science and Technology Cooperation Agreement signed in 1998, and in 2018 a joint Agreement for Science and Technology was renewed (European Commission, n.d.). In 2019, the two parties agreed to develop a *Joint Roadmap for Future Science, Technology and Innovation Cooperation*, intended to address both framework conditions for R&I and thematic cooperation such as on environment, climate and health. China has become one of the EU's major international partners in research and technological innovation through the EU's Horizon 2020 – the European Commission's framework programme for research and innovation that ran from 2014 to 2020.

These high-level dialogues and initiatives feed into the annual High-level Environment and Climate Dialogue (HECD) between China and the EU, launched in 2020, which elevated the EU-China climate dialogue that started formally in 2005 to ministerial level. The HECD acts as a key platform through which "to enhance actions and bilateral cooperation on environment and in the fight against climate change" and for both sides to show climate action leadership (European Commission, 2021). The HECD reaffirms the joint commitment of the EU and China to advance the implementation of the Paris Agreement and to intensify their cooperation on climate change and clean energy.

The EU-China Emissions Trading Systems (ETS) Cooperation Project is the flagship project between the two jurisdictions. The EU cooperated closely with China to support the design and implementation of China's national ETS, which was launched at the end of 2017. During the three-year project (2014–2017), the EU provided technical assistance for capacity-building in China, based on its long and significant experience with the EU ETS, the world's oldest carbon market. The project supported the seven regional emissions trading market pilot systems – in Beijing, Shanghai, Tianjin, Chongqing, Guangdong, Hubei and Shenzhen – paving the way for the establishment of a national ETS in China. A full realisation of China's ETS would make it the world's biggest carbon market.

The EU and China consider the emissions trading system to be a "cost-effective policy tool with significant potential to contribute to a low-carbon economy and the necessary innovation and deployment of low carbon technologies", as stated in the cooperation project's memorandum of understanding. To further enhance their bilateral cooperation on carbon markets, the European Commission and the National Development and Reform Commission of China agreed in 2018 on a new ETS project.

China and the UK

The UK-China dialogue on climate and energy that commenced in 2006 is another important aspect of China's climate diplomacy and international cooperation on R&D. Since then, such cooperation has deepened. In 2014, the Climate Science for Service Partnership China (CSSP China) was launched to stimulate scientific collaboration between research institutes in the UK and China. It focuses on supporting climate-resilient economic development and well-being through producing world-leading scientific research. The ongoing project also serves to strengthen collaboration between the UK climate science community and Chinese research institutes (Met Office, n.d.).

The *UK-China Joint Strategy for Science, Technology and Innovation Cooperation* was officially launched in December 2017, with a commitment to take science and innovation collaboration to a new level, and is the first bilateral science and innovation strategy developed jointly by China with another country (BEIS and Johnson, 2017). At the 2021 China-UK Joint Commission on Science, Technology and Innovation Cooperation, both countries agreed that their respective STI strategies, including China's *14th Five-Year Plan for Science, Technology and Innovation* and the UK's *Research and Development Roadmap*, offer synergies. They confirmed a common vision in addressing issues including climate change and biodiversity, and the ambition for strengthened cooperation in the future.⁹

China and the UN

The internationalisation of China's R&D policy is also embedded in China's commitment to the 2030 Agenda for sustainable development and UN-led climate action. The 2030 Agenda highlighted science, technology and innovation as key means that can facilitate the attainment of the Sustainable Development Goals (SDGs). The importance of science and research in addressing climate change is most manifest in the negotiations in the UNFCCC's Subsidiary Body for Scientific and Technological Advice (SBSTA), which promotes collaboration in climate research and systematic observation and acts as a link between scientific information from expert sources and "the policy-oriented needs of the COP" (UNFCCC, n.d.). China's role in the SBSTA has been instrumental to its work in recent years.

China's contribution to the multilateral climate change process has been fundamental, especially in its joint leadership with the United States in the run-up to and at COP21, where on 12 December 2015, 196 Parties adopted the Paris Agreement, the world's first legally binding international treaty on climate change, bringing nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects. Prior to COP21, China and the US announced additional measures to strengthen and expand their climate cooperation via the *US-China Joint Presidential Statement on Climate Change* in September 2015. Both sides reaffirmed their commitment to reach an ambitious agreement in 2015 and committed to advance domestic climate action and to enhance bilateral and multilateral climate cooperation. The historic *US-China Joint Announcement on Climate Change* of 2014 included the creation of the US-China Clean Energy Research Center, which aims to facilitate collaborative work in carbon capture and storage technologies, energy efficiency in buildings, and clean vehicles. The announcement recognised the importance of technological innovation for reducing the cost of climate change mitigation technologies, and for the invention and dissemination of new zero- and low-carbon technologies, and committed to building a programme of "energy technology cooperation" (The White House, 2014).

China is also showing leadership in building a 'nature-positive'¹⁰ future and preventing biodiversity loss, which is both accelerated by and exacerbating climate change. As described above, China hosted the first part of the Convention on Biological Diversity (CBD) summit, COP15, in 2021, with the second stage scheduled for April to May 2022 in Kunming. Part 1 set the stage for the adoption of the post-2020 global biodiversity framework due to be agreed in 2022, and established the 1.5 billion-yuan (c. \$233 million) Kunming Biodiversity Fund (Convention on Biological Diversity, 2021). The CBD post-2020 framework sets out an "ambitious plan to implement broad-based action to bring about a transformation in society's relationship with biodiversity and to ensure that, by 2050, the shared vision of living in harmony with nature is fulfilled" (UNEP, 2021). China's role as CBD COP15 President attests to China's aspiring

⁹ http://en.safef.gov.cn/pressroom/202106/t20210604_175066.htm

¹⁰ "A nature positive approach enriches biodiversity, stores carbon, purifies water and reduces pandemic risk. In short, a nature positive approach enhances the resilience of our planet and our societies" (Holdorf et al., 2021).

responsible leadership role in creating a more sustainable world and the construction of 'ecological civilisation' – a view that underpins China's climate change governance and diplomacy.

China's contribution to global R&D

China's contribution to global R&D is increasingly important. This is demonstrated through the growth in international patent applications, the tech race between the US and China, and the emergence of China as a powerhouse of science and technology.

The European Commission's Joint Research Centre and the Organisation for Economic Co-operation and Development (OECD) recently analysed the role of the world's top corporate R&D investors are playing in reaching climate neutrality by developing, owning and commercialising low-carbon technologies. Their report shows that R&D is highly concentrated, with just four economies (the US, EU27, China and Japan) collectively representing almost 85 per cent of the total R&D invested. While the US is by far the largest R&D-investing economy, China has "increased its presence most considerably within the top 2,000 R&D investors" (Amoroso. et. al., 2021).

These top 2,000 corporate R&D investors are playing an increasingly important role in the development and commercialisation of new climate change mitigation and adaptation technologies. Patents and trademarks owned by these R&D investors are primarily found in key markets – China, Europe, the US, Japan and Korea – which are shaping the development of future technologies. The State Intellectual Property Office of the People's Republic of China (CNIPA) is one of the five largest intellectual property offices in the world, alongside the European Patent Office, the Japan Patent Office, the Korean Intellectual Property Office, and the United States Patent and Trademark Office. However, compared with the major economies, the US, Japan and the EU27, China appears relatively less specialised in climate-related innovation and thus it needs to reprioritise and reorganise its R&D policy initiatives and goals in this field. The World Economic Forum suggests that R&D priorities to 2025 should be energy storage technologies, generation and decarbonisation, and to 2030 they should be focused on zero-carbon fuels, conversion processes and interseasonal storage (Schniering, 2021). China should aim to turn itself into a global R&D power that is able to influence global standards and supply chains and drive global innovation.

China's contribution to global R&D is also accelerating and expanding in Track 1.5 (governmental and non-governmental mixed diplomacy) and Track 2 diplomacies (non-governmental diplomacy). The country is contributing, for example, to Mission Innovation, an ambitious initiative launched by 20 countries including China, India, the US, Indonesia and Brazil alongside the Paris Agreement in 2015, with the aim of bringing together governments, public authorities, companies, investors and academia to work on making clean energy affordable. The countries committed to double their respective clean energy R&D investment over five years. Together, they represent 75 per cent of the world's CO₂ emissions from electricity and more than 80 per cent of the world's clean energy R&D investment (Bodnar and Turk, 2015). In May 2021, the member countries committed to an ambitious second phase, Mission Innovation 2.0, in which 25 member countries will invest an additional \$5.8 billion annually in R&D. Mission Innovation is widely regarded as a catalyst for global cooperation on R&D to scale up the deployment of existing clean energy technologies and accelerate clean energy innovation to deliver affordable solutions to reach net-zero emissions.

China is also the co-founder of the Global Alliance of Universities on Climate (GAUC). Initiated by China's Tsinghua University, eight leading universities across the globe, including the London School of Economics and Political Science, launched GAUC in 2019 at the Annual Meeting of the World Economic Forum in Davos, Switzerland. Through promoting exchange and cooperation among its members it aims to advance solutions to climate change through research, education and public outreach, partnering with industry, non-profit organisations and government to promote implementation from local to global scales. China's updated NDC submitted to the UNFCCC in October 2021 notes the role of GAUC in promoting global cooperation and exchange among young people, raising public awareness and mobilising more climate actions.

5. Conclusion

As the world's biggest greenhouse gas emitter and the largest developing country, with a population of 1.4 billion, China's role in tackling the climate crisis and the other challenges of the Anthropocene is omnipresent and essential. This paper has examined China's domestic and foreign policymaking and its role in promoting multilateralism and international collaboration on building a sustainable world. The important international contribution that China has already played on climate change paves the way for further opportunities to enhance China's leadership in global climate governance.

With a growing coalition of governments around the world committing to net-zero targets, China has pledged to reach peak carbon emissions by 2030 and carbon neutrality by 2060. This requires China to significantly expand its energy storage capacity, to provide the necessary flexibility for enabling a much higher penetration of renewables, to promote green hydrogen from electrolysis, and to upgrade its natural gas storage system to deal with hydrogen. China also needs to support further development of New Energy Vehicles, increase distributed renewable generation in Central and Eastern China, and deepen electricity market reform to support further development of renewables. In short, promoting the transition to renewable energy and clean technology is critical for low-carbon development.

Green finance is also crucial to a net-zero and 'nature-positive' future. China's role in the global financial system has grown substantially in the past two decades, taking it into the top 10 countries globally in terms of total foreign assets and liabilities. There is an enormous opportunity for China to demonstrate in practice the clear and positive links between climate action and sustainable economic development through greening its investments in the Belt and Road Initiative. Moreover, given China's growing importance as a creditor, developing frameworks beyond the Paris Club such as the G20's Debt Service Suspension Initiative and the Common Framework will be increasingly necessary. China's support of economic, debt-related and environmental sustainability towards debtor countries is also reflected in its participation and leadership of multilateral sustainability initiatives including the Network for Greening the Financial System, the G20's Sustainable Finance Working Group, and the International Platform on Sustainable Finance.

China's role in the energy transition and scaling up international finance to build a net-zero and climate-resilient world is intertwined with fostering R&D and accelerating innovation in China's domestic climate action and international climate diplomacy. China's R&D spending accounted for 2.4 per cent of its aggregate GDP in 2020, and its domestic R&D and innovation policies are also strategically aligned with China's pursuit of science diplomacy and enhanced international cooperation, which it is achieving particularly through collaborations with the EU, UK and US. The urgency of climate change necessitates technological innovation and there is an international imperative to strengthen concerted diplomatic efforts in climate-related R&D; China should be more confident and strategic in leading the way in R&D to achieve a net-zero future.

In the race to net-zero and strengthened resilience against climate impacts, China's role in multilateral fora such as the G20 should be viewed on a par with its place in the UNFCCC-led climate negotiations. Developed countries have committed to mobilise a total of US\$100 billion per year of international climate finance from 2020 until 2025 to help the most vulnerable countries and small island states in particular in their mitigation and adaptation efforts. At the 16th G20 Leaders' Summit, China's President said that the G20 members should take the lead in the promotion and application of advanced technologies, and that developed countries should "earnestly fulfil" their commitments to providing funds for developing countries in the face of climate impacts.

The Glasgow Climate Pact agreed at COP26 marked the first time that coal or fossil fuels had been directly referenced in a COP agreement. China has pledged to 'phase down' coal consumption during its 15th Five Year Plan, which starts in 2026, and is developing a national plan to cut methane. In the critical decade of the 2020s, China has the opportunity to further transform and upgrade energy and industrial structures, promote research, development and application of green and low-carbon technologies and intensify international climate cooperation. As the Chinese proverb says, *"A journey of a thousand miles begins with a single step"*; China could be an effective leader for raising climate ambition and accelerating climate action for a sustainable, more equitable and just world.

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